DET TEKNISK-NATURVITENSKAPELIGE FAKULTET

MASTEROPPGAVE

Studieprogram/spesialisering:

Konstruksjoner og materialer med spesialisering bygg- og offshorekonstruksjoner

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Åpen / ~~Konfidensiell~~

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Tittel på masteroppgaven: FEM analyse av komposittdekker i betong og krysslaminert tre med skrueforbindelser

Engelsk tittel: FEM analysis of timber-concrete composite using bolted connections

Studiepoeng: 30

Emneord:

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Krysslaminert tre
Massivtre
Skjærforbindelser

Sidetall: 57

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Forord

Denne oppgaven er skrevet som siste, avsluttende del av mitt 5-årige Master studium, Konstruksjoner og materialer, ved Universitetet i Stavanger. Jeg ønsker å takke min interne veileder, Sudath C. Siriwardane, for støtte og mange gode diskusjoner. Du har vært til stor hjelp. Videre ønsker jeg å takke Lars Henning Krokengen, ekstern veileder fra Cowi, for hjelp i prosessen med å velge retning for oppgaven og gode innspill. Jeg ønsker også å takke min mor og min far for å være gode støttespillere gjennom hele prosessen. Til slutt ønsker jeg også å takke det gode studentmiljøet på Ivar Langens hus ved Universitetet i Stavanger. Det har vært 5 lærerike og fine år.

Sammendrag

I denne oppgaven ble temaet FEM analyse av komposittdekker i betong og krysslaminert tre med skrueforbindelser utforsket. Oppgaven sammenstiller resultater fra FEM analyser med tidligere utførte laboratorieforsøk på komposittdekker med to ulike skruetyper brukt i skjærforbindelsen, dekke type A og B. Begge skruetypene er festet i tredelen av dekket med en vinkel på 45˚ fra overflaten. Type A bestående av CTC skruer er festet parvis med motsatt orientering på skruene, mens Type B består av KOP skruer festet med lik orientering.

Til utføring av FEM analysen ble programmet RFEM 6 brukt, fra Dlubal Software. Dette programmet ble valgt fordi det benytter de ønskede materialtypene, betong og krysslaminert tre, samt har funksjoner for sammenkobling av flere overflater. Det ble benyttet to metoder for sammenkoblingen av tredelen til betongdelen. Metode 1 benyttet en kontaktflate der glidemodulen mellom lagene kan settes i kN/m^3. For metode 2 ble det dannet linjer som senere ble satt som faste innspenninger mellom overflatene. Linjene ble plassert slik at de representerer rekkene med skruene plassert i dekket.

For å systematisere gjennomføring av analysearbeidet ble det utarbeidet et flytdiagram som viser hele arbeidsprosessen for FEM analysene. I denne oppgaven ble det totalt kjørt fire analyser. To analyser for dekke av type A, ene med metode 1 og andre med metode 2, og så to analyser for dekke av B med de samme metodene.

Resultatet av oppgaven viser at FEM analyse metode 1 gir konservative, lineære grafer med tilfredsstillende likhet til grafene basert på data fra laboratorieforsøk. FEM analyse metode 2 gir derimot ikke-lineære deformasjons grafer som har mer samsvarende utforming til grafene basert på laboratorieforsøkene, men på grunn av manglene mulighet for justering av parameter for glidemodulen i programvaren oppstår en større usikkerhet om dataene fra analysen er konservative eller for gunstige.

Abstract

The main topic of this thesis has been to explore FEM analysis of timber-concrete composite slabs consisting of cross-laminated timber and with screw connections. The thesis compares results produced in a FEM analysis software to previously executed laboratory work on such slabs. In the laboratory work two different types of screws were used to create two different types of shear connectors, one for slab type A and one for slab type B. Both types of screws were angled at a 45˚ from the timber surface. In type A, consisting of CTC screws, the screws were placed in pairs with a opposite orientation to each other. While in type B, KOP screws were placed in rows with the same orientation.

Structural analysis software RFEM 6, from Dlubal Software, was chosen to perform the FEM analysis. This program was chosen because it provides functions for the martials used, concrete and cross-laminated timber, as well as functions to represents connections between two surfaces. Two different methods of modelling the shear connectors were used. Method 1 used a contact surface with an adjustable shear stiffness constant C for force transmission parallel to the surfaces in kN/m^3. Method 2, on the other hand, uses lines defined as rigid connections between the surfaces. The lines used was placed in the same row pattern as the screws placed in the laboratory tests.

To systemize the work done regarding the analysis, a flowchart diagram was created illustrating the whole work process for the FEM analysis. In total the thesis considers 4 FEM analyzes. Two for slab type A, using method 1 and 2, and then two for slab type B using the same methods.

The conclusion from reviewing the results produced by FEM analysis method 1 is that this method provides conservative, linear results which preform satisfyingly close the laboratory results. FEM analysis method 2 provides non-linear deformation graphs. This type of shapes is more similar to those occurring in the laboratory tests. However, due to this method lacking ways to regulate the slip of the shear connectors, there is a higher uncertainty with how the analysis will perform compared to for example laboratory tests.

Innholdsfortegnelse

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1 Innledning

Dette kapittelet har som formål å presentere oppgavens bakgrunn, samt oppgavens problemstilling og avgrensninger for arbeidet. Oppgavens disposisjon vil også forklares i dette kapittelet.

1.1 Bakgrunn

Betong har alltid spilt en stor rolle i menneskers byggverk gjennom tidene. Byggebransjen har gjennom mange års erfaringer bygd opp et godt og solid erfaringsgrunnlag for både korttids- og langtidsvirkninger i betongen og med det kommet fram tid et svært anvendelig byggemateriale. Betong har gode egenskaper på å håndtere trykkbelastning, men er svakere i forbindelse med strekkbelastninger. Derfor benyttes armering i konstruksjoner med betong, slik at stålet som har gode strekkegenskaper, bistår betongen. Til sammen skaper dette et svært anvendelig og godt byggemateriale.

Med et større fokus på miljøvennlighet de siste tiårene har forskning på substitutter som delvis eller helt kan erstatte betongelementer blitt mer framtredene. Bakgrunnen for dette er betongproduksjonens høye CO_2-utslipp og ønske om å redusere dette. Den mest populære substitutten i Norge for tiden er å benytte massiv tre, oftest krysslaminert tre elementer. Disse elementene har sine begrensninger, som å være mer utsatt for vibrasjoner, utfordringer med brannkrav og kortere spennlengde sammenlignet med tradisjonelle betongkonstruksjoner.

På bakgrunn av dette er komposittdekker i betong og tre kommet mer fokus. Formålet med slike dekker er å la materialenes egenskaper utfylle hverandre til å gi en forbedret sammensatt konstruksjon. Likevel er det utfordringer med denne kombinasjonen også. Det er ingen standardverk som omhandler dimensjonering av slike dekker og den svært kritiske skjærforbindelsen mellom betongen og treet. Uten mer forskning og erfaringer på området, er det utfordrende å benytte slike komposittdekker i byggeprosjekter.

1.2 Problemstilling

Formålet med denne oppgaven er å se nærmere på bruk av FEM analyse program og sammenligne resultater fra valgt analyseprogram med resultater fra laboratorieforsøk. Til bruk i oppgaven har jeg derfor valgt å benytte data fra en tidligere masteroppgave utført ved Universitetet i Stavanger [1], som omhandler laboratorieforsøk på bruksgrensetilstand i to typer kompositt dekker av krysslaminert tre og betong med skjærforbindelse av skruer.
I denne oppgaven vil jeg modellere to typer dekker i et FEM analyse program og sammenligne resultater fra analysen med nevnte laboratorieforsøk. Fokuset for sammenligningen vil være last-deformasjonskurver og stressutvikling i hver elementdel, da formålet på sikt er å kunne legge inn bruddkriterier. Brudkriterier i programvare vil derimot ikke bli omhandlet i denne oppgaven.

1.3 Disposisjon av oppgaven

Oppgaven vil være bygget opp på følgende måte:
Kapittel 1 er en introduksjon til problemstillingen og hva oppgaven skal videre inneholde.
Kapittel 2 inneholder introduksjon komposittdekke i betong og tre, aktuell litteratur og grunnlaget for videre arbeid i oppgaven.
Kapittel 3 omhandler arbeidsflyten i valgt programvare, RFEM 6, og hva som ligger til grunn for modellene og analysene. Det ble i programvaren kjørt 4 analyser, der hver av de to dekke typene ble modellert på med to metoder.
Kapittel 4 viser resultatene, mens kapittel 5 diskuterer og konkluderer resultatene.

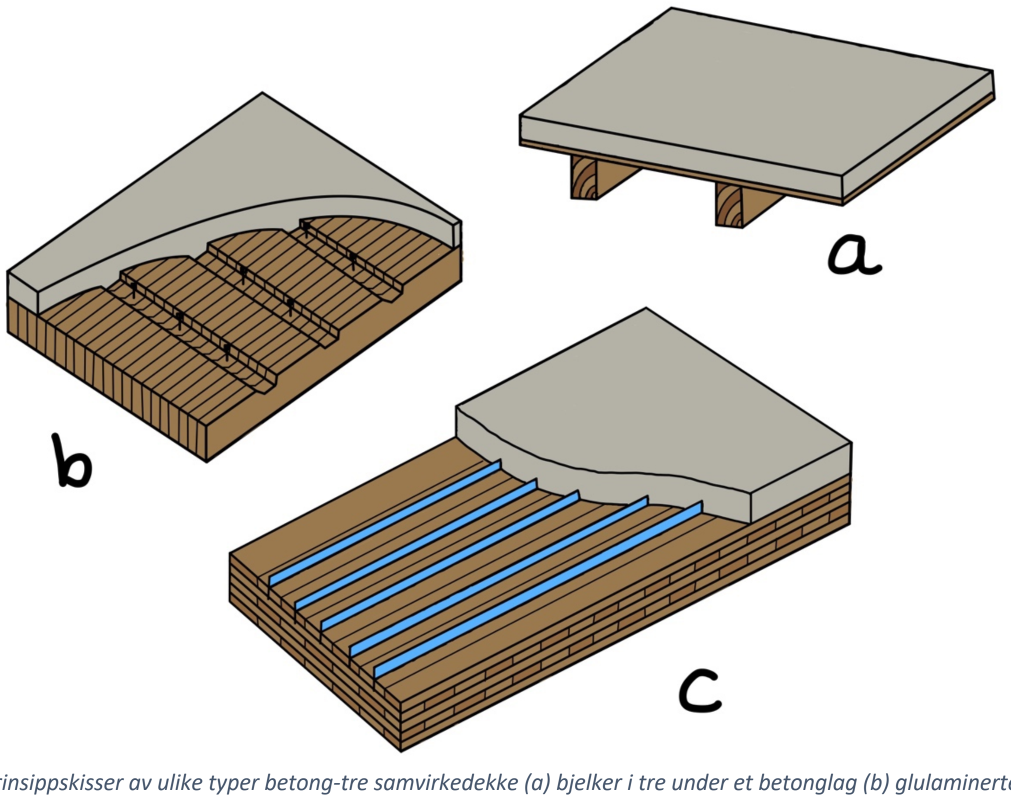
2 Samvirke dekke i betong og tre

2.1 Introduksjon

Til strukturering av introduksjonen av betong-tre samvirkedekker har jeg valgt å stille noen forskningsspørsmål for å strukturere egen opplæring og for å bryte ned oppgaven på en mer oversiktlig måte. Gjennom kapittelet benyttes kompositt dekker og samvirkedekker som synonymer.

Hva er et betong-tre samvirkedekke?
Et samvirkedekke i betong og tre er kort fortalt et dekke bestående av en betongdel og en tredel som sammen virker som et sammensattdekke. Målet er å utnytte treets gunstige materialegenskaper i strekk delen av dekke, mens betongdelen hovedsakelig håndterer trykkdelen av dekket. Til sammen vil dette bidra til et mer fleksibelt og anvendelig dekke.

Hvordan ser et typisk betong-tre samvirkedekke ut?
Det er ingen satte regler for hvordan et betong-tre samvirkedekke skal se ut, men det som er vanligst er at tredelen er plassert nederst og betongdelen øverst, grunnet deres materialegenskaper i strekk og trykk respektivt. Tredelen kan også delvis erstatte forskaling under utstøping. Videre er det variasjoner i utformingen av tredelen der de vanligste er limtrebjelker eller krysslaminert tre, ofte kalt massiv tre. I forbindelsen mellom tre og betong, referert i oppgaven som skjærforbindelsen, varieres oftest mellom å bestå av skruer, uthulinger eller stål skiver. Valg av skjærforbindelse har stor innvirkning på dekkets samvirke egenskaper.



Figur 1 - Prinsippskisser av ulike typer betong-tre samvirkedekke (a) bjelker i tre under et betonglag (b) glulaminerte lameller på høykant med utskjæring og skruer i skjærovergangen (c) massivtre under betonglag med stålskiver i skjærovergangen. Grunnlaget for tegningene er hentet fra [2] og [3, side 56]

Hva er fordelene med samvirkedekket sammenlignet med et vanlig betongdekke?
Den åpenbare motivasjonen for å benytte kompositt dekke i betong og tre sammenlignet med et vanlig, armert betongdekke er det reduserte CO2-utslippet. Gjennom å bytte deler av betongen mot tre er tanken å oppnå et element som gjennom sitt livsløp har et lavere totalt utslipp av CO2. Andre fordeler er en redusert egenvekt og volum, og dermed muligheten for en raskere byggeprosess med mindre transport på byggeplass, sammenlignet med plasstøpt betong.

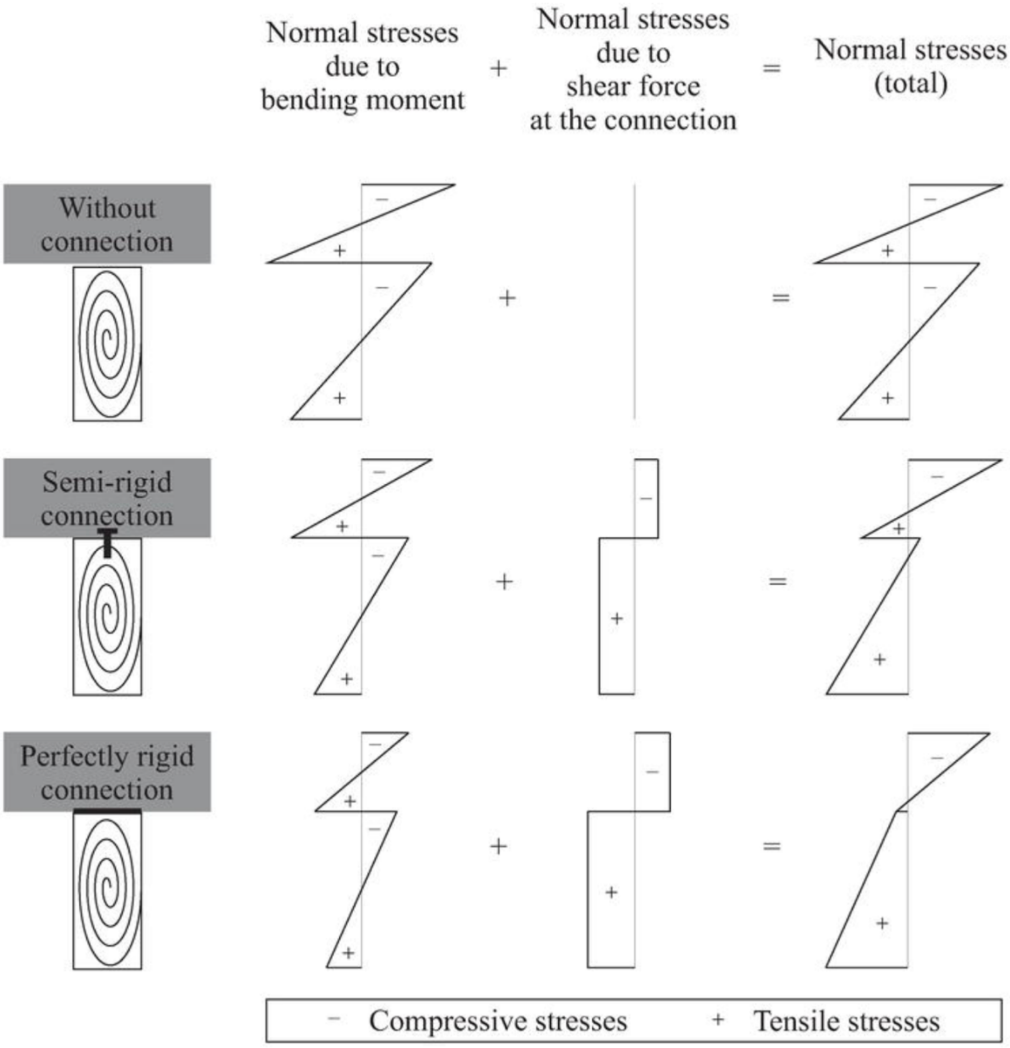
Videre kan man argumentere for at det i Norge er en fordel å benytte trematerialer, siden dette er en naturressurs Norge har lett tilgang på. Ved å kunne benytte tre i flere sammenhenger bidrar det til å styrke norsk produksjon, redusere transport for byggematerialer og stryke den sirkulære økonomien internt i landet.

Det er viktig å understreke at komposittdekker og krysslaminerte dekker, mest sannsynlig aldri vil erstatte armerte betongdekker fullstendig. Men kanskje kan vi utvikle nye metoder å bygge konstruksjonene våre med for å oppnå flere valgmuligheter og mer fleksibilitet i byggekulturen vår. Disse mulighetene vil på sikt komplementere hverandre og sannsynligvis bidra til en mere bærekraftig byggenæring.

Hva er fordelene med samvirkedekket sett i forhold til et dekke i krysslaminert tre?
Som nevnt i introduksjonen vil hovedfokuset for denne oppgaven ligge på komposittdekker av krysslaminert tre og betong, det er derfor ikke så unaturlig å sammenligne disse med rene krysslaminerte dekker. Massivtre begrenses som regel av 3 faktorer; spennlengde, brannkrav og vibrasjoner. Komposittdekkene har klare fordeler her. Betongens høyere egenvekt bidrar til å redusere vibrasjoner i dekket, både med tanke på lydreduksjon og egenopplevd vibrasjon ved lastpåføring. Videre bidrar implementering av betong til økt stivhet i dekket, økt bærekapasitet og lengre spennlengde. Betongen vil også bidra positivt til å oppnå brannkrav, både kapasitetsmessig og for overflatevarme, sammenlignet med rene krysslaminerte tredekker.

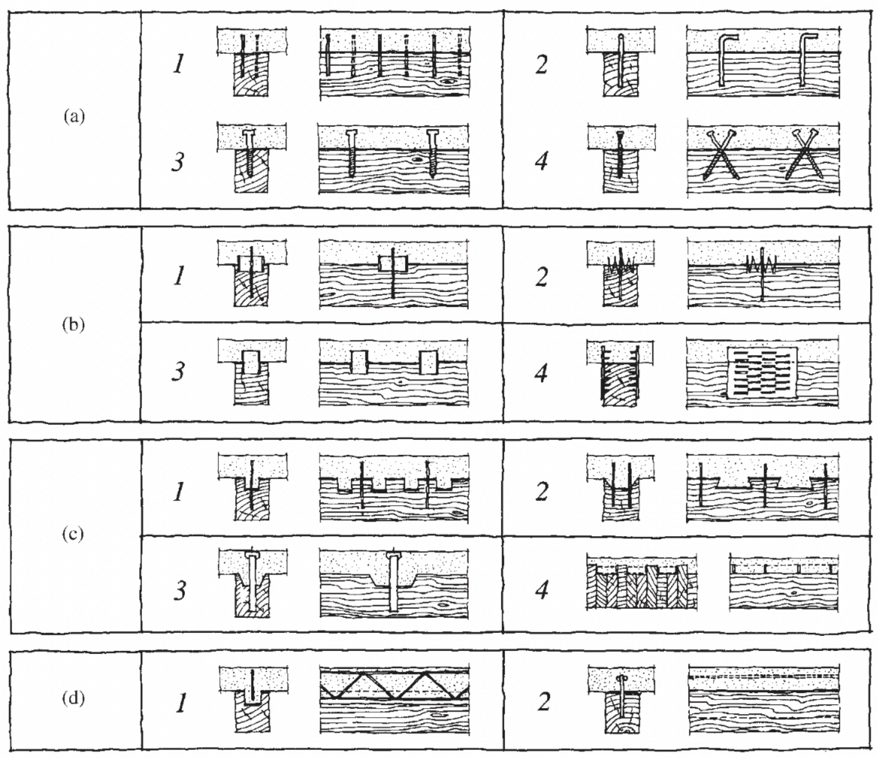
Kort fattet, kan komposittdekker i betong og krysslaminert tre bidra til å fylle ut flere bruksområder enn dekker av bare krysslaminert tre kan. Dette til sammen fører til mer bruk av krysslaminert tre, som igjen kan bidra til å øke produksjonsmengden, øke erfaringsbasen og senke prisen for krysslaminerte elementer totalt sett. I dag benyttes ofte utenlandsk ekspertise på bygg i massiv tre for eksempel til dimensjonering, kanskje med flere bruksmuligheter vil dette på sikt bli mer vanlig kompetanse blant norske aktører også.

Hvorfor er fokuset på skjærforbindelsen mellom materialene viktig?
I et samvirke er det viktig at de ulike komponentene virker sammen og oppfører seg sammenhengende nok. Graden de to elementene henger sammen defineres som graden av kompositt handling, der sammenkoblingen vurderes på en skala fra ingen til full kompositt handling. Ved full kompositt handling er skjærforbindelsen sterk nok til å forhindre at elementene glir i forhold til hverandre. Ideelt sett ønsker man nok styrke i skjærforbindelsen til å tåle skjærkreftene som den utsettes for med minimum tillatt forskyvning mellom materialene og en duktilitet som forhindrer sprø, raske brudd i skjærovergangen. Figuren på neste side illustrerer hvordan graden av kompositt handling mellom materialene påvirker stressutviklingen i elementet.

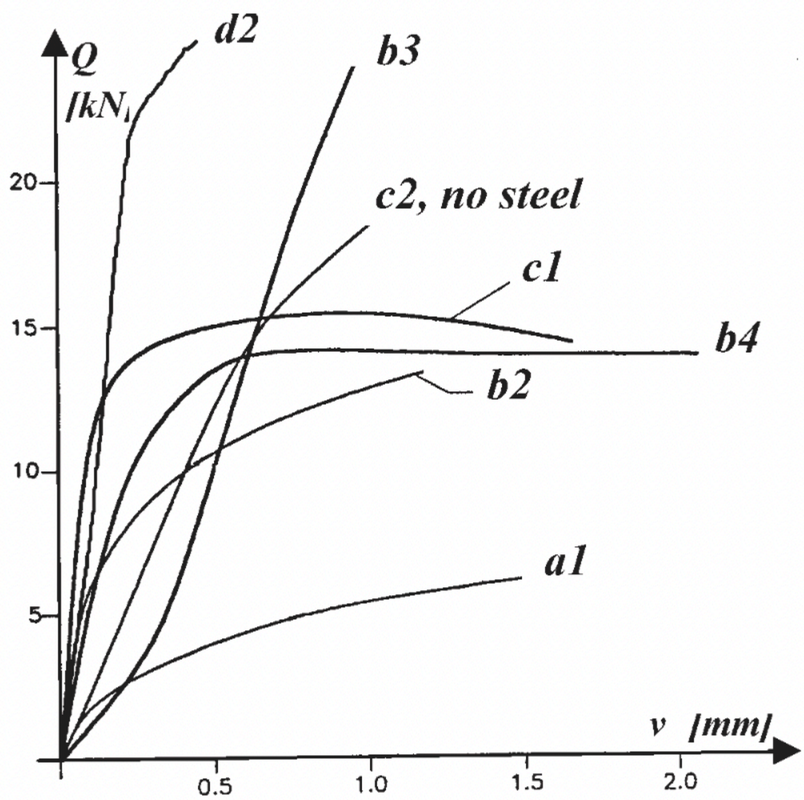


Figur 2 - Stressutvikling i elementer med ulik grad av kompositt handling [2]

Det er mange valgmuligheter blant skjæroverganger i komposittdekker av betong og krysslaminert tre. Figur 3 viser eksempler på ulike skjærforbindelser, der kategori (a) viser skruer, spiker og armerings bolter, (b) viser ulike typer stålskiver og rør, mens kategori (c) omhandler overganger med utfresinger for økt kontaktflate mellom materialene og kategori (d) omhandler kontinuerlige ståloverganger. Videre viser figur 4 forskyvningsutviklingen i ulike typer skjærforbindelser under last og gir et bilde på overgangenes kompositt egenskaper.



Figur 3 - Eksempler på forbindelser i kompositt elementer av betong og tre [4]



Figur 4 - Last-forskyvningskurver for ulike typer forbindelser. Bokstav og tall er basert på figur 3. [4]

2.2 Norske næringslivets bruk av komposittdekker i betong og tre

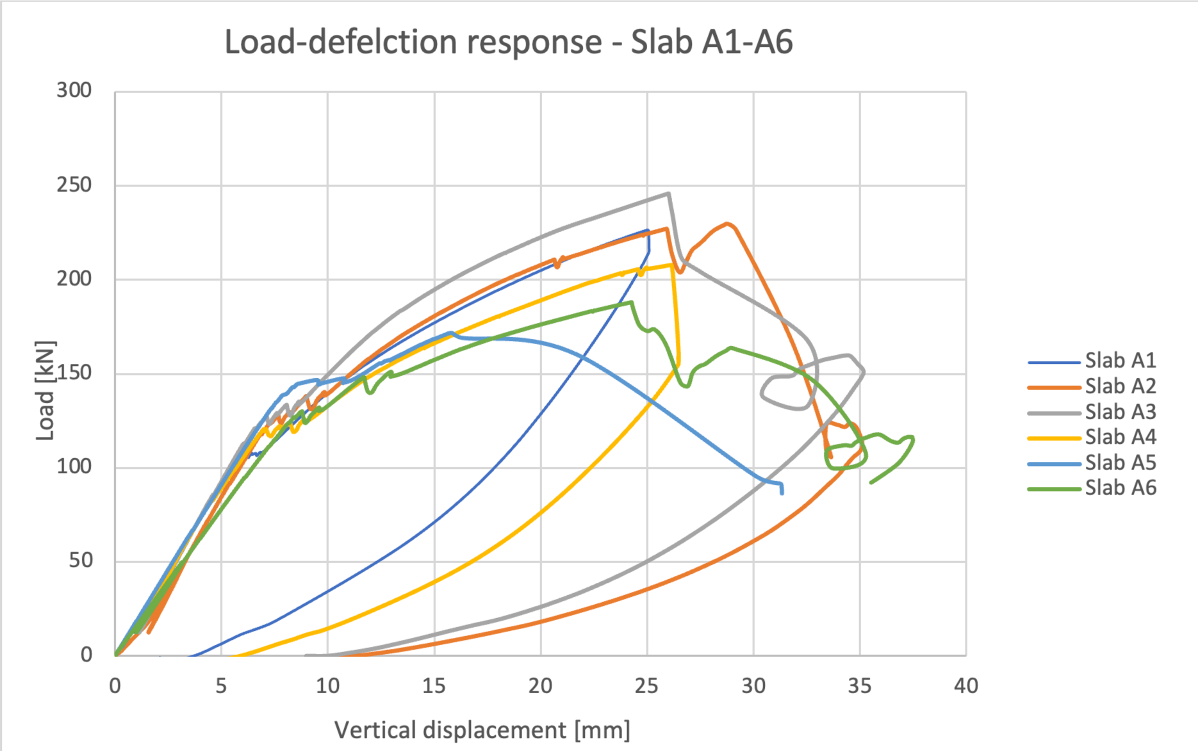
I en spørreundersøkelse utført i en tidligere masteroppgave gjennomført ved Universitetet i Stavanger [3], ble det kartlagt at det norske næringslivet henger etter når det gjelder initiativet til å bruke komposittdekker i betong og massivtre, sammenlignet med for eksempel Østerrike, som har kommet lagt på området. Det er foreløpig ingen leverandører som tilbyr levering og produsering av slike komposittdekker i sine produktkataloger.

Undersøkelsen peker på flere mulige grunner til dette, blant annet lav forespørsel og muligens at kundens behov i stor nok grad dekkes av massivtre dekker. Videre påpekes det at siden materialkombinasjonen er relativt ny for det norske markedet kan næringen trenge mer tid på å bli trygg på denne, gjennom for eksempel nasjonale retningslinjer for produksjon og dimensjonering, slik at kravet til dokumentasjon blir lettere oppnåelig.

2.3 Eksperimentelle forsøk

Som nevnt i innledningen, kapittel 1, baseres denne oppgaven på tidligere laboratorieforsøk utført ved Universitetet i Stavanger [1]. Forsøket gikk ut på å teste bæreevnen til to typer komposittdekker i betong og krysslaminert tre. Begge typene besto av skrueforbindelser med skruene festet i en vinkel på 45˚, men av ulike typer skruer. Bakgrunnen for valg av skjærforbindelse var at denne typen skrueforbindelser med vinkel 45˚ er lite forsket på. I oppgaven sammenlignes laboratorietestene med teoretiske prediksjoner for å se om det teoretiske grunnlaget gir resultater likt nok med virkeligheten. Metoden brukt for de teoretiske forventede verdiene er en blanding av skjæranalogi metoden og gammametoden fra Eurokode 5.

Oppgaven konkluderer med at de forutsatte verdiene for dekkene av type A, bestående av CTC skruer plassert parvis med motsatt orientering, ga svært konservative prediksjoner sammenlignet med laboratorieforsøk. Mens dekkene av type B, bestående av KOP skruer plassert med lik orientering, ga gode teoretiske prediksjoner sammenlignet med laboratorieforsøk. Videre viser last-deformasjons kurvene en tydelig plastisk utvikling hos elementene som de teoretiske beregningene ikke inkluderer, se figur 5 og 6. Det er altså en del mer kapasitet å hente fra dekkene i den plastiske deformasjonsfasen enn det som det teoretiske grunnlaget beregner. Dette motiverer for å søke etter analyseverktøy som håndterer også den plastiske deformasjonen i dekkene.



Figur 5 - Last-deformasjons kurver for komposittdekker av type A fra tidligere laboratorieforsøk [1]

Figur 6 - Last-deformasjons kurver for komposittdekker av typen B fra tidligere laboratorieforsøk [1]

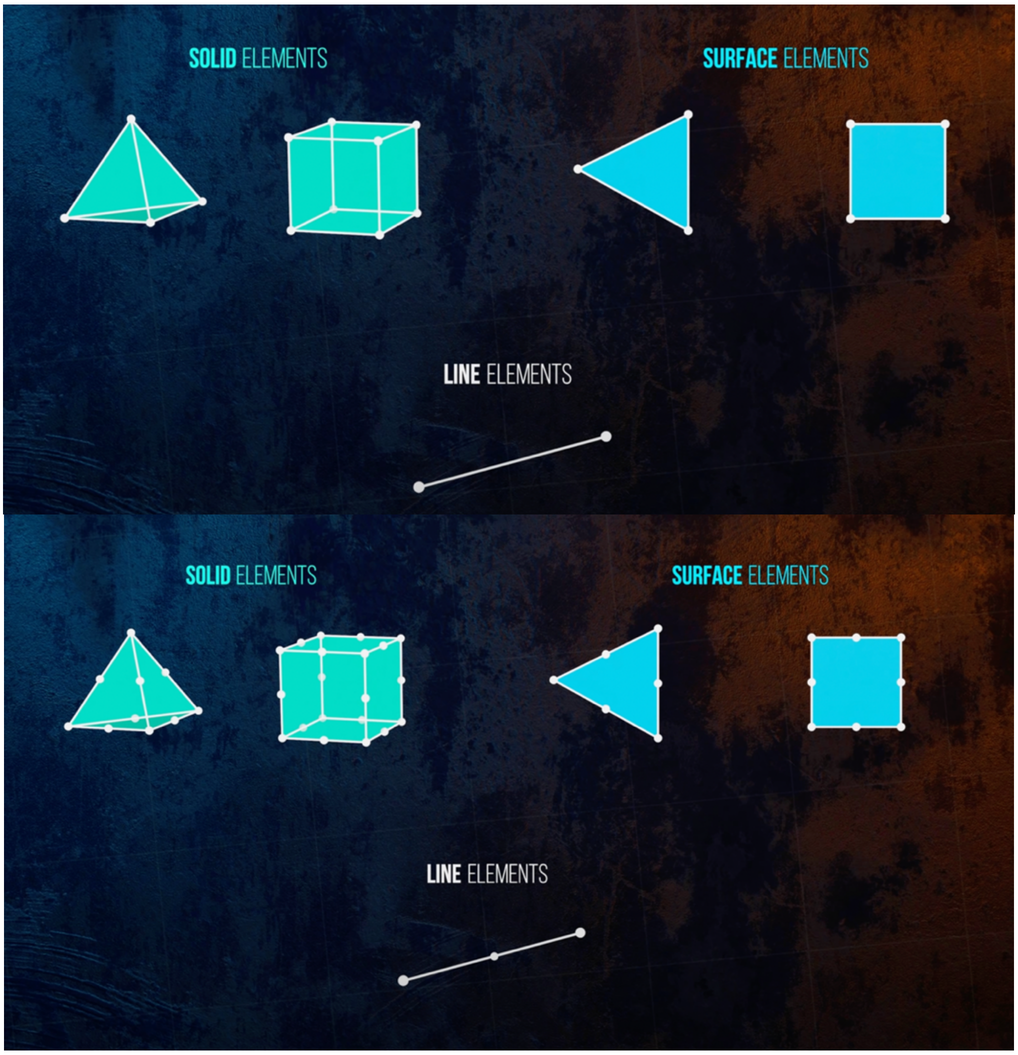
Ved nærmere observasjon av bruddene hos dekkene som ble testet, gjennom bilder vedlagt oppgaven, kan det tyde på at dekker av typen A har tendenser til å bryte først i nedre sjiktet i tredelen av dekket. Dekker av typen B derimot viste tegn til brudd både i betongdel og tredelen. Det kan derfor være interessant å se på stressfordelingen i et analyseprogram for å kunne etablere bruddkriterier for elementene. Spesielt siden første tegn til brudd omtales som tidlige og ser ut til å markere starten på den ikke-lineære oppførselen til elementene. Videre virker ikke skjærforbindelsene til å ha noe begrensende faktorer for dekkenes bruddlast.

2.4 FEM analyse

Finite Element Method, eller FEM, er en numerisk teknikk for å løse strukturelle mekanikk situasjoner, i for eksempel bjelker eller overflateelementer der geometrien, lastpåføringen eller materialet gjør utregningen for komplisert. Metoden gir en omtrentlig løsning, der mye av presisjonen er opp til brukerens behov. Den kan brukes i en rekke sitasjoner for solide mekanikk til statiske, dynamiske, modal og knekk analyser. Videre er metoden også brukt i flytende mekanikk, varmeoverførings analyser og elektromagnetiske analyser. For denne oppgaven vil statisk analyse av solide elementer være tilstrekkelig.

I en FE analyse deles modellen eller elementet som skal utforskes opp i flere små elementer som henger sammen i knutepunkter, kalt noder. Den spesifikke arrangeringen av noder og elementer refereres til som FE nett eller FE mesh. Formålet med dette er at man i en FEM analyse ser på et diskret antall noder i stedet for en kontinuerlig analyse over for eksempel en overflate. De mindre elementene er ofte mindre 2D overflater i enten trekantet eller firkantet formasjon. Formen avhenger av hva som er praktisk for det enkelte tilfellet. En trekantet formasjon er gunstig for å håndtere komplekse former, mens en firkantet formasjon oftere gir et mer presist resultat. Elementene kan også bestå av linjer, 1D, dersom dette gir tilstrekkelig analysering. Dette er eksempelvis ofte gunstig i fagverksbroer. Dersom det er ønskelig kan elementene bestå av 3D elementer, ofte kalt *solid elements*, i pyramideformatur eller kubeformatur. Hvilke type elementer som passer til hvilke tilfeller avhenger av hvert enkelt tilfelle og grad av forenkling.

Nevnte elementtyper kan videre deles inn i 1. og 2. ordens elementer, der 1. ordens elementer har noder plassert i «endene» av linjen mens 2. ordens elementer har noder plasser i enden og midt på hver linje, se figur 7. Av disse to gir 2. ordens bedre resultater men er også mer krevende.



Figur 7 - Illustrasjon av 1. og 2. ordens elementer i FEM respektivt [5]

For denne oppgaven er statiske spennings analyser mest interessante. Denne typen analyser gjennomføres oftest ved å først regne på deformasjoner i elementet eller modellen, for så å estimere tøyning og spenning. Last og deformasjon henger sammen ved formelen:

$$\{F\} = [K] * \{D\}$$

Der vektor {F} er kreftene i systemet, vektor {D} er deformasjonen mens [K] er stivhetsmatrisen. Ved direkte metode for etablering av stivhetsmatrisen benyttes likevektsligninger, dette anses som å løse likningene i sterk form. Andre metoder for etablering av matrisen kan være *Variational method* og *Galerkin method of weighted residuals*, disse anses å løse likningene i svak form og er i større grad basert på tilnærminger.

Etter finnet deformasjonsverdier kalkuleres tøyning ε og spenning σ med formlene

$$\varepsilon = \frac{\Delta L}{L_0}$$

$$\sigma = E * \varepsilon$$

3 Modellerings prosessen

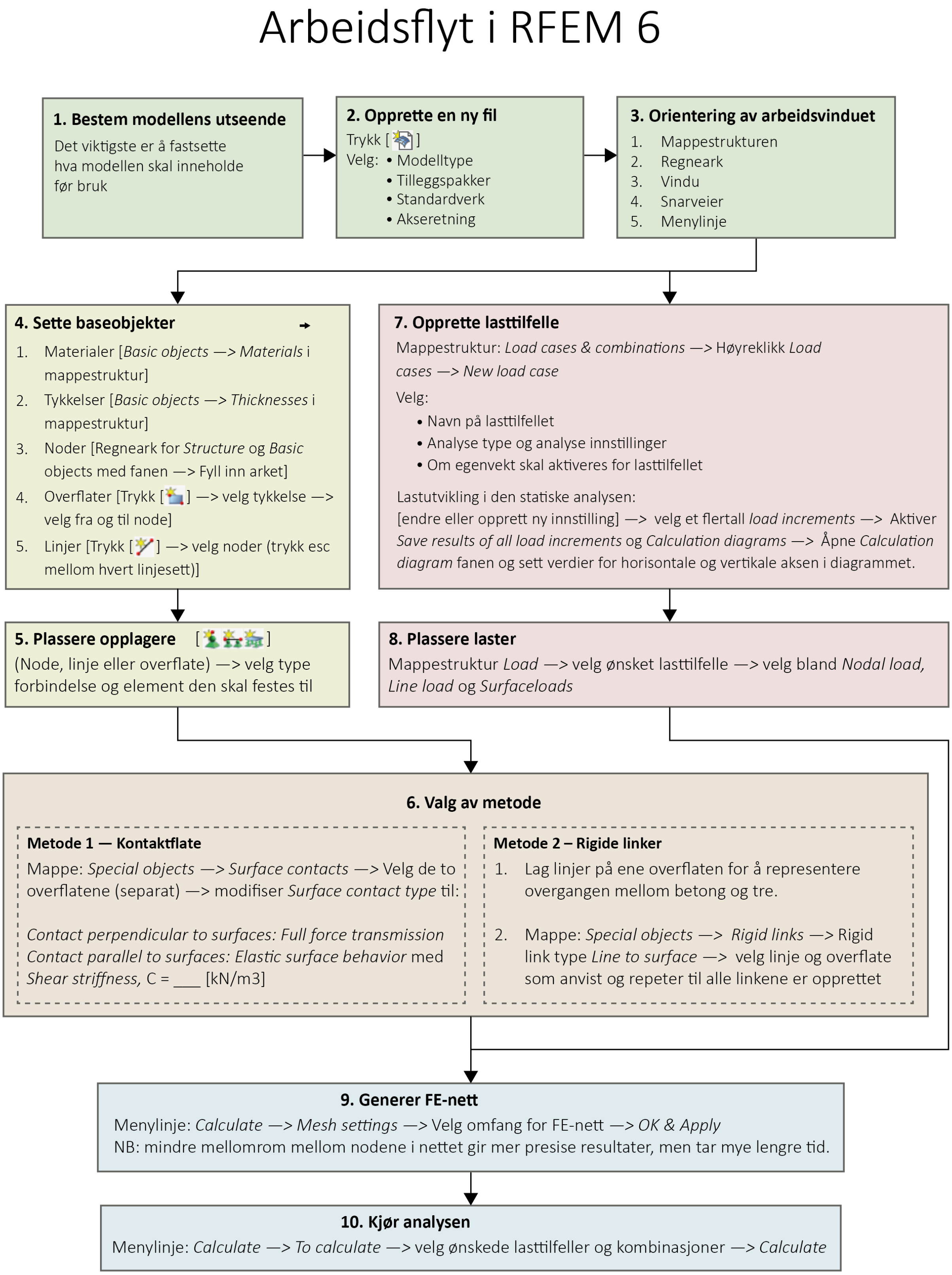
I dette kapittelet vil først valgt programvare presenteres og begrunnes. Deretter vil framgangsmåte brukt for modelleringen presenteres med valg av materialer og løsninger for modellene forklart sammen med hver del. Flytdiagrammet fungerer både som en oppsummering av arbeidet utført i programvaren og en presentasjon av stegene i modelleringsprosessen. Underkapitlene vil følge rekkefølgen til disse stegene. Denne framgangsmåten er stort sett brukt til alle gjennomføre analyser. Der det er deler for spesifikke modeller er dette presisert.

3.1 Programmet RFEM 6

RFEM 6 er FEM basert program for utføring av konstruksjonsanalyse, utviklet av den tyskbaserte programvareutvikleren Dlubal Software [6]. Programmet er universelt utformet til å passe de fleste materialvalg, deriblant betong og tre, samt kan man benytte programvaren til å dimensjonere med flere ulike materialer sammen, som armert betong og krysslaminert tre. Grunnlaget for programvaren er tatt i utgangspunkt i internasjonale og nasjonale standardverk og har derfor et bredt utvalgt standarder å velge mellom, deriblant Eurokoden og Norsk Standard. En kan velge mellom å bare se på et element eller å designe hele konstruksjonen i programmet. Videre benytter programvaren stor fleksibilitet i påkjenningstyper for konstruksjonene med mulighet for å dimensjonere for blant annet vibrasjoner og utmatting. Dlubal som programvareutvikler har flere programmer, der blant RSTAB, RSECTION og RWIND. Modeller kan utveksles mellom programmene og RSECTION og RWIND inkluderes i både RFEM og RSTAB. Videre for oppgaven vil kun RFEM 6 benyttes.

Bakgrunnen for valg av RFEM som programvare for analysen er at programvaren tilbyr et brukervennlig design. Dette vil sannsynligvis være lettere enn flere andre programmer med tanke på opplæring og orientering. Programvaren tilbyr en rekke ferdige løsninger for elementer, modell og analyse baser som vil gjøre modelleringsprosessen raskere enn andre programmer som for eksempel ABAQUS. Akkurat dette er en del av et tveegget sverd i og med at desto mer programvaren gjør automatisk uten at brukeren trenger å sette seg inn i det, desto mindre kontroll har brukeren på det som ligger til grunn ved sluttresultatet. Det kan derfor være gunstig å være ekstra kritisk til eget arbeid i nye programvarer av denne typen. Likevel er fordelene at resultatene blir tilfredsstillende og prosessen lettere, slik at dette programmet vil være et gunstig alternativ. Til opplæring av programvaren tilbyr Dlubal en nettbasert manual av programvaren [7], videoer og tilgjengelighet på mail. Dette har vært svært nyttig til modelleringen.

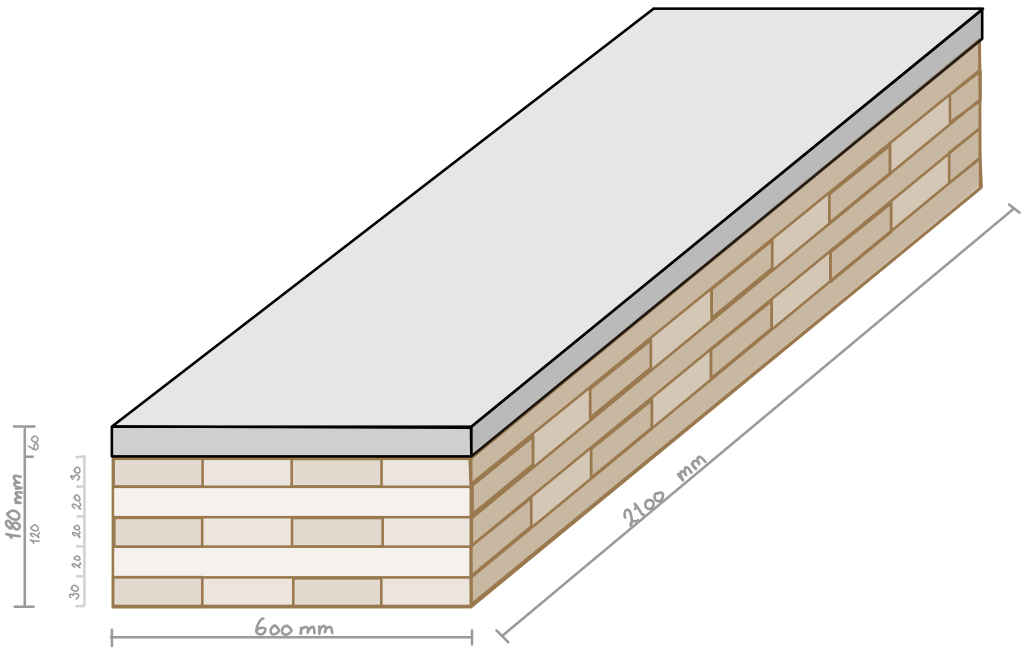
3.2 Flytdiagram av arbeidsprosessen



Figur 8 - Flytdiagram av arbeidsprosessen i FEM program

3.3 Modell grunnlag

Som grunnlag for modellene brukt i oppgaven benyttes dekker allerede testet i en tidligere laboratoriestudie [1]. Resultatene fra analysen i programvaren skal så sammenlignes med laboratorieresultatene, deretter vil sammenligningen kunne informere om videre utbedringer ved modelleringen for å tilnærme resultatene. En av utfordringene ved dette er overgangen fra betong til tre, der skrue type, vinkel og mengde vil ha en del å si. Likt som i studien nevnt tidligere i avsnittet, vil denne oppgaven også benytte to typer samvirkedekker, type A og B. Hoveddimensjonene er like for begge typene og illustreres i Figur 1. Det som skiller de to typene, er valg av skruer i overgangen betong-tre.



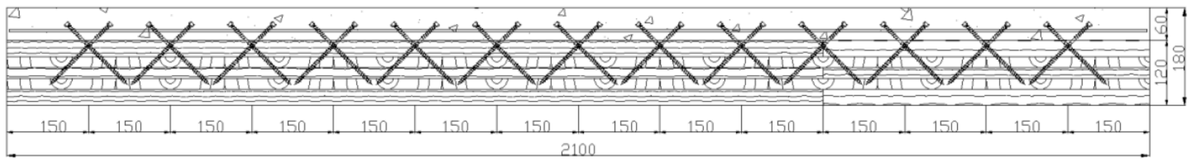
Figur 9 – Prinsippskisse av hoveddimensjonene for valgte samvirkedekkene, svart illustrerer betong og brun krysslaminert tre, alle mål er oppgitt i millimeter.

Felles trekkene mellom dekke type A og B er at begge består av en massivtredel nederst. Lagene i massivtre delen består av 5-lag lameller i treklasse T22, T15, T15, T15 og T22 respektivt. Hvert lag er rotert 90˚ i forhold til hverandre. De langsgående lamellene er plassert øverst, nederst og i midten. Tykkelsen på lagene varier, der øverste og nederste lag er 30 mm tykt, mens de midtre lagene er 20 mm. På toppen av hvert dekke er et 60 mm tykt betong lag av selvkomprimerende betong i klasse B35. Massivtredelen er bestilt fra Splitcon og har Sintef sertifisering, mens skruene, eventuell armering og betongen er blitt ferdigstilt på laboratoriet.

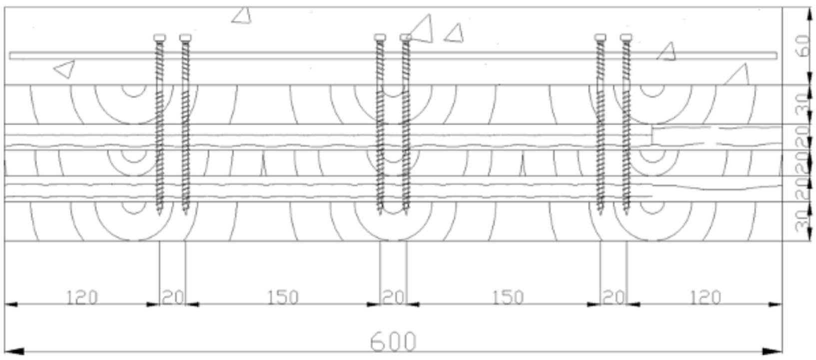
Figur 10 – Dekke type A (venstre) og type B (høyre), bilder hentet fra tidligere masteroppgave [1]

3.3.1 Komposittdekke type A

For samvirkedekke av type A ble det benyttet CTC skruer med 7 mm diameter og lengde på 160 mm. Skruene ble festet i massivtredekket med avstand og vinkel som anvist i figur 11 og 12. Vinkelen på skruene er 45˚ fra treoverflaten. I tillegg til skruer benyttes armeringsnett av typen B500NA K 131 2000 X 5000 MM fra Norsk Stål, med 150x150 mm rutenett og 5 mm diameter på armeringsjernet. Nettet er plassert midt i betonglaget.



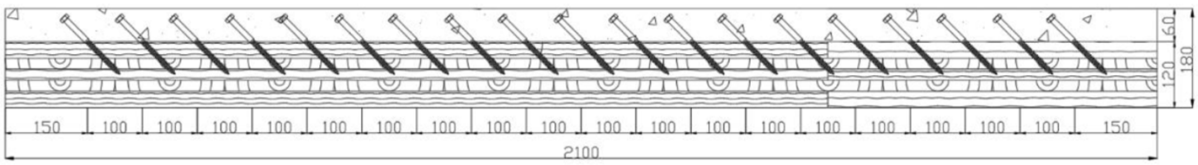
Figur 11 - Illustrasjon av skrueplasseringer i langsgående retning, hentet fra Bergfjords master [1], side 53 figur 4-6]



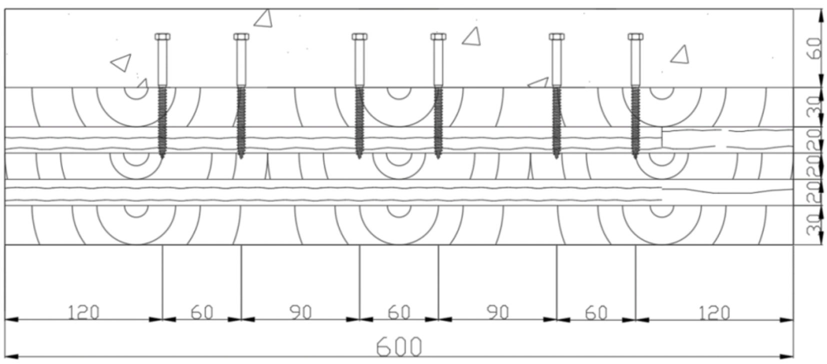
Figur 12 - Illustrasjon av skruer i vertikalretning for type A dekke, fra Bergfjords master [1]

3.3.2 Komposittdekke type B

For komposittdekke type B ble det kun benyttet skruer an typen KOP med diameter 10 mm og lengde 140 mm. Disse ble plassert parvis med likt orientert 45˚ vinkel, som anvist i figur 13 og 14. På grunn av skruens mer massive størrelse ble det ikke brukt noe ekstra armering i denne typen dekke.



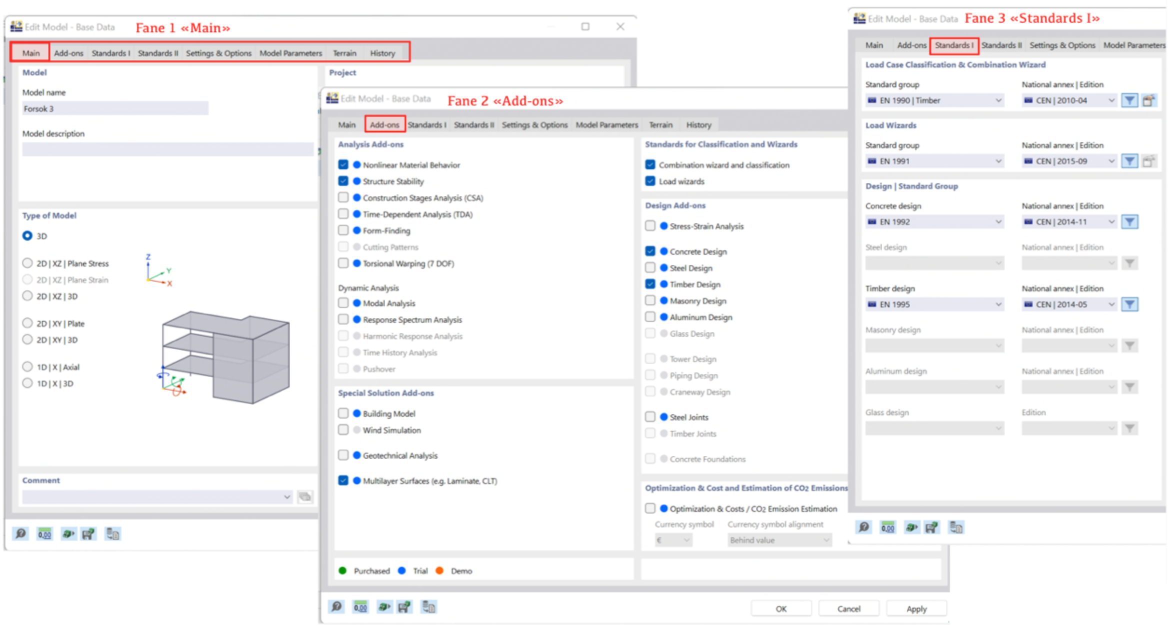
Figur 13 - Illustrasjon av skrueplasseringer i langsgåenderetning hos samvirkedekke type B [1]



Figur 14 - Illustrasjon av skrueplasseringer i tversgåenderetning hos samvirkedekke type B [1]

3.4 Opprette fil | Grunnlag for filen

Ved oppretting av nye filer trykk på ny modell ikonet , da åpnes vinduet for *Base Data*. Figur 15 viser oppbygningen av *Base data*-menyen. I hovedmenyen *Main* settes navn, plassering på pc og type modell. I øverste linje ligger det flere faner. Under fanen *Add-ons* velges hvilke tilleggspakker som skal aktiviseres. For disse analysene ble følgende tilleggspakker valgt: *Nonlinear material behaviour*, *multilayer Surfaces (e.g. Laminate, CLT)*, *Concrete design* og *Timber design*. Videre til fane 3 *Standards I*, ble standardverk satt til europeisk med norske tillegg. Ved aktivering av Timber design er det et krav at første standardgruppe må være *EN 1990 | Timber*. Til slutt ble positiv global z-retning satt oppover under fanen *Settings and options*.



Figur 15 - Oversikt over "Base Data" i RFEM-modell

3.5 Oversikt over arbeidsvinduet

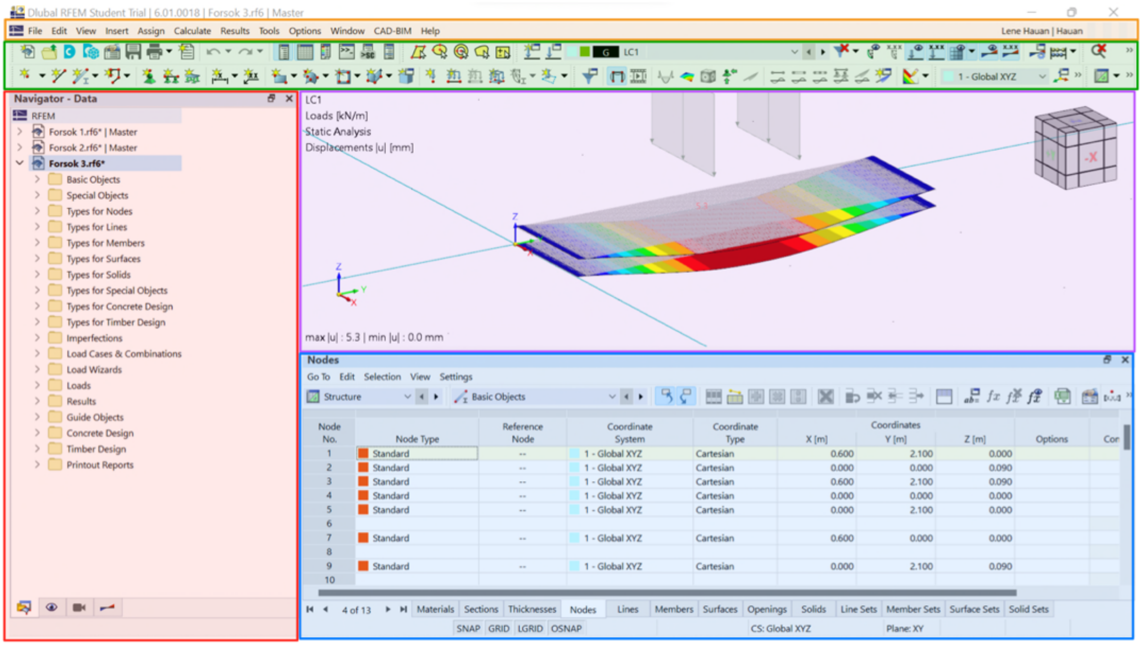
Programvarens arbeidsvindu er bygget opp som anvist i figur 16. De fargede områdene er lagt på for å illustrere de ulike sonene. Øverste linje, markert oransje, er en menylinje for base kommandoer, som fil oppretting, kjøring av analysen og valg av vindu som skal vises. De to neste radene, markert grønt, er snarveier og kan tilpasses brukerens behov gjennom for eksempel dra og slipp. Eksempler på slike snarveier kan være oppretting av noder, linjer og overflater eller valg av lasttilfelle som skal vises i modellvinduet.

Videre til menyen langs venstre side kalt *Navigator* og er markert med rød. Dette vinduet sorterer dataen i en mappestruktur som er tilpasset arbeidsflyten i programmet og refereres til i oppgaven som mappestrukturen. Øverst er selve filnavnet og der under hver fil finner man lik mappestruktur med modellert data. Man kan ved å åpne alle mappene ende opp med en liste over alle datapunktene i filen, som kan være praktisk til å sjekke at alle elementene er kommet med. Nederst i vinduet kan brukeren velge mellom ulike faner. Standardinnstillingen til programmet er å vise mappestrukturen, men ved å bytte mellom *Display*, *Views* og etter kjørt analyse *Results* etter behov. Disse fanene benyttes til å modifisere modellvinduet.

På høyre side deles hovedvinduet i to felt. Det øverste, lilla, gir en visuell framstilling av strukturen, modellvinduet. Dette vinduet kan som nevnt modifiseres fra *Navigator*-vinduet via *Display* og *Results*. Vinduet funger også til modellering med snap funksjoner til noder allerede plassert. Nå illustrer figuren deformasjonene i elementet etter lastpåføring med grått skalert område for overflatene med FE nett og fargekoder for å illustrere grafen av deformasjon. Dette vinduet er en spesielt nyttig for å oppdage geometriske feil i modellen.

I nedre høyre hjørne, markert i blått, er vinduet som refereres til som regnearket. Her har programmet lister over alle inputdata i regneark form. Dette vinduet er spesielt nyttig for organisering av noder og for oppretting av kalkulasjons diagrammer etter å ha kjørt en analyse. Disse regnearkene kan videre eksporteres til Excel om ønskelig.

Slik som programmet er bygd opp er det stor valgfrihet til hvilken type arbeidsflyt en ønsker i programvaren. En erfaren bruker trenger nok i hovedsak bare snarveiene og 3D ruten, mens en som er nyere i programvaren finner det nok tryggere å følge mappestrukturens handlingsliste. Disse variasjonene er også nyttige for programmets allsidige bruk.



Figur 16 - Oversiktsbilde over arbeidsvinduet i RFEM 6 [6]

3.6 Sett materialegenskaper og tykkelser

For å legge til materialer åpne mappen *Basic objects* → *Materials*, dobbelttrykk for å åpne meny. Bruk det lille symbolet av en bok for å velge blant programmets database eller fyll ut materialverdiene selv i vinduet. De integrerte materialdataene kan modifiseres ved behov. En liste over materialene i bruk for modellen ligger i venstre side av vinduet og for å legge til flere benytt enten for nytt materiale eller for å kopiere. Materialer og materialverdier brukt i modellene presenteres i de neste delkapitlene.

3.6.1 Betong

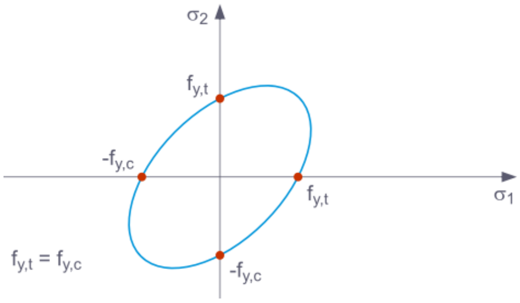
Betonglaget øverst på modellen er av typen B35. I programvaren navngis tilsvarende betong *C35/45* siden programvaren benytter den engelske versjonen av Eurokodene. Tabell 1 viser materialverdier for betongen brukt i programvaren og er de samme verdiene som ble brukt i analysene.

Tabell 1 - Materialverdier betong B35

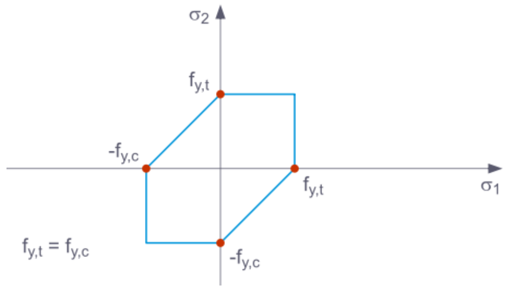
Materialverdier		B35	
Basic Properties			
Modulus of elasticity	E	34000,0	N/mm^2
Shear modulus	G	14166,7	N/mm^2
Poisson's ratio	ν	0,200	
Mass density	ρ	2500,00	kg/m^3
Specific weight	γ	25,00	kN/m^3
Coefficient of thermal expansion	α	0,000010	1/°C
Strengths			
Characteristic cylinder compressive strength	f_{ck}	35,000	N/mm^2
Characteristic cube compressive strength	$f_{cu,k}$	45,000	N/mm^2
Mean cylinder compressive strength	f_{cm}	43,000	N/mm^2
Mean axial tensile strength	f_{ctm}	3,200	N/mm^2
5% fractile of axial tensile strength	$f_{ctk;0.05}$	2,200	N/mm^2
95% fractile of axial tensile strength	$f_{ctk;0.95}$	4,200	N/mm^2
Strains			
Ultimate strain for pure compression	εc1	-2,3	‰
Ultimate strain at failure	εcu1	-3,5	‰
Parabola exponent	n	2,000	
Ultimate strain for pure compression	εc2	-2,0	‰
Ultimate strain at failure	εcu2	-3,5	‰
Ultimate strain for pure compression	εc3	-1,8	‰
Ultimate strain at failure	εcu3	-3,5	‰
Moduli			
Mean secant modulus of elasticity	E_{cm}	34000,0	N/mm^2

Videre for å tilegne materialet plastiske egenskaper ble materialtypen satt til være *Isotropic |Plastic (Surface/Solids)*. Der isotropi refererer til materialets like egenskaper uavhengig av orientering, mens plastisk overflate refereres til elementtypen brukt for modelleringen. Ved valg av denne materialtypen opprettes en ny fane der de plastiske materialverdiene kan settes.

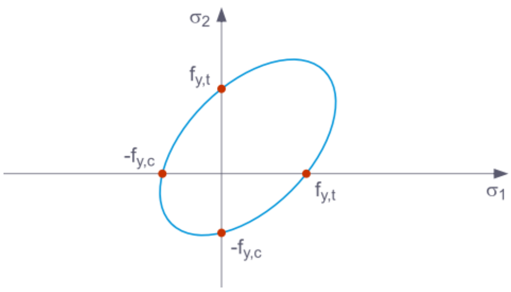
Under den nye fanen blir brukeren først bedt om å definere et *Stress-strain failure hypothesis*, eller flytgrensekriteria. For denne oppgaven ble det valgt *Drucker-Prager* som flytgrensekriteria. Bakgrunnen for det valget er at den spenning-tøynings modellen benytter en asymmetrisk oval om origo for å illustrere flytgrensene under strekk og kompresjon. Dette åpner for valg av høyere flytgrense ved kompresjon enn for strekk, noe som passer bra med betongens egenskaper. Videre benytter modellen også avrundede overganger mellom punktene, lik *von Mises* flytgrensekriteria, i stedet for skarpe overganger som benyttes *Tresca* og *Mohr-Coulumb* flytgrensekriteria. Se figur 17 – 20.



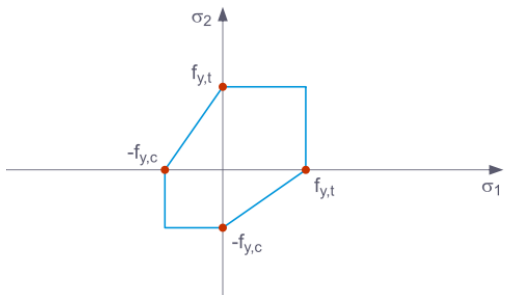
Figur 17 - von Mises flytgrensekriteria



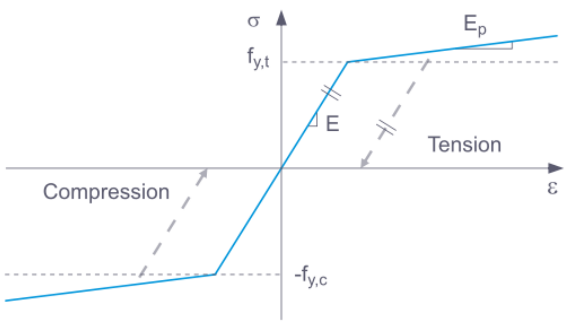
Figur 18 - Tresca flytgrensekriteria



Figur 19 - Drucker-Prager flytgrensekriteria



Figur 20 - Mohr-Coulomb flytgrensekriteria



Figur 21 - Bilineært spennings-tøyningsdiagram

Etter valgt flytgrensekriteria, kan brukeren sette verdier for elastisitetsmodul og flytgrenser. Disse verdiene vil følge et bilineært spenning-tøyningsdiagram som vist i figur 21. Bilineært betyr at modellen bruker en lineær tilnærming til materialets oppførsel i elastisk og plastisk sone, som er en forenkling. Verdier brukt for diagrammet er vist i tabell 2. Verdiene for flytgrense i kompresjon og strekkfase er hentet fra Eurokode 2 [8] og er den dimensjonerende trykkfasthet, fcd, og den dimensjonerende strekkfasthet, fctd, vist i formlene på neste side.

Tabell 2 - Plastiske input-verdier for betong materialet

Elastisitetsmodulen			
Elastisk fase	E	34 000.0	N/mm^2
Plastisk fase	Ep	0.3	N/mm^2
Flytgrense for			
Kompresjon	$f_{y,c}$	23.333	N/mm^2
Strekk	$f_{y,t}$	1.667	N/mm^2

$$f_{cd} = \frac{\alpha_{cc} * f_{ck}}{\gamma_c} = \frac{1 * 35}{1,5} = 23,333\ MPa$$

$$f_{ctd} = \frac{\alpha_{ct} * f_{ctk,0.05}}{\gamma_c} = \frac{1 * 2,2}{1,5} = 1,667\ MPa$$

3.6.2 Trelamellene

Likt som for betong finnes det ferdige materialprofiler basert på standardverket, men på grunn av detaljert informasjon fra produsents datablad vedlagt laboratoriestudiene [1] modifiseres materialet deretter. Tre er et ortotropisk materiale, det vil si materialverdiene avhenger av orienteringen på elementet. For å representere dette settes material modell til «Orthotropic | Plastic (Surfaces)». Det brukte materialverdiene er presentert i tabell 3 og 4.

Tabell 3 - Materialverdier for treverk T22 og T15

Materialverdier		T22	T15	
Basic Properties				
Modulus of elasticity	E	13000,0	11500,0	N/mm^2
Shear modulus	G	810,0	720,0	N/mm^2
Mass density	ρ	470,00	430,00	kg/m^3
Specific weight	γ	4,70	4,30	kN/m^3
Coefficient of thermal expansion	α	0,000005	0,000005	1/°C
Strengths				
Characteristic strength for bending	$f_{m,k}$	30,500	22,000	N/mm^2
Characteristic strength for tension	$f_{t,0,k}$	22,000	15,000	N/mm^2
Characteristic strength for tension perpendicular	$f_{t,90,k}$	0,400	0.400	N/mm^2
Characteristic strength for compression	$f_{c,0,k}$	26,000	21,000	N/mm^2
Characteristic strength for compression perpendicular	$f_{c,90,k}$	2,700	2,500	N/mm^2
Characteristic strength for shear/torsion	$f_{v,k}$	4,000	4,000	N/mm^2
Rolling shear strength	$f_{R,k}$	0,700	0,700	N/mm^2
Moduli				
Modulus of elasticity parallel	$E_{0,mean}$	13000,0	11500,0	N/mm^2
Modulus of elasticity perpendicular to grain	$E_{90,mean}$	430,0	380,0	N/mm^2
Shear modulus	G_{mean}	810,0	720,0	N/mm^2
Modulus of elasticity parallel	$E_{0,05}$	8700,0	7700,0	N/mm^2
Modulus of elasticity perpendicular	$E_{90,05}$	288,1	254,6	N/mm^2
Shear modulus	G_{05}	542,1	482,1	N/mm^2
Desities				
Characteristic density	ρk	390,00	360,00	kg/m^3
Mean density	ρm	470,00	430,00	kg/m^3

Tabell 4 - Ortotropiske materialverdier for treverk T22 og T15

		T22	T15	
Elastisitetsmodulusen				
	Ex	13 000	11 500	N/mm^2
	E_y	430	230	N/mm^2
Skjærmodulus				
	G_{yz}	81	72	N/mm^2
	G_{xz}	810	720	N/mm^2
	G_{xy}	810	720	N/mm^2
Poisson's ratio				
	Definert:	Vxy	Vxy	
	V_{xy}	0.400	0.400	
	V_{yx}	0.013	0.008	
Hardening modulus				
	$E_{p,x}$	0.0	0.0	N/mm^2
	$E_{p,y}$	0.0	0.0	N/mm^2
Coefficient of thermal expansion				
	α_x	0.000005	0.000005	1/˚C
	α_y	0.000005	0.000005	1/˚C
Ultimate compressive strength				
	$f_{c,x}$	26.0	21.0	N/mm^2
	$f_{c,y}$	2.7	2.5	N/mm^2
Ultimate tensile strength				
	$F_{t,x}$	22.0	15.0	N/mm^2
	$F_{t,y}$	0.4	0.4	N/mm^2
Ultimate shear strength				
	$F_{v,xy}$	4.0	4.0	N/mm^2

3.6.3 Armeringsstål

Dette avsnittet gjelder kun for dekkene av type A, da det kun er disse som inneholder armering utenom den som kommer fra skruenes bidrag. Som nevnt i kapittel 3.3.1 Komposittdekke type A, inneholder betongdelen armering i form av et armeringsnett plassert midt i laget. Armeringsnettet er stål av typen B500NA, men som i programvaren oppgis som B500M(A) og følger EN 1992-1-1/A1:2014. Materialverdier er angitt i tabell 5.

Etter valg av stål ble materialet endret til *isotropic | Plastic (surface)* for å hensynta de plastiske egenskapene i hele elementet. Som flytgrensekriteria ble *von Mises* spennings hypotese brukt med diagramtypen *bilineært* likt som betongen. Verdiene brukt er vist i tabell 6.

Tabell 5 - Materialverdier armeringsstål

Materialverdier		B500M(A)	
Basic Properties			
Modulus of elasticity	E	200 000,0	N/mm^2
Shear modulus	G	76923,1	N/mm^2
Poisson's ratio	ν	0,300	
Mass density	ρ	7850,00	kg/m^3
Specific weight	γ	78,50	kN/m^3
Coefficient of thermal expansion	α	0,000010	1/°C
Strengths			
Characteristic tensile strength	f_{tk}	525,000	N/mm^2
Characteristic yield strength	f_{yk}	500,000	N/mm^2
Strains			
Ultimate strain	ε_{uk}	25,0	‰
Moduli			
Modulus of elasticity	E_s	200 000,0	N/mm^2

Tabell 6 - Spenning-tøynings diagram-verdier for armeringstålet

Elastisitetsmodulen			
Elastisk fase	E	200 000.0	N/mm^2
Plastisk fase	Ep	2.0	N/mm^2
Flytgrense for			
Kompresjon	$f_{y,c}$	500.000	N/mm^2
Strekk	$f_{y,t}$	500.000	N/mm^2

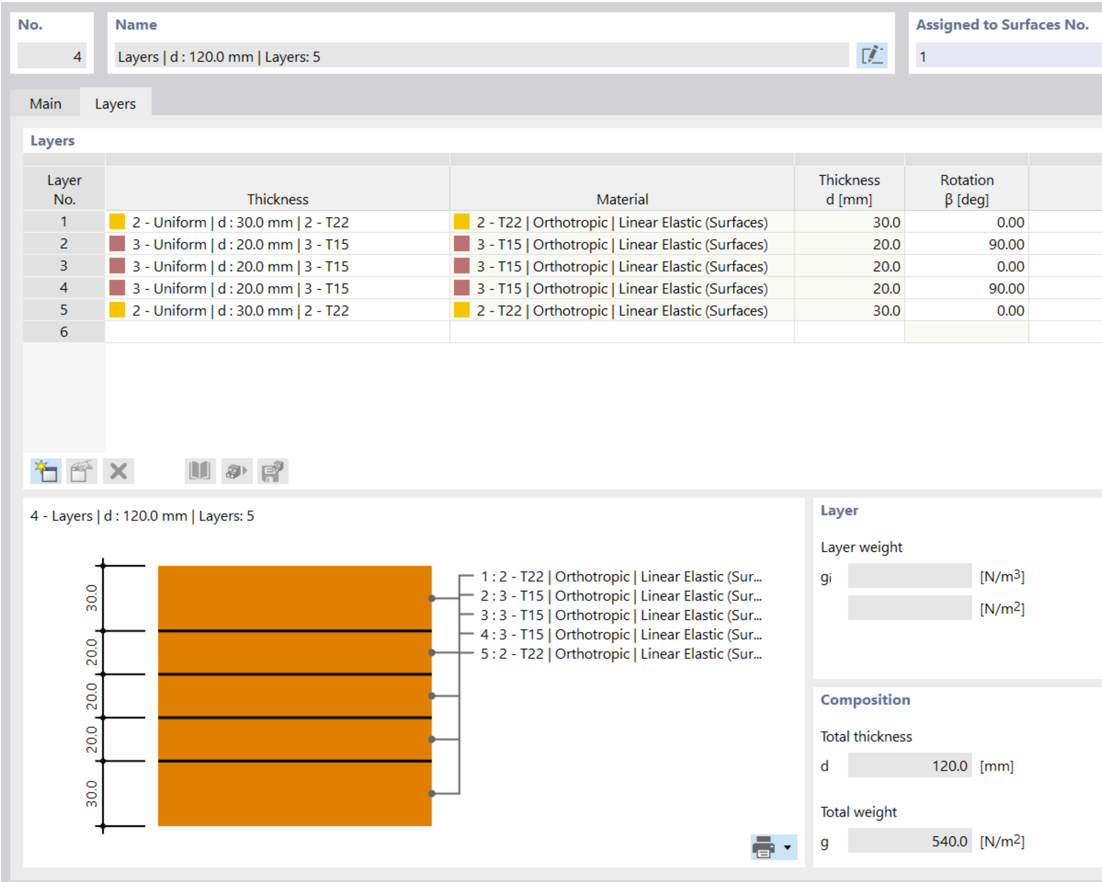
3.6.4 Tykkelser

Programmet funger på en slik måte at man for tegning av dekker først setter sammen ulike tykkelser, før man videre kan tilegne disse til overflater. For å legge til en tykkelse velg i mappestrukturen *Basic objects* → *Thickness*, dobbelttrykk på sistnevnte. For samtlige av modellene ble følgene tykkelser satt:

Tabell 7 - Tykkelser i materiallag

1.	60 mm	Uniform tykkelse	C35 Concrete
2.	30 mm	Uniform tykkelse	T22 Timber
3.	20 mm	Uniform tykkelse	T15 Timber

De satte tykkelsene for tre lamellene kan videre brukes til å danne en krysslaminert tre-tykkelse. Opprett en ny tykkelse og typen *layers* som tykkelse, så åpne den nye fanen *Layers* for så å velge hvilke tykkelser som skal plasseres lagvis. Programmet gir så mulighet for å velge blant de satte tykkelsene og hvilken rotasjon lagene har i forhold til hverandre. Rotasjon av lagene er bare aktuelt for ortotropiske materialer, ikke isotroiske siden orientering ikke påvirker materialegenskapene for slike materialer. Figuren under viser oppbygningen av dette vinduet. Merk at materialene er satt til *Linear Elastic* i figuren, men for modellene er disse endret til plastisk.



Figur 22 - Lagene i den krysslaminerte tredelen

3.7 Plassere noder, linjer og overflater

For å plassere noder tilbyr programvaren flere framgangsmåter. Den jeg fant mest ryddig for arbeidet var ved bruk av regnearket, blå rute i figur av arbeidsvinduet. Ved å ha valgt *Structure* og *Basic objects* i de to øvre rullgardinene kan man velge *Nodes* i fanerekken helt nederst i vinduet. Deretter kan koordinatene til nodene fylles ut, slik som vist i tabell 8.

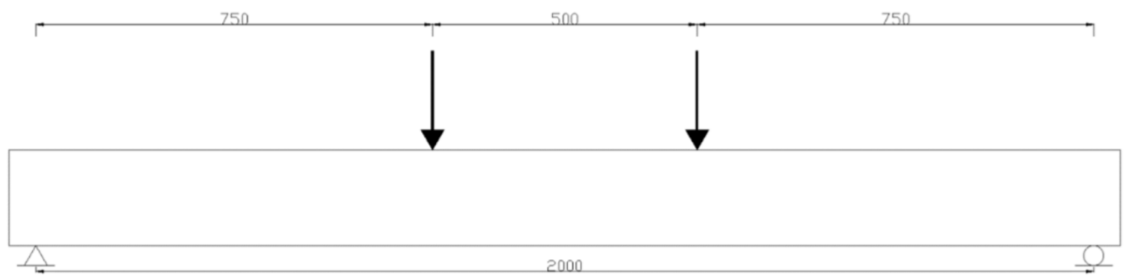
Tabell 8 - Plassering av noder for modellbase

Node No.	Node Type	Coordinate System	Coordinate Type	Coordinates X [m]	Y [m]	Z [m]
1	Standard	1 - Global XYZ	Cartesian	2,100	0,600	0,000
2	Standard	1 - Global XYZ	Cartesian	0,000	0,000	0,090
3	Standard	1 - Global XYZ	Cartesian	2,100	0,600	0,090
4						
5	Standard	1 - Global XYZ	Cartesian	0,050	0,000	0,000
6	Standard	1 - Global XYZ	Cartesian	0,050	0,600	0,000
7	Standard	1 - Global XYZ	Cartesian	2,050	0,000	0,000
8	Standard	1 - Global XYZ	Cartesian	2,050	0,600	0,000
9						
10	Standard	1 - Global XYZ	Cartesian	0,800	0,000	0,090
11	Standard	1 - Global XYZ	Cartesian	0,800	0,600	0,090
12	Standard	1 - Global XYZ	Cartesian	1,300	0,000	0,090
13	Standard	1 - Global XYZ	Cartesian	1,300	0,600	0,090

Nodene er i utgangspunkt plassert etter størrelsen på dekket, altså 2.1x0.6 m2, som representeres av node 1-3, origo telles som en node uten behov for egen definering. Programvaren benytter x-retning som hovedretning for spenn som standardinnstilling. Dette kan justeres. Senteravstanden mellom platene er satt til 90 mm og begrunnet med formelen under.

$$\frac{T_{KLT} + T_{Betong}}{2} = \frac{120mm + 60mm}{2} = 90\ mm$$

Nodene 5-8 representerer opplagere og er plassert på overflate 1, massivtredelen, mens nodene 10-13 representerer lastsonene elementet skal utsettes for. Utgangspunktet for plasseringen av disse punktene er tatt fra figur 23, hentet fra [1] og er basert på målene til maskinen brukt til tøyetesting i de laboratorieforsøkene. Siden dekket totalt er 2,1 meter langt og målene i figuren viser et spenn på 2,0 m antas uthenget på hver side å være likt på begge sider, altså 0,05 m.



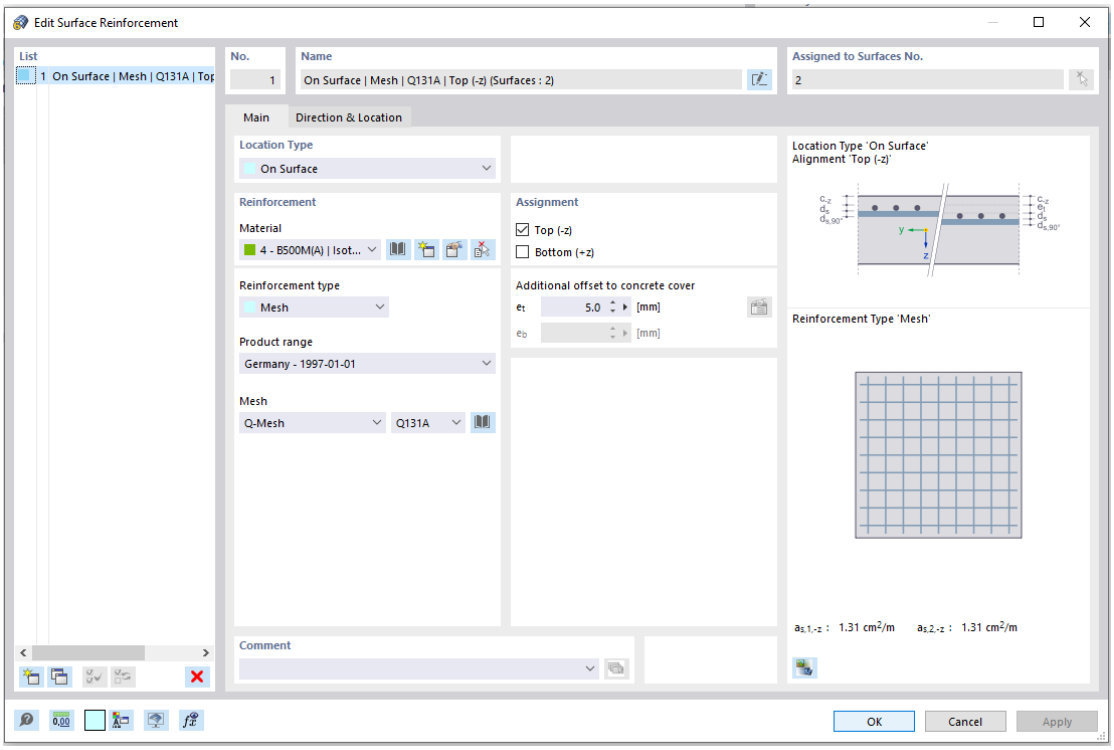
Figur 23 - Illustrasjon av påført last og opplagere [1, s. 59]

3.7.1 Overflater og linjer

Overflater dannes ved bruk av snarveien [ ], fra gult felt i figuren av arbeidsvinduet. Først velg ønsket materialtykkelse og trykk ok, deretter velg de ønskede nodene i modellvinduet. For denne modellen går den trebaserte overflaten fra origo til node 1, mens betongoverflaten fra node 2 til 3. Linjer dannes automatisk langs kanten av overflaten. Ekstra linjer for opplagerne og linjelasten legges med snarveien for deretter å velge de aktuelle nodene. For å forhindre at linjene etterfølger hverandre trykk *esc* en gang mellom hver linje som tegnes.

3.7.2 Armering i betongoverflaten

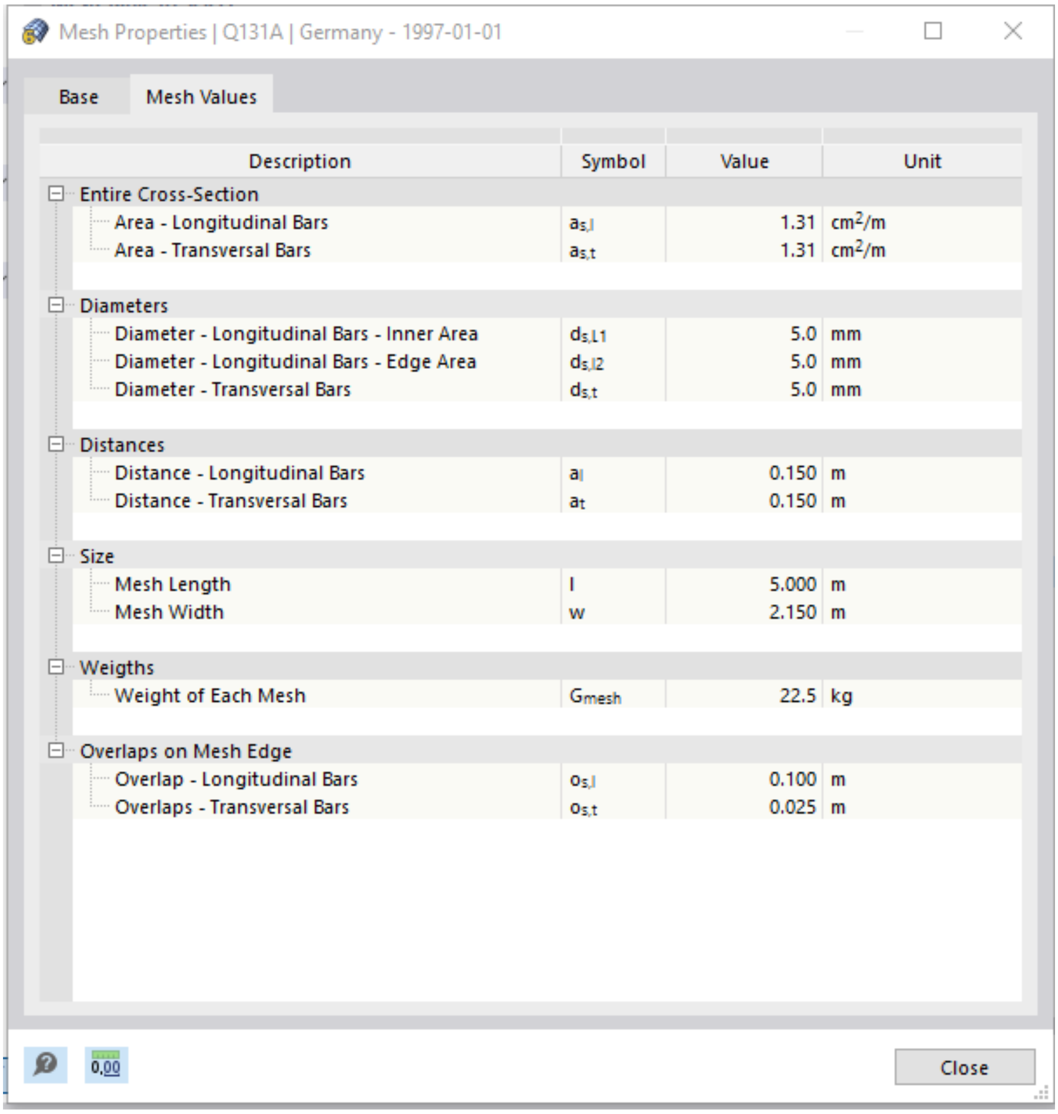
Denne seksjonen omhandler kun dekker av type A, da det kun er denne typen dekke som inneholder ekstra armering. Armering kan tilføyes betongoverflater på menyen for overflaten. Ved valg av betongmateriale vil fanen *Concrete cover* bli synlig, sjekk denne før påføring av armering i fanen *Surface reinforcement*. Trykk på symbolet for å legge til ny armering. Menyen som åpnes vil være lik den vist i figuren under.



Figur 24 - Vindu for definering av armering i overflate 2 dekke type A i RFEM 6

Som nevnt i kapittel 3.3.1, inneholder type A dekke et armerings nett med 150x150 mm avstand mellom stegene og en diameter på 5 mm på stegene. Nettet er plassert midt i betonglaget, som vil si med 30 mm overdekning. Etter en forespørsel til betonglaboratoriet ved Universitetet i Stavanger, ble det avklart at armerings nettet brukt er av typen B500NA K 131 2000 x 5000 MM fra Norsk Stål [9], og ifølge Norsk ståls hjemmeside følger kravene til NS 3576-4 [10].

I vinduet vist i figur 24 ble det først kontrollert at kun *Assignment top (-z)* er aktivert, slik at kun et armeringsnett som legges til. Deretter ønskes nettet å plasseres med overdekning på 30 mm. I dette tilfellet var kravet til minimums overdekning, sjekket i fanen *Concrete cover*, satt til 25 mm og ekstra ønsket avstand ble satt til 5 mm. Stålmaterialet definert i punkt 3.6.3 ble deretter satt til ståltype for armeringen. Til slutt ble armeringstype nett valgt, med *Q131A* som type armerings nett hentet fra produktserien 1997-01-01 Tysk standard, som tilsvarer verdiene oppgitt for et K131 nett i NS 3576-4.


Mesh Properties | Q131A | Germany - 1997-01-01

Base | Mesh Values

Description	Symbol	Value	Unit
Entire Cross-Section			
Area - Longitudinal Bars	$a_{s,l}$	1.31	cm²/m
Area - Transversal Bars	$a_{s,t}$	1.31	cm²/m
Diameters			
Diameter - Longitudinal Bars - Inner Area	$d_{s,l1}$	5.0	mm
Diameter - Longitudinal Bars - Edge Area	$d_{s,l2}$	5.0	mm
Diameter - Transversal Bars	$d_{s,t}$	5.0	mm
Distances			
Distance - Longitudinal Bars	a_l	0.150	m
Distance - Transversal Bars	a_t	0.150	m
Size			
Mesh Length	l	5.000	m
Mesh Width	w	2.150	m
Weigths			
Weight of Each Mesh	G_{mesh}	22.5	kg
Overlaps on Mesh Edge			
Overlap - Longitudinal Bars	$o_{s,l}$	0.100	m
Overlaps - Transversal Bars	$o_{s,t}$	0.025	m

Figur 25 - Tabell over egenskaper til Q131A armerings nett i programvaren RFEM 6

3.8 Plassering av opplagere

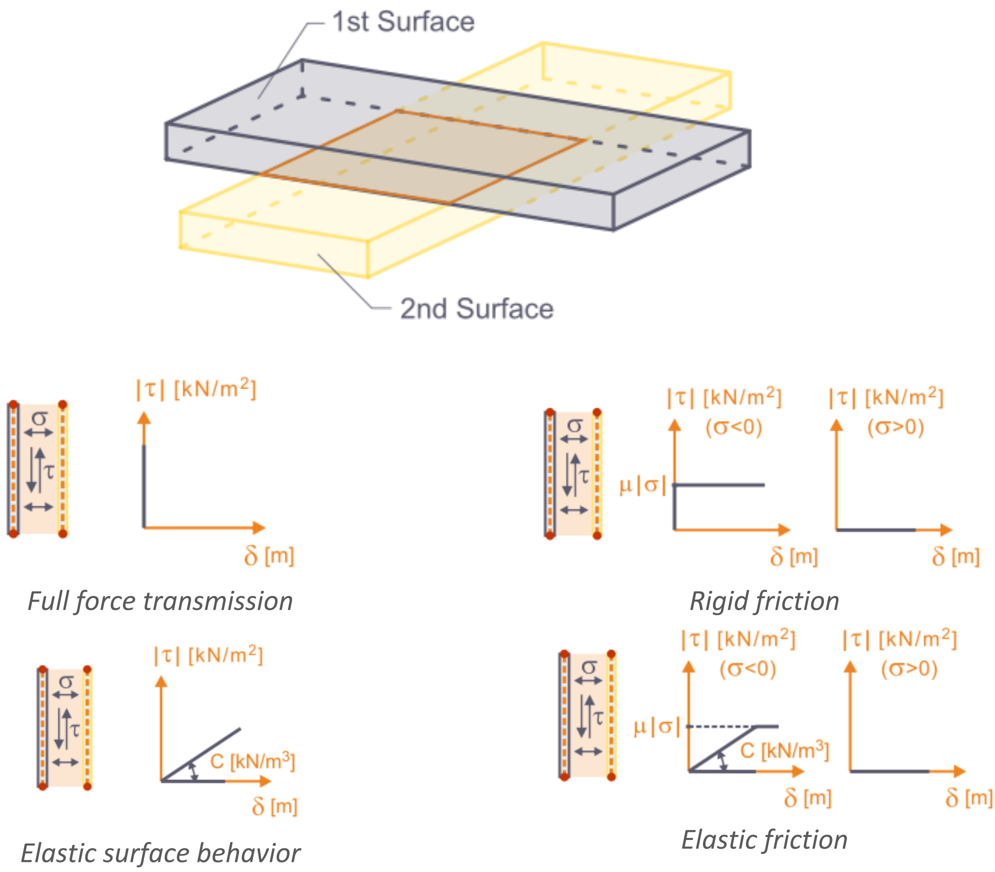
For å støtte opp elementet må opplagere plasseres, disse plasseres etter utgangspunkt i figur 23. Raskeste måte å plassere disse ved bruk av snarveiene, grønn seksjon i figur over arbeidsvinduet. De illustreres ved symbolene og betyr node støtte, linjestøtte og overflatestøtte respektivt. Disse funksjonene kan også bli funnet i mappestrukturen under *Types of nodes* → *Node support* og likt for linjer og overflater. For denne oppgaven ble linjestøtte nærmest origo satt til å være fast innspent, kaldt *hinged* support i programvaren, mens den andre linjestøtten ble satt til å være fritt opplagt med kun restriksjoner i z-retning. Opplagerne er vist i figur 26.

Figur 26 - Opplagere i modell

3.9 Metode 1 – Kontaktflater

Fremgangsmåte 1 innebærer å danne en kontaktflate mellom betong delen og tredelen som skal representere kraftoverføringen mellom de to flatene. I programvaren opprettes en slik overgang i mappestrukturen under mappen *Special Objects* og kalles *Surface Contacts*. Ved å dobbelt trykke på denne mappen åpnes en meny der man først velger hvilke to overflater denne overgangen skal gjelde for, deretter hvilken type skjærkraftovergang programmet skal bruke.

Ved å velge å opprette ny eller redigere eksisterende kontaktoverflate, med knappene respektivt, får man valget mellom å definere skjærovergangen rettvinklet på overflate og paralellt med overflate respektivt. For den rettvinklede overføringen er alternativene *Full force transmission*, *Failure under compression* og *Failure under tension*, der førstnevnte alternativ ble valgt. Den parallelle skjærovergangen tilbyr fire alternativer. De fire er vist i figuren under, figur 27. Til modellene ble overgangstypen *Elastic surface behavior* valgt.



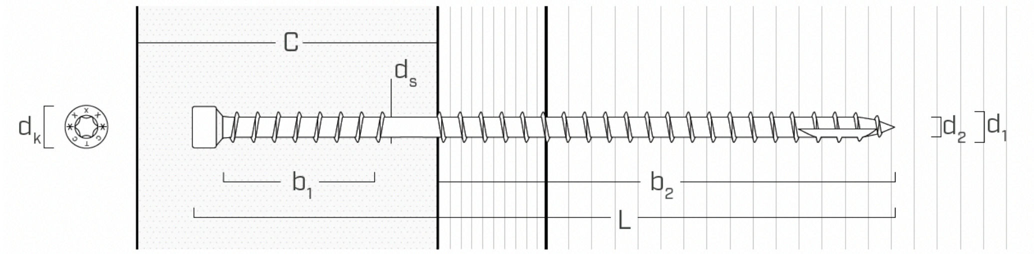
Figur 27 - Valgmuligheter for den horisontale delen av skjærkraftforbindelsen mellom to kontaktflater i RFEM 6

Ved bruk av *Elastic surface behavior* type parallell skjærkraftovergang etableres det en skjærstivhetsmodul C i programvaren, også kalt glidemodul K_{ser} i Eurokoder. Denne konstanten kan fastsettes ved flere framgangsmåter, for eksempel ved gjennomføring av laboratoriestudier med målinger for forskyvning mellom lagene eller ved en teoretisk tilnærming basert på verdier fra datablad hos leverandør eller i standardverk.

For denne oppgaven ble en teoretisk tilnærming benyttet. Bakgrunnen for det er at dersom disse verdiene viser seg å være tilstrekkelige vil framgangsmåten kunne lettere tilpasses andre geometriske og materielle situasjoner. I tillegg åpner laboratorieforsøk for flere mulige feilkilder. For type A dekker benyttes informasjon gitt i produktdatablad, vedlagt tidligere laboratorieoppgave [1]. Til type B dekker benyttes en teoretisk tilnærming basert på Eurokode 5 [11].

3.9.1 Beregning av glidemodul for dekketype A

Som nevnt tidligere i oppgaven, seksjon 3.3.1, består type A dekke av tre rader med parvis plasserte CTC skruer. Skruene er festet før påføringen av betong-delen og er montert delvis i tredelen med en vinkel på 45˚ fra overflaten og med parvis motsatt orientering. En detaljtegning for skruetypens generelle dimensjoner er vist i figur 28. Skruene benyttet i oppgaven har diameter på 7 mm.



Figur 28 - Detaljtegning av CTC skrue hentet fra Datablad [Kilde]

Gjennom informasjon fra databladet ble følgende formel benyttet for glidemodulusen per skruepar

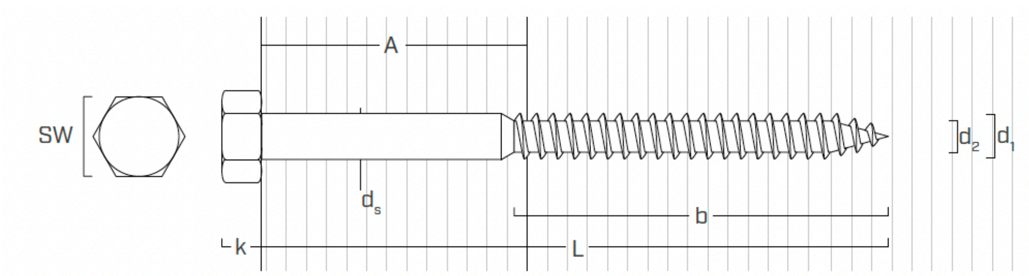
$$K_{ser} = 70 * l_{ef} = 70 * b_2 = 70 * 110mm = 7700\ N/mm$$

Slipfaktoren for enhetsområdet, som er enheten *Contact Surface* bruker, blir deretter

$$C = K_{ser,unitarea} = \frac{3\ rader * 13\ skruer\ pr\ rad * 7700kN/m}{(2.0 * 0.6)m^2} = 250250\ kN/m^3$$

3.9.2 Beregning av glidemodul for dekketype B

Type B dekker benytter en skjærforbindelse av KOP skruer delvis festet i tredelen før påføring av betongen. Skruene ble her montert i en vinkel på 45˚ fra overflaten, men denne gangen er alle skruene montert i samme retning. Det vil si 6 rader med 13 skruer, illustrert i figur 13 og 14 fra seksjon 3.3.1. Skruene brukt har diameter 10 mm og en detaljert skisse av KOP skruer er vist i figur 29.



Figur 29 - Illustrasjon av KOP skrue hentet fra datablad [Kilde]

For å regne glidemodulen benyttes formelen under, hentet fra Eurokode 5 seksjon 7.1 [11], da datablad ikke tilfører tilstrekkelig informasjon rundt KOP skruer montert på denne måten.

$$K_{ser,skruepar} = \frac{\rho_m^{1,5} * d}{23} = \frac{\left(\rho_m^{1,5} * d\right)}{23} = 4144{,}26\ N/mm$$

Der diameter, $d \quad = 10mm$

midlere densitet, $\rho_m \quad = \sqrt{\rho_{m,T22} * \rho_{m,T15}}$

$= \sqrt{470 * 430} \qquad [kg/m^3]$

$$C = K_{ser,unitarea} = \frac{6\ rader * 13\ skruer\ pr\ rad * K_{ser}}{A_{spenn}} = 269\ 376.841\ kN/m^3$$

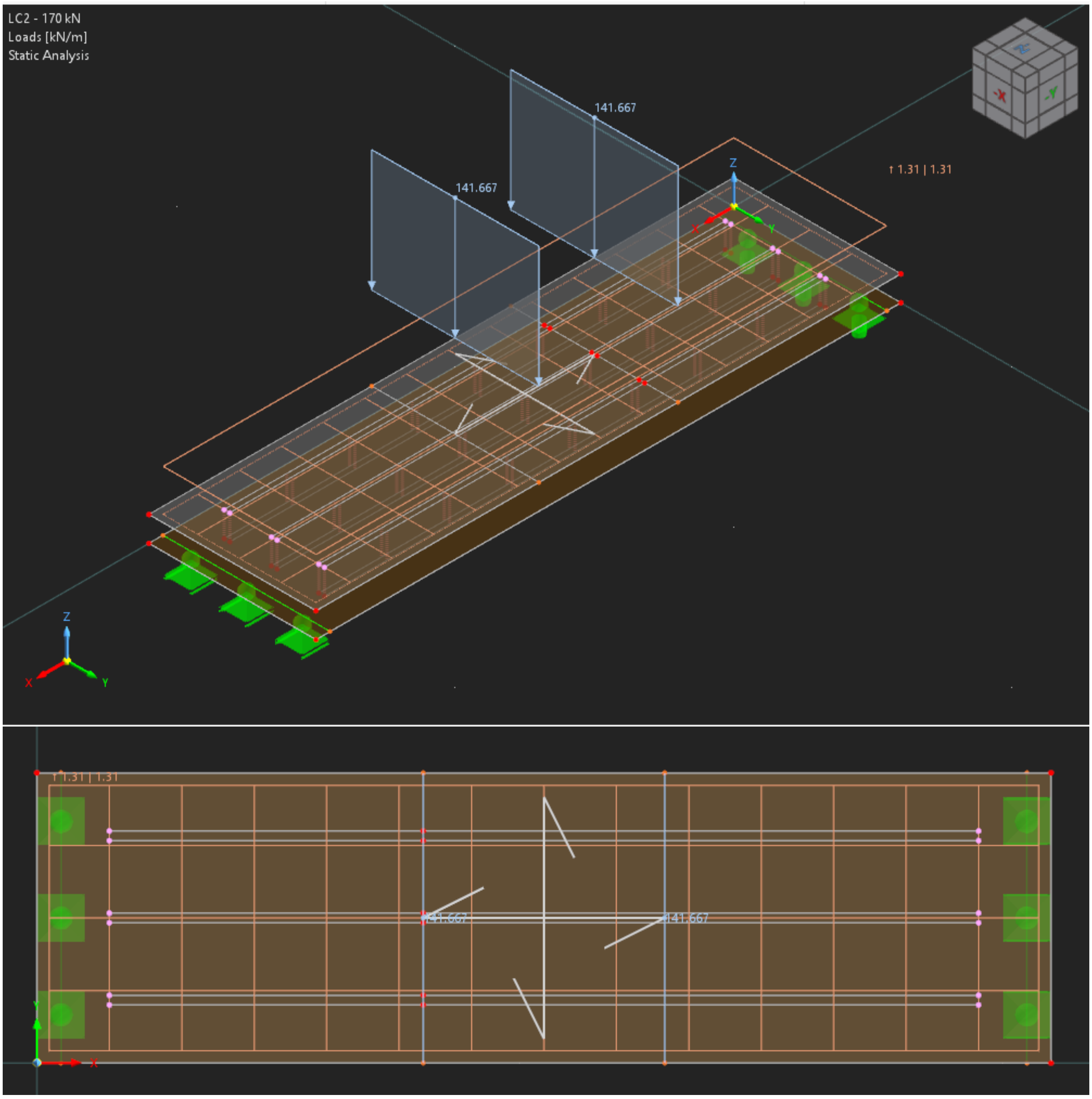
3.10 Metode 2 – Faste innspenninger

Ved bruk av metode 2 faste innspenninger må mer forarbeid gjøres til modellen. Først må linjer plasseres i de sonene skruene er plassert, disse skal så brukes til å opprette en forbindelse mellom overflate 1, tredelen, og overflate 2, betongdelen. For oppgaven ble det derfor valgt å tegne inn 6 rader med forbindelser for å representere de seks radene med skruer vist i kapittel 3.3.1 og kapittel 3.3.2. Noder og linjer ble opprettet ved bruk av samme framgangsmåte som nevnt tidligere, kapittel 3.7, og nodene hadde følgende koordinater:

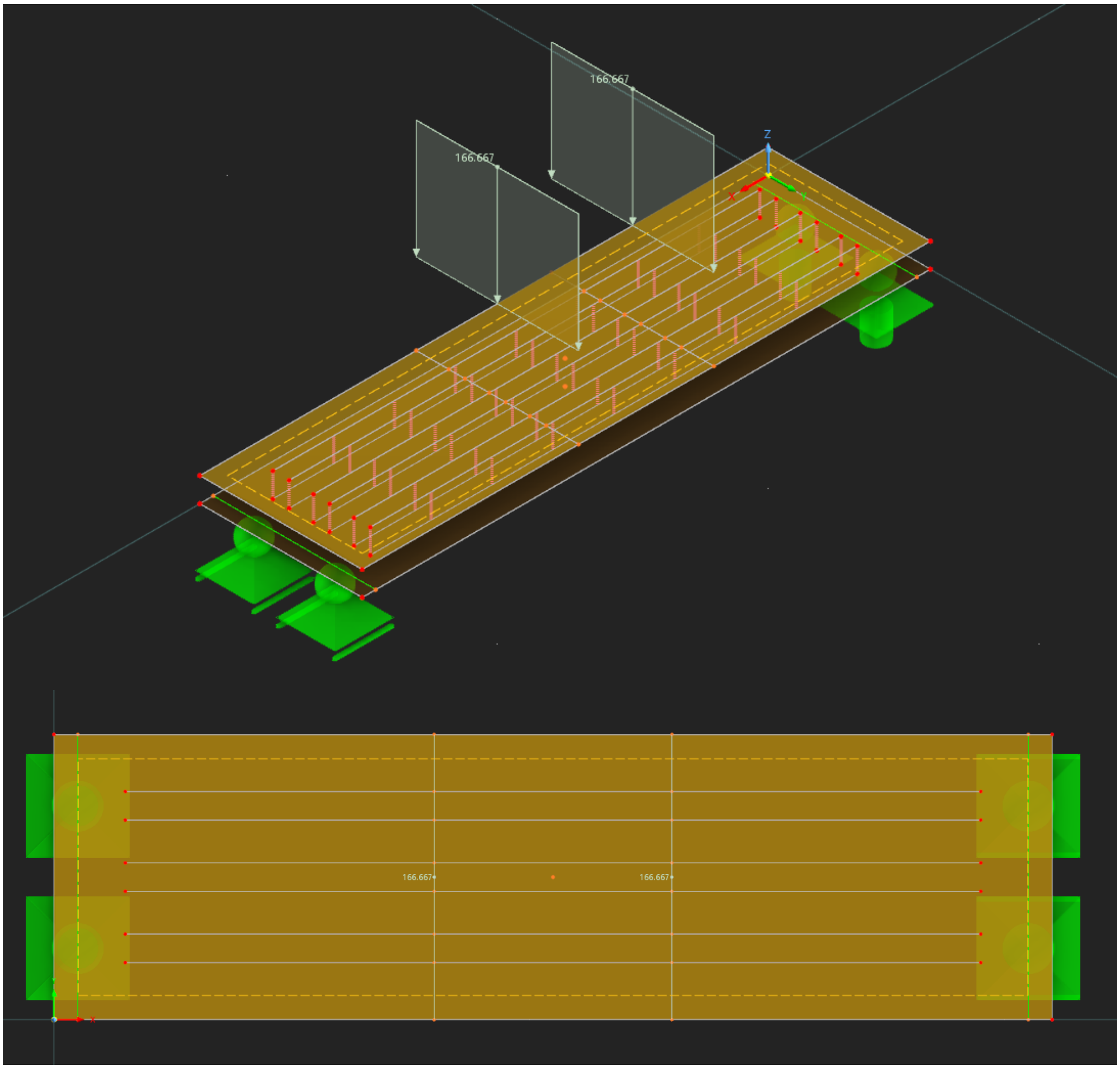
Tabell 9 - Node plasseringer for tilføyde linjer til metode 2

	Type A	Type B
Linje 1	(0.15, 0.12, 0) – (1.95, 0.12, 0)	(0.15, 0.12, 0) – (1.95, 0.12, 0)
Linje 2	(0.15, 0.14, 0) – (1.95, 0.14, 0)	(0.15, 0.18, 0) – (1.95, 0.18, 0)
Linje 3	(0.15, 0.29, 0) – (1.95, 0.29, 0)	(0.15, 0.27, 0) – (1.95, 0.27, 0)
Linje 4	(0.15, 0.31, 0) – (1.95, 0.31, 0)	(0.15, 0.33, 0) – (1.95, 0.33, 0)
Linje 5	(0.15, 0.46, 0) – (1.95, 0.46, 0)	(0.15, 0.42, 0) – (1.95, 0.42, 0)
Linje 6	(0.15, 0.48, 0) – (1.95, 0.48, 0)	(0.15, 0.48, 0) – (1.95, 0.48, 0)

Merk at alle linjene har lik z-høyde, det er fordi programvaren kun trenger linje på ene overflaten for å opprette forbindelsen. Etter å ha plassert linjene kan man opprette de faste innspenningene gjennom mappestrukturen: åpne *Spescal Objects* → dobbelttrykk på *Rigid links* for å opprette en ny link. I vinduet som åpnes blir brukeren bedt om å velge hvilken type kobling, for denne oppgaven ble *Line to surface* valgt. Deretter plot linjen på overflate 1 mot overflate 2 og trykk *Apply & Next* og fortsett til alle 6 forbindelsene er opprettet. Merk at *ignore relative position* er aktivert, det betyr at programmet ignorer eventuelle mellomrom mellom overflatene og er ok for vårt tilfelle da det ideelt ikke skal være noe mellomrom som skaper moment. Figur 30 og 31 viser modellene med det påførte linjene



Figur 30 – Faste innspenninger i type A dekke vist i RFEM



Figur 31 – Faste innspenninger i type B dekke vist i RFEM

3.11 Etablering av lasttilfelle

For å tilføre last til modellen må et lasttilfelle opprettes. Som standardinnstilling i programvaren er det et lasttilfelle kalt *LC1 – Self-weigth*, dette kan finnes i mappestrukturen under *Load cases & Combinations* → *Load cases*. Ved å åpne menyen for Lasttilfeller kan man velge å opprette et nytt et. For denne oppgaven ble et lasttilfelle kalt *LC2 – 200kN* opprettet med analysetypen *Static Analysis,* aktivert egenvekt og *Action Category* permanent.

3.11.1 Innstillinger for den statiske analysen

Videre for lasttilfellet må innstillinger for analysetypen settes, dette fordi det er ønskelig å se på utviklingen i elementet over en trinnvis lastpåføring. For denne oppgaven ble det opprettet en ny statisk analyse innstilling med analysetype *Geometrically linear* med *Newton-Raphson* som iterativ metode for ikke-lineær analyse. Programmet er satt til å bruke direkte metode for løsning av ukjente i matrisen.

Etter at denne basen er satt ble antallet inkrement satt. Inkrement vil si antallet trinn lasten blir påført i. Antallet inkrement ble satt til lik antall som total lasten påført modellen, det vil si at et inkrement tilsier 1 kN. Etter litt utprøving ble total lasten for type A dekke satt til 170 kN, som betyr at antallet inkrement ble satt til 170. Mens type B ble belastet med 200 kN og brukte derfor 200 inkrementer i disse analysene.

Programmet foreslår videre et maksimum av 100 iterasjoner for hvert inkrement, som er det jeg endte med å bruke for analysene. Iterasjoner er punkter regnet mellom hver inkrement og er mest aktuell i situasjoner der last-deformasjonskurven ikke opptrer lineært. Det er disse faktorene to sammen med størrelsen på FE-nettet som har størst innvirkning på tiden det tar å kjøre analysen. Disse verdiene spiller også en viktig rolle hvor detaljert analysen blir og har stor innvirkning på sluttresultatet.

For å hente data fra iterasjonene etter at analysen er kjørt må *Save results of all increments* aktiveres før analysen kjøres. Denne funksjonen ligger under listen *Options II* og blir kun tilgjengelig etter å ha valgt et flertall inkrementer. Deretter aktivere *Calculation diagrams* fra *Options I* menyen. Denne åpner en egen fane der man kan sette egne kalkuleringsdiagrammer for deformasjon, last, stress etc. for ulike punkter i elementet. Disse diagramfunksjonene ble videre brukt til å produsere resultatene til resultatdelen av oppgaven.

Det er viktig å nevne noen utfordringer programmet RFEM 6 har i skrivende stund angående kalkuleringsdiagrammer. Denne funksjonen er relativt ny og med det har noen utfordringer oppstått slik at brukeren bør være varsom ved avlesing av disse diagrammene og sammenligne resultatene for eksempel med programmets oppsummeringsside for kjørt analyse. Det er uvisst hva som forårsaker dette, men et av funnene mine etter prøving og feiling var at noder definert som standard noder gir verdier som stemmer mer med forventinger enn for eksempel *on-line nodes*.

Videre tilbyr ikke programvaren muligheten til å benytte noder i FEM-nettet til elementet som avlesningspunkter, derfor må eventuelle noder plasserer i kritiske soner etter å ha kjørt analysen en gang. Dette medfører til at programvaren ugyldiggjør den første analysen, sletter den, og brukeren må så kjøre samme analyse på nytt for å få avlest de kritiske punktene ned bruk av kalkuleringsdiagram.

3.11.2 Påføring av last

For å påføre modellen belasting åpne mappen *Loads* og deretter velge mappen for ønsket lasttilfelle. I mappen ligger det mange ulike alternativer for lastformasjoner. Til modellen ble linjelast påført to linjer på betongoverflaten, linjer forklart i kapittel 3.7, med fremgangsmåten dobbeltrykk på *Line loads* → velg linjene under *Assigned to lines No.* → Sette P for de ulike typene slik at ønsket total last oppnås. Lastverdiene satt ble regnet på følgende måte:

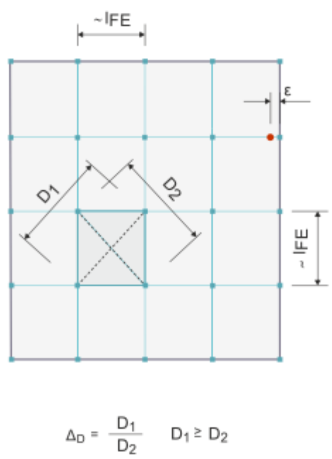
$$P_{type\ A} = \frac{-170}{2 * 0.6} = -141.667\ kN/m$$

$$P_{type\ B} = \frac{-200}{2 * 0.6} = -166.667\ kN/m$$

3.12 FE mesh

Etablering av FE-mesh skjer automatisk ved å velge å kjøre en analyse, men siden denne analysen består av et realtivt lite element må dimensjonene for nettet justeres. Nett innstillingene åpnes med *Calculate* → *Mesh settings* i menyen helt øverst i programvaren, gul sone i figuren for arbeidsvinduet. Det er ønskelig med et så detaljert FE-nett som mulig, da dette vil gi det mest presise resultatene. Ulempen er bare at mindre nett betyr flere noder, mer tid å kjøre analyse og krever mye mer kapasitet av maskinen som kjører programvaren. Siden modellen allerede innebærer ikke-lineær analyse er dette med kapasitet svært viktig og begrensende for analysene. For denne oppgaven ble følgende FE-nett innstillinger valgt.

Ideell lengde for FE (*Target length of FE)*		
l_{Fe}	0.010	m
Maksimum distanse mellom en node og en linje for å kunne integrere noden til linjen		
E	0.001	m
Maksimum antall nodes i FE nettet (i tusen)		
n_{max}	500	



Figur 32 - Illustrasjon av konstanter brukt til oppretting av FE nett fra RFEM

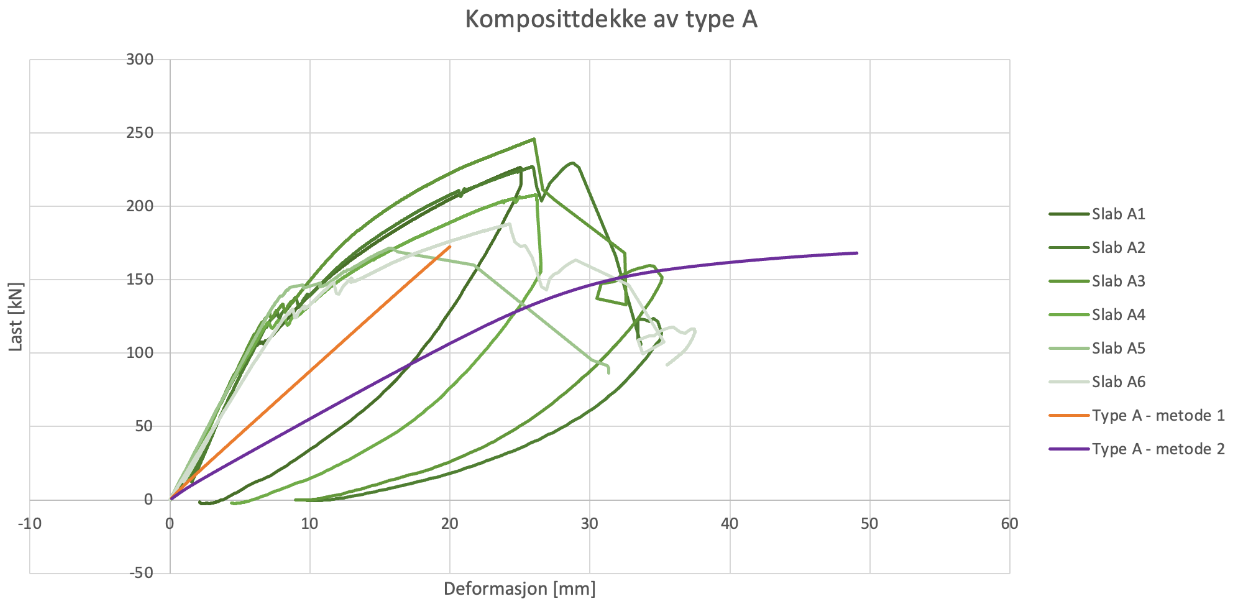
3.13 Kjøre analysen

For å kjøre ønskede analyser velg *Calculate* → *To calcualte* i menylinjen helt øverst, gul sone figur av arbeidsvinduet. En liste over de analysene programmet er klar for å kjøre. Flytt de analysene som ønskes å kjøre over til høyre kolonne i vinduet og tykk *Ok* for å kjøre. For oppgaven ble det kjørt en analysen for lasttilfelle *LC1 – 200 kN*.
Ved kalkulering av analyser holder programvaren oppe et oversiktsvindu der man kan se hvordan inkrementene påvirker maks deformasjon i elementet underveis og hvor mange iterasjoner som kjøres under hvert inkrement. Dette har vært nyttig informasjon til å kontrollere at analysen går som forventet og tilpasse den om nødvendig. Dersom belastningen blir for stor for modellen stoppes analysen helt og programmet informerer om hva som eventuelt kan være feil.

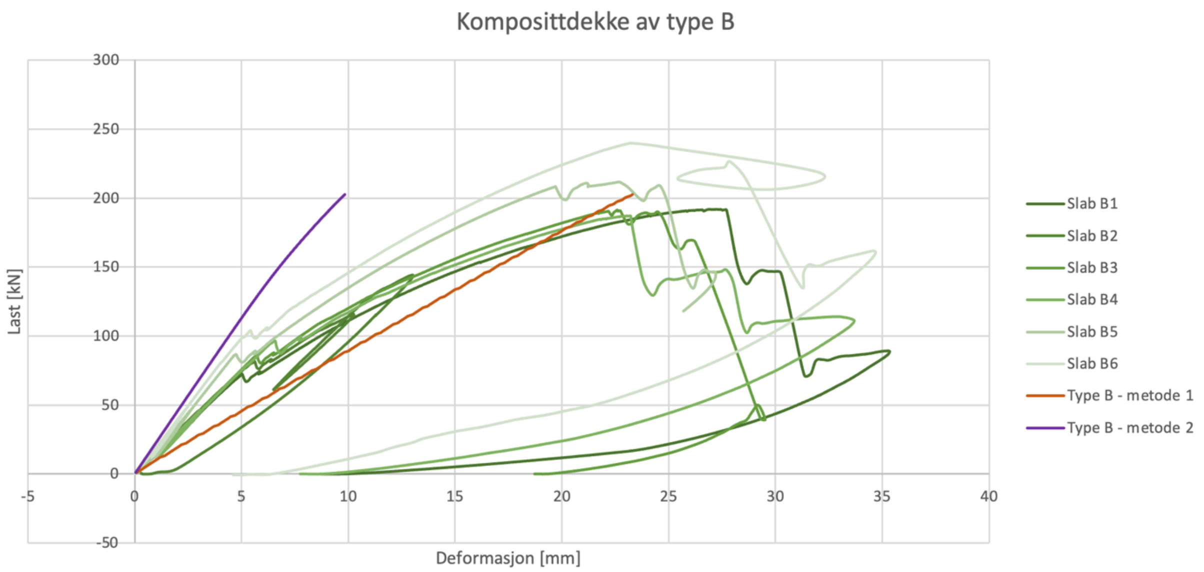
4 Resultater

4.1 Last-deformasjonskurver

Figurene under viser resultater av avlest data fra tidligere laboratorieforsøk, marker med nyanser av grønn, plottet sammen med resultater av analysene kjørt i RFEM 6. Oransje linje viser resultat av FEM analyse metode 1 kontaktflate, mens lilla viser FEM analyse metode 2 faste innspenninger.



Figur 33 - Last-deformasjonskurve for type A dekke, sammenligning av analytiske og laboratorieforsøk

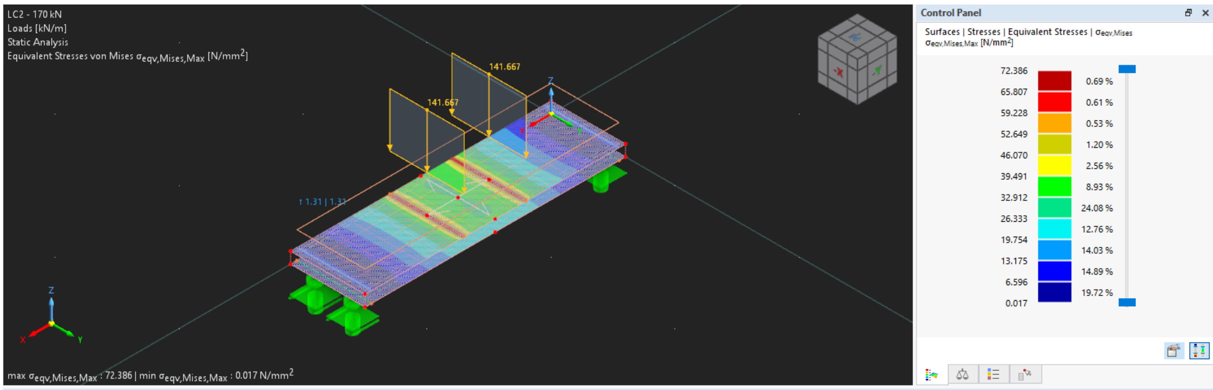


Figur 34 - Last-deformasjonskurve for type B dekke, sammenligning av analytiske og laboratorieforsøk

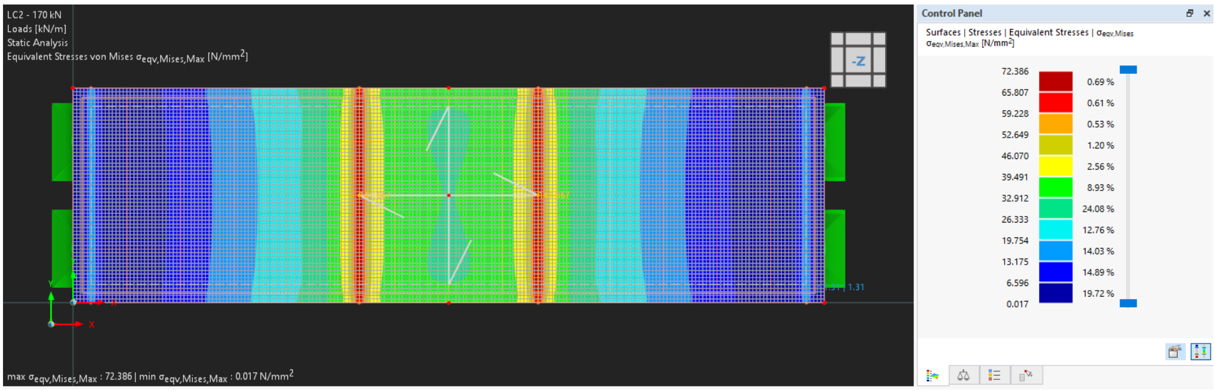
4.2 Fordeling av spenning med metode 1

Til presentasjon av spenningsfordelingen i elementene presenteres først en grafisk framstilling av spenningene oppstått ved maks last. Forklaring på fargene er vist i vindu ved siden av den respektive figuren. Deretter vil spenningsutviklingen i kritiske punkter på overflaten presenteres i spenning-last diagrammer, videre utdyping av disse vil skje i neste kapittel, 5 Diskusjon og konklusjon.

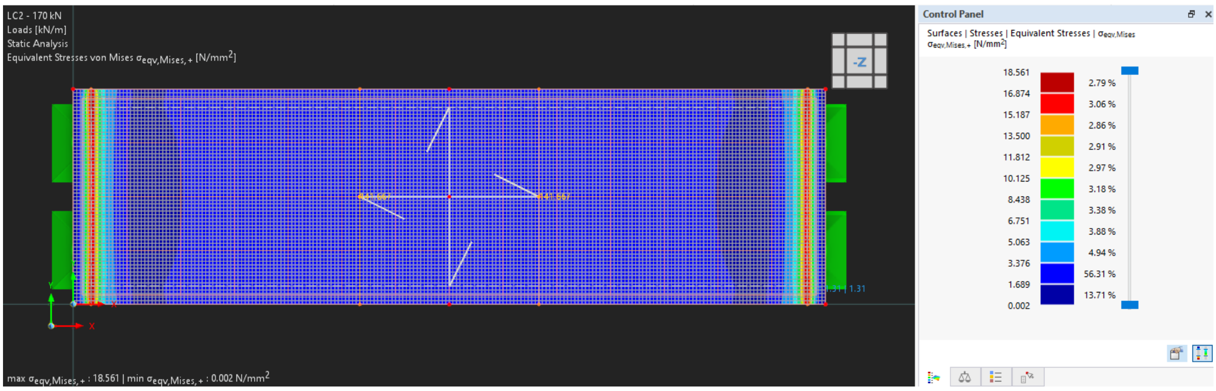
Komposittdekke av type A



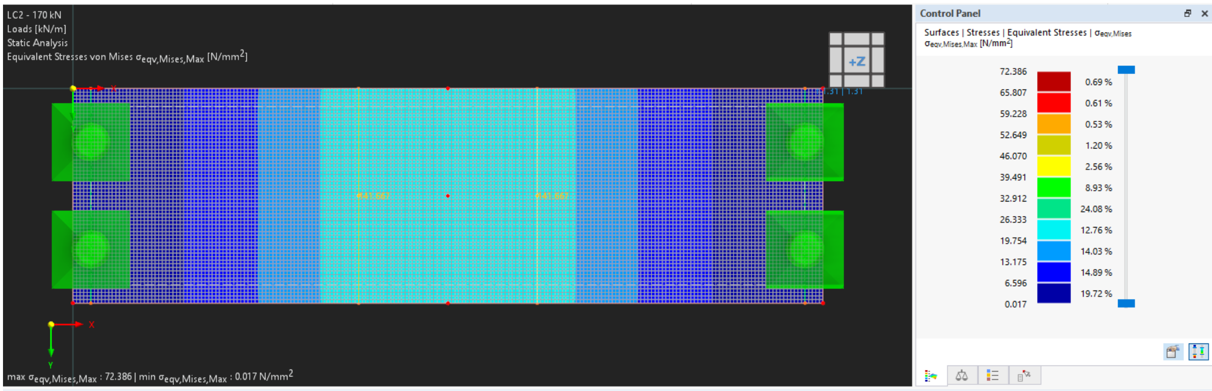
Figur 35 - Oversiktsbilde over de høyeste spenningssonene i modell type A med metode 1



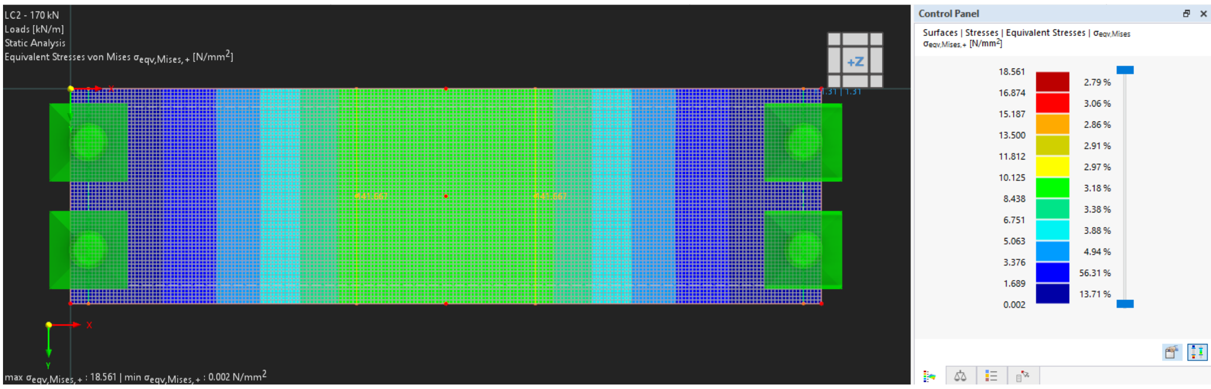
Figur 36 - Konturplott av overside betonglag (Type A metode 1)



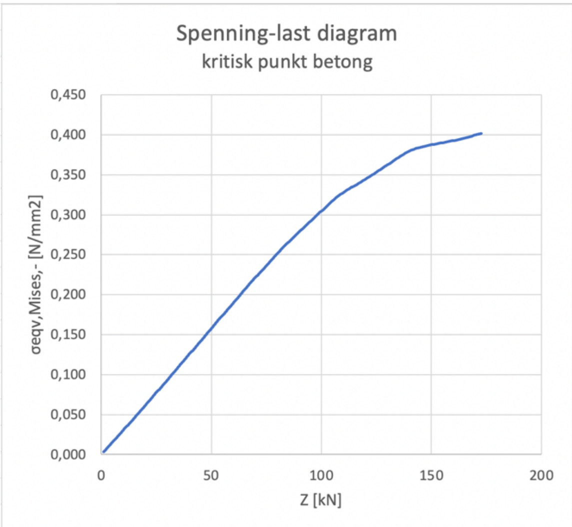
Figur 37 - Konturplott av underside betonglag (Type A metode 1)



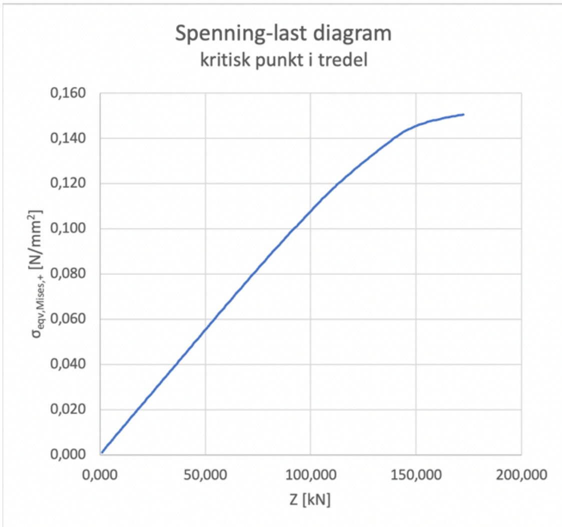
Figur 38 - Konturplott av overside tredel (Type A metode 1)



Figur 39 - Konturplott av underside tredel (Type A metode 1)

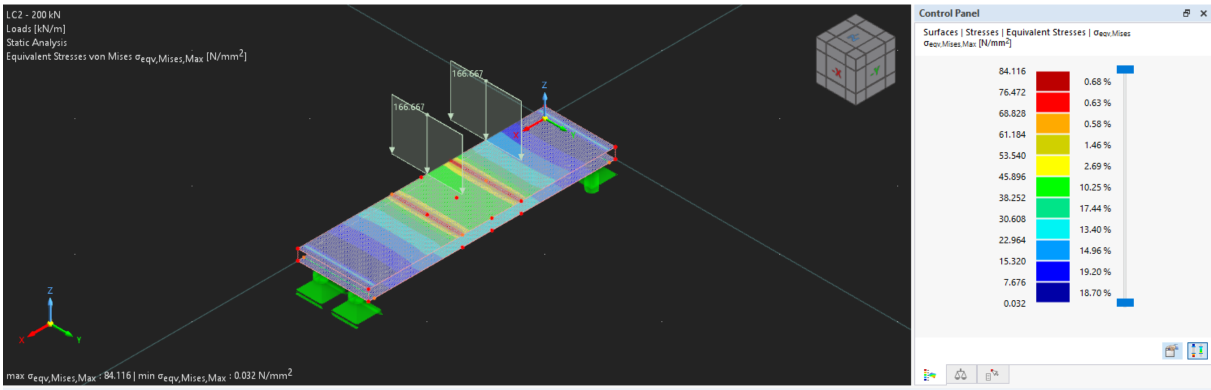


Figur 40 - Spenning-last diagram, avlesningspunkt midt på ene lastlinjen i øvre del av betongoverflaten

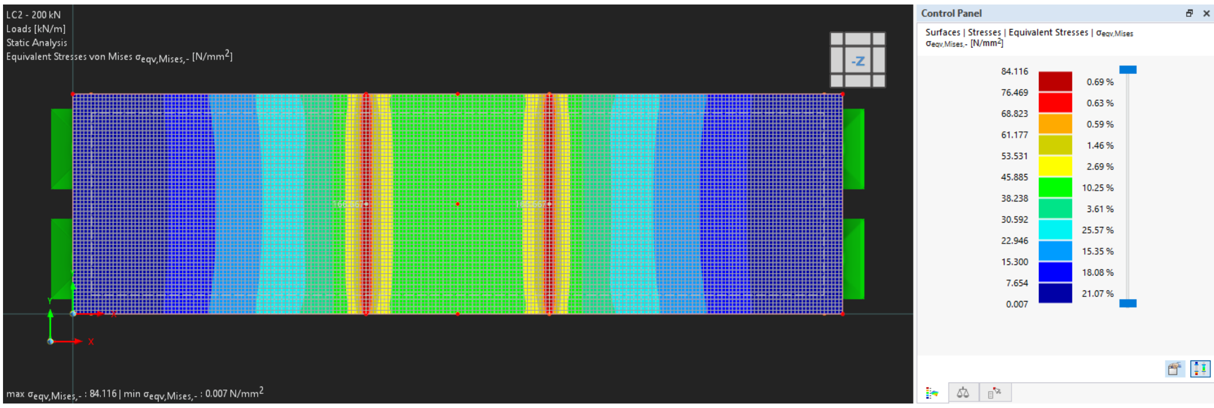


Figur 41 - Spenning-last diagram, avlesningspunkt midt på spenn nederst i treoverflaten

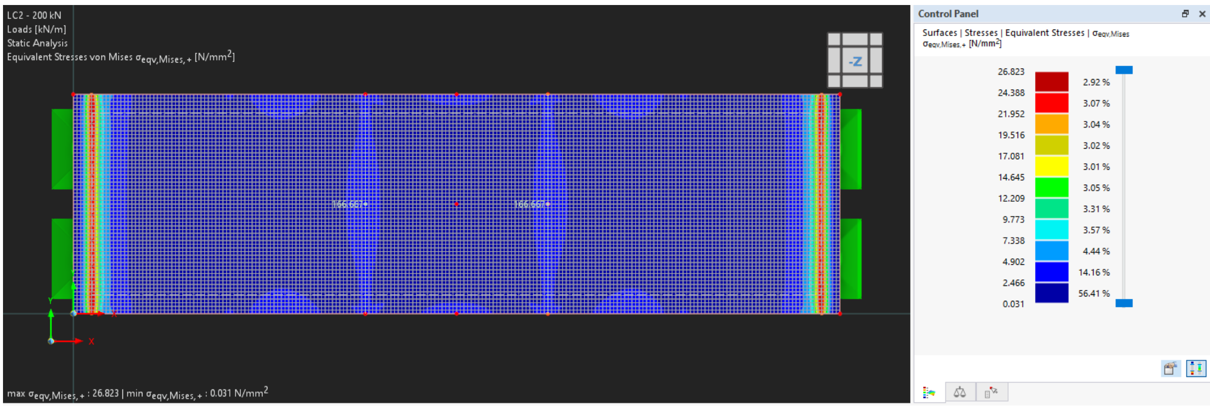
Komposittdekke av type B



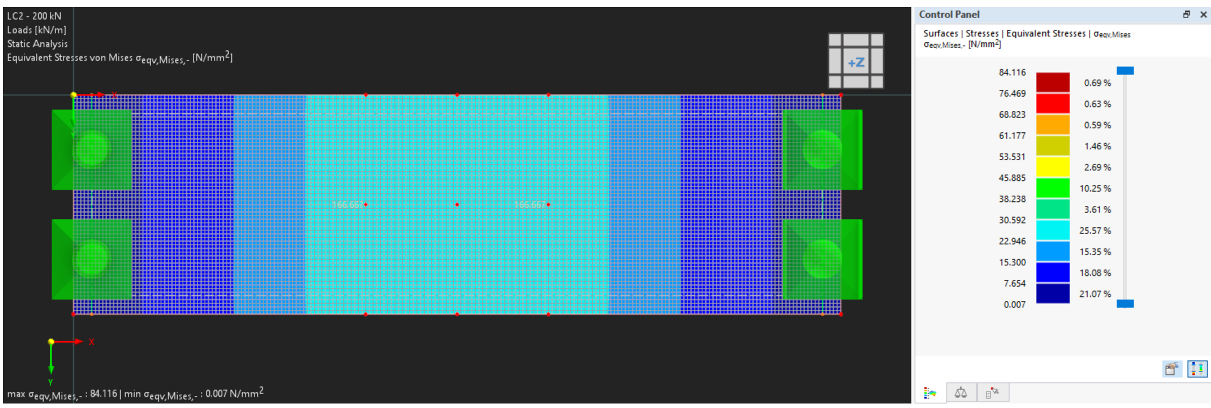
Figur 42 - Oversiktsbilde over de høyeste spenningssonene i modell type B med metode 1



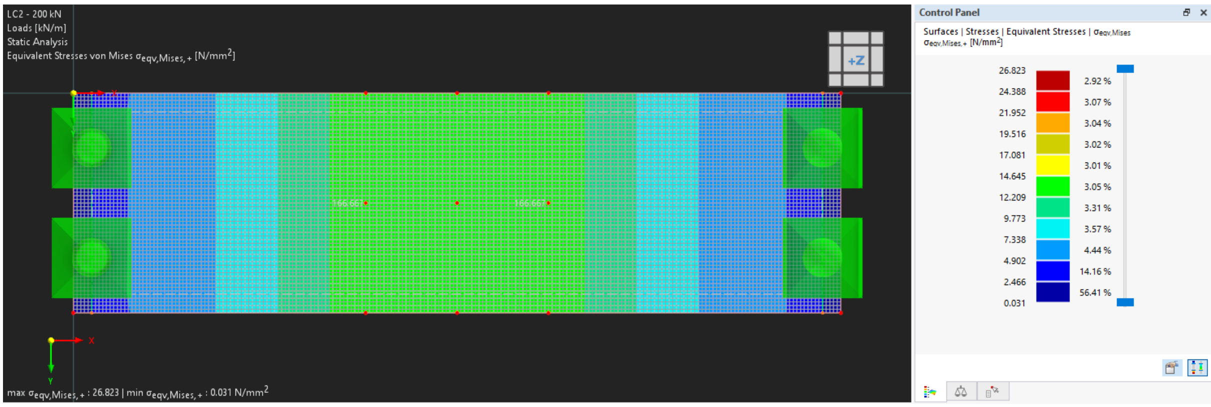
Figur 43 - Konturplott av overside betonglag (Type B metode 1)



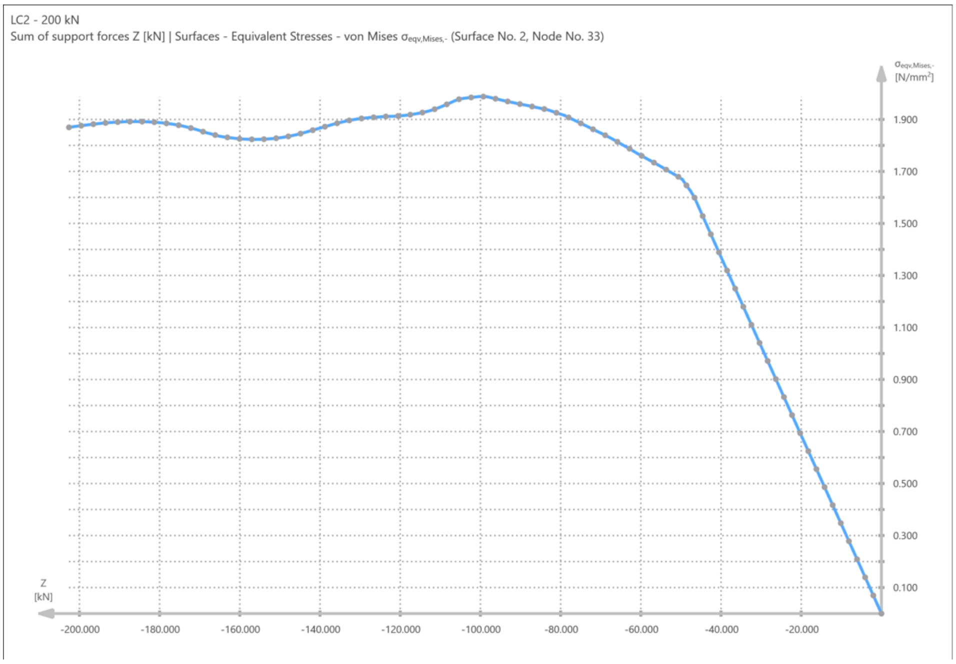
Figur 44 - Konturplott av underside betonglag (Type B metode 1)



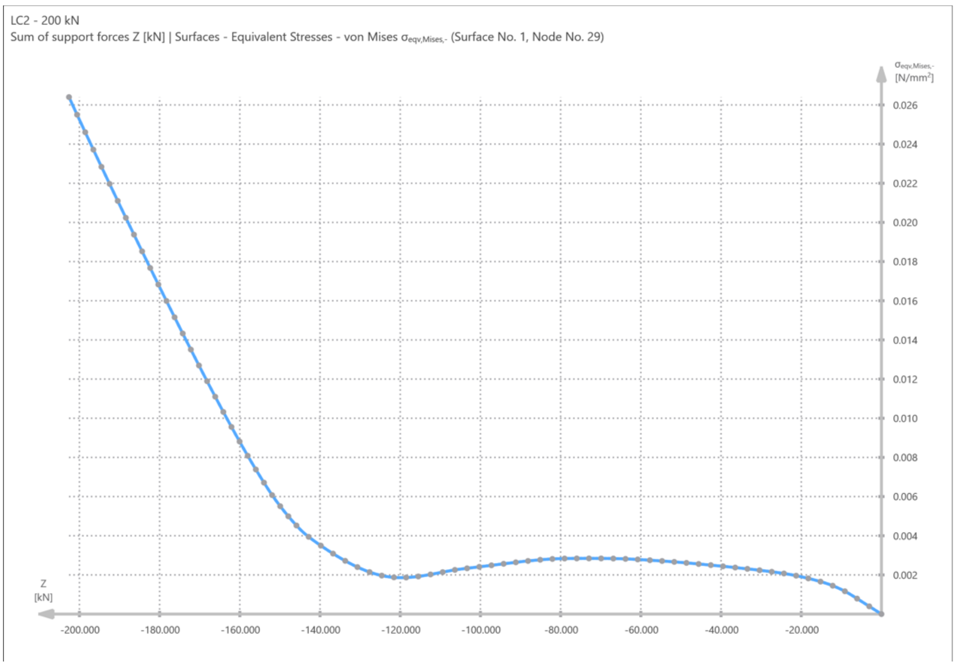
Figur 45 - Konturplott av overside tredel (Type B metode 1)



Figur 46 - Konturplott av underside tredel (Type B metode 1)



Figur 47 - Spenning-last diagram, avlesningspunkt midt på ene lastlinjen i øvre del av betongoverflaten

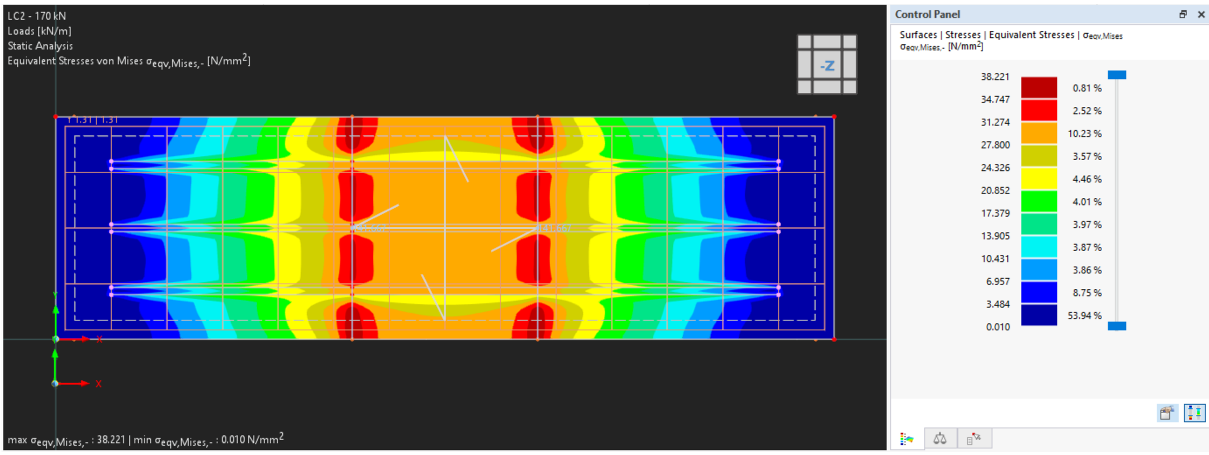


Figur 48 - Spenning-last diagram, avlesningspunkt midt på ene lastlinjen i øvre del av tredelen

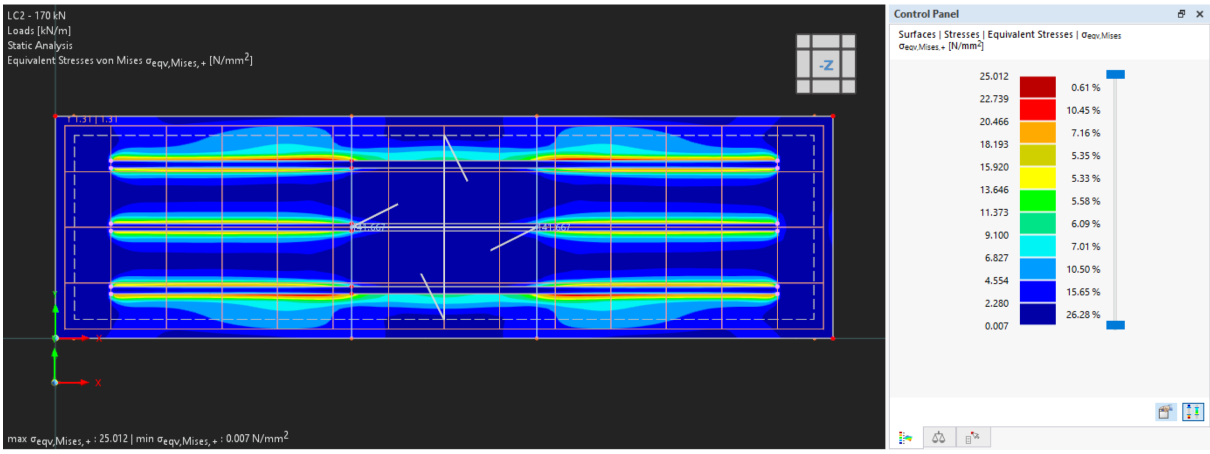
Diagramfunksjonen integrert i programvaren ble brukt for plotting av disse spenning-last diagrammene. Dette fordi spenningsverdiene for tredelen ble for små til å føres over til Excel på en fornuftig måte. X-aksen går derfor også motsatt vei, da programvaren registrerer lasten som negativ.

4.3 Fordeling av spenning med metode 2

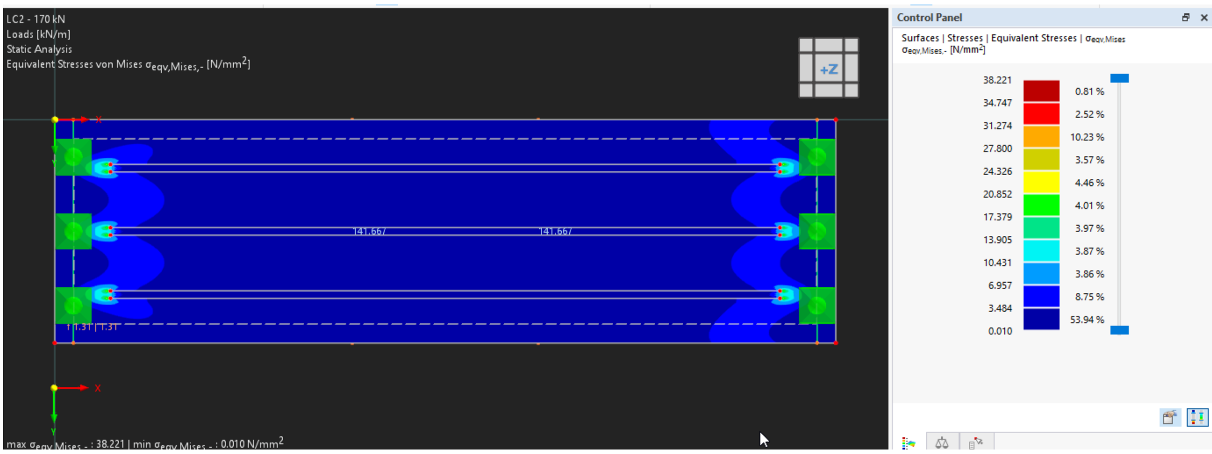
Komposittdekke av type A



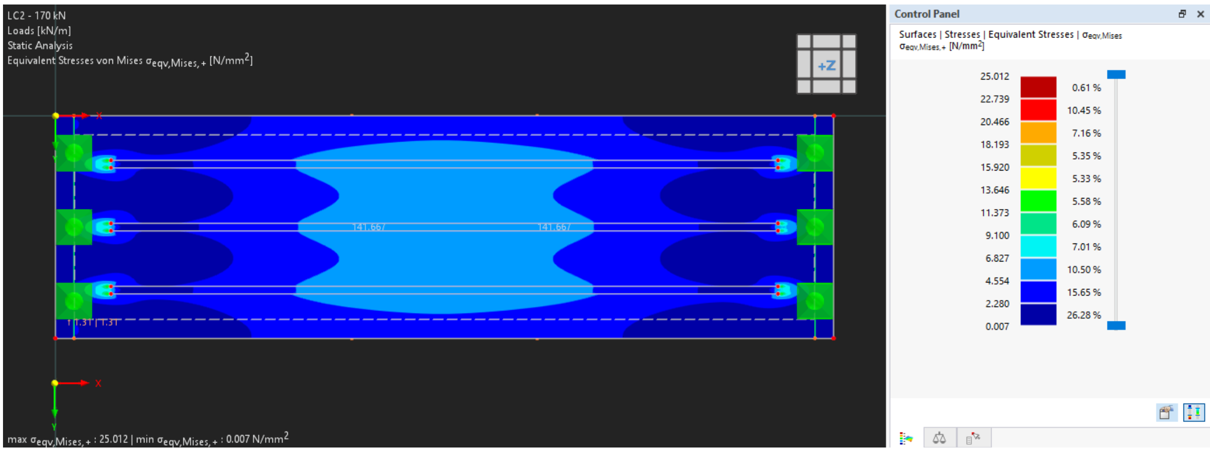
Figur 49 - Spenningsfordeling øvre betonglag (Type A metode 2)



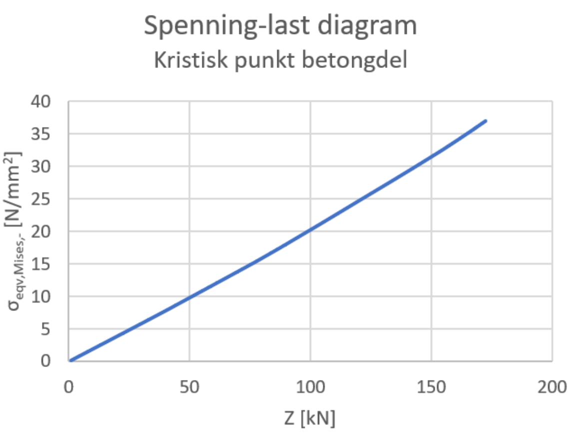
Figur 50 - Spenningsfordeling nedre del betonglag (Type A metode 2)



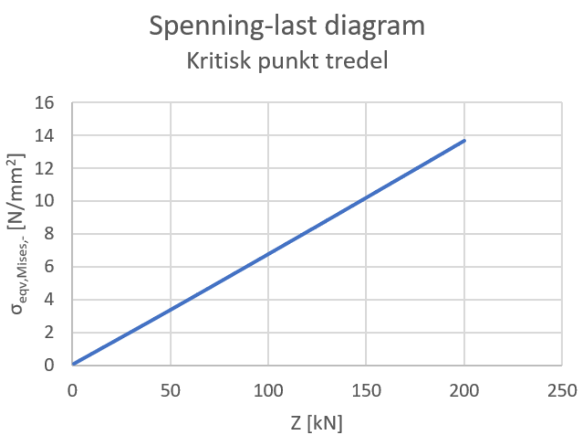
Figur 51 - Spenningsfordeling øvre lag tredel (Type A metode 2)



Figur 52 - Spenningsfordeling nedre lag tredel (Type A metode 2)

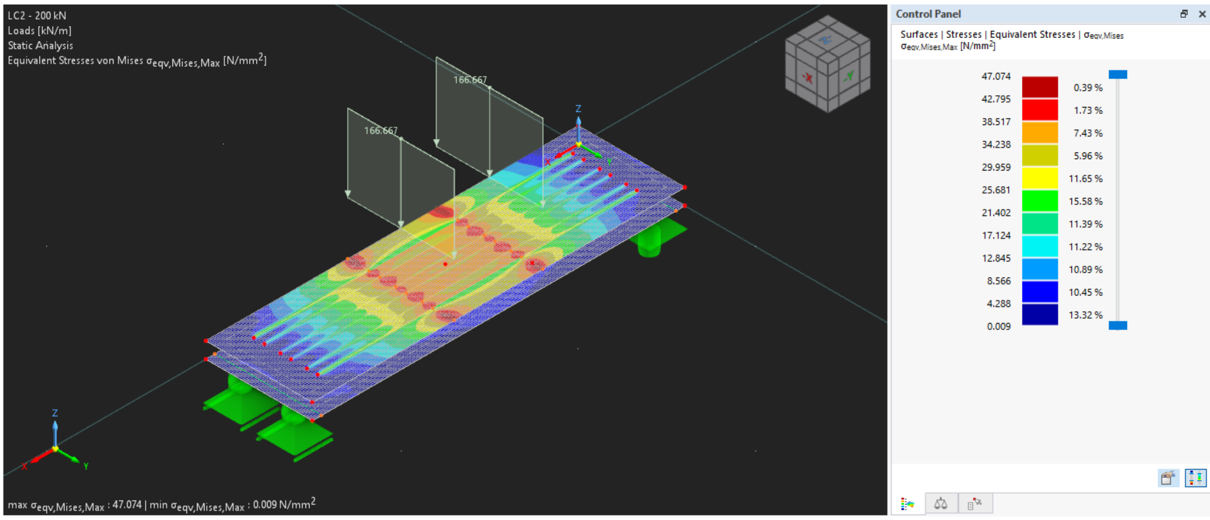


Figur 53 - Spenning-last diagram for kritisk punkt betongoverflaten. Punktet er valgt grafisk.

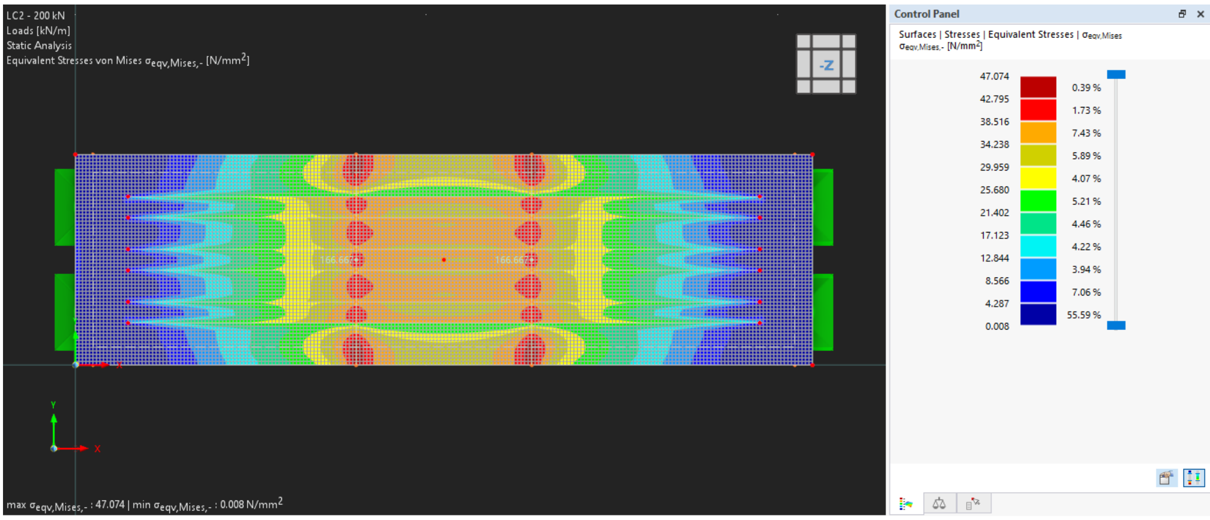


Figur 54 - Spenning-last diagram for kritisk punkt i treoverflaten. Punkt valgt grafisk.

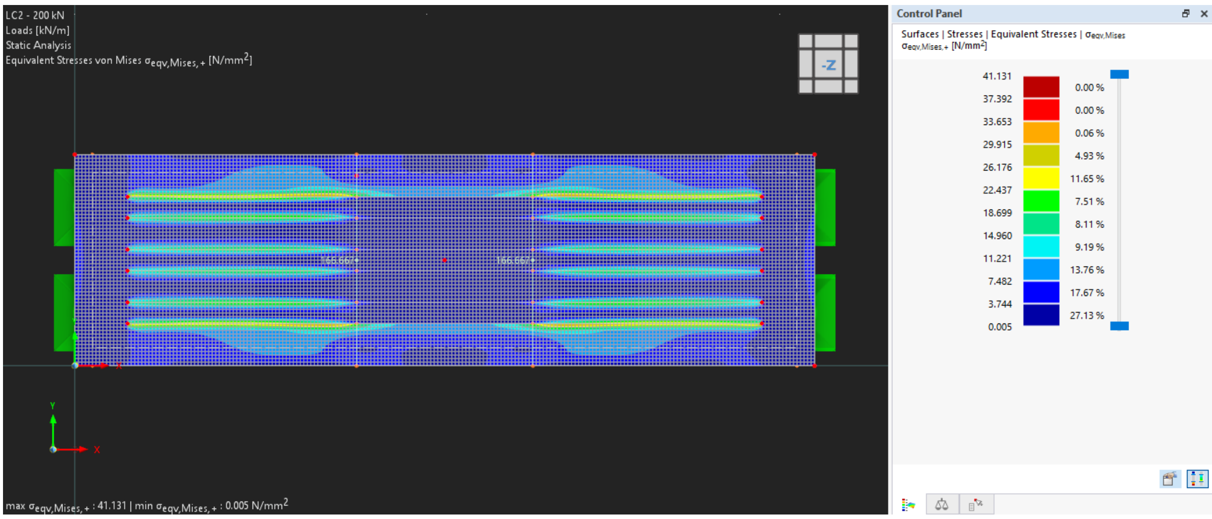
Komposittdekke av type B



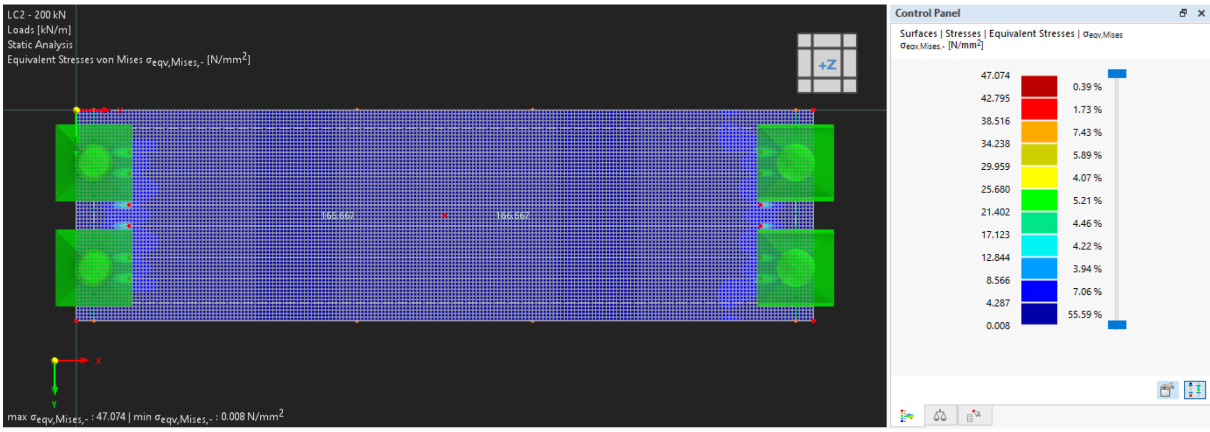
Figur 55 - Oversiktsbilde over de høyeste spenningssonene i modell type B med metode 2



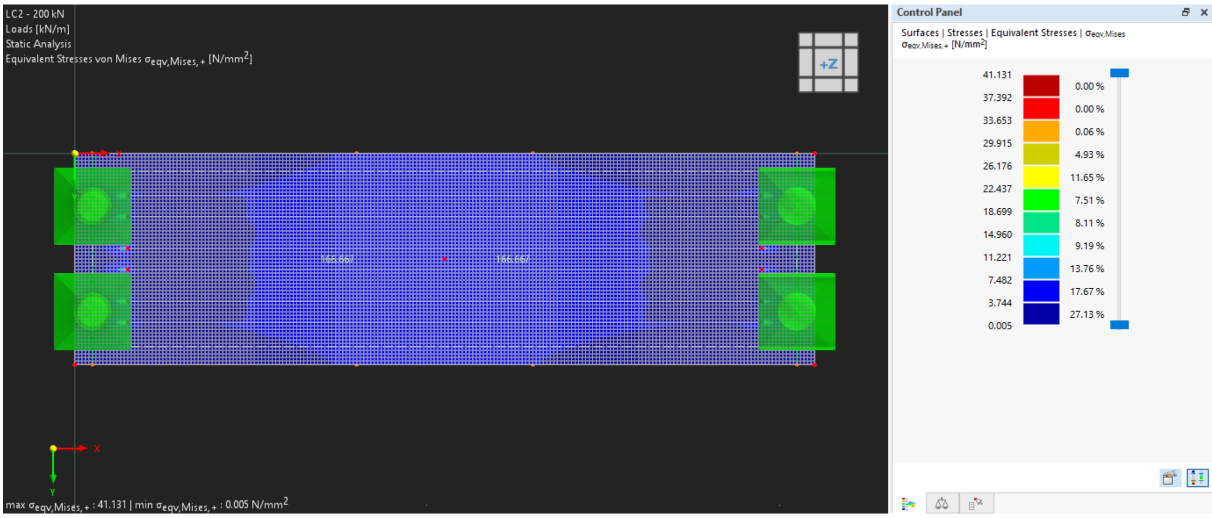
Figur 56 - Spenningsfordeling øvre betonglag



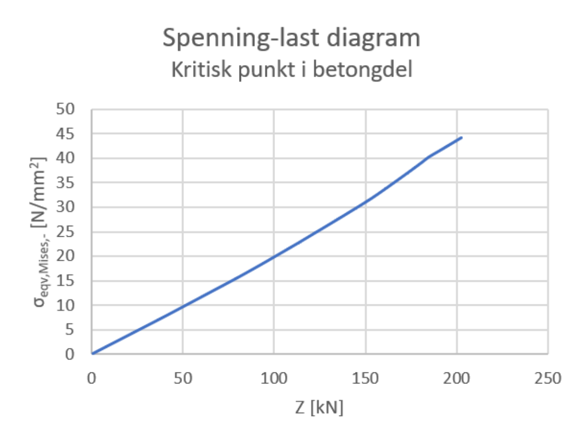
Figur 57 - Spenningsfordeling nedre del betonglag



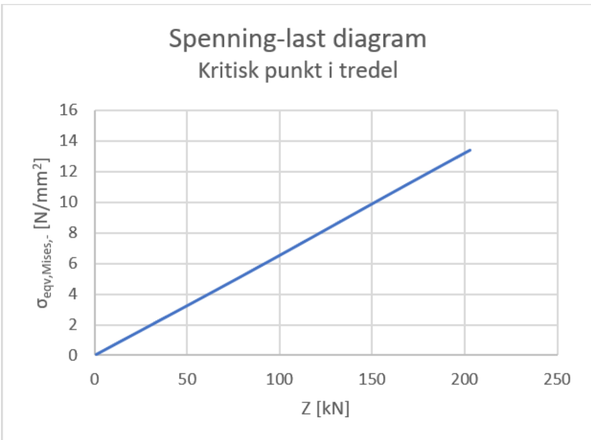
Figur 58 - Spenningsfordeling øvre lag tredel



Figur 59 - Spenningsfordeling nedre lag tredel



Figur 61 - Spenning-last diagram for kritisk punkt betongoverflate. Punktet er valgt grafisk.



Figur 60 - Spenning-last diagram for kritisk punkt i treoverflatel. Punkt valgt grafisk.

5 Diskusjon og konklusjon

Last-deformasjons diagrammene

For komposittdekke av type A, se kapittel 3.3.1, viser resultatene at last-deformasjonskurvene er konservative for begge modellerings metodene, sammenlignet med målingene fra laboratorieforsøket.

FEM analyse metode 1 gir en lineær presentasjon av deformasjonen under lastpåvirkning. Laboratorieforsøkene gir en brattere kurve i starten av belastningsfasen, for så å flate ut etter første tegn på brudd. Avstanden mellom grafene for laboratorieforsøket og grafen for metode 1 blir derfor først større før den smalner etter 150 kN.

FEM analyse metode 2 gir en ikke-lineær kurve som følger formen til laboratorieforsøk grafene tilfredsstillende, men konservativt. Grafen oppnår høy deformasjon ved lavere belastning i forhold til hva laboratorieforsøkene viser, men FEM analysen starter å flate ut på 150 kN.

For komposittdekke av type B, se kapittel 3.3.1, viser resultatene av kombinert last-deformasjonsfigur to analyser som samsvarer bedre med laboratorieforsøkene enn tilsvarende figur for type A.

Også for komposittdekke av type B gir FEM analyse metode 1 en lineær graf som tidlig i belastningen er konservativ, sammenlignet med laboratorieforsøkene, for så å passere en del av de rundt 175 kN.

FEM analyse metode 2 gir i kontrast med de andre analysene en for gunstig kurve sammenlignet med laboratorieforsøkene. Analysen følger det øvre sjiktet av kurvene fra laboratorieforsøket fram til cirka 100 kN der kurvene fra laboratorieforsøket knekker så over i en flatere kurve.

Metode 1

Fordeler:

- Mulighet for å sette en egen verdi for glidemodulen og er derfor mer anvendelig for ulike skjærforbindelser av for eksempel skruer.

- Analysen gir tilfredsstillende, men konservative, resultat ved maks belastning.

Ulemper:

- Produserer lineære resultater som tidvis er mer konservative enn laboratorieforsøkene.

- Skjærforbindelsen blir ansett å være jevnt fordelt over hele kontaktområdet. I virkeligheten vil det oppstå høyere spenning rundt skruene i forbindelsen, disse sonene blir ikke hensyntatt i denne metoden.

Metode 2

Fordeler:

- Produserer ikke-lineære kurver som ligner mer på kurvene fra laboratorieforsøkene.

- Tar bedre hensyn de ulike spenningssonene dannet av skrueforbindelsene.

Ulemper:

- Har mindre fleksibilitet med tanke på glidemodul. Dette gir større usikkerhet i resultatene.

Avlesing av spenningsutvikling i elementene

Modellvinduet gir et tilfredsstillende visuelt bilde av spenningsfordelingen ved den høyeste lasten. Det er likevel et kritisk sprik mellom verdier grafisk framstilt i modellvinduet og i oppsummeringen av analysen i regnearkvinduet med verdier presentert i kalkulasjons diagrammene for FEM analyse metode 1. Tabell 10 viser en oversikt over hvilke spenninger som er forventet i overflaten på de valgte, kritiske punktene ut ifra det grafiske vinduet, og hvilke verdier som kalkulasjons diagrammet viser ved lik last. Dette kan bero på en feil i programvareversjonen brukt i oppgaven, RFEM 6.02.0011.

Tabell 10 - Oversikt over forventede verdier utfra grafisk vindu etter kjørt analyse mot verdier produsert i samme punkter i kalkulasjons diagrammer

	Grafiske verdier		Diagramverdier		
	Betong [N/mm^2]	Tre [N/mm^2]	Betong [N/mm^2]	Tre [N/mm^2]	
Type A Metode 1	72-66	20-26	0,400	0,150	-
Type B Metode 1	77-84	23-31	1,950	0,026	-
Type A Metode 2	35-38	14-17	37	13,5	OK
Type B Metode 2	43-47	13-17	44	13,5	OK

Referanser

[1] M. Bergfjord, «Load capacity and structural response of CLT-concrete composite slabs with two different types of shear fasteners», Masteroppgave i Konstruksjoner og materialer, Institutt for maskin, bygg og materialteknologi, Universitetet i Stavanger, Stavanger, 2021.

[2] A. Ogrin og T. Hozjan, «Timber-Concrete Composite Structural Elements», i *Engineered Wood Products for Construction*, July 23rd 2021., IntechOpen, 2021. doi: 10.5772/intechopen.99624.

[3] R. W. Haug, «Tre-betong samvirkedekker i Norge/Skandinavia: Nylig utvikling og dimensjoneringsmetoder», Masteroppgave i Konstruksjoner og materialer, Institutt for maskin, bygg og materialteknologi, Universitetet i Stavanger, Stavanger, 2020.

[4] A. Ceccotti, «Composite concrete-timber structures», *Prog. Struct. Eng. Mater.*, bd. 4, nr. 3, s. 264–275, 2002, doi: 10.1002/pse.126.

[5] The Efficient Engineer, *Understanding the Finite Element Method*, (27. april 2021). Åpnet: 3. juli 2022. [Online Video]. Tilgjengelig på: https://www.youtube.com/watch?v=GHjopp47vvQ

[6] Dlubal Software, «RFEM 6 | FEA software», *DLUBAL.COM*. https://www.dlubal.com/en/products/rfem-fea-software/what-is-rfem (åpnet 25. april 2022).

[7] Dlubal Software, «RFEM 6 - manual», *DLUBAL.COM*. https://www.dlubal.com/en/downloads-and-information/documents/online-manuals/rfem-6 (åpnet 3. juli 2022).

[8] NS-EN 1992-1-1:2004+A1:2014+NA:2021, «Eurokode 2 — Prosjektering av betongkonstruksjoner — Del 1-1: Allmenne regler og regler for bygninger». 2021.

[9] «Armeringsnett B500NA regulær», *NORSKSTAAL.NO*. https://www.norskstaal.no/Default.aspx?ID=6605&groupid=GROUP261&productid=PROD2928 (åpnet 4. juli 2022).

[10] NS 3576-4:2005, «Armeringsstål - Mål og egenskaper - Del 4: Sveiste armeringsnett». 2005.

[11] NS-EN 1995-1-1:2004+A1:2008+NA:2010, «Eurokode 5: Prosjektering av trekonstruksjoner - Del 1-1: Allmenne regler og regler for bygninger». 2010.

Vedlegg

A. Utskriftsrapport fra RFEM modell «Type A metode 1»
B. Utskriftsrapport fra RFEM modell «Type A metode 2»
C. Utskriftsrapport fra RFEM modell «Type B metode 1»
D. Utskriftsrapport fra RFEM modell «Type B metode 2»

Kommentar: vedlegg C viser ikke den fullstendige utskriftsrapporten, da det har skjedd en feil ved henting av rapporten i programvaren.

A. Utskriftsrapport fra RFEM modell «Type A metode 1»

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Structural Analysis

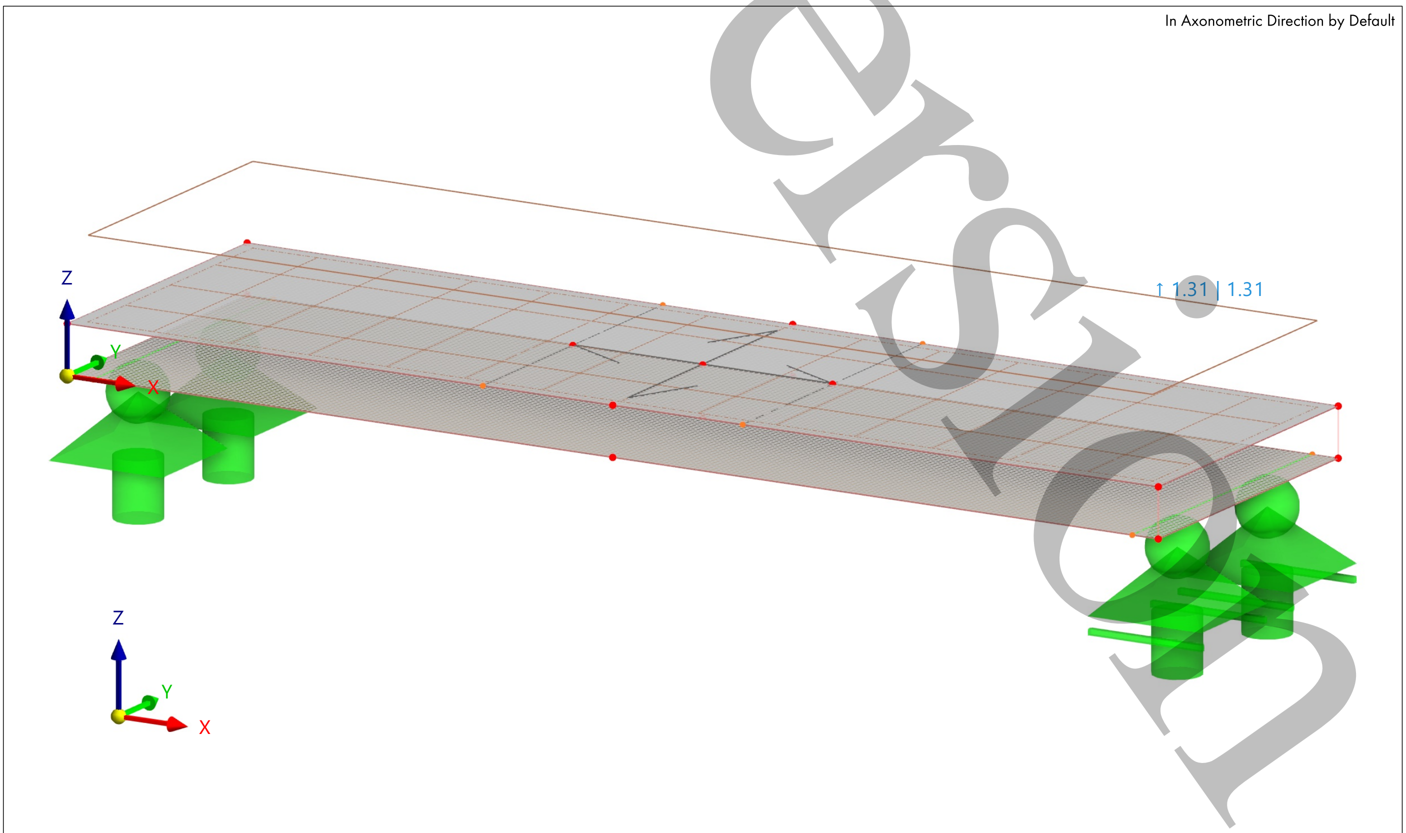
Chapters

CLIENT

CREATED BY

PROJECT

MODEL



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CONTENTS

A MODEL - LOCATION

Location

Country	:	--
Street	:	
Zip / Postal code	:	
City	:	
State	:	
Latitude	:	deg
Longitude	:	deg
Altitude	:	m

B MODEL - PARAMETERS

Model ID {10145bfe-e70e-4978-8914-8947fb342e32}
Unique model identifier

Project ID {91af4629-d872-463e-8724-66011f1f28ef}
Unique project identifier

C MODEL - BASE DATA

Main

Model name		:	Type A - method 1.rf6
Model description		:	
Type of model		:	3D

Add-ons

Concrete Design
Timber Design

Standards I

Load case classification & combination wizard	:	EN 1990 | Timber CEN | 2010-04
Load Wizard	:	EN 1991 CEN | 2015-09
Standard group for concrete design	:	EN 1992 CEN | 2014-11
Standard group for timber design	:	EN 1995 CEN | 2014-05

Settings & Options

Acceleration of gravity / mass conversion constant	g	:	10.00 m/s²
Date of day zero in time diagram		:	01.01.2016
Global axes XYZ		:	Z upward
Local axes xyz		:	z downward

Tolerances

Tolerance for nodes	:	0.00050 m
Tolerance for lines	:	0.00050 m
Tolerance for surfaces/planes	:	0.00050 m
Tolerance for directions	:	0.00050 m

D MESH SETTINGS

General

Target length of finite elements	L_F	:	0.010 m
Maximum distance between a node and a line to integrate it into the line	ε	:	0.001 m
Maximum number of mesh nodes (in thousands)	n_m	:	500

Members

Number of divisions for result diagram	:	10

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D MESH SETTINGS

Number of divisions for special types of members (cable, elastic foundation, taper, nonlinearity)	:	10
Number of divisions for determination of max/min values	:	10
Activate member divisions for straight members, which are not integrated into surfaces, with concrete material category group (necessary for nonlinear calculation)		
Minimum number of member divisions	:	10
Activate member divisions for large deformation or post-critical analysis		
Activate member divisions for straight members		
Minimum number of member divisions	:	8
Activate division for members with nodes lying on them		

Surfaces

Maximum ratio of FE rectangle diagonals	Δ_D	:	1.800
Maximum out-of-plane inclination of two finite elements	α	:	0.50
Shape of finite elements		:	Triangles and quadrangles
Same squares where possible			
Triangles for membranes			

1 Basic Objects

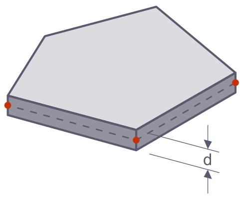
1.1 MATERIALS

Legend
Concrete Settings
Stiffness modification
User-Defined Material

Material No.	Material Name	Material Type	Analysis Model	Options
1	C35/45 | Isotropic | Plastic (Surfaces/Solids)	Concrete	Isotropic | Plastic (Surfaces/ Solids)	
2	T22 | Orthotropic | Plastic (Surfaces)	Timber	Orthotropic | Plastic (Surfaces)	
3	T15 | Orthotropic | Plastic (Surfaces)	Timber	Orthotropic | Plastic (Surfaces)	
4	B500M(A) | Isotropic | Plastic (Surfaces/Solids)	Reinforcing Steel	Isotropic | Plastic (Surfaces/ Solids)	

1.2 THICKNESSES

Uniform



Thick. No.	Type	Assigned to Surface No.	Material	Symbol	Thickness Value	Unit	Nodes	Direction
1	Uniform | d : 60.0 mm | 1 - C35/45							
	Uniform	2	1	d	60.0	mm		
2	Uniform | d : 30.0 mm | 2 - T22							
	Uniform		2	d	30.0	mm		
3	Uniform | d : 20.0 mm | 3 - T15							
	Uniform		3	d	20.0	mm		
4	Layers | d : 120.0 mm | Layers: 5							
	Layers	1						

1.2.1 THICKNESSES - LAYER INFO

Thick. No.	Layer Model Solid	Layer Model Gas	Total Thickness d [mm]	Total Weight g [N/m²]	Comment
4			120.0	540.0	

1.2.2 THICKNESSES - LAYERS

Thick. No.	Layer No.	Layer Type	Object	Material	Thickness d [mm]	Rotation β [deg]	Connected	Spec. W. g_i [N/m³]	Weight g [N/m²]	Comment
4	1	Layer	2	2	30.0	0.00	☐	4700.0	141.0	
	2	Layer	3	3	20.0	90.00	☐	4300.0	86.0	
	3	Layer	3	3	20.0	0.00	☐	4300.0	86.0	
	4	Layer	3	3	20.0	90.00	☐	4300.0	86.0	
	5	Layer	2	2	30.0	0.00	☐	4700.0	141.0	

1.3 NODES

Legend
On Line

Node No.	Node Type	Reference Node	Coordinate System	Coordinate Type	X [m]	Y [m]	Z [m]	Options	Comment
1	Standard	--	1	Cartesian	2.100	0.600	0.000		
2	Standard	--	1	Cartesian	0.000	0.000	0.090		
3	Standard	--	1	Cartesian	2.100	0.600	0.090		
4	Standard	--	1	Cartesian	0.000	0.000	0.000		
5	Standard	--	1	Cartesian	2.100	0.000	0.000		

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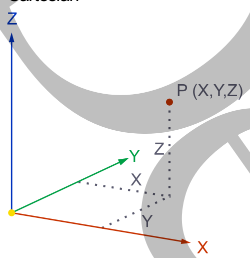
1.3

NODES

Cartesian



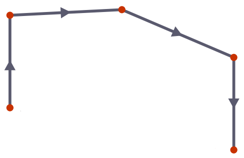
Node No.	Node Type	Reference Node	Coordinate System	Coordinate Type	X [m]	Y [m]	Z [m]	Options	Comment
7	Standard	--	1	Cartesian	0.000	0.600	0.000		
9	Standard	--	1	Cartesian	2.100	0.000	0.090		
11	Standard	--	1	Cartesian	0.000	0.600	0.090		
13	On Line		1	Cartesian	0.800	0.000	0.090		
14	On Line		1	Cartesian	0.800	0.600	0.090		
15	On Line		1	Cartesian	1.300	0.000	0.090		
16	On Line		1	Cartesian	1.300	0.600	0.090		
18	On Line		1	Cartesian	0.050	0.000	0.000		
19	On Line		1	Cartesian	0.050	0.600	0.000		
20	On Line		1	Cartesian	2.050	0.000	0.000		
21	On Line		1	Cartesian	2.050	0.600	0.000		
23	Standard	--	1	Cartesian	1.050	0.000	0.000		
24	Standard	--	1	Cartesian	1.050	0.600	0.000		
26	Standard	--	1	Cartesian	1.050	0.600	0.090		
27	Standard	--	1	Cartesian	1.050	0.000	0.090		
29	Standard	--	1	Cartesian	1.050	0.300	0.000		
30	Standard	--	1	Cartesian	1.050	0.300	0.090		
31	Standard	--	1	Cartesian	1.300	0.300	0.090		
32	Standard	--	1	Cartesian	0.800	0.300	0.090		

1.4

LINES

Legend
Line Support
Nodes on Line

Polyline



Line No.	Line Type	Nodes No.	Line Length L [m]	Position	Options	Comment
1	Polyline	4,5	2.100	On X		
2	Polyline	5,1	0.600	|| Y		
3	Polyline	1,7	2.100	|| X		
4	Polyline	7,4	0.600	On Y		
5	Polyline	2,9	2.100	|| X		
6	Polyline	9,3	0.600	|| Y		
7	Polyline	3,11	2.100	|| X		
8	Polyline	11,2	0.600	|| Y		
9	Polyline	13,14	0.600	|| Y		
10	Polyline	15,16	0.600	|| Y		
11	Polyline	18,19	0.600	|| Y		
12	Polyline	19,21	2.000	|| X		
13	Polyline	21,20	0.600	|| Y		

1.5

SURFACES

Legend
Concrete Durability (Concrete Design)
Design properties
Grid for Results

Surface No.	Boundary Lines	Stiffness Type	Geometry Type	Thickness	Material	Position	Options
1	1-4	Standard	Plane	4		In XY	
2	5-8	Standard	Plane	1	1	|| XY	

Integrated Objects · Reinforcement Direction – Bottom · Reinforcement Direction – Top
Service Class (Timber Design)
Surface Reinforcement Table

2 Special Objects

2.1

SURFACE CONTACTS

Contact No.	Contact Type	Surface Assignment Group 1	Group 2	Comment
1	4	1	2	

2.2

STRUCTURE MODIFICATIONS

Mod. No.	Description	Value	Comment
1	Structure Modification 1		
	Assigned to	CO 1	
	Partial Safety Factor γ_M	☒	
	Materials	☐	
	Surfaces	☐	
	Line Supports	☐	
	Surface Reinforcement	☐	
	Material Nonlinearity Models	☐	

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2.2 STRUCTURE MODIFICATIONS

Mod. No.	Description	Value	Comment
	Surface Contact, Solid Types "Contact"	☐	
	Timber Members due to Moisture Class	☐	

3 Types for Lines

3.1 LINE SUPPORTS

Support No.	Lines No.	Coordinate System	x Axis R. β [deg]	Translational Spring [kN/m²] $C_{u,X}$	$C_{u,Y}$	$C_{u,Z}$	Rotational Spring [kNm·rad⁻¹·m⁻¹] $C_{\varphi,X}$	$C_{\varphi,Y}$	$C_{\varphi,Z}$
1	11	Global XYZ		☒	☒	☒	☐	☐	☐
3	13	Global XYZ		☐	☒	☒	☐	☐	☐

4 Types for Special Objects

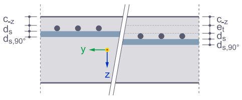
4.1 SURFACE CONTACT TYPES

Contact No.	Contacts No.	Perpendicular to Surface	Parallel to Surface	Comment
4	Full force transmission | Elastic surface behavior (Surface Contacts : 1)			
	1	Full force transmission	Elastic surface behavior	

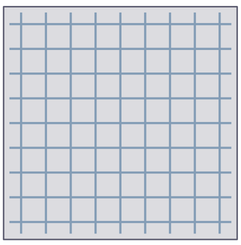
5 Types for Concrete Design

5.1 SURFACE REINFORCEMENTS

Location Type 'On Surface' | Alignment 'Top (-z)'

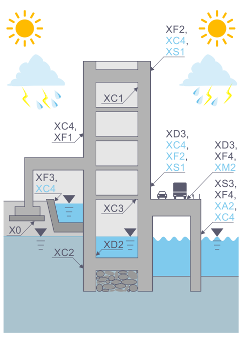


Reinforcement Type 'Mesh'



Reinf. No.	Description	Symbol	Value	Unit
1	On Surface | Mesh | Q131A | Top (-z) (Surfaces : 2)			
	Assigned to Surfaces No.		2	
	Location type		On Surface	
	Material		4 - B500M(A) | Isotropic | Plastic (Surfaces/Solids)	
	Reinforcement type		Mesh	
	Mesh product range		Germany - 1997-01-01	
	Mesh name		Q131A	
	Mesh shape		Q-Mesh	
	Rebar diameter	d_s	5.0	mm
	Rebar spacing	s	0.150	m
	Additional transverse reinforcement enabled		☒	
	Additional rebar diameter	$d_{s,90°}$	5.0	mm
	Additional rebar spacing	$s_{90°}$	0.150	m
	Top alignment enabled		☒	
	Bottom alignment enabled		☐	
	Top additional offset to concrete cover	e_t	10.0	mm
	Reinforcement direction type		In reinforcement direction	
	In reinforcement direction of design		$a_{s,1}$	
	Reinforcement area	$a_{s,1}$	1.31	cm²/m
	Reinforcement area	$a_{s,2}$	1.31	cm²/m
	Reinforcement area	$a_{s,1,-z}$	1.31	cm²/m
	Reinforcement area	$a_{s,2,-z}$	1.31	cm²/m

5.2 CONCRETE DURABILITIES



Cond. No.	Description	Symbol	Value	Unit
1	XC1 (Surfaces : 2)			
	Assigned to Members No.			
	Assigned to Member Sets No.			
	Assigned to Surfaces No.		2	
	Corrosion induced by carbonation		XC1 - Dry or permanently wet	
	Structural class type		According to standard	
	Increase design working life from 50 to 100 years enabled		☐	
	Position of reinforcement not affected by construction process enabled		☐	
	Special quality control of production enabled		☐	
	Air entrainment of more than 4% enabled		☐	
	Allowance for deviation type		According to standard	

5.3

REINFORCEMENT DIRECTIONS

Direction No.	Type	Surfaces	Reinf. Dir. Rotations About z Related to x φ1 [deg]	φ2 [deg]	Δφ2 [deg]
1	First Reinforcement Direction in x	2			

6 Load Cases & Combinations

6.1

LOAD CASES

LC No.	Settings	Value	Unit	To Solve
1	G 200 kN			
	Analysis type	Static Analysis		☒
	Static analysis settings	SA1 - Geometrically linear | Newton-Raphson		
	Action category	G Permanent		
	Self-weight - Factor in direction X	0.000	--	
	Self-weight - Factor in direction Y	0.000	--	
	Self-weight - Factor in direction Z	-1.000	--	
	Load duration	Permanent		
2	G 170 kN			
	Analysis type	Static Analysis		☒
	Static analysis settings	SA1 - Geometrically linear | Newton-Raphson		
	Action category	G Permanent		
	Self-weight - Factor in direction X	0.000	--	
	Self-weight - Factor in direction Y	0.000	--	
	Self-weight - Factor in direction Z	-1.000	--	
	Load duration	Permanent		

6.2

STATIC ANALYSIS SETTINGS

Settings No.	Description	Symbol	Value	Unit
1	Geometrically linear | Newton-Raphson			
	Analysis type		Geometrically linear	
	Iterative method for nonlinear analysis		Newton-Raphson	
	Maximum number of iterations		100	
	Number of load increments		200	
	Modify standard precision and tolerance settings		☐	
	Ignore all nonlinearities		☐	
	Modify loading by multiplier factor		☐	
	Displacements due to member load of type 'Pipe internal pressure' (Bourdon effect)		☐	
	Save results of all load increments		☒	
	Method for equation system		Direct	
	Plate bending theory		Mindlin	
	Activate mass conversion to load		☐	
	Asymmetric direct solver		☐	
2	Second-order (P-Δ) | Picard | 100 | 1			
	Analysis type		Second-order (P-Δ)	
	Iterative method for nonlinear analysis		Picard	
	Maximum number of iterations		100	
	Number of load increments		1	
	Modify standard precision and tolerance settings		☐	
	Ignore all nonlinearities		☐	
	Modify loading by multiplier factor		☐	
	Consider favorable effect due to tension in members		☒	
	Displacements due to member load of type 'Pipe internal pressure' (Bourdon effect)		☐	
	Refer internal forces to deformed structure		☒	
	Refer internal forces to deformed structure for normal forces		☒	
	Refer internal forces to deformed structure for shear forces		☒	
	Refer internal forces to deformed structure for moments		☒	
	Method for equation system		Direct	
	Plate bending theory		Mindlin	
	Activate mass conversion to load		☐	
	Asymmetric direct solver		☐	
3	Large deformations | Newton-Raphson | 100 | 1			
	Analysis type		Large deformations	
	Iterative method for nonlinear analysis		Newton-Raphson	
	Maximum number of iterations		100	
	Number of load increments		1	

6.2 STATIC ANALYSIS SETTINGS

Settings No.	Description	Symbol	Value	Unit
	Modify standard precision and tolerance settings		☐	
	Ignore all nonlinearities		☐	
	Modify loading by multiplier factor		☐	
	Consider favorable effect due to tension in members		☒	
	Try to calculate unstable structure		☐	
	Displacements due to member load of type 'Pipe internal pressure' (Bourdon effect)		☐	
	Method for equation system		Direct	
	Plate bending theory		Mindlin	
	Activate mass conversion to load		☐	
	Asymmetric direct solver		☐	
4	Large deformations | Newton-Raphson | 100 | 20			
	Analysis type		Large deformations	
	Iterative method for nonlinear analysis		Newton-Raphson	
	Maximum number of iterations		100	
	Number of load increments		20	
	Modify standard precision and tolerance settings		☐	
	Ignore all nonlinearities		☐	
	Modify loading by multiplier factor		☐	
	Consider favorable effect due to tension in members		☒	
	Try to calculate unstable structure		☐	
	Displacements due to member load of type 'Pipe internal pressure' (Bourdon effect)		☐	
	Save results of all load increments		☐	
	Method for equation system		Direct	
	Plate bending theory		Mindlin	
	Activate mass conversion to load		☐	
	Asymmetric direct solver		☐	

6.2.1 STATIC ANALYSIS SETTINGS - CALCULATION DIAGRAMS

Settings	Horizontal Axis				Vertical Axis			
No.	Result Type	Value	Object	Node	Result Type	Value	Object	Node
1	Maximum deformation	u_z			Sum of support forces	Z		
	Sum of support forces	Z			Surfaces - Equivalent Stresses - von Mises	$\sigma_{eqv,Mises,Max}$	2	31
	Sum of support forces	Z			Surfaces - Equivalent Stresses - von Mises	$\sigma_{eqv,Mises,Max}$	1	29
4	Surfaces - Local Deformations	u_z	1	23	Increment			
	Surfaces - Local Deformations	|u|	1	24	Increment			
	Surfaces - Local Deformations	u_z	1	29	Increment			
	Surfaces - Local Deformations	u_z	2	27	Increment			
	Surfaces - Local Deformations	|u|	2	26	Increment			
	Surfaces - Local Deformations	u_z	2	30	Increment			

7 Guide Objects

7.1 COORDINATE SYSTEMS

System		Coordinates			Rotation				
No.	Type	Symbol	Value	Unit	Sequence	Symbol	Value	Unit	Comment
1	Global XYZ								

8 Parts List

8.1 PARTS LIST - ALL BY MATERIAL

Parts Lists

Material No.	Material Name	Object Type	Tot. Coating C_Σ [m²]	Tot. Volume V_Σ [m³]	Tot. Weight W_Σ [t]
1	C35/45	Surfaces	2.844	0.076	0.189
Total			2.844	0.076	0.189
2	T22	Surfaces	2.520	0.151	0.068
Total			2.520	0.151	0.068
Σ Total			5.364	0.227	0.257

9 Static Analysis Results

9.1 SUMMARY

Static Analysis

Description	Value	Unit	Notes
LC2 - 170 kN			
Sum of loads and the sum of support forces			
Sum of loads in X	0.00	kN	
Sum of support forces in X	0.00	kN	
Sum of loads in Y	0.00	kN	
Sum of support forces in Y	0.00	kN	
Sum of loads in Z	-172.60	kN	
Sum of support forces in Z	-172.60	kN	Deviation: 0.00 %
Resultant of reactions			
Resultant of reactions about X	0.00	kNm	At center of gravity of model (1.050, 0.300, 0.086 m)
Resultant of reactions about Y	0.00	kNm	At center of gravity of model
Resultant of reactions about Z	0.00	kNm	At center of gravity of model
Maximum deformations			
Maximum displacement in X-direction	0.5	mm	FE node No. 12821: (2.100, 0.500, 0.000 m)
Maximum displacement in Y-direction	-0.1	mm	FE node No. 15: (1.300, 0.000, 0.090 m)
Maximum displacement in Z-direction	-20.1	mm	FE node No. 20728: (1.050, 0.000, 0.090 m)
Maximum vectorial displacement	20.1	mm	FE node No. 20728: (1.050, 0.000, 0.090 m)
Maximum rotation about X-axis	0.4	mrad	FE node No. 8019: (1.580, 0.000, 0.000 m)
Maximum rotation about Y-axis	-28.3	mrad	FE node No. 20989: (1.940, 0.020, 0.090 m)
Maximum rotation about Z-axis	-0.4	mrad	FE node No. 20751: (1.280, 0.000, 0.090 m)
Calculation statistic			
Number of iterations	2		
Maximum value of element of stiffness matrix on diagonal	3.97e+09	--	
Minimum value of element of stiffness matrix on diagonal	1422.72	--	
Stiffness matrix determinant	4.66e+1087358	--	
Infinity Norm	9.78e+09	--	
Static Analysis Settings No. 1 - Geometrically linear | Newton-Raphson			
Analysis type	Geometrically linear		
Iterative method	Newton-Raphson		
Maximum number of iterations	100		
Number of load increments	200		
Modify loading by multiplier factor	☐		
Save results of all load increments	☒		
Asymmetric direct solver	☐		
Method for Equation System	Direct		
Plate bending theory	Mindlin		

9.2 CALCULATION DIAGRAMS

Static Analysis

Increment No.	Iteration No.	Load Factor [--]	Value on Vertical Axis	Value on Horizontal Axis	Comment
LC2 - 170 kN					
Calculation Diagram: 1					
			Z [kN]	u_Z [mm]	Maximum deformation u_Z [mm] | Sum of support forces Z [kN]
1	2	0.005	-0.863	-0.1	
2	2	0.010	-1.726	-0.2	
3	2	0.015	-2.589	-0.3	
4	2	0.020	-3.452	-0.4	
5	2	0.025	-4.315	-0.4	
6	2	0.030	-5.178	-0.5	
7	2	0.035	-6.041	-0.6	
8	2	0.040	-6.904	-0.7	
9	2	0.045	-7.767	-0.8	
10	2	0.050	-8.630	-0.9	
11	2	0.055	-9.493	-1.0	
12	2	0.060	-10.356	-1.1	
13	2	0.065	-11.219	-1.2	
14	2	0.070	-12.082	-1.3	
15	2	0.075	-12.945	-1.3	
16	2	0.080	-13.808	-1.4	
17	2	0.085	-14.671	-1.5	
18	2	0.090	-15.534	-1.6	
19	2	0.095	-16.397	-1.7	
20	2	0.100	-17.260	-1.8	
21	2	0.105	-18.123	-1.9	
22	2	0.110	-18.986	-2.0	
23	2	0.115	-19.849	-2.1	
24	2	0.120	-20.712	-2.2	

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9.2 CALCULATION DIAGRAMS

Static Analysis

Increment No.	Iteration No.	Load Factor [--]	Value on Vertical Axis	Value on Horizontal Axis	Comment
25	2	0.125	-21.575	-2.3	
26	2	0.130	-22.438	-2.4	
27	2	0.135	-23.301	-2.5	
28	2	0.140	-24.164	-2.6	
29	2	0.145	-25.027	-2.7	
30	2	0.150	-25.890	-2.8	
31	2	0.155	-26.753	-2.9	
32	2	0.160	-27.616	-3.0	
33	2	0.165	-28.479	-3.1	
34	2	0.170	-29.342	-3.2	
35	2	0.175	-30.205	-3.3	
36	2	0.180	-31.068	-3.4	
37	2	0.185	-31.931	-3.5	
38	2	0.190	-32.794	-3.6	
39	2	0.195	-33.657	-3.7	
40	2	0.200	-34.520	-3.8	
41	2	0.205	-35.383	-3.9	
42	2	0.210	-36.246	-4.0	
43	2	0.215	-37.109	-4.1	
44	2	0.220	-37.972	-4.2	
45	2	0.225	-38.835	-4.3	
46	2	0.230	-39.698	-4.4	
47	2	0.235	-40.561	-4.5	
48	2	0.240	-41.424	-4.6	
49	2	0.245	-42.287	-4.7	
50	2	0.250	-43.150	-4.8	
51	2	0.255	-44.013	-4.9	
52	2	0.260	-44.876	-5.0	
53	2	0.265	-45.739	-5.1	
54	2	0.270	-46.602	-5.2	
55	2	0.275	-47.465	-5.3	
56	2	0.280	-48.328	-5.4	
57	2	0.285	-49.191	-5.5	
58	2	0.290	-50.054	-5.6	
59	2	0.295	-50.917	-5.7	
60	2	0.300	-51.780	-5.8	
61	2	0.305	-52.643	-5.9	
62	2	0.310	-53.506	-6.0	
63	2	0.315	-54.369	-6.1	
64	2	0.320	-55.232	-6.2	
65	2	0.325	-56.095	-6.3	
66	2	0.330	-56.958	-6.4	
67	2	0.335	-57.821	-6.5	
68	2	0.340	-58.684	-6.6	
69	2	0.345	-59.547	-6.7	
70	2	0.350	-60.410	-6.8	
71	2	0.355	-61.273	-6.9	
72	2	0.360	-62.136	-7.0	
73	2	0.365	-62.999	-7.1	
74	2	0.370	-63.862	-7.2	
75	2	0.375	-64.725	-7.3	
76	2	0.380	-65.588	-7.4	
77	2	0.385	-66.451	-7.5	
78	2	0.390	-67.314	-7.6	
79	2	0.395	-68.177	-7.7	
80	2	0.400	-69.040	-7.8	
81	2	0.405	-69.903	-7.9	
82	2	0.410	-70.766	-8.0	
83	2	0.415	-71.629	-8.1	
84	2	0.420	-72.492	-8.2	
85	2	0.425	-73.355	-8.3	
86	2	0.430	-74.218	-8.4	
87	2	0.435	-75.081	-8.5	
88	2	0.440	-75.944	-8.6	
89	2	0.445	-76.807	-8.7	
90	2	0.450	-77.670	-8.8	
91	2	0.455	-78.533	-8.9	
92	2	0.460	-79.396	-9.0	
93	2	0.465	-80.259	-9.1	
94	2	0.470	-81.122	-9.2	
95	2	0.475	-81.985	-9.3	
96	2	0.480	-82.849	-9.4	
97	2	0.485	-83.712	-9.5	
98	2	0.490	-84.575	-9.6	
99	2	0.495	-85.438	-9.7	
100	2	0.500	-86.301	-9.8	
101	2	0.505	-87.164	-9.9	

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9.2 CALCULATION DIAGRAMS

Static Analysis

Increment No.	Iteration No.	Load Factor [--]	Value on Vertical Axis	Value on Horizontal Axis	Comment
102	2	0.510	-88.027	-10.0	
103	2	0.515	-88.890	-10.1	
104	2	0.520	-89.753	-10.2	
105	2	0.525	-90.616	-10.3	
106	2	0.530	-91.479	-10.4	
107	2	0.535	-92.342	-10.5	
108	2	0.540	-93.205	-10.6	
109	2	0.545	-94.068	-10.7	
110	2	0.550	-94.931	-10.8	
111	2	0.555	-95.794	-10.9	
112	2	0.560	-96.657	-11.0	
113	2	0.565	-97.520	-11.1	
114	2	0.570	-98.383	-11.2	
115	2	0.575	-99.246	-11.3	
116	2	0.580	-100.109	-11.4	
117	2	0.585	-100.972	-11.5	
118	2	0.590	-101.835	-11.6	
119	2	0.595	-102.698	-11.7	
120	2	0.600	-103.561	-11.8	
121	2	0.605	-104.424	-11.9	
122	2	0.610	-105.287	-12.0	
123	2	0.615	-106.150	-12.1	
124	2	0.620	-107.013	-12.2	
125	2	0.625	-107.876	-12.4	
126	2	0.630	-108.739	-12.5	
127	2	0.635	-109.602	-12.6	
128	2	0.640	-110.465	-12.7	
129	2	0.645	-111.328	-12.8	
130	2	0.650	-112.191	-12.9	
131	2	0.655	-113.054	-13.0	
132	2	0.660	-113.917	-13.1	
133	2	0.665	-114.780	-13.2	
134	2	0.670	-115.643	-13.3	
135	2	0.675	-116.506	-13.4	
136	2	0.680	-117.369	-13.5	
137	2	0.685	-118.232	-13.6	
138	2	0.690	-119.095	-13.7	
139	2	0.695	-119.958	-13.8	
140	2	0.700	-120.821	-13.9	
141	2	0.705	-121.684	-14.0	
142	2	0.710	-122.547	-14.1	
143	2	0.715	-123.410	-14.2	
144	2	0.720	-124.273	-14.3	
145	2	0.725	-125.136	-14.4	
146	2	0.730	-125.999	-14.5	
147	2	0.735	-126.862	-14.6	
148	2	0.740	-127.725	-14.7	
149	2	0.745	-128.588	-14.8	
150	2	0.750	-129.451	-14.9	
151	2	0.755	-130.314	-15.0	
152	2	0.760	-131.177	-15.1	
153	2	0.765	-132.040	-15.2	
154	2	0.770	-132.903	-15.3	
155	2	0.775	-133.766	-15.4	
156	2	0.780	-134.629	-15.5	
157	2	0.785	-135.492	-15.6	
158	2	0.790	-136.355	-15.7	
159	2	0.795	-137.218	-15.8	
160	2	0.800	-138.081	-15.9	
161	2	0.805	-138.944	-16.0	
162	2	0.810	-139.807	-16.1	
163	2	0.815	-140.670	-16.2	
164	2	0.820	-141.533	-16.3	
165	2	0.825	-142.396	-16.4	
166	2	0.830	-143.259	-16.5	
167	2	0.835	-144.122	-16.6	
168	2	0.840	-144.985	-16.7	
169	2	0.845	-145.848	-16.8	
170	2	0.850	-146.711	-16.9	
171	2	0.855	-147.574	-17.1	
172	2	0.860	-148.437	-17.2	
173	2	0.865	-149.300	-17.3	
174	2	0.870	-150.163	-17.4	
175	2	0.875	-151.026	-17.5	
176	2	0.880	-151.889	-17.6	
177	2	0.885	-152.752	-17.7	
178	2	0.890	-153.615	-17.8	

9.2 CALCULATION DIAGRAMS

Static Analysis

	Increment No.	Iteration No.	Load Factor [--]	Value on Vertical Axis	Value on Horizontal Axis	Comment
	179	2	0.895	-154.478	-17.9	
	180	2	0.900	-155.341	-18.0	
	181	2	0.905	-156.204	-18.1	
	182	2	0.910	-157.067	-18.2	
	183	2	0.915	-157.930	-18.3	
	184	2	0.920	-158.793	-18.4	
	185	2	0.925	-159.656	-18.5	
	186	2	0.930	-160.519	-18.6	
	187	2	0.935	-161.382	-18.7	
	188	2	0.940	-162.245	-18.8	
	189	2	0.945	-163.108	-18.9	
	190	2	0.950	-163.971	-19.0	
	191	2	0.955	-164.834	-19.1	
	192	2	0.960	-165.697	-19.2	
	193	2	0.965	-166.560	-19.3	
	194	2	0.970	-167.423	-19.4	
	195	2	0.975	-168.286	-19.6	
	196	2	0.980	-169.149	-19.7	
	197	2	0.985	-170.012	-19.8	
	198	2	0.990	-170.875	-19.9	
	199	2	0.995	-171.738	-20.0	
	200	2	1.000	-172.601	-20.1	
	G LC2 - 170 kN					
	Calculation Diagram: 2					
				$\sigma_{eqv,Mises,Max}$ [N/mm²]	Z [kN]	Sum of support forces Z [kN] | Surfaces - Equivalent Stresses - von Mises $\sigma_{eqv,Mises,Max}$ (Surface No. 2, Node No. 31)
	1	2	0.005	0.003	-0.863	
	2	2	0.010	0.006	-1.726	
	3	2	0.015	0.009	-2.589	
	4	2	0.020	0.012	-3.452	
	5	2	0.025	0.015	-4.315	
	6	2	0.030	0.019	-5.178	
	7	2	0.035	0.022	-6.041	
	8	2	0.040	0.025	-6.904	
	9	2	0.045	0.028	-7.767	
	10	2	0.050	0.031	-8.630	
	11	2	0.055	0.034	-9.493	
	12	2	0.060	0.037	-10.356	
	13	2	0.065	0.041	-11.219	
	14	2	0.070	0.044	-12.082	
	15	2	0.075	0.047	-12.945	
	16	2	0.080	0.050	-13.808	
	17	2	0.085	0.053	-14.671	
	18	2	0.090	0.057	-15.534	
	19	2	0.095	0.060	-16.397	
	20	2	0.100	0.063	-17.260	
	21	2	0.105	0.067	-18.123	
	22	2	0.110	0.070	-18.986	
	23	2	0.115	0.073	-19.849	
	24	2	0.120	0.076	-20.712	
	25	2	0.125	0.080	-21.575	
	26	2	0.130	0.083	-22.438	
	27	2	0.135	0.086	-23.301	
	28	2	0.140	0.090	-24.164	
	29	2	0.145	0.093	-25.027	
	30	2	0.150	0.096	-25.890	
	31	2	0.155	0.100	-26.753	
	32	2	0.160	0.103	-27.616	
	33	2	0.165	0.106	-28.479	
	34	2	0.170	0.110	-29.342	
	35	2	0.175	0.113	-30.205	
	36	2	0.180	0.116	-31.068	
	37	2	0.185	0.120	-31.931	
	38	2	0.190	0.123	-32.794	
	39	2	0.195	0.127	-33.657	
	40	2	0.200	0.130	-34.520	
	41	2	0.205	0.133	-35.383	
	42	2	0.210	0.137	-36.246	
	43	2	0.215	0.140	-37.109	
	44	2	0.220	0.143	-37.972	
	45	2	0.225	0.147	-38.835	
	46	2	0.230	0.150	-39.698	
	47	2	0.235	0.154	-40.561	
	48	2	0.240	0.157	-41.424	
	49	2	0.245	0.160	-42.287	
	50	2	0.250	0.164	-43.150	

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9.2 CALCULATION DIAGRAMS

Static Analysis

Increment No.	Iteration No.	Load Factor [--]	Value on Vertical Axis	Value on Horizontal Axis	Comment
51	2	0.255	0.167	-44.013	
52	2	0.260	0.170	-44.876	
53	2	0.265	0.174	-45.739	
54	2	0.270	0.177	-46.602	
55	2	0.275	0.181	-47.465	
56	2	0.280	0.184	-48.328	
57	2	0.285	0.187	-49.191	
58	2	0.290	0.191	-50.054	
59	2	0.295	0.194	-50.917	
60	2	0.300	0.198	-51.780	
61	2	0.305	0.201	-52.643	
62	2	0.310	0.204	-53.506	
63	2	0.315	0.208	-54.369	
64	2	0.320	0.211	-55.232	
65	2	0.325	0.215	-56.095	
66	2	0.330	0.218	-56.958	
67	2	0.335	0.221	-57.821	
68	2	0.340	0.225	-58.684	
69	2	0.345	0.228	-59.547	
70	2	0.350	0.231	-60.410	
71	2	0.355	0.235	-61.273	
72	2	0.360	0.238	-62.136	
73	2	0.365	0.242	-62.999	
74	2	0.370	0.245	-63.862	
75	2	0.375	0.248	-64.725	
76	2	0.380	0.252	-65.588	
77	2	0.385	0.255	-66.451	
78	2	0.390	0.258	-67.314	
79	2	0.395	0.262	-68.177	
80	2	0.400	0.265	-69.040	
81	2	0.405	0.268	-69.903	
82	2	0.410	0.271	-70.766	
83	2	0.415	0.275	-71.629	
84	2	0.420	0.278	-72.492	
85	2	0.425	0.281	-73.355	
86	2	0.430	0.284	-74.218	
87	2	0.435	0.287	-75.081	
88	2	0.440	0.291	-75.944	
89	2	0.445	0.294	-76.807	
90	2	0.450	0.297	-77.670	
91	2	0.455	0.300	-78.533	
92	2	0.460	0.304	-79.396	
93	2	0.465	0.307	-80.259	
94	2	0.470	0.310	-81.122	
95	2	0.475	0.313	-81.985	
96	2	0.480	0.316	-82.849	
97	2	0.485	0.319	-83.712	
98	2	0.490	0.322	-84.575	
99	2	0.495	0.325	-85.438	
100	2	0.500	0.328	-86.301	
101	2	0.505	0.331	-87.164	
102	2	0.510	0.334	-88.027	
103	2	0.515	0.337	-88.890	
104	2	0.520	0.340	-89.753	
105	2	0.525	0.343	-90.616	
106	2	0.530	0.346	-91.479	
107	2	0.535	0.349	-92.342	
108	2	0.540	0.352	-93.205	
109	2	0.545	0.355	-94.068	
110	2	0.550	0.358	-94.931	
111	2	0.555	0.361	-95.794	
112	2	0.560	0.363	-96.657	
113	2	0.565	0.366	-97.520	
114	2	0.570	0.369	-98.383	
115	2	0.575	0.372	-99.246	
116	2	0.580	0.375	-100.109	
117	2	0.585	0.378	-100.972	
118	2	0.590	0.381	-101.835	
119	2	0.595	0.384	-102.698	
120	2	0.600	0.387	-103.561	
121	2	0.605	0.390	-104.424	
122	2	0.610	0.393	-105.287	
123	2	0.615	0.395	-106.150	
124	2	0.620	0.398	-107.013	
125	2	0.625	0.400	-107.876	
126	2	0.630	0.403	-108.739	
127	2	0.635	0.405	-109.602	

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9.2 CALCULATION DIAGRAMS

Static Analysis

	Increment No.	Iteration No.	Load Factor [--]	Value on Vertical Axis	Value on Horizontal Axis	Comment
	128	2	0.640	0.407	-110.465	
	129	2	0.645	0.410	-111.328	
	130	2	0.650	0.412	-112.191	
	131	2	0.655	0.414	-113.054	
	132	2	0.660	0.417	-113.917	
	133	2	0.665	0.419	-114.780	
	134	2	0.670	0.421	-115.643	
	135	2	0.675	0.424	-116.506	
	136	2	0.680	0.426	-117.369	
	137	2	0.685	0.428	-118.232	
	138	2	0.690	0.431	-119.095	
	139	2	0.695	0.433	-119.958	
	140	2	0.700	0.436	-120.821	
	141	2	0.705	0.438	-121.684	
	142	2	0.710	0.440	-122.547	
	143	2	0.715	0.443	-123.410	
	144	2	0.720	0.445	-124.273	
	145	2	0.725	0.448	-125.136	
	146	2	0.730	0.450	-125.999	
	147	2	0.735	0.452	-126.862	
	148	2	0.740	0.455	-127.725	
	149	2	0.745	0.457	-128.588	
	150	2	0.750	0.460	-129.451	
	151	2	0.755	0.462	-130.314	
	152	2	0.760	0.465	-131.177	
	153	2	0.765	0.467	-132.040	
	154	2	0.770	0.470	-132.903	
	155	2	0.775	0.472	-133.766	
	156	2	0.780	0.475	-134.629	
	157	2	0.785	0.477	-135.492	
	158	2	0.790	0.479	-136.355	
	159	2	0.795	0.482	-137.218	
	160	2	0.800	0.484	-138.081	
	161	2	0.805	0.486	-138.944	
	162	2	0.810	0.488	-139.807	
	163	2	0.815	0.490	-140.670	
	164	2	0.820	0.492	-141.533	
	165	2	0.825	0.494	-142.396	
	166	2	0.830	0.496	-143.259	
	167	2	0.835	0.498	-144.122	
	168	2	0.840	0.499	-144.985	
	169	2	0.845	0.501	-145.848	
	170	2	0.850	0.503	-146.711	
	171	2	0.855	0.504	-147.574	
	172	2	0.860	0.506	-148.437	
	173	2	0.865	0.508	-149.300	
	174	2	0.870	0.509	-150.163	
	175	2	0.875	0.511	-151.026	
	176	2	0.880	0.513	-151.889	
	177	2	0.885	0.514	-152.752	
	178	2	0.890	0.516	-153.615	
	179	2	0.895	0.517	-154.478	
	180	2	0.900	0.519	-155.341	
	181	2	0.905	0.521	-156.204	
	182	2	0.910	0.522	-157.067	
	183	2	0.915	0.524	-157.930	
	184	2	0.920	0.526	-158.793	
	185	2	0.925	0.527	-159.656	
	186	2	0.930	0.529	-160.519	
	187	2	0.935	0.530	-161.382	
	188	2	0.940	0.532	-162.245	
	189	2	0.945	0.534	-163.108	
	190	2	0.950	0.535	-163.971	
	191	2	0.955	0.537	-164.834	
	192	2	0.960	0.539	-165.697	
	193	2	0.965	0.540	-166.560	
	194	2	0.970	0.542	-167.423	
	195	2	0.975	0.544	-168.286	
	196	2	0.980	0.546	-169.149	
	197	2	0.985	0.547	-170.012	
	198	2	0.990	0.549	-170.875	
	199	2	0.995	0.551	-171.738	
	200	2	1.000	0.553	-172.601	
	G LC2 - 170 kN Calculation Diagram: 3					
				$\sigma_{eqv,Mises,Max}$ [N/mm²]	Z [kN]	Sum of support forces Z [kN] | Surfaces - Equivalent Stresses - von

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9.2 CALCULATION DIAGRAMS

Static Analysis

Increment No.	Iteration No.	Load Factor [--]	Value on Vertical Axis	Horizontal Axis	Comment
					Mises $\sigma_{eqv,Mises,Max}$ (Surface No. 1, Node No. 29)
1	2	0.005	0.000	-0.863	
2	2	0.010	0.001	-1.726	
3	2	0.015	0.001	-2.589	
4	2	0.020	0.002	-3.452	
5	2	0.025	0.002	-4.315	
6	2	0.030	0.003	-5.178	
7	2	0.035	0.003	-6.041	
8	2	0.040	0.004	-6.904	
9	2	0.045	0.004	-7.767	
10	2	0.050	0.005	-8.630	
11	2	0.055	0.005	-9.493	
12	2	0.060	0.006	-10.356	
13	2	0.065	0.006	-11.219	
14	2	0.070	0.006	-12.082	
15	2	0.075	0.007	-12.945	
16	2	0.080	0.007	-13.808	
17	2	0.085	0.008	-14.671	
18	2	0.090	0.008	-15.534	
19	2	0.095	0.009	-16.397	
20	2	0.100	0.009	-17.260	
21	2	0.105	0.010	-18.123	
22	2	0.110	0.010	-18.986	
23	2	0.115	0.011	-19.849	
24	2	0.120	0.011	-20.712	
25	2	0.125	0.012	-21.575	
26	2	0.130	0.012	-22.438	
27	2	0.135	0.012	-23.301	
28	2	0.140	0.013	-24.164	
29	2	0.145	0.013	-25.027	
30	2	0.150	0.014	-25.890	
31	2	0.155	0.014	-26.753	
32	2	0.160	0.015	-27.616	
33	2	0.165	0.015	-28.479	
34	2	0.170	0.016	-29.342	
35	2	0.175	0.016	-30.205	
36	2	0.180	0.017	-31.068	
37	2	0.185	0.017	-31.931	
38	2	0.190	0.017	-32.794	
39	2	0.195	0.018	-33.657	
40	2	0.200	0.018	-34.520	
41	2	0.205	0.019	-35.383	
42	2	0.210	0.019	-36.246	
43	2	0.215	0.020	-37.109	
44	2	0.220	0.020	-37.972	
45	2	0.225	0.021	-38.835	
46	2	0.230	0.021	-39.698	
47	2	0.235	0.022	-40.561	
48	2	0.240	0.022	-41.424	
49	2	0.245	0.022	-42.287	
50	2	0.250	0.023	-43.150	
51	2	0.255	0.023	-44.013	
52	2	0.260	0.024	-44.876	
53	2	0.265	0.024	-45.739	
54	2	0.270	0.025	-46.602	
55	2	0.275	0.025	-47.465	
56	2	0.280	0.026	-48.328	
57	2	0.285	0.026	-49.191	
58	2	0.290	0.027	-50.054	
59	2	0.295	0.027	-50.917	
60	2	0.300	0.028	-51.780	
61	2	0.305	0.028	-52.643	
62	2	0.310	0.028	-53.506	
63	2	0.315	0.029	-54.369	
64	2	0.320	0.029	-55.232	
65	2	0.325	0.030	-56.095	
66	2	0.330	0.030	-56.958	
67	2	0.335	0.031	-57.821	
68	2	0.340	0.031	-58.684	
69	2	0.345	0.032	-59.547	
70	2	0.350	0.032	-60.410	
71	2	0.355	0.033	-61.273	
72	2	0.360	0.033	-62.136	
73	2	0.365	0.033	-62.999	
74	2	0.370	0.034	-63.862	
75	2	0.375	0.034	-64.725	
76	2	0.380	0.035	-65.588	

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9.2 CALCULATION DIAGRAMS

Static Analysis

Increment No.	Iteration No.	Load Factor [--]	Value on Vertical Axis	Horizontal Axis	Comment
77	2	0.385	0.035	-66.451	
78	2	0.390	0.036	-67.314	
79	2	0.395	0.036	-68.177	
80	2	0.400	0.037	-69.040	
81	2	0.405	0.037	-69.903	
82	2	0.410	0.037	-70.766	
83	2	0.415	0.038	-71.629	
84	2	0.420	0.038	-72.492	
85	2	0.425	0.039	-73.355	
86	2	0.430	0.039	-74.218	
87	2	0.435	0.040	-75.081	
88	2	0.440	0.040	-75.944	
89	2	0.445	0.041	-76.807	
90	2	0.450	0.041	-77.670	
91	2	0.455	0.041	-78.533	
92	2	0.460	0.042	-79.396	
93	2	0.465	0.042	-80.259	
94	2	0.470	0.043	-81.122	
95	2	0.475	0.043	-81.985	
96	2	0.480	0.044	-82.849	
97	2	0.485	0.044	-83.712	
98	2	0.490	0.044	-84.575	
99	2	0.495	0.045	-85.438	
100	2	0.500	0.045	-86.301	
101	2	0.505	0.046	-87.164	
102	2	0.510	0.046	-88.027	
103	2	0.515	0.047	-88.890	
104	2	0.520	0.047	-89.753	
105	2	0.525	0.047	-90.616	
106	2	0.530	0.048	-91.479	
107	2	0.535	0.048	-92.342	
108	2	0.540	0.049	-93.205	
109	2	0.545	0.049	-94.068	
110	2	0.550	0.049	-94.931	
111	2	0.555	0.050	-95.794	
112	2	0.560	0.050	-96.657	
113	2	0.565	0.051	-97.520	
114	2	0.570	0.051	-98.383	
115	2	0.575	0.052	-99.246	
116	2	0.580	0.052	-100.109	
117	2	0.585	0.052	-100.972	
118	2	0.590	0.053	-101.835	
119	2	0.595	0.053	-102.698	
120	2	0.600	0.054	-103.561	
121	2	0.605	0.054	-104.424	
122	2	0.610	0.054	-105.287	
123	2	0.615	0.055	-106.150	
124	2	0.620	0.055	-107.013	
125	2	0.625	0.055	-107.876	
126	2	0.630	0.056	-108.739	
127	2	0.635	0.056	-109.602	
128	2	0.640	0.057	-110.465	
129	2	0.645	0.057	-111.328	
130	2	0.650	0.057	-112.191	
131	2	0.655	0.058	-113.054	
132	2	0.660	0.058	-113.917	
133	2	0.665	0.058	-114.780	
134	2	0.670	0.059	-115.643	
135	2	0.675	0.059	-116.506	
136	2	0.680	0.059	-117.369	
137	2	0.685	0.060	-118.232	
138	2	0.690	0.060	-119.095	
139	2	0.695	0.060	-119.958	
140	2	0.700	0.061	-120.821	
141	2	0.705	0.061	-121.684	
142	2	0.710	0.061	-122.547	
143	2	0.715	0.062	-123.410	
144	2	0.720	0.062	-124.273	
145	2	0.725	0.062	-125.136	
146	2	0.730	0.063	-125.999	
147	2	0.735	0.063	-126.862	
148	2	0.740	0.063	-127.725	
149	2	0.745	0.064	-128.588	
150	2	0.750	0.064	-129.451	
151	2	0.755	0.064	-130.314	
152	2	0.760	0.065	-131.177	
153	2	0.765	0.065	-132.040	

9.2 CALCULATION DIAGRAMS

Static Analysis

	Increment No.	Iteration No.	Load Factor [--]	Value on Vertical Axis	Value on Horizontal Axis	Comment
	154	2	0.770	0.065	-132.903	
	155	2	0.775	0.065	-133.766	
	156	2	0.780	0.066	-134.629	
	157	2	0.785	0.066	-135.492	
	158	2	0.790	0.066	-136.355	
	159	2	0.795	0.067	-137.218	
	160	2	0.800	0.067	-138.081	
	161	2	0.805	0.067	-138.944	
	162	2	0.810	0.068	-139.807	
	163	2	0.815	0.068	-140.670	
	164	2	0.820	0.068	-141.533	
	165	2	0.825	0.068	-142.396	
	166	2	0.830	0.069	-143.259	
	167	2	0.835	0.069	-144.122	
	168	2	0.840	0.069	-144.985	
	169	2	0.845	0.069	-145.848	
	170	2	0.850	0.069	-146.711	
	171	2	0.855	0.070	-147.574	
	172	2	0.860	0.070	-148.437	
	173	2	0.865	0.070	-149.300	
	174	2	0.870	0.070	-150.163	
	175	2	0.875	0.070	-151.026	
	176	2	0.880	0.070	-151.889	
	177	2	0.885	0.071	-152.752	
	178	2	0.890	0.071	-153.615	
	179	2	0.895	0.071	-154.478	
	180	2	0.900	0.071	-155.341	
	181	2	0.905	0.071	-156.204	
	182	2	0.910	0.071	-157.067	
	183	2	0.915	0.071	-157.930	
	184	2	0.920	0.072	-158.793	
	185	2	0.925	0.072	-159.656	
	186	2	0.930	0.072	-160.519	
	187	2	0.935	0.072	-161.382	
	188	2	0.940	0.072	-162.245	
	189	2	0.945	0.072	-163.108	
	190	2	0.950	0.072	-163.971	
	191	2	0.955	0.072	-164.834	
	192	2	0.960	0.072	-165.697	
	193	2	0.965	0.072	-166.560	
	194	2	0.970	0.073	-167.423	
	195	2	0.975	0.073	-168.286	
	196	2	0.980	0.073	-169.149	
	197	2	0.985	0.073	-170.012	
	198	2	0.990	0.073	-170.875	
	199	2	0.995	0.073	-171.738	
	200	2	1.000	0.073	-172.601	

9.3 NODES - GLOBAL DEFORMATIONS

Static Analysis

Node No.	Displacements [mm] |u|	u_X	u_Y	u_Z	Rotations [mrad] φ_X	φ_Y	φ_Z	Node Comment Cor. Loading
	G LC2 - 170 kN							
1	1.4	0.5	0.0	1.3	0.0	-22.5	-0.3	
2	1.3	0.1	0.0	1.3	0.0	26.6	0.0	
3	1.4	0.5	0.0	1.3	0.0	-26.6	0.0	
4	1.3	0.0	0.0	1.3	0.0	22.5	-0.3	
5	1.4	0.5	0.0	1.3	0.0	-22.5	0.3	
7	1.3	0.0	0.0	1.3	0.0	22.5	0.3	
9	1.4	0.5	0.0	1.3	0.0	-26.6	0.0	
11	1.3	0.1	0.0	1.3	0.0	26.6	0.0	
13	18.8	0.2	-0.1	-18.8	-0.2	13.1	0.0	
14	18.8	0.2	0.1	-18.8	0.2	13.0	0.0	
15	18.8	0.4	-0.1	-18.8	-0.2	-13.0	0.0	
16	18.8	0.4	0.1	-18.8	0.2	-13.1	0.0	
18	0.0	0.0	0.0	0.0	0.0	22.4	-0.3	
19	0.0	0.0	0.0	0.0	0.0	22.4	0.3	
20	0.5	0.5	0.0	0.0	0.0	-22.4	0.3	
21	0.5	0.5	0.0	0.0	0.0	-22.4	-0.3	
Total	18.8	0.5	0.1	1.3	0.2	26.6	0.3	
max/min	0.0	0.0	-0.1	-18.8	-0.2	-26.6	-0.3	

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9.4 LINES - SUPPORT FORCES

Static Analysis

Line No.	Node No.	Location x [m]		Support Forces [kN/m] p_x	p_y	p_z	Support Moments [kNm/m] m_x	m_y	m_z	Line Comment Cor. Loading
		LC2 - 170 kN								
11	18	0.000		2.918	1.685	-156.027	0.000	0.000	0.000	
		0.010		1.328	0.746	-151.592	0.000	0.000	0.000	
		0.020		0.541	0.780	-149.732	0.000	0.000	0.000	
		0.030		-0.016	0.729	-148.679	0.000	0.000	0.000	
		0.040		-0.348	0.689	-147.926	0.000	0.000	0.000	
		0.050		-0.537	0.656	-147.290	0.000	0.000	0.000	
		0.060		-0.634	0.625	-146.704	0.000	0.000	0.000	
		0.070		-0.673	0.598	-146.139	0.000	0.000	0.000	
		0.080		-0.671	0.572	-145.592	0.000	0.000	0.000	
		0.090		-0.642	0.546	-145.062	0.000	0.000	0.000	
		0.100		-0.594	0.522	-144.556	0.000	0.000	0.000	
		0.110		-0.534	0.497	-144.077	0.000	0.000	0.000	
		0.120		-0.465	0.472	-143.631	0.000	0.000	0.000	
		0.130		-0.391	0.448	-143.221	0.000	0.000	0.000	
		0.140		-0.315	0.423	-142.847	0.000	0.000	0.000	
		0.150	1/4	-0.239	0.398	-142.512	0.000	0.000	0.000	
		0.160		-0.165	0.372	-142.213	0.000	0.000	0.000	
		0.170		-0.093	0.347	-141.951	0.000	0.000	0.000	
		0.180		-0.025	0.321	-141.722	0.000	0.000	0.000	
		0.190		0.038	0.295	-141.525	0.000	0.000	0.000	
		0.200	1/3	0.098	0.268	-141.357	0.000	0.000	0.000	
		0.210		0.152	0.242	-141.214	0.000	0.000	0.000	
		0.220		0.200	0.215	-141.095	0.000	0.000	0.000	
		0.230		0.244	0.189	-140.997	0.000	0.000	0.000	
		0.240		0.281	0.162	-140.917	0.000	0.000	0.000	
		0.250		0.313	0.135	-140.853	0.000	0.000	0.000	
		0.260		0.339	0.108	-140.804	0.000	0.000	0.000	
		0.270		0.360	0.081	-140.767	0.000	0.000	0.000	
		0.280		0.374	0.054	-140.741	0.000	0.000	0.000	
		0.290		0.383	0.027	-140.727	0.000	0.000	0.000	
		0.300	1/2	0.386	0.000	-140.722	0.000	0.000	0.000	
		0.310		0.383	-0.027	-140.727	0.000	0.000	0.000	
		0.320		0.374	-0.054	-140.742	0.000	0.000	0.000	
		0.330		0.360	-0.082	-140.767	0.000	0.000	0.000	
		0.340		0.340	-0.109	-140.804	0.000	0.000	0.000	
		0.350		0.313	-0.136	-140.854	0.000	0.000	0.000	
		0.360		0.282	-0.162	-140.918	0.000	0.000	0.000	
		0.370		0.244	-0.189	-140.998	0.000	0.000	0.000	
		0.380		0.201	-0.216	-141.096	0.000	0.000	0.000	
		0.390		0.152	-0.243	-141.216	0.000	0.000	0.000	
		0.400	2/3	0.098	-0.269	-141.358	0.000	0.000	0.000	
		0.410		0.039	-0.295	-141.527	0.000	0.000	0.000	
		0.420		-0.025	-0.321	-141.725	0.000	0.000	0.000	
		0.430		-0.093	-0.347	-141.954	0.000	0.000	0.000	
		0.440		-0.164	-0.373	-142.218	0.000	0.000	0.000	
		0.450	3/4	-0.238	-0.398	-142.517	0.000	0.000	0.000	
		0.460		-0.314	-0.423	-142.854	0.000	0.000	0.000	
		0.470		-0.390	-0.448	-143.229	0.000	0.000	0.000	
		0.480		-0.463	-0.473	-143.641	0.000	0.000	0.000	
		0.490		-0.532	-0.497	-144.089	0.000	0.000	0.000	
		0.500		-0.592	-0.522	-144.570	0.000	0.000	0.000	
		0.510		-0.640	-0.547	-145.079	0.000	0.000	0.000	
		0.520		-0.668	-0.572	-145.612	0.000	0.000	0.000	
		0.530		-0.669	-0.598	-146.163	0.000	0.000	0.000	
		0.540		-0.630	-0.626	-146.732	0.000	0.000	0.000	
		0.550		-0.531	-0.656	-147.323	0.000	0.000	0.000	
		0.560		-0.342	-0.689	-147.963	0.000	0.000	0.000	
		0.570		-0.007	-0.729	-148.722	0.000	0.000	0.000	
		0.580		0.552	-0.780	-149.781	0.000	0.000	0.000	
		0.590		1.341	-0.746	-151.649	0.000	0.000	0.000	
	19	0.600		2.934	-1.686	-156.098	0.000	0.000	0.000	
Extremes	19	0.600	p_x	2.934	-1.686	-156.098	0.000	0.000	0.000	
11		0.070		-0.673	0.598	-146.139	0.000	0.000	0.000	
	18	0.000	p_y	2.918	1.685	-156.027	0.000	0.000	0.000	
	19	0.600		2.934	-1.686	-156.098	0.000	0.000	0.000	
		0.290	p_z	0.383	0.027	-140.727	0.000	0.000	0.000	
	19	0.600		2.934	-1.686	-156.098	0.000	0.000	0.000	
	18	0.000	m_x	2.918	1.685	-156.027	0.000	0.000	0.000	
	18	0.000		2.918	1.685	-156.027	0.000	0.000	0.000	
	18	0.000	m_y	2.918	1.685	-156.027	0.000	0.000	0.000	
	18	0.000		2.918	1.685	-156.027	0.000	0.000	0.000	
	18	0.000	m_z	2.918	1.685	-156.027	0.000	0.000	0.000	
	18	0.000		2.918	1.685	-156.027	0.000	0.000	0.000	
Total				2.934	1.685	-140.727	0.000	0.000	0.000	
11				-0.673	-1.686	-156.098	0.000	0.000	0.000	
Average				0.000	0.000	-143.834	0.000	0.000	0.000	

9.4 LINES - SUPPORT FORCES

Static Analysis

Line No.	Node No.	Location x [m]		Support Forces [kN/m] p_x	p_y	p_z	Support Moments [kNm/m] m_x	m_y	m_z	Line Comment Cor. Loading
		G LC2 - 170 kN								
13	21	0.000		0.000	-1.646	-156.027	0.000	0.000	0.000	
		0.010		0.000	-0.724	-151.592	0.000	0.000	0.000	
		0.020		0.000	-0.754	-149.732	0.000	0.000	0.000	
		0.030		0.000	-0.701	-148.679	0.000	0.000	0.000	
		0.040		0.000	-0.660	-147.926	0.000	0.000	0.000	
		0.050		0.000	-0.625	-147.290	0.000	0.000	0.000	
		0.060		0.000	-0.594	-146.704	0.000	0.000	0.000	
		0.070		0.000	-0.567	-146.139	0.000	0.000	0.000	
		0.080		0.000	-0.543	-145.592	0.000	0.000	0.000	
		0.090		0.000	-0.521	-145.062	0.000	0.000	0.000	
		0.100		0.000	-0.500	-144.555	0.000	0.000	0.000	
		0.110		0.000	-0.480	-144.077	0.000	0.000	0.000	
		0.120		0.000	-0.461	-143.631	0.000	0.000	0.000	
		0.130		0.000	-0.441	-143.220	0.000	0.000	0.000	
		0.140		0.000	-0.421	-142.847	0.000	0.000	0.000	
		0.150 ¼		0.000	-0.401	-142.512	0.000	0.000	0.000	
		0.160		0.000	-0.380	-142.213	0.000	0.000	0.000	
		0.170		0.000	-0.358	-141.951	0.000	0.000	0.000	
		0.180		0.000	-0.335	-141.722	0.000	0.000	0.000	
		0.190		0.000	-0.311	-141.525	0.000	0.000	0.000	
		0.200 ⅓		0.000	-0.287	-141.357	0.000	0.000	0.000	
		0.210		0.000	-0.261	-141.214	0.000	0.000	0.000	
		0.220		0.000	-0.234	-141.095	0.000	0.000	0.000	
		0.230		0.000	-0.207	-140.997	0.000	0.000	0.000	
		0.240		0.000	-0.179	-140.917	0.000	0.000	0.000	
		0.250		0.000	-0.150	-140.853	0.000	0.000	0.000	
		0.260		0.000	-0.121	-140.804	0.000	0.000	0.000	
		0.270		0.000	-0.091	-140.767	0.000	0.000	0.000	
		0.280		0.000	-0.061	-140.742	0.000	0.000	0.000	
		0.290		0.000	-0.030	-140.727	0.000	0.000	0.000	
		0.300 ½		0.000	0.000	-140.722	0.000	0.000	0.000	
		0.310		0.000	0.031	-140.727	0.000	0.000	0.000	
		0.320		0.000	0.061	-140.742	0.000	0.000	0.000	
		0.330		0.000	0.092	-140.767	0.000	0.000	0.000	
		0.340		0.000	0.121	-140.804	0.000	0.000	0.000	
		0.350		0.000	0.151	-140.854	0.000	0.000	0.000	
		0.360		0.000	0.180	-140.918	0.000	0.000	0.000	
		0.370		0.000	0.208	-140.998	0.000	0.000	0.000	
		0.380		0.000	0.235	-141.096	0.000	0.000	0.000	
		0.390		0.000	0.262	-141.216	0.000	0.000	0.000	
		0.400 ⅔		0.000	0.287	-141.358	0.000	0.000	0.000	
		0.410		0.000	0.312	-141.527	0.000	0.000	0.000	
		0.420		0.000	0.336	-141.725	0.000	0.000	0.000	
		0.430		0.000	0.358	-141.954	0.000	0.000	0.000	
		0.440		0.000	0.380	-142.218	0.000	0.000	0.000	
		0.450 ¾		0.000	0.401	-142.517	0.000	0.000	0.000	
		0.460		0.000	0.422	-142.854	0.000	0.000	0.000	
		0.470		0.000	0.442	-143.229	0.000	0.000	0.000	
		0.480		0.000	0.461	-143.641	0.000	0.000	0.000	
		0.490		0.000	0.481	-144.089	0.000	0.000	0.000	
		0.500		0.000	0.500	-144.570	0.000	0.000	0.000	
		0.510		0.000	0.521	-145.079	0.000	0.000	0.000	
		0.520		0.000	0.543	-145.612	0.000	0.000	0.000	
		0.530		0.000	0.567	-146.163	0.000	0.000	0.000	
		0.540		0.000	0.594	-146.731	0.000	0.000	0.000	
		0.550		0.000	0.624	-147.323	0.000	0.000	0.000	
		0.560		0.000	0.659	-147.963	0.000	0.000	0.000	
		0.570		0.000	0.701	-148.722	0.000	0.000	0.000	
		0.580		0.000	0.754	-149.781	0.000	0.000	0.000	
		0.590		0.000	0.724	-151.649	0.000	0.000	0.000	
	20	0.600		0.000	1.646	-156.098	0.000	0.000	0.000	
Extremes	21	0.000	p_x	0.000	-1.646	-156.027	0.000	0.000	0.000	
13	21	0.000		0.000	-1.646	-156.027	0.000	0.000	0.000	
	20	0.600	p_y	0.000	1.646	-156.098	0.000	0.000	0.000	
	21	0.000		0.000	-1.646	-156.027	0.000	0.000	0.000	
		0.290	p_z	0.000	-0.030	-140.727	0.000	0.000	0.000	
	20	0.600		0.000	1.646	-156.098	0.000	0.000	0.000	
	21	0.000	m_x	0.000	-1.646	-156.027	0.000	0.000	0.000	
	21	0.000		0.000	-1.646	-156.027	0.000	0.000	0.000	
	21	0.000	m_y	0.000	-1.646	-156.027	0.000	0.000	0.000	
	21	0.000		0.000	-1.646	-156.027	0.000	0.000	0.000	
	21	0.000	m_z	0.000	-1.646	-156.027	0.000	0.000	0.000	
	21	0.000		0.000	-1.646	-156.027	0.000	0.000	0.000	
Total				0.000	1.646	-140.727	0.000	0.000	0.000	
13				0.000	-1.646	-156.098	0.000	0.000	0.000	
Average				0.000	0.000	-143.834	0.000	0.000	0.000	

9.4 LINES - SUPPORT FORCES

Static Analysis

Line No.	Node No.	Location x [m]		Support Forces [kN/m] p_x	p_y	p_z	Support Moments [kNm/m] m_x	m_y	m_z	Line Comment Cor. Loading
	LC2 - 170 kN									
	Total max/min values with corresponding values									
11		0.600	p_x	2.934	-1.686	-156.098	0.000	0.000	0.000	
11		0.070		-0.673	0.598	-146.139	0.000	0.000	0.000	
11		0.000	p_y	2.918	1.685	-156.027	0.000	0.000	0.000	
11		0.600		2.934	-1.686	-156.098	0.000	0.000	0.000	
11		0.290	p_z	0.383	0.027	-140.727	0.000	0.000	0.000	
11		0.600		2.934	-1.686	-156.098	0.000	0.000	0.000	
11		0.000	m_x	2.918	1.685	-156.027	0.000	0.000	0.000	
11		0.000		2.918	1.685	-156.027	0.000	0.000	0.000	
11		0.000	m_y	2.918	1.685	-156.027	0.000	0.000	0.000	
11		0.000		2.918	1.685	-156.027	0.000	0.000	0.000	
11		0.000	m_z	2.918	1.685	-156.027	0.000	0.000	0.000	
11		0.000		2.918	1.685	-156.027	0.000	0.000	0.000	
	LC2 - 170 kN									
Total				2.934	1.685	-140.722	0.000	0.000	0.000	
max/min				-0.673	-1.686	-156.098	0.000	0.000	0.000	
	LC2 - 170 kN									
	Sum of loads and support forces									
				P_X [kN]	P_Y [kN]	P_Z [kN]				
Σ				0.00	0.00	-172.60	Loads			
Σ				0.00	0.00	-172.60	Support Forces			

9.5 SURFACES - GLOBAL DEFORMATIONS

Static Analysis

Surface No.	Grid Point No.	Grid Point Coordinates [m] X	Y	Z		Displacements [mm] |u|	u_X	u_Y	u_Z	Rotations [mrad] φ_X	φ_Y	φ_Z	Surface Comment Cor. Loading
	LC2 - 170 kN												
1	1	0.100	0.500	0.000		1.4	0.0	0.0	-1.4	-0.1	22.4	0.0	
	2	0.600	0.500	0.000		14.9	0.1	0.0	-14.9	-0.2	15.7	0.1	
	3	1.100	0.500	0.000		20.0	0.3	0.0	-20.0	-0.1	-1.9	0.0	
	4	1.600	0.500	0.000		12.4	0.5	0.0	-12.4	-0.2	-18.0	-0.1	
	5	2.100	0.500	0.000		1.4	0.5	0.0	1.3	0.0	-22.5	0.0	
	6	0.100	0.000	0.000		1.4	0.0	0.0	-1.4	0.1	22.4	-0.2	
	7	0.600	0.000	0.000		14.9	0.1	0.0	-14.9	0.3	15.7	-0.3	
	8	1.100	0.000	0.000		20.0	0.3	0.0	-20.0	0.1	-1.9	0.0	
	9	1.600	0.000	0.000		12.5	0.5	0.0	-12.4	0.4	-18.0	0.3	
	10	2.100	0.000	0.000		1.4	0.5	0.0	1.3	0.0	-22.5	0.3	
Extremes	5	2.100	0.500	0.000	u_X	1.4	0.5	0.0	1.3	0.0	-22.5	0.0	
1	1	0.100	0.500	0.000		1.4	0.0	0.0	-1.4	-0.1	22.4	0.0	
	3	1.100	0.500	0.000	u_Y	20.0	0.3	0.0	-20.0	-0.1	-1.9	0.0	
	8	1.100	0.000	0.000		20.0	0.3	0.0	-20.0	0.1	-1.9	0.0	
	5	2.100	0.500	0.000	u_Z	1.4	0.5	0.0	1.3	0.0	-22.5	0.0	
	8	1.100	0.000	0.000		20.0	0.3	0.0	-20.0	0.1	-1.9	0.0	
	9	1.600	0.000	0.000	φ_X	12.5	0.5	0.0	-12.4	0.4	-18.0	0.3	
	4	1.600	0.500	0.000		12.4	0.5	0.0	-12.4	-0.2	-18.0	-0.1	
	1	0.100	0.500	0.000	φ_Y	1.4	0.0	0.0	-1.4	-0.1	22.4	0.0	
	5	2.100	0.500	0.000		1.4	0.5	0.0	1.3	0.0	-22.5	0.0	
	10	2.100	0.000	0.000	φ_Z	1.4	0.5	0.0	1.3	0.0	-22.5	0.3	
	7	0.600	0.000	0.000		14.9	0.1	0.0	-14.9	0.3	15.7	-0.3	
Total						20.0	0.5	0.0	1.3	0.4	22.4	0.3	
1						1.4	0.0	0.0	-20.0	-0.2	-22.5	-0.3	
	LC2 - 170 kN												
2	1	0.100	0.500	0.090		1.4	0.1	0.0	-1.4	0.0	28.1	0.0	
	2	0.600	0.500	0.090		14.9	0.1	0.0	-14.9	-0.2	23.2	0.0	
	3	1.100	0.500	0.090		20.0	0.3	0.0	-20.0	-0.1	-1.8	0.0	
	4	1.600	0.500	0.090		12.4	0.5	0.0	-12.4	-0.2	-25.3	0.0	
	5	2.100	0.500	0.090		1.4	0.5	0.0	1.3	0.0	-26.6	0.0	
	6	0.100	0.000	0.090		1.4	0.1	0.0	-1.4	0.0	28.2	0.1	
	7	0.600	0.000	0.090		14.9	0.1	0.0	-14.9	0.3	23.2	0.0	
	8	1.100	0.000	0.090		20.0	0.3	0.0	-20.0	0.3	-1.8	0.0	
	9	1.600	0.000	0.090		12.5	0.5	0.0	-12.4	0.3	-25.4	0.0	
	10	2.100	0.000	0.090		1.4	0.5	0.0	1.3	0.0	-26.6	0.0	
Extremes	9	1.600	0.000	0.090	u_X	12.5	0.5	0.0	-12.4	0.3	-25.4	0.0	
2	7	0.600	0.000	0.090		14.9	0.1	0.0	-14.9	0.3	23.2	0.0	
	3	1.100	0.500	0.090	u_Y	20.0	0.3	0.0	-20.0	-0.1	-1.8	0.0	
	8	1.100	0.000	0.090		20.0	0.3	0.0	-20.0	0.3	-1.8	0.0	
	5	2.100	0.500	0.090	u_Z	1.4	0.5	0.0	1.3	0.0	-26.6	0.0	
	8	1.100	0.000	0.090		20.0	0.3	0.0	-20.0	0.3	-1.8	0.0	
	9	1.600	0.000	0.090	φ_X	12.5	0.5	0.0	-12.4	0.3	-25.4	0.0	
	2	0.600	0.500	0.090		14.9	0.1	0.0	-14.9	-0.2	23.2	0.0	
	6	0.100	0.000	0.090	φ_Y	1.4	0.1	0.0	-1.4	0.0	28.2	0.1	
	5	2.100	0.500	0.090		1.4	0.5	0.0	1.3	0.0	-26.6	0.0	

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9.5 SURFACES - GLOBAL DEFORMATIONS **Static Analysis**

Surface No.	Grid Point No.	Grid Point Coordinates [m] X	Y	Z		Displacements [mm] |u|	u_X	u_Y	u_Z	Rotations [mrad] φ_X	φ_Y	φ_Z	Surface Comment Cor. Loading
2	6	0.100	0.000	0.090	φ_Z	1.4	0.1	0.0	-1.4	0.0	28.2	0.1	
	7	0.600	0.000	0.090		14.9	0.1	0.0	-14.9	0.3	23.2	0.0	
Total						20.0	0.5	0.0	1.3	0.3	28.2	0.1	
2						1.4	0.1	0.0	-20.0	-0.2	-26.6	0.0	
	LC2 - 170 kN												
	Total max/min values with corresponding values												
1	5	2.100	0.500	0.000	u_X	1.4	0.5	0.0	1.3	0.0	-22.5	0.0	
1	1	0.100	0.500	0.000		1.4	0.0	0.0	-1.4	-0.1	22.4	0.0	
2	3	1.100	0.500	0.090	u_Y	20.0	0.3	0.0	-20.0	-0.1	-1.8	0.0	
2	8	1.100	0.000	0.090		20.0	0.3	0.0	-20.0	0.3	-1.8	0.0	
2	5	2.100	0.500	0.090	u_Z	1.4	0.5	0.0	1.3	0.0	-26.6	0.0	
2	8	1.100	0.000	0.090		20.0	0.3	0.0	-20.0	0.3	-1.8	0.0	
1	9	1.600	0.000	0.000	φ_X	12.5	0.5	0.0	-12.4	0.4	-18.0	0.3	
1	4	1.600	0.500	0.000		12.4	0.5	0.0	-12.4	-0.2	-18.0	-0.1	
2	6	0.100	0.000	0.090	φ_Y	1.4	0.1	0.0	-1.4	0.0	28.2	0.1	
2	5	2.100	0.500	0.090		1.4	0.5	0.0	1.3	0.0	-26.6	0.0	
1	10	2.100	0.000	0.000	φ_Z	1.4	0.5	0.0	1.3	0.0	-22.5	0.3	
1	7	0.600	0.000	0.000		14.9	0.1	0.0	-14.9	0.3	15.7	-0.3	
	LC2 - 170 kN												
Total						20.0	0.5	0.0	1.3	0.4	28.2	0.3	
max/min						1.4	0.0	0.0	-20.0	-0.2	-26.6	-0.3	

9.6 SURFACES - LOCAL DEFORMATIONS **Static Analysis**

Surface No.	Grid Point No.	Grid Point Coordinates [m] X	Y	Z		Displacements [mm] |u|	u_x	u_y	u_z	Rotations [mrad] φ_x	φ_y	φ_z	Surface Comment Cor. Loading
	LC2 - 170 kN												
1	1	0.100	0.500	0.000		1.4	0.0	0.0	1.4	-0.1	-22.4	0.0	
	2	0.600	0.500	0.000		14.9	0.1	0.0	14.9	-0.2	-15.7	-0.1	
	3	1.100	0.500	0.000		20.0	0.3	0.0	20.0	-0.1	1.9	0.0	
	4	1.600	0.500	0.000		12.4	0.5	0.0	12.4	-0.2	18.0	0.1	
	5	2.100	0.500	0.000		1.4	0.5	0.0	-1.3	0.0	22.5	0.0	
	6	0.100	0.000	0.000		1.4	0.0	0.0	1.4	0.1	-22.4	0.2	
	7	0.600	0.000	0.000		14.9	0.1	0.0	14.9	0.3	-15.7	0.3	
	8	1.100	0.000	0.000		20.0	0.3	0.0	20.0	0.1	1.9	0.0	
	9	1.600	0.000	0.000		12.5	0.5	0.0	12.4	0.4	18.0	-0.3	
	10	2.100	0.000	0.000		1.4	0.5	0.0	-1.3	0.0	22.5	-0.3	
Extremes	5	2.100	0.500	0.000	u_x	1.4	0.5	0.0	-1.3	0.0	22.5	0.0	
1	1	0.100	0.500	0.000		1.4	0.0	0.0	1.4	-0.1	-22.4	0.0	
	8	1.100	0.000	0.000	u_y	20.0	0.3	0.0	20.0	0.1	1.9	0.0	
	3	1.100	0.500	0.000		20.0	0.3	0.0	20.0	-0.1	1.9	0.0	
	8	1.100	0.000	0.000	u_z	20.0	0.3	0.0	20.0	0.1	1.9	0.0	
	5	2.100	0.500	0.000		1.4	0.5	0.0	-1.3	0.0	22.5	0.0	
	9	1.600	0.000	0.000	φ_x	12.5	0.5	0.0	12.4	0.4	18.0	-0.3	
	4	1.600	0.500	0.000		12.4	0.5	0.0	12.4	-0.2	18.0	0.1	
	5	2.100	0.500	0.000	φ_y	1.4	0.5	0.0	-1.3	0.0	22.5	0.0	
	1	0.100	0.500	0.000		1.4	0.0	0.0	1.4	-0.1	-22.4	0.0	
	7	0.600	0.000	0.000	φ_z	14.9	0.1	0.0	14.9	0.3	-15.7	0.3	
	10	2.100	0.000	0.000		1.4	0.5	0.0	-1.3	0.0	22.5	-0.3	
Total						20.0	0.5	0.0	20.0	0.4	22.5	0.3	
1						1.4	0.0	0.0	-1.3	-0.2	-22.4	-0.3	
	LC2 - 170 kN												
2	1	0.100	0.500	0.090		1.4	0.1	0.0	1.4	0.0	-28.1	0.0	
	2	0.600	0.500	0.090		14.9	0.1	0.0	14.9	-0.2	-23.2	0.0	
	3	1.100	0.500	0.090		20.0	0.3	0.0	20.0	-0.1	1.8	0.0	
	4	1.600	0.500	0.090		12.4	0.5	0.0	12.4	-0.2	25.3	0.0	
	5	2.100	0.500	0.090		1.4	0.5	0.0	-1.3	0.0	26.6	0.0	
	6	0.100	0.000	0.090		1.4	0.1	0.0	1.4	0.0	-28.2	-0.1	
	7	0.600	0.000	0.090		14.9	0.1	0.0	14.9	0.3	-23.2	0.0	
	8	1.100	0.000	0.090		20.0	0.3	0.0	20.0	0.3	1.8	0.0	
	9	1.600	0.000	0.090		12.5	0.5	0.0	12.4	0.3	25.4	0.0	
	10	2.100	0.000	0.090		1.4	0.5	0.0	-1.3	0.0	26.6	0.0	
Extremes	9	1.600	0.000	0.090	u_x	12.5	0.5	0.0	12.4	0.3	25.4	0.0	
2	7	0.600	0.000	0.090		14.9	0.1	0.0	14.9	0.3	-23.2	0.0	
	8	1.100	0.000	0.090	u_y	20.0	0.3	0.0	20.0	0.3	1.8	0.0	
	3	1.100	0.500	0.090		20.0	0.3	0.0	20.0	-0.1	1.8	0.0	
	8	1.100	0.000	0.090	u_z	20.0	0.3	0.0	20.0	0.3	1.8	0.0	
	5	2.100	0.500	0.090		1.4	0.5	0.0	-1.3	0.0	26.6	0.0	
	9	1.600	0.000	0.090	φ_x	12.5	0.5	0.0	12.4	0.3	25.4	0.0	
	2	0.600	0.500	0.090		14.9	0.1	0.0	14.9	-0.2	-23.2	0.0	
	5	2.100	0.500	0.090	φ_y	1.4	0.5	0.0	-1.3	0.0	26.6	0.0	
	6	0.100	0.000	0.090		1.4	0.1	0.0	1.4	0.0	-28.2	-0.1	
	7	0.600	0.000	0.090	φ_z	14.9	0.1	0.0	14.9	0.3	-23.2	0.0	

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9.6 SURFACES - LOCAL DEFORMATIONS

Static Analysis

Surface No.	Grid Point No.	X	Y	Z		|u|	u_x	u_y	u_z	φ_x	φ_y	φ_z	Surface Comment Cor. Loading
	Grid Point Coordinates [m]					Displacements [mm]				Rotations [mrad]			
2	6	0.100	0.000	0.090	φ_z	1.4	0.1	0.0	1.4	0.0	-28.2	-0.1	
Total						20.0	0.5	0.0	20.0	0.3	26.6	0.0	
2						1.4	0.1	0.0	-1.3	-0.2	-28.2	-0.1	
	G LC2 - 170 kN												
	Total max/min values with corresponding values												
1	5	2.100	0.500	0.000	u_x	1.4	0.5	0.0	-1.3	0.0	22.5	0.0	
1	1	0.100	0.500	0.000		1.4	0.0	0.0	1.4	-0.1	-22.4	0.0	
2	8	1.100	0.000	0.090	u_y	20.0	0.3	0.0	20.0	0.3	1.8	0.0	
2	3	1.100	0.500	0.090		20.0	0.3	0.0	20.0	-0.1	1.8	0.0	
2	8	1.100	0.000	0.090	u_z	20.0	0.3	0.0	20.0	0.3	1.8	0.0	
2	5	2.100	0.500	0.090		1.4	0.5	0.0	-1.3	0.0	26.6	0.0	
1	9	1.600	0.000	0.000	φ_x	12.5	0.5	0.0	12.4	0.4	18.0	-0.3	
1	4	1.600	0.500	0.000		12.4	0.5	0.0	12.4	-0.2	18.0	0.1	
2	5	2.100	0.500	0.090	φ_y	1.4	0.5	0.0	-1.3	0.0	26.6	0.0	
2	6	0.100	0.000	0.090		1.4	0.1	0.0	1.4	0.0	-28.2	-0.1	
1	7	0.600	0.000	0.000	φ_z	14.9	0.1	0.0	14.9	0.3	-15.7	0.3	
1	10	2.100	0.000	0.000		1.4	0.5	0.0	-1.3	0.0	22.5	-0.3	
	G LC2 - 170 kN												
Total max/min						20.0	0.5	0.0	20.0	0.4	26.6	0.3	
						1.4	0.0	0.0	-1.3	-0.2	-28.2	-0.3	

9.7 SURFACES - BASIC STRESSES

Static Analysis

Surface No.	Grid Pt. No.	X	Y	Z	Layer No.	$\sigma_{x,+}$	$\sigma_{y,+}$	$\sigma_{x,-}$	$\sigma_{y,-}$	$\tau_{xy,+}$	$\tau_{xy,-}$	τ_{xz}	τ_{yz}	Surface Comment Cor. Loading
	Grid Point Coordinates [m]					Axial stresses [N/mm²]				Shear stresses [N/mm²]				
	G LC2 - 170 kN													
1	1	0.100	0.500	0.000	1	-0.346	-0.002	-1.371	-0.012	-0.004	-0.013	0.463	0.001	
					2	0.016	0.006	0.068	-0.006	-0.001	0.004	0.924	0.002	
					3	0.902	0.006	0.298	0.003	0.006	0.001	1.029	0.002	
					4	-0.089	0.029	-0.036	0.018	-0.012	-0.006	0.924	0.002	
					5	2.729	0.029	1.704	0.019	0.022	0.013	0.463	0.001	
	2	0.600	0.500	0.000	1	-6.123	-0.066	-16.286	-0.185	-0.002	0.005	0.602	0.002	
					2	0.138	0.013	0.366	-0.105	0.005	0.001	1.202	0.004	
					3	6.557	0.050	0.575	0.007	-0.009	-0.005	1.338	0.004	
					4	-0.318	0.247	-0.090	0.130	0.013	0.009	1.202	0.004	
					5	23.827	-0.077	14.202	0.172	-0.020	-0.014	0.602	0.002	
	3	1.100	0.500	0.000	1	-8.923	-0.105	-23.495	-0.295	-0.001	-0.001	0.006	-0.003	
					2	0.314	0.016	0.297	-0.155	0.001	0.001	0.012	-0.006	
					3	9.274	0.079	0.698	0.012	-0.001	-0.001	0.013	-0.006	
					4	0.348	0.359	0.331	0.187	0.001	0.001	0.012	-0.006	
					5	32.094	-0.686	19.966	0.074	-0.001	-0.001	0.006	-0.003	
	4	1.600	0.500	0.000	1	-4.641	-0.047	-12.668	-0.136	0.004	0.006	-0.589	0.002	
					2	0.085	0.013	0.350	-0.079	-0.002	-0.003	-1.176	0.005	
					3	5.352	0.038	0.627	0.007	0.001	0.002	-1.309	0.005	
					4	-0.446	0.197	-0.180	0.105	0.001	-0.001	-1.176	0.005	
					5	19.283	0.097	11.413	0.131	-0.003	-0.001	-0.589	0.002	
	5	2.100	0.500	0.000	1	0.018	0.001	0.002	0.001	0.001	0.001	-0.203	0.001	
					2	0.012	0.001	0.017	0.000	0.000	-0.001	-0.406	0.002	
					3	0.035	0.000	0.025	0.000	0.000	0.000	-0.452	0.002	
					4	0.002	0.001	0.007	0.001	0.001	0.000	-0.406	0.002	
					5	0.066	0.001	0.050	0.001	-0.001	-0.001	-0.203	0.001	
	6	0.100	0.000	0.000	1	-0.347	-0.002	-1.386	-0.013	-0.012	-0.010	0.468	-0.001	
					2	0.011	0.006	0.061	-0.006	0.011	0.010	0.934	-0.003	
					3	0.917	0.006	0.305	0.003	-0.012	-0.011	1.040	-0.003	
					4	-0.090	0.030	-0.040	0.018	0.012	0.012	0.934	-0.003	
					5	2.770	0.030	1.731	0.019	-0.015	-0.014	0.468	-0.001	
	7	0.600	0.000	0.000	1	-6.108	-0.062	-16.198	-0.175	-0.011	-0.013	0.599	-0.002	
					2	0.162	0.012	0.474	-0.104	0.009	0.010	1.196	-0.004	
					3	6.485	0.048	0.545	0.008	-0.008	-0.009	1.331	-0.004	
					4	-0.461	0.244	-0.149	0.128	0.007	0.008	1.196	-0.004	
					5	23.654	-0.070	14.071	0.165	-0.005	-0.008	0.599	-0.002	
	8	1.100	0.000	0.000	1	-8.915	-0.110	-23.521	-0.305	0.001	0.000	0.005	0.005	
					2	0.268	0.017	0.161	-0.156	-0.001	0.000	0.010	0.011	
					3	9.319	0.081	0.724	0.011	0.001	0.001	0.011	0.012	
					4	0.480	0.361	0.374	0.189	-0.001	-0.001	0.010	0.011	
					5	32.129	-0.691	20.028	0.072	0.002	0.001	0.005	0.005	
	9	1.600	0.000	0.000	1	-4.631	-0.042	-12.577	-0.125	0.010	0.010	-0.590	-0.003	
					2	0.122	0.013	0.487	-0.078	-0.010	-0.009	-1.179	-0.005	
					3	5.265	0.036	0.587	0.007	0.010	0.010	-1.312	-0.006	
					4	-0.606	0.193	-0.242	0.103	-0.010	-0.010	-1.179	-0.005	
					5	19.074	0.104	11.259	0.123	0.012	0.011	-0.590	-0.003	
	10	2.100	0.000	0.000	1	0.022	-0.001	0.006	-0.001	0.011	0.011	-0.204	0.000	
					2	-0.023	0.000	-0.024	0.000	-0.009	-0.010	-0.407	-0.001	
					3	0.039	0.000	0.029	0.000	0.009	0.009	-0.453	-0.001	

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9.7 SURFACES - BASIC STRESSES

Static Analysis

Surface No.	Grid Pt. No.	Grid Point Coordinates [m] X	Y	Z	Layer No.		Axial stresses [N/mm²] $\sigma_{x,+}$	$\sigma_{y,+}$	$\sigma_{x,-}$	$\sigma_{y,-}$	Shear stresses [N/mm²] $\tau_{xy,+}$	$\tau_{xy,-}$	τ_{xz}	τ_{yz}	Surface Comment Cor. Loading
1	10	2.100	0.000	0.000	4		-0.022	0.001	-0.022	0.001	-0.009	-0.009	-0.407	-0.001	
					5		0.071	0.000	0.055	0.000	0.010	0.010	-0.204	0.000	
Extremes	8	1.100	0.000	0.000	5	$\sigma_{x,+}$	32.129	-0.691	20.028	0.072	0.002	0.001	0.005	0.005	
1	3	1.100	0.500	0.000	1		-8.923	-0.105	-23.495	-0.295	-0.001	-0.001	0.006	-0.003	
	8	1.100	0.000	0.000	4	$\sigma_{y,+}$	0.480	0.361	0.374	0.189	-0.001	-0.001	0.010	0.011	
	8	1.100	0.000	0.000	5		32.129	-0.691	20.028	0.072	0.002	0.001	0.005	0.005	
	8	1.100	0.000	0.000	5	$\sigma_{x,-}$	32.129	-0.691	20.028	0.072	0.002	0.001	0.005	0.005	
	8	1.100	0.000	0.000	1		-8.915	-0.110	-23.521	-0.305	0.001	0.000	0.005	0.005	
	8	1.100	0.000	0.000	4	$\sigma_{y,-}$	0.480	0.361	0.374	0.189	-0.001	-0.001	0.010	0.011	
	8	1.100	0.000	0.000	1		-8.915	-0.110	-23.521	-0.305	0.001	0.000	0.005	0.005	
	1	0.100	0.500	0.000	5	$\tau_{xy,+}$	2.729	0.029	1.704	0.019	0.022	0.013	0.463	0.001	
	2	0.600	0.500	0.000	5		23.827	-0.077	14.202	0.172	-0.020	-0.014	0.602	0.002	
	1	0.100	0.500	0.000	5	$\tau_{xy,-}$	2.729	0.029	1.704	0.019	0.022	0.013	0.463	0.001	
	2	0.600	0.500	0.000	5		23.827	-0.077	14.202	0.172	-0.020	-0.014	0.602	0.002	
	2	0.600	0.500	0.000	3	τ_{xz}	6.557	0.050	0.575	0.007	-0.009	-0.005	1.338	0.004	
	9	1.600	0.000	0.000	3		5.265	0.036	0.587	0.007	0.010	0.010	-1.312	-0.006	
	8	1.100	0.000	0.000	3	τ_{yz}	9.319	0.081	0.724	0.011	0.001	0.001	0.011	0.012	
	3	1.100	0.500	0.000	3		9.274	0.079	0.698	0.012	-0.001	-0.001	0.013	-0.006	
Total							32.129	0.361	20.028	0.189	0.022	0.013	1.338	0.012	
1							-8.923	-0.691	-23.521	-0.305	-0.020	-0.014	-1.312	-0.006	
	G LC2 - 170 kN														
2	1	0.100	0.500	0.090	1		-4.524	-0.554	1.505	0.532	0.512	-0.106	1.518	0.012	
	2	0.600	0.500	0.090	1		1.763	-0.775	-25.043	-1.890	-0.058	-0.133	0.853	0.021	
	3	1.100	0.500	0.090	1		1.752	-0.617	-34.019	-2.543	-0.010	-0.143	-0.029	0.032	
	4	1.600	0.500	0.090	1		1.768	-0.827	-20.069	-1.486	0.013	0.100	-0.912	0.011	
	5	2.100	0.500	0.090	1		-0.566	0.214	0.467	0.549	0.015	-0.006	0.928	-0.028	
	6	0.100	0.000	0.090	1		-4.558	-0.064	1.585	-0.063	-0.030	0.069	1.653	0.064	
	7	0.600	0.000	0.090	1		1.780	-1.029	-25.847	-1.810	0.026	-0.020	0.749	-0.002	
	8	1.100	0.000	0.090	1		1.774	-0.911	-34.902	-2.441	0.009	-0.050	-0.110	-0.032	
	9	1.600	0.000	0.090	1		1.776	-0.948	-20.584	-1.265	-0.001	-0.050	-0.971	0.007	
	10	2.100	0.000	0.090	1		-0.564	-0.035	0.397	-0.006	-0.043	0.011	0.849	0.071	
Extremes	7	0.600	0.000	0.090	1	$\sigma_{x,+}$	1.780	-1.029	-25.847	-1.810	0.026	-0.020	0.749	-0.002	
2	6	0.100	0.000	0.090	1		-4.558	-0.064	1.585	-0.063	-0.030	0.069	1.653	0.064	
	5	2.100	0.500	0.090	1	$\sigma_{y,+}$	-0.566	0.214	0.467	0.549	0.015	-0.006	0.928	-0.028	
	7	0.600	0.000	0.090	1		1.780	-1.029	-25.847	-1.810	0.026	-0.020	0.749	-0.002	
	6	0.100	0.000	0.090	1	$\sigma_{x,-}$	-4.558	-0.064	1.585	-0.063	-0.030	0.069	1.653	0.064	
	8	1.100	0.000	0.090	1		1.774	-0.911	-34.902	-2.441	0.009	-0.050	-0.110	-0.032	
	5	2.100	0.500	0.090	1	$\sigma_{y,-}$	-0.566	0.214	0.467	0.549	0.015	-0.006	0.928	-0.028	
	3	1.100	0.500	0.090	1		1.752	-0.617	-34.019	-2.543	-0.010	-0.143	-0.029	0.032	
	1	0.100	0.500	0.090	1	$\tau_{xy,+}$	-4.524	-0.554	1.505	0.532	0.512	-0.106	1.518	0.012	
	2	0.600	0.500	0.090	1		1.763	-0.775	-25.043	-1.890	-0.058	-0.133	0.853	0.021	
	4	1.600	0.500	0.090	1	$\tau_{xy,-}$	1.768	-0.827	-20.069	-1.486	0.013	0.100	-0.912	0.011	
	3	1.100	0.500	0.090	1		1.752	-0.617	-34.019	-2.543	-0.010	-0.143	-0.029	0.032	
	6	0.100	0.000	0.090	1	τ_{xz}	-4.558	-0.064	1.585	-0.063	-0.030	0.069	1.653	0.064	
	9	1.600	0.000	0.090	1		1.776	-0.948	-20.584	-1.265	-0.001	-0.050	-0.971	0.007	
	10	2.100	0.000	0.090	1	τ_{yz}	-0.564	-0.035	0.397	-0.006	-0.043	0.011	0.849	0.071	
	8	1.100	0.000	0.090	1		1.774	-0.911	-34.902	-2.441	0.009	-0.050	-0.110	-0.032	
Total							1.780	0.214	1.585	0.549	0.512	0.100	1.653	0.071	
2							-4.558	-1.029	-34.902	-2.543	-0.058	-0.143	-0.971	-0.032	
	G LC2 - 170 kN														
	Total max/min values with corresponding values														
1	8	1.100	0.000	0.000	5	$\sigma_{x,+}$	32.129	-0.691	20.028	0.072	0.002	0.001	0.005	0.005	
1	3	1.100	0.500	0.000	1		-8.923	-0.105	-23.495	-0.295	-0.001	-0.001	0.006	-0.003	
1	8	1.100	0.000	0.000	4	$\sigma_{y,+}$	0.480	0.361	0.374	0.189	-0.001	-0.001	0.010	0.011	
2	7	0.600	0.000	0.090	1		1.780	-1.029	-25.847	-1.810	0.026	-0.020	0.749	-0.002	
1	8	1.100	0.000	0.000	5	$\sigma_{x,-}$	32.129	-0.691	20.028	0.072	0.002	0.001	0.005	0.005	
2	8	1.100	0.000	0.090	1		1.774	-0.911	-34.902	-2.441	0.009	-0.050	-0.110	-0.032	
2	5	2.100	0.500	0.090	1	$\sigma_{y,-}$	-0.566	0.214	0.467	0.549	0.015	-0.006	0.928	-0.028	
2	3	1.100	0.500	0.090	1		1.752	-0.617	-34.019	-2.543	-0.010	-0.143	-0.029	0.032	
2	1	0.100	0.500	0.090	1	$\tau_{xy,+}$	-4.524	-0.554	1.505	0.532	0.512	-0.106	1.518	0.012	
2	2	0.600	0.500	0.090	1		1.763	-0.775	-25.043	-1.890	-0.058	-0.133	0.853	0.021	
2	4	1.600	0.500	0.090	1	$\tau_{xy,-}$	1.768	-0.827	-20.069	-1.486	0.013	0.100	-0.912	0.011	
2	3	1.100	0.500	0.090	1		1.752	-0.617	-34.019	-2.543	-0.010	-0.143	-0.029	0.032	
2	6	0.100	0.000	0.090	1	τ_{xz}	-4.558	-0.064	1.585	-0.063	-0.030	0.069	1.653	0.064	
1	9	1.600	0.000	0.000	3		5.265	0.036	0.587	0.007	0.010	0.010	-1.312	-0.006	
2	10	2.100	0.000	0.090	1	τ_{yz}	-0.564	-0.035	0.397	-0.006	-0.043	0.011	0.849	0.071	
2	8	1.100	0.000	0.090	1		1.774	-0.911	-34.902	-2.441	0.009	-0.050	-0.110	-0.032	
	G LC2 - 170 kN														
Total							32.129	0.361	20.028	0.549	0.512	0.100	1.653	0.071	
max/min							-8.923	-1.029	-34.902	-2.543	-0.058	-0.143	-1.312	-0.032	

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9.8 SURFACES - EQUIVALENT STRESSES VON MISES

Static Analysis

Surface No.	Grid Point No.	Grid Point Coordinates [m] X	Y	Z	Layer No.		Equivalent Stresses [N/mm²] $\sigma_{eqv,Mises,Max}$	$\sigma_{eqv,Mises,+}$	$\sigma_{eqv,Mises,-}$	Surface Comment Cor. Loading
	LC2 - 170 kN									
1	1	0.100	0.500	0.000	1		1.365	0.345	1.365	
					2		0.071	0.014	0.071	
					3		0.898	0.898	0.297	
					4		0.108	0.108	0.049	
					5		2.715	2.715	1.695	
	2	0.600	0.500	0.000	1		16.194	6.091	16.194	
					2		0.428	0.133	0.428	
					3		6.532	6.532	0.571	
					4		0.492	0.492	0.192	
					5		23.866	23.866	14.116	
	3	1.100	0.500	0.000	1		23.349	8.871	23.349	
					2		0.397	0.306	0.397	
					3		9.235	9.235	0.692	
					4		0.353	0.353	0.287	
					5		32.442	32.442	19.929	
	4	1.600	0.500	0.000	1		12.600	4.617	12.600	
					2		0.396	0.079	0.396	
					3		5.333	5.333	0.624	
					4		0.570	0.570	0.250	
					5		19.235	19.235	11.348	
	5	2.100	0.500	0.000	1		0.018	0.018	0.003	
					2		0.017	0.012	0.017	
					3		0.034	0.034	0.025	
					4		0.007	0.002	0.007	
					5		0.066	0.066	0.050	
	6	0.100	0.000	0.000	1		1.379	0.346	1.379	
					2		0.066	0.021	0.066	
					3		0.914	0.914	0.305	
					4		0.111	0.111	0.055	
					5		2.755	2.755	1.722	
	7	0.600	0.000	0.000	1		16.111	6.078	16.111	
					2		0.534	0.157	0.534	
					3		6.461	6.461	0.542	
					4		0.620	0.620	0.241	
					5		23.688	23.688	13.990	
	8	1.100	0.000	0.000	1		23.370	8.861	23.370	
					2		0.274	0.260	0.274	
					3		9.279	9.279	0.718	
					4		0.433	0.433	0.324	
					5		32.480	32.480	19.992	
	9	1.600	0.000	0.000	1		12.515	4.610	12.515	
					2		0.530	0.118	0.530	
					3		5.247	5.247	0.584	
					4		0.722	0.722	0.307	
					5		19.023	19.023	11.198	
	10	2.100	0.000	0.000	1		0.029	0.029	0.020	
					2		0.029	0.029	0.029	
					3		0.042	0.042	0.034	
					4		0.028	0.027	0.028	
					5		0.073	0.073	0.058	
Extremes	8	1.100	0.000	0.000	5	$\sigma_{eqv,Mises,Max}$	32.480	32.480	19.992	
1	5	2.100	0.500	0.000	4		0.007	0.002	0.007	
	8	1.100	0.000	0.000	5	$\sigma_{eqv,Mises,+}$	32.480	32.480	19.992	
	5	2.100	0.500	0.000	4		0.007	0.002	0.007	
	8	1.100	0.000	0.000	1	$\sigma_{eqv,Mises,-}$	23.370	8.861	23.370	
	5	2.100	0.500	0.000	1		0.018	0.018	0.003	
Total							32.480	32.480	23.370	
1							0.007	0.002	0.003	
	LC2 - 170 kN									
2	1	0.100	0.500	0.090	1		4.365	4.365	1.335	
	2	0.600	0.500	0.090	1		24.154	2.255	24.154	
	3	1.100	0.500	0.090	1		32.823	2.129	32.823	
	4	1.600	0.500	0.090	1		19.369	2.296	19.369	
	5	2.100	0.500	0.090	1		0.698	0.698	0.513	
	6	0.100	0.000	0.090	1		4.526	4.526	1.622	
	7	0.600	0.000	0.090	1		24.992	2.461	24.992	
	8	1.100	0.000	0.090	1		33.748	2.365	33.748	
	9	1.600	0.000	0.090	1		19.982	2.395	19.982	
	10	2.100	0.000	0.090	1		0.553	0.553	0.401	
Extremes	8	1.100	0.000	0.090	1	$\sigma_{eqv,Mises,Max}$	33.748	2.365	33.748	
2	10	2.100	0.000	0.090	1		0.553	0.553	0.401	
	6	0.100	0.000	0.090	1	$\sigma_{eqv,Mises,+}$	4.526	4.526	1.622	
	10	2.100	0.000	0.090	1		0.553	0.553	0.401	

9.8 SURFACES - EQUIVALENT STRESSES VON MISES

Static Analysis

Surface No.	Grid Point No.	Grid Point Coordinates [m] X	Y	Z	Layer No.		Equivalent Stresses [N/mm²] $\sigma_{eqv,Mises,Max}$	$\sigma_{eqv,Mises,+}$	$\sigma_{eqv,Mises,-}$	Surface Comment Cor. Loading
2	8	1.100	0.000	0.090	1	$\sigma_{eqv,Mises,-}$	33.748	2.365	33.748	
	10	2.100	0.000	0.090	1		0.553	0.553	0.401	
Total							33.748	4.526	33.748	
2							0.553	0.553	0.401	
	LC2 - 170 kN									
	Total max/min values with corresponding values									
2	8	1.100	0.000	0.090	1	$\sigma_{eqv,Mises,Max}$	33.748	2.365	33.748	
1	5	2.100	0.500	0.000	4		0.007	0.002	0.007	
1	8	1.100	0.000	0.000	5	$\sigma_{eqv,Mises,+}$	32.480	32.480	19.992	
1	5	2.100	0.500	0.000	4		0.007	0.002	0.007	
2	8	1.100	0.000	0.090	1	$\sigma_{eqv,Mises,-}$	33.748	2.365	33.748	
1	5	2.100	0.500	0.000	1		0.018	0.018	0.003	
	LC2 - 170 kN									
Total max/min							33.748	32.480	33.748	
							0.007	0.002	0.003	

9.9 SURFACES - EQUIVALENT PLASTIC STRAINS - VON MISES

Static Analysis

Surface No.	Grid Point No.	Grid Point Coordinates [m] X	Y	Z	Layer No.		von Mises [‰] $\varepsilon_{eqv,pl,Mises,+}$	$\varepsilon_{eqv,pl,Mises,-}$	$\varepsilon_{eqv,pl,Mises}$	Surface Comment Cor. Loading
	LC2 - 170 kN									
1	1	0.100	0.500	0.000	1		0.0	0.0	0.0	
					2		0.0	0.0	0.0	
					3		0.0	0.0	0.0	
					4		0.0	0.0	0.0	
					5		0.0	0.0	0.0	
	2	0.600	0.500	0.000	1		0.0	0.0	0.0	
					2		0.0	0.0	0.0	
					3		0.0	0.0	0.0	
					4		0.0	0.0	0.0	
					5		0.8	0.0	0.8	
	3	1.100	0.500	0.000	1		0.0	0.0	0.0	
					2		0.0	0.0	0.0	
					3		0.0	0.0	0.0	
					4		0.0	0.0	0.0	
					5		2.5	0.4	2.5	
	4	1.600	0.500	0.000	1		0.0	0.0	0.0	
					2		0.0	0.0	0.0	
					3		0.0	0.0	0.0	
					4		0.0	0.0	0.0	
					5		0.3	0.0	0.3	
	5	2.100	0.500	0.000	1		0.0	0.0	0.0	
					2		0.0	0.0	0.0	
					3		0.0	0.0	0.0	
					4		0.0	0.0	0.0	
					5		0.0	0.0	0.0	
	6	0.100	0.000	0.000	1		0.0	0.0	0.0	
					2		0.0	0.0	0.0	
					3		0.0	0.0	0.0	
					4		0.0	0.0	0.0	
					5		0.0	0.0	0.0	
	7	0.600	0.000	0.000	1		0.0	0.0	0.0	
					2		0.0	0.0	0.0	
					3		0.0	0.0	0.0	
					4		0.0	0.0	0.0	
					5		0.8	0.0	0.8	
	8	1.100	0.000	0.000	1		0.0	0.0	0.0	
					2		0.0	0.0	0.0	
					3		0.0	0.0	0.0	
					4		0.0	0.0	0.0	
					5		2.5	0.5	2.5	
	9	1.600	0.000	0.000	1		0.0	0.0	0.0	
					2		0.0	0.0	0.0	
					3		0.0	0.0	0.0	
					4		0.0	0.0	0.0	
					5		0.2	0.0	0.2	
	10	2.100	0.000	0.000	1		0.0	0.0	0.0	
					2		0.0	0.0	0.0	
					3		0.0	0.0	0.0	
					4		0.0	0.0	0.0	
					5		0.0	0.0	0.0	
Extremes	8	1.100	0.000	0.000	5	$\varepsilon_{eqv,pl,Mises,+}$	2.5	0.5	2.5	

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9.9 SURFACES - EQUIVALENT PLASTIC STRAINS - VON MISES

Static Analysis

Surface No.	Grid Point No.	Grid Point Coordinates [m] X	Y	Z	Layer No.		von Mises [‰] $\varepsilon_{eqv,pl,Mises,+}$	$\varepsilon_{eqv,pl,Mises,-}$	$\varepsilon_{eqv,pl,Mises}$	Surface Comment Cor. Loading
1	1	0.100	0.500	0.000	1	$\varepsilon_{eqv,pl,Mises,+}$	0.0	0.0	0.0	
	8	1.100	0.000	0.000	5	$\varepsilon_{eqv,pl,Mises,-}$	2.5	0.5	2.5	
	1	0.100	0.500	0.000	1		0.0	0.0	0.0	
	8	1.100	0.000	0.000	5	$\varepsilon_{eqv,pl,Mises}$	2.5	0.5	2.5	
	1	0.100	0.500	0.000	1		0.0	0.0	0.0	
Total							2.5	0.5	2.5	
1							0.0	0.0	0.0	
	G LC2 - 170 kN									
2	1	0.100	0.500	0.090	1		0.0	0.0	0.0	
	2	0.600	0.500	0.090	1		0.7	0.0	0.7	
	3	1.100	0.500	0.090	1		1.1	0.0	1.1	
	4	1.600	0.500	0.090	1		0.4	0.0	0.4	
	5	2.100	0.500	0.090	1		0.0	0.0	0.0	
	6	0.100	0.000	0.090	1		0.0	0.0	0.0	
	7	0.600	0.000	0.090	1		0.7	0.0	0.7	
	8	1.100	0.000	0.090	1		1.0	0.0	1.0	
	9	1.600	0.000	0.090	1		0.4	0.0	0.4	
	10	2.100	0.000	0.090	1		0.0	0.0	0.0	
Extremes	3	1.100	0.500	0.090	1	$\varepsilon_{eqv,pl,Mises,+}$	1.1	0.0	1.1	
2	1	0.100	0.500	0.090	1		0.0	0.0	0.0	
	1	0.100	0.500	0.090	1	$\varepsilon_{eqv,pl,Mises,-}$	0.0	0.0	0.0	
	3	1.100	0.500	0.090	1		1.1	0.0	1.1	
	3	1.100	0.500	0.090	1	$\varepsilon_{eqv,pl,Mises}$	1.1	0.0	1.1	
	5	2.100	0.500	0.090	1		0.0	0.0	0.0	
Total							1.1	0.0	1.1	
2							0.0	0.0	0.0	
	G LC2 - 170 kN									
	Total max/min values with corresponding values									
1	8	1.100	0.000	0.000	5	$\varepsilon_{eqv,pl,Mises,+}$	2.5	0.5	2.5	
1	1	0.100	0.500	0.000	1		0.0	0.0	0.0	
1	8	1.100	0.000	0.000	5	$\varepsilon_{eqv,pl,Mises,-}$	2.5	0.5	2.5	
1	1	0.100	0.500	0.000	1		0.0	0.0	0.0	
1	8	1.100	0.000	0.000	5	$\varepsilon_{eqv,pl,Mises}$	2.5	0.5	2.5	
1	1	0.100	0.500	0.000	1		0.0	0.0	0.0	
	G LC2 - 170 kN									
Total							2.5	0.0	2.5	
max/min							0.0	0.0	0.0	

B. Utskriftsrapport fra RFEM modell «Type A metode 2»

Structural Analysis

CLIENT

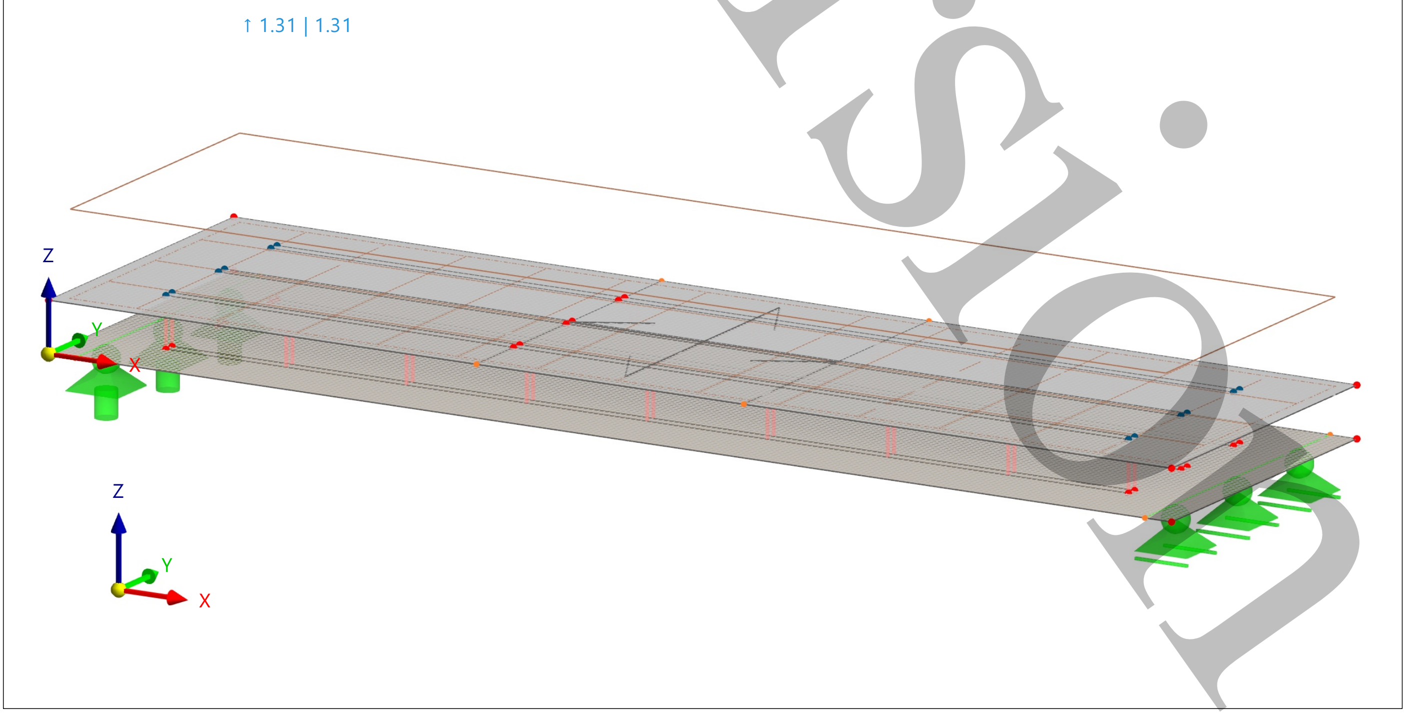
CREATED BY

PROJECT

Chapters

MODEL

In Axonometric Direction by Default



CONTENTS

A MODEL - LOCATION

Location

Country	:	--
Street	:	
Zip / Postal code	:	
City	:	
State	:	
Latitude	:	deg
Longitude	:	deg
Altitude	:	m

B MODEL - PARAMETERS

Model ID

{b823393c-08b3-4103-81f5-72afa83a2be3}
Unique model identifier

Project ID

{91af4629-d872-463e-8724-66011f1f28ef}
Unique project identifier

C MODEL - BASE DATA

Main

Model name	:	Type A - method 2 - 03 – Kopi.rf6
Model description	:	
Type of model	:	3D

Add-ons

Stress-Strain Analysis
Concrete Design
Timber Design

Standards I

Load case classification & combination wizard	:	EN 1990 | Timber NS | 2016-05
Load Wizard	:	EN 1991 NS | 2018-05
Standard group for concrete design	:	EN 1992 NS | 2010-11
Standard group for timber design	:	EN 1995 NS | 2014-08

Settings & Options

Acceleration of gravity / mass conversion constant	g	:	10.00 m/s²
Date of day zero in time diagram		:	01.01.2016
Global axes XYZ		:	Z upward
Local axes xyz		:	z downward

Tolerances

Tolerance for nodes	:	0.00050 m
Tolerance for lines	:	0.00050 m
Tolerance for surfaces/planes	:	0.00050 m
Tolerance for directions	:	0.00050 m

D MESH SETTINGS

General

Target length of finite elements	L_F	:	0.010 m
Maximum distance between a node and a line to integrate it into the line	ε	:	0.001 m
Maximum number of mesh nodes (in thousands)	n_m	:	1000

Members

Number of divisions for result diagram	:	10

D **MESH SETTINGS**

Number of divisions for special types of members (cable, elastic foundation, taper, nonlinearity)	:	10
Number of divisions for determination of max/min values	:	10
Activate member divisions for straight members, which are not integrated into surfaces, with concrete material category group (necessary for nonlinear calculation)		
Minimum number of member divisions	:	10
Activate member divisions for large deformation or post-critical analysis		
Activate member divisions for straight members		
Minimum number of member divisions	:	8
Activate division for members with nodes lying on them		

Surfaces

Maximum ratio of FE rectangle diagonals	Δ_D	:	1.800
Maximum out-of-plane inclination of two finite elements	α	:	0.50
Shape of finite elements		:	Triangles and quadrangles
Same squares where possible			
Triangles for membranes			

1 Basic Objects

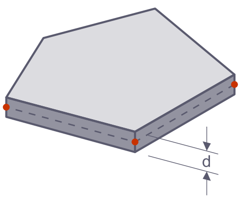
1.1 MATERIALS

Legend
Concrete Settings
Stiffness modification
User-Defined Material

Material No.	Material Name	Material Type	Analysis Model	Options
1	C35/45 | Isotropic | Plastic (Surfaces/Solids)	Concrete	Isotropic | Plastic (Surfaces/ Solids)	
2	T22 | Orthotropic | Plastic (Surfaces)	Timber	Orthotropic | Plastic (Surfaces)	
3	T15 | Orthotropic | Plastic (Surfaces)	Timber	Orthotropic | Plastic (Surfaces)	
5	B500M(A) | Isotropic | Plastic (Members)	Reinforcing Steel	Isotropic | Plastic (Members)	

1.2 THICKNESSES

Uniform



Thick. No.	Type	Assigned to Surface No.	Material	Symbol	Thickness Value	Unit	Nodes	Direction
1	Uniform | d : 60.0 mm | 1 - C35/45							
	Uniform	2	1	d	60.0	mm		
2	Uniform | d : 30.0 mm | 2 - T22							
	Uniform		2	d	30.0	mm		
3	Uniform | d : 20.0 mm | 3 - T15							
	Uniform		3	d	20.0	mm		
4	Layers | d : 120.0 mm | Layers: 5							
	Layers	1						

1.2.1 THICKNESSES - LAYER INFO

Thick. No.	Layer Model Solid	Layer Model Gas	Total Thickness d [mm]	Total Weight g [N/m²]	Comment
4			120.0	540.0	

1.2.2 THICKNESSES - LAYERS

Thick. No.	Layer No.	Layer Type	Object	Material	Thickness d [mm]	Rotation β [deg]	Connected	Spec. W. g_l [N/m³]	Weight g [N/m²]	Comment
4	1	Layer	2	2	30.0	0.00	☐	4700.0	141.0	
	2	Layer	3	3	20.0	90.00	☐	4300.0	86.0	
	3	Layer	3	3	20.0	0.00	☐	4300.0	86.0	
	4	Layer	3	3	20.0	90.00	☐	4300.0	86.0	
	5	Layer	2	2	30.0	0.00	☐	4700.0	141.0	

1.3 NODES

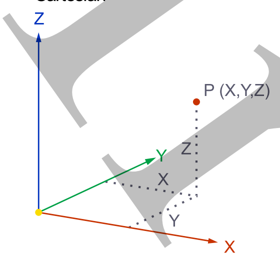
Legend
Generated
On Line

Node No.	Node Type	Reference Node	Coordinate System	Coordinate Type	X [m]	Y [m]	Z [m]	Options	Comment
1	Standard	--	1	Cartesian	2.100	0.600	0.000		
2	Standard	--	1	Cartesian	2.100	0.600	0.090		
3	Standard	--	1	Cartesian	0.000	0.000	0.090		
5	On Line		1	Cartesian	0.050	0.000	0.000		
6	On Line		1	Cartesian	0.050	0.600	0.000		
7	On Line		1	Cartesian	2.050	0.000	0.000		

1.3

NODES

Cartesian



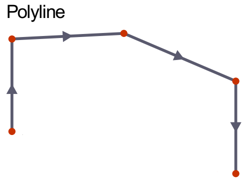
Node No.	Node Type	Reference Node	Coordinate System	Coordinate Type	Node Coordinates X [m]	Y [m]	Z [m]	Options	Comment
8	On Line		1	Cartesian	2.050	0.600	0.000	+	
10	On Line		1	Cartesian	0.800	0.000	0.090	+	
11	On Line		1	Cartesian	0.800	0.600	0.090	+	
12	On Line		1	Cartesian	1.300	0.000	0.090	+	
13	On Line		1	Cartesian	1.300	0.600	0.090	+	
15	Standard	--	1	Cartesian	0.150	0.120	0.000		
16	Standard	--	1	Cartesian	0.150	0.140	0.000		
17	Standard	--	1	Cartesian	0.150	0.290	0.000		
18	Standard	--	1	Cartesian	0.150	0.310	0.000		
19	Standard	--	1	Cartesian	0.150	0.460	0.000		
20	Standard	--	1	Cartesian	0.150	0.480	0.000		
22	Standard	--	1	Cartesian	1.950	0.120	0.000		
23	Standard	--	1	Cartesian	1.950	0.140	0.000		
24	Standard	--	1	Cartesian	1.950	0.290	0.000		
25	Standard	--	1	Cartesian	1.950	0.310	0.000		
26	Standard	--	1	Cartesian	1.950	0.460	0.000		
27	Standard	--	1	Cartesian	1.950	0.480	0.000		
28	Standard	--	1	Cartesian	0.000	0.000	0.000		
29	Standard	--	1	Cartesian	0.000	0.600	0.000		
31	Standard	--	1	Cartesian	2.100	0.000	0.000		
33	Standard	--	1	Cartesian	0.000	0.600	0.090		
35	Standard	--	1	Cartesian	2.100	0.000	0.090		
36	Standard	--	1	Cartesian	0.150	0.120	0.090	Generated	
37	Standard	--	1	Cartesian	1.950	0.120	0.090	Generated	
38	Standard	--	1	Cartesian	0.150	0.140	0.090	Generated	
39	Standard	--	1	Cartesian	1.950	0.140	0.090	Generated	
40	Standard	--	1	Cartesian	0.150	0.290	0.090	Generated	
41	Standard	--	1	Cartesian	1.950	0.290	0.090	Generated	
42	Standard	--	1	Cartesian	0.150	0.310	0.090	Generated	
43	Standard	--	1	Cartesian	1.950	0.310	0.090	Generated	
44	Standard	--	1	Cartesian	0.150	0.460	0.090	Generated	
45	Standard	--	1	Cartesian	1.950	0.460	0.090	Generated	
46	Standard	--	1	Cartesian	0.150	0.480	0.090	Generated	
47	Standard	--	1	Cartesian	1.950	0.480	0.090	Generated	
49	Standard	--	1	Cartesian	0.800	0.120	0.090		
50	Standard	--	1	Cartesian	0.800	0.140	0.090		
51	Standard	--	1	Cartesian	0.800	0.290	0.090		
52	Standard	--	1	Cartesian	0.800	0.310	0.090		
53	Standard	--	1	Cartesian	0.800	0.460	0.090		
54	Standard	--	1	Cartesian	0.800	0.480	0.090		

1.4

LINES

Legend
- Generated
- Line Support
- Nodes on Line

Polyline



Line No.	Line Type	Nodes No.	Line Length L [m]	Position	Options	Comment
1	Polyline	28,29	0.600	On Y		
2	Polyline	29,1	2.100	|| X	Nodes on Line	
3	Polyline	1,31	0.600	|| Y		
4	Polyline	31,28	2.100	On X	Nodes on Line	
5	Polyline	3,33	0.600	|| Y		
6	Polyline	33,2	2.100	|| X	Nodes on Line	
7	Polyline	2,35	0.600	|| Y		
8	Polyline	35,3	2.100	|| X	Nodes on Line	
9	Polyline	10,11	0.600	|| Y		
10	Polyline	13,12	0.600	|| Y		
11	Polyline	8,7	0.600	|| Y	Line Support	
12	Polyline	6,5	0.600	|| Y	Line Support	
13	Polyline	15,22	1.800	|| X		
14	Polyline	16,23	1.800	|| X		
15	Polyline	17,24	1.800	|| X		
16	Polyline	18,25	1.800	|| X		
17	Polyline	19,26	1.800	|| X		
18	Polyline	20,27	1.800	|| X		
19	Polyline	36,37	1.800	|| X	Generated	
20	Polyline	38,39	1.800	|| X	Generated	
21	Polyline	40,41	1.800	|| X	Generated	
22	Polyline	42,43	1.800	|| X	Generated	
23	Polyline	44,45	1.800	|| X	Generated	
24	Polyline	46,47	1.800	|| X	Generated	

1.5 SURFACES

Legend
Concrete Durability (Concrete Design)
Design properties
Grid for Results

Surface No.	Boundary Lines	Stiffness Type	Geometry Type	Thickness	Material	Position	Options
1	1-4	Standard	Plane	4		In XY	
2	5-8	Standard	Plane	1	1	|| XY	

Integrated Objects   Reinforcement Direction – Bottom   Reinforcement Direction – Top
Service Class (Timber Design)
Surface Reinforcement Table

2 Special Objects

2.1 STRUCTURE MODIFICATIONS

Mod. No.	Description	Value	Comment
1	Structure Modification 1		
	Assigned to	CO 1	
	Partial Safety Factor γ_M	☒	
	Materials	☐	
	Surfaces	☐	
	Line Supports	☐	
	Surface Reinforcement	☐	
	Material Nonlinearity Models	☐	
	Timber Members due to Moisture Class	☐	

3 Types for Lines

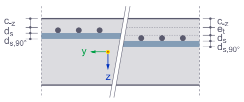
3.1 LINE SUPPORTS

Support No.	Lines No.	Coordinate System	x Axis R. β [deg]	Translational Spring [kN/m²] $C_{u,X}$	$C_{u,Y}$	$C_{u,Z}$	Rotational Spring [kNm·rad⁻¹·m⁻¹] $C_{\varphi,X}$	$C_{\varphi,Y}$	$C_{\varphi,Z}$
1	12	Global XYZ		☒	☒	☒	☐	☐	☐
2	11	Global XYZ		☐	☒	☒	☐	☐	☒

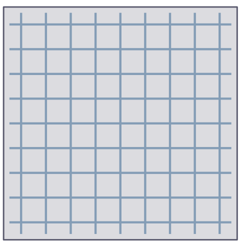
4 Types for Concrete Design

4.1 SURFACE REINFORCEMENTS

Location Type 'On Surface' | Alignment 'Top (-z)'



Reinforcement Type 'Mesh'



Reinf. No.	Description	Symbol	Value	Unit
1	On Surface | Mesh | Q131A | Top (-z) (Surfaces : 2)			
	Assigned to Surfaces No.		2	
	Location type		On Surface	
	Material		5 - B500M(A) | Isotropic | Plastic (Members)	
	Reinforcement type		Mesh	
	Mesh product range		Germany - 1997-01-01	
	Mesh name		Q131A	
	Mesh shape		Q-Mesh	
	Rebar diameter	d_s	5.0	mm
	Rebar spacing	s	0.150	m
	Additional transverse reinforcement enabled		☒	
	Additional rebar diameter	$d_{s,90°}$	5.0	mm
	Additional rebar spacing	$s_{90°}$	0.150	m
	Top alignment enabled		☒	
	Bottom alignment enabled		☐	
	Top additional offset to concrete cover	e_t	5.0	mm
	Reinforcement direction type		In reinforcement direction	
	In reinforcement direction of design		$a_{s,1}$	
	Reinforcement area	$a_{s,1}$	1.31	cm²/m
	Reinforcement area	$a_{s,2}$	1.31	cm²/m
	Reinforcement area	$a_{s,1,-z}$	1.31	cm²/m
	Reinforcement area	$a_{s,2,-z}$	1.31	cm²/m

4.2 **CONCRETE DURABILITIES**

Cond. No.	Description	Symbol	Value	Unit
1	XC1 (Surfaces : 2)			
	Assigned to Members No.			
	Assigned to Member Sets No.			
	Assigned to Surfaces No.		2	
	Corrosion induced by carbonation		XC1 - Dry or permanently wet	
	Structural class type		According to standard	
	Increase design working life from 50 to 100 years enabled		☐	
	Allowance for deviation type		According to standard	

4.3 **REINFORCEMENT DIRECTIONS**

Direction No.	Type	Surfaces	Reinf. Dir. Rotations About z Related to x φ1 [deg]	φ2 [deg]	Δφ2 [deg]
1	First Reinforcement Direction in x	2			

5 Load Cases & Combinations

5.1 **LOAD CASES**

LC No.	Settings	Value	Unit	To Solve
1	G 200 kN			
	Analysis type	Static Analysis		☒
	Static analysis settings	SA4 - Geometrically linear | Newton-Raphson		
	Action category	G Permanent		
	Self-weight - Factor in direction X	0.000	--	
	Self-weight - Factor in direction Y	0.000	--	
	Self-weight - Factor in direction Z	-1.000	--	
	Load duration	Permanent		
2	G 170 kN			
	Analysis type	Static Analysis		☒
	Static analysis settings	SA4 - Geometrically linear | Newton-Raphson		
	Action category	G Permanent		
	Self-weight - Factor in direction X	0.000	--	
	Self-weight - Factor in direction Y	0.000	--	
	Self-weight - Factor in direction Z	-1.000	--	
	Load duration	Permanent		
3	G 168 kN			
	Analysis type	Static Analysis		☒
	Static analysis settings	SA5 - Geometrically linear | Newton-Raphson		
	Action category	G Permanent		
	Self-weight - Factor in direction X	0.000	--	
	Self-weight - Factor in direction Y	0.000	--	
	Self-weight - Factor in direction Z	-1.000	--	
	Load duration	Permanent		

5.2 **STATIC ANALYSIS SETTINGS**

Settings No.	Description	Symbol	Value	Unit
1	Geometrically linear | Newton-Raphson			
	Analysis type		Geometrically linear	
	Iterative method for nonlinear analysis		Newton-Raphson	
	Maximum number of iterations		100	
	Number of load increments		1	
	Modify standard precision and tolerance settings		☐	
	Ignore all nonlinearities		☐	
	Modify loading by multiplier factor		☐	
	Displacements due to member load of type 'Pipe internal pressure' (Bourdon effect)		☐	
	Method for equation system		Direct	
	Plate bending theory		Mindlin	
	Activate mass conversion to load		☐	
	Asymmetric direct solver		☐	
2	Second-order (P-Δ) | Picard | 100 | 1			
	Analysis type		Second-order (P-Δ)	
	Iterative method for nonlinear analysis		Picard	
	Maximum number of iterations		100	

5.2

STATIC ANALYSIS SETTINGS

Settings No.	Description	Symbol	Value	Unit
	Number of load increments		1	
	Modify standard precision and tolerance settings		☐	
	Ignore all nonlinearities		☐	
	Modify loading by multiplier factor		☐	
	Consider favorable effect due to tension in members		☒	
	Displacements due to member load of type 'Pipe internal pressure' (Bourdon effect)		☐	
	Refer internal forces to deformed structure		☒	
	Refer internal forces to deformed structure for normal forces		☒	
	Refer internal forces to deformed structure for shear forces		☒	
	Refer internal forces to deformed structure for moments		☒	
	Method for equation system		Direct	
	Plate bending theory		Mindlin	
	Activate mass conversion to load		☐	
	Asymmetric direct solver		☐	
3	Large deformations | Newton-Raphson | 100 | 1			
	Analysis type		Large deformations	
	Iterative method for nonlinear analysis		Newton-Raphson	
	Maximum number of iterations		100	
	Number of load increments		1	
	Modify standard precision and tolerance settings		☐	
	Ignore all nonlinearities		☐	
	Modify loading by multiplier factor		☐	
	Consider favorable effect due to tension in members		☒	
	Try to calculate unstable structure		☐	
	Displacements due to member load of type 'Pipe internal pressure' (Bourdon effect)		☐	
	Method for equation system		Direct	
	Plate bending theory		Mindlin	
	Activate mass conversion to load		☐	
	Asymmetric direct solver		☐	
4	Geometrically linear | Newton-Raphson			
	Analysis type		Geometrically linear	
	Iterative method for nonlinear analysis		Newton-Raphson	
	Maximum number of iterations		100	
	Number of load increments		200	
	Modify standard precision and tolerance settings		☐	
	Ignore all nonlinearities		☐	
	Modify loading by multiplier factor		☐	
	Displacements due to member load of type 'Pipe internal pressure' (Bourdon effect)		☐	
	Save results of all load increments		☒	
	Method for equation system		Direct	
	Plate bending theory		Mindlin	
	Activate mass conversion to load		☐	
	Asymmetric direct solver		☐	
5	Geometrically linear | Newton-Raphson			
	Analysis type		Geometrically linear	
	Iterative method for nonlinear analysis		Newton-Raphson	
	Maximum number of iterations		100	
	Number of load increments		168	
	Modify standard precision and tolerance settings		☐	
	Ignore all nonlinearities		☐	
	Modify loading by multiplier factor		☐	
	Displacements due to member load of type 'Pipe internal pressure' (Bourdon effect)		☐	
	Save results of all load increments		☒	
	Method for equation system		Direct	
	Plate bending theory		Mindlin	
	Activate mass conversion to load		☐	
	Asymmetric direct solver		☐	

5.2.1

STATIC ANALYSIS SETTINGS - CALCULATION DIAGRAMS

Settings	Horizontal Axis				Vertical Axis			
No.	Result Type	Value	Object	Node	Result Type	Value	Object	Node
4	Maximum deformation	u_Z			Sum of support forces	Z		
	Sum of support forces	Z			Surfaces - Equivalent Stresses - von Mises	$\sigma_{eqv,Mises,-}$	1	23
	Sum of support forces	Z			Surfaces - Equivalent Stresses - von Mises	$\sigma_{eqv,Mises,-}$	2	12

5.2.1

STATIC ANALYSIS SETTINGS - CALCULATION DIAGRAMS

Settings	Horizontal Axis				Vertical Axis			
No.	Result Type	Value	Object	Node	Result Type	Value	Object	Node
5	Maximum deformation	u_Z			Sum of support forces	Z		

5.3

COMBINATION WIZARDS

Wizard No.	Settings	Value
1	Load combinations | SA2 - Second-order (P-Δ) | Picard | 100 | 1	
	Assigned to	DS 1-3
	Generate combinations	Load combinations (non-linear analysis)
	Static analysis settings	SA2 - Second-order (P-Δ) | Picard | 100 | 1
	Consider imperfection case	☒
	Consider initial state	☐
	Structure modification enabled	☐
	Generate same load combinations without imperfection case	☐
	Consider construction stages	☐
	User-defined action combinations	☐
	Favorable permanent actions	☐
	Reduce number of generated combinations	☐
2	Load combinations | SA1 - Geometrically linear | Newton-Raphson	
	Assigned to	
	Generate combinations	Load combinations (non-linear analysis)
	Static analysis settings	SA1 - Geometrically linear | Newton-Raphson
	Consider imperfection case	☐
	Consider initial state	☐
	Structure modification enabled	☐
	Consider construction stages	☐
	User-defined action combinations	☐
	Favorable permanent actions	☐
	Reduce number of generated combinations	☐

6 Guide Objects

6.1

COORDINATE SYSTEMS

System		Coordinates			Rotation				
No.	Type	Symbol	Value	Unit	Sequence	Symbol	Value	Unit	Comment
1	Global XYZ								

7 Parts List

7.1

PARTS LIST - ALL BY MATERIAL

Parts Lists

Material No.	Material Name	Object Type	Tot. Coating C_Σ [m²]	Tot. Volume V_Σ [m³]	Tot. Weight W_Σ [t]
1	C35/45	Surfaces	2.844	0.076	0.189
Total			2.844	0.076	0.189
2	T22	Surfaces	2.520	0.151	0.068
Total			2.520	0.151	0.068
Σ Total			5.364	0.227	0.257

8 Static Analysis Results

8.1

SUMMARY

Static Analysis

Description	Value	Unit	Notes
G LC2 - 170 kN			
Sum of loads and the sum of support forces			
Sum of loads in X	0.00	kN	
Sum of support forces in X	0.00	kN	
Sum of loads in Y	0.00	kN	
Sum of support forces in Y	0.00	kN	
Sum of loads in Z	-172.60	kN	
Sum of support forces in Z	-172.60	kN	Deviation: 0.00 %

8.1 SUMMARY

Static Analysis

	Description	Value	Unit	Notes
	Resultant of reactions			
	Resultant of reactions about X	0.00	kNm	At center of gravity of model (1.050, 0.300, 0.086 m)
	Resultant of reactions about Y	0.00	kNm	At center of gravity of model
	Resultant of reactions about Z	0.00	kNm	At center of gravity of model
	Maximum deformations			
	Maximum displacement in X-direction	1.0	mm	FE node No. 24: (1.950, 0.290, 0.000 m)
	Maximum displacement in Y-direction	-0.1	mm	FE node No. 13018: (0.750, 0.000, 0.090 m)
	Maximum displacement in Z-direction	-8.2	mm	FE node No. 23439: (1.050, 0.000, 0.090 m)
	Maximum vectorial displacement	8.2	mm	FE node No. 23439: (1.050, 0.000, 0.090 m)
	Maximum rotation about X-axis	2.2	mrad	FE node No. 23435: (1.070, 0.000, 0.090 m)
	Maximum rotation about Y-axis	-10.4	mrad	FE node No. 12870: (2.090, 0.000, 0.000 m)
	Maximum rotation about Z-axis	-2.9	mrad	FE node No. 5: (0.050, 0.000, 0.000 m)
	Calculation statistic			
	Number of iterations	2		
	Maximum value of element of stiffness matrix on diagonal	2.64e+12	--	
	Minimum value of element of stiffness matrix on diagonal	1415.55	--	
	Stiffness matrix determinant	6.10e+1123633	--	
	Infinity Norm	5.52e+12	--	
	Static Analysis Settings No. 4 - Geometrically linear | Newton-Raphson			
	Analysis type	Geometrically linear		
	Iterative method	Newton-Raphson		
	Maximum number of iterations	100		
	Number of load increments	200		
	Modify loading by multiplier factor	☐		
	Save results of all load increments	☒		
	Asymmetric direct solver	☐		
	Method for Equation System	Direct		
	Plate bending theory	Mindlin		

8.2 CALCULATION DIAGRAMS

Static Analysis

	Increment No.	Iteration No.	Load Factor [--]	Value on Vertical Axis	Value on Horizontal Axis	Comment
	G LC2 - 170 kN					
	Calculation Diagram: 1					
				Z [kN]	u_Z [mm]	Maximum deformation u_Z [mm] | Sum of support forces Z [kN]
	1	2	0.005	-0.863	0.0	
	2	2	0.010	-1.726	-0.1	
	3	2	0.015	-2.589	-0.1	
	4	2	0.020	-3.452	-0.2	
	5	2	0.025	-4.315	-0.2	
	6	2	0.030	-5.178	-0.2	
	7	2	0.035	-6.041	-0.3	
	8	2	0.040	-6.904	-0.3	
	9	2	0.045	-7.767	-0.4	
	10	2	0.050	-8.630	-0.4	
	11	2	0.055	-9.493	-0.4	
	12	2	0.060	-10.356	-0.5	
	13	2	0.065	-11.219	-0.5	
	14	2	0.070	-12.082	-0.5	
	15	2	0.075	-12.945	-0.6	
	16	2	0.080	-13.808	-0.6	
	17	2	0.085	-14.671	-0.7	
	18	2	0.090	-15.534	-0.7	
	19	2	0.095	-16.397	-0.7	
	20	2	0.100	-17.260	-0.8	
	21	2	0.105	-18.123	-0.8	
	22	2	0.110	-18.986	-0.9	
	23	2	0.115	-19.849	-0.9	
	24	2	0.120	-20.712	-0.9	
	25	2	0.125	-21.575	-1.0	
	26	2	0.130	-22.438	-1.0	
	27	2	0.135	-23.301	-1.1	
	28	2	0.140	-24.164	-1.1	
	29	2	0.145	-25.027	-1.1	
	30	2	0.150	-25.890	-1.2	
	31	2	0.155	-26.753	-1.2	
	32	2	0.160	-27.616	-1.2	
	33	2	0.165	-28.479	-1.3	
	34	2	0.170	-29.342	-1.3	
	35	2	0.175	-30.205	-1.4	
	36	2	0.180	-31.068	-1.4	
	37	2	0.185	-31.931	-1.4	

8.2 CALCULATION DIAGRAMS

Static Analysis

Increment No.	Iteration No.	Load Factor [--]	Value on Vertical Axis	Value on Horizontal Axis	Comment
38	2	0.190	-32.794	-1.5	
39	2	0.195	-33.657	-1.5	
40	2	0.200	-34.520	-1.6	
41	2	0.205	-35.383	-1.6	
42	2	0.210	-36.246	-1.6	
43	2	0.215	-37.109	-1.7	
44	2	0.220	-37.972	-1.7	
45	2	0.225	-38.835	-1.8	
46	2	0.230	-39.698	-1.8	
47	2	0.235	-40.561	-1.8	
48	2	0.240	-41.424	-1.9	
49	2	0.245	-42.287	-1.9	
50	2	0.250	-43.150	-2.0	
51	2	0.255	-44.013	-2.0	
52	2	0.260	-44.876	-2.0	
53	2	0.265	-45.739	-2.1	
54	2	0.270	-46.602	-2.1	
55	2	0.275	-47.465	-2.1	
56	2	0.280	-48.328	-2.2	
57	2	0.285	-49.191	-2.2	
58	2	0.290	-50.054	-2.3	
59	2	0.295	-50.917	-2.3	
60	2	0.300	-51.780	-2.3	
61	2	0.305	-52.643	-2.4	
62	2	0.310	-53.506	-2.4	
63	2	0.315	-54.369	-2.5	
64	2	0.320	-55.232	-2.5	
65	2	0.325	-56.095	-2.5	
66	2	0.330	-56.958	-2.6	
67	2	0.335	-57.821	-2.6	
68	2	0.340	-58.684	-2.7	
69	2	0.345	-59.547	-2.7	
70	2	0.350	-60.410	-2.7	
71	2	0.355	-61.273	-2.8	
72	2	0.360	-62.136	-2.8	
73	2	0.365	-62.999	-2.9	
74	2	0.370	-63.862	-2.9	
75	2	0.375	-64.725	-2.9	
76	2	0.380	-65.588	-3.0	
77	2	0.385	-66.451	-3.0	
78	2	0.390	-67.314	-3.0	
79	2	0.395	-68.177	-3.1	
80	2	0.400	-69.040	-3.1	
81	2	0.405	-69.903	-3.2	
82	2	0.410	-70.766	-3.2	
83	2	0.415	-71.629	-3.2	
84	2	0.420	-72.492	-3.3	
85	2	0.425	-73.355	-3.3	
86	2	0.430	-74.218	-3.4	
87	2	0.435	-75.081	-3.4	
88	2	0.440	-75.944	-3.4	
89	2	0.445	-76.807	-3.5	
90	2	0.450	-77.670	-3.5	
91	2	0.455	-78.533	-3.6	
92	2	0.460	-79.396	-3.6	
93	2	0.465	-80.259	-3.6	
94	2	0.470	-81.122	-3.7	
95	2	0.475	-81.985	-3.7	
96	2	0.480	-82.849	-3.8	
97	2	0.485	-83.712	-3.8	
98	2	0.490	-84.575	-3.8	
99	2	0.495	-85.438	-3.9	
100	2	0.500	-86.301	-3.9	
101	2	0.505	-87.164	-4.0	
102	2	0.510	-88.027	-4.0	
103	2	0.515	-88.890	-4.0	
104	2	0.520	-89.753	-4.1	
105	2	0.525	-90.616	-4.1	
106	2	0.530	-91.479	-4.2	
107	2	0.535	-92.342	-4.2	
108	2	0.540	-93.205	-4.2	
109	2	0.545	-94.068	-4.3	
110	2	0.550	-94.931	-4.3	
111	2	0.555	-95.794	-4.4	
112	2	0.560	-96.657	-4.4	
113	2	0.565	-97.520	-4.4	
114	2	0.570	-98.383	-4.5	

8.2 CALCULATION DIAGRAMS

Static Analysis

Increment No.	Iteration No.	Load Factor [--]	Value on Vertical Axis	Value on Horizontal Axis	Comment
115	2	0.575	-99.246	-4.5	
116	2	0.580	-100.109	-4.6	
117	2	0.585	-100.972	-4.6	
118	2	0.590	-101.835	-4.6	
119	2	0.595	-102.698	-4.7	
120	2	0.600	-103.561	-4.7	
121	2	0.605	-104.424	-4.8	
122	2	0.610	-105.287	-4.8	
123	2	0.615	-106.150	-4.8	
124	2	0.620	-107.013	-4.9	
125	2	0.625	-107.876	-4.9	
126	2	0.630	-108.739	-5.0	
127	2	0.635	-109.602	-5.0	
128	2	0.640	-110.465	-5.0	
129	2	0.645	-111.328	-5.1	
130	2	0.650	-112.191	-5.1	
131	2	0.655	-113.054	-5.2	
132	2	0.660	-113.917	-5.2	
133	2	0.665	-114.780	-5.2	
134	2	0.670	-115.643	-5.3	
135	2	0.675	-116.506	-5.3	
136	2	0.680	-117.369	-5.4	
137	2	0.685	-118.232	-5.4	
138	2	0.690	-119.095	-5.4	
139	2	0.695	-119.958	-5.5	
140	2	0.700	-120.821	-5.5	
141	2	0.705	-121.684	-5.6	
142	2	0.710	-122.547	-5.6	
143	2	0.715	-123.410	-5.6	
144	2	0.720	-124.273	-5.7	
145	2	0.725	-125.136	-5.7	
146	2	0.730	-125.999	-5.8	
147	2	0.735	-126.862	-5.8	
148	2	0.740	-127.725	-5.9	
149	2	0.745	-128.588	-5.9	
150	2	0.750	-129.451	-5.9	
151	2	0.755	-130.314	-6.0	
152	2	0.760	-131.177	-6.0	
153	2	0.765	-132.040	-6.1	
154	2	0.770	-132.903	-6.1	
155	2	0.775	-133.766	-6.1	
156	2	0.780	-134.629	-6.2	
157	2	0.785	-135.492	-6.2	
158	2	0.790	-136.355	-6.3	
159	2	0.795	-137.218	-6.3	
160	2	0.800	-138.081	-6.4	
161	2	0.805	-138.944	-6.4	
162	2	0.810	-139.807	-6.4	
163	2	0.815	-140.670	-6.5	
164	2	0.820	-141.533	-6.5	
165	2	0.825	-142.396	-6.6	
166	2	0.830	-143.259	-6.6	
167	2	0.835	-144.122	-6.7	
168	2	0.840	-144.985	-6.7	
169	2	0.845	-145.848	-6.8	
170	2	0.850	-146.711	-6.8	
171	2	0.855	-147.574	-6.8	
172	2	0.860	-148.437	-6.9	
173	2	0.865	-149.300	-6.9	
174	2	0.870	-150.163	-7.0	
175	2	0.875	-151.026	-7.0	
176	2	0.880	-151.889	-7.1	
177	2	0.885	-152.752	-7.1	
178	2	0.890	-153.615	-7.2	
179	2	0.895	-154.478	-7.2	
180	2	0.900	-155.341	-7.2	
181	2	0.905	-156.204	-7.3	
182	2	0.910	-157.067	-7.3	
183	2	0.915	-157.930	-7.4	
184	2	0.920	-158.793	-7.4	
185	2	0.925	-159.656	-7.5	
186	2	0.930	-160.519	-7.5	
187	2	0.935	-161.382	-7.6	
188	2	0.940	-162.245	-7.6	
189	2	0.945	-163.108	-7.6	
190	2	0.950	-163.971	-7.7	
191	2	0.955	-164.834	-7.7	

8.2 CALCULATION DIAGRAMS

Static Analysis

Increment No.	Iteration No.	Load Factor [--]	Value on Vertical Axis	Value on Horizontal Axis	Comment
192	2	0.960	-165.697	-7.8	
193	2	0.965	-166.560	-7.8	
194	2	0.970	-167.423	-7.9	
195	2	0.975	-168.286	-7.9	
196	2	0.980	-169.149	-8.0	
197	2	0.985	-170.012	-8.0	
198	2	0.990	-170.875	-8.1	
199	2	0.995	-171.738	-8.1	
200	2	1.000	-172.601	-8.2	
LC2 - 170 kN Calculation Diagram: 2					
			$\sigma_{eqv,Mises,-}$ [N/mm²]	Z [kN]	Sum of support forces Z [kN] | Surfaces - Equivalent Stresses - von Mises $\sigma_{eqv,Mises,-}$ (Surface No. 1, Node No. 23)
1	2	0.005	0.067	-0.863	
2	2	0.010	0.133	-1.726	
3	2	0.015	0.200	-2.589	
4	2	0.020	0.266	-3.452	
5	2	0.025	0.333	-4.315	
6	2	0.030	0.400	-5.178	
7	2	0.035	0.466	-6.041	
8	2	0.040	0.533	-6.904	
9	2	0.045	0.599	-7.767	
10	2	0.050	0.666	-8.630	
11	2	0.055	0.733	-9.493	
12	2	0.060	0.799	-10.356	
13	2	0.065	0.866	-11.219	
14	2	0.070	0.933	-12.082	
15	2	0.075	0.999	-12.945	
16	2	0.080	1.066	-13.808	
17	2	0.085	1.132	-14.671	
18	2	0.090	1.199	-15.534	
19	2	0.095	1.266	-16.397	
20	2	0.100	1.332	-17.260	
21	2	0.105	1.399	-18.123	
22	2	0.110	1.465	-18.986	
23	2	0.115	1.532	-19.849	
24	2	0.120	1.599	-20.712	
25	2	0.125	1.665	-21.575	
26	2	0.130	1.732	-22.438	
27	2	0.135	1.799	-23.301	
28	2	0.140	1.865	-24.164	
29	2	0.145	1.932	-25.027	
30	2	0.150	1.999	-25.890	
31	2	0.155	2.065	-26.753	
32	2	0.160	2.132	-27.616	
33	2	0.165	2.199	-28.479	
34	2	0.170	2.266	-29.342	
35	2	0.175	2.332	-30.205	
36	2	0.180	2.399	-31.068	
37	2	0.185	2.466	-31.931	
38	2	0.190	2.533	-32.794	
39	2	0.195	2.600	-33.657	
40	2	0.200	2.667	-34.520	
41	2	0.205	2.735	-35.383	
42	2	0.210	2.802	-36.246	
43	2	0.215	2.869	-37.109	
44	2	0.220	2.936	-37.972	
45	2	0.225	3.004	-38.835	
46	2	0.230	3.071	-39.698	
47	2	0.235	3.138	-40.561	
48	2	0.240	3.206	-41.424	
49	2	0.245	3.273	-42.287	
50	2	0.250	3.341	-43.150	
51	2	0.255	3.408	-44.013	
52	2	0.260	3.476	-44.876	
53	2	0.265	3.544	-45.739	
54	2	0.270	3.611	-46.602	
55	2	0.275	3.679	-47.465	
56	2	0.280	3.747	-48.328	
57	2	0.285	3.815	-49.191	
58	2	0.290	3.883	-50.054	
59	2	0.295	3.951	-50.917	
60	2	0.300	4.019	-51.780	
61	2	0.305	4.087	-52.643	
62	2	0.310	4.155	-53.506	
63	2	0.315	4.223	-54.369	

8.2 **CALCULATION DIAGRAMS** **Static Analysis**

Increment No.	Iteration No.	Load Factor [--]	Value on Vertical Axis	Value on Horizontal Axis	Comment
64	2	0.320	4.291	-55.232	
65	2	0.325	4.359	-56.095	
66	2	0.330	4.427	-56.958	
67	2	0.335	4.496	-57.821	
68	2	0.340	4.564	-58.684	
69	2	0.345	4.632	-59.547	
70	2	0.350	4.700	-60.410	
71	2	0.355	4.768	-61.273	
72	2	0.360	4.837	-62.136	
73	2	0.365	4.905	-62.999	
74	2	0.370	4.973	-63.862	
75	2	0.375	5.042	-64.725	
76	2	0.380	5.110	-65.588	
77	2	0.385	5.178	-66.451	
78	2	0.390	5.247	-67.314	
79	2	0.395	5.315	-68.177	
80	2	0.400	5.384	-69.040	
81	2	0.405	5.452	-69.903	
82	2	0.410	5.521	-70.766	
83	2	0.415	5.589	-71.629	
84	2	0.420	5.658	-72.492	
85	2	0.425	5.726	-73.355	
86	2	0.430	5.794	-74.218	
87	2	0.435	5.863	-75.081	
88	2	0.440	5.931	-75.944	
89	2	0.445	6.000	-76.807	
90	2	0.450	6.068	-77.670	
91	2	0.455	6.137	-78.533	
92	2	0.460	6.205	-79.396	
93	2	0.465	6.274	-80.259	
94	2	0.470	6.342	-81.122	
95	2	0.475	6.411	-81.985	
96	2	0.480	6.479	-82.849	
97	2	0.485	6.548	-83.712	
98	2	0.490	6.616	-84.575	
99	2	0.495	6.685	-85.438	
100	2	0.500	6.754	-86.301	
101	2	0.505	6.822	-87.164	
102	2	0.510	6.891	-88.027	
103	2	0.515	6.960	-88.890	
104	2	0.520	7.029	-89.753	
105	2	0.525	7.098	-90.616	
106	2	0.530	7.166	-91.479	
107	2	0.535	7.235	-92.342	
108	2	0.540	7.304	-93.205	
109	2	0.545	7.372	-94.068	
110	2	0.550	7.441	-94.931	
111	2	0.555	7.510	-95.794	
112	2	0.560	7.578	-96.657	
113	2	0.565	7.647	-97.520	
114	2	0.570	7.716	-98.383	
115	2	0.575	7.784	-99.246	
116	2	0.580	7.853	-100.109	
117	2	0.585	7.922	-100.972	
118	2	0.590	7.991	-101.835	
119	2	0.595	8.060	-102.698	
120	2	0.600	8.129	-103.561	
121	2	0.605	8.198	-104.424	
122	2	0.610	8.267	-105.287	
123	2	0.615	8.335	-106.150	
124	2	0.620	8.404	-107.013	
125	2	0.625	8.473	-107.876	
126	2	0.630	8.542	-108.739	
127	2	0.635	8.612	-109.602	
128	2	0.640	8.681	-110.465	
129	2	0.645	8.750	-111.328	
130	2	0.650	8.819	-112.191	
131	2	0.655	8.888	-113.054	
132	2	0.660	8.957	-113.917	
133	2	0.665	9.026	-114.780	
134	2	0.670	9.095	-115.643	
135	2	0.675	9.165	-116.506	
136	2	0.680	9.234	-117.369	
137	2	0.685	9.303	-118.232	
138	2	0.690	9.372	-119.095	
139	2	0.695	9.442	-119.958	
140	2	0.700	9.511	-120.821	

8.2 CALCULATION DIAGRAMS

Static Analysis

	Increment No.	Iteration No.	Load Factor [--]	Value on Vertical Axis	Value on Horizontal Axis	Comment
	141	2	0.705	9.580	-121.684	
	142	2	0.710	9.650	-122.547	
	143	2	0.715	9.719	-123.410	
	144	2	0.720	9.789	-124.273	
	145	2	0.725	9.858	-125.136	
	146	2	0.730	9.928	-125.999	
	147	2	0.735	9.997	-126.862	
	148	2	0.740	10.066	-127.725	
	149	2	0.745	10.136	-128.588	
	150	2	0.750	10.205	-129.451	
	151	2	0.755	10.275	-130.314	
	152	2	0.760	10.344	-131.177	
	153	2	0.765	10.414	-132.040	
	154	2	0.770	10.483	-132.903	
	155	2	0.775	10.553	-133.766	
	156	2	0.780	10.622	-134.629	
	157	2	0.785	10.691	-135.492	
	158	2	0.790	10.761	-136.355	
	159	2	0.795	10.830	-137.218	
	160	2	0.800	10.900	-138.081	
	161	2	0.805	10.969	-138.944	
	162	2	0.810	11.039	-139.807	
	163	2	0.815	11.108	-140.670	
	164	2	0.820	11.178	-141.533	
	165	2	0.825	11.247	-142.396	
	166	2	0.830	11.317	-143.259	
	167	2	0.835	11.386	-144.122	
	168	2	0.840	11.456	-144.985	
	169	2	0.845	11.525	-145.848	
	170	2	0.850	11.595	-146.711	
	171	2	0.855	11.664	-147.574	
	172	2	0.860	11.734	-148.437	
	173	2	0.865	11.803	-149.300	
	174	2	0.870	11.873	-150.163	
	175	2	0.875	11.943	-151.026	
	176	2	0.880	12.012	-151.889	
	177	2	0.885	12.082	-152.752	
	178	2	0.890	12.151	-153.615	
	179	2	0.895	12.221	-154.478	
	180	2	0.900	12.291	-155.341	
	181	2	0.905	12.360	-156.204	
	182	2	0.910	12.430	-157.067	
	183	2	0.915	12.500	-157.930	
	184	2	0.920	12.570	-158.793	
	185	2	0.925	12.639	-159.656	
	186	2	0.930	12.709	-160.519	
	187	2	0.935	12.779	-161.382	
	188	2	0.940	12.849	-162.245	
	189	2	0.945	12.918	-163.108	
	190	2	0.950	12.988	-163.971	
	191	2	0.955	13.058	-164.834	
	192	2	0.960	13.128	-165.697	
	193	2	0.965	13.198	-166.560	
	194	2	0.970	13.268	-167.423	
	195	2	0.975	13.338	-168.286	
	196	2	0.980	13.408	-169.149	
	197	2	0.985	13.478	-170.012	
	198	2	0.990	13.548	-170.875	
	199	2	0.995	13.618	-171.738	
	200	2	1.000	13.688	-172.601	
	G LC2 - 170 kN					
	Calculation Diagram: 3					
				$\sigma_{eqv,Mises,-}$ [N/mm²]	Z [kN]	Sum of support forces Z [kN] | Surfaces - Equivalent Stresses - von Mises $\sigma_{eqv,Mises,-}$ (Surface No. 2, Node No. 12)
	1	2	0.005	0.168	-0.863	
	2	2	0.010	0.336	-1.726	
	3	2	0.015	0.504	-2.589	
	4	2	0.020	0.672	-3.452	
	5	2	0.025	0.840	-4.315	
	6	2	0.030	1.007	-5.178	
	7	2	0.035	1.175	-6.041	
	8	2	0.040	1.343	-6.904	
	9	2	0.045	1.511	-7.767	
	10	2	0.050	1.679	-8.630	
	11	2	0.055	1.847	-9.493	
	12	2	0.060	2.015	-10.356	

8.2 CALCULATION DIAGRAMS

Static Analysis

Increment No.	Iteration No.	Load Factor [--]	Value on Vertical Axis	Value on Horizontal Axis	Comment
13	2	0.065	2.183	-11.219	
14	2	0.070	2.351	-12.082	
15	2	0.075	2.519	-12.945	
16	2	0.080	2.686	-13.808	
17	2	0.085	2.854	-14.671	
18	2	0.090	3.022	-15.534	
19	2	0.095	3.190	-16.397	
20	2	0.100	3.358	-17.260	
21	2	0.105	3.526	-18.123	
22	2	0.110	3.694	-18.986	
23	2	0.115	3.862	-19.849	
24	2	0.120	4.030	-20.712	
25	2	0.125	4.198	-21.575	
26	2	0.130	4.365	-22.438	
27	2	0.135	4.533	-23.301	
28	2	0.140	4.701	-24.164	
29	2	0.145	4.869	-25.027	
30	2	0.150	5.037	-25.890	
31	2	0.155	5.205	-26.753	
32	2	0.160	5.373	-27.616	
33	2	0.165	5.541	-28.479	
34	2	0.170	5.709	-29.342	
35	2	0.175	5.877	-30.205	
36	2	0.180	6.046	-31.068	
37	2	0.185	6.214	-31.931	
38	2	0.190	6.383	-32.794	
39	2	0.195	6.552	-33.657	
40	2	0.200	6.722	-34.520	
41	2	0.205	6.891	-35.383	
42	2	0.210	7.060	-36.246	
43	2	0.215	7.229	-37.109	
44	2	0.220	7.398	-37.972	
45	2	0.225	7.567	-38.835	
46	2	0.230	7.737	-39.698	
47	2	0.235	7.907	-40.561	
48	2	0.240	8.080	-41.424	
49	2	0.245	8.254	-42.287	
50	2	0.250	8.429	-43.150	
51	2	0.255	8.603	-44.013	
52	2	0.260	8.778	-44.876	
53	2	0.265	8.953	-45.739	
54	2	0.270	9.127	-46.602	
55	2	0.275	9.300	-47.465	
56	2	0.280	9.474	-48.328	
57	2	0.285	9.647	-49.191	
58	2	0.290	9.821	-50.054	
59	2	0.295	9.995	-50.917	
60	2	0.300	10.168	-51.780	
61	2	0.305	10.342	-52.643	
62	2	0.310	10.516	-53.506	
63	2	0.315	10.690	-54.369	
64	2	0.320	10.863	-55.232	
65	2	0.325	11.036	-56.095	
66	2	0.330	11.210	-56.958	
67	2	0.335	11.384	-57.821	
68	2	0.340	11.558	-58.684	
69	2	0.345	11.732	-59.547	
70	2	0.350	11.906	-60.410	
71	2	0.355	12.080	-61.273	
72	2	0.360	12.254	-62.136	
73	2	0.365	12.428	-62.999	
74	2	0.370	12.603	-63.862	
75	2	0.375	12.777	-64.725	
76	2	0.380	12.951	-65.588	
77	2	0.385	13.125	-66.451	
78	2	0.390	13.300	-67.314	
79	2	0.395	13.474	-68.177	
80	2	0.400	13.649	-69.040	
81	2	0.405	13.824	-69.903	
82	2	0.410	13.998	-70.766	
83	2	0.415	14.173	-71.629	
84	2	0.420	14.348	-72.492	
85	2	0.425	14.523	-73.355	
86	2	0.430	14.698	-74.218	
87	2	0.435	14.874	-75.081	
88	2	0.440	15.049	-75.944	
89	2	0.445	15.226	-76.807	

8.2 CALCULATION DIAGRAMS

Static Analysis

Increment No.	Iteration No.	Load Factor [--]	Value on Vertical Axis	Value on Horizontal Axis	Comment
90	2	0.450	15.404	-77.670	
91	2	0.455	15.586	-78.533	
92	2	0.460	15.768	-79.396	
93	2	0.465	15.951	-80.259	
94	2	0.470	16.134	-81.122	
95	2	0.475	16.317	-81.985	
96	2	0.480	16.500	-82.849	
97	2	0.485	16.684	-83.712	
98	2	0.490	16.868	-84.575	
99	2	0.495	17.053	-85.438	
100	2	0.500	17.237	-86.301	
101	2	0.505	17.423	-87.164	
102	2	0.510	17.610	-88.027	
103	2	0.515	17.798	-88.890	
104	2	0.520	17.986	-89.753	
105	2	0.525	18.175	-90.616	
106	2	0.530	18.364	-91.479	
107	2	0.535	18.555	-92.342	
108	2	0.540	18.746	-93.205	
109	2	0.545	18.936	-94.068	
110	2	0.550	19.125	-94.931	
111	2	0.555	19.314	-95.794	
112	2	0.560	19.503	-96.657	
113	2	0.565	19.692	-97.520	
114	2	0.570	19.881	-98.383	
115	2	0.575	20.070	-99.246	
116	2	0.580	20.259	-100.109	
117	2	0.585	20.448	-100.972	
118	2	0.590	20.638	-101.835	
119	2	0.595	20.827	-102.698	
120	2	0.600	21.017	-103.561	
121	2	0.605	21.208	-104.424	
122	2	0.610	21.400	-105.287	
123	2	0.615	21.592	-106.150	
124	2	0.620	21.785	-107.013	
125	2	0.625	21.978	-107.876	
126	2	0.630	22.171	-108.739	
127	2	0.635	22.363	-109.602	
128	2	0.640	22.556	-110.465	
129	2	0.645	22.748	-111.328	
130	2	0.650	22.941	-112.191	
131	2	0.655	23.133	-113.054	
132	2	0.660	23.326	-113.917	
133	2	0.665	23.519	-114.780	
134	2	0.670	23.712	-115.643	
135	2	0.675	23.906	-116.506	
136	2	0.680	24.099	-117.369	
137	2	0.685	24.292	-118.232	
138	2	0.690	24.486	-119.095	
139	2	0.695	24.679	-119.958	
140	2	0.700	24.872	-120.821	
141	2	0.705	25.064	-121.684	
142	2	0.710	25.256	-122.547	
143	2	0.715	25.449	-123.410	
144	2	0.720	25.641	-124.273	
145	2	0.725	25.832	-125.136	
146	2	0.730	26.024	-125.999	
147	2	0.735	26.216	-126.862	
148	2	0.740	26.407	-127.725	
149	2	0.745	26.599	-128.588	
150	2	0.750	26.790	-129.451	
151	2	0.755	26.982	-130.314	
152	2	0.760	27.174	-131.177	
153	2	0.765	27.367	-132.040	
154	2	0.770	27.559	-132.903	
155	2	0.775	27.752	-133.766	
156	2	0.780	27.945	-134.629	
157	2	0.785	28.139	-135.492	
158	2	0.790	28.334	-136.355	
159	2	0.795	28.528	-137.218	
160	2	0.800	28.723	-138.081	
161	2	0.805	28.918	-138.944	
162	2	0.810	29.113	-139.807	
163	2	0.815	29.309	-140.670	
164	2	0.820	29.505	-141.533	
165	2	0.825	29.701	-142.396	
166	2	0.830	29.897	-143.259	

8.2 CALCULATION DIAGRAMS

Static Analysis

	Increment No.	Iteration No.	Load Factor [--]	Value on Vertical Axis	Value on Horizontal Axis	Comment
	167	2	0.835	30.093	-144.122	
	168	2	0.840	30.290	-144.985	
	169	2	0.845	30.488	-145.848	
	170	2	0.850	30.687	-146.711	
	171	2	0.855	30.886	-147.574	
	172	2	0.860	31.086	-148.437	
	173	2	0.865	31.283	-149.300	
	174	2	0.870	31.480	-150.163	
	175	2	0.875	31.677	-151.026	
	176	2	0.880	31.874	-151.889	
	177	2	0.885	32.073	-152.752	
	178	2	0.890	32.273	-153.615	
	179	2	0.895	32.475	-154.478	
	180	2	0.900	32.681	-155.341	
	181	2	0.905	32.889	-156.204	
	182	2	0.910	33.098	-157.067	
	183	2	0.915	33.307	-157.930	
	184	2	0.920	33.517	-158.793	
	185	2	0.925	33.728	-159.656	
	186	2	0.930	33.939	-160.519	
	187	2	0.935	34.150	-161.382	
	188	2	0.940	34.363	-162.245	
	189	2	0.945	34.576	-163.108	
	190	2	0.950	34.790	-163.971	
	191	2	0.955	35.005	-164.834	
	192	2	0.960	35.221	-165.697	
	193	2	0.965	35.439	-166.560	
	194	2	0.970	35.658	-167.423	
	195	2	0.975	35.879	-168.286	
	196	2	0.980	36.100	-169.149	
	197	2	0.985	36.322	-170.012	
	198	2	0.990	36.543	-170.875	
	199	2	0.995	36.766	-171.738	
	200	2	1.000	36.991	-172.601	

8.3 NODES - GLOBAL DEFORMATIONS

Static Analysis

Node No.	Displacements [mm] |u|	u_X	u_Y	u_Z	Rotations [mrad] φ_X	φ_Y	φ_Z	Node Comment Cor. Loading
	G LC2 - 170 kN							
1	1.1	0.9	0.0	0.5	-0.1	-10.4	0.0	
2	1.1	0.3	0.0	-1.1	0.0	-9.1	0.0	
3	1.3	0.7	0.0	-1.1	0.0	9.1	0.0	
5	0.0	0.0	0.0	0.0	-0.1	10.4	-2.9	
6	0.0	0.0	0.0	0.0	0.1	10.4	2.9	
7	0.9	0.9	0.0	0.0	-0.1	-10.4	0.0	
8	0.9	0.9	0.0	0.0	0.1	-10.4	0.0	
10	7.7	0.6	-0.1	-7.7	1.9	4.3	0.1	
11	7.7	0.6	0.1	-7.7	-1.9	4.3	-0.1	
12	7.7	0.4	-0.1	-7.7	1.9	-4.3	-0.1	
13	7.7	0.4	0.1	-7.7	-1.9	-4.3	0.1	
15	2.4	0.0	0.0	-2.4	0.0	8.6	-0.3	
16	2.4	0.0	0.0	-2.4	0.0	8.7	0.1	
17	2.4	0.0	0.0	-2.4	0.0	8.7	-0.2	
18	2.4	0.0	0.0	-2.4	0.0	8.7	0.2	
19	2.4	0.0	0.0	-2.4	0.0	8.7	-0.1	
20	2.4	0.0	0.0	-2.4	0.0	8.6	0.3	
22	2.7	1.0	0.0	-2.4	0.0	-8.6	0.3	
23	2.7	1.0	0.0	-2.4	0.0	-8.7	-0.1	
24	2.6	1.0	0.0	-2.4	0.0	-8.8	0.1	
25	2.6	1.0	0.0	-2.4	0.0	-8.8	-0.1	
26	2.7	1.0	0.0	-2.4	0.0	-8.7	0.1	
27	2.7	1.0	0.0	-2.4	0.0	-8.6	-0.3	
28	0.5	0.0	0.0	0.5	0.1	10.4	-0.9	
29	0.5	0.0	0.0	0.5	-0.1	10.4	0.9	
31	1.1	0.9	0.0	0.5	0.1	-10.4	0.0	
33	1.3	0.7	0.0	-1.1	0.0	9.1	0.0	
35	1.1	0.3	0.0	-1.1	0.0	-9.1	0.0	
36	2.6	0.7	0.0	-2.4	0.0	8.6	-0.3	
37	2.5	0.2	0.0	-2.4	0.0	-8.6	0.3	
38	2.6	0.8	0.0	-2.4	0.0	8.7	0.1	
39	2.5	0.2	0.0	-2.4	0.0	-8.7	-0.1	
40	2.6	0.8	0.0	-2.4	0.0	8.7	-0.2	
41	2.5	0.2	0.0	-2.4	0.0	-8.8	0.1	
42	2.6	0.8	0.0	-2.4	0.0	8.7	0.2	
43	2.5	0.2	0.0	-2.4	0.0	-8.8	-0.1	

8.3 NODES - GLOBAL DEFORMATIONS

Static Analysis

Node No.	Displacements [mm] |u|	u_X	u_Y	u_Z	Rotations [mrad] φ_X	φ_Y	φ_Z	Node Comment Cor. Loading
44	2.6	0.8	0.0	-2.4	0.0	8.7	-0.1	
45	2.5	0.2	0.0	-2.4	0.0	-8.7	0.1	
46	2.6	0.7	0.0	-2.4	0.0	8.6	0.3	
47	2.5	0.2	0.0	-2.4	0.0	-8.6	-0.3	
Total	7.7	1.0	0.1	0.5	1.9	10.4	2.9	
max/min	0.0	0.0	-0.1	-7.7	-1.9	-10.4	-2.9	

8.4 LINES - SUPPORT FORCES

Static Analysis

Line No.	Node No.	Location x [m]		Support Forces [kN/m] p_x	p_y	p_z	Support Moments [kNm/m] m_x	m_y	m_z	Line Comment Cor. Loading
	G LC2 - 170 kN									
11	8	0.000		0.000	33.379	-100.955	0.000	0.000	-0.025	
		0.010		0.000	24.626	-102.755	0.000	0.000	-0.016	
		0.020		0.000	31.051	-104.991	0.000	0.000	-0.012	
		0.030		0.000	33.008	-108.080	0.000	0.000	-0.008	
		0.040		0.000	34.154	-112.178	0.000	0.000	-0.005	
		0.050		0.000	34.805	-117.295	0.000	0.000	-0.002	
		0.060		0.000	35.100	-123.387	0.000	0.000	0.002	
		0.070		0.000	35.103	-130.336	0.000	0.000	0.006	
		0.080		0.000	34.804	-137.905	0.000	0.000	0.010	
		0.090		0.000	34.090	-145.701	0.000	0.000	0.013	
		0.100		0.000	32.721	-153.159	0.000	0.000	0.016	
		0.110		0.000	30.468	-159.568	0.000	0.000	0.015	
		0.120		0.000	27.376	-164.197	0.000	0.000	0.008	
		0.130		0.000	23.710	-166.500	0.000	0.000	-0.002	
		0.140		0.000	20.054	-166.315	0.000	0.000	-0.012	
		0.150 ¼		0.000	16.975	-163.921	0.000	0.000	-0.018	
		0.160		0.000	14.682	-159.963	0.000	0.000	-0.019	
		0.170		0.000	13.167	-155.251	0.000	0.000	-0.016	
		0.180		0.000	12.185	-150.561	0.000	0.000	-0.013	
		0.190		0.000	11.489	-146.518	0.000	0.000	-0.009	
		0.200 ⅓		0.000	10.942	-143.566	0.000	0.000	-0.006	
		0.210		0.000	10.480	-141.981	0.000	0.000	-0.003	
		0.220		0.000	10.070	-141.894	0.000	0.000	0.000	
		0.230		0.000	9.689	-143.314	0.000	0.000	0.003	
		0.240		0.000	9.303	-146.128	0.000	0.000	0.006	
		0.250		0.000	8.846	-150.085	0.000	0.000	0.010	
		0.260		0.000	8.188	-154.773	0.000	0.000	0.013	
		0.270		0.000	7.093	-159.608	0.000	0.000	0.015	
		0.280		0.000	5.335	-163.871	0.000	0.000	0.015	
		0.290		0.000	2.909	-166.815	0.000	0.000	0.009	
		0.300 ½		0.000	0.001	-167.867	0.000	0.000	0.000	
		0.310		0.000	-2.908	-166.815	0.000	0.000	-0.009	
		0.320		0.000	-5.334	-163.871	0.000	0.000	-0.015	
		0.330		0.000	-7.092	-159.608	0.000	0.000	-0.015	
		0.340		0.000	-8.187	-154.773	0.000	0.000	-0.013	
		0.350		0.000	-8.845	-150.085	0.000	0.000	-0.010	
		0.360		0.000	-9.302	-146.128	0.000	0.000	-0.006	
		0.370		0.000	-9.688	-143.314	0.000	0.000	-0.003	
		0.380		0.000	-10.069	-141.894	0.000	0.000	0.000	
		0.390		0.000	-10.479	-141.981	0.000	0.000	0.003	
		0.400 ⅔		0.000	-10.941	-143.566	0.000	0.000	0.006	
		0.410		0.000	-11.489	-146.518	0.000	0.000	0.009	
		0.420		0.000	-12.185	-150.561	0.000	0.000	0.013	
		0.430		0.000	-13.167	-155.251	0.000	0.000	0.016	
		0.440		0.000	-14.682	-159.963	0.000	0.000	0.019	
		0.450 ¾		0.000	-16.974	-163.921	0.000	0.000	0.018	
		0.460		0.000	-20.054	-166.315	0.000	0.000	0.012	
		0.470		0.000	-23.710	-166.500	0.000	0.000	0.002	
		0.480		0.000	-27.376	-164.197	0.000	0.000	-0.008	
		0.490		0.000	-30.468	-159.568	0.000	0.000	-0.015	
		0.500		0.000	-32.721	-153.158	0.000	0.000	-0.016	
		0.510		0.000	-34.091	-145.701	0.000	0.000	-0.013	
		0.520		0.000	-34.805	-137.905	0.000	0.000	-0.010	
		0.530		0.000	-35.104	-130.336	0.000	0.000	-0.006	
		0.540		0.000	-35.100	-123.387	0.000	0.000	-0.002	
		0.550		0.000	-34.805	-117.295	0.000	0.000	0.002	
		0.560		0.000	-34.155	-112.178	0.000	0.000	0.005	
		0.570		0.000	-33.008	-108.080	0.000	0.000	0.008	
		0.580		0.000	-31.052	-104.991	0.000	0.000	0.012	
		0.590		0.000	-24.626	-102.755	0.000	0.000	0.016	
	7	0.600		0.000	-33.379	-100.955	0.000	0.000	0.025	
Extremes	8	0.000	p_x	0.000	33.379	-100.955	0.000	0.000	-0.025	
11	8	0.000		0.000	33.379	-100.955	0.000	0.000	-0.025	
		0.070	p_y	0.000	35.103	-130.336	0.000	0.000	0.006	

8.4 LINES - SUPPORT FORCES

Static Analysis

Line No.	Node No.	Location x [m]		Support Forces [kN/m]			Support Moments [kNm/m]			Line Comment Cor. Loading
				p_x	p_y	p_z	m_x	m_y	m_z	
11		0.530	p_y	0.000	-35.104	-130.336	0.000	0.000	-0.006	
	8	0.000	p_z	0.000	33.379	-100.955	0.000	0.000	-0.025	
		0.300	½	0.000	0.001	-167.867	0.000	0.000	0.000	
	8	0.000	m_x	0.000	33.379	-100.955	0.000	0.000	-0.025	
	8	0.000		0.000	33.379	-100.955	0.000	0.000	-0.025	
	8	0.000	m_y	0.000	33.379	-100.955	0.000	0.000	-0.025	
	8	0.000		0.000	33.379	-100.955	0.000	0.000	-0.025	
	7	0.600	m_z	0.000	-33.379	-100.955	0.000	0.000	0.025	
	8	0.000		0.000	33.379	-100.955	0.000	0.000	-0.025	
Total				0.000	35.103	-100.955	0.000	0.000	0.025	
11				0.000	-35.104	-167.867	0.000	0.000	-0.025	
Average				0.000	0.000	-143.834	0.000	0.000	0.000	
	G LC2 - 170 kN									
12	6	0.000		145.210	8.636	-100.161	0.000	0.000	0.000	
		0.010		196.104	8.293	-102.077	0.000	0.000	0.000	
		0.020		209.187	11.412	-104.375	0.000	0.000	0.000	
		0.030		200.346	13.009	-107.505	0.000	0.000	0.000	
		0.040		183.514	14.349	-111.639	0.000	0.000	0.000	
		0.050		160.991	15.531	-116.787	0.000	0.000	0.000	
		0.060		132.332	16.553	-122.909	0.000	0.000	0.000	
		0.070		96.487	17.361	-129.887	0.000	0.000	0.000	
		0.080		52.327	17.849	-137.487	0.000	0.000	0.000	
		0.090		-0.708	17.820	-145.317	0.000	0.000	0.000	
		0.100		-60.926	16.974	-152.813	0.000	0.000	0.000	
		0.110		-121.288	15.058	-159.269	0.000	0.000	0.000	
		0.120		-168.190	12.136	-163.951	0.000	0.000	0.000	
		0.130		-188.426	8.553	-166.312	0.000	0.000	0.000	
		0.140		-177.557	5.013	-166.187	0.000	0.000	0.000	
		0.150	¼	-141.192	2.213	-163.851	0.000	0.000	0.000	
		0.160		-92.815	0.463	-159.948	0.000	0.000	0.000	
		0.170		-45.814	-0.206	-155.292	0.000	0.000	0.000	
		0.180		-7.127	-0.060	-150.660	0.000	0.000	0.000	
		0.190		21.416	0.591	-146.677	0.000	0.000	0.000	
		0.200	⅓	40.045	1.537	-143.789	0.000	0.000	0.000	
		0.210		49.402	2.640	-142.272	0.000	0.000	0.000	
		0.220		49.913	3.805	-142.257	0.000	0.000	0.000	
		0.230		41.610	4.945	-143.753	0.000	0.000	0.000	
		0.240		24.121	5.968	-146.647	0.000	0.000	0.000	
		0.250		-3.157	6.745	-150.687	0.000	0.000	0.000	
		0.260		-40.468	7.079	-155.458	0.000	0.000	0.000	
		0.270		-86.142	6.679	-160.371	0.000	0.000	0.000	
		0.280		-133.699	5.296	-164.700	0.000	0.000	0.000	
		0.290		-170.607	2.971	-167.690	0.000	0.000	0.000	
		0.300	½	-184.464	0.000	-168.758	0.000	0.000	0.000	
		0.310		-170.607	-2.971	-167.690	0.000	0.000	0.000	
		0.320		-133.700	-5.296	-164.700	0.000	0.000	0.000	
		0.330		-86.144	-6.678	-160.371	0.000	0.000	0.000	
		0.340		-40.470	-7.079	-155.458	0.000	0.000	0.000	
		0.350		-3.159	-6.745	-150.687	0.000	0.000	0.000	
		0.360		24.118	-5.968	-146.647	0.000	0.000	0.000	
		0.370		41.606	-4.945	-143.753	0.000	0.000	0.000	
		0.380		49.909	-3.805	-142.257	0.000	0.000	0.000	
		0.390		49.397	-2.640	-142.272	0.000	0.000	0.000	
		0.400	⅔	40.040	-1.537	-143.789	0.000	0.000	0.000	
		0.410		21.411	-0.591	-146.677	0.000	0.000	0.000	
		0.420		-7.133	0.060	-150.660	0.000	0.000	0.000	
		0.430		-45.820	0.206	-155.292	0.000	0.000	0.000	
		0.440		-92.822	-0.463	-159.948	0.000	0.000	0.000	
		0.450	¾	-141.200	-2.213	-163.851	0.000	0.000	0.000	
		0.460		-177.565	-5.013	-166.187	0.000	0.000	0.000	
		0.470		-188.434	-8.553	-166.312	0.000	0.000	0.000	
		0.480		-168.197	-12.137	-163.951	0.000	0.000	0.000	
		0.490		-121.294	-15.058	-159.269	0.000	0.000	0.000	
		0.500		-60.931	-16.975	-152.813	0.000	0.000	0.000	
		0.510		-0.712	-17.821	-145.317	0.000	0.000	0.000	
		0.520		52.324	-17.849	-137.487	0.000	0.000	0.000	
		0.530		96.486	-17.362	-129.887	0.000	0.000	0.000	
		0.540		132.331	-16.553	-122.909	0.000	0.000	0.000	
		0.550		160.991	-15.532	-116.787	0.000	0.000	0.000	
		0.560		183.514	-14.350	-111.639	0.000	0.000	0.000	
		0.570		200.347	-13.010	-107.506	0.000	0.000	0.000	
		0.580		209.188	-11.413	-104.376	0.000	0.000	0.000	
		0.590		196.105	-8.294	-102.078	0.000	0.000	0.000	
	5	0.600		145.210	-8.636	-100.161	0.000	0.000	0.000	
Extremes		0.020	p_x	209.187	11.412	-104.375	0.000	0.000	0.000	
12		0.130		-188.426	8.553	-166.312	0.000	0.000	0.000	

8.4 LINES - SUPPORT FORCES

Static Analysis

Line No.	Node No.	Location x [m]		Support Forces [kN/m] p_x	p_y	p_z	Support Moments [kNm/m] m_x	m_y	m_z	Line Comment Cor. Loading
12		0.080	p_y	52.327	17.849	-137.487	0.000	0.000	0.000	
		0.520		52.324	-17.849	-137.487	0.000	0.000	0.000	
	6	0.000	p_z	145.210	8.636	-100.161	0.000	0.000	0.000	
		0.300		-184.464	0.000	-168.758	0.000	0.000	0.000	
	6	0.000	m_x	145.210	8.636	-100.161	0.000	0.000	0.000	
	6	0.000		145.210	8.636	-100.161	0.000	0.000	0.000	
	6	0.000	m_y	145.210	8.636	-100.161	0.000	0.000	0.000	
	6	0.000		145.210	8.636	-100.161	0.000	0.000	0.000	
	6	0.000	m_z	145.210	8.636	-100.161	0.000	0.000	0.000	
	6	0.000		145.210	8.636	-100.161	0.000	0.000	0.000	
Total				209.187	17.849	-100.161	0.000	0.000	0.000	
12				-188.426	-17.849	-168.758	0.000	0.000	0.000	
Average				0.000	0.000	-143.834	0.000	0.000	0.000	
	G LC2 - 170 kN									
	Total max/min values with corresponding values									
12		0.020	p_x	209.187	11.412	-104.375	0.000	0.000	0.000	
12		0.130		-188.426	8.553	-166.312	0.000	0.000	0.000	
11		0.070	p_y	0.000	35.103	-130.336	0.000	0.000	0.006	
11		0.530		0.000	-35.104	-130.336	0.000	0.000	-0.006	
12		0.000	p_z	145.210	8.636	-100.161	0.000	0.000	0.000	
12		0.300		-184.464	0.000	-168.758	0.000	0.000	0.000	
11		0.000	m_x	0.000	33.379	-100.955	0.000	0.000	-0.025	
11		0.000		0.000	33.379	-100.955	0.000	0.000	-0.025	
11		0.000	m_y	0.000	33.379	-100.955	0.000	0.000	-0.025	
11		0.000		0.000	33.379	-100.955	0.000	0.000	-0.025	
11		0.600	m_z	0.000	-33.379	-100.955	0.000	0.000	0.025	
11		0.000		0.000	33.379	-100.955	0.000	0.000	-0.025	
	G LC2 - 170 kN									
Total				209.188	35.103	-100.161	0.000	0.000	0.025	
max/min				-188.434	-35.104	-168.758	0.000	0.000	-0.025	
	G LC2 - 170 kN									
	Sum of loads and support forces									
				P_X [kN]	P_Y [kN]	P_Z [kN]				
Σ				0.00	0.00	-172.60	Loads			
Σ				0.00	0.00	-172.60	Support Forces			

8.5 SURFACES - GLOBAL DEFORMATIONS

Static Analysis

Surface No.	Grid Point No.	Grid Point Coordinates [m] X	Y	Z		Displacements [mm] |u|	u_X	u_Y	u_Z	Rotations [mrad] φ_X	φ_Y	φ_Z	Surface Comment Cor. Loading
	G LC2 - 170 kN												
1	1	0.000	0.500	0.000		0.5	0.0	0.0	0.5	-0.1	9.9	-0.1	
	2	0.500	0.500	0.000		5.6	0.1	0.0	-5.6	-0.4	7.0	0.3	
	3	1.000	0.500	0.000		7.9	0.5	0.0	-7.9	-0.5	0.7	0.0	
	4	1.500	0.500	0.000		6.4	0.8	0.0	-6.3	-0.5	-6.0	-0.3	
	5	2.000	0.500	0.000		1.4	1.0	0.0	-1.0	0.2	-9.8	0.1	
	6	0.000	0.000	0.000		0.5	0.0	0.0	0.5	0.1	10.4	-0.9	
	7	0.500	0.000	0.000		5.6	0.1	0.0	-5.6	0.4	7.0	-1.3	
	8	1.000	0.000	0.000		8.0	0.5	0.0	-8.0	0.5	0.7	-0.1	
	9	1.500	0.000	0.000		6.4	0.8	0.0	-6.4	0.5	-5.9	1.3	
	10	2.000	0.000	0.000		1.3	0.9	0.0	-0.9	-0.2	-10.4	0.8	
Extremes	5	2.000	0.500	0.000	u_X	1.4	1.0	0.0	-1.0	0.2	-9.8	0.1	
1	1	0.000	0.500	0.000		0.5	0.0	0.0	0.5	-0.1	9.9	-0.1	
	8	1.000	0.000	0.000	u_Y	8.0	0.5	0.0	-8.0	0.5	0.7	-0.1	
	3	1.000	0.500	0.000		7.9	0.5	0.0	-7.9	-0.5	0.7	0.0	
	6	0.000	0.000	0.000	u_Z	0.5	0.0	0.0	0.5	0.1	10.4	-0.9	
	8	1.000	0.000	0.000		8.0	0.5	0.0	-8.0	0.5	0.7	-0.1	
	9	1.500	0.000	0.000	φ_X	6.4	0.8	0.0	-6.4	0.5	-5.9	1.3	
	4	1.500	0.500	0.000		6.4	0.8	0.0	-6.3	-0.5	-6.0	-0.3	
	6	0.000	0.000	0.000	φ_Y	0.5	0.0	0.0	0.5	0.1	10.4	-0.9	
	10	2.000	0.000	0.000		1.3	0.9	0.0	-0.9	-0.2	-10.4	0.8	
	9	1.500	0.000	0.000	φ_Z	6.4	0.8	0.0	-6.4	0.5	-5.9	1.3	
	7	0.500	0.000	0.000		5.6	0.1	0.0	-5.6	0.4	7.0	-1.3	
Total						8.0	1.0	0.0	0.5	0.5	10.4	1.3	
1						0.5	0.0	0.0	-8.0	-0.5	-10.4	-1.3	
	G LC2 - 170 kN												
2	1	0.000	0.500	0.090		1.3	0.7	0.0	-1.1	0.0	9.1	0.1	
	2	0.500	0.500	0.090		5.6	0.7	0.1	-5.6	-0.1	8.0	0.1	
	3	1.000	0.500	0.090		8.0	0.5	0.0	-7.9	-1.3	0.7	0.0	
	4	1.500	0.500	0.090		6.3	0.3	0.1	-6.3	-0.5	-7.1	-0.1	
	5	2.000	0.500	0.090		2.0	0.3	0.0	-2.0	0.0	-9.1	0.0	
	6	0.000	0.000	0.090		1.3	0.7	0.0	-1.1	0.0	9.1	0.0	

8.5 SURFACES - GLOBAL DEFORMATIONS

Static Analysis

Surface No.	Grid Point No.	Grid Point Coordinates [m] X	Y	Z		Displacements [mm] |u|	u_X	u_Y	u_Z	Rotations [mrad] φ_X	φ_Y	φ_Z	Surface Comment Cor. Loading
2	7	0.500	0.000	0.090		5.6	0.7	-0.1	-5.6	0.3	8.3	0.1	
	8	1.000	0.000	0.090		8.2	0.5	-0.1	-8.1	2.2	0.7	0.0	
	9	1.500	0.000	0.090		6.4	0.3	-0.1	-6.4	0.8	-7.4	0.0	
	10	2.000	0.000	0.090		2.0	0.3	0.0	-2.0	0.0	-9.2	-0.1	
Extremes	1	0.000	0.500	0.090	u_X	1.3	0.7	0.0	-1.1	0.0	9.1	0.1	
2	5	2.000	0.500	0.090		2.0	0.3	0.0	-2.0	0.0	-9.1	0.0	
	4	1.500	0.500	0.090	u_Y	6.3	0.3	0.1	-6.3	-0.5	-7.1	-0.1	
	9	1.500	0.000	0.090		6.4	0.3	-0.1	-6.4	0.8	-7.4	0.0	
	6	0.000	0.000	0.090	u_Z	1.3	0.7	0.0	-1.1	0.0	9.1	0.0	
	8	1.000	0.000	0.090		8.2	0.5	-0.1	-8.1	2.2	0.7	0.0	
	8	1.000	0.000	0.090	φ_X	8.2	0.5	-0.1	-8.1	2.2	0.7	0.0	
	3	1.000	0.500	0.090		8.0	0.5	0.0	-7.9	-1.3	0.7	0.0	
	6	0.000	0.000	0.090	φ_Y	1.3	0.7	0.0	-1.1	0.0	9.1	0.0	
	10	2.000	0.000	0.090		2.0	0.3	0.0	-2.0	0.0	-9.2	-0.1	
	1	0.000	0.500	0.090	φ_Z	1.3	0.7	0.0	-1.1	0.0	9.1	0.1	
	10	2.000	0.000	0.090		2.0	0.3	0.0	-2.0	0.0	-9.2	-0.1	
Total						8.2	0.7	0.1	-1.1	2.2	9.1	0.1	
2						1.3	0.3	-0.1	-8.1	-1.3	-9.2	-0.1	
	G LC2 - 170 kN												
	Total max/min values with corresponding values												
1	5	2.000	0.500	0.000	u_X	1.4	1.0	0.0	-1.0	0.2	-9.8	0.1	
1	1	0.000	0.500	0.000		0.5	0.0	0.0	0.5	-0.1	9.9	-0.1	
2	4	1.500	0.500	0.090	u_Y	6.3	0.3	0.1	-6.3	-0.5	-7.1	-0.1	
2	9	1.500	0.000	0.090		6.4	0.3	-0.1	-6.4	0.8	-7.4	0.0	
1	6	0.000	0.000	0.000	u_Z	0.5	0.0	0.0	0.5	0.1	10.4	-0.9	
2	8	1.000	0.000	0.090		8.2	0.5	-0.1	-8.1	2.2	0.7	0.0	
2	8	1.000	0.000	0.090	φ_X	8.2	0.5	-0.1	-8.1	2.2	0.7	0.0	
2	3	1.000	0.500	0.090		8.0	0.5	0.0	-7.9	-1.3	0.7	0.0	
1	6	0.000	0.000	0.000	φ_Y	0.5	0.0	0.0	0.5	0.1	10.4	-0.9	
1	10	2.000	0.000	0.000		1.3	0.9	0.0	-0.9	-0.2	-10.4	0.8	
1	9	1.500	0.000	0.000	φ_Z	6.4	0.8	0.0	-6.4	0.5	-5.9	1.3	
1	7	0.500	0.000	0.000		5.6	0.1	0.0	-5.6	0.4	7.0	-1.3	
	G LC2 - 170 kN												
Total						8.2	1.0	0.1	0.5	2.2	10.4	1.3	
max/min						0.5	0.0	-0.1	-8.1	-1.3	-10.4	-1.3	

8.6 SURFACES - BASIC STRESSES

Static Analysis

Surface No.	Grid Pt. No.	Grid Point Coordinates [m] X	Y	Z	Layer No.		Axial stresses [N/mm²] $\sigma_{x,+}$	$\sigma_{y,+}$	$\sigma_{x,-}$	$\sigma_{y,-}$	Shear stresses [N/mm²] $\tau_{xy,+}$	$\tau_{xy,-}$	τ_{xz}	τ_{yz}	Surface Comment Cor. Loading
	G LC2 - 170 kN														
1	1	0.000	0.500	0.000	1		0.000	0.042	0.000	0.083	-0.048	-0.089	0.002	0.016	
					2		0.389	0.005	1.129	0.014	0.019	0.043	0.003	0.033	
					3		0.000	-0.011	0.000	0.013	0.006	-0.019	0.003	0.036	
					4		-1.089	-0.014	-0.350	-0.004	-0.030	-0.006	0.003	0.033	
					5		0.001	-0.082	0.001	-0.040	0.074	0.033	0.002	0.016	
	2	0.500	0.500	0.000	1		2.942	0.025	-0.569	-0.026	-0.822	-0.801	0.083	0.005	
					2		-0.248	0.150	-0.349	0.081	0.742	0.730	0.166	0.011	
					3		6.743	0.081	4.673	0.052	-0.755	-0.742	0.185	0.012	
					4		-0.045	0.289	-0.147	0.220	0.767	0.755	0.166	0.011	
					5		13.473	0.176	9.963	0.126	-0.883	-0.863	0.083	0.005	
	3	1.000	0.500	0.000	1		5.197	0.055	-0.373	-0.014	-0.051	-0.048	0.002	0.011	
					2		-0.345	0.255	-0.310	0.147	0.047	0.045	0.005	0.021	
					3		11.167	0.130	7.882	0.089	-0.049	-0.047	0.005	0.024	
					4		-0.452	0.403	-0.380	0.362	0.050	0.049	0.005	0.021	
					5		21.573	0.016	16.325	0.183	-0.059	-0.057	0.002	0.011	
	4	1.500	0.500	0.000	1		3.672	0.034	-0.528	-0.021	0.738	0.650	-0.081	0.009	
					2		-0.346	0.184	-0.362	0.102	-0.708	-0.656	-0.163	0.018	
					3		8.202	0.094	5.725	0.062	0.760	0.708	-0.181	0.020	
					4		-0.314	0.347	-0.330	0.265	-0.813	-0.760	-0.163	0.018	
					5		16.227	0.160	12.071	0.143	0.999	0.914	-0.081	0.009	
	5	2.000	0.500	0.000	1		-2.162	-0.055	-3.927	-0.111	0.944	1.215	-0.888	0.116	
					2		-0.154	-0.031	-0.747	-0.072	-0.678	-0.839	-1.772	0.232	
					3		0.168	0.017	-0.872	-0.016	0.517	0.678	-1.973	0.259	
					4		1.031	0.053	0.439	0.011	-0.356	-0.517	-1.772	0.232	
					5		3.131	0.111	1.366	0.056	0.130	0.401	-0.888	0.116	
	6	0.000	0.000	0.000	1		0.002	0.000	0.002	-0.001	-0.012	-0.013	-0.004	-0.004	
					2		-0.001	0.000	-0.007	0.000	0.010	0.011	-0.008	-0.008	
					3		0.001	0.000	0.001	0.000	-0.010	-0.010	-0.009	-0.008	
					4		0.013	0.000	0.006	0.000	0.009	0.010	-0.008	-0.008	
					5		0.001	0.001	0.002	0.000	-0.009	-0.010	-0.004	-0.004	
	7	0.500	0.000	0.000	1		2.099	0.033	-1.967	-0.008	0.021	0.026	0.104	-0.001	
					2		-0.044	0.139	0.154	0.063	-0.015	-0.019	0.207	-0.001	
					3		6.652	0.077	4.254	0.053	0.012	0.015	0.231	-0.001	

8.6 SURFACES - BASIC STRESSES

Static Analysis

Surface No.	Grid Pt. No.	X [m]	Y [m]	Z [m]	Layer No.		σx,+ [N/mm²]	σy,+ [N/mm²]	σx,- [N/mm²]	σy,- [N/mm²]	τxy,+ [N/mm²]	τxy,- [N/mm²]	τxz [N/mm²]	τyz [N/mm²]	Surface Comment Cor. Loading
1	7	0.500	0.000	0.000	4		-0.440	0.292	-0.242	0.216	-0.009	-0.012	0.207	-0.001	
					5		14.297	0.156	10.231	0.115	0.004	0.010	0.104	-0.001	
	8	1.000	0.000	0.000	1		4.005	0.055	-1.466	-0.006	0.001	0.001	0.006	-0.001	
					2		-0.087	0.221	0.088	0.118	-0.001	-0.001	0.013	-0.001	
					3		9.995	0.119	6.769	0.084	0.001	0.001	0.014	-0.001	
					4		-0.452	0.403	-0.262	0.325	-0.002	-0.001	0.013	-0.001	
					5		20.197	0.066	14.946	0.175	0.002	0.002	0.006	-0.001	
	9	1.500	0.000	0.000	1		2.514	0.038	-1.909	-0.006	-0.016	-0.018	-0.092	-0.001	
					2		-0.054	0.158	0.162	0.075	0.014	0.015	-0.184	-0.001	
					3		7.441	0.086	4.833	0.060	-0.013	-0.014	-0.205	-0.001	
					4		-0.485	0.324	-0.269	0.241	0.012	0.013	-0.184	-0.001	
					5		15.784	0.172	11.360	0.127	-0.013	-0.014	-0.092	-0.001	
	10	2.000	0.000	0.000	1		-0.680	-0.006	-1.977	-0.019	-0.023	-0.016	-0.526	-0.006	
					2		0.010	0.005	0.070	-0.019	0.024	0.020	-1.050	-0.011	
					3		0.927	0.010	0.162	0.002	-0.029	-0.024	-1.169	-0.013	
					4		-0.109	0.054	-0.050	0.030	0.033	0.029	-1.050	-0.011	
					5		3.208	0.034	1.912	0.020	-0.044	-0.037	-0.526	-0.006	
Extremes	3	1.000	0.500	0.000	5	σx,+	21.573	0.016	16.325	0.183	-0.059	-0.057	0.002	0.011	
1	5	2.000	0.500	0.000	1		-2.162	-0.055	-3.927	-0.111	0.944	1.215	-0.888	0.116	
	8	1.000	0.000	0.000	4	σy,+	-0.452	0.403	-0.262	0.325	-0.002	-0.001	0.013	-0.001	
	1	0.000	0.500	0.000	5		0.001	-0.082	0.001	-0.040	0.074	0.033	0.002	0.016	
	3	1.000	0.500	0.000	5	σx,-	21.573	0.016	16.325	0.183	-0.059	-0.057	0.002	0.011	
	5	2.000	0.500	0.000	1		-2.162	-0.055	-3.927	-0.111	0.944	1.215	-0.888	0.116	
	3	1.000	0.500	0.000	4	σy,-	-0.452	0.403	-0.380	0.362	0.050	0.049	0.005	0.021	
	5	2.000	0.500	0.000	1		-2.162	-0.055	-3.927	-0.111	0.944	1.215	-0.888	0.116	
	4	1.500	0.500	0.000	5	τxy,+	16.227	0.160	12.071	0.143	0.999	0.914	-0.081	0.009	
	2	0.500	0.500	0.000	5		13.473	0.176	9.963	0.126	-0.883	-0.863	0.083	0.005	
	5	2.000	0.500	0.000	1	τxy,-	-2.162	-0.055	-3.927	-0.111	0.944	1.215	-0.888	0.116	
	2	0.500	0.500	0.000	5		13.473	0.176	9.963	0.126	-0.883	-0.863	0.083	0.005	
	7	0.500	0.000	0.000	3	τxz	6.652	0.077	4.254	0.053	0.012	0.015	0.231	-0.001	
	5	2.000	0.500	0.000	3		0.168	0.017	-0.872	-0.016	0.517	0.678	-1.973	0.259	
	5	2.000	0.500	0.000	3	τyz	0.168	0.017	-0.872	-0.016	0.517	0.678	-1.973	0.259	
	10	2.000	0.000	0.000	3		0.927	0.010	0.162	0.002	-0.029	-0.024	-1.169	-0.013	
Total							21.573	0.403	16.325	0.362	0.999	1.215	0.231	0.259	
1							-2.162	-0.082	-3.927	-0.111	-0.883	-0.863	-1.973	-0.013	
	G LC2 - 170 kN														
2	1	0.000	0.500	0.090	1		-0.007	-0.923	-0.005	-1.297	0.047	0.029	-0.001	0.061	
	2	0.500	0.500	0.090	1		-2.247	-2.773	-15.212	0.590	4.020	-1.641	0.906	-0.058	
	3	1.000	0.500	0.090	1		-1.300	-8.339	-23.491	-0.017	0.054	0.234	0.086	-0.281	
	4	1.500	0.500	0.090	1		-2.806	-3.740	-19.132	0.256	-4.673	1.642	-0.400	-0.175	
	5	2.000	0.500	0.090	1		0.334	0.139	0.293	-0.396	-0.838	-0.819	-0.037	0.086	
	6	0.000	0.000	0.090	1		0.004	0.008	0.008	0.004	0.010	0.009	-0.006	-0.006	
	7	0.500	0.000	0.090	1		-0.255	-0.021	-14.296	0.027	-0.673	0.602	2.387	0.045	
	8	1.000	0.000	0.090	1		-0.261	-0.259	-29.120	-0.568	-0.017	-0.002	-0.100	0.010	
	9	1.500	0.000	0.090	1		1.090	-0.013	-18.499	0.027	0.929	-0.878	-3.334	0.043	
	10	2.000	0.000	0.090	1		-1.418	-0.004	-0.985	-0.008	0.031	0.057	0.112	-0.006	
Extremes	9	1.500	0.000	0.090	1	σx,+	1.090	-0.013	-18.499	0.027	0.929	-0.878	-3.334	0.043	
2	4	1.500	0.500	0.090	1		-2.806	-3.740	-19.132	0.256	-4.673	1.642	-0.400	-0.175	
	5	2.000	0.500	0.090	1	σy,+	0.334	0.139	0.293	-0.396	-0.838	-0.819	-0.037	0.086	
	3	1.000	0.500	0.090	1		-1.300	-8.339	-23.491	-0.017	0.054	0.234	0.086	-0.281	
	5	2.000	0.500	0.090	1	σx,-	0.334	0.139	0.293	-0.396	-0.838	-0.819	-0.037	0.086	
	8	1.000	0.000	0.090	1		-0.261	-0.259	-29.120	-0.568	-0.017	-0.002	-0.100	0.010	
	2	0.500	0.500	0.090	1	σy,-	-2.247	-2.773	-15.212	0.590	4.020	-1.641	0.906	-0.058	
	1	0.000	0.500	0.090	1		-0.007	-0.923	-0.005	-1.297	0.047	0.029	-0.001	0.061	
	2	0.500	0.500	0.090	1	τxy,+	-2.247	-2.773	-15.212	0.590	4.020	-1.641	0.906	-0.058	
	4	1.500	0.500	0.090	1		-2.806	-3.740	-19.132	0.256	-4.673	1.642	-0.400	-0.175	
	4	1.500	0.500	0.090	1	τxy,-	-2.806	-3.740	-19.132	0.256	-4.673	1.642	-0.400	-0.175	
	2	0.500	0.500	0.090	1		-2.247	-2.773	-15.212	0.590	4.020	-1.641	0.906	-0.058	
	7	0.500	0.000	0.090	1	τxz	-0.255	-0.021	-14.296	0.027	-0.673	0.602	2.387	0.045	
	9	1.500	0.000	0.090	1		1.090	-0.013	-18.499	0.027	0.929	-0.878	-3.334	0.043	
	5	2.000	0.500	0.090	1	τyz	0.334	0.139	0.293	-0.396	-0.838	-0.819	-0.037	0.086	
	3	1.000	0.500	0.090	1		-1.300	-8.339	-23.491	-0.017	0.054	0.234	0.086	-0.281	
Total							1.090	0.139	0.293	0.590	4.020	1.642	2.387	0.086	
2							-2.806	-8.339	-29.120	-1.297	-4.673	-1.641	-3.334	-0.281	
	G LC2 - 170 kN														
	Total max/min values with corresponding values														
1	3	1.000	0.500	0.000	5	σx,+	21.573	0.016	16.325	0.183	-0.059	-0.057	0.002	0.011	
2	4	1.500	0.500	0.090	1		-2.806	-3.740	-19.132	0.256	-4.673	1.642	-0.400	-0.175	
1	8	1.000	0.000	0.000	4	σy,+	-0.452	0.403	-0.262	0.325	-0.002	-0.001	0.013	-0.001	
2	3	1.000	0.500	0.090	1		-1.300	-8.339	-23.491	-0.017	0.054	0.234	0.086	-0.281	
1	3	1.000	0.500	0.000	5	σx,-	21.573	0.016	16.325	0.183	-0.059	-0.057	0.002	0.011	
2	8	1.000	0.000	0.090	1		-0.261	-0.259	-29.120	-0.568	-0.017	-0.002	-0.100	0.010	
2	2	0.500	0.500	0.090	1	σy,-	-2.247	-2.773	-15.212	0.590	4.020	-1.641	0.906	-0.058	
2	1	0.000	0.500	0.090	1		-0.007	-0.923	-0.005	-1.297	0.047	0.029	-0.001	0.061	
2	2	0.500	0.500	0.090	1	τxy,+	-2.247	-2.773	-15.212	0.590	4.020	-1.641	0.906	-0.058	

8.6 SURFACES - BASIC STRESSES

Static Analysis

Surface No.	Grid Pt. No.	Grid Point Coordinates [m] X	Y	Z	Layer No.		Axial stresses [N/mm²] $\sigma_{x,+}$	$\sigma_{y,+}$	$\sigma_{x,-}$	$\sigma_{y,-}$	Shear stresses [N/mm²] $\tau_{xy,+}$	$\tau_{xy,-}$	τ_{xz}	τ_{yz}	Surface Comment Cor. Loading
2	4	1.500	0.500	0.090	1	$\tau_{xy,+}$	-2.806	-3.740	-19.132	0.256	-4.673	1.642	-0.400	-0.175	
2	4	1.500	0.500	0.090	1	$\tau_{xy,-}$	-2.806	-3.740	-19.132	0.256	-4.673	1.642	-0.400	-0.175	
2	2	0.500	0.500	0.090	1		-2.247	-2.773	-15.212	0.590	4.020	-1.641	0.906	-0.058	
2	7	0.500	0.000	0.090	1	τ_{xz}	-0.255	-0.021	-14.296	0.027	-0.673	0.602	2.387	0.045	
2	9	1.500	0.000	0.090	1		1.090	-0.013	-18.499	0.027	0.929	-0.878	-3.334	0.043	
1	5	2.000	0.500	0.000	3	τ_{yz}	0.168	0.017	-0.872	-0.016	0.517	0.678	-1.973	0.259	
2	3	1.000	0.500	0.090	1		-1.300	-8.339	-23.491	-0.017	0.054	0.234	0.086	-0.281	
	G LC2 - 170 kN														
Total							21.573	0.403	16.325	0.590	4.020	1.642	2.387	0.259	
max/min							-2.806	-8.339	-29.120	-1.297	-4.673	-1.641	-3.334	-0.281	

8.7 SURFACES - EQUIVALENT STRESSES VON MISES

Static Analysis

Surface No.	Grid Point No.	Grid Point Coordinates [m] X	Y	Z	Layer No.		Equivalent Stresses [N/mm²] $\sigma_{eqv,Mises,Max}$	$\sigma_{eqv,Mises,+}$	$\sigma_{eqv,Mises,-}$	Surface Comment Cor. Loading
	G LC2 - 170 kN									
1	1	0.000	0.500	0.000	1		0.174	0.093	0.174	
					2		1.124	0.388	1.124	
					3		0.034	0.015	0.034	
					4		1.083	1.083	0.348	
					5		0.152	0.152	0.071	
	2	0.500	0.500	0.000	1		3.257	3.257	1.495	
					2		1.332	1.332	1.325	
					3		6.829	6.829	4.822	
					4		1.365	1.365	1.346	
					5		13.473	13.473	10.013	
	3	1.000	0.500	0.000	1		5.170	5.170	0.376	
					2		0.528	0.528	0.412	
					3		11.103	11.103	7.838	
					4		0.746	0.746	0.648	
					5		21.565	21.565	16.234	
	4	1.500	0.500	0.000	1		3.872	3.872	1.239	
					2		1.312	1.312	1.212	
					3		8.261	8.261	5.825	
					4		1.519	1.519	1.415	
					5		16.240	16.240	12.104	
	5	2.000	0.500	0.000	1		4.407	2.689	4.407	
					2		1.618	1.183	1.618	
					3		1.458	0.910	1.458	
					4		1.180	1.180	0.995	
					5		3.085	3.085	1.509	
	6	0.000	0.000	0.000	1		0.023	0.021	0.023	
					2		0.020	0.018	0.020	
					3		0.018	0.017	0.018	
					4		0.020	0.020	0.018	
					5		0.018	0.016	0.018	
	7	0.500	0.000	0.000	1		2.083	2.083	1.964	
					2		0.168	0.168	0.138	
					3		6.614	6.614	4.228	
					4		0.638	0.638	0.397	
					5		14.219	14.219	10.174	
	8	1.000	0.000	0.000	1		3.978	3.978	1.463	
					2		0.275	0.275	0.106	
					3		9.936	9.936	6.727	
					4		0.741	0.741	0.510	
					5		20.163	20.163	14.859	
	9	1.500	0.000	0.000	1		2.496	2.496	1.906	
					2		0.192	0.192	0.143	
					3		7.398	7.398	4.803	
					4		0.706	0.706	0.443	
					5		15.698	15.698	11.297	
	10	2.000	0.000	0.000	1		1.967	0.679	1.967	
					2		0.088	0.043	0.088	
					3		0.923	0.923	0.167	
					4		0.155	0.155	0.085	
					5		3.192	3.192	1.903	
Extremes	3	1.000	0.500	0.000	5	$\sigma_{eqv,Mises,Max}$	21.565	21.565	16.234	
1	6	0.000	0.000	0.000	5		0.018	0.016	0.018	
	3	1.000	0.500	0.000	5	$\sigma_{eqv,Mises,+}$	21.565	21.565	16.234	
	1	0.000	0.500	0.000	3		0.034	0.015	0.034	
	3	1.000	0.500	0.000	5	$\sigma_{eqv,Mises,-}$	21.565	21.565	16.234	
	6	0.000	0.000	0.000	5		0.018	0.016	0.018	
Total							21.565	21.565	16.234	
1							0.018	0.015	0.018	

8.7 SURFACES - EQUIVALENT STRESSES VON MISES

Static Analysis

Surface No.	Grid Point No.	Grid Point Coordinates [m] X	Y	Z	Layer No.		Equivalent Stresses [N/mm²] $\sigma_{eqv,Mises,Max}$	$\sigma_{eqv,Mises,+}$	$\sigma_{eqv,Mises,-}$	Surface Comment Cor. Loading
	LC2 - 170 kN									
2	1	0.000	0.500	0.090	1		1.296	0.923	1.296	
	2	0.500	0.500	0.090	1		15.773	7.416	15.773	
	3	1.000	0.500	0.090	1		23.486	7.772	23.486	
	4	1.500	0.500	0.090	1		19.470	8.768	19.470	
	5	2.000	0.500	0.090	1		1.541	1.481	1.541	
	6	0.000	0.000	0.090	1		0.018	0.018	0.018	
	7	0.500	0.000	0.090	1		14.348	1.192	14.348	
	8	1.000	0.000	0.090	1		28.841	0.262	28.841	
	9	1.500	0.000	0.090	1		18.575	1.948	18.575	
	10	2.000	0.000	0.090	1		1.416	1.416	0.986	
Extremes	8	1.000	0.000	0.090	1	$\sigma_{eqv,Mises,Max}$	28.841	0.262	28.841	
2	6	0.000	0.000	0.090	1		0.018	0.018	0.018	
	4	1.500	0.500	0.090	1	$\sigma_{eqv,Mises,+}$	19.470	8.768	19.470	
	6	0.000	0.000	0.090	1		0.018	0.018	0.018	
	8	1.000	0.000	0.090	1	$\sigma_{eqv,Mises,-}$	28.841	0.262	28.841	
	6	0.000	0.000	0.090	1		0.018	0.018	0.018	
Total							28.841	8.768	28.841	
2							0.018	0.018	0.018	
	LC2 - 170 kN									
	Total max/min values with corresponding values									
2	8	1.000	0.000	0.090	1	$\sigma_{eqv,Mises,Max}$	28.841	0.262	28.841	
1	6	0.000	0.000	0.000	5		0.018	0.016	0.018	
1	3	1.000	0.500	0.000	5	$\sigma_{eqv,Mises,+}$	21.565	21.565	16.234	
1	1	0.000	0.500	0.000	3		0.034	0.015	0.034	
2	8	1.000	0.000	0.090	1	$\sigma_{eqv,Mises,-}$	28.841	0.262	28.841	
1	6	0.000	0.000	0.000	5		0.018	0.016	0.018	
	LC2 - 170 kN									
Total max/min							28.841	21.565	28.841	
							0.018	0.015	0.018	

8.8 SURFACES - BASIC TOTAL STRAINS

Static Analysis

Surface No.	Grid Pt. No.	Grid Point Coordinates [m] X	Y	Z	Layer No.	Basic Strains [‰] $\varepsilon_{x,+}$	$\varepsilon_{y,+}$	$\gamma_{xy,+}$	$\varepsilon_{x,-}$	$\varepsilon_{y,-}$	$\gamma_{xy,-}$	Surface Comment Cor. Loading
	LC2 - 170 kN											
1	1	0.000	0.500	0.000	1	0.0	0.1	-0.1	0.0	0.2	-0.1	
					2	0.0	0.0	0.0	0.1	0.0	0.1	
					3	0.0	0.0	0.0	0.0	0.0	0.0	
					4	-0.1	0.0	0.0	0.0	0.0	0.0	
					5	0.0	-0.2	0.1	0.0	-0.1	0.0	
	2	0.500	0.500	0.000	1	0.2	0.0	-1.0	0.0	0.0	-1.0	
					2	0.0	0.4	1.0	0.0	0.2	1.0	
					3	0.6	0.0	-1.0	0.4	0.0	-1.0	
					4	0.0	0.8	1.1	0.0	0.6	1.0	
					5	1.0	0.0	-1.1	0.8	0.0	-1.1	
	3	1.000	0.500	0.000	1	0.4	0.0	-0.1	0.0	0.0	-0.1	
					2	0.0	0.7	0.1	0.0	0.4	0.1	
					3	1.0	0.0	-0.1	0.7	0.0	-0.1	
					4	-0.1	1.3	0.1	0.0	1.0	0.1	
					5	1.7	-0.1	-0.1	1.3	-0.1	-0.1	
	4	1.500	0.500	0.000	1	0.3	0.0	0.9	0.0	0.0	0.8	
					2	0.0	0.5	-1.0	0.0	0.3	-0.9	
					3	0.7	0.0	1.1	0.5	0.0	1.0	
					4	0.0	0.9	-1.1	0.0	0.7	-1.1	
					5	1.2	0.0	1.2	0.9	0.0	1.1	
	5	2.000	0.500	0.000	1	-0.2	-0.1	1.2	-0.3	-0.1	1.5	
					2	0.0	-0.1	-0.9	-0.1	-0.2	-1.2	
					3	0.0	0.0	0.7	-0.1	0.0	0.9	
					4	0.1	0.1	-0.5	0.0	0.0	-0.7	
					5	0.2	0.2	0.2	0.1	0.1	0.5	
	6	0.000	0.000	0.000	1	0.0	0.0	0.0	0.0	0.0	0.0	
					2	0.0	0.0	0.0	0.0	0.0	0.0	
					3	0.0	0.0	0.0	0.0	0.0	0.0	
					4	0.0	0.0	0.0	0.0	0.0	0.0	
					5	0.0	0.0	0.0	0.0	0.0	0.0	
	7	0.500	0.000	0.000	1	0.2	0.0	0.0	-0.2	0.0	0.0	
					2	0.0	0.4	0.0	0.0	0.2	0.0	
					3	0.6	0.0	0.0	0.4	0.0	0.0	
					4	0.0	0.8	0.0	0.0	0.6	0.0	
					5	1.1	-0.1	0.0	0.8	0.0	0.0	
	8	1.000	0.000	0.000	1	0.3	0.0	0.0	-0.1	0.0	0.0	

8.8 SURFACES - BASIC TOTAL STRAINS

Static Analysis

Surface No.	Grid Pt. No.	Grid Point Coordinates [m] X	Y	Z	Layer No.		Basic Strains [‰] $\varepsilon_{x,+}$	$\varepsilon_{y,+}$	$\gamma_{xy,+}$	$\varepsilon_{x,-}$	$\varepsilon_{y,-}$	$\gamma_{xy,-}$	Surface Comment Cor. Loading
1	8	1.000	0.000	0.000	2		0.0	0.6	0.0	0.0	0.3	0.0	
					3		0.9	0.0	0.0	0.6	0.0	0.0	
					4		-0.1	1.1	0.0	0.0	0.9	0.0	
					5		1.6	-0.1	0.0	1.1	-0.1	0.0	
	9	1.500	0.000	0.000	1		0.2	0.0	0.0	-0.1	0.0	0.0	
					2		0.0	0.4	0.0	0.0	0.2	0.0	
					3		0.6	0.0	0.0	0.4	0.0	0.0	
					4		-0.1	0.9	0.0	0.0	0.6	0.0	
					5		1.2	-0.1	0.0	0.9	-0.1	0.0	
	10	2.000	0.000	0.000	1		-0.1	0.0	0.0	-0.2	0.0	0.0	
					2		0.0	0.0	0.0	0.0	-0.1	0.0	
					3		0.1	0.0	0.0	0.0	0.0	0.0	
					4		0.0	0.1	0.0	0.0	0.1	0.0	
					5		0.2	0.0	-0.1	0.1	0.0	0.0	
Extremes	3	1.000	0.500	0.000	5	$\varepsilon_{x,+}$	1.7	-0.1	-0.1	1.3	-0.1	-0.1	
1	5	2.000	0.500	0.000	1		-0.2	-0.1	1.2	-0.3	-0.1	1.5	
	3	1.000	0.500	0.000	4	$\varepsilon_{y,+}$	-0.1	1.3	0.1	0.0	1.0	0.1	
	1	0.000	0.500	0.000	5		0.0	-0.2	0.1	0.0	-0.1	0.0	
	4	1.500	0.500	0.000	5	$\gamma_{xy,+}$	1.2	0.0	1.2	0.9	0.0	1.1	
	4	1.500	0.500	0.000	4		0.0	0.9	-1.1	0.0	0.7	-1.1	
	3	1.000	0.500	0.000	5	$\varepsilon_{x,-}$	1.7	-0.1	-0.1	1.3	-0.1	-0.1	
	5	2.000	0.500	0.000	1		-0.2	-0.1	1.2	-0.3	-0.1	1.5	
	3	1.000	0.500	0.000	4	$\varepsilon_{y,-}$	-0.1	1.3	0.1	0.0	1.0	0.1	
	5	2.000	0.500	0.000	2		0.0	-0.1	-0.9	-0.1	-0.2	-1.2	
	5	2.000	0.500	0.000	1	$\gamma_{xy,-}$	-0.2	-0.1	1.2	-0.3	-0.1	1.5	
	5	2.000	0.500	0.000	2		0.0	-0.1	-0.9	-0.1	-0.2	-1.2	
Total							1.7	1.3	1.2	1.3	1.0	1.5	
1							-0.2	-0.2	-1.1	-0.3	-0.2	-1.2	
	G LC2 - 170 kN												
2	1	0.000	0.500	0.090	1		0.0	0.0	0.0	0.0	0.0	0.0	
	2	0.500	0.500	0.090	1		0.0	0.0	0.4	-0.5	0.1	-0.1	
	3	1.000	0.500	0.090	1		0.0	-0.2	0.0	-0.8	1.7	0.1	
	4	1.500	0.500	0.090	1		0.0	0.0	-0.6	-0.6	0.4	0.2	
	5	2.000	0.500	0.090	1		0.0	0.0	-0.1	0.0	0.0	-0.1	
	6	0.000	0.000	0.090	1		0.0	0.0	0.0	0.0	0.0	0.0	
	7	0.500	0.000	0.090	1		0.0	0.0	0.0	-0.4	0.1	0.0	
	8	1.000	0.000	0.090	1		0.0	0.0	0.0	-0.9	0.2	0.0	
	9	1.500	0.000	0.090	1		0.0	0.0	0.1	-0.5	0.1	-0.1	
	10	2.000	0.000	0.090	1		0.0	0.0	0.0	0.0	0.0	0.0	
Extremes	4	1.500	0.500	0.090	1	$\varepsilon_{x,+}$	0.0	0.0	-0.6	-0.6	0.4	0.2	
2	10	2.000	0.000	0.090	1		0.0	0.0	0.0	0.0	0.0	0.0	
	10	2.000	0.000	0.090	1	$\varepsilon_{y,+}$	0.0	0.0	0.0	0.0	0.0	0.0	
	3	1.000	0.500	0.090	1		0.0	-0.2	0.0	-0.8	1.7	0.1	
	2	0.500	0.500	0.090	1	$\gamma_{xy,+}$	0.0	0.0	0.4	-0.5	0.1	-0.1	
	4	1.500	0.500	0.090	1		0.0	0.0	-0.6	-0.6	0.4	0.2	
	5	2.000	0.500	0.090	1	$\varepsilon_{x,-}$	0.0	0.0	-0.1	0.0	0.0	-0.1	
	8	1.000	0.000	0.090	1		0.0	0.0	0.0	-0.9	0.2	0.0	
	3	1.000	0.500	0.090	1	$\varepsilon_{y,-}$	0.0	-0.2	0.0	-0.8	1.7	0.1	
	1	0.000	0.500	0.090	1		0.0	0.0	0.0	0.0	0.0	0.0	
	4	1.500	0.500	0.090	1	$\gamma_{xy,-}$	0.0	0.0	-0.6	-0.6	0.4	0.2	
	2	0.500	0.500	0.090	1		0.0	0.0	0.4	-0.5	0.1	-0.1	
Total							0.0	0.0	0.4	0.0	1.7	0.2	
2							0.0	-0.2	-0.6	-0.9	0.0	-0.1	
	G LC2 - 170 kN												
	Total max/min values with corresponding values												
1	3	1.000	0.500	0.000	5	$\varepsilon_{x,+}$	1.7	-0.1	-0.1	1.3	-0.1	-0.1	
1	5	2.000	0.500	0.000	1		-0.2	-0.1	1.2	-0.3	-0.1	1.5	
1	3	1.000	0.500	0.000	4	$\varepsilon_{y,+}$	-0.1	1.3	0.1	0.0	1.0	0.1	
2	3	1.000	0.500	0.090	1		0.0	-0.2	0.0	-0.8	1.7	0.1	
1	4	1.500	0.500	0.000	5	$\gamma_{xy,+}$	1.2	0.0	1.2	0.9	0.0	1.1	
1	4	1.500	0.500	0.000	4		0.0	0.9	-1.1	0.0	0.7	-1.1	
1	3	1.000	0.500	0.000	5	$\varepsilon_{x,-}$	1.7	-0.1	-0.1	1.3	-0.1	-0.1	
2	8	1.000	0.000	0.090	1		0.0	0.0	0.0	-0.9	0.2	0.0	
2	3	1.000	0.500	0.090	1	$\varepsilon_{y,-}$	0.0	-0.2	0.0	-0.8	1.7	0.1	
1	5	2.000	0.500	0.000	2		0.0	-0.1	-0.9	-0.1	-0.2	-1.2	
1	5	2.000	0.500	0.000	1	$\gamma_{xy,-}$	-0.2	-0.1	1.2	-0.3	-0.1	1.5	
1	5	2.000	0.500	0.000	2		0.0	-0.1	-0.9	-0.1	-0.2	-1.2	
	G LC2 - 170 kN												
Total							1.7	1.3	1.2	1.3	1.7	1.5	
max/min							-0.2	-0.2	-1.1	-0.9	-0.2	-1.2	

8.9 **SURFACES - EQUIVALENT TOTAL STRAINS - VON MISES** **Static Analysis**

Surface No.	Grid Point No.	Grid Point Coordinates [m] X	Y	Z	Layer No.		von Mises [‰] $\varepsilon_{eqv,Mises,+}$	$\varepsilon_{eqv,Mises,-}$	$\varepsilon_{eqv,Mises}$	Surface Comment Cor. Loading
	LC2 - 170 kN									
1	1	0.000	0.500	0.000	1		0.1	0.2	0.2	
					2		0.0	0.1	0.1	
					3		0.0	0.0	0.0	
					4		0.1	0.0	0.1	
					5		0.2	0.1	0.2	
	2	0.500	0.500	0.000	1		0.9	0.8	0.9	
					2		1.0	0.9	1.0	
					3		1.1	1.0	1.1	
					4		1.2	1.1	1.2	
					5		1.4	1.2	1.4	
	3	1.000	0.500	0.000	1		0.4	0.1	0.4	
					2		0.7	0.4	0.7	
					3		1.0	0.7	1.0	
					4		1.3	1.0	1.3	
					5		1.7	1.3	1.7	
	4	1.500	0.500	0.000	1		0.8	0.7	0.8	
					2		1.0	0.8	1.0	
					3		1.1	1.0	1.1	
					4		1.3	1.1	1.3	
					5		1.6	1.3	1.6	
	5	2.000	0.500	0.000	1		1.0	1.3	1.3	
					2		0.8	1.0	1.0	
					3		0.6	0.8	0.8	
					4		0.4	0.6	0.6	
					5		0.3	0.4	0.4	
	6	0.000	0.000	0.000	1		0.0	0.0	0.0	
					2		0.0	0.0	0.0	
					3		0.0	0.0	0.0	
					4		0.0	0.0	0.0	
					5		0.0	0.0	0.0	
	7	0.500	0.000	0.000	1		0.2	0.2	0.2	
					2		0.4	0.2	0.4	
					3		0.6	0.4	0.6	
					4		0.8	0.6	0.8	
					5		1.1	0.8	1.1	
	8	1.000	0.000	0.000	1		0.3	0.1	0.3	
					2		0.6	0.3	0.6	
					3		0.9	0.6	0.9	
					4		1.2	0.9	1.2	
					5		1.6	1.2	1.6	
	9	1.500	0.000	0.000	1		0.2	0.2	0.2	
					2		0.4	0.2	0.4	
					3		0.7	0.4	0.7	
					4		0.9	0.7	0.9	
					5		1.2	0.9	1.2	
	10	2.000	0.000	0.000	1		0.1	0.2	0.2	
					2		0.0	0.1	0.1	
					3		0.1	0.0	0.1	
					4		0.2	0.1	0.2	
					5		0.3	0.2	0.3	
Extremes	3	1.000	0.500	0.000	5	$\varepsilon_{eqv,Mises,+}$	1.7	1.3	1.7	
1	6	0.000	0.000	0.000	5		0.0	0.0	0.0	
	4	1.500	0.500	0.000	5	$\varepsilon_{eqv,Mises,-}$	1.6	1.3	1.6	
	6	0.000	0.000	0.000	5		0.0	0.0	0.0	
	3	1.000	0.500	0.000	5	$\varepsilon_{eqv,Mises}$	1.7	1.3	1.7	
	6	0.000	0.000	0.000	5		0.0	0.0	0.0	
Total							1.7	1.3	1.7	
1							0.0	0.0	0.0	
	LC2 - 170 kN									
2	1	0.000	0.500	0.090	1		0.0	0.0	0.0	
	2	0.500	0.500	0.090	1		0.3	0.5	0.5	
	3	1.000	0.500	0.090	1		0.2	1.9	1.9	
	4	1.500	0.500	0.090	1		0.4	0.8	0.8	
	5	2.000	0.500	0.090	1		0.0	0.0	0.0	
	6	0.000	0.000	0.090	1		0.0	0.0	0.0	
	7	0.500	0.000	0.090	1		0.0	0.4	0.4	
	8	1.000	0.000	0.090	1		0.0	0.9	0.9	
	9	1.500	0.000	0.090	1		0.1	0.5	0.5	
	10	2.000	0.000	0.090	1		0.0	0.0	0.0	
Extremes	4	1.500	0.500	0.090	1	$\varepsilon_{eqv,Mises,+}$	0.4	0.8	0.8	
2	6	0.000	0.000	0.090	1		0.0	0.0	0.0	

8.9 SURFACES - EQUIVALENT TOTAL STRAINS - VON MISES

Static Analysis

Surface No.	Grid Point No.	Grid Point Coordinates [m] X	Y	Z	Layer No.		von Mises [‰] $\varepsilon_{eqv,Mises,+}$	$\varepsilon_{eqv,Mises,-}$	$\varepsilon_{eqv,Mises}$	Surface Comment Cor. Loading
2	3	1.000	0.500	0.090	1	$\varepsilon_{eqv,Mises,-}$	0.2	1.9	1.9	
	6	0.000	0.000	0.090	1		0.0	0.0	0.0	
	3	1.000	0.500	0.090	1	$\varepsilon_{eqv,Mises}$	0.2	1.9	1.9	
	6	0.000	0.000	0.090	1		0.0	0.0	0.0	
Total							0.4	1.9	1.9	
2							0.0	0.0	0.0	
	G LC2 - 170 kN									
	Total max/min values with corresponding values									
1	3	1.000	0.500	0.000	5	$\varepsilon_{eqv,Mises,+}$	1.7	1.3	1.7	
2	6	0.000	0.000	0.090	1		0.0	0.0	0.0	
2	3	1.000	0.500	0.090	1	$\varepsilon_{eqv,Mises,-}$	0.2	1.9	1.9	
2	6	0.000	0.000	0.090	1		0.0	0.0	0.0	
2	3	1.000	0.500	0.090	1	$\varepsilon_{eqv,Mises}$	0.2	1.9	1.9	
2	6	0.000	0.000	0.090	1		0.0	0.0	0.0	
	G LC2 - 170 kN									
Total							1.7	1.9	1.9	
max/min							0.0	0.0	0.0	

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Model: Type B - method 1

Date 4.7.2022 Page 1/29

Sheet 1

MODEL

Structural Analysis

CLIENT

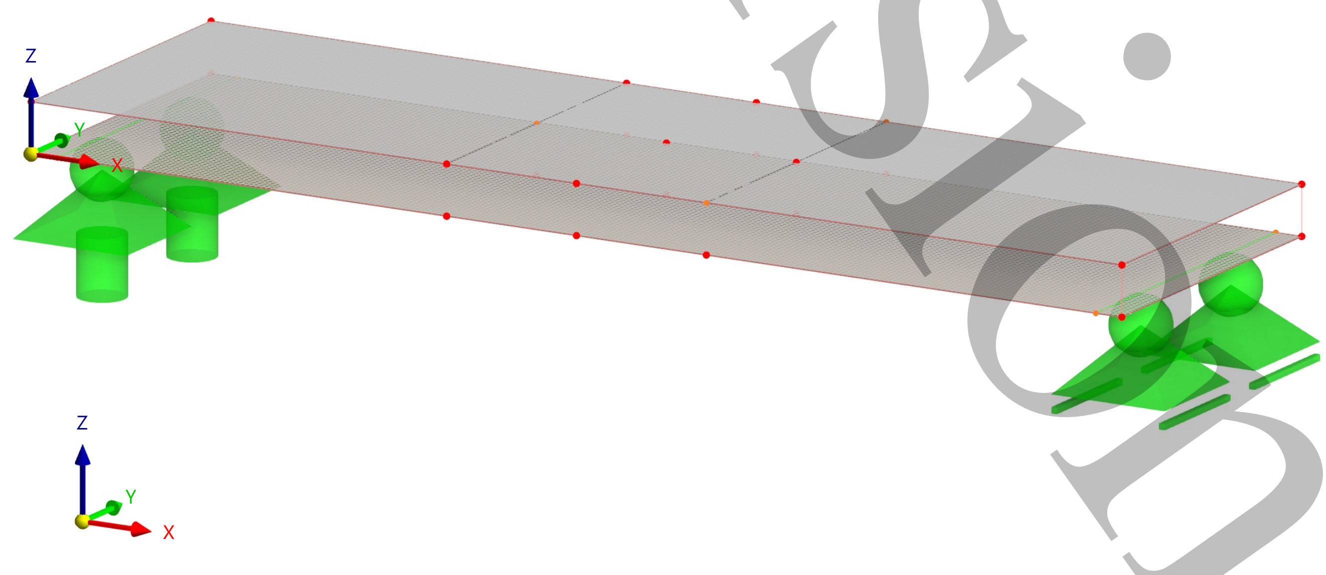
CREATED BY

PROJECT

Chapters

MODEL

In Axonometric Direction by Default

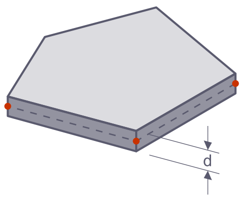


CONTENTS

1 Basic Objects

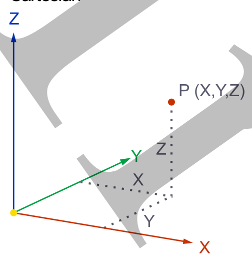
Legend
Concrete Settings
Stiffness modification
User-Defined Material

Uniform



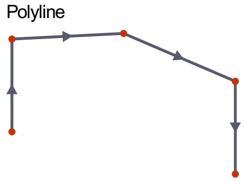
Legend
On Line

Cartesian



Legend
- Line Support
- Nodes on Line

Polyline



Legend
- Concrete Durability (Concrete Design)
- Design properties
- Grid for Results

- Integrated Objects
- Reinforcement Direction – Bottom
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2 Special Objects

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4 Types for Concrete Design

5 Load Cases & Combinations

6 Guide Objects

7 Parts List

8 Static Analysis Results

RESULTS

9 Stress Analysis

Legend
Concrete Settings
Stiffness modification
User-Defined Material

STRESS

Lene Hauan

Model: Type B - method 2

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Sheet 1

MODEL

Structural Analysis

CLIENT

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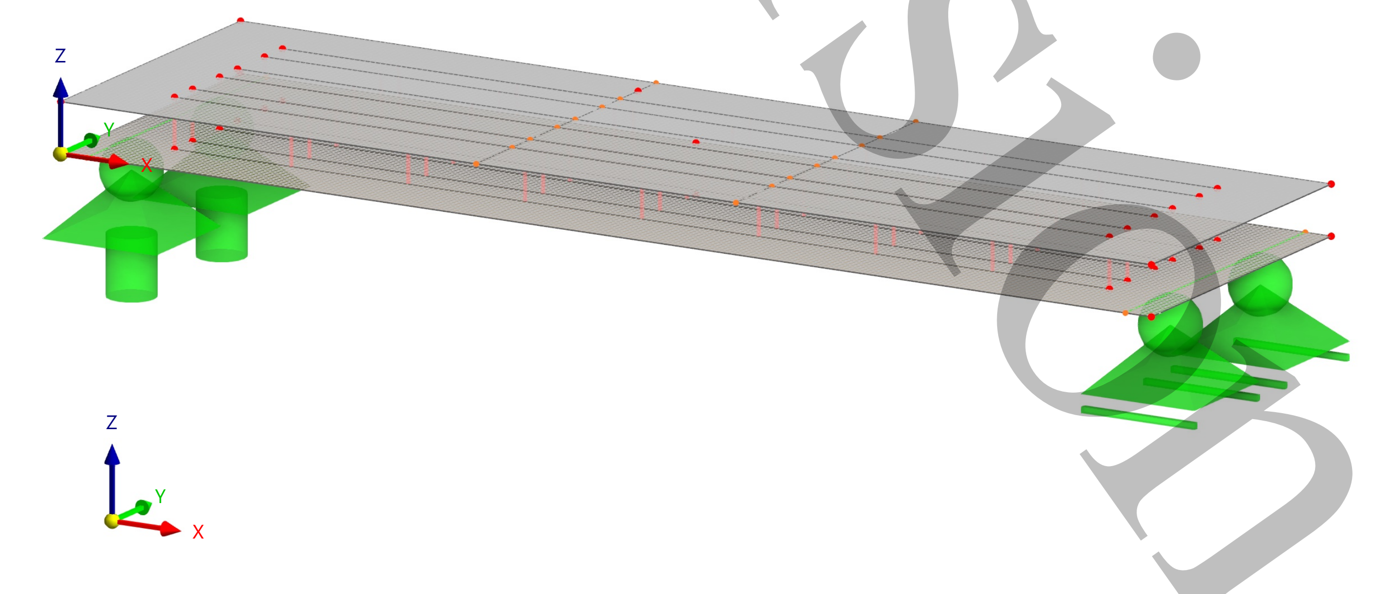
PROJECT

Chapters

MODEL

In Axonometric Direction by Default



CONTENTS

A MODEL - LOCATION

Location

Country	:	--
Street	:	
Zip / Postal code	:	
City	:	
State	:	
Latitude	:	deg
Longitude	:	deg
Altitude	:	m

B MODEL - PARAMETERS

Model ID {d78799ac-7f5a-4ab8-9b06-bb2eea9fcd75}
Unique model identifier

Project ID {91af4629-d872-463e-8724-66011f1f28ef}
Unique project identifier

C MODEL - BASE DATA

Main

Model name	:	Type B - method 2 - less nodes.rf6
Model description	:	
Type of model	:	3D

Add-ons

- Stress-Strain Analysis
- Concrete Design
- Timber Design

Standards I

Load case classification & combination wizard	:	EN 1990 | Timber NS | 2016-05
Load Wizard	:	EN 1991 NS | 2018-05
Standard group for concrete design	:	EN 1992 NS | 2010-11
Standard group for timber design	:	EN 1995 NS | 2014-08

Settings & Options

Acceleration of gravity / mass conversion constant	g	:	10.00 m/s²
Date of day zero in time diagram		:	01.01.2016
Global axes XYZ		:	Z upward
Local axes xyz		:	z downward

Tolerances

Tolerance for nodes	:	0.00050 m
Tolerance for lines	:	0.00050 m
Tolerance for surfaces/planes	:	0.00050 m
Tolerance for directions	:	0.00050 m

D MESH SETTINGS

General

Target length of finite elements	L_F	:	0.010 m
Maximum distance between a node and a line to integrate it into the line	ε	:	0.001 m
Maximum number of mesh nodes (in thousands)	n_m	:	500

Members

Number of divisions for result diagram	:	10

D MESH SETTINGS

Number of divisions for special types of members (cable, elastic foundation, taper, nonlinearity)	:	10
Number of divisions for determination of max/min values	:	10
Activate member divisions for straight members, which are not integrated into surfaces, with concrete material category group (necessary for nonlinear calculation)		
Minimum number of member divisions	:	10
Activate member divisions for large deformation or post-critical analysis		
Activate member divisions for straight members		
Minimum number of member divisions	:	8
Activate division for members with nodes lying on them		

Surfaces

Maximum ratio of FE rectangle diagonals	Δ_D	:	1.800
Maximum out-of-plane inclination of two finite elements	α	:	0.50
Shape of finite elements		:	Triangles and quadrangles
Same squares where possible			
Triangles for membranes			

1 Basic Objects

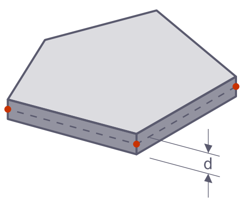
1.1 MATERIALS

Legend
Concrete Settings
Stiffness modification
User-Defined Material

Material No.	Material Name	Material Type	Analysis Model	Options
1	C35/45 | Isotropic | Plastic (Surfaces/Solids)	Concrete	Isotropic | Plastic (Surfaces/ Solids)	
2	T15 | Orthotropic | Plastic (Surfaces)	Timber	Orthotropic | Plastic (Surfaces)	
3	T22 | Orthotropic | Plastic (Surfaces)	Timber	Orthotropic | Plastic (Surfaces)	

1.2 THICKNESSES

Uniform



Thick. No.	Type	Assigned to Surface No.	Material	Symbol	Thickness Value	Unit	Nodes	Direction
1	Uniform | d : 60.0 mm | 1 - C35/45							
	Uniform	2	1	d	60.0	mm		
2	Uniform | d : 20.0 mm | 2 - T15							
	Uniform		2	d	20.0	mm		
3	Uniform | d : 30.0 mm | 3 - T22							
	Uniform		3	d	30.0	mm		
4	Layers | d : 120.0 mm | Layers: 5							
	Layers	1						

1.2.1 THICKNESSES - LAYER INFO

Thick. No.	Layer Model Solid	Layer Model Gas	Total Thickness d [mm]	Total Weight g [N/m²]	Comment
4			120.0	540.0	

1.2.2 THICKNESSES - LAYERS

Thick. No.	Layer No.	Layer Type	Object	Material	Thickness d [mm]	Rotation β [deg]	Connected	Spec. W. γ_i [N/m³]	Weight g [N/m²]	Comment
4	1	Layer	3	3	30.0	0.00	☐	4700.0	141.0	
	2	Layer	2	2	20.0	90.00	☐	4300.0	86.0	
	3	Layer	2	2	20.0	0.00	☐	4300.0	86.0	
	4	Layer	2	2	20.0	90.00	☐	4300.0	86.0	
	5	Layer	3	3	30.0	0.00	☐	4700.0	141.0	

1.3 NODES

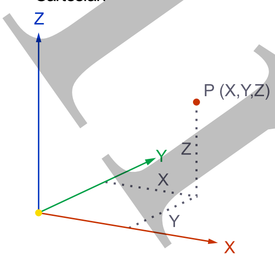
Legend
On Line

Node No.	Node Type	Reference Node	Coordinate System	Coordinate Type	X [m]	Y [m]	Z [m]	Options	Comment
1	Standard	--	1	Cartesian	2.100	0.600	0.000		
2	Standard	--	1	Cartesian	0.000	0.000	0.090		
3	Standard	--	1	Cartesian	2.100	0.600	0.090		
4	On Line		1	Cartesian	0.050	0.000	0.000	✚	
5	On Line		1	Cartesian	0.050	0.600	0.000	✚	
6	On Line		1	Cartesian	2.050	0.000	0.000	✚	
7	On Line		1	Cartesian	2.050	0.600	0.000	✚	

1.3

NODES

Cartesian



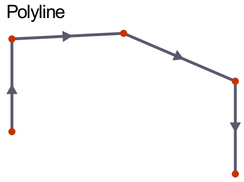
Node No.	Node Type	Reference Node	Coordinate System	Coordinate Type	X [m]	Y [m]	Z [m]	Options	Comment
8	On Line		1	Cartesian	0.800	0.000	0.090		
9	On Line		1	Cartesian	0.800	0.600	0.090		
10	On Line		1	Cartesian	1.300	0.000	0.090		
11	On Line		1	Cartesian	1.300	0.600	0.090		
12	Standard	--	1	Cartesian	0.000	0.000	0.000		
13	Standard	--	1	Cartesian	0.000	0.600	0.000		
15	Standard	--	1	Cartesian	2.100	0.000	0.000		
17	Standard	--	1	Cartesian	0.000	0.600	0.090		
19	Standard	--	1	Cartesian	2.100	0.000	0.090		
21	Standard	--	1	Cartesian	0.150	0.120	0.000		
22	Standard	--	1	Cartesian	0.150	0.120	0.090		
23	Standard	--	1	Cartesian	1.950	0.120	0.000		
24	Standard	--	1	Cartesian	1.950	0.120	0.090		
25	Standard	--	1	Cartesian	0.150	0.180	0.000		
26	Standard	--	1	Cartesian	0.150	0.180	0.090		
27	Standard	--	1	Cartesian	1.950	0.180	0.000		
28	Standard	--	1	Cartesian	1.950	0.180	0.090		
29	On Line		1	Cartesian	1.300	0.120	0.090		
30	On Line		1	Cartesian	0.800	0.120	0.090		
31	On Line		1	Cartesian	1.300	0.180	0.090		
32	On Line		1	Cartesian	0.800	0.180	0.090		
33	Standard	--	1	Cartesian	0.150	0.270	0.000		
34	Standard	--	1	Cartesian	0.150	0.270	0.090		
35	Standard	--	1	Cartesian	1.950	0.270	0.000		
36	Standard	--	1	Cartesian	1.950	0.270	0.090		
37	Standard	--	1	Cartesian	0.150	0.330	0.000		
38	Standard	--	1	Cartesian	0.150	0.330	0.090		
39	Standard	--	1	Cartesian	1.950	0.330	0.000		
40	Standard	--	1	Cartesian	1.950	0.330	0.090		
41	On Line		1	Cartesian	1.300	0.270	0.090		
42	On Line		1	Cartesian	0.800	0.270	0.090		
43	On Line		1	Cartesian	1.300	0.330	0.090		
44	On Line		1	Cartesian	0.800	0.330	0.090		
45	Standard	--	1	Cartesian	0.150	0.420	0.000		
46	Standard	--	1	Cartesian	0.150	0.420	0.090		
47	Standard	--	1	Cartesian	1.950	0.420	0.000		
48	Standard	--	1	Cartesian	1.950	0.420	0.090		
49	Standard	--	1	Cartesian	0.150	0.480	0.000		
50	Standard	--	1	Cartesian	0.150	0.480	0.090		
51	Standard	--	1	Cartesian	1.950	0.480	0.000		
52	Standard	--	1	Cartesian	1.950	0.480	0.090		
53	On Line		1	Cartesian	1.300	0.420	0.090		
54	On Line		1	Cartesian	0.800	0.420	0.090		
55	On Line		1	Cartesian	1.300	0.480	0.090		
56	On Line		1	Cartesian	0.800	0.480	0.090		
57	Standard	--	1	Cartesian	1.050	0.300	0.090		
58	Standard	--	1	Cartesian	1.050	0.300	0.000		
59	Standard	--	1	Cartesian	0.800	0.540	0.090		

1.4

LINES

Legend
Generated
Line Support
Nodes on Line

Polyline



Line No.	Line Type	Nodes No.	Line Length L [m]	Position	Options	Comment
1	Polyline	12,13	0.600	On Y		
2	Polyline	13,1	2.100	|| X		
3	Polyline	1,15	0.600	|| Y		
4	Polyline	15,12	2.100	On X		
5	Polyline	2,17	0.600	|| Y		
6	Polyline	17,3	2.100	|| X		
7	Polyline	3,19	0.600	|| Y		
8	Polyline	19,2	2.100	|| X		
9	Polyline	10,11	0.600	|| Y		
10	Polyline	9,8	0.600	|| Y		
11	Polyline	7,6	0.600	|| Y		
12	Polyline	5,4	0.600	|| Y		
13	Polyline	21,23	1.800	|| X		
14	Polyline	24,29	0.650	|| X		
15	Polyline	29,30	0.500	|| X		
16	Polyline	30,22	0.650	|| X		
17	Polyline	26,32	0.650	|| X		
18	Polyline	32,31	0.500	|| X		
19	Polyline	31,28	0.650	|| X		
20	Polyline	27,25	1.800	|| X		
21	Polyline	36,41	0.650	|| X		
22	Polyline	41,42	0.500	|| X		
23	Polyline	42,34	0.650	|| X		

1.4
LINES

Line No.	Line Type	Nodes No.	Line Length L [m]	Position	Options	Comment
24	Polyline	35,33	1.800	|| X		
25	Polyline	40,43	0.650	|| X		
26	Polyline	43,44	0.500	|| X		
27	Polyline	44,38	0.650	|| X		
28	Polyline	39,37	1.800	|| X		
29	Polyline	48,53	0.650	|| X		
30	Polyline	53,54	0.500	|| X		
31	Polyline	54,46	0.650	|| X		
32	Polyline	50,56	0.650	|| X		
33	Polyline	56,55	0.500	|| X		
34	Polyline	55,52	0.650	|| X		
35	Polyline	47,45	1.800	|| X		
36	Polyline	49,51	1.800	|| X		
37	Polyline	22,24	1.800	|| X		
38	Polyline	28,26	1.800	|| X		
39	Polyline	36,34	1.800	|| X		
40	Polyline	40,38	1.800	|| X		
41	Polyline	48,46	1.800	|| X		
42	Polyline	50,52	1.800	|| X		

1.5
SURFACES

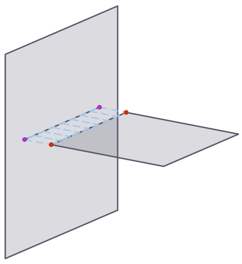
Surface No.	Boundary Lines	Stiffness Type	Geometry Type	Thickness	Material	Position	Options
1	1-4	Standard	Plane	4		In XY	
2	5-8	Standard	Plane	1	1	|| XY	

Legend
Concrete Durability (Concrete Design)
Design properties
Grid for Results
Integrated Objects
Reinforcement Direction – Bottom
Reinforcement Direction – Top
Service Class (Timber Design)

2 Special Objects

2.1
RIGID LINKS

Line to surface



Link No.	Description	Symbol	Value	Unit
1	Line No. 13 | Surface No. 2			
	Line 1 No.		13	
	Line 2 No.		37	
	Surface No.		2	
	Ignore relative position		☐	
2	Line No. 20 | Surface No. 2			
	Line 1 No.		20	
	Line 2 No.		38	
	Surface No.		2	
	Ignore relative position		☐	
3	Line No. 24 | Surface No. 2			
	Line 1 No.		24	
	Line 2 No.		39	
	Surface No.		2	
	Ignore relative position		☐	
4	Line No. 28 | Surface No. 2			
	Line 1 No.		28	
	Line 2 No.		40	
	Surface No.		2	
	Ignore relative position		☐	
5	Line No. 35 | Surface No. 2			
	Line 1 No.		35	
	Line 2 No.		41	
	Surface No.		2	
	Ignore relative position		☐	
6	Line No. 36 | Surface No. 2			
	Line 1 No.		36	
	Line 2 No.		42	
	Surface No.		2	

2.1 RIGID LINKS

Link No.	Description	Symbol	Value	Unit
	Ignore relative position		☐	

2.2 STRUCTURE MODIFICATIONS

Mod. No.	Description	Value	Comment
1	Structure Modification 1		
	Assigned to	CO 1	
	Partial Safety Factor γ_M	☒	
	Materials	☐	
	Surfaces	☐	
	Line Supports	☐	
	Material Nonlinearity Models	☐	
	Timber Members due to Moisture Class	☐	

3 Types for Lines

3.1 LINE SUPPORTS

Support No.	Lines No.	Coordinate System	x Axis R. β [deg]	Translational Spring [kN/m²] $C_{u,X}$	$C_{u,Y}$	$C_{u,Z}$	Rotational Spring [kNm·rad⁻¹·m⁻¹] $C_{\varphi,X}$	$C_{\varphi,Y}$	$C_{\varphi,Z}$
1	12	Global XYZ		☒	☒	☒	☐	☐	☐
3	11	Global XYZ		☐	☒	☒	☐	☐	☒

4 Load Cases & Combinations

4.1 LOAD CASES

LC No.	Settings	Value	Unit	To Solve
2	G 200 kN			
	Analysis type	Static Analysis		☒
	Static analysis settings	SA1 - Geometrically linear | Newton-Raphson		
	Action category	G Permanent		
	Self-weight - Factor in direction X	0.000	--	
	Self-weight - Factor in direction Y	0.000	--	
	Self-weight - Factor in direction Z	-1.000	--	
	Load duration	Permanent		

4.2 STATIC ANALYSIS SETTINGS

Settings No.	Description	Symbol	Value	Unit
1	Geometrically linear | Newton-Raphson			
	Analysis type		Geometrically linear	
	Iterative method for nonlinear analysis		Newton-Raphson	
	Maximum number of iterations		100	
	Number of load increments		200	
	Modify standard precision and tolerance settings		☐	
	Ignore all nonlinearities		☐	
	Modify loading by multiplier factor		☐	
	Displacements due to member load of type 'Pipe internal pressure' (Bourdon effect)		☐	
	Save results of all load increments		☒	
	Method for equation system		Direct	
	Plate bending theory		Mindlin	
	Activate mass conversion to load		☐	
	Asymmetric direct solver		☐	
2	Second-order (P-Δ) | Picard | 100 | 1			
	Analysis type		Second-order (P-Δ)	
	Iterative method for nonlinear analysis		Picard	
	Maximum number of iterations		100	
	Number of load increments		1	
	Modify standard precision and tolerance settings		☐	
	Ignore all nonlinearities		☐	
	Modify loading by multiplier factor		☐	
	Consider favorable effect due to tension in members		☒	
	Displacements due to member load of type 'Pipe internal		☐	

4.2 STATIC ANALYSIS SETTINGS

Settings No.	Description	Symbol	Value	Unit
	pressure' (Bourdon effect)			
	Refer internal forces to deformed structure		☒	
	Refer internal forces to deformed structure for normal forces		☒	
	Refer internal forces to deformed structure for shear forces		☒	
	Refer internal forces to deformed structure for moments		☒	
	Method for equation system		Direct	
	Plate bending theory		Mindlin	
	Activate mass conversion to load		☐	
	Asymmetric direct solver		☐	
3	Large deformations | Newton-Raphson | 100 | 1			
	Analysis type		Large deformations	
	Iterative method for nonlinear analysis		Newton-Raphson	
	Maximum number of iterations		100	
	Number of load increments		1	
	Modify standard precision and tolerance settings		☐	
	Ignore all nonlinearities		☐	
	Modify loading by multiplier factor		☐	
	Consider favorable effect due to tension in members		☒	
	Try to calculate unstable structure		☐	
	Displacements due to member load of type 'Pipe internal pressure' (Bourdon effect)		☐	
	Method for equation system		Direct	
	Plate bending theory		Mindlin	
	Activate mass conversion to load		☐	
	Asymmetric direct solver		☐	

4.2.1 STATIC ANALYSIS SETTINGS - CALCULATION DIAGRAMS

Settings	Horizontal Axis				Vertical Axis			
No.	Result Type	Value	Object	Node	Result Type	Value	Object	Node
1	Maximum deformation	u_Z			Sum of support forces	Z		
	Sum of support forces	Z			Surfaces - Equivalent Stresses - von Mises	$\sigma_{eqv,Mises,-}$	1	39
	Sum of support forces	Z			Surfaces - Equivalent Stresses - von Mises	$\sigma_{eqv,Mises,-}$	2	9

5 Guide Objects

5.1 COORDINATE SYSTEMS

System		Coordinates			Rotation				
No.	Type	Symbol	Value	Unit	Sequence	Symbol	Value	Unit	Comment
1	Global XYZ								

6 Parts List

6.1 PARTS LIST - SURFACES BY MATERIAL - OVERVIEW

Parts Lists

Material No.	Material Name	Thickness Name	Surfaces No.	Quantity Q [–]	Surface S [m²]	Coating C [m²]	Volume V [m³]	Unit Weight W [kg/m²]	Surface Weig. W [t]
1	C35/45	Uniform | d : 60.0 mm | 1 - C35/45	2	1.00	1.260	2.844	0.076	150.00	0.189
Total				1.00					
3	T22	Layers | d : 120.0 mm | Layers: 5	1	1.00	1.260	2.520	0.151	54.00	0.068
Total				1.00					
Σ Total				2.00					

6.2 PARTS LIST - SURFACES BY MATERIAL - TOTAL VALUES

Parts Lists

Material No.	Material Name	Thickness Name	Surfaces No.	Quantity Q [–]	Surface S [m²]	Tot. Coating C_Σ [m²]	Tot. Surface S_Σ [m²]	Tot. Volume V_Σ [m³]	Tot. Weight W_Σ [t]
1	C35/45	Uniform | d : 60.0 mm | 1 - C35/45	2	1.00	1.260	2.844	1.260	0.076	0.189

6.2 PARTS LIST - SURFACES BY MATERIAL - TOTAL VALUES

Parts Lists

Material No.	Material Name	Thickness Name	Surfaces No.	Quantity Q [--]	Surface S [m²]	Tot. Coating C_{Σ} [m²]	Tot. Surface S_{Σ} [m²]	Tot. Volume V_{Σ} [m³]	Tot. Weight W_{Σ} [t]
Total				1.00		2.844	1.260	0.076	0.189
3	T22	Layers | d : 120.0 mm | Layers: 5	1	1.00	1.260	2.520	1.260	0.151	0.068
Total				1.00		2.520	1.260	0.151	0.068
Σ Total				2.00		5.364	2.520	0.227	0.257

6.3 PARTS LIST - ALL BY MATERIAL

Parts Lists

Material No.	Material Name	Object Type	Tot. Coating C_{Σ} [m²]	Tot. Volume V_{Σ} [m³]	Tot. Weight W_{Σ} [t]
1	C35/45	Surfaces	2.844	0.076	0.189
Total			2.844	0.076	0.189
3	T22	Surfaces	2.520	0.151	0.068
Total			2.520	0.151	0.068
Σ Total			5.364	0.227	0.257

7 Static Analysis Results

7.1 SUMMARY

Static Analysis

	Description	Value	Unit	Notes
	G LC2 - 200 kN			
	Sum of loads and the sum of support forces			
	Sum of loads in X	0.00	kN	
	Sum of support forces in X	0.00	kN	
	Sum of loads in Y	0.00	kN	
	Sum of support forces in Y	0.00	kN	
	Sum of loads in Z	-202.60	kN	
	Sum of support forces in Z	-202.60	kN	Deviation: 0.00 %
	Resultant of reactions			
	Resultant of reactions about X	0.00	kNm	At center of gravity of model (1.050, 0.300, 0.086 m)
	Resultant of reactions about Y	0.00	kNm	At center of gravity of model
	Resultant of reactions about Z	0.00	kNm	At center of gravity of model
	Maximum deformations			
	Maximum displacement in X-direction	1.2	mm	FE node No. 35: (1.950, 0.270, 0.000 m)
	Maximum displacement in Y-direction	-0.2	mm	FE node No. 13014: (0.790, 0.000, 0.090 m)
	Maximum displacement in Z-direction	-9.8	mm	FE node No. 17861: (1.050, 0.600, 0.090 m)
	Maximum vectorial displacement	9.9	mm	FE node No. 17861: (1.050, 0.600, 0.090 m)
	Maximum rotation about X-axis	-5.0	mrad	FE node No. 17861: (1.050, 0.600, 0.090 m)
	Maximum rotation about Y-axis	12.2	mrad	FE node No. 18542: (0.010, 0.000, 0.000 m)
	Maximum rotation about Z-axis	-4.0	mrad	FE node No. 4: (0.050, 0.000, 0.000 m)
	Calculation statistic			
	Number of iterations	2		
	Maximum value of element of stiffness matrix on diagonal	2.64e+12	--	
	Minimum value of element of stiffness matrix on diagonal	1415.55	--	
	Stiffness matrix determinant	1.90e+1118961	--	
	Infinity Norm	5.52e+12	--	
	Static Analysis Settings No. 1 - Geometrically linear | Newton-Raphson			
	Analysis type	Geometrically linear		
	Iterative method	Newton-Raphson		
	Maximum number of iterations	100		
	Number of load increments	200		
	Modify loading by multiplier factor	☐		
	Save results of all load increments	☒		
	Asymmetric direct solver	☐		
	Method for Equation System	Direct		
	Plate bending theory	Mindlin		

7.2

CALCULATION DIAGRAMS

Static Analysis

Increment No.	Iteration No.	Load Factor [--]	Value on Vertical Axis	Value on Horizontal Axis	Comment
LC2 - 200 kN					
Calculation Diagram: 1					
			Z [kN]	u_Z [mm]	Maximum deformation u_Z [mm] | Sum of support forces Z [kN]
1	2	0.005	-1.013	0.0	
2	2	0.010	-2.026	-0.1	
3	2	0.015	-3.039	-0.1	
4	2	0.020	-4.052	-0.2	
5	2	0.025	-5.065	-0.2	
6	2	0.030	-6.078	-0.3	
7	2	0.035	-7.091	-0.3	
8	2	0.040	-8.104	-0.4	
9	2	0.045	-9.117	-0.4	
10	2	0.050	-10.130	-0.4	
11	2	0.055	-11.143	-0.5	
12	2	0.060	-12.156	-0.5	
13	2	0.065	-13.169	-0.6	
14	2	0.070	-14.182	-0.6	
15	2	0.075	-15.195	-0.7	
16	2	0.080	-16.208	-0.7	
17	2	0.085	-17.221	-0.8	
18	2	0.090	-18.234	-0.8	
19	2	0.095	-19.247	-0.8	
20	2	0.100	-20.260	-0.9	
21	2	0.105	-21.273	-0.9	
22	2	0.110	-22.286	-1.0	
23	2	0.115	-23.299	-1.0	
24	2	0.120	-24.312	-1.1	
25	2	0.125	-25.325	-1.1	
26	2	0.130	-26.338	-1.2	
27	2	0.135	-27.351	-1.2	
28	2	0.140	-28.364	-1.2	
29	2	0.145	-29.377	-1.3	
30	2	0.150	-30.390	-1.3	
31	2	0.155	-31.403	-1.4	
32	2	0.160	-32.416	-1.4	
33	2	0.165	-33.429	-1.5	
34	2	0.170	-34.442	-1.5	
35	2	0.175	-35.455	-1.6	
36	2	0.180	-36.468	-1.6	
37	2	0.185	-37.481	-1.6	
38	2	0.190	-38.494	-1.7	
39	2	0.195	-39.507	-1.7	
40	2	0.200	-40.520	-1.8	
41	2	0.205	-41.533	-1.8	
42	2	0.210	-42.546	-1.9	
43	2	0.215	-43.559	-1.9	
44	2	0.220	-44.572	-2.0	
45	2	0.225	-45.585	-2.0	
46	2	0.230	-46.598	-2.0	
47	2	0.235	-47.611	-2.1	
48	2	0.240	-48.624	-2.1	
49	2	0.245	-49.637	-2.2	
50	2	0.250	-50.650	-2.2	
51	2	0.255	-51.663	-2.3	
52	2	0.260	-52.676	-2.3	
53	2	0.265	-53.689	-2.4	
54	2	0.270	-54.702	-2.4	
55	2	0.275	-55.715	-2.5	
56	2	0.280	-56.728	-2.5	
57	2	0.285	-57.741	-2.5	
58	2	0.290	-58.754	-2.6	
59	2	0.295	-59.767	-2.6	
60	2	0.300	-60.780	-2.7	
61	2	0.305	-61.793	-2.7	
62	2	0.310	-62.806	-2.8	
63	2	0.315	-63.819	-2.8	
64	2	0.320	-64.832	-2.9	
65	2	0.325	-65.845	-2.9	
66	2	0.330	-66.858	-2.9	
67	2	0.335	-67.871	-3.0	
68	2	0.340	-68.884	-3.0	
69	2	0.345	-69.897	-3.1	
70	2	0.350	-70.910	-3.1	
71	2	0.355	-71.923	-3.2	
72	2	0.360	-72.936	-3.2	
73	2	0.365	-73.949	-3.3	
74	2	0.370	-74.962	-3.3	

7.2 CALCULATION DIAGRAMS

Static Analysis

Increment No.	Iteration No.	Load Factor [--]	Value on Vertical Axis	Value on Horizontal Axis	Comment
75	2	0.375	-75.975	-3.3	
76	2	0.380	-76.988	-3.4	
77	2	0.385	-78.001	-3.4	
78	2	0.390	-79.014	-3.5	
79	2	0.395	-80.027	-3.5	
80	2	0.400	-81.040	-3.6	
81	2	0.405	-82.053	-3.6	
82	2	0.410	-83.066	-3.7	
83	2	0.415	-84.079	-3.7	
84	2	0.420	-85.092	-3.8	
85	2	0.425	-86.105	-3.8	
86	2	0.430	-87.118	-3.8	
87	2	0.435	-88.131	-3.9	
88	2	0.440	-89.144	-3.9	
89	2	0.445	-90.157	-4.0	
90	2	0.450	-91.170	-4.0	
91	2	0.455	-92.183	-4.1	
92	2	0.460	-93.196	-4.1	
93	2	0.465	-94.209	-4.2	
94	2	0.470	-95.222	-4.2	
95	2	0.475	-96.235	-4.2	
96	2	0.480	-97.248	-4.3	
97	2	0.485	-98.262	-4.3	
98	2	0.490	-99.275	-4.4	
99	2	0.495	-100.288	-4.4	
100	2	0.500	-101.301	-4.5	
101	2	0.505	-102.314	-4.5	
102	2	0.510	-103.327	-4.6	
103	2	0.515	-104.340	-4.6	
104	2	0.520	-105.353	-4.7	
105	2	0.525	-106.366	-4.7	
106	2	0.530	-107.379	-4.7	
107	2	0.535	-108.392	-4.8	
108	2	0.540	-109.405	-4.8	
109	2	0.545	-110.418	-4.9	
110	2	0.550	-111.431	-4.9	
111	2	0.555	-112.444	-5.0	
112	2	0.560	-113.457	-5.0	
113	2	0.565	-114.470	-5.1	
114	2	0.570	-115.483	-5.1	
115	2	0.575	-116.496	-5.2	
116	2	0.580	-117.509	-5.2	
117	2	0.585	-118.522	-5.3	
118	2	0.590	-119.535	-5.3	
119	2	0.595	-120.548	-5.3	
120	2	0.600	-121.561	-5.4	
121	2	0.605	-122.574	-5.4	
122	2	0.610	-123.587	-5.5	
123	2	0.615	-124.600	-5.5	
124	2	0.620	-125.613	-5.6	
125	2	0.625	-126.626	-5.6	
126	2	0.630	-127.639	-5.7	
127	2	0.635	-128.652	-5.7	
128	2	0.640	-129.665	-5.8	
129	2	0.645	-130.678	-5.8	
130	2	0.650	-131.691	-5.9	
131	2	0.655	-132.704	-5.9	
132	2	0.660	-133.717	-6.0	
133	2	0.665	-134.730	-6.0	
134	2	0.670	-135.743	-6.1	
135	2	0.675	-136.756	-6.1	
136	2	0.680	-137.769	-6.2	
137	2	0.685	-138.782	-6.2	
138	2	0.690	-139.795	-6.3	
139	2	0.695	-140.808	-6.3	
140	2	0.700	-141.821	-6.4	
141	2	0.705	-142.834	-6.4	
142	2	0.710	-143.847	-6.5	
143	2	0.715	-144.860	-6.5	
144	2	0.720	-145.873	-6.6	
145	2	0.725	-146.886	-6.6	
146	2	0.730	-147.899	-6.7	
147	2	0.735	-148.912	-6.7	
148	2	0.740	-149.925	-6.8	
149	2	0.745	-150.938	-6.8	
150	2	0.750	-151.951	-6.9	
151	2	0.755	-152.964	-6.9	

7.2 CALCULATION DIAGRAMS

Static Analysis

Increment No.	Iteration No.	Load Factor [--]	Value on Vertical Axis	Value on Horizontal Axis	Comment
152	2	0.760	-153.977	-7.0	
153	2	0.765	-154.990	-7.0	
154	2	0.770	-156.003	-7.1	
155	2	0.775	-157.016	-7.1	
156	2	0.780	-158.029	-7.2	
157	2	0.785	-159.042	-7.2	
158	2	0.790	-160.055	-7.3	
159	2	0.795	-161.068	-7.4	
160	2	0.800	-162.081	-7.4	
161	2	0.805	-163.094	-7.5	
162	2	0.810	-164.107	-7.5	
163	2	0.815	-165.120	-7.6	
164	2	0.820	-166.133	-7.6	
165	2	0.825	-167.146	-7.7	
166	2	0.830	-168.159	-7.8	
167	2	0.835	-169.172	-7.8	
168	2	0.840	-170.185	-7.9	
169	2	0.845	-171.198	-7.9	
170	2	0.850	-172.211	-8.0	
171	2	0.855	-173.224	-8.0	
172	2	0.860	-174.237	-8.1	
173	2	0.865	-175.250	-8.2	
174	2	0.870	-176.263	-8.2	
175	2	0.875	-177.276	-8.3	
176	2	0.880	-178.289	-8.3	
177	2	0.885	-179.302	-8.4	
178	2	0.890	-180.315	-8.4	
179	2	0.895	-181.328	-8.5	
180	2	0.900	-182.341	-8.6	
181	2	0.905	-183.354	-8.6	
182	2	0.910	-184.367	-8.7	
183	2	0.915	-185.380	-8.8	
184	2	0.920	-186.393	-8.8	
185	2	0.925	-187.406	-8.9	
186	2	0.930	-188.419	-8.9	
187	2	0.935	-189.432	-9.0	
188	2	0.940	-190.445	-9.1	
189	2	0.945	-191.458	-9.1	
190	2	0.950	-192.471	-9.2	
191	2	0.955	-193.484	-9.2	
192	2	0.960	-194.497	-9.3	
193	2	0.965	-195.510	-9.4	
194	2	0.970	-196.523	-9.4	
195	2	0.975	-197.536	-9.5	
196	2	0.980	-198.549	-9.6	
197	2	0.985	-199.562	-9.6	
198	2	0.990	-200.575	-9.7	
199	2	0.995	-201.588	-9.8	
200	2	1.000	-202.601	-9.8	

G LC2 - 200 kN

Calculation Diagram: 2

Increment No.	Iteration No.	Load Factor [--]	$\sigma_{eqv,Mises,-}$ [N/mm^2]	Z [kN]	Comment
					Sum of support forces Z [kN] | Surfaces - Equivalent Stresses - von Mises $\sigma_{eqv,Mises,-}$ (Surface No. 1, Node No. 39)
1	2	0.005	0.066	-1.013	
2	2	0.010	0.131	-2.026	
3	2	0.015	0.197	-3.039	
4	2	0.020	0.263	-4.052	
5	2	0.025	0.328	-5.065	
6	2	0.030	0.394	-6.078	
7	2	0.035	0.460	-7.091	
8	2	0.040	0.525	-8.104	
9	2	0.045	0.591	-9.117	
10	2	0.050	0.657	-10.130	
11	2	0.055	0.723	-11.143	
12	2	0.060	0.788	-12.156	
13	2	0.065	0.854	-13.169	
14	2	0.070	0.920	-14.182	
15	2	0.075	0.985	-15.195	
16	2	0.080	1.051	-16.208	
17	2	0.085	1.117	-17.221	
18	2	0.090	1.182	-18.234	
19	2	0.095	1.248	-19.247	
20	2	0.100	1.314	-20.260	
21	2	0.105	1.379	-21.273	
22	2	0.110	1.445	-22.286	
23	2	0.115	1.511	-23.299	

7.2 CALCULATION DIAGRAMS

Static Analysis

Increment No.	Iteration No.	Load Factor [--]	Value on Vertical Axis	Value on Horizontal Axis	Comment
24	2	0.120	1.576	-24.312	
25	2	0.125	1.642	-25.325	
26	2	0.130	1.708	-26.338	
27	2	0.135	1.774	-27.351	
28	2	0.140	1.839	-28.364	
29	2	0.145	1.905	-29.377	
30	2	0.150	1.971	-30.390	
31	2	0.155	2.036	-31.403	
32	2	0.160	2.102	-32.416	
33	2	0.165	2.168	-33.429	
34	2	0.170	2.233	-34.442	
35	2	0.175	2.299	-35.455	
36	2	0.180	2.365	-36.468	
37	2	0.185	2.431	-37.481	
38	2	0.190	2.496	-38.494	
39	2	0.195	2.562	-39.507	
40	2	0.200	2.628	-40.520	
41	2	0.205	2.694	-41.533	
42	2	0.210	2.759	-42.546	
43	2	0.215	2.825	-43.559	
44	2	0.220	2.891	-44.572	
45	2	0.225	2.957	-45.585	
46	2	0.230	3.023	-46.598	
47	2	0.235	3.088	-47.611	
48	2	0.240	3.154	-48.624	
49	2	0.245	3.220	-49.637	
50	2	0.250	3.286	-50.650	
51	2	0.255	3.352	-51.663	
52	2	0.260	3.418	-52.676	
53	2	0.265	3.484	-53.689	
54	2	0.270	3.550	-54.702	
55	2	0.275	3.616	-55.715	
56	2	0.280	3.682	-56.728	
57	2	0.285	3.747	-57.741	
58	2	0.290	3.813	-58.754	
59	2	0.295	3.880	-59.767	
60	2	0.300	3.946	-60.780	
61	2	0.305	4.012	-61.793	
62	2	0.310	4.078	-62.806	
63	2	0.315	4.144	-63.819	
64	2	0.320	4.210	-64.832	
65	2	0.325	4.276	-65.845	
66	2	0.330	4.343	-66.858	
67	2	0.335	4.409	-67.871	
68	2	0.340	4.475	-68.884	
69	2	0.345	4.541	-69.897	
70	2	0.350	4.608	-70.910	
71	2	0.355	4.674	-71.923	
72	2	0.360	4.740	-72.936	
73	2	0.365	4.807	-73.949	
74	2	0.370	4.873	-74.962	
75	2	0.375	4.940	-75.975	
76	2	0.380	5.006	-76.988	
77	2	0.385	5.073	-78.001	
78	2	0.390	5.140	-79.014	
79	2	0.395	5.206	-80.027	
80	2	0.400	5.273	-81.040	
81	2	0.405	5.340	-82.053	
82	2	0.410	5.407	-83.066	
83	2	0.415	5.474	-84.079	
84	2	0.420	5.541	-85.092	
85	2	0.425	5.608	-86.105	
86	2	0.430	5.675	-87.118	
87	2	0.435	5.743	-88.131	
88	2	0.440	5.810	-89.144	
89	2	0.445	5.877	-90.157	
90	2	0.450	5.945	-91.170	
91	2	0.455	6.012	-92.183	
92	2	0.460	6.079	-93.196	
93	2	0.465	6.147	-94.209	
94	2	0.470	6.214	-95.222	
95	2	0.475	6.282	-96.235	
96	2	0.480	6.349	-97.248	
97	2	0.485	6.417	-98.262	
98	2	0.490	6.485	-99.275	
99	2	0.495	6.552	-100.288	
100	2	0.500	6.620	-101.301	

7.2 CALCULATION DIAGRAMS

Static Analysis

Increment No.	Iteration No.	Load Factor [--]	Value on Vertical Axis	Value on Horizontal Axis	Comment
101	2	0.505	6.688	-102.314	
102	2	0.510	6.756	-103.327	
103	2	0.515	6.823	-104.340	
104	2	0.520	6.891	-105.353	
105	2	0.525	6.959	-106.366	
106	2	0.530	7.027	-107.379	
107	2	0.535	7.095	-108.392	
108	2	0.540	7.163	-109.405	
109	2	0.545	7.231	-110.418	
110	2	0.550	7.299	-111.431	
111	2	0.555	7.367	-112.444	
112	2	0.560	7.436	-113.457	
113	2	0.565	7.504	-114.470	
114	2	0.570	7.572	-115.483	
115	2	0.575	7.640	-116.496	
116	2	0.580	7.708	-117.509	
117	2	0.585	7.777	-118.522	
118	2	0.590	7.845	-119.535	
119	2	0.595	7.913	-120.548	
120	2	0.600	7.982	-121.561	
121	2	0.605	8.050	-122.574	
122	2	0.610	8.118	-123.587	
123	2	0.615	8.187	-124.600	
124	2	0.620	8.255	-125.613	
125	2	0.625	8.324	-126.626	
126	2	0.630	8.392	-127.639	
127	2	0.635	8.460	-128.652	
128	2	0.640	8.528	-129.665	
129	2	0.645	8.597	-130.678	
130	2	0.650	8.665	-131.691	
131	2	0.655	8.734	-132.704	
132	2	0.660	8.802	-133.717	
133	2	0.665	8.870	-134.730	
134	2	0.670	8.939	-135.743	
135	2	0.675	9.007	-136.756	
136	2	0.680	9.076	-137.769	
137	2	0.685	9.144	-138.782	
138	2	0.690	9.212	-139.795	
139	2	0.695	9.281	-140.808	
140	2	0.700	9.349	-141.821	
141	2	0.705	9.417	-142.834	
142	2	0.710	9.485	-143.847	
143	2	0.715	9.554	-144.860	
144	2	0.720	9.622	-145.873	
145	2	0.725	9.690	-146.886	
146	2	0.730	9.758	-147.899	
147	2	0.735	9.826	-148.912	
148	2	0.740	9.895	-149.925	
149	2	0.745	9.963	-150.938	
150	2	0.750	10.031	-151.951	
151	2	0.755	10.099	-152.964	
152	2	0.760	10.167	-153.977	
153	2	0.765	10.235	-154.990	
154	2	0.770	10.303	-156.003	
155	2	0.775	10.371	-157.016	
156	2	0.780	10.438	-158.029	
157	2	0.785	10.506	-159.042	
158	2	0.790	10.574	-160.055	
159	2	0.795	10.641	-161.068	
160	2	0.800	10.709	-162.081	
161	2	0.805	10.776	-163.094	
162	2	0.810	10.844	-164.107	
163	2	0.815	10.911	-165.120	
164	2	0.820	10.979	-166.133	
165	2	0.825	11.046	-167.146	
166	2	0.830	11.114	-168.159	
167	2	0.835	11.181	-169.172	
168	2	0.840	11.248	-170.185	
169	2	0.845	11.315	-171.198	
170	2	0.850	11.383	-172.211	
171	2	0.855	11.450	-173.224	
172	2	0.860	11.517	-174.237	
173	2	0.865	11.585	-175.250	
174	2	0.870	11.652	-176.263	
175	2	0.875	11.719	-177.276	
176	2	0.880	11.786	-178.289	
177	2	0.885	11.854	-179.302	

7.2 CALCULATION DIAGRAMS

Static Analysis

Increment No.	Iteration No.	Load Factor [--]	Value on Vertical Axis	Value on Horizontal Axis	Comment
178	2	0.890	11.921	-180.315	
179	2	0.895	11.988	-181.328	
180	2	0.900	12.055	-182.341	
181	2	0.905	12.122	-183.354	
182	2	0.910	12.189	-184.367	
183	2	0.915	12.256	-185.380	
184	2	0.920	12.323	-186.393	
185	2	0.925	12.390	-187.406	
186	2	0.930	12.457	-188.419	
187	2	0.935	12.524	-189.432	
188	2	0.940	12.591	-190.445	
189	2	0.945	12.657	-191.458	
190	2	0.950	12.724	-192.471	
191	2	0.955	12.791	-193.484	
192	2	0.960	12.857	-194.497	
193	2	0.965	12.924	-195.510	
194	2	0.970	12.990	-196.523	
195	2	0.975	13.057	-197.536	
196	2	0.980	13.123	-198.549	
197	2	0.985	13.190	-199.562	
198	2	0.990	13.256	-200.575	
199	2	0.995	13.322	-201.588	
200	2	1.000	13.388	-202.601	

G LC2 - 200 kN

Calculation Diagram: 3

			$\sigma_{eqv,Mises,-}$ [N/mm²]	Z [kN]	Sum of support forces Z [kN] | Surfaces - Equivalent Stresses - von Mises $\sigma_{eqv,Mises,-}$ (Surface No. 2, Node No. 9)
1	2	0.005	0.195	-1.013	
2	2	0.010	0.390	-2.026	
3	2	0.015	0.585	-3.039	
4	2	0.020	0.780	-4.052	
5	2	0.025	0.974	-5.065	
6	2	0.030	1.169	-6.078	
7	2	0.035	1.364	-7.091	
8	2	0.040	1.559	-8.104	
9	2	0.045	1.754	-9.117	
10	2	0.050	1.949	-10.130	
11	2	0.055	2.144	-11.143	
12	2	0.060	2.339	-12.156	
13	2	0.065	2.533	-13.169	
14	2	0.070	2.728	-14.182	
15	2	0.075	2.923	-15.195	
16	2	0.080	3.118	-16.208	
17	2	0.085	3.313	-17.221	
18	2	0.090	3.508	-18.234	
19	2	0.095	3.703	-19.247	
20	2	0.100	3.898	-20.260	
21	2	0.105	4.092	-21.273	
22	2	0.110	4.287	-22.286	
23	2	0.115	4.482	-23.299	
24	2	0.120	4.677	-24.312	
25	2	0.125	4.872	-25.325	
26	2	0.130	5.067	-26.338	
27	2	0.135	5.262	-27.351	
28	2	0.140	5.457	-28.364	
29	2	0.145	5.652	-29.377	
30	2	0.150	5.847	-30.390	
31	2	0.155	6.042	-31.403	
32	2	0.160	6.237	-32.416	
33	2	0.165	6.433	-33.429	
34	2	0.170	6.629	-34.442	
35	2	0.175	6.825	-35.455	
36	2	0.180	7.021	-36.468	
37	2	0.185	7.217	-37.481	
38	2	0.190	7.413	-38.494	
39	2	0.195	7.609	-39.507	
40	2	0.200	7.805	-40.520	
41	2	0.205	8.002	-41.533	
42	2	0.210	8.203	-42.546	
43	2	0.215	8.405	-43.559	
44	2	0.220	8.606	-44.572	
45	2	0.225	8.808	-45.585	
46	2	0.230	9.010	-46.598	
47	2	0.235	9.212	-47.611	
48	2	0.240	9.415	-48.624	
49	2	0.245	9.616	-49.637	

7.2 CALCULATION DIAGRAMS

Static Analysis

Increment No.	Iteration No.	Load Factor [--]	Value on Vertical Axis	Value on Horizontal Axis	Comment
50	2	0.250	9.816	-50.650	
51	2	0.255	10.017	-51.663	
52	2	0.260	10.218	-52.676	
53	2	0.265	10.419	-53.689	
54	2	0.270	10.620	-54.702	
55	2	0.275	10.821	-55.715	
56	2	0.280	11.023	-56.728	
57	2	0.285	11.224	-57.741	
58	2	0.290	11.424	-58.754	
59	2	0.295	11.625	-59.767	
60	2	0.300	11.826	-60.780	
61	2	0.305	12.027	-61.793	
62	2	0.310	12.228	-62.806	
63	2	0.315	12.430	-63.819	
64	2	0.320	12.631	-64.832	
65	2	0.325	12.832	-65.845	
66	2	0.330	13.034	-66.858	
67	2	0.335	13.235	-67.871	
68	2	0.340	13.436	-68.884	
69	2	0.345	13.638	-69.897	
70	2	0.350	13.839	-70.910	
71	2	0.355	14.041	-71.923	
72	2	0.360	14.242	-72.936	
73	2	0.365	14.444	-73.949	
74	2	0.370	14.646	-74.962	
75	2	0.375	14.848	-75.975	
76	2	0.380	15.050	-76.988	
77	2	0.385	15.252	-78.001	
78	2	0.390	15.454	-79.014	
79	2	0.395	15.657	-80.027	
80	2	0.400	15.866	-81.040	
81	2	0.405	16.076	-82.053	
82	2	0.410	16.287	-83.066	
83	2	0.415	16.497	-84.079	
84	2	0.420	16.708	-85.092	
85	2	0.425	16.920	-86.105	
86	2	0.430	17.131	-87.118	
87	2	0.435	17.343	-88.131	
88	2	0.440	17.555	-89.144	
89	2	0.445	17.768	-90.157	
90	2	0.450	17.981	-91.170	
91	2	0.455	18.194	-92.183	
92	2	0.460	18.410	-93.196	
93	2	0.465	18.626	-94.209	
94	2	0.470	18.843	-95.222	
95	2	0.475	19.061	-96.235	
96	2	0.480	19.279	-97.248	
97	2	0.485	19.498	-98.262	
98	2	0.490	19.718	-99.275	
99	2	0.495	19.938	-100.288	
100	2	0.500	20.158	-101.301	
101	2	0.505	20.377	-102.314	
102	2	0.510	20.597	-103.327	
103	2	0.515	20.816	-104.340	
104	2	0.520	21.035	-105.353	
105	2	0.525	21.254	-106.366	
106	2	0.530	21.474	-107.379	
107	2	0.535	21.693	-108.392	
108	2	0.540	21.912	-109.405	
109	2	0.545	22.133	-110.418	
110	2	0.550	22.355	-111.431	
111	2	0.555	22.578	-112.444	
112	2	0.560	22.802	-113.457	
113	2	0.565	23.027	-114.470	
114	2	0.570	23.252	-115.483	
115	2	0.575	23.478	-116.496	
116	2	0.580	23.705	-117.509	
117	2	0.585	23.930	-118.522	
118	2	0.590	24.156	-119.535	
119	2	0.595	24.382	-120.548	
120	2	0.600	24.608	-121.561	
121	2	0.605	24.835	-122.574	
122	2	0.610	25.061	-123.587	
123	2	0.615	25.289	-124.600	
124	2	0.620	25.516	-125.613	
125	2	0.625	25.743	-126.626	
126	2	0.630	25.970	-127.639	

7.2 CALCULATION DIAGRAMS

Static Analysis

Increment No.	Iteration No.	Load Factor [--]	Value on Vertical Axis	Value on Horizontal Axis	Comment
127	2	0.635	26.197	-128.652	
128	2	0.640	26.424	-129.665	
129	2	0.645	26.651	-130.678	
130	2	0.650	26.879	-131.691	
131	2	0.655	27.106	-132.704	
132	2	0.660	27.334	-133.717	
133	2	0.665	27.563	-134.730	
134	2	0.670	27.792	-135.743	
135	2	0.675	28.021	-136.756	
136	2	0.680	28.251	-137.769	
137	2	0.685	28.482	-138.782	
138	2	0.690	28.713	-139.795	
139	2	0.695	28.945	-140.808	
140	2	0.700	29.177	-141.821	
141	2	0.705	29.409	-142.834	
142	2	0.710	29.641	-143.847	
143	2	0.715	29.872	-144.860	
144	2	0.720	30.104	-145.873	
145	2	0.725	30.337	-146.886	
146	2	0.730	30.572	-147.899	
147	2	0.735	30.809	-148.912	
148	2	0.740	31.046	-149.925	
149	2	0.745	31.284	-150.938	
150	2	0.750	31.523	-151.951	
151	2	0.755	31.766	-152.964	
152	2	0.760	32.014	-153.977	
153	2	0.765	32.272	-154.990	
154	2	0.770	32.529	-156.003	
155	2	0.775	32.789	-157.016	
156	2	0.780	33.051	-158.029	
157	2	0.785	33.315	-159.042	
158	2	0.790	33.579	-160.055	
159	2	0.795	33.844	-161.068	
160	2	0.800	34.111	-162.081	
161	2	0.805	34.380	-163.094	
162	2	0.810	34.650	-164.107	
163	2	0.815	34.919	-165.120	
164	2	0.820	35.190	-166.133	
165	2	0.825	35.460	-167.146	
166	2	0.830	35.731	-168.159	
167	2	0.835	36.001	-169.172	
168	2	0.840	36.274	-170.185	
169	2	0.845	36.547	-171.198	
170	2	0.850	36.821	-172.211	
171	2	0.855	37.095	-173.224	
172	2	0.860	37.370	-174.237	
173	2	0.865	37.645	-175.250	
174	2	0.870	37.919	-176.263	
175	2	0.875	38.195	-177.276	
176	2	0.880	38.476	-178.289	
177	2	0.885	38.758	-179.302	
178	2	0.890	39.042	-180.315	
179	2	0.895	39.330	-181.328	
180	2	0.900	39.625	-182.341	
181	2	0.905	39.933	-183.354	
182	2	0.910	40.217	-184.367	
183	2	0.915	40.460	-185.380	
184	2	0.920	40.690	-186.393	
185	2	0.925	40.914	-187.406	
186	2	0.930	41.132	-188.419	
187	2	0.935	41.354	-189.432	
188	2	0.940	41.573	-190.445	
189	2	0.945	41.793	-191.458	
190	2	0.950	42.014	-192.471	
191	2	0.955	42.238	-193.484	
192	2	0.960	42.465	-194.497	
193	2	0.965	42.691	-195.510	
194	2	0.970	42.920	-196.523	
195	2	0.975	43.148	-197.536	
196	2	0.980	43.376	-198.549	
197	2	0.985	43.604	-199.562	
198	2	0.990	43.832	-200.575	
199	2	0.995	44.058	-201.588	
200	2	1.000	44.283	-202.601	

7.3 LINES - SUPPORT FORCES

Static Analysis

Line No.	Node No.	Location x [m]		Support Forces [kN/m] px	py	pz	Support Moments [kNm/m] mx	my	mz	Line Comment Cor. Loading
		LC2 - 200 kN								
11	7	0.000		0.000	46.642	-112.774	0.000	0.000	-0.027	
		0.010		0.000	34.337	-114.746	0.000	0.000	-0.021	
		0.020		0.000	43.279	-117.060	0.000	0.000	-0.015	
		0.030		0.000	46.063	-120.209	0.000	0.000	-0.012	
		0.040		0.000	47.817	-124.384	0.000	0.000	-0.008	
		0.050		0.000	48.964	-129.607	0.000	0.000	-0.004	
		0.060		0.000	49.680	-135.842	0.000	0.000	0.000	
		0.070		0.000	50.040	-142.976	0.000	0.000	0.004	
		0.080		0.000	50.020	-150.789	0.000	0.000	0.008	
		0.090		0.000	49.474	-158.930	0.000	0.000	0.012	
		0.100		0.000	48.127	-166.918	0.000	0.000	0.014	
		0.110		0.000	45.804	-174.196	0.000	0.000	0.012	
		0.120		0.000	42.807	-180.255	0.000	0.000	0.003	
		0.130		0.000	39.624	-184.827	0.000	0.000	-0.006	
		0.140		0.000	36.706	-187.971	0.000	0.000	-0.007	
		0.150 ¼		0.000	34.237	-189.928	0.000	0.000	-0.004	
		0.160		0.000	31.827	-190.917	0.000	0.000	-0.001	
		0.170		0.000	29.060	-191.032	0.000	0.000	-0.001	
		0.180		0.000	26.005	-190.312	0.000	0.000	-0.006	
		0.190		0.000	22.976	-188.897	0.000	0.000	-0.012	
		0.200 ⅓		0.000	20.334	-187.149	0.000	0.000	-0.012	
		0.210		0.000	18.301	-185.554	0.000	0.000	-0.009	
		0.220		0.000	16.720	-184.553	0.000	0.000	-0.005	
		0.230		0.000	15.317	-184.404	0.000	0.000	0.000	
		0.240		0.000	13.839	-185.128	0.000	0.000	0.005	
		0.250		0.000	12.019	-186.510	0.000	0.000	0.008	
		0.260		0.000	9.699	-188.160	0.000	0.000	0.007	
		0.270		0.000	7.061	-189.655	0.000	0.000	0.002	
		0.280		0.000	4.415	-190.712	0.000	0.000	-0.003	
		0.290		0.000	2.036	-191.287	0.000	0.000	-0.003	
		0.300 ½		0.000	0.000	-191.462	0.000	0.000	0.000	
		0.310		0.000	-2.036	-191.287	0.000	0.000	0.003	
		0.320		0.000	-4.415	-190.712	0.000	0.000	0.003	
		0.330		0.000	-7.061	-189.655	0.000	0.000	-0.002	
		0.340		0.000	-9.699	-188.160	0.000	0.000	-0.007	
		0.350		0.000	-12.019	-186.510	0.000	0.000	-0.008	
		0.360		0.000	-13.839	-185.128	0.000	0.000	-0.005	
		0.370		0.000	-15.317	-184.404	0.000	0.000	0.000	
		0.380		0.000	-16.720	-184.553	0.000	0.000	0.005	
		0.390		0.000	-18.301	-185.554	0.000	0.000	0.009	
		0.400 ⅔		0.000	-20.334	-187.149	0.000	0.000	0.012	
		0.410		0.000	-22.976	-188.897	0.000	0.000	0.012	
		0.420		0.000	-26.005	-190.312	0.000	0.000	0.006	
		0.430		0.000	-29.060	-191.032	0.000	0.000	0.001	
		0.440		0.000	-31.827	-190.917	0.000	0.000	0.001	
		0.450 ¾		0.000	-34.237	-189.928	0.000	0.000	0.004	
		0.460		0.000	-36.706	-187.971	0.000	0.000	0.007	
		0.470		0.000	-39.624	-184.827	0.000	0.000	0.006	
		0.480		0.000	-42.807	-180.255	0.000	0.000	-0.003	
		0.490		0.000	-45.804	-174.196	0.000	0.000	-0.012	
		0.500		0.000	-48.127	-166.918	0.000	0.000	-0.014	
		0.510		0.000	-49.474	-158.930	0.000	0.000	-0.012	
		0.520		0.000	-50.020	-150.789	0.000	0.000	-0.008	
		0.530		0.000	-50.040	-142.976	0.000	0.000	-0.004	
		0.540		0.000	-49.680	-135.842	0.000	0.000	0.000	
		0.550		0.000	-48.964	-129.607	0.000	0.000	0.004	
		0.560		0.000	-47.817	-124.384	0.000	0.000	0.008	
		0.570		0.000	-46.063	-120.209	0.000	0.000	0.012	
		0.580		0.000	-43.279	-117.060	0.000	0.000	0.015	
		0.590		0.000	-34.337	-114.746	0.000	0.000	0.021	
	6	0.600		0.000	-46.642	-112.774	0.000	0.000	0.027	
Extremes	7	0.000	p_x	0.000	46.642	-112.774	0.000	0.000	-0.027	
11	7	0.000		0.000	46.642	-112.774	0.000	0.000	-0.027	
		0.070	p_y	0.000	50.040	-142.976	0.000	0.000	0.004	
		0.530		0.000	-50.040	-142.976	0.000	0.000	-0.004	
	7	0.000	p_z	0.000	46.642	-112.774	0.000	0.000	-0.027	
		0.300 ½		0.000	0.000	-191.462	0.000	0.000	0.000	
	7	0.000	m_x	0.000	46.642	-112.774	0.000	0.000	-0.027	
	7	0.000		0.000	46.642	-112.774	0.000	0.000	-0.027	
	7	0.000	m_y	0.000	46.642	-112.774	0.000	0.000	-0.027	
	7	0.000		0.000	46.642	-112.774	0.000	0.000	-0.027	
	6	0.600	m_z	0.000	-46.642	-112.774	0.000	0.000	0.027	
	7	0.000		0.000	46.642	-112.774	0.000	0.000	-0.027	
Total				0.000	50.040	-112.774	0.000	0.000	0.027	
11				0.000	-50.040	-191.462	0.000	0.000	-0.027	
Average				0.000	0.000	-168.834	0.000	0.000	0.000	

7.3 LINES - SUPPORT FORCES

Static Analysis

Line No.	Node No.	Location x [m]		Support Forces [kN/m] p_x	p_y	p_z	Support Moments [kNm/m] m_x	m_y	m_z	Line Comment Cor. Loading
		LC2 - 200 kN								
12	5	0.000		196.859	10.161	-111.510	0.000	0.000	0.000	
		0.010		264.181	10.012	-113.570	0.000	0.000	0.000	
		0.020		283.534	13.890	-115.938	0.000	0.000	0.000	
		0.030		274.888	15.883	-119.126	0.000	0.000	0.000	
		0.040		256.917	17.543	-123.335	0.000	0.000	0.000	
		0.050		232.809	19.005	-128.588	0.000	0.000	0.000	
		0.060		202.194	20.279	-134.851	0.000	0.000	0.000	
		0.070		164.011	21.321	-142.014	0.000	0.000	0.000	
		0.080		117.227	22.021	-149.861	0.000	0.000	0.000	
		0.090		61.690	22.180	-158.044	0.000	0.000	0.000	
		0.100		0.135	21.502	-166.088	0.000	0.000	0.000	
		0.110		-58.564	19.832	-173.443	0.000	0.000	0.000	
		0.120		-99.914	17.504	-179.605	0.000	0.000	0.000	
		0.130		-116.250	15.052	-184.309	0.000	0.000	0.000	
		0.140		-116.941	12.965	-187.609	0.000	0.000	0.000	
		0.150 ¼		-117.402	11.433	-189.740	0.000	0.000	0.000	
		0.160		-124.805	10.062	-190.910	0.000	0.000	0.000	
		0.170		-134.690	8.428	-191.205	0.000	0.000	0.000	
		0.180		-134.683	6.621	-190.651	0.000	0.000	0.000	
		0.190		-117.220	4.995	-189.387	0.000	0.000	0.000	
		0.200 ⅓		-89.248	3.949	-187.773	0.000	0.000	0.000	
		0.210		-63.663	3.709	-186.306	0.000	0.000	0.000	
		0.220		-48.719	4.064	-185.430	0.000	0.000	0.000	
		0.230		-47.470	4.646	-185.406	0.000	0.000	0.000	
		0.240		-59.952	5.097	-186.253	0.000	0.000	0.000	
		0.250		-83.278	5.056	-187.753	0.000	0.000	0.000	
		0.260		-109.624	4.318	-189.509	0.000	0.000	0.000	
		0.270		-126.744	3.096	-191.086	0.000	0.000	0.000	
		0.280		-128.010	1.775	-192.196	0.000	0.000	0.000	
		0.290		-120.604	0.706	-192.797	0.000	0.000	0.000	
		0.300 ½		-116.470	0.000	-192.980	0.000	0.000	0.000	
		0.310		-120.604	-0.706	-192.797	0.000	0.000	0.000	
		0.320		-128.010	-1.775	-192.196	0.000	0.000	0.000	
		0.330		-126.744	-3.096	-191.086	0.000	0.000	0.000	
		0.340		-109.624	-4.318	-189.509	0.000	0.000	0.000	
		0.350		-83.278	-5.056	-187.753	0.000	0.000	0.000	
		0.360		-59.952	-5.097	-186.253	0.000	0.000	0.000	
		0.370		-47.470	-4.646	-185.406	0.000	0.000	0.000	
		0.380		-48.719	-4.064	-185.430	0.000	0.000	0.000	
		0.390		-63.663	-3.709	-186.306	0.000	0.000	0.000	
		0.400 ⅔		-89.248	-3.949	-187.773	0.000	0.000	0.000	
		0.410		-117.220	-4.995	-189.387	0.000	0.000	0.000	
		0.420		-134.683	-6.621	-190.651	0.000	0.000	0.000	
		0.430		-134.690	-8.428	-191.205	0.000	0.000	0.000	
		0.440		-124.805	-10.062	-190.910	0.000	0.000	0.000	
		0.450 ¾		-117.402	-11.433	-189.740	0.000	0.000	0.000	
		0.460		-116.941	-12.965	-187.609	0.000	0.000	0.000	
		0.470		-116.250	-15.052	-184.309	0.000	0.000	0.000	
		0.480		-99.914	-17.504	-179.605	0.000	0.000	0.000	
		0.490		-58.564	-19.832	-173.443	0.000	0.000	0.000	
		0.500		0.135	-21.502	-166.088	0.000	0.000	0.000	
		0.510		61.690	-22.180	-158.044	0.000	0.000	0.000	
		0.520		117.227	-22.021	-149.861	0.000	0.000	0.000	
		0.530		164.011	-21.321	-142.014	0.000	0.000	0.000	
		0.540		202.194	-20.279	-134.851	0.000	0.000	0.000	
		0.550		232.809	-19.005	-128.588	0.000	0.000	0.000	
		0.560		256.917	-17.543	-123.335	0.000	0.000	0.000	
		0.570		274.888	-15.883	-119.126	0.000	0.000	0.000	
		0.580		283.534	-13.890	-115.938	0.000	0.000	0.000	
		0.590		264.181	-10.012	-113.570	0.000	0.000	0.000	
	4	0.600		196.859	-10.161	-111.510	0.000	0.000	0.000	
Extremes		0.020	p_x	283.534	13.890	-115.938	0.000	0.000	0.000	
12		0.170		-134.690	8.428	-191.205	0.000	0.000	0.000	
		0.090	p_y	61.690	22.180	-158.044	0.000	0.000	0.000	
		0.510		61.690	-22.180	-158.044	0.000	0.000	0.000	
	5	0.000	p_z	196.859	10.161	-111.510	0.000	0.000	0.000	
		0.300 ½		-116.470	0.000	-192.980	0.000	0.000	0.000	
	5	0.000	m_x	196.859	10.161	-111.510	0.000	0.000	0.000	
	5	0.000		196.859	10.161	-111.510	0.000	0.000	0.000	
	5	0.000	m_y	196.859	10.161	-111.510	0.000	0.000	0.000	
	5	0.000		196.859	10.161	-111.510	0.000	0.000	0.000	
	5	0.000	m_z	196.859	10.161	-111.510	0.000	0.000	0.000	
	5	0.000		196.859	10.161	-111.510	0.000	0.000	0.000	
Total				283.534	22.180	-111.510	0.000	0.000	0.000	
12				-134.690	-22.180	-192.980	0.000	0.000	0.000	
Average				0.000	0.000	-168.834	0.000	0.000	0.000	

7.3 LINES - SUPPORT FORCES

Static Analysis

Line No.	Node No.	Location x [m]		Support Forces [kN/m] px	py	pz	Support Moments [kNm/m] mx	my	mz	Line Comment Cor. Loading
	LC2 - 200 kN									
	Total max/min values with corresponding values									
12		0.020	px	283.534	13.890	-115.938	0.000	0.000	0.000	
12		0.170		-134.690	8.428	-191.205	0.000	0.000	0.000	
11		0.070	py	0.000	50.040	-142.976	0.000	0.000	0.004	
11		0.530		0.000	-50.040	-142.976	0.000	0.000	-0.004	
12		0.000	pz	196.859	10.161	-111.510	0.000	0.000	0.000	
12		0.300		-116.470	0.000	-192.980	0.000	0.000	0.000	
11		0.000	mx	0.000	46.642	-112.774	0.000	0.000	-0.027	
11		0.000		0.000	46.642	-112.774	0.000	0.000	-0.027	
11		0.000	my	0.000	46.642	-112.774	0.000	0.000	-0.027	
11		0.000		0.000	46.642	-112.774	0.000	0.000	-0.027	
11		0.600	mz	0.000	-46.642	-112.774	0.000	0.000	0.027	
11		0.000		0.000	46.642	-112.774	0.000	0.000	-0.027	
	LC2 - 200 kN									
Total max/min				283.534	50.040	-111.510	0.000	0.000	0.027	
				-134.690	-50.040	-192.980	0.000	0.000	-0.027	
	LC2 - 200 kN									
	Sum of loads and support forces									
				PX [kN]	PY [kN]	PZ [kN]				
Σ				0.00	0.00	-202.60	Loads			
Σ				0.00	0.00	-202.60	Support Forces			

7.4 SURFACES - GLOBAL DEFORMATIONS

Static Analysis

Surface No.	Grid Point No.	Grid Point Coordinates [m] X	Y	Z		Displacements [mm] |u|	uX	uY	uZ	Rotations [mrad] φX	φY	φZ	Surface Comment Cor. Loading
	LC2 - 200 kN												
1	1	0.000	0.500	0.000		0.6	0.0	0.0	0.6	-0.2	11.6	-0.1	
	2	0.500	0.500	0.000		6.5	0.1	0.0	-6.5	-1.0	8.3	0.4	
	3	1.000	0.500	0.000		9.4	0.5	0.0	-9.4	-1.3	0.9	0.0	
	4	1.500	0.500	0.000		7.5	1.0	0.0	-7.4	-1.2	-7.1	-0.4	
	5	2.000	0.500	0.000		1.7	1.2	0.0	-1.2	0.2	-11.5	0.1	
	6	0.000	0.000	0.000		0.6	0.0	0.0	0.6	0.1	12.2	-1.4	
	7	0.500	0.000	0.000		6.6	0.2	0.0	-6.6	1.0	8.2	-1.5	
	8	1.000	0.000	0.000		9.5	0.5	0.0	-9.5	1.3	0.8	-0.1	
	9	1.500	0.000	0.000		7.6	0.9	0.0	-7.5	1.2	-6.9	1.5	
	10	2.000	0.000	0.000		1.5	1.1	0.0	-1.0	-0.2	-12.0	1.0	
Extremes	5	2.000	0.500	0.000	uX	1.7	1.2	0.0	-1.2	0.2	-11.5	0.1	
1	1	0.000	0.500	0.000		0.6	0.0	0.0	0.6	-0.2	11.6	-0.1	
	8	1.000	0.000	0.000	uY	9.5	0.5	0.0	-9.5	1.3	0.8	-0.1	
	3	1.000	0.500	0.000		9.4	0.5	0.0	-9.4	-1.3	0.9	0.0	
	6	0.000	0.000	0.000	uZ	0.6	0.0	0.0	0.6	0.1	12.2	-1.4	
	8	1.000	0.000	0.000		9.5	0.5	0.0	-9.5	1.3	0.8	-0.1	
	8	1.000	0.000	0.000	φX	9.5	0.5	0.0	-9.5	1.3	0.8	-0.1	
	3	1.000	0.500	0.000		9.4	0.5	0.0	-9.4	-1.3	0.9	0.0	
	6	0.000	0.000	0.000	φY	0.6	0.0	0.0	0.6	0.1	12.2	-1.4	
	10	2.000	0.000	0.000		1.5	1.1	0.0	-1.0	-0.2	-12.0	1.0	
	9	1.500	0.000	0.000	φZ	7.6	0.9	0.0	-7.5	1.2	-6.9	1.5	
	7	0.500	0.000	0.000		6.6	0.2	0.0	-6.6	1.0	8.2	-1.5	
Total						9.5	1.2	0.0	0.6	1.3	12.2	1.5	
1						0.6	0.0	0.0	-9.5	-1.3	-12.0	-1.5	
	LC2 - 200 kN												
2	1	0.000	0.500	0.090		1.4	0.9	0.0	-1.1	0.0	10.9	0.2	
	2	0.500	0.500	0.090		6.6	0.8	0.1	-6.5	-0.6	9.8	0.2	
	3	1.000	0.500	0.090		9.4	0.6	0.1	-9.4	-2.7	0.9	0.0	
	4	1.500	0.500	0.090		7.5	0.4	0.1	-7.4	-1.3	-8.7	-0.2	
	5	2.000	0.500	0.090		2.2	0.3	0.0	-2.2	0.0	-11.0	0.0	
	6	0.000	0.000	0.090		1.4	0.8	0.0	-1.1	0.0	10.9	-0.1	
	7	0.500	0.000	0.090		6.6	0.8	-0.1	-6.6	0.9	10.2	-0.1	
	8	1.000	0.000	0.090		9.8	0.6	-0.2	-9.8	5.0	0.9	0.0	
	9	1.500	0.000	0.090		7.6	0.4	-0.2	-7.6	1.8	-9.3	0.1	
	10	2.000	0.000	0.090		2.2	0.3	0.0	-2.2	0.0	-11.0	-0.1	
Extremes	1	0.000	0.500	0.090	uX	1.4	0.9	0.0	-1.1	0.0	10.9	0.2	
2	5	2.000	0.500	0.090		2.2	0.3	0.0	-2.2	0.0	-11.0	0.0	
	4	1.500	0.500	0.090	uY	7.5	0.4	0.1	-7.4	-1.3	-8.7	-0.2	
	8	1.000	0.000	0.090		9.8	0.6	-0.2	-9.8	5.0	0.9	0.0	
	6	0.000	0.000	0.090	uZ	1.4	0.8	0.0	-1.1	0.0	10.9	-0.1	
	8	1.000	0.000	0.090		9.8	0.6	-0.2	-9.8	5.0	0.9	0.0	
	8	1.000	0.000	0.090	φX	9.8	0.6	-0.2	-9.8	5.0	0.9	0.0	
	3	1.000	0.500	0.090		9.4	0.6	0.1	-9.4	-2.7	0.9	0.0	
	6	0.000	0.000	0.090	φY	1.4	0.8	0.0	-1.1	0.0	10.9	-0.1	
	10	2.000	0.000	0.090		2.2	0.3	0.0	-2.2	0.0	-11.0	-0.1	

7.4 SURFACES - GLOBAL DEFORMATIONS

Static Analysis

Surface No.	Grid Point No.	Grid Point Coordinates [m] X	Y	Z		Displacements [mm] |u|	u_X	u_Y	u_Z	Rotations [mrad] φ_X	φ_Y	φ_Z	Surface Comment Cor. Loading
2	1	0.000	0.500	0.090	φ_Z	1.4	0.9	0.0	-1.1	0.0	10.9	0.2	
	4	1.500	0.500	0.090		7.5	0.4	0.1	-7.4	-1.3	-8.7	-0.2	
Total						9.8	0.9	0.1	-1.1	5.0	10.9	0.2	
2						1.4	0.3	-0.2	-9.8	-2.7	-11.0	-0.2	
	G LC2 - 200 kN												
	Total max/min values with corresponding values												
1	5	2.000	0.500	0.000	u_X	1.7	1.2	0.0	-1.2	0.2	-11.5	0.1	
1	1	0.000	0.500	0.000		0.6	0.0	0.0	0.6	-0.2	11.6	-0.1	
2	4	1.500	0.500	0.090	u_Y	7.5	0.4	0.1	-7.4	-1.3	-8.7	-0.2	
2	8	1.000	0.000	0.090		9.8	0.6	-0.2	-9.8	5.0	0.9	0.0	
1	6	0.000	0.000	0.000	u_Z	0.6	0.0	0.0	0.6	0.1	12.2	-1.4	
2	8	1.000	0.000	0.090		9.8	0.6	-0.2	-9.8	5.0	0.9	0.0	
2	8	1.000	0.000	0.090	φ_X	9.8	0.6	-0.2	-9.8	5.0	0.9	0.0	
2	3	1.000	0.500	0.090		9.4	0.6	0.1	-9.4	-2.7	0.9	0.0	
1	6	0.000	0.000	0.000	φ_Y	0.6	0.0	0.0	0.6	0.1	12.2	-1.4	
1	10	2.000	0.000	0.000		1.5	1.1	0.0	-1.0	-0.2	-12.0	1.0	
1	9	1.500	0.000	0.000	φ_Z	7.6	0.9	0.0	-7.5	1.2	-6.9	1.5	
1	7	0.500	0.000	0.000		6.6	0.2	0.0	-6.6	1.0	8.2	-1.5	
	G LC2 - 200 kN												
Total						9.8	1.2	0.1	0.6	5.0	12.2	1.5	
max/min						0.6	0.0	-0.2	-9.8	-2.7	-12.0	-1.5	

7.5 SURFACES - LOCAL DEFORMATIONS

Static Analysis

Surface No.	Grid Point No.	Grid Point Coordinates [m] X	Y	Z		Displacements [mm] |u|	u_x	u_y	u_z	Rotations [mrad] φ_x	φ_y	φ_z	Surface Comment Cor. Loading
	G LC2 - 200 kN												
1	1	0.000	0.500	0.000		0.6	0.0	0.0	-0.6	-0.2	-11.6	0.1	
	2	0.500	0.500	0.000		6.5	0.1	0.0	6.5	-1.0	-8.3	-0.4	
	3	1.000	0.500	0.000		9.4	0.5	0.0	9.4	-1.3	-0.9	0.0	
	4	1.500	0.500	0.000		7.5	1.0	0.0	7.4	-1.2	7.1	0.4	
	5	2.000	0.500	0.000		1.7	1.2	0.0	1.2	0.2	11.5	-0.1	
	6	0.000	0.000	0.000		0.6	0.0	0.0	-0.6	0.1	-12.2	1.4	
	7	0.500	0.000	0.000		6.6	0.2	0.0	6.6	1.0	-8.2	1.5	
	8	1.000	0.000	0.000		9.5	0.5	0.0	9.5	1.3	-0.8	0.1	
	9	1.500	0.000	0.000		7.6	0.9	0.0	7.5	1.2	6.9	-1.5	
	10	2.000	0.000	0.000		1.5	1.1	0.0	1.0	-0.2	12.0	-1.0	
Extremes	5	2.000	0.500	0.000	u_x	1.7	1.2	0.0	1.2	0.2	11.5	-0.1	
1	1	0.000	0.500	0.000		0.6	0.0	0.0	-0.6	-0.2	-11.6	0.1	
	3	1.000	0.500	0.000	u_y	9.4	0.5	0.0	9.4	-1.3	-0.9	0.0	
	8	1.000	0.000	0.000		9.5	0.5	0.0	9.5	1.3	-0.8	0.1	
	8	1.000	0.000	0.000	u_z	9.5	0.5	0.0	9.5	1.3	-0.8	0.1	
	6	0.000	0.000	0.000		0.6	0.0	0.0	-0.6	0.1	-12.2	1.4	
	8	1.000	0.000	0.000	φ_x	9.5	0.5	0.0	9.5	1.3	-0.8	0.1	
	3	1.000	0.500	0.000		9.4	0.5	0.0	9.4	-1.3	-0.9	0.0	
	10	2.000	0.000	0.000	φ_y	1.5	1.1	0.0	1.0	-0.2	12.0	-1.0	
	6	0.000	0.000	0.000		0.6	0.0	0.0	-0.6	0.1	-12.2	1.4	
	7	0.500	0.000	0.000	φ_z	6.6	0.2	0.0	6.6	1.0	-8.2	1.5	
	9	1.500	0.000	0.000		7.6	0.9	0.0	7.5	1.2	6.9	-1.5	
Total						9.5	1.2	0.0	9.5	1.3	12.0	1.5	
1						0.6	0.0	0.0	-0.6	-1.3	-12.2	-1.5	
	G LC2 - 200 kN												
2	1	0.000	0.500	0.090		1.4	0.9	0.0	1.1	0.0	-10.9	-0.2	
	2	0.500	0.500	0.090		6.6	0.8	-0.1	6.5	-0.6	-9.8	-0.2	
	3	1.000	0.500	0.090		9.4	0.6	-0.1	9.4	-2.7	-0.9	0.0	
	4	1.500	0.500	0.090		7.5	0.4	-0.1	7.4	-1.3	8.7	0.2	
	5	2.000	0.500	0.090		2.2	0.3	0.0	2.2	0.0	11.0	0.0	
	6	0.000	0.000	0.090		1.4	0.8	0.0	1.1	0.0	-10.9	0.1	
	7	0.500	0.000	0.090		6.6	0.8	0.1	6.6	0.9	-10.2	0.1	
	8	1.000	0.000	0.090		9.8	0.6	0.2	9.8	5.0	-0.9	0.0	
	9	1.500	0.000	0.090		7.6	0.4	0.2	7.6	1.8	9.3	-0.1	
	10	2.000	0.000	0.090		2.2	0.3	0.0	2.2	0.0	11.0	0.1	
Extremes	1	0.000	0.500	0.090	u_x	1.4	0.9	0.0	1.1	0.0	-10.9	-0.2	
2	5	2.000	0.500	0.090		2.2	0.3	0.0	2.2	0.0	11.0	0.0	
	8	1.000	0.000	0.090	u_y	9.8	0.6	0.2	9.8	5.0	-0.9	0.0	
	4	1.500	0.500	0.090		7.5	0.4	-0.1	7.4	-1.3	8.7	0.2	
	8	1.000	0.000	0.090	u_z	9.8	0.6	0.2	9.8	5.0	-0.9	0.0	
	6	0.000	0.000	0.090		1.4	0.8	0.0	1.1	0.0	-10.9	0.1	
	8	1.000	0.000	0.090	φ_x	9.8	0.6	0.2	9.8	5.0	-0.9	0.0	
	3	1.000	0.500	0.090		9.4	0.6	-0.1	9.4	-2.7	-0.9	0.0	
	10	2.000	0.000	0.090	φ_y	2.2	0.3	0.0	2.2	0.0	11.0	0.1	
	6	0.000	0.000	0.090		1.4	0.8	0.0	1.1	0.0	-10.9	0.1	
	4	1.500	0.500	0.090	φ_z	7.5	0.4	-0.1	7.4	-1.3	8.7	0.2	

7.5 SURFACES - LOCAL DEFORMATIONS

Static Analysis

Surface No.	Grid Point No.	Grid Point Coordinates [m] X	Y	Z		Displacements [mm] |u|	u_x	u_y	u_z	Rotations [mrad] φ_x	φ_y	φ_z	Surface Comment Cor. Loading
2	1	0.000	0.500	0.090	φ_z	1.4	0.9	0.0	1.1	0.0	-10.9	-0.2	
Total						9.8	0.9	0.2	9.8	5.0	11.0	0.2	
2						1.4	0.3	-0.1	1.1	-2.7	-10.9	-0.2	
	LC2 - 200 kN												
	Total max/min values with corresponding values												
1	5	2.000	0.500	0.000	u_x	1.7	1.2	0.0	1.2	0.2	11.5	-0.1	
1	1	0.000	0.500	0.000		0.6	0.0	0.0	-0.6	-0.2	-11.6	0.1	
2	8	1.000	0.000	0.090	u_y	9.8	0.6	0.2	9.8	5.0	-0.9	0.0	
2	4	1.500	0.500	0.090		7.5	0.4	-0.1	7.4	-1.3	8.7	0.2	
2	8	1.000	0.000	0.090	u_z	9.8	0.6	0.2	9.8	5.0	-0.9	0.0	
1	6	0.000	0.000	0.000		0.6	0.0	0.0	-0.6	0.1	-12.2	1.4	
2	8	1.000	0.000	0.090	φ_x	9.8	0.6	0.2	9.8	5.0	-0.9	0.0	
2	3	1.000	0.500	0.090		9.4	0.6	-0.1	9.4	-2.7	-0.9	0.0	
1	10	2.000	0.000	0.000	φ_y	1.5	1.1	0.0	1.0	-0.2	12.0	-1.0	
1	6	0.000	0.000	0.000		0.6	0.0	0.0	-0.6	0.1	-12.2	1.4	
1	7	0.500	0.000	0.000	φ_z	6.6	0.2	0.0	6.6	1.0	-8.2	1.5	
1	9	1.500	0.000	0.000		7.6	0.9	0.0	7.5	1.2	6.9	-1.5	
	LC2 - 200 kN												
Total						9.8	1.2	0.2	9.8	5.0	12.0	1.5	
max/min						0.6	0.0	-0.1	-0.6	-2.7	-12.2	-1.5	

7.6 SURFACES - BASIC STRESSES

Static Analysis

Surface No.	Grid Pt. No.	Grid Point Coordinates [m] X	Y	Z	Layer No.	Axial stresses [N/mm²] $\sigma_{x,+}$	$\sigma_{y,+}$	$\sigma_{x,-}$	$\sigma_{y,-}$	Shear stresses [N/mm²] $\tau_{xy,+}$	$\tau_{xy,-}$	τ_{xz}	τ_{yz}	Surface Comment Cor. Loading
	LC2 - 200 kN													
1	1	0.000	0.500	0.000	1	-0.003	0.032	-0.006	0.063	-0.038	-0.070	0.001	0.017	
					2	0.308	0.004	0.868	0.011	0.016	0.034	0.002	0.033	
					3	0.001	-0.008	-0.001	0.010	0.003	-0.016	0.003	0.037	
					4	-0.812	-0.010	-0.252	-0.003	-0.021	-0.003	0.002	0.033	
					5	0.006	-0.061	0.003	-0.030	0.055	0.024	0.001	0.017	
	2	0.500	0.500	0.000	1	3.537	0.029	-0.581	-0.031	-0.923	-0.958	0.118	0.007	
					2	-0.299	0.179	-0.433	0.097	0.799	0.820	0.235	0.013	
					3	7.985	0.097	5.557	0.061	-0.778	-0.799	0.262	0.015	
					4	-0.032	0.342	-0.165	0.260	0.757	0.778	0.235	0.013	
					5	15.854	0.178	11.772	0.149	-0.814	-0.852	0.118	0.007	
	3	1.000	0.500	0.000	1	5.843	0.054	-0.780	-0.040	-0.056	-0.047	0.003	0.014	
					2	-0.385	0.293	-0.551	0.163	0.055	0.050	0.006	0.029	
					3	12.888	0.103	9.074	0.103	-0.061	-0.055	0.007	0.032	
					4	-0.140	0.401	-0.232	0.401	0.066	0.061	0.006	0.029	
					5	24.994	-0.133	18.920	0.108	-0.081	-0.074	0.003	0.014	
	4	1.500	0.500	0.000	1	4.187	0.033	-0.727	-0.038	0.859	0.814	-0.116	0.013	
					2	-0.412	0.212	-0.554	0.115	-0.789	-0.763	-0.232	0.027	
					3	9.500	0.113	6.602	0.071	0.815	0.789	-0.258	0.030	
					4	-0.139	0.386	-0.270	0.309	-0.840	-0.815	-0.232	0.027	
					5	18.734	0.088	14.015	0.175	0.977	0.947	-0.116	0.013	
	5	2.000	0.500	0.000	1	-2.339	-0.047	-4.404	-0.095	1.116	1.389	-0.958	0.118	
					2	-0.060	-0.029	-0.451	-0.074	-0.830	-0.992	-1.913	0.236	
					3	0.366	0.016	-0.851	-0.013	0.669	0.830	-2.129	0.263	
					4	0.723	0.061	0.332	0.016	-0.507	-0.669	-1.913	0.236	
					5	3.855	0.098	1.791	0.050	0.298	0.571	-0.958	0.118	
	6	0.000	0.000	0.000	1	0.003	0.000	0.003	0.000	-0.016	-0.018	-0.004	-0.004	
					2	0.001	0.000	-0.005	0.000	0.014	0.015	-0.007	-0.007	
					3	0.002	0.000	0.002	0.000	-0.013	-0.014	-0.008	-0.008	
					4	0.012	0.000	0.007	0.000	0.013	0.013	-0.007	-0.007	
					5	0.001	0.001	0.002	0.000	-0.013	-0.014	-0.004	-0.004	
	7	0.500	0.000	0.000	1	2.672	0.041	-2.003	-0.007	0.026	0.035	0.146	-0.001	
					2	-0.057	0.168	0.170	0.080	-0.017	-0.023	0.292	-0.001	
					3	7.877	0.091	5.120	0.064	0.011	0.017	0.325	-0.002	
					4	-0.511	0.343	-0.284	0.255	-0.006	-0.011	0.292	-0.001	
					5	16.685	0.173	12.021	0.135	-0.003	0.006	0.146	-0.001	
	8	1.000	0.000	0.000	1	4.524	0.056	-1.998	-0.026	0.001	0.000	0.008	-0.001	
					2	-0.083	0.257	-0.053	0.131	-0.001	-0.001	0.016	-0.002	
					3	11.693	0.146	7.847	0.098	0.002	0.001	0.018	-0.002	
					4	-0.204	0.401	-0.112	0.383	-0.002	-0.002	0.016	-0.002	
					5	23.556	-0.065	17.484	0.151	0.004	0.003	0.008	-0.001	
	9	1.500	0.000	0.000	1	2.850	0.043	-2.293	-0.010	-0.020	-0.023	-0.130	-0.001	
					2	-0.062	0.182	0.168	0.085	0.016	0.018	-0.260	-0.002	
					3	8.587	0.100	5.554	0.069	-0.014	-0.016	-0.290	-0.002	
					4	-0.521	0.375	-0.291	0.279	0.012	0.014	-0.260	-0.002	
					5	18.191	0.131	13.136	0.149	-0.010	-0.013	-0.130	-0.001	
	10	2.000	0.000	0.000	1	-0.840	-0.008	-2.316	-0.023	-0.031	-0.024	-0.594	-0.006	
					2	0.013	0.004	0.083	-0.023	0.031	0.028	-1.185	-0.012	
					3	0.997	0.011	0.127	0.002	-0.035	-0.031	-1.319	-0.013	

7.6 SURFACES - BASIC STRESSES

Static Analysis

Surface No.	Grid Pt. No.	Grid Point Coordinates [m] X	Y	Z	Layer No.		Axial stresses [N/mm²] $\sigma_{x,+}$	$\sigma_{y,+}$	$\sigma_{x,-}$	$\sigma_{y,-}$	Shear stresses [N/mm²] $\tau_{xy,+}$	$\tau_{xy,-}$	τ_{xz}	τ_{yz}	Surface Comment Cor. Loading
1	10	2.000	0.000	0.000	4		-0.127	0.060	-0.057	0.032	0.039	0.035	-1.185	-0.012	
					5		3.586	0.037	2.111	0.022	-0.051	-0.044	-0.594	-0.006	
Extremes	3	1.000	0.500	0.000	5	$\sigma_{x,+}$	24.994	-0.133	18.920	0.108	-0.081	-0.074	0.003	0.014	
1	5	2.000	0.500	0.000	1		-2.339	-0.047	-4.404	-0.095	1.116	1.389	-0.958	0.118	
	8	1.000	0.000	0.000	4	$\sigma_{y,+}$	-0.204	0.401	-0.112	0.383	-0.002	-0.002	0.016	-0.002	
	3	1.000	0.500	0.000	5		24.994	-0.133	18.920	0.108	-0.081	-0.074	0.003	0.014	
	3	1.000	0.500	0.000	5	$\sigma_{x,-}$	24.994	-0.133	18.920	0.108	-0.081	-0.074	0.003	0.014	
	5	2.000	0.500	0.000	1		-2.339	-0.047	-4.404	-0.095	1.116	1.389	-0.958	0.118	
	3	1.000	0.500	0.000	4	$\sigma_{y,-}$	-0.140	0.401	-0.232	0.401	0.066	0.061	0.006	0.029	
	5	2.000	0.500	0.000	1		-2.339	-0.047	-4.404	-0.095	1.116	1.389	-0.958	0.118	
	5	2.000	0.500	0.000	1	$\tau_{xy,+}$	-2.339	-0.047	-4.404	-0.095	1.116	1.389	-0.958	0.118	
	2	0.500	0.500	0.000	1		3.537	0.029	-0.581	-0.031	-0.923	-0.958	0.118	0.007	
	5	2.000	0.500	0.000	1	$\tau_{xy,-}$	-2.339	-0.047	-4.404	-0.095	1.116	1.389	-0.958	0.118	
	5	2.000	0.500	0.000	2		-0.060	-0.029	-0.451	-0.074	-0.830	-0.992	-1.913	0.236	
	7	0.500	0.000	0.000	3	τ_{xz}	7.877	0.091	5.120	0.064	0.011	0.017	0.325	-0.002	
	5	2.000	0.500	0.000	3		0.366	0.016	-0.851	-0.013	0.669	0.830	-2.129	0.263	
	5	2.000	0.500	0.000	3	τ_{yz}	0.366	0.016	-0.851	-0.013	0.669	0.830	-2.129	0.263	
	10	2.000	0.000	0.000	3		0.997	0.011	0.127	0.002	-0.035	-0.031	-1.319	-0.013	
Total							24.994	0.401	18.920	0.401	1.116	1.389	0.325	0.263	
1							-2.339	-0.133	-4.404	-0.095	-0.923	-0.992	-2.129	-0.013	
	LC2 - 200 kN														
2	1	0.000	0.500	0.090	1		-0.014	-1.962	-0.011	-1.829	0.117	0.036	-0.005	0.157	
	2	0.500	0.500	0.090	1		-3.391	-4.026	-16.650	0.556	5.065	-1.183	-0.062	-0.020	
	3	1.000	0.500	0.090	1		-1.985	-9.508	-24.147	-0.080	0.456	0.180	0.065	-0.312	
	4	1.500	0.500	0.090	1		-4.730	-4.923	-20.451	0.196	-6.010	1.236	0.160	-0.323	
	5	2.000	0.500	0.090	1		-0.082	0.030	0.055	0.293	-1.475	-1.151	0.036	0.092	
	6	0.000	0.000	0.090	1		0.008	0.010	0.011	0.008	0.012	0.017	-0.003	-0.004	
	7	0.500	0.000	0.090	1		-1.607	-0.035	-16.023	0.038	-1.224	1.156	4.174	0.075	
	8	1.000	0.000	0.090	1		0.180	-2.228	-33.281	-0.979	-0.128	0.094	0.176	-0.012	
	9	1.500	0.000	0.090	1		0.440	-0.097	-20.462	0.038	1.581	-1.611	-5.787	0.069	
	10	2.000	0.000	0.090	1		-2.240	-0.011	-1.332	-0.005	0.111	0.014	-0.035	0.003	
Extremes	9	1.500	0.000	0.090	1	$\sigma_{x,+}$	0.440	-0.097	-20.462	0.038	1.581	-1.611	-5.787	0.069	
2	4	1.500	0.500	0.090	1		-4.730	-4.923	-20.451	0.196	-6.010	1.236	0.160	-0.323	
	5	2.000	0.500	0.090	1	$\sigma_{y,+}$	-0.082	0.030	0.055	0.293	-1.475	-1.151	0.036	0.092	
	3	1.000	0.500	0.090	1		-1.985	-9.508	-24.147	-0.080	0.456	0.180	0.065	-0.312	
	5	2.000	0.500	0.090	1	$\sigma_{x,-}$	-0.082	0.030	0.055	0.293	-1.475	-1.151	0.036	0.092	
	8	1.000	0.000	0.090	1		0.180	-2.228	-33.281	-0.979	-0.128	0.094	0.176	-0.012	
	2	0.500	0.500	0.090	1	$\sigma_{y,-}$	-3.391	-4.026	-16.650	0.556	5.065	-1.183	-0.062	-0.020	
	1	0.000	0.500	0.090	1		-0.014	-1.962	-0.011	-1.829	0.117	0.036	-0.005	0.157	
	2	0.500	0.500	0.090	1	$\tau_{xy,+}$	-3.391	-4.026	-16.650	0.556	5.065	-1.183	-0.062	-0.020	
	4	1.500	0.500	0.090	1		-4.730	-4.923	-20.451	0.196	-6.010	1.236	0.160	-0.323	
	4	1.500	0.500	0.090	1	$\tau_{xy,-}$	-4.730	-4.923	-20.451	0.196	-6.010	1.236	0.160	-0.323	
	9	1.500	0.000	0.090	1		0.440	-0.097	-20.462	0.038	1.581	-1.611	-5.787	0.069	
	7	0.500	0.000	0.090	1	τ_{xz}	-1.607	-0.035	-16.023	0.038	-1.224	1.156	4.174	0.075	
	9	1.500	0.000	0.090	1		0.440	-0.097	-20.462	0.038	1.581	-1.611	-5.787	0.069	
	1	0.000	0.500	0.090	1	τ_{yz}	-0.014	-1.962	-0.011	-1.829	0.117	0.036	-0.005	0.157	
	4	1.500	0.500	0.090	1		-4.730	-4.923	-20.451	0.196	-6.010	1.236	0.160	-0.323	
Total							0.440	0.030	0.055	0.556	5.065	1.236	4.174	0.157	
2							-4.730	-9.508	-33.281	-1.829	-6.010	-1.611	-5.787	-0.323	
	LC2 - 200 kN														
	Total max/min values with corresponding values														
1	3	1.000	0.500	0.000	5	$\sigma_{x,+}$	24.994	-0.133	18.920	0.108	-0.081	-0.074	0.003	0.014	
2	4	1.500	0.500	0.090	1		-4.730	-4.923	-20.451	0.196	-6.010	1.236	0.160	-0.323	
1	8	1.000	0.000	0.000	4	$\sigma_{y,+}$	-0.204	0.401	-0.112	0.383	-0.002	-0.002	0.016	-0.002	
2	3	1.000	0.500	0.090	1		-1.985	-9.508	-24.147	-0.080	0.456	0.180	0.065	-0.312	
1	3	1.000	0.500	0.000	5	$\sigma_{x,-}$	24.994	-0.133	18.920	0.108	-0.081	-0.074	0.003	0.014	
2	8	1.000	0.000	0.090	1		0.180	-2.228	-33.281	-0.979	-0.128	0.094	0.176	-0.012	
2	2	0.500	0.500	0.090	1	$\sigma_{y,-}$	-3.391	-4.026	-16.650	0.556	5.065	-1.183	-0.062	-0.020	
2	1	0.000	0.500	0.090	1		-0.014	-1.962	-0.011	-1.829	0.117	0.036	-0.005	0.157	
2	2	0.500	0.500	0.090	1	$\tau_{xy,+}$	-3.391	-4.026	-16.650	0.556	5.065	-1.183	-0.062	-0.020	
2	4	1.500	0.500	0.090	1		-4.730	-4.923	-20.451	0.196	-6.010	1.236	0.160	-0.323	
1	5	2.000	0.500	0.000	1	$\tau_{xy,-}$	-2.339	-0.047	-4.404	-0.095	1.116	1.389	-0.958	0.118	
2	9	1.500	0.000	0.090	1		0.440	-0.097	-20.462	0.038	1.581	-1.611	-5.787	0.069	
2	7	0.500	0.000	0.090	1	τ_{xz}	-1.607	-0.035	-16.023	0.038	-1.224	1.156	4.174	0.075	
2	9	1.500	0.000	0.090	1		0.440	-0.097	-20.462	0.038	1.581	-1.611	-5.787	0.069	
1	5	2.000	0.500	0.000	3	τ_{yz}	0.366	0.016	-0.851	-0.013	0.669	0.830	-2.129	0.263	
2	4	1.500	0.500	0.090	1		-4.730	-4.923	-20.451	0.196	-6.010	1.236	0.160	-0.323	
	LC2 - 200 kN														
Total							24.994	0.401	18.920	0.556	5.065	1.389	4.174	0.263	
max/min							-4.730	-9.508	-33.281	-1.829	-6.010	-1.611	-5.787	-0.323	

7.7 SURFACES - EQUIVALENT STRESSES VON MISES

Static Analysis

Surface No.	Grid Point No.	Grid Point Coordinates [m] X	Y	Z	Layer No.		Equivalent Stresses [N/mm²] $\sigma_{eqv,Mises,Max}$	$\sigma_{eqv,Mises,+}$	$\sigma_{eqv,Mises,-}$	Surface Comment Cor. Loading
	G LC2 - 200 kN									
1	1	0.000	0.500	0.000	1		0.138	0.075	0.138	
					2		0.864	0.307	0.864	
					3		0.029	0.010	0.029	
					4		0.808	0.808	0.250	
					5		0.115	0.115	0.052	
	2	0.500	0.500	0.000	1		3.868	3.868	1.754	
					2		1.503	1.446	1.503	
					3		8.051	8.051	5.698	
					4		1.399	1.360	1.399	
					5		15.829	15.829	11.791	
	3	1.000	0.500	0.000	1		5.817	5.817	0.765	
					2		0.653	0.597	0.653	
					3		12.838	12.838	9.023	
					4		0.565	0.500	0.565	
					5		25.061	25.061	18.867	
	4	1.500	0.500	0.000	1		4.428	4.428	1.579	
					2		1.473	1.473	1.460	
					3		9.549	9.549	6.708	
					4		1.530	1.530	1.499	
					5		18.767	18.767	14.025	
	5	2.000	0.500	0.000	1		4.977	3.017	4.977	
					2		1.769	1.439	1.769	
					3		1.668	1.213	1.668	
					4		1.203	1.120	1.203	
					5		3.842	3.842	2.024	
	6	0.000	0.000	0.000	1		0.031	0.029	0.031	
					2		0.026	0.024	0.026	
					3		0.024	0.023	0.024	
					4		0.025	0.025	0.024	
					5		0.025	0.023	0.025	
	7	0.500	0.000	0.000	1		2.652	2.652	2.000	
					2		0.204	0.204	0.153	
					3		7.832	7.832	5.089	
					4		0.744	0.744	0.467	
					5		16.599	16.599	11.954	
	8	1.000	0.000	0.000	1		4.496	4.496	1.985	
					2		0.307	0.307	0.164	
					3		11.621	11.621	7.799	
					4		0.533	0.533	0.450	
					5		23.589	23.589	17.409	
	9	1.500	0.000	0.000	1		2.829	2.829	2.288	
					2		0.221	0.221	0.149	
					3		8.538	8.538	5.520	
					4		0.780	0.780	0.494	
					5		18.126	18.126	13.062	
	10	2.000	0.000	0.000	1		2.305	0.838	2.305	
					2		0.108	0.056	0.108	
					3		0.993	0.993	0.137	
					4		0.178	0.178	0.099	
					5		3.569	3.569	2.101	
Extremes	3	1.000	0.500	0.000	5	$\sigma_{eqv,Mises,Max}$	25.061	25.061	18.867	
1	6	0.000	0.000	0.000	3		0.024	0.023	0.024	
	3	1.000	0.500	0.000	5	$\sigma_{eqv,Mises,+}$	25.061	25.061	18.867	
	1	0.000	0.500	0.000	3		0.029	0.010	0.029	
	3	1.000	0.500	0.000	5	$\sigma_{eqv,Mises,-}$	25.061	25.061	18.867	
	6	0.000	0.000	0.000	4		0.025	0.025	0.024	
Total							25.061	25.061	18.867	
1							0.024	0.010	0.024	
	G LC2 - 200 kN									
2	1	0.000	0.500	0.090	1		1.966	1.966	1.824	
	2	0.500	0.500	0.090	1		17.058	9.540	17.058	
	3	1.000	0.500	0.090	1		24.109	8.724	24.109	
	4	1.500	0.500	0.090	1		20.662	11.475	20.662	
	5	2.000	0.500	0.090	1		2.556	2.556	2.012	
	6	0.000	0.000	0.090	1		0.030	0.023	0.030	
	7	0.500	0.000	0.090	1		16.166	2.650	16.166	
	8	1.000	0.000	0.090	1		32.803	2.333	32.803	
	9	1.500	0.000	0.090	1		20.670	2.782	20.670	
	10	2.000	0.000	0.090	1		2.243	2.243	1.330	
Extremes	8	1.000	0.000	0.090	1	$\sigma_{eqv,Mises,Max}$	32.803	2.333	32.803	
2	6	0.000	0.000	0.090	1		0.030	0.023	0.030	
	4	1.500	0.500	0.090	1	$\sigma_{eqv,Mises,+}$	20.662	11.475	20.662	
	6	0.000	0.000	0.090	1		0.030	0.023	0.030	

7.7 SURFACES - EQUIVALENT STRESSES VON MISES — Static Analysis

Surface No.	Grid Point No.	X	Y	Z	Layer No.		$\sigma_{eqv,Mises,Max}$	$\sigma_{eqv,Mises,+}$	$\sigma_{eqv,Mises,-}$	Surface Comment Cor. Loading
	Grid Point Coordinates [m]						Equivalent Stresses [N/mm²]			
2	8	1.000	0.000	0.090	1	$\sigma_{eqv,Mises,-}$	32.803	2.333	32.803	
	6	0.000	0.000	0.090	1		0.030	0.023	0.030	
Total							32.803	11.475	32.803	
2							0.030	0.023	0.030	
	LC2 - 200 kN									
	Total max/min values with corresponding values									
2	8	1.000	0.000	0.090	1	$\sigma_{eqv,Mises,Max}$	32.803	2.333	32.803	
1	6	0.000	0.000	0.000	3		0.024	0.023	0.024	
1	3	1.000	0.500	0.000	5	$\sigma_{eqv,Mises,+}$	25.061	25.061	18.867	
1	1	0.000	0.500	0.000	3		0.029	0.010	0.029	
2	8	1.000	0.000	0.090	1	$\sigma_{eqv,Mises,-}$	32.803	2.333	32.803	
1	6	0.000	0.000	0.000	4		0.025	0.025	0.024	
	LC2 - 200 kN									
Total							32.803	25.061	32.803	
max/min							0.024	0.010	0.024	

7.8 SURFACES - BASIC TOTAL STRAINS — Static Analysis

Surface No.	Grid Pt. No.	X	Y	Z	Layer No.		$\varepsilon_{x,+}$	$\varepsilon_{y,+}$	$\gamma_{xy,+}$	$\varepsilon_{x,-}$	$\varepsilon_{y,-}$	$\gamma_{xy,-}$	Surface Comment Cor. Loading
		Grid Point Coordinates [m]					Basic Strains [‰]						
	LC2 - 200 kN												
1	1	0.000	0.500	0.000	1		0.0	0.1	0.0	0.0	0.1	-0.1	
					2		0.0	0.0	0.0	0.1	0.0	0.0	
					3		0.0	0.0	0.0	0.0	0.0	0.0	
					4		-0.1	0.0	0.0	0.0	0.0	0.0	
					5		0.0	-0.1	0.1	0.0	-0.1	0.0	
	2	0.500	0.500	0.000	1		0.3	0.0	-1.1	0.0	-0.1	-1.2	
					2		0.0	0.5	1.1	0.0	0.3	1.1	
					3		0.7	0.0	-1.1	0.5	0.0	-1.1	
					4		0.0	0.9	1.1	0.0	0.7	1.1	
					5		1.2	0.0	-1.0	0.9	0.0	-1.1	
	3	1.000	0.500	0.000	1		0.4	-0.1	-0.1	-0.1	-0.1	-0.1	
					2		0.0	0.8	0.1	-0.1	0.4	0.1	
					3		1.1	0.0	-0.1	0.8	0.0	-0.1	
					4		0.0	1.5	0.1	0.0	1.1	0.1	
					5		2.0	0.0	-0.1	1.5	0.0	-0.1	
	4	1.500	0.500	0.000	1		0.3	-0.1	1.1	-0.1	-0.1	1.0	
					2		0.0	0.6	-1.1	-0.1	0.3	-1.1	
					3		0.8	0.0	1.1	0.6	0.0	1.1	
					4		0.0	1.1	-1.2	0.0	0.8	-1.1	
					5		1.4	0.0	1.2	1.1	0.0	1.2	
	5	2.000	0.500	0.000	1		-0.2	0.0	1.4	-0.3	-0.1	1.7	
					2		0.0	-0.1	-1.2	0.0	-0.2	-1.4	
					3		0.0	0.0	0.9	-0.1	0.0	1.2	
					4		0.1	0.1	-0.7	0.0	0.0	-0.9	
					5		0.3	0.1	0.4	0.1	0.1	0.7	
	6	0.000	0.000	0.000	1		0.0	0.0	0.0	0.0	0.0	0.0	
					2		0.0	0.0	0.0	0.0	0.0	0.0	
					3		0.0	0.0	0.0	0.0	0.0	0.0	
					4		0.0	0.0	0.0	0.0	0.0	0.0	
					5		0.0	0.0	0.0	0.0	0.0	0.0	
	7	0.500	0.000	0.000	1		0.2	0.0	0.0	-0.2	0.0	0.0	
					2		0.0	0.4	0.0	0.0	0.2	0.0	
					3		0.7	0.0	0.0	0.4	0.0	0.0	
					4		-0.1	0.9	0.0	0.0	0.7	0.0	
					5		1.3	-0.1	0.0	0.9	-0.1	0.0	
	8	1.000	0.000	0.000	1		0.3	0.0	0.0	-0.2	0.0	0.0	
					2		0.0	0.7	0.0	0.0	0.3	0.0	
					3		1.0	0.0	0.0	0.7	0.0	0.0	
					4		0.0	1.3	0.0	0.0	1.0	0.0	
					5		1.8	0.0	0.0	1.3	0.0	0.0	
	9	1.500	0.000	0.000	1		0.2	0.0	0.0	-0.2	0.0	0.0	
					2		0.0	0.5	0.0	0.0	0.2	0.0	
					3		0.7	0.0	0.0	0.5	0.0	0.0	
					4		-0.1	1.0	0.0	0.0	0.7	0.0	
					5		1.4	-0.1	0.0	1.0	-0.1	0.0	
	10	2.000	0.000	0.000	1		-0.1	0.0	0.0	-0.2	0.0	0.0	
					2		0.0	0.0	0.0	0.0	-0.1	0.0	
					3		0.1	0.0	0.0	0.0	0.0	0.0	
					4		0.0	0.2	0.1	0.0	0.1	0.0	
					5		0.3	0.0	-0.1	0.2	0.0	-0.1	
Extremes	3	1.000	0.500	0.000	5	$\varepsilon_{x,+}$	2.0	0.0	-0.1	1.5	0.0	-0.1	
1	5	2.000	0.500	0.000	1		-0.2	0.0	1.4	-0.3	-0.1	1.7	

7.8 SURFACES - BASIC TOTAL STRAINS

Static Analysis

Surface No.	Grid Pt. No.	X	Y	Z	Layer No.		$\varepsilon_{x,+}$	$\varepsilon_{y,+}$	$\gamma_{xy,+}$	$\varepsilon_{x,-}$	$\varepsilon_{y,-}$	$\gamma_{xy,-}$	Surface Comment Cor. Loading
		Grid Point Coordinates [m]					Basic Strains [‰]						
1	3	1.000	0.500	0.000	4	$\varepsilon_{y,+}$	0.0	1.5	0.1	0.0	1.1	0.1	
	1	0.000	0.500	0.000	5		0.0	-0.1	0.1	0.0	-0.1	0.0	
	5	2.000	0.500	0.000	1	$\gamma_{xy,+}$	-0.2	0.0	1.4	-0.3	-0.1	1.7	
	4	1.500	0.500	0.000	4		0.0	1.1	-1.2	0.0	0.8	-1.1	
	3	1.000	0.500	0.000	5	$\varepsilon_{x,-}$	2.0	0.0	-0.1	1.5	0.0	-0.1	
	5	2.000	0.500	0.000	1		-0.2	0.0	1.4	-0.3	-0.1	1.7	
	3	1.000	0.500	0.000	4	$\varepsilon_{y,-}$	0.0	1.5	0.1	0.0	1.1	0.1	
	5	2.000	0.500	0.000	2		0.0	-0.1	-1.2	0.0	-0.2	-1.4	
	5	2.000	0.500	0.000	1	$\gamma_{xy,-}$	-0.2	0.0	1.4	-0.3	-0.1	1.7	
	5	2.000	0.500	0.000	2		0.0	-0.1	-1.2	0.0	-0.2	-1.4	
Total							2.0	1.5	1.4	1.5	1.1	1.7	
1							-0.2	-0.1	-1.2	-0.3	-0.2	-1.4	
	G LC2 - 200 kN												
2	1	0.000	0.500	0.090	1		0.0	-0.1	0.0	0.0	-0.1	0.0	
	2	0.500	0.500	0.090	1		0.0	0.0	0.5	-0.5	0.5	-0.2	
	3	1.000	0.500	0.090	1		0.0	-0.3	0.0	-1.0	3.4	0.1	
	4	1.500	0.500	0.090	1		0.1	0.0	-0.8	-0.7	1.1	0.3	
	5	2.000	0.500	0.090	1		0.0	0.0	-0.1	0.0	0.0	-0.1	
	6	0.000	0.000	0.090	1		0.0	0.0	0.0	0.0	0.0	0.0	
	7	0.500	0.000	0.090	1		0.0	0.0	-0.1	-0.5	0.1	0.1	
	8	1.000	0.000	0.090	1		0.0	-0.1	0.0	-1.0	0.5	0.0	
	9	1.500	0.000	0.090	1		0.0	0.0	0.1	-0.6	0.1	-0.1	
	10	2.000	0.000	0.090	1		-0.1	0.0	0.0	0.0	0.0	0.0	
Extremes	4	1.500	0.500	0.090	1	$\varepsilon_{x,+}$	0.1	0.0	-0.8	-0.7	1.1	0.3	
2	10	2.000	0.000	0.090	1		-0.1	0.0	0.0	0.0	0.0	0.0	
	4	1.500	0.500	0.090	1	$\varepsilon_{y,+}$	0.1	0.0	-0.8	-0.7	1.1	0.3	
	3	1.000	0.500	0.090	1		0.0	-0.3	0.0	-1.0	3.4	0.1	
	2	0.500	0.500	0.090	1	$\gamma_{xy,+}$	0.0	0.0	0.5	-0.5	0.5	-0.2	
	4	1.500	0.500	0.090	1		0.1	0.0	-0.8	-0.7	1.1	0.3	
	1	0.000	0.500	0.090	1	$\varepsilon_{x,-}$	0.0	-0.1	0.0	0.0	-0.1	0.0	
	3	1.000	0.500	0.090	1		0.0	-0.3	0.0	-1.0	3.4	0.1	
	3	1.000	0.500	0.090	1	$\varepsilon_{y,-}$	0.0	-0.3	0.0	-1.0	3.4	0.1	
	1	0.000	0.500	0.090	1		0.0	-0.1	0.0	0.0	-0.1	0.0	
	4	1.500	0.500	0.090	1	$\gamma_{xy,-}$	0.1	0.0	-0.8	-0.7	1.1	0.3	
	2	0.500	0.500	0.090	1		0.0	0.0	0.5	-0.5	0.5	-0.2	
Total							0.1	0.0	0.5	0.0	3.4	0.3	
2							-0.1	-0.3	-0.8	-1.0	-0.1	-0.2	
	G LC2 - 200 kN												
	Total max/min values with corresponding values												
1	3	1.000	0.500	0.000	5	$\varepsilon_{x,+}$	2.0	0.0	-0.1	1.5	0.0	-0.1	
1	5	2.000	0.500	0.000	1		-0.2	0.0	1.4	-0.3	-0.1	1.7	
1	3	1.000	0.500	0.000	4	$\varepsilon_{y,+}$	0.0	1.5	0.1	0.0	1.1	0.1	
2	3	1.000	0.500	0.090	1		0.0	-0.3	0.0	-1.0	3.4	0.1	
1	5	2.000	0.500	0.000	1	$\gamma_{xy,+}$	-0.2	0.0	1.4	-0.3	-0.1	1.7	
1	4	1.500	0.500	0.000	4		0.0	1.1	-1.2	0.0	0.8	-1.1	
1	3	1.000	0.500	0.000	5	$\varepsilon_{x,-}$	2.0	0.0	-0.1	1.5	0.0	-0.1	
2	3	1.000	0.500	0.090	1		0.0	-0.3	0.0	-1.0	3.4	0.1	
2	3	1.000	0.500	0.090	1	$\varepsilon_{y,-}$	0.0	-0.3	0.0	-1.0	3.4	0.1	
1	5	2.000	0.500	0.000	2		0.0	-0.1	-1.2	0.0	-0.2	-1.4	
1	5	2.000	0.500	0.000	1	$\gamma_{xy,-}$	-0.2	0.0	1.4	-0.3	-0.1	1.7	
1	5	2.000	0.500	0.000	2		0.0	-0.1	-1.2	0.0	-0.2	-1.4	
	G LC2 - 200 kN												
Total							2.0	1.5	1.4	1.5	3.4	1.7	
max/min							-0.2	-0.3	-1.2	-1.0	-0.2	-1.4	

7.9 SURFACES - MAXIMUM TOTAL STRAINS

Static Analysis

Surface No.	Grid Pt. No.	X	Y	Z	Layer No.		$\varepsilon_{max,+}$	$\varepsilon_{min,+}$	$\lvert\varepsilon_{max}\rvert_{+}$	$\varepsilon_{max,-}$	$\varepsilon_{min,-}$	$\lvert\varepsilon_{max}\rvert_{-}$	ε_{max}	ε_{min}	$\lvert\varepsilon_{max}\rvert$	Surface Comment Cor. Loading
		Grid Point Coordinates [m]					Maximum Strains [‰]									
	G LC2 - 200 kN															
1	1	0.000	0.500	0.000	1		0.1	0.0	0.1	0.2	0.0	0.2	0.2	0.0	0.2	
					2		0.0	0.0	0.0	0.1	0.0	0.1	0.1	0.0	0.1	
					3		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
					4		0.0	-0.1	0.1	0.0	0.0	0.0	0.0	-0.1	0.1	
					5		0.0	-0.2	0.2	0.0	-0.1	0.1	0.0	-0.2	0.2	
	2	0.500	0.500	0.000	1		0.7	-0.5	0.7	0.5	-0.6	0.6	0.7	-0.6	0.7	
					2		0.8	-0.4	0.8	0.7	-0.5	0.7	0.8	-0.5	0.8	
					3		1.0	-0.3	1.0	0.8	-0.4	0.8	1.0	-0.4	1.0	
					4		1.1	-0.3	1.1	1.0	-0.3	1.0	1.1	-0.3	1.1	
					5		1.4	-0.2	1.4	1.1	-0.3	1.1	1.4	-0.3	1.4	
	3	1.000	0.500	0.000	1		0.5	-0.1	0.5	0.0	-0.1	0.1	0.5	-0.1	0.5	
					2		0.8	0.0	0.8	0.5	-0.1	0.5	0.8	-0.1	0.8	
					3		1.1	0.0	1.1	0.8	0.0	0.8	1.1	0.0	1.1	

7.9 SURFACES - MAXIMUM TOTAL STRAINS

Static Analysis

Surface No.	Grid Pt. No.	X	Y	Z	Layer No.		$\varepsilon_{max,+}$	$\varepsilon_{min,+}$	$\lvert\varepsilon_{max}\rvert_+$	$\varepsilon_{max,-}$	$\varepsilon_{min,-}$	$\lvert\varepsilon_{max}\rvert_-$	ε_{max}	ε_{min}	$\lvert\varepsilon_{max}\rvert$	Surface Comment Cor. Loading
		Grid Point Coordinates [m]					Maximum Strains [‰]									
1	3	1.000	0.500	0.000	4		1.5	0.0	1.5	1.1	0.0	1.1	1.5	0.0	1.5	
					5		2.0	0.0	2.0	1.5	0.0	1.5	2.0	0.0	2.0	
	4	1.500	0.500	0.000	1		0.7	-0.4	0.7	0.4	-0.6	0.6	0.7	-0.6	0.7	
					2		0.9	-0.4	0.9	0.7	-0.4	0.7	0.9	-0.4	0.9	
					3		1.1	-0.3	1.1	0.9	-0.4	0.9	1.1	-0.4	1.1	
					4		1.3	-0.3	1.3	1.1	-0.3	1.1	1.3	-0.3	1.3	
					5		1.7	-0.2	1.7	1.3	-0.3	1.3	1.7	-0.3	1.7	
	5	2.000	0.500	0.000	1		0.6	-0.8	0.8	0.7	-1.1	1.1	0.7	-1.1	1.1	
					2		0.5	-0.6	0.6	0.6	-0.8	0.8	0.6	-0.8	0.8	
					3		0.5	-0.4	0.5	0.5	-0.6	0.6	0.5	-0.6	0.6	
					4		0.5	-0.3	0.5	0.5	-0.4	0.5	0.5	-0.4	0.5	
					5		0.4	0.0	0.4	0.5	-0.3	0.5	0.5	-0.3	0.5	
	6	0.000	0.000	0.000	1		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
					2		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
					3		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
					4		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
					5		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	7	0.500	0.000	0.000	1		0.2	0.0	0.2	0.0	-0.2	0.2	0.2	-0.2	0.2	
					2		0.4	0.0	0.4	0.2	0.0	0.2	0.4	0.0	0.4	
					3		0.7	0.0	0.7	0.4	0.0	0.4	0.7	0.0	0.7	
					4		0.9	-0.1	0.9	0.7	0.0	0.7	0.9	-0.1	0.9	
					5		1.3	-0.1	1.3	0.9	-0.1	0.9	1.3	-0.1	1.3	
	8	1.000	0.000	0.000	1		0.3	0.0	0.3	0.0	-0.2	0.2	0.3	-0.2	0.3	
					2		0.7	0.0	0.7	0.3	0.0	0.3	0.7	0.0	0.7	
					3		1.0	0.0	1.0	0.7	0.0	0.7	1.0	0.0	1.0	
					4		1.3	0.0	1.3	1.0	0.0	1.0	1.3	0.0	1.3	
					5		1.8	0.0	1.8	1.3	0.0	1.3	1.8	0.0	1.8	
	9	1.500	0.000	0.000	1		0.2	0.0	0.2	0.0	-0.2	0.2	0.2	-0.2	0.2	
					2		0.5	0.0	0.5	0.2	0.0	0.2	0.5	0.0	0.5	
					3		0.7	0.0	0.7	0.5	0.0	0.5	0.7	0.0	0.7	
					4		1.0	-0.1	1.0	0.7	0.0	0.7	1.0	-0.1	1.0	
					5		1.4	-0.1	1.4	1.0	-0.1	1.0	1.4	-0.1	1.4	
	10	2.000	0.000	0.000	1		0.0	-0.1	0.1	0.0	-0.2	0.2	0.0	-0.2	0.2	
					2		0.0	0.0	0.0	0.0	-0.1	0.1	0.0	-0.1	0.1	
					3		0.1	0.0	0.1	0.0	0.0	0.0	0.1	0.0	0.1	
					4		0.2	0.0	0.2	0.1	0.0	0.1	0.2	0.0	0.2	
					5		0.3	0.0	0.3	0.2	0.0	0.2	0.3	0.0	0.3	
Extremes	3	1.000	0.500	0.000	5	$\varepsilon_{max,+}$	2.0	0.0	2.0	1.5	0.0	1.5	2.0	0.0	2.0	
1	1	0.000	0.500	0.000	3		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	9	1.500	0.000	0.000	1	$\varepsilon_{min,+}$	0.2	0.0	0.2	0.0	-0.2	0.2	0.2	-0.2	0.2	
	5	2.000	0.500	0.000	1		0.6	-0.8	0.8	0.7	-1.1	1.1	0.7	-1.1	1.1	
	3	1.000	0.500	0.000	5	$\lvert\varepsilon_{max}\rvert_+$	2.0	0.0	2.0	1.5	0.0	1.5	2.0	0.0	2.0	
	6	0.000	0.000	0.000	5		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	3	1.000	0.500	0.000	5	$\varepsilon_{max,-}$	2.0	0.0	2.0	1.5	0.0	1.5	2.0	0.0	2.0	
	3	1.000	0.500	0.000	1		0.5	-0.1	0.5	0.0	-0.1	0.1	0.5	-0.1	0.5	
	9	1.500	0.000	0.000	2	$\varepsilon_{min,-}$	0.5	0.0	0.5	0.2	0.0	0.2	0.5	0.0	0.5	
	5	2.000	0.500	0.000	1		0.6	-0.8	0.8	0.7	-1.1	1.1	0.7	-1.1	1.1	
	3	1.000	0.500	0.000	5	$\lvert\varepsilon_{max}\rvert_-$	2.0	0.0	2.0	1.5	0.0	1.5	2.0	0.0	2.0	
	6	0.000	0.000	0.000	5		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	3	1.000	0.500	0.000	5	ε_{max}	2.0	0.0	2.0	1.5	0.0	1.5	2.0	0.0	2.0	
	1	0.000	0.500	0.000	4		0.0	-0.1	0.1	0.0	0.0	0.0	0.0	-0.1	0.1	
	1	0.000	0.500	0.000	2	ε_{min}	0.0	0.0	0.0	0.1	0.0	0.1	0.1	0.0	0.1	
	5	2.000	0.500	0.000	1		0.6	-0.8	0.8	0.7	-1.1	1.1	0.7	-1.1	1.1	
	3	1.000	0.500	0.000	5	$\lvert\varepsilon_{max}\rvert$	2.0	0.0	2.0	1.5	0.0	1.5	2.0	0.0	2.0	
	6	0.000	0.000	0.000	5		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total							2.0	0.0	2.0	1.5	0.0	1.5	2.0	0.0	2.0	
1							0.0	-0.8	0.0	0.0	-1.1	0.0	0.0	-1.1	0.0	
	LC2 - 200 kN															
2	1	0.000	0.500	0.090	1		0.0	-0.1	0.1	0.0	-0.1	0.1	0.0	-0.1	0.1	
	2	0.500	0.500	0.090	1		0.3	-0.3	0.3	0.5	-0.5	0.5	0.5	-0.5	0.5	
	3	1.000	0.500	0.090	1		0.0	-0.3	0.3	3.4	-1.0	3.4	3.4	-1.0	3.4	
	4	1.500	0.500	0.090	1		0.5	-0.4	0.5	1.1	-0.7	1.1	1.1	-0.7	1.1	
	5	2.000	0.500	0.090	1		0.1	-0.1	0.1	0.0	0.0	0.0	0.1	-0.1	0.1	
	6	0.000	0.000	0.090	1		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	7	0.500	0.000	0.090	1		0.0	-0.1	0.1	0.1	-0.5	0.5	0.1	-0.5	0.5	
	8	1.000	0.000	0.090	1		0.0	-0.1	0.1	0.5	-1.0	1.0	0.5	-1.0	1.0	
	9	1.500	0.000	0.090	1		0.1	-0.1	0.1	0.1	-0.6	0.6	0.1	-0.6	0.6	
	10	2.000	0.000	0.090	1		0.0	-0.1	0.1	0.0	0.0	0.0	0.0	-0.1	0.1	
Extremes	4	1.500	0.500	0.090	1	$\varepsilon_{max,+}$	0.5	-0.4	0.5	1.1	-0.7	1.1	1.1	-0.7	1.1	
2	3	1.000	0.500	0.090	1		0.0	-0.3	0.3	3.4	-1.0	3.4	3.4	-1.0	3.4	
	6	0.000	0.000	0.090	1	$\varepsilon_{min,+}$	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	4	1.500	0.500	0.090	1		0.5	-0.4	0.5	1.1	-0.7	1.1	1.1	-0.7	1.1	
	4	1.500	0.500	0.090	1	$\lvert\varepsilon_{max}\rvert_+$	0.5	-0.4	0.5	1.1	-0.7	1.1	1.1	-0.7	1.1	
	6	0.000	0.000	0.090	1		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	3	1.000	0.500	0.090	1	$\varepsilon_{max,-}$	0.0	-0.3	0.3	3.4	-1.0	3.4	3.4	-1.0	3.4	
	6	0.000	0.000	0.090	1		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	

7.9 SURFACES - MAXIMUM TOTAL STRAINS

Static Analysis

Surface No.	Grid Pt. No.	Grid Point Coordinates [m] X	Y	Z	Layer No.		Maximum Strains [‰] $\varepsilon_{max,+}$	$\varepsilon_{min,+}$	$\lvert\varepsilon_{max}\rvert_{+}$	$\varepsilon_{max,-}$	$\varepsilon_{min,-}$	$\lvert\varepsilon_{max}\rvert_{-}$	ε_{max}	ε_{min}	$\lvert\varepsilon_{max}\rvert$	Surface Comment Cor. Loading
2	6	0.000	0.000	0.090	1	$\varepsilon_{min,-}$	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	3	1.000	0.500	0.090	1		0.0	-0.3	0.3	3.4	-1.0	3.4	3.4	-1.0	3.4	
	3	1.000	0.500	0.090	1	$\lvert\varepsilon_{max}\rvert_{-}$	0.0	-0.3	0.3	3.4	-1.0	3.4	3.4	-1.0	3.4	
	6	0.000	0.000	0.090	1		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	3	1.000	0.500	0.090	1	ε_{max}	0.0	-0.3	0.3	3.4	-1.0	3.4	3.4	-1.0	3.4	
	6	0.000	0.000	0.090	1		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	6	0.000	0.000	0.090	1	ε_{min}	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	3	1.000	0.500	0.090	1		0.0	-0.3	0.3	3.4	-1.0	3.4	3.4	-1.0	3.4	
	3	1.000	0.500	0.090	1	$\lvert\varepsilon_{max}\rvert$	0.0	-0.3	0.3	3.4	-1.0	3.4	3.4	-1.0	3.4	
	6	0.000	0.000	0.090	1		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total							0.5	0.0	0.5	3.4	0.0	3.4	3.4	0.0	3.4	
2							0.0	-0.4	0.0	0.0	-1.0	0.0	0.0	-1.0	0.0	
	G LC2 - 200 kN															
	Total max/min values with corresponding values															
1	3	1.000	0.500	0.000	5	$\varepsilon_{max,+}$	2.0	0.0	2.0	1.5	0.0	1.5	2.0	0.0	2.0	
2	3	1.000	0.500	0.090	1		0.0	-0.3	0.3	3.4	-1.0	3.4	3.4	-1.0	3.4	
1	9	1.500	0.000	0.000	1	$\varepsilon_{min,+}$	0.2	0.0	0.2	0.0	-0.2	0.2	0.2	-0.2	0.2	
1	5	2.000	0.500	0.000	1		0.6	-0.8	0.8	0.7	-1.1	1.1	0.7	-1.1	1.1	
1	3	1.000	0.500	0.000	5	$\lvert\varepsilon_{max}\rvert_{+}$	2.0	0.0	2.0	1.5	0.0	1.5	2.0	0.0	2.0	
2	6	0.000	0.000	0.090	1		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
2	3	1.000	0.500	0.090	1	$\varepsilon_{max,-}$	0.0	-0.3	0.3	3.4	-1.0	3.4	3.4	-1.0	3.4	
1	3	1.000	0.500	0.000	1		0.5	-0.1	0.5	0.0	-0.1	0.1	0.5	-0.1	0.5	
1	9	1.500	0.000	0.000	2	$\varepsilon_{min,-}$	0.5	0.0	0.5	0.2	0.0	0.2	0.5	0.0	0.5	
1	5	2.000	0.500	0.000	1		0.6	-0.8	0.8	0.7	-1.1	1.1	0.7	-1.1	1.1	
2	3	1.000	0.500	0.090	1	$\lvert\varepsilon_{max}\rvert_{-}$	0.0	-0.3	0.3	3.4	-1.0	3.4	3.4	-1.0	3.4	
2	6	0.000	0.000	0.090	1		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
2	3	1.000	0.500	0.090	1	ε_{max}	0.0	-0.3	0.3	3.4	-1.0	3.4	3.4	-1.0	3.4	
2	6	0.000	0.000	0.090	1		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
2	6	0.000	0.000	0.090	1	ε_{min}	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
1	5	2.000	0.500	0.000	1		0.6	-0.8	0.8	0.7	-1.1	1.1	0.7	-1.1	1.1	
2	3	1.000	0.500	0.090	1	$\lvert\varepsilon_{max}\rvert$	0.0	-0.3	0.3	3.4	-1.0	3.4	3.4	-1.0	3.4	
2	6	0.000	0.000	0.090	1		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	G LC2 - 200 kN															
Total max/min							2.0	0.0	2.0	3.4	0.0	3.4	3.4	0.0	3.4	
							0.0	-0.8	0.0	0.0	-1.1	0.0	0.0	-1.1	0.0	

7.10 SURFACES - EQUIVALENT TOTAL STRAINS - VON MISES

Static Analysis

Surface No.	Grid Point No.	Grid Point Coordinates [m] X	Y	Z	Layer No.	von Mises [‰] $\varepsilon_{eqv,Mises,+}$	$\varepsilon_{eqv,Mises,-}$	$\varepsilon_{eqv,Mises}$	Surface Comment Cor. Loading
	G LC2 - 200 kN								
1	1	0.000	0.500	0.000	1	0.1	0.2	0.2	
					2	0.0	0.1	0.1	
					3	0.0	0.0	0.0	
					4	0.1	0.0	0.1	
					5	0.2	0.1	0.2	
	2	0.500	0.500	0.000	1	1.0	1.0	1.0	
					2	1.1	1.0	1.1	
					3	1.1	1.1	1.1	
					4	1.3	1.1	1.3	
					5	1.5	1.3	1.5	
	3	1.000	0.500	0.000	1	0.5	0.1	0.5	
					2	0.8	0.5	0.8	
					3	1.1	0.8	1.1	
					4	1.5	1.1	1.5	
					5	1.9	1.5	1.9	
	4	1.500	0.500	0.000	1	1.0	0.8	1.0	
					2	1.1	1.0	1.1	
					3	1.3	1.1	1.3	
					4	1.5	1.3	1.5	
					5	1.8	1.5	1.8	
	5	2.000	0.500	0.000	1	1.2	1.5	1.5	
					2	1.0	1.2	1.2	
					3	0.8	1.0	1.0	
					4	0.6	0.8	0.8	
					5	0.4	0.6	0.6	
	6	0.000	0.000	0.000	1	0.0	0.0	0.0	
					2	0.0	0.0	0.0	
					3	0.0	0.0	0.0	
					4	0.0	0.0	0.0	
					5	0.0	0.0	0.0	
	7	0.500	0.000	0.000	1	0.2	0.2	0.2	
					2	0.4	0.2	0.4	
					3	0.7	0.4	0.7	

7.10 SURFACES - EQUIVALENT TOTAL STRAINS - VON MISES

Static Analysis

Surface No.	Grid Point No.	Grid Point Coordinates [m] X	Y	Z	Layer No.		von Mises [‰] $\varepsilon_{eqv,Mises,+}$	$\varepsilon_{eqv,Mises,-}$	$\varepsilon_{eqv,Mises}$	Surface Comment Cor. Loading
1	7	0.500	0.000	0.000	4		0.9	0.7	0.9	
					5		1.3	0.9	1.3	
	8	1.000	0.000	0.000	1		0.3	0.2	0.3	
					2		0.7	0.3	0.7	
					3		1.0	0.7	1.0	
					4		1.3	1.0	1.3	
					5		1.8	1.3	1.8	
	9	1.500	0.000	0.000	1		0.2	0.2	0.2	
					2		0.5	0.2	0.5	
					3		0.8	0.5	0.8	
					4		1.0	0.8	1.0	
					5		1.4	1.0	1.4	
	10	2.000	0.000	0.000	1		0.1	0.2	0.2	
					2		0.0	0.1	0.1	
					3		0.1	0.0	0.1	
					4		0.2	0.1	0.2	
					5		0.3	0.2	0.3	
Extremes	3	1.000	0.500	0.000	5	$\varepsilon_{eqv,Mises,+}$	1.9	1.5	1.9	
1	6	0.000	0.000	0.000	5		0.0	0.0	0.0	
	5	2.000	0.500	0.000	1	$\varepsilon_{eqv,Mises,-}$	1.2	1.5	1.5	
	6	0.000	0.000	0.000	5		0.0	0.0	0.0	
	3	1.000	0.500	0.000	5	$\varepsilon_{eqv,Mises}$	1.9	1.5	1.9	
	6	0.000	0.000	0.000	5		0.0	0.0	0.0	
Total							1.9	1.5	1.9	
1							0.0	0.0	0.0	
	LC2 - 200 kN									
2	1	0.000	0.500	0.090	1		0.1	0.1	0.1	
	2	0.500	0.500	0.090	1		0.4	0.8	0.8	
	3	1.000	0.500	0.090	1		0.3	3.5	3.5	
	4	1.500	0.500	0.090	1		0.6	1.3	1.3	
	5	2.000	0.500	0.090	1		0.1	0.1	0.1	
	6	0.000	0.000	0.090	1		0.0	0.0	0.0	
	7	0.500	0.000	0.090	1		0.1	0.5	0.5	
	8	1.000	0.000	0.090	1		0.1	1.1	1.1	
	9	1.500	0.000	0.090	1		0.1	0.6	0.6	
	10	2.000	0.000	0.090	1		0.1	0.0	0.1	
Extremes	4	1.500	0.500	0.090	1	$\varepsilon_{eqv,Mises,+}$	0.6	1.3	1.3	
2	6	0.000	0.000	0.090	1		0.0	0.0	0.0	
	3	1.000	0.500	0.090	1	$\varepsilon_{eqv,Mises,-}$	0.3	3.5	3.5	
	6	0.000	0.000	0.090	1		0.0	0.0	0.0	
	3	1.000	0.500	0.090	1	$\varepsilon_{eqv,Mises}$	0.3	3.5	3.5	
	6	0.000	0.000	0.090	1		0.0	0.0	0.0	
Total							0.6	3.5	3.5	
2							0.0	0.0	0.0	
	LC2 - 200 kN									
	Total max/min values with corresponding values									
1	3	1.000	0.500	0.000	5	$\varepsilon_{eqv,Mises,+}$	1.9	1.5	1.9	
2	6	0.000	0.000	0.090	1		0.0	0.0	0.0	
2	3	1.000	0.500	0.090	1	$\varepsilon_{eqv,Mises,-}$	0.3	3.5	3.5	
2	6	0.000	0.000	0.090	1		0.0	0.0	0.0	
2	3	1.000	0.500	0.090	1	$\varepsilon_{eqv,Mises}$	0.3	3.5	3.5	
2	6	0.000	0.000	0.090	1		0.0	0.0	0.0	
	LC2 - 200 kN									
Total max/min							1.9	3.5	3.5	
							0.0	0.0	0.0	

7.11 SURFACES - MAXIMUM PLASTIC STRAINS

Static Analysis

Surface No.	Grid Pt. No.	Grid Point Coordinates [m] X	Y	Z	Layer No.		Maximum Plastic Strains [‰] $\varepsilon_{pl,max,+}$	$\varepsilon_{pl,min,+}$	$\lvert\varepsilon_{pl,max}\rvert_+$	$\varepsilon_{pl,max,-}$	$\varepsilon_{pl,min,-}$	$\lvert\varepsilon_{pl,max}\rvert_-$	$\varepsilon_{pl,max}$	$\varepsilon_{pl,min}$	$\lvert\varepsilon_{pl,max}\rvert$	Surface Comment Cor. Loading
	LC2 - 200 kN															
1	1	0.000	0.500	0.000	1		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
					2		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
					3		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	

7.11 **SURFACES - MAXIMUM PLASTIC STRAINS** **Static Analysis**

Surface No.	Grid Pt. No.	Grid Point Coordinates [m] X	Y	Z	Layer No.		Maximum Plastic Strains [‰] $\varepsilon_{pl,max,+}$	$\varepsilon_{pl,min,+}$	$\lvert\varepsilon_{pl,max}\rvert_+$	$\varepsilon_{pl,max,-}$	$\varepsilon_{pl,min,-}$	$\lvert\varepsilon_{pl,max}\rvert_-$	$\varepsilon_{pl,max}$	$\varepsilon_{pl,min}$	$\lvert\varepsilon_{pl,max}\rvert$	Surface Comment Cor. Loading
1	1	0.000	0.500	0.000	4		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
					5		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	2	0.500	0.500	0.000	1		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
					2		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
					3		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
					4		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
					5		0.1	0.0	0.1	0.0	0.0	0.0	0.1	0.0	0.1	
	3	1.000	0.500	0.000	1		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
					2		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
					3		0.1	0.0	0.1	0.0	0.0	0.0	0.1	0.0	0.1	
					4		0.4	0.0	0.4	0.1	0.0	0.1	0.4	0.0	0.4	
					5		1.1	0.0	1.1	0.3	0.0	0.3	1.1	0.0	1.1	
	4	1.500	0.500	0.000	1		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
					2		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
					3		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
					4		0.1	0.0	0.1	0.0	0.0	0.0	0.1	0.0	0.1	
					5		0.4	0.0	0.4	0.0	0.0	0.0	0.4	0.0	0.4	
	5	2.000	0.500	0.000	1		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
					2		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
					3		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
					4		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
					5		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	6	0.000	0.000	0.000	1		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
					2		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
					3		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
					4		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
					5		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	7	0.500	0.000	0.000	1		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
					2		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
					3		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
					4		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
					5		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	8	1.000	0.000	0.000	1		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
					2		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
					3		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
					4		0.3	0.0	0.3	0.0	0.0	0.0	0.3	0.0	0.3	
					5		0.8	0.0	0.8	0.2	0.0	0.2	0.8	0.0	0.8	
	9	1.500	0.000	0.000	1		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
					2		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
					3		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
					4		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
					5		0.2	0.0	0.2	0.0	0.0	0.0	0.2	0.0	0.2	
	10	2.000	0.000	0.000	1		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
					2		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
					3		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
					4		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
					5		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Extremes	3	1.000	0.500	0.000	5	$\varepsilon_{pl,max,+}$	1.1	0.0	1.1	0.3	0.0	0.3	1.1	0.0	1.1	
1	1	0.000	0.500	0.000	1		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	3	1.000	0.500	0.000	5	$\varepsilon_{pl,min,+}$	1.1	0.0	1.1	0.3	0.0	0.3	1.1	0.0	1.1	
	1	0.000	0.500	0.000	1		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	3	1.000	0.500	0.000	5	$\lvert\varepsilon_{pl,max}\rvert_+$	1.1	0.0	1.1	0.3	0.0	0.3	1.1	0.0	1.1	
	1	0.000	0.500	0.000	1		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	3	1.000	0.500	0.000	5	$\varepsilon_{pl,max,-}$	1.1	0.0	1.1	0.3	0.0	0.3	1.1	0.0	1.1	
	1	0.000	0.500	0.000	1		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	3	1.000	0.500	0.000	5	$\varepsilon_{pl,min,-}$	1.1	0.0	1.1	0.3	0.0	0.3	1.1	0.0	1.1	
	1	0.000	0.500	0.000	1		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	3	1.000	0.500	0.000	5	$\lvert\varepsilon_{pl,max}\rvert_-$	1.1	0.0	1.1	0.3	0.0	0.3	1.1	0.0	1.1	
	1	0.000	0.500	0.000	1		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	3	1.000	0.500	0.000	5	$\varepsilon_{pl,max}$	1.1	0.0	1.1	0.3	0.0	0.3	1.1	0.0	1.1	
	1	0.000	0.500	0.000	1		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	3	1.000	0.500	0.000	5	$\varepsilon_{pl,min}$	1.1	0.0	1.1	0.3	0.0	0.3	1.1	0.0	1.1	
	1	0.000	0.500	0.000	1		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	3	1.000	0.500	0.000	5	$\lvert\varepsilon_{pl,max}\rvert$	1.1	0.0	1.1	0.3	0.0	0.3	1.1	0.0	1.1	
	1	0.000	0.500	0.000	1		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total							1.1	0.0	1.1	0.3	0.0	0.3	1.1	0.0	1.1	
1							0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	G LC2 - 200 kN															
2	1	0.000	0.500	0.090	1		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	2	0.500	0.500	0.090	1		0.2	0.0	0.2	0.4	0.0	0.4	0.4	0.0	0.4	
	3	1.000	0.500	0.090	1		0.0	0.0	0.0	3.2	-0.3	3.2	3.2	-0.3	3.2	
	4	1.500	0.500	0.090	1		0.4	0.0	0.4	1.0	-0.1	1.0	1.0	-0.1	1.0	
	5	2.000	0.500	0.090	1		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	6	0.000	0.000	0.090	1		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	

7.11

SURFACES - MAXIMUM PLASTIC STRAINS

Static Analysis

Surface No.	Grid Pt. No.	X [m]	Y [m]	Z [m]	Layer No.		$\varepsilon_{pl,max,+}$	$\varepsilon_{pl,min,+}$	$\|\varepsilon_{pl,max}\|_{+}$	$\varepsilon_{pl,max,-}$	$\varepsilon_{pl,min,-}$	$\|\varepsilon_{pl,max}\|_{-}$	$\varepsilon_{pl,max}$	$\varepsilon_{pl,min}$	$\|\varepsilon_{pl,max}\|$	Surface Comment Cor. Loading
2	7	0.500	0.000	0.090	1		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	8	1.000	0.000	0.090	1		0.0	0.0	0.0	0.3	0.0	0.3	0.3	0.0	0.3	
	9	1.500	0.000	0.090	1		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	10	2.000	0.000	0.090	1		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Extremes	4	1.500	0.500	0.090	1	$\varepsilon_{pl,max,+}$	0.4	0.0	0.4	1.0	-0.1	1.0	1.0	-0.1	1.0	
2	1	0.000	0.500	0.090	1		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	9	1.500	0.000	0.090	1	$\varepsilon_{pl,min,+}$	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	4	1.500	0.500	0.090	1		0.4	0.0	0.4	1.0	-0.1	1.0	1.0	-0.1	1.0	
	4	1.500	0.500	0.090	1	$\|\varepsilon_{pl,max}\|_{+}$	0.4	0.0	0.4	1.0	-0.1	1.0	1.0	-0.1	1.0	
	1	0.000	0.500	0.090	1		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	3	1.000	0.500	0.090	1	$\varepsilon_{pl,max,-}$	0.0	0.0	0.0	3.2	-0.3	3.2	3.2	-0.3	3.2	
	1	0.000	0.500	0.090	1		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	1	0.000	0.500	0.090	1	$\varepsilon_{pl,min,-}$	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	3	1.000	0.500	0.090	1		0.0	0.0	0.0	3.2	-0.3	3.2	3.2	-0.3	3.2	
	3	1.000	0.500	0.090	1	$\|\varepsilon_{pl,max}\|_{-}$	0.0	0.0	0.0	3.2	-0.3	3.2	3.2	-0.3	3.2	
	1	0.000	0.500	0.090	1		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	3	1.000	0.500	0.090	1	$\varepsilon_{pl,max}$	0.0	0.0	0.0	3.2	-0.3	3.2	3.2	-0.3	3.2	
	1	0.000	0.500	0.090	1		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	1	0.000	0.500	0.090	1	$\varepsilon_{pl,min}$	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	3	1.000	0.500	0.090	1		0.0	0.0	0.0	3.2	-0.3	3.2	3.2	-0.3	3.2	
	3	1.000	0.500	0.090	1	$\|\varepsilon_{pl,max}\|$	0.0	0.0	0.0	3.2	-0.3	3.2	3.2	-0.3	3.2	
	1	0.000	0.500	0.090	1		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total							0.4	0.0	0.4	3.2	0.0	3.2	3.2	0.0	3.2	
2							0.0	0.0	0.0	0.0	-0.3	0.0	0.0	-0.3	0.0	
	LC2 - 200 kN															
	Total max/min values with corresponding values															
1	3	1.000	0.500	0.000	5	$\varepsilon_{pl,max,+}$	1.1	0.0	1.1	0.3	0.0	0.3	1.1	0.0	1.1	
1	1	0.000	0.500	0.000	1		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
1	3	1.000	0.500	0.000	5	$\varepsilon_{pl,min,+}$	1.1	0.0	1.1	0.3	0.0	0.3	1.1	0.0	1.1	
2	4	1.500	0.500	0.090	1		0.4	0.0	0.4	1.0	-0.1	1.0	1.0	-0.1	1.0	
1	3	1.000	0.500	0.000	5	$\|\varepsilon_{pl,max}\|_{+}$	1.1	0.0	1.1	0.3	0.0	0.3	1.1	0.0	1.1	
1	1	0.000	0.500	0.000	1		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
2	3	1.000	0.500	0.090	1	$\varepsilon_{pl,max,-}$	0.0	0.0	0.0	3.2	-0.3	3.2	3.2	-0.3	3.2	
1	1	0.000	0.500	0.000	1		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
1	3	1.000	0.500	0.000	5	$\varepsilon_{pl,min,-}$	1.1	0.0	1.1	0.3	0.0	0.3	1.1	0.0	1.1	
2	3	1.000	0.500	0.090	1		0.0	0.0	0.0	3.2	-0.3	3.2	3.2	-0.3	3.2	
2	3	1.000	0.500	0.090	1	$\|\varepsilon_{pl,max}\|_{-}$	0.0	0.0	0.0	3.2	-0.3	3.2	3.2	-0.3	3.2	
1	1	0.000	0.500	0.000	1		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
2	3	1.000	0.500	0.090	1	$\varepsilon_{pl,max}$	0.0	0.0	0.0	3.2	-0.3	3.2	3.2	-0.3	3.2	
1	1	0.000	0.500	0.000	1		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
1	3	1.000	0.500	0.000	5	$\varepsilon_{pl,min}$	1.1	0.0	1.1	0.3	0.0	0.3	1.1	0.0	1.1	
2	3	1.000	0.500	0.090	1		0.0	0.0	0.0	3.2	-0.3	3.2	3.2	-0.3	3.2	
2	3	1.000	0.500	0.090	1	$\|\varepsilon_{pl,max}\|$	0.0	0.0	0.0	3.2	-0.3	3.2	3.2	-0.3	3.2	
1	1	0.000	0.500	0.000	1		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	LC2 - 200 kN															
Total							1.1	0.0	1.1	3.2	0.0	3.2	3.2	0.0	3.2	
max/min							0.0	0.0	0.0	0.0	-0.3	0.0	0.0	-0.3	0.0	

8 Stress Analysis

8.1

OBJECTS TO ANALYZE - STRESSES

	Object Type	Analyze All	Selected	Objects to Analyze To Analyze	Removed	Not Valid / Deact.	Comment
	Surfaces	☒	1,2	2		1	

8.2

OBJECTS TO ANALYZE - STRESS RANGES

	Object Type	Analyze All	Selected	Objects to Analyze To Analyze	Removed	Not Valid / Deact.	Comment
	Surfaces	☐					

8.3

DESIGN SITUATIONS

DS No.	Name	To Analyze	Active	Combinations to Design for Enumeration Method
1	ULS (STR/GEO) - Permanent and transient - Eq. 6.10a and 6.10b	☒	☒	All
2	SLS - Characteristic	☒	☒	All
3	SLS - Quasi-permanent	☒	☒	All

8.4

MATERIALS

Legend
- Concrete Settings
- Stiffness modification
- User-Defined Material

Material No.	Name	To Analyze	Material Type	Options	Comment
1	C35/45	☒	Concrete	User-Defined Material, Concrete Settings	
2	T15	☒	Timber	Stiffness modification, User-Defined Material	
3	T22	☒	Timber	Stiffness modification, User-Defined Material	

8.5

THICKNESSES

Thick. No.	Name	Thickness Type	Material	To Analyze	Use Other Thickness d [mm] for Analysis
1	Uniform | d : 60.0 mm | 1 - C35/45	Uniform	1	☒	--
2	Uniform | d : 20.0 mm | 2 - T15	Uniform	2	☒	--
3	Uniform | d : 30.0 mm | 3 - T22	Uniform	3	☒	--
4	Layers | d : 120.0 mm | Layers: 5	Layers		☒	--

8.6

SURFACE CONFIGURATIONS

Conf. No.	Name	Assigned to Surfaces	Assigned to Surface Sets	Comment
1	Default	All	All	

8.6.1

SURFACE CONFIGURATIONS - STRAINS TO CALCULATE

Conf. No.	Enabled	Strain Type	Limit Strain [‰]	
1	Default			
	☒	$\varepsilon_{x,+}$	50.0	
	☒	$\varepsilon_{y,+}$	50.0	
	☒	$\gamma_{xy,+}$	50.0	
	☒	$\varepsilon_{x,-}$	50.0	
	☒	$\varepsilon_{y,-}$	50.0	
	☒	$\gamma_{xy,-}$	50.0	
	☒	$\varepsilon_{1,+}$	50.0	
	☒	$\varepsilon_{2,+}$	50.0	
	☒	$\varepsilon_{1,-}$	50.0	
	☒	$\varepsilon_{2,-}$	50.0	
	☐	$\varepsilon_{max,+}$	50.0	
	☐	$\varepsilon_{min,+}$	50.0	
	☐	$\|\varepsilon_{max}\|_{+}$	50.0	
	☐	$\varepsilon_{max,-}$	50.0	
	☐	$\varepsilon_{min,-}$	50.0	
	☐	$\|\varepsilon_{max}\|_{-}$	50.0	
	☒	ε_{max}	50.0	
	☒	ε_{min}	50.0	
	☐	$\|\varepsilon_{max}\|$	50.0	
	☒	$\varepsilon_{+,Mises}$	50.0	
	☒	$\varepsilon_{-,Mises}$	50.0	
	☒	ε_{Mises}	50.0	
	☐	$\varepsilon_{+,Tresca}$	50.0	
	☐	$\varepsilon_{-,Tresca}$	50.0	
	☐	ε_{Tresca}	50.0	
	☐	$\varepsilon_{+,Rankine}$	50.0	
	☐	$\varepsilon_{-,Rankine}$	50.0	
	☐	$\varepsilon_{Rankine}$	50.0	
	☐	$\varepsilon_{+,Bach}$	50.0	
	☐	$\varepsilon_{-,Bach}$	50.0	
	☐	ε_{Bach}	50.0	

8.7

SOLID CONFIGURATIONS

Conf. No.	Name	Assigned to Solids	Assigned to Solid Sets	Comment
1	Default	All	All	

8.7.1 SOLID CONFIGURATIONS - STRAINS TO CALCULATE

Conf. No.	Enabled	Strain Type	Limit Strain [‰]	
1	Default			
	☒	ε_x	50.0	
	☒	ε_y	50.0	
	☒	ε_z	50.0	
	☒	γ_{yz}	50.0	
	☒	γ_{xz}	50.0	
	☒	γ_{xy}	50.0	
	☐	ε_1	50.0	
	☐	ε_2	50.0	
	☐	ε_3	50.0	
	☒	ε_{Mises}	50.0	
	☐	ε_{Tresca}	50.0	
	☐	$\varepsilon_{Rankine}$	50.0	
	☐	ε_{Bach}	50.0	