JRC Scientific and Technical Reports

EFAST Inquiry

EFAST project (Design Study of a European Facility for Advanced Seismic Testing)

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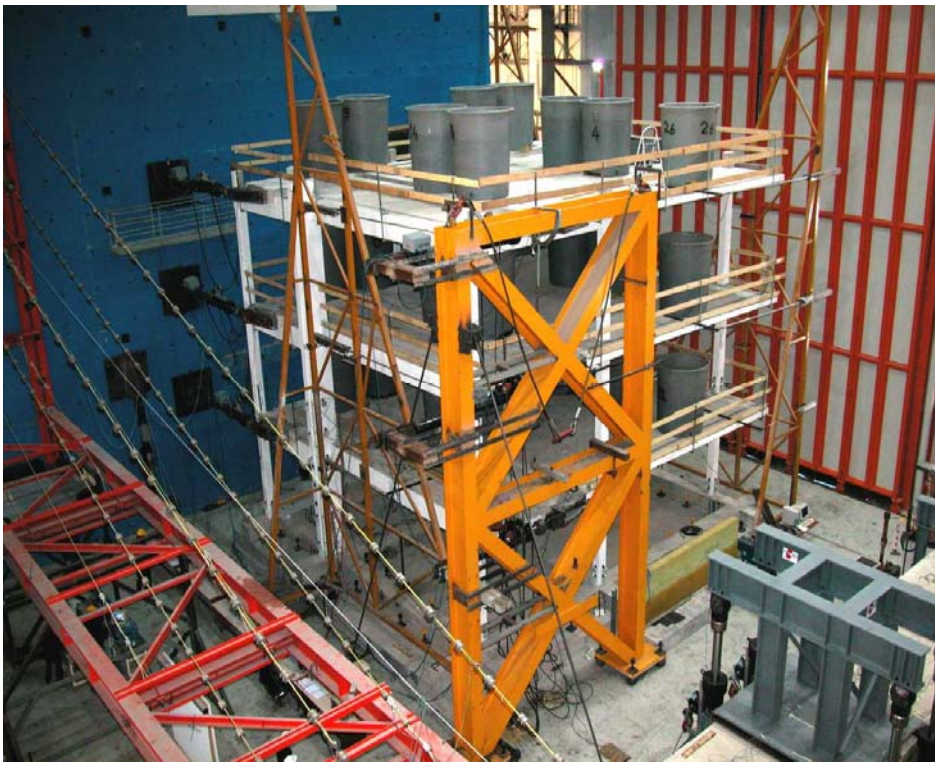

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Objectives

EFAST (Design Study of a European Facility for Advanced Seismic Testing) is a joint project financed by the European Commission that foresees the study of all the aspects regarding the design of a major testing facility in Europe that would complement and collaborate with the existing ones. This study aims at identifying the current and future needs in the field, and proposes the concept of a facility using the best available testing technologies. For further information: http://efast.eknowrisk.eu/EFAST/.

As a preliminary step to the whole EFAST project, it is very important to know the actual seismic testing capabilities all around the world and to identify the needs of the earthquake engineering community, especially in Europe. This will allow a proper design for the new major European testing facility that will serve as a complement to existing laboratories and will fill the emerged gaps.
The inquiry targeted three different kinds of entities:

1. seismic testing laboratories;
2. nuclear energy and chemical industry industries;
3. construction companies.

The first target has the main purpose of obtaining an updated state-of-the-art in available seismic testing capabilities and technologies. The second and the third targets are similar and addresses the final user for seismic testing activities.
Three different sets of questions and three lists of contact persons were prepared in order to facilitate answers. The second and the third inquiries, however, has several questions in common since the two classes of entities have some similar aspects.
This report describes into detail the data obtained and outlines some interpretations of the results. The aggregation and interpretation of the answers suggested some general conclusions that will be taken into consideration in the following design phases of EFAST project.

Implementation

EFAST project grant agreement Annex I (Description of Work) specifies this task as follows:

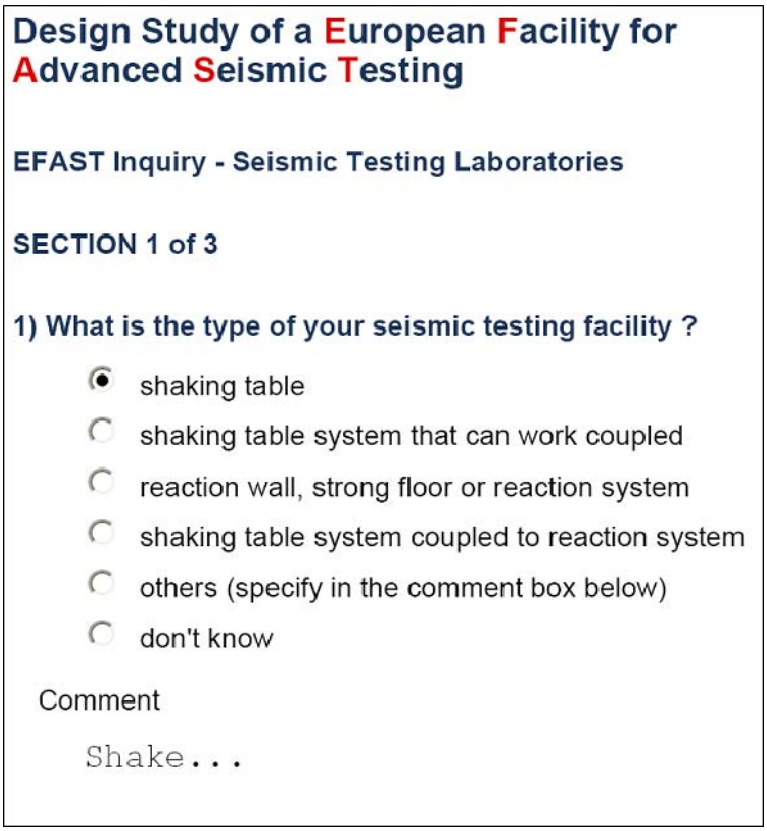
Task 2.2 […] an inquiry will be addressed to different entities, including researchers, industry and administrations, asking for their views on issues such as:

1. *he kind and the size of the required experiments in the recent past and in the next 20 years in Europe;*
2. *possible architecture and size of testing facilities;*
3. *possible location for an new facility;*
4. *integration with the existing infrastructures: communication architecture to be developed, upgrading strategy. […]*

The partners agreed to prepare three different sets of questions with special focus to three different target groups: seismic testing laboratories, nuclear energy and chemical industries and construction companies. JRC prepared the first questionnaire and list of targets, CEA the second and EUCENTRE the third, then the questions were shared among all partners in order to have consistent questionnaires. Some questions were more generic and equal for everybody, some other were more focused to the specific target group. The three sets of questions were implemented in a web page accessible with a dedicated link. The web server and services of EUCENTRE were used to this purpose.

Structure

Each contacted target received an e-mail with a brief presentation of the EFAST project, a description of the main purposes of the inquiry and a reserved link to access to the inquiry. By clicking on this link, a form opened. The form contained mainly multiple choice questions (check boxes, option buttons) and some text boxes. Each question was followed by a free field for comments. This makes the form easy to be filled on the web. The user can interrupt his compilation in any time and the system saves the data. By pressing the "submit" button the results are definitively stored in a database. The following figure gives an example of the first question of the seismic testing laboratories inquiry.



Example of one question of the inquiry

INQUIRY FOR SEISMIC TESTING LABORATORIES

This set of questions is divided into 12 parts. The detailed results for each question are reported hereafter. The inquiry was sent to 108 large laboratories around the word. We received back 35 compiled inquiries, so the percentage of success is 32%. This means that the statistical analysis of the obtained results must be viewed as indicative since the sample may be not fully representative of the whole population, even if it can be considered a good sample.

The following table contains the list of the compiled inquiries.

List of compiled inquiries for
Seismic Testing Laboratories

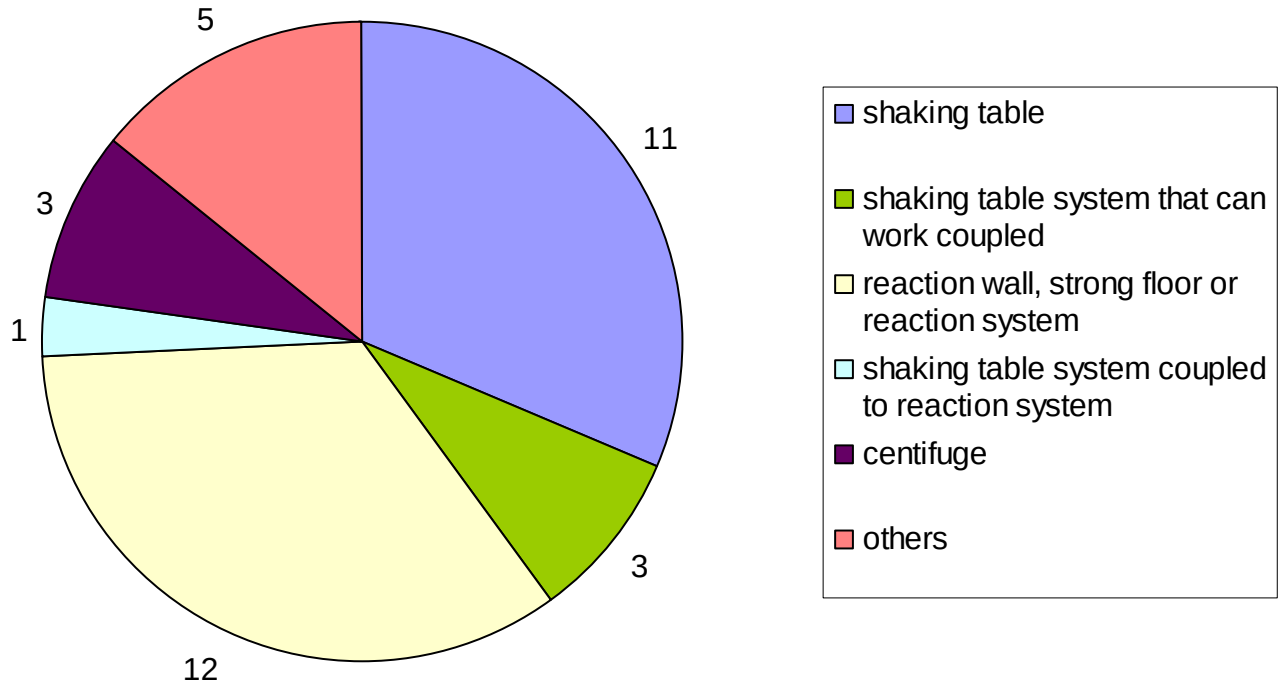
institution	country	contact
Tongji University	China	Prof. Xilin Lu
CEA - Commissariat a l'Energie Atomique	France	Dr. Ioannis Politopoulos
Sopemea	France	Dr. Bernard Colomies
Universität Kassel	Germany	Prof. Uwe Dorka
National Technical University of Athens	Greece	Prof. Constantine Spyrakos
University of Patras	Greece	Prof. Michail Fardis
Indian Institute of Technology	India	Prof. Sajal Kanti Deb
CESI ricerca spa	Italy	Ing. Guido Mazzà
ENEA - Ente per le Nuove Tecnologie, l'Energia e l'Ambiente	Italy	Ing. Gerardo De Canio
Joint Research Centre	Italy	Dr. Francisco Javier Molina
P&P Consulting Engineers	Italy	Ing. Cesari
Università degli Studi della Basilicata	Italy	Prof. Mauro Dolce
Università degli Studi di Trento	Italy	Prof. Oreste Bursi
Central Research Institute of Electric Power Industry	Japan	Dr. Nori Sakurai
Public Works Research Institute	Japan	Dr. Junichi Sakai
Seoul National University	Korea	Prof. Jae Kwan Kim
Laboratório Nacional de Engenharia Civil	Portugal	Dr. Ema Coelho

University of Azores	Portugal	Prof. Mário Rouxinol Fragoso
Technical University “Gheorghe Asachi”	Romania	Prof. Gabriela Atanasiu
SP Technical Research Institute of Sweden	Sweden	Dr. Per-Erik Petersson
Empa - Swiss Federal Laboratories for Materials Testing and Research	Switzerland	Dr. Glauco Feltrin
Geotechnical Drum Centrifuge	Switzerland	Prof. Alessandro Dazio
National Center for Research in Earthquake Engineering	Taiwan	Prof. Keh-Chyuan Tsai
Deltares	The Netherlands	Dr. Adam Bezuijen
The Kandilli Observatory and Earthquake Research Institute	Turkey	Prof. Erdal Safak
University of Cambridge	U.K.	Dr. Gopal Madabhushi
Purdue University	U.S.A.	Prof. Judy Liu
The State University of New York	U.S.A.	Prof. Andrei Reinhorn
U.S. Army Corps of Engineers	U.S.A.	Dr. Wipawi Vanadit-Ellis
University of California at Davis	U.S.A.	Prof. Bruce L. Kutter
University of California at Los Angeles	U.S.A.	Prof. Robert Nigbor
University of California at San Diego	U.S.A.	Prof. Christopher Latham
University of Colorado at Boulder	U.S.A.	Prof. Thomas Bowen
University of Illinois at Urbana Champaign	U.S.A.	Prof. Amr. S. Elnashai
University of Texas at Austin	U.S.A.	Prof. Kenneth H. Stokoe

Questions 1

What is the type of your seismic testing facility?

Results

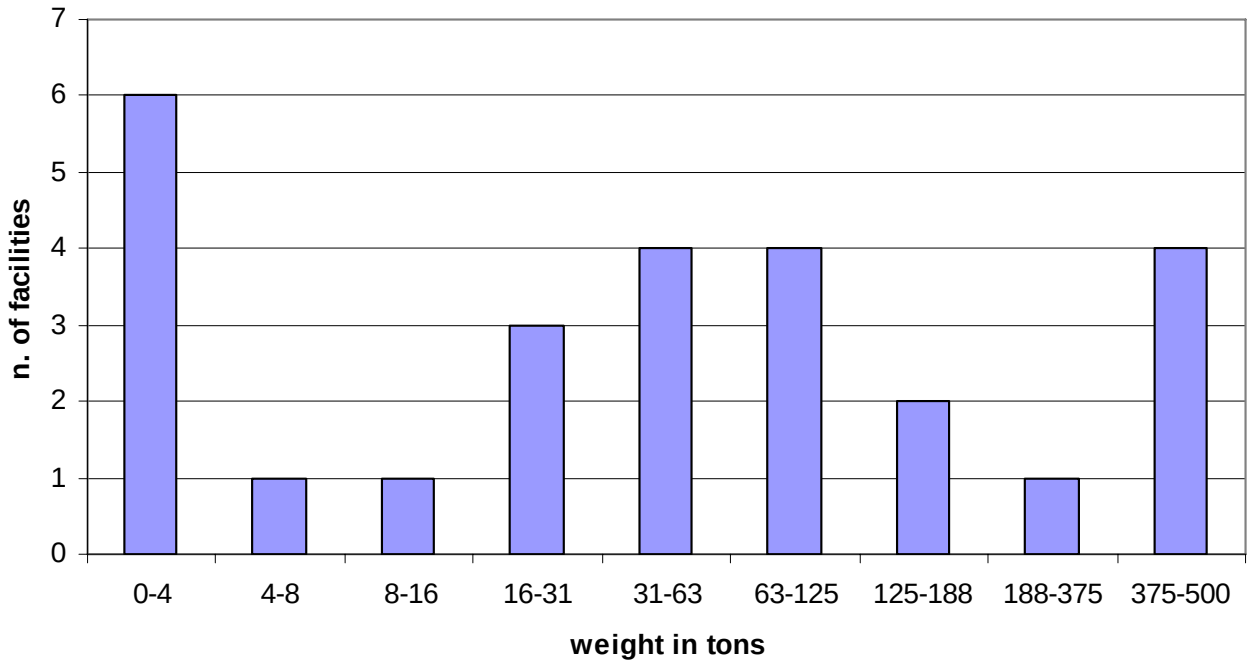


Comment

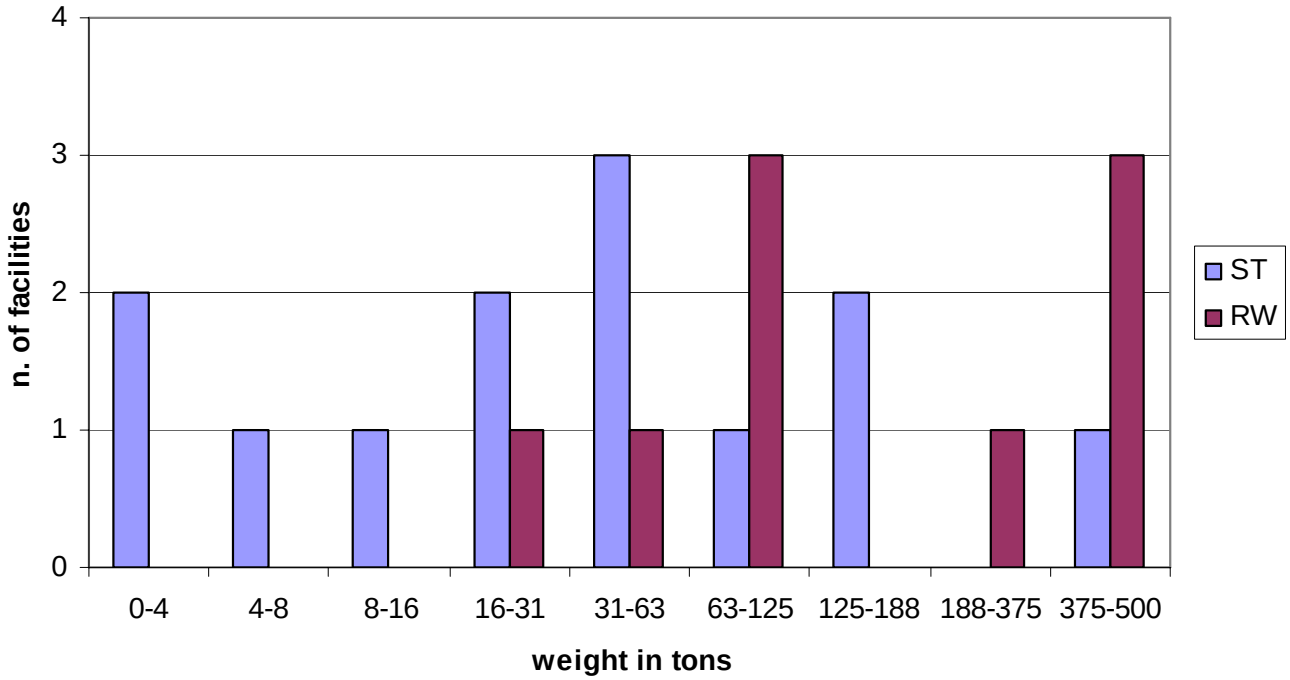
All types of seismic testing facilities are well represented.

Questions 2
What is the capacity of your facility for a seismic test?

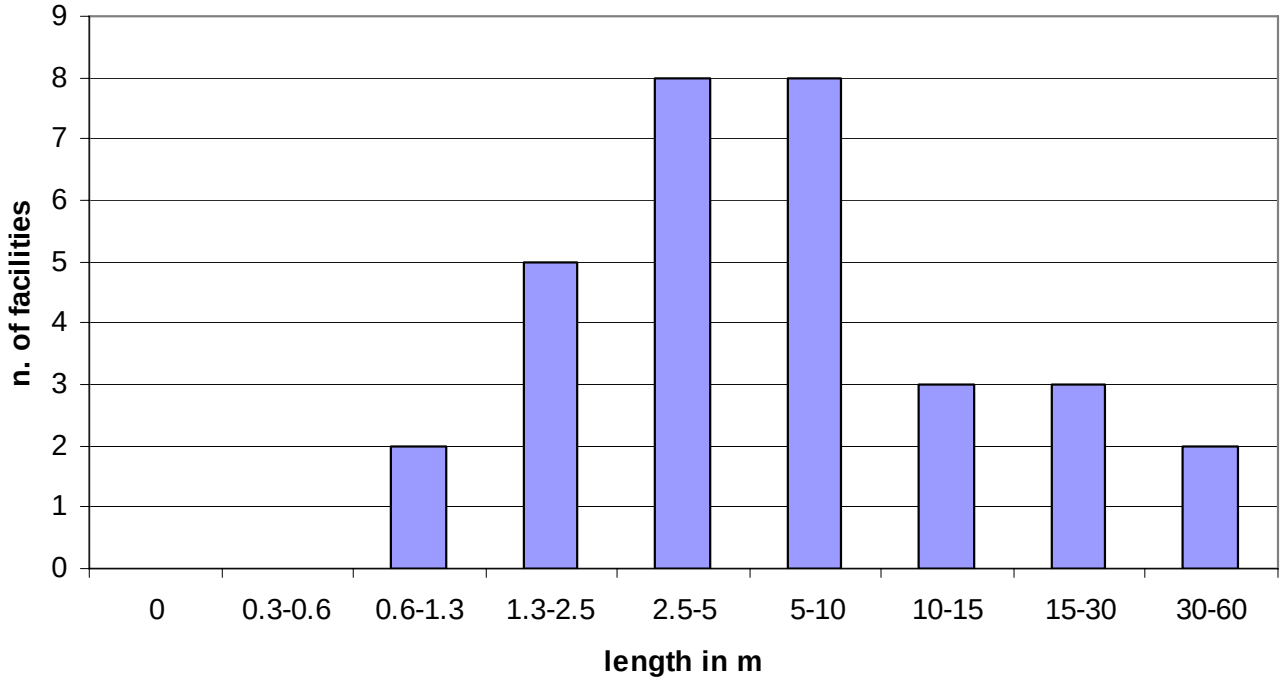
Results
Maximum weight of the specimen (in ton) considering all type of testing facilities:



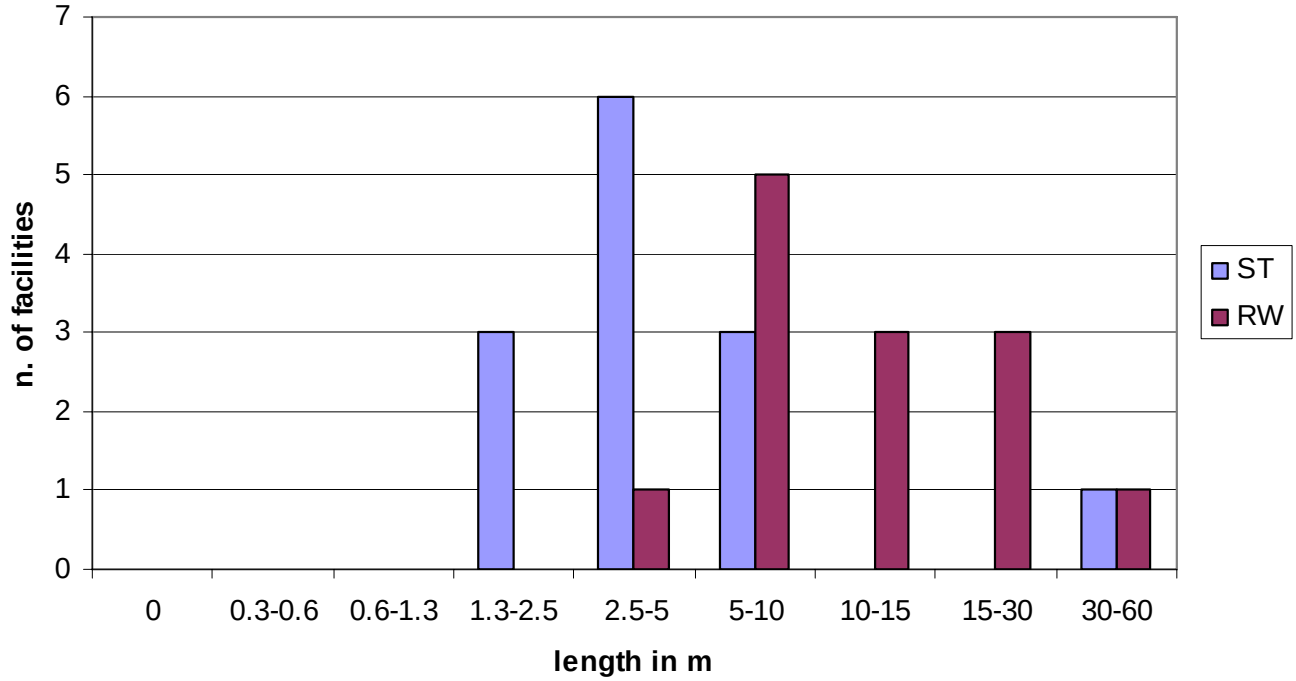
Maximum weight of the specimen (in ton) considering only Shaking Table (ST) or Reaction Wall (RW) testing facilities:



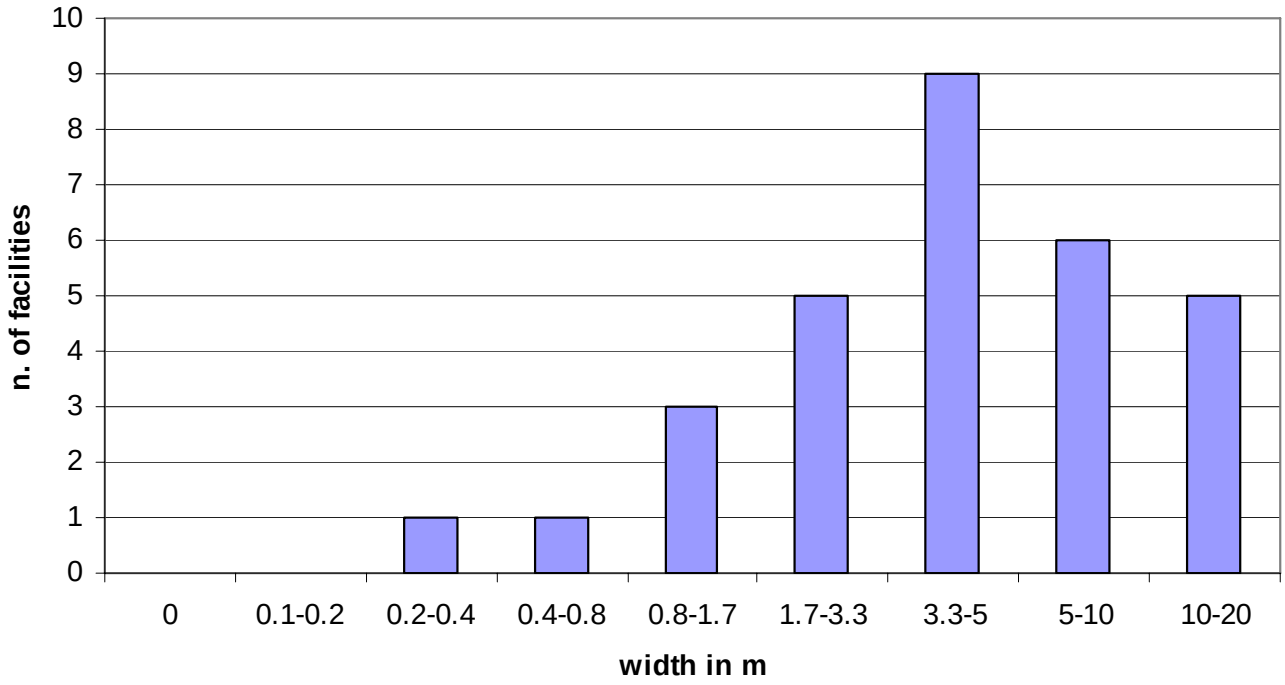
Maximum length (in m) considering all type of testing facilities:



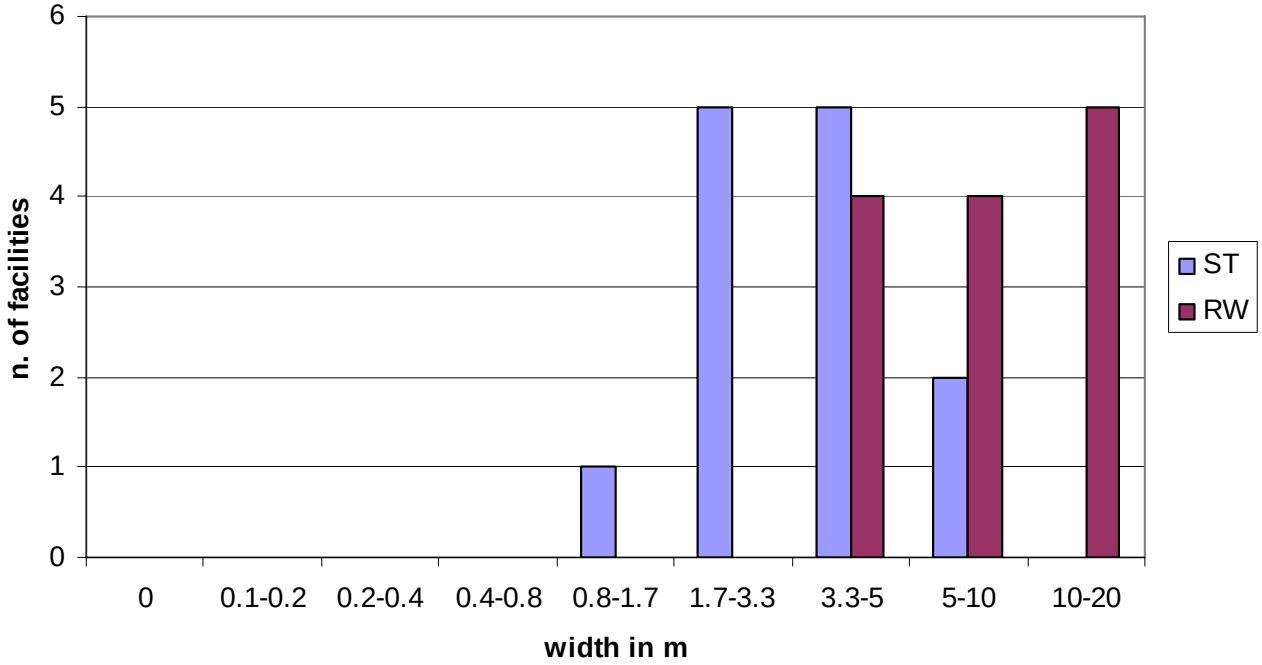
Maximum length (in m) considering only Shaking Table (ST) and Reaction Wall (RW) testing facilities:



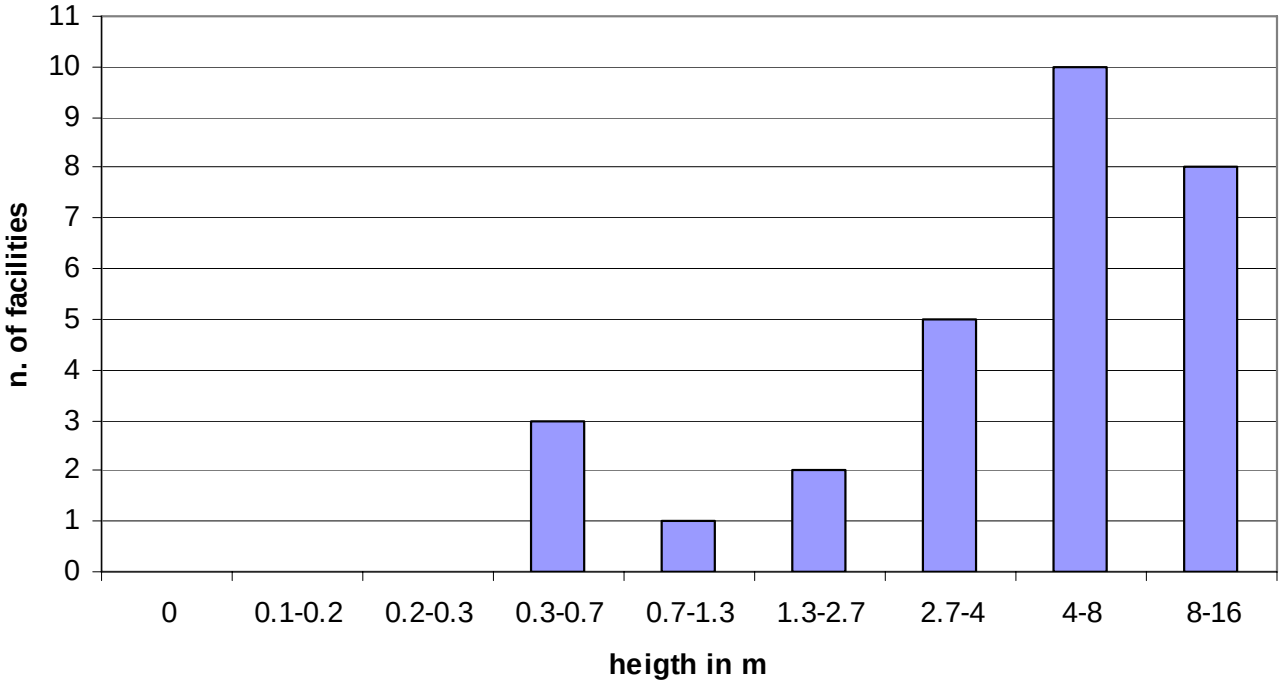
Maximum width (in m) considering all type of testing facilities:



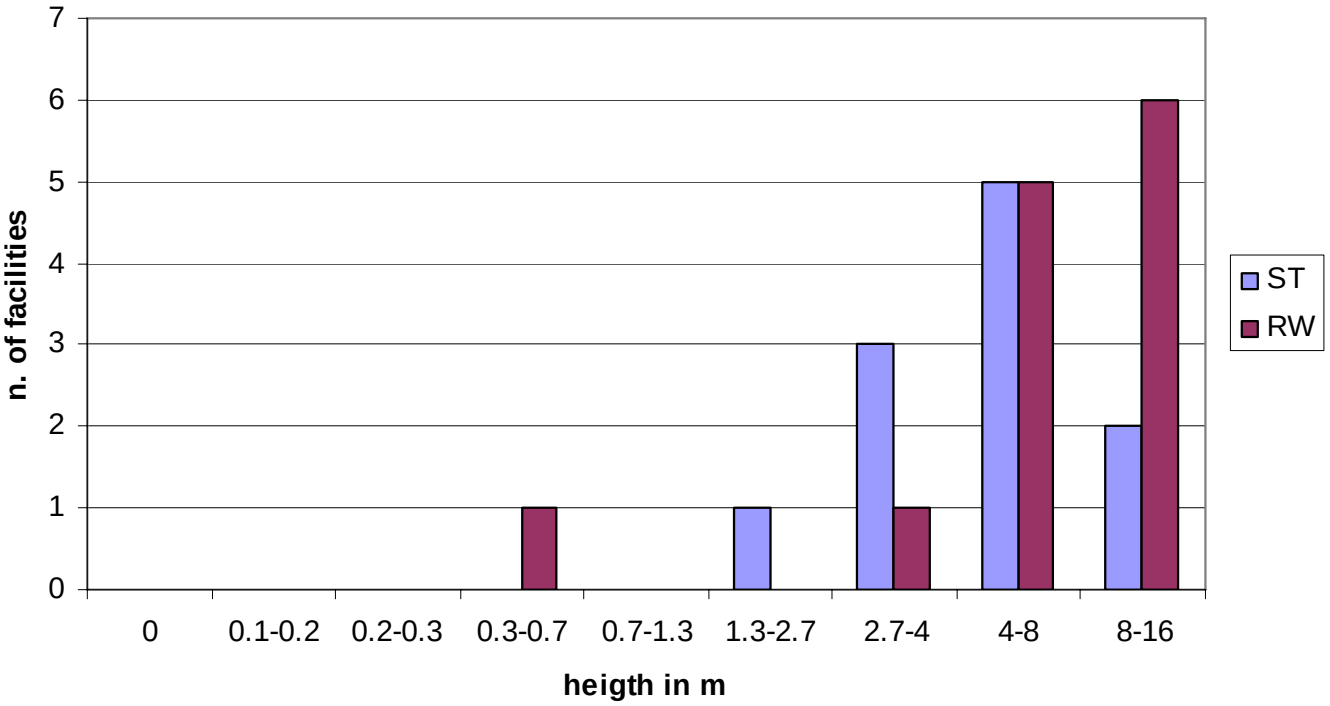
Maximum width (in m) considering only Shaking Table (ST) and Reaction Wall (RW) testing facilities:



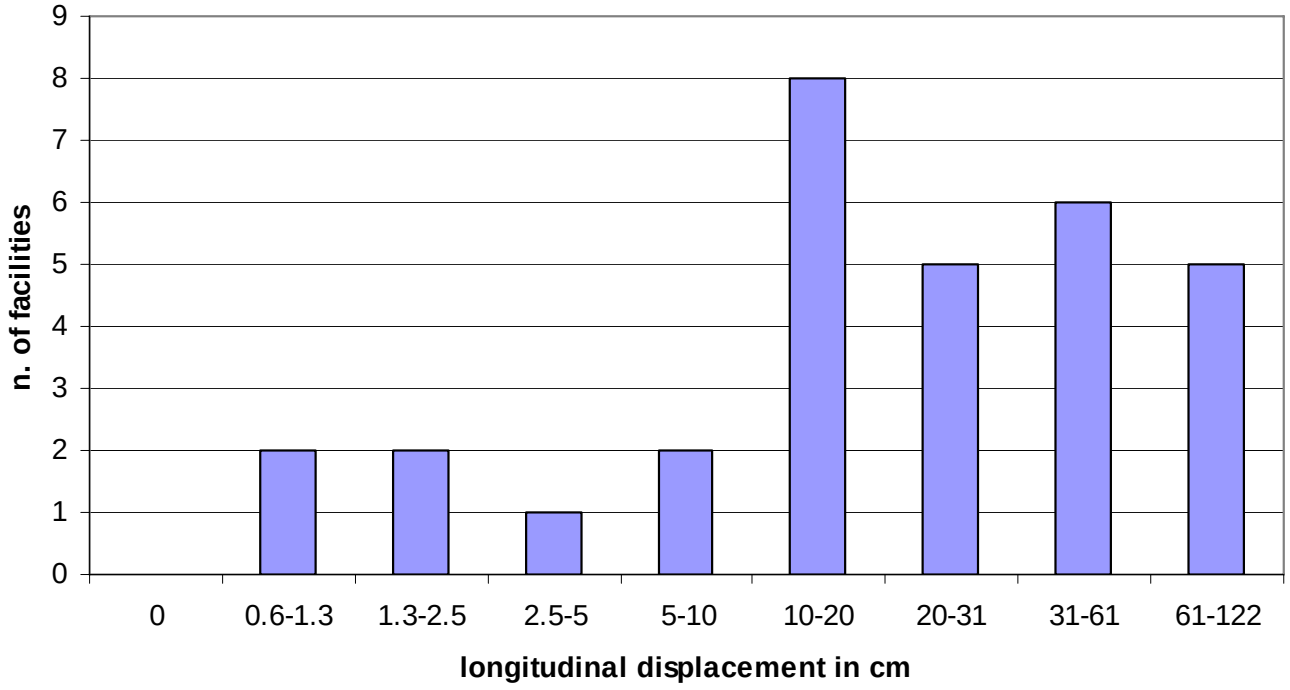
Maximum height (in m) considering all type of testing facilities:



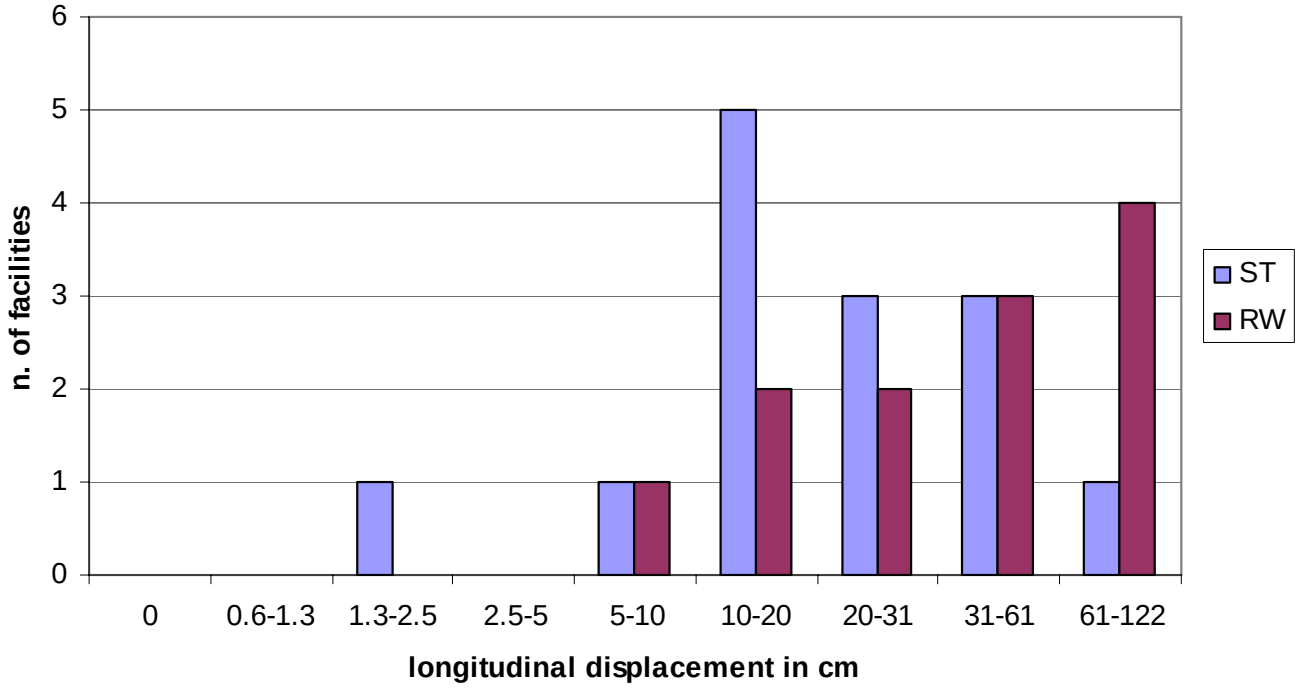
Maximum height (in m) considering only Shaking Table (ST) and Reaction Wall (RW) testing facilities:



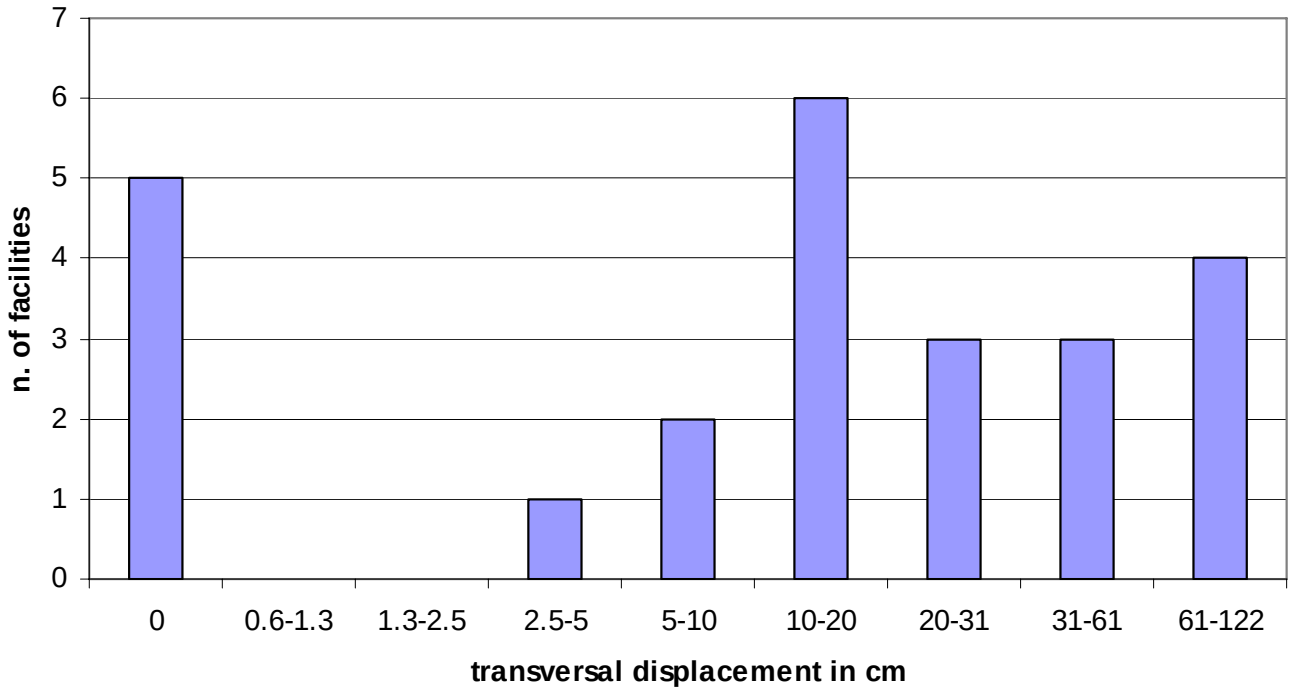
Maximum longitudinal displacement (in cm) considering all type of testing facilities:



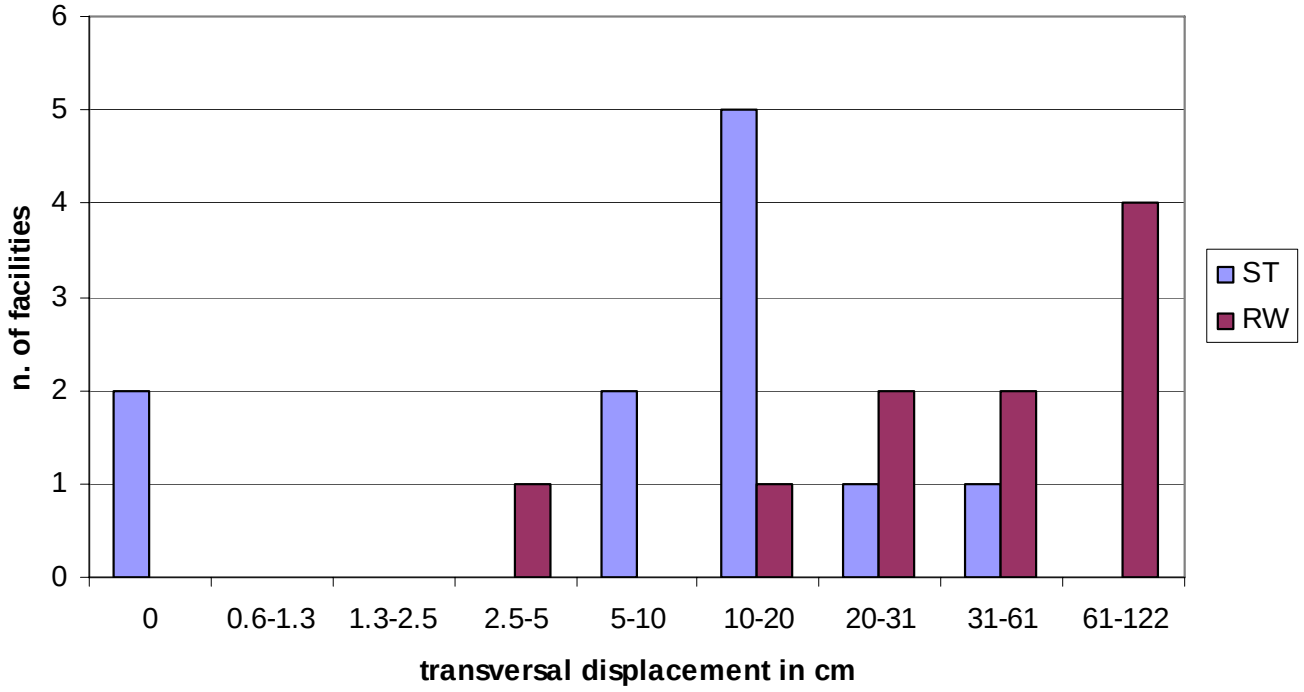
Maximum longitudinal displacement (in cm) considering only Shaking Table (ST) and Reaction Wall (RW) testing facilities:



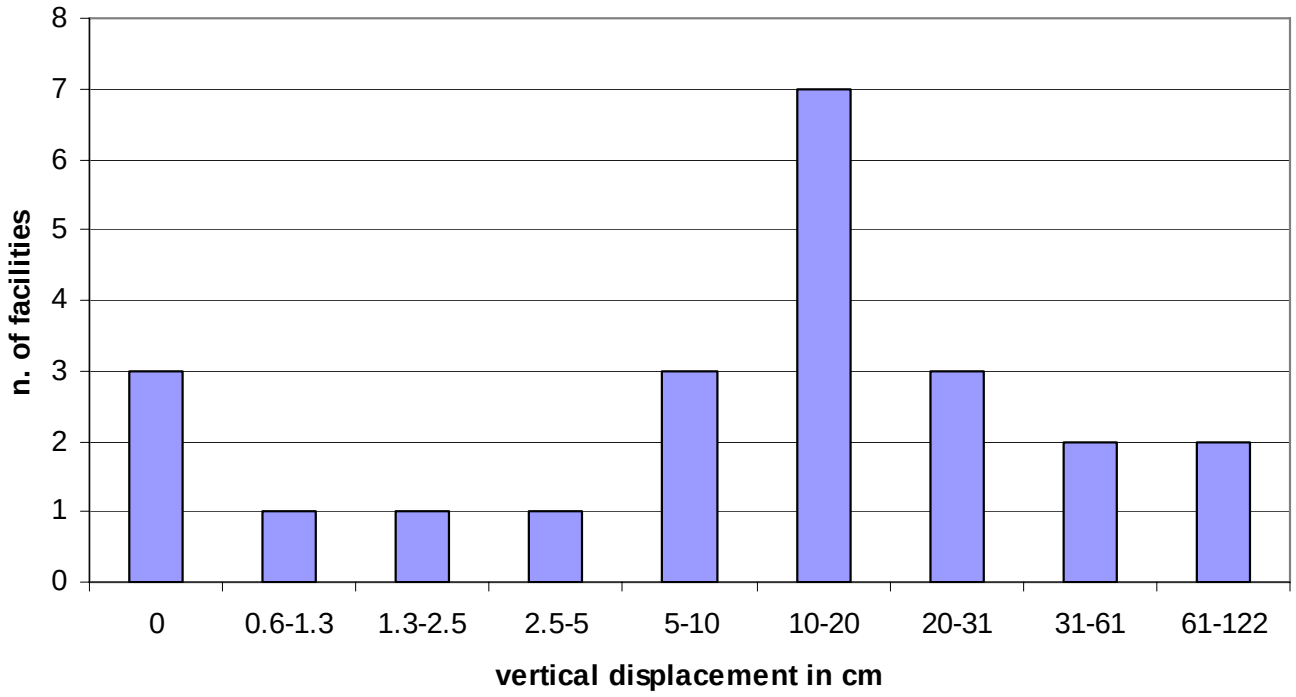
Maximum transversal displacement (in cm) considering all type of testing facilities:



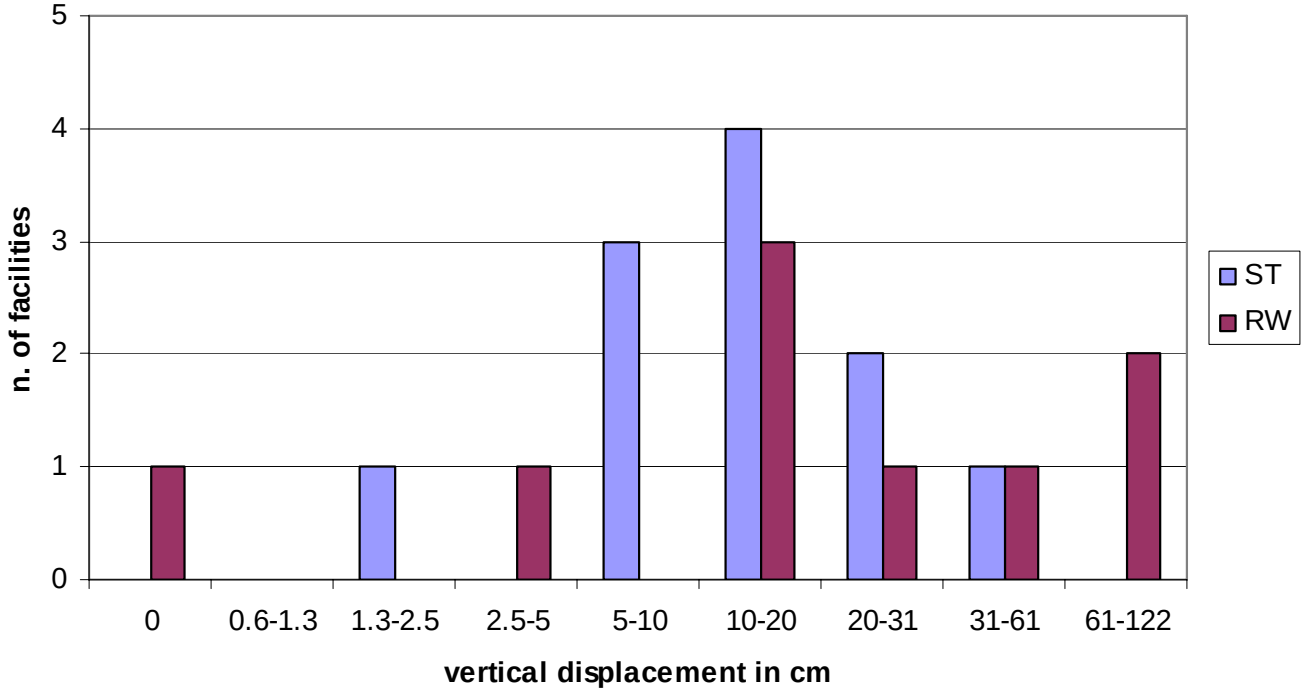
Maximum transversal displacement (in cm) considering only Shaking Table (ST) and Reaction Wall (RW) testing facilities:



Maximum vertical displacement (in cm) considering all type of testing facilities:



Maximum vertical displacement (in cm) considering only Shaking Table (ST) and Reaction Wall (RW) testing facilities:



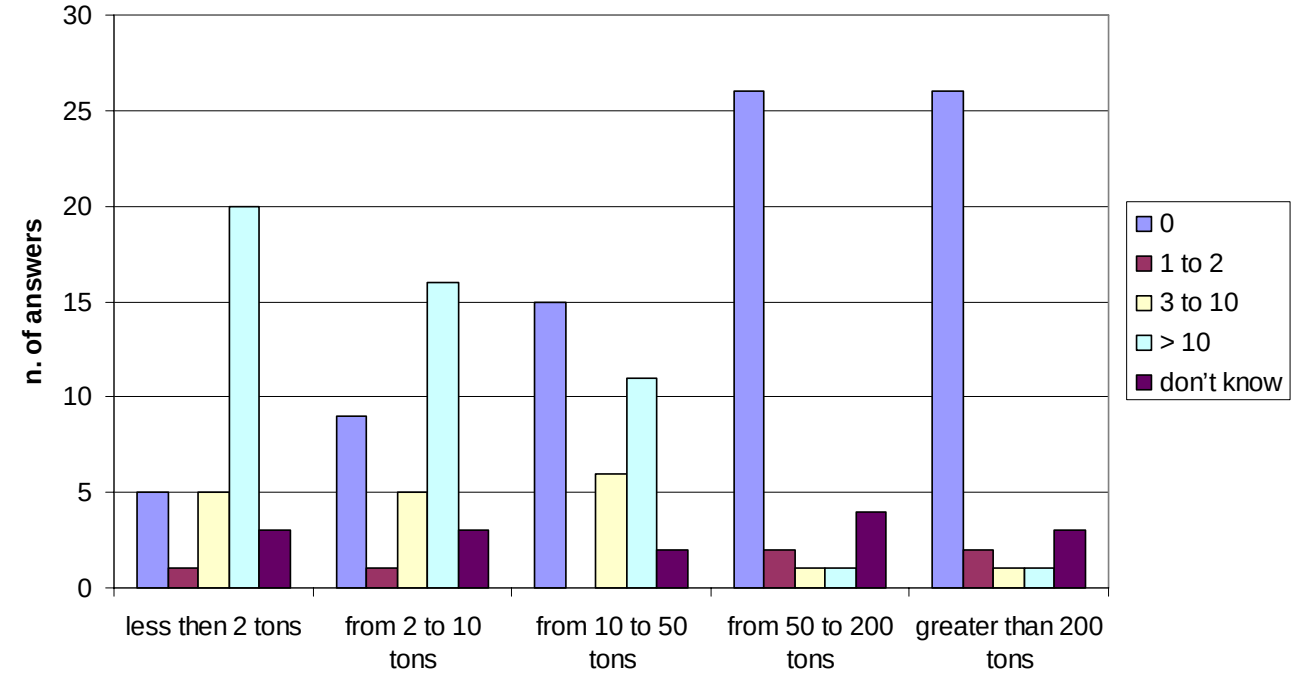
Comment

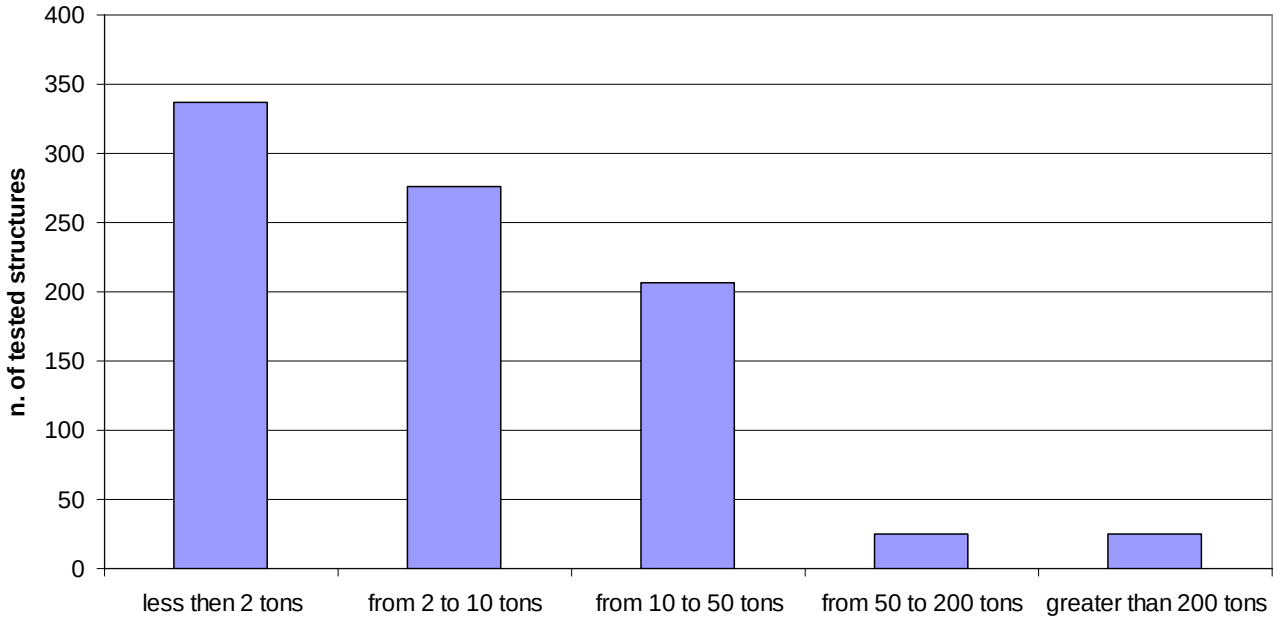
Regarding the maximum weight, length, width and height, the upper values are for Reaction Walls (RW) facilities, the lower values for Shaking Tables (ST) facilities. Regarding the maximum displacement that the testing facility can realize, it is interesting to notice that some facilities cannot perform tests in the transversal and the vertical direction.

Questions 3

Approximately, how many specimens have been seismically tested in your facility for each one of the following ranges of weight?

Results





Comment

The first diagram must be read as follows: for each class of weight there is a coloured histogram representing how many laboratories have answered for each range of number of performed tests. For example: for specimens with a weight higher than 200 tons (group on the right) there where 26 laboratories who answered they didn't perform any test (blue), 2 laboratories answered they have performed 1 or 2 tests (red), 1 has answered he has performed from 2 to 10 tests (yellow), 1 has answered he has performed more than 10 tests (cyan) and 3 laboratories answered they don't know (brown).

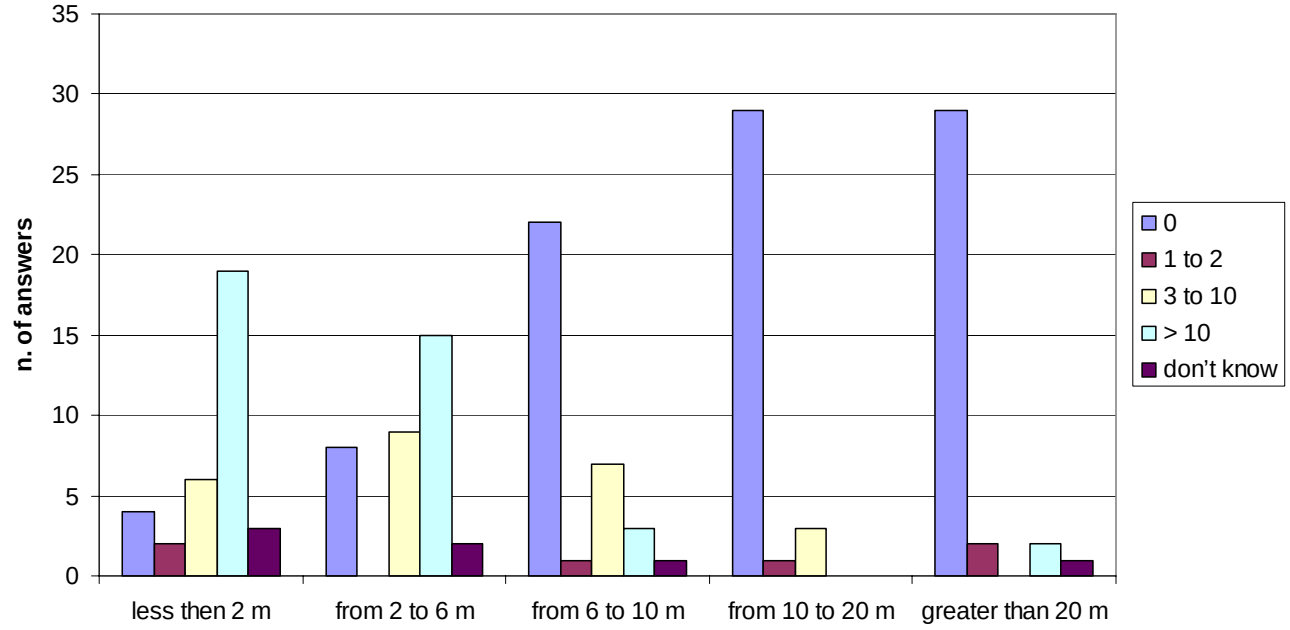
The second diagram is obtained by multiplying the number of answers times the number of tested specimens according with the formula: $n_{test} = n_{answers}^{1to2} \times 1.5 + n_{answers}^{3to7} \times 7 + n_{answers}^{>10} \times 15$

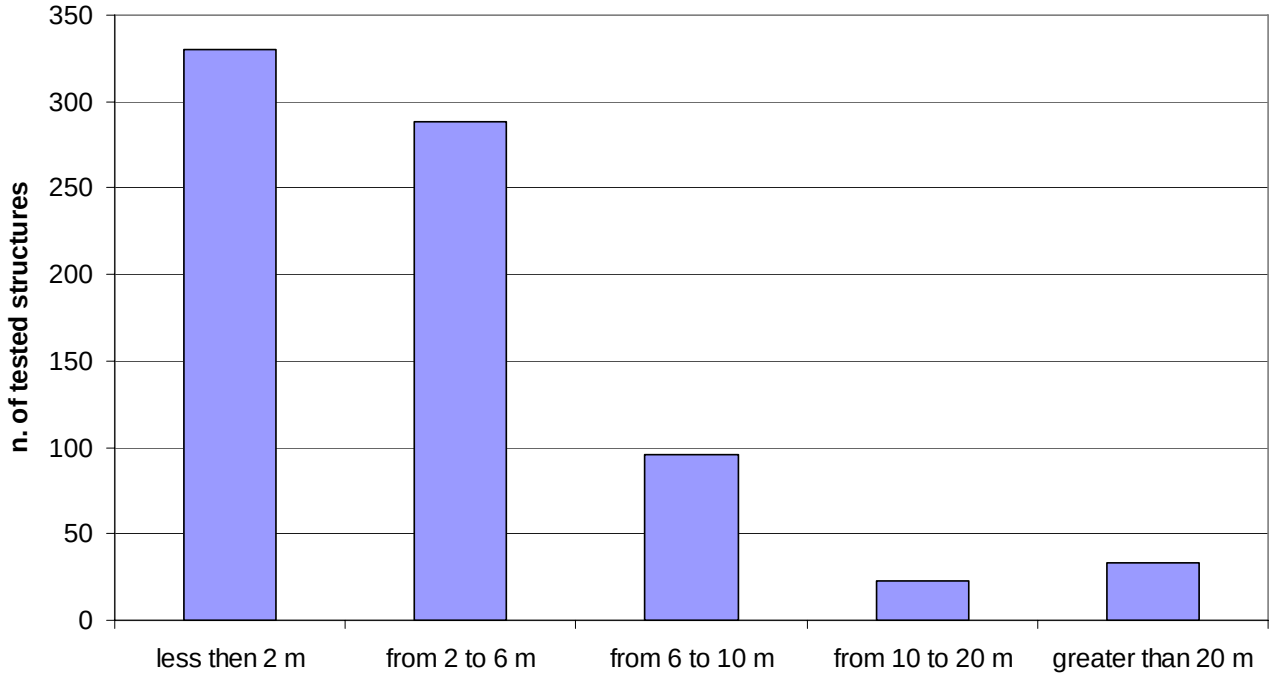
The figure clearly shows that have been tested many light specimens but very few heavy specimens.

Questions 4

Approximately, how many specimens have been seismically tested in your facility for each one of the following ranges of length?

Results





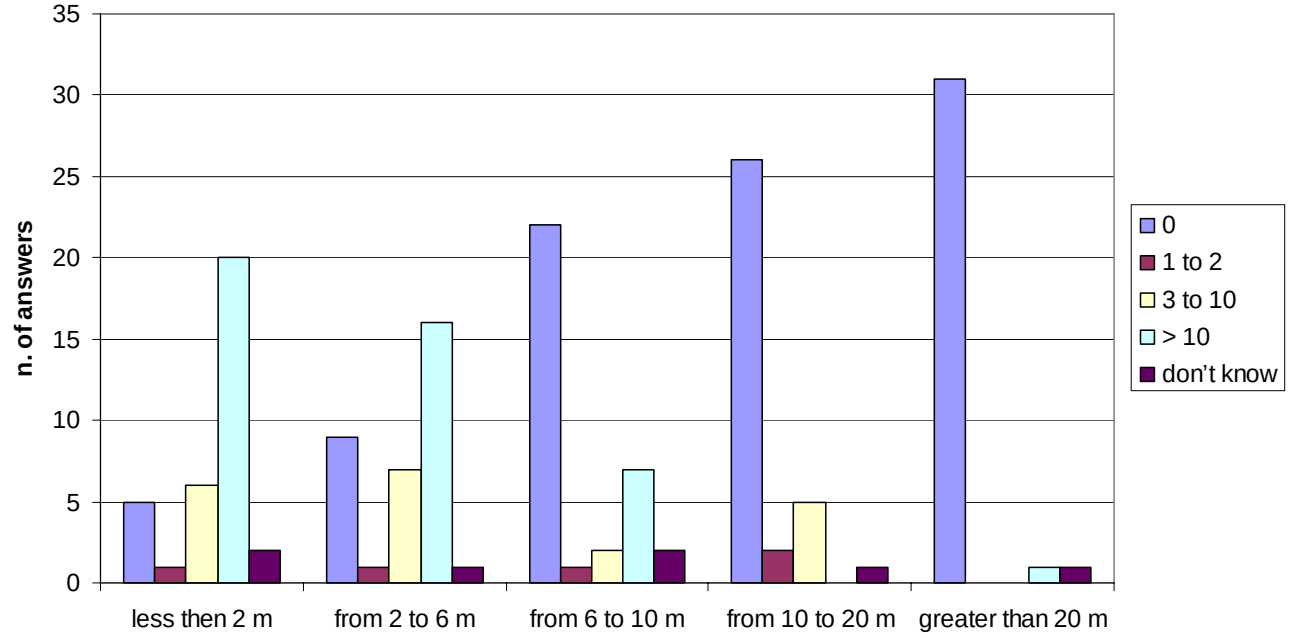
Comment

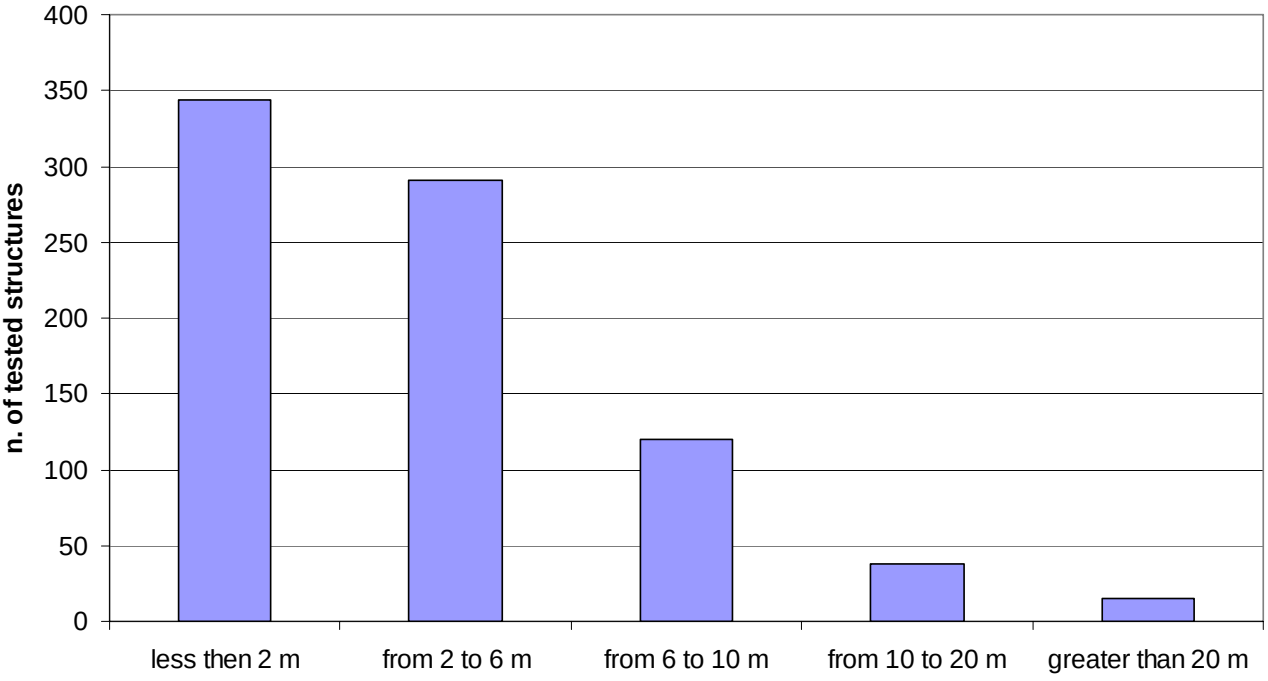
Many structures were tested with small length, very few with large length.

Questions 5

Approximately, how many specimens have been seismically tested in your facility for each one of the following ranges of height?

Results





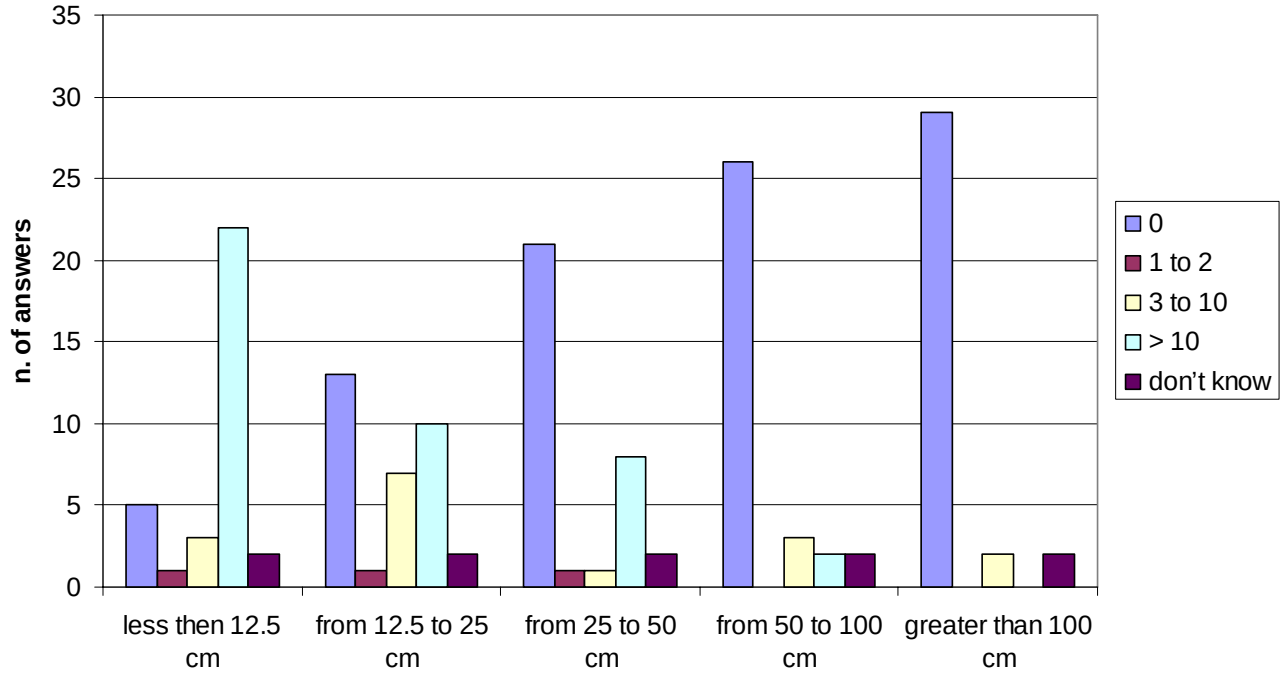
Comment

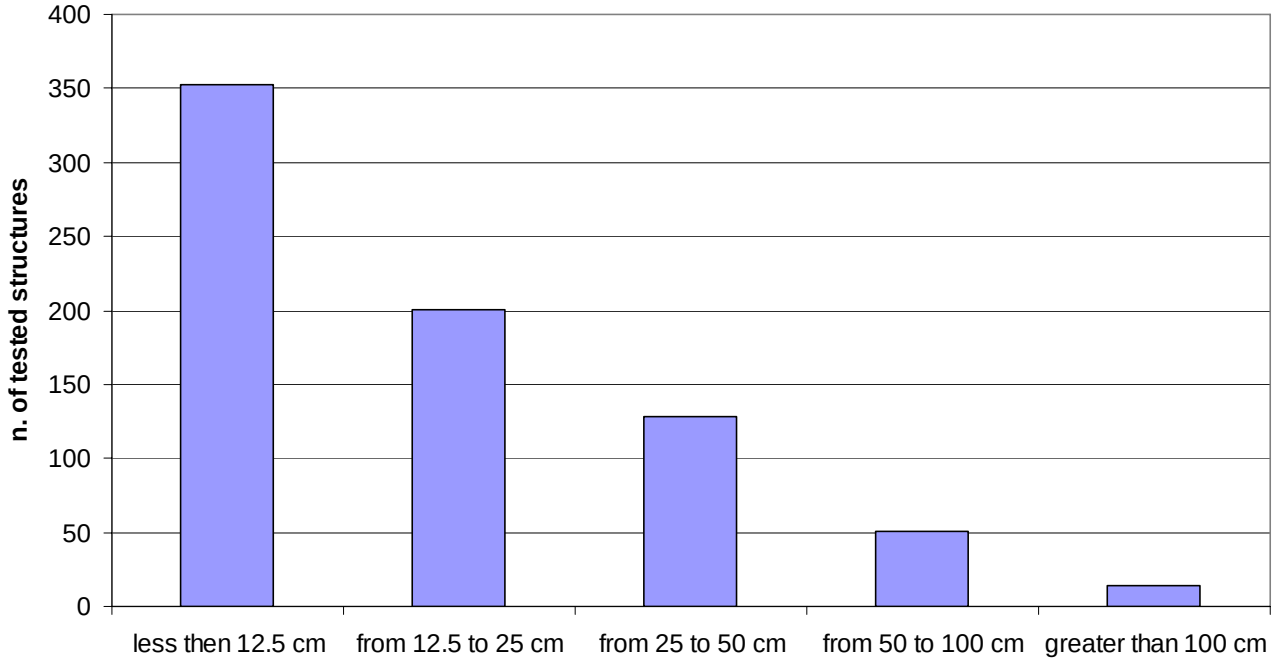
Many structures were tested with small height, very few with large height.

Questions 6

Approximately, how many specimens have been seismically tested in your facility for each one of the following ranges of peak-to-peak longitudinal displacement?

Results





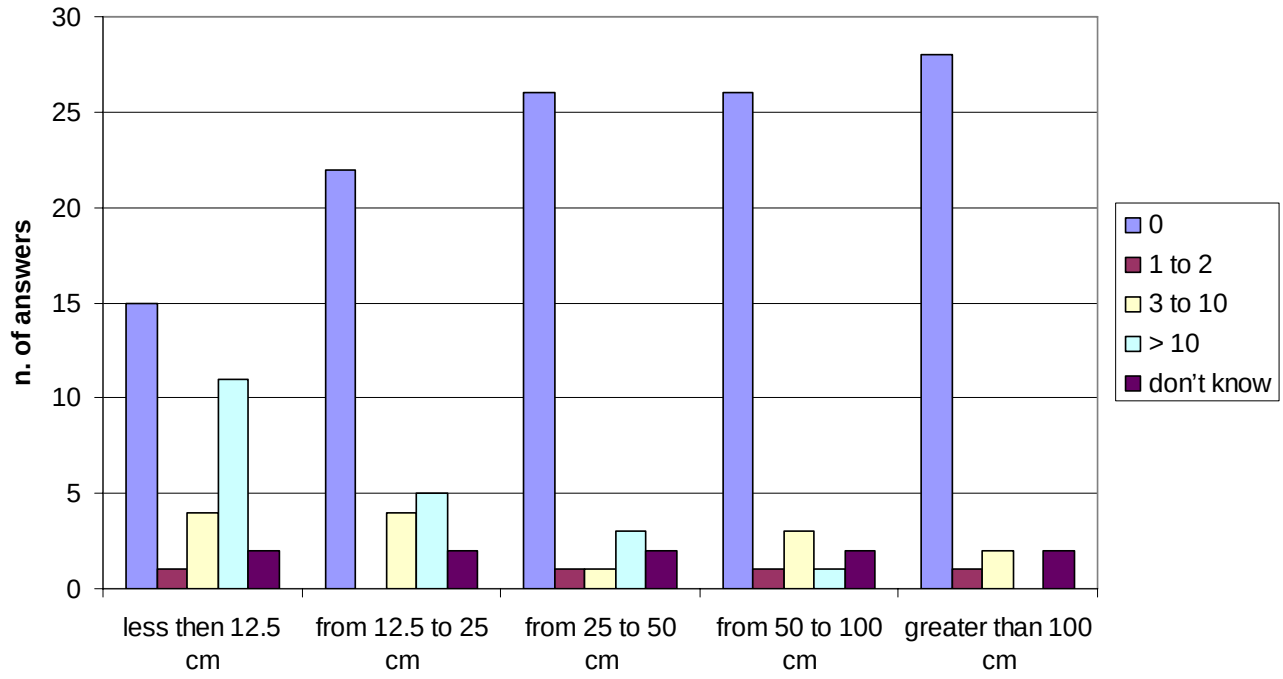
Comment

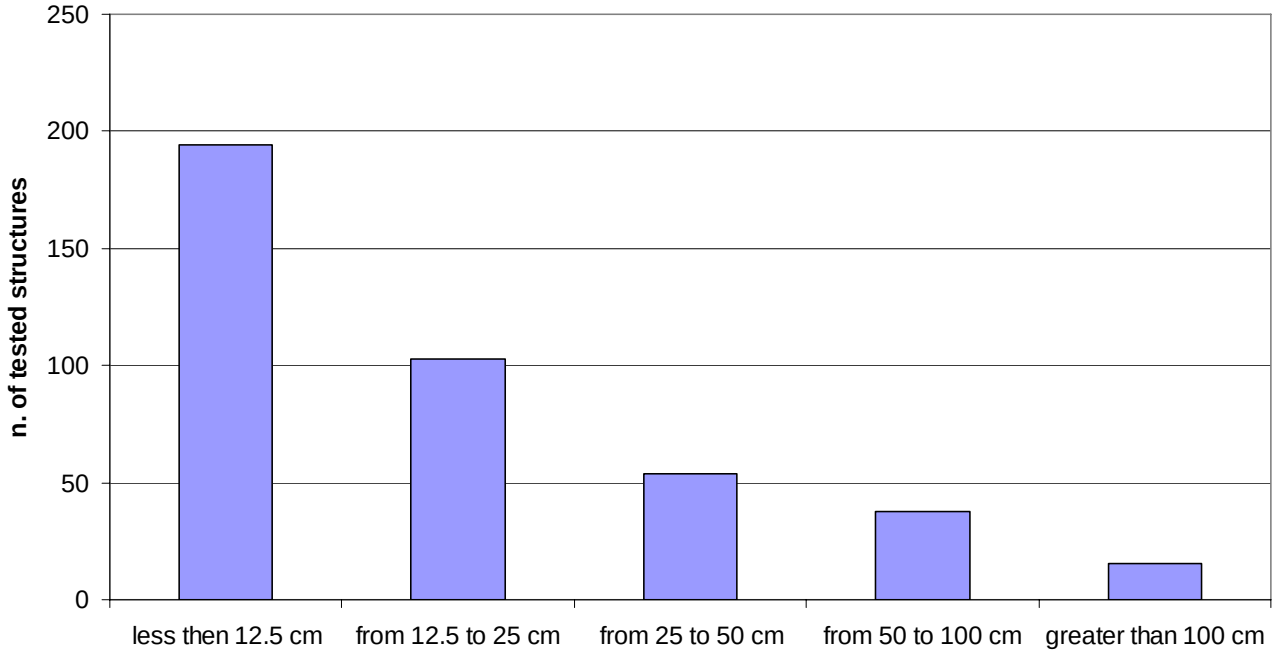
Many structures were tested with small displacements, very few with large displacements.

Questions 7

Approximately, how many specimens have been seismically tested in your facility for each one of the following ranges of peak-to-peak transversal displacement?

Results





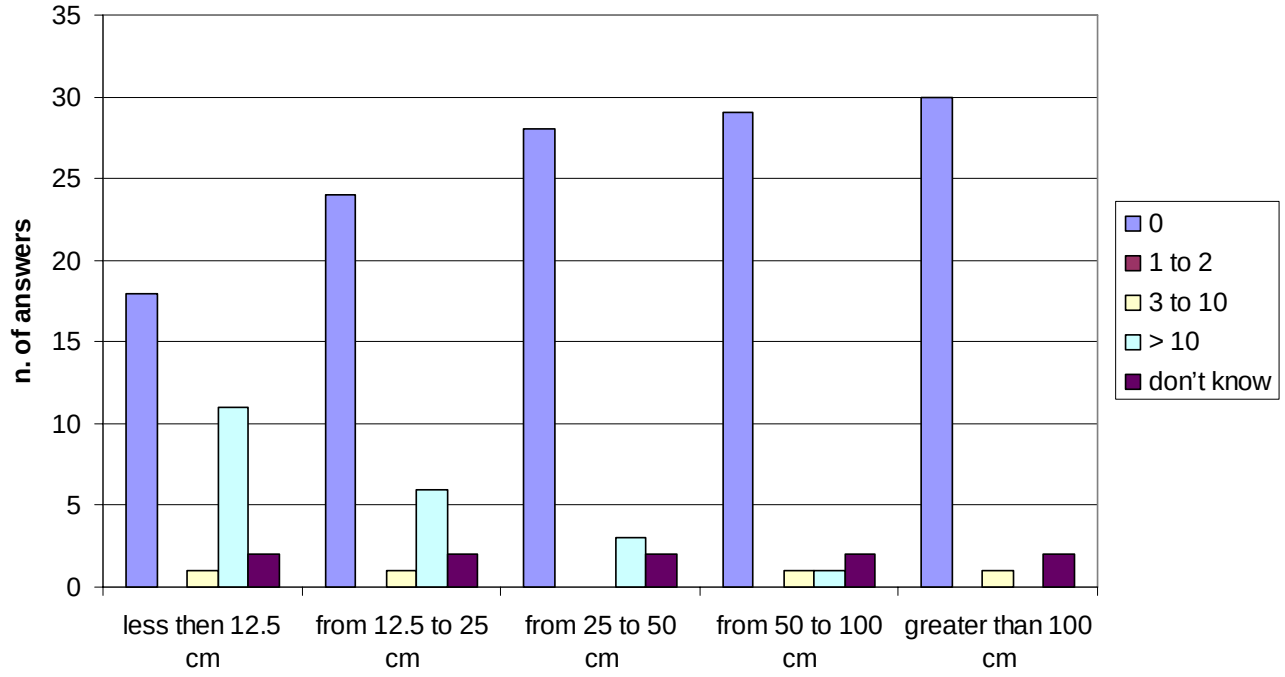
Comment

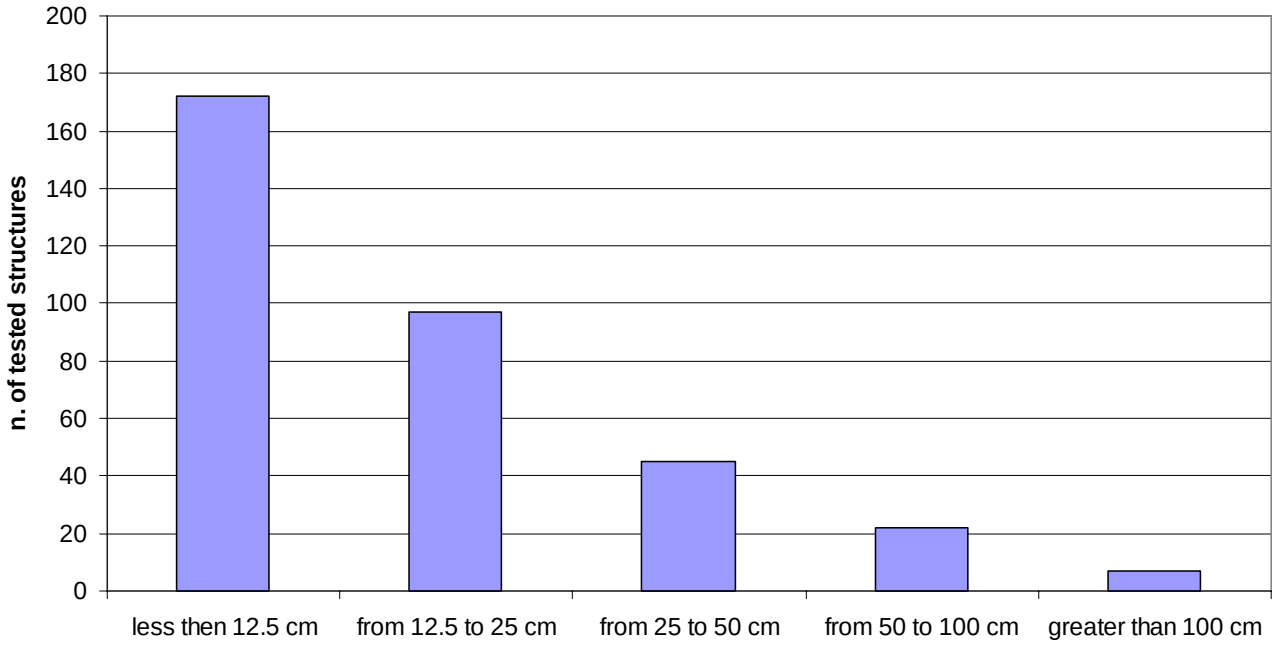
Many structures were tested with small displacements, very few with large displacements. A comparison with the question number 6 shows that only few specimens were tested in transversal direction.

Questions 8

Approximately, how many specimens have been/will be seismically tested in your facility for each one of the following ranges of peak-to-peak vertical displacement?

Results





Comment

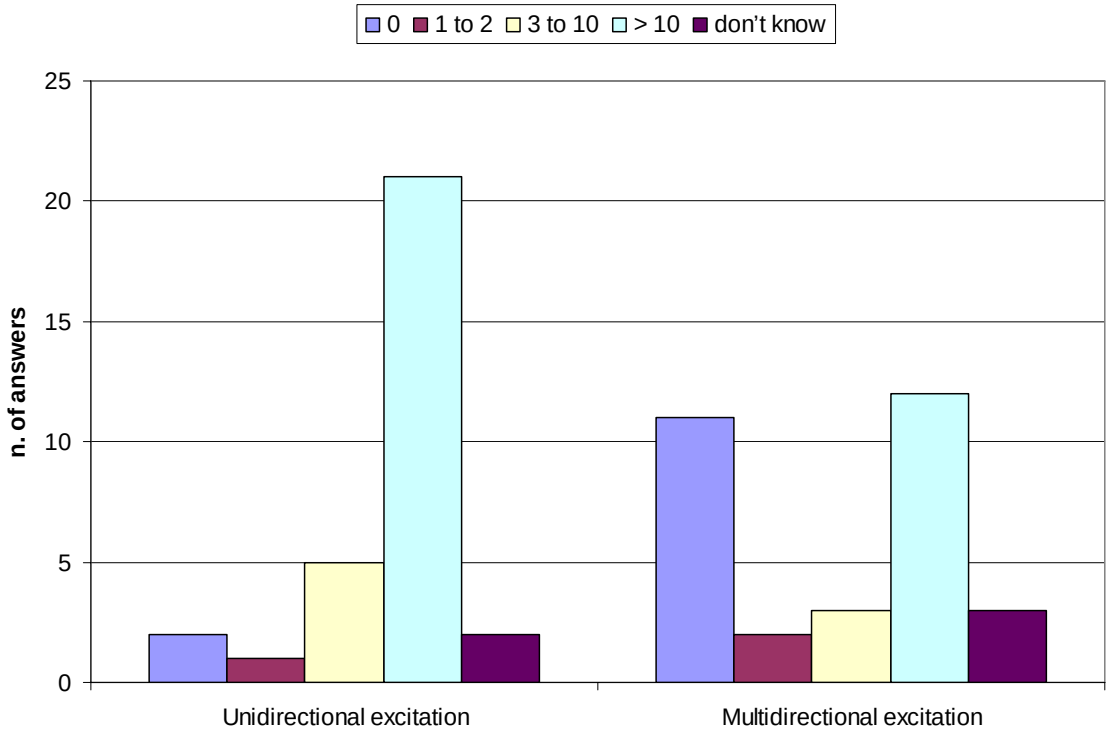
Many structures were tested with small displacements, very few with large displacements. A comparison with the questions number 6 and 7 shows that only few specimens were tested in vertical direction.

Questions 9

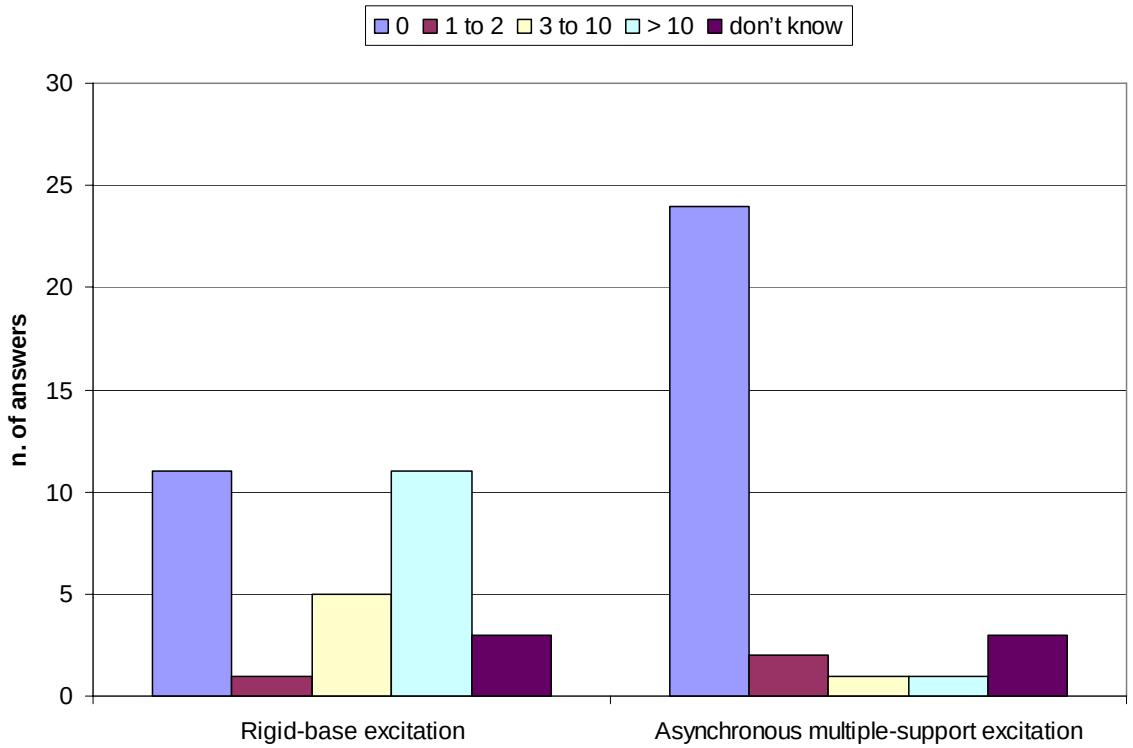
Approximately, how many specimens have been seismically tested in your facility with each one of the following specific techniques?

Results

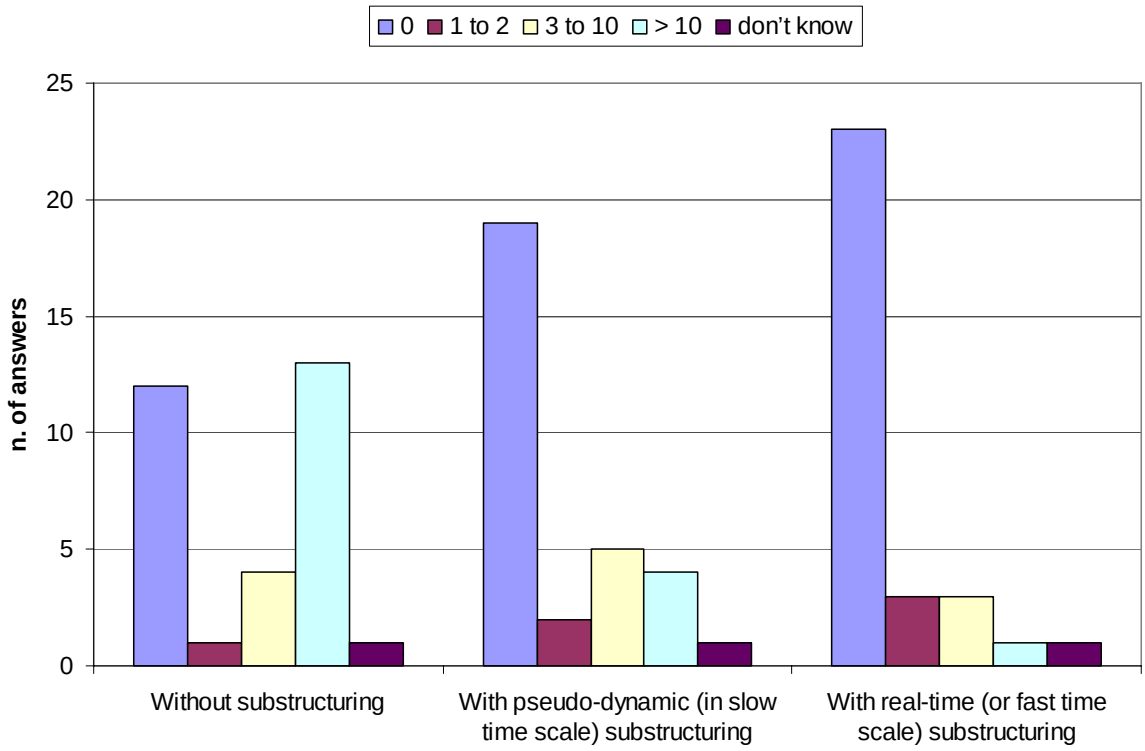
Unidirectional and multidirectional excitation:



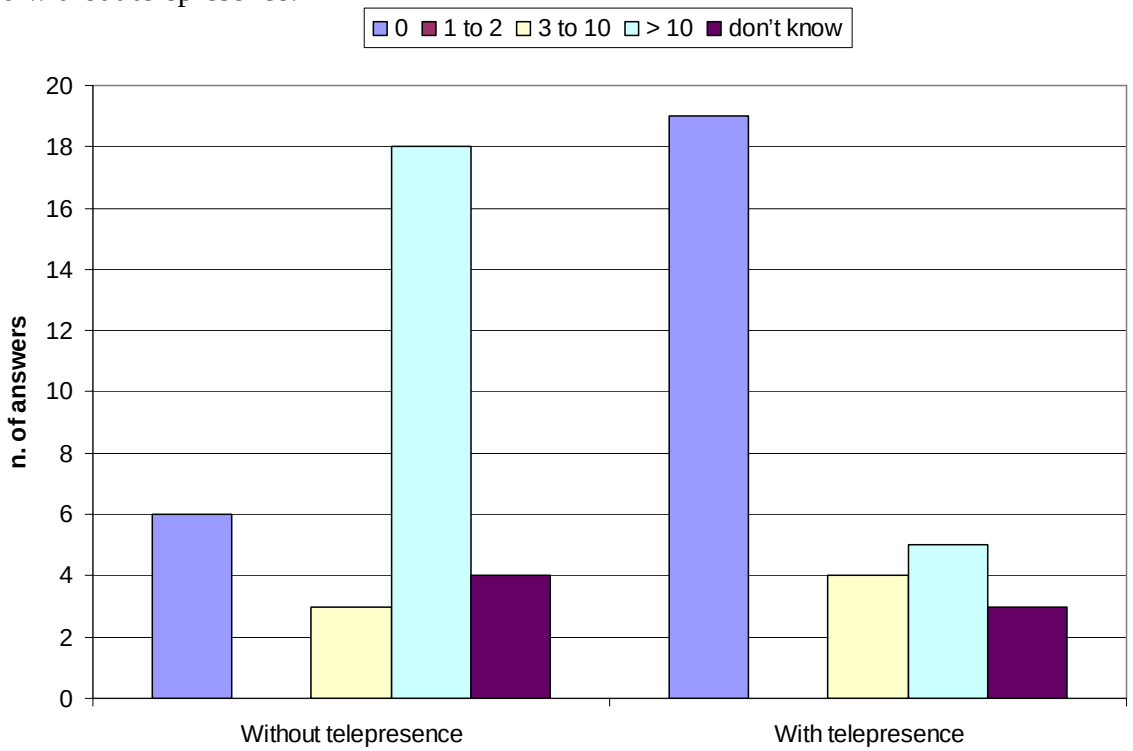
Rigid-base excitation and asynchronous multiple-support excitation:



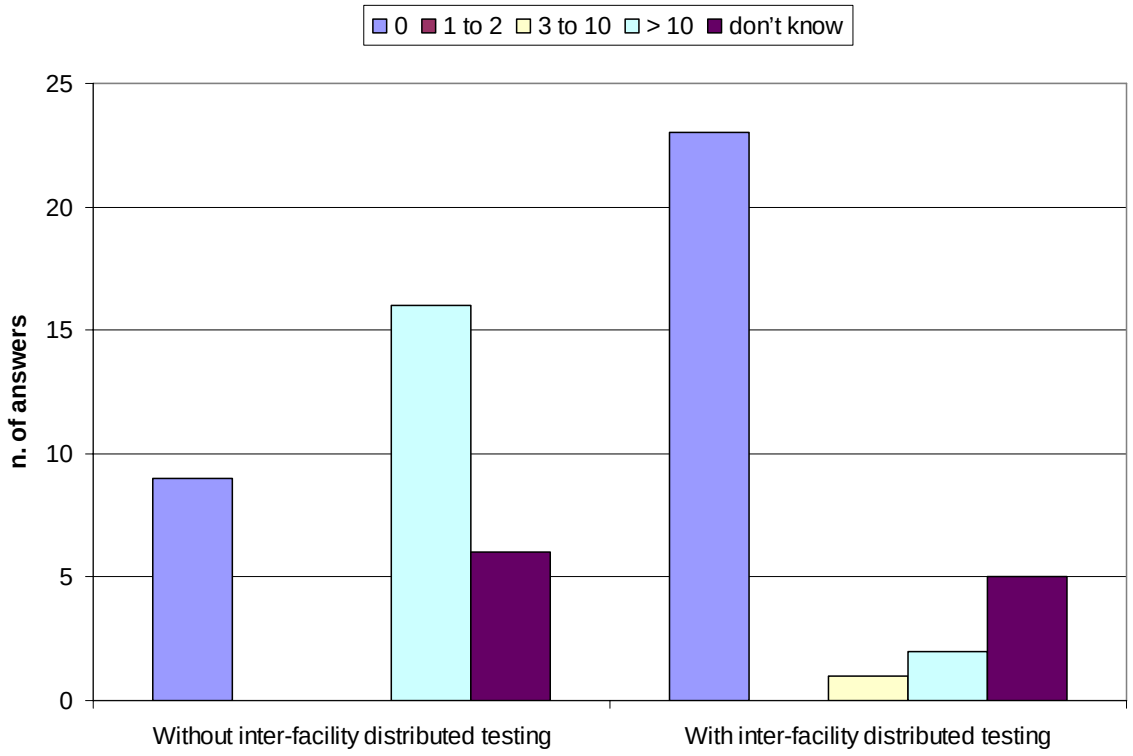
Without substructuring, with pseudo-dynamic (in slow time scale) substructuring and with real-time (or fast time scale) substructuring:



With and without telepresence:



With and without inter-facility distributed testing:



Comment

Presently, there is a prevalence of unidirectional excitation tests even if several multidirectional excitation tests were also performed.

Rigid-base excitation is strongly the most common choice while asynchronous multiple-support excitation tests are very rare.

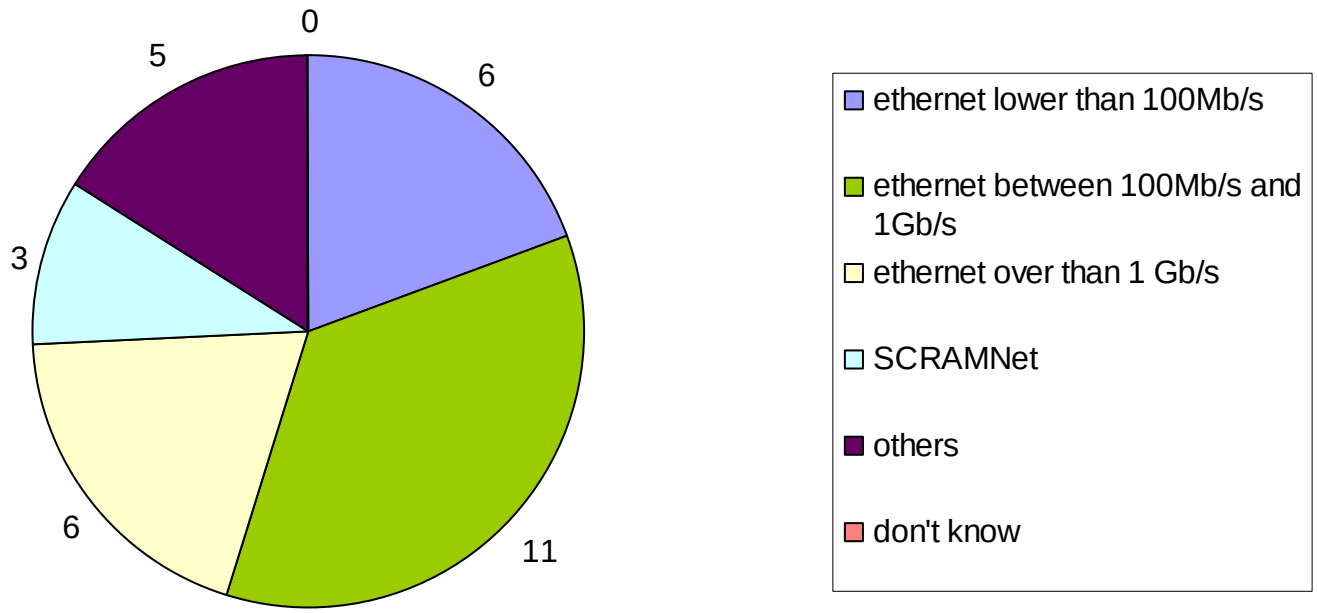
Tests are usually performed without substructuring, sometimes with pseudo-dynamic (in slow time scale) substructuring and only in very few cases with real-time (or fast time scale) substructuring.

Telepresence is sometimes used, but the majority of the conducted tests were without telepresence.

Tests with inter-facility distributed testing are very rare, the almost totality of the performed tests being without inter-facility distributed characteristics.

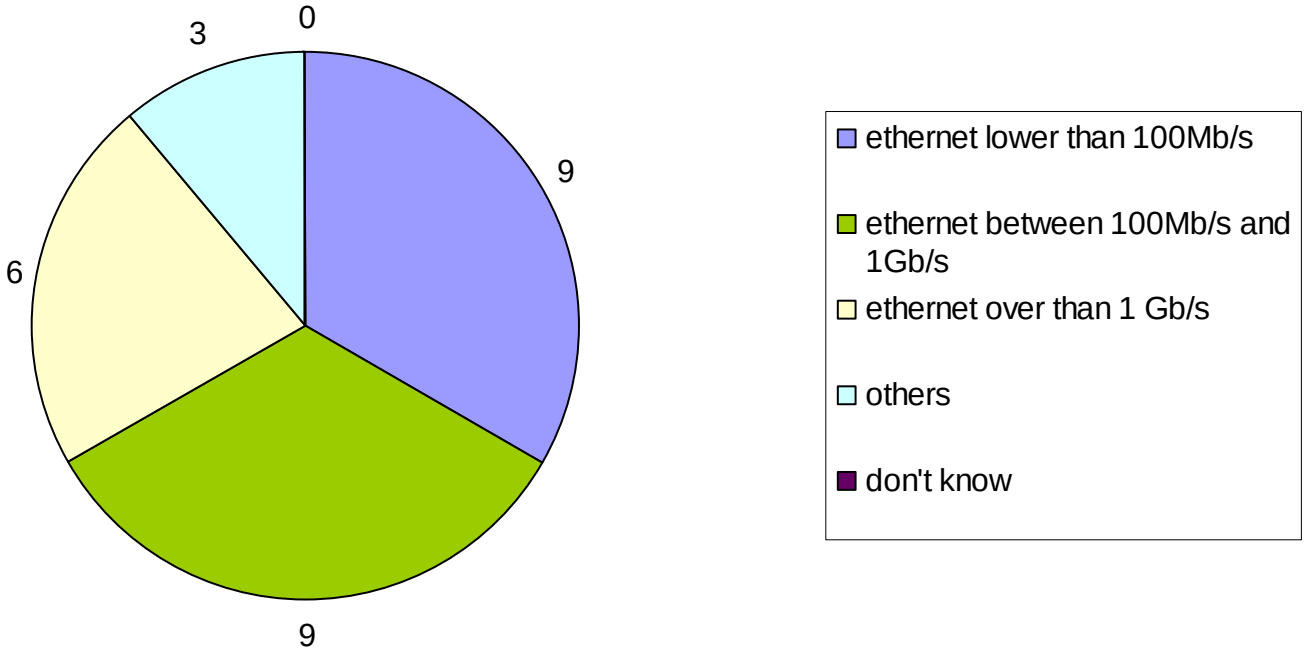
Questions 10
What is the type of the informatics network internal to your laboratory?

Results

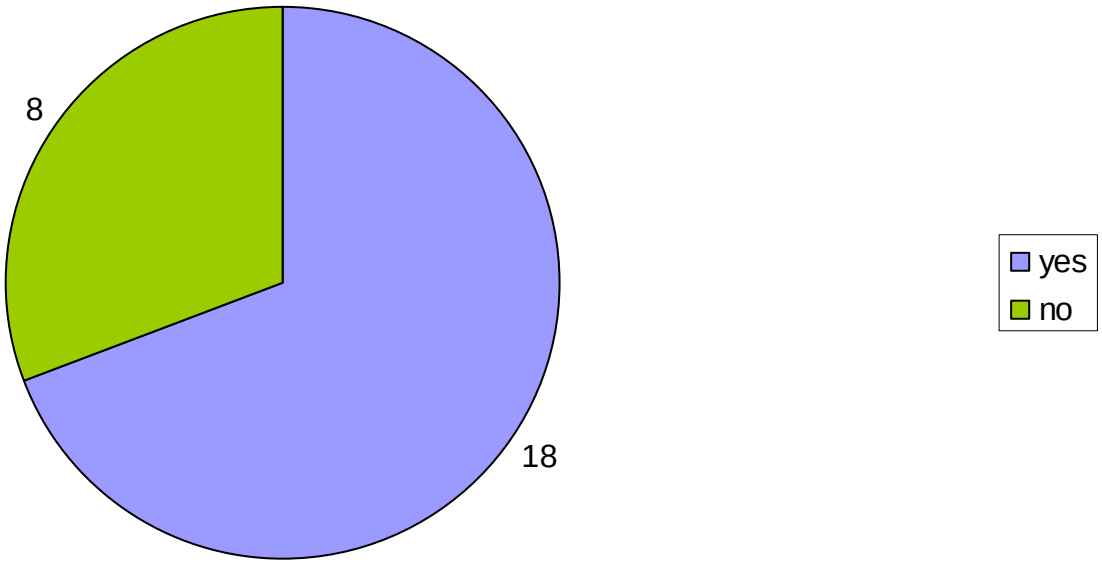


Questions 11
What is the type of the informatics network connecting your laboratory with the other laboratories?

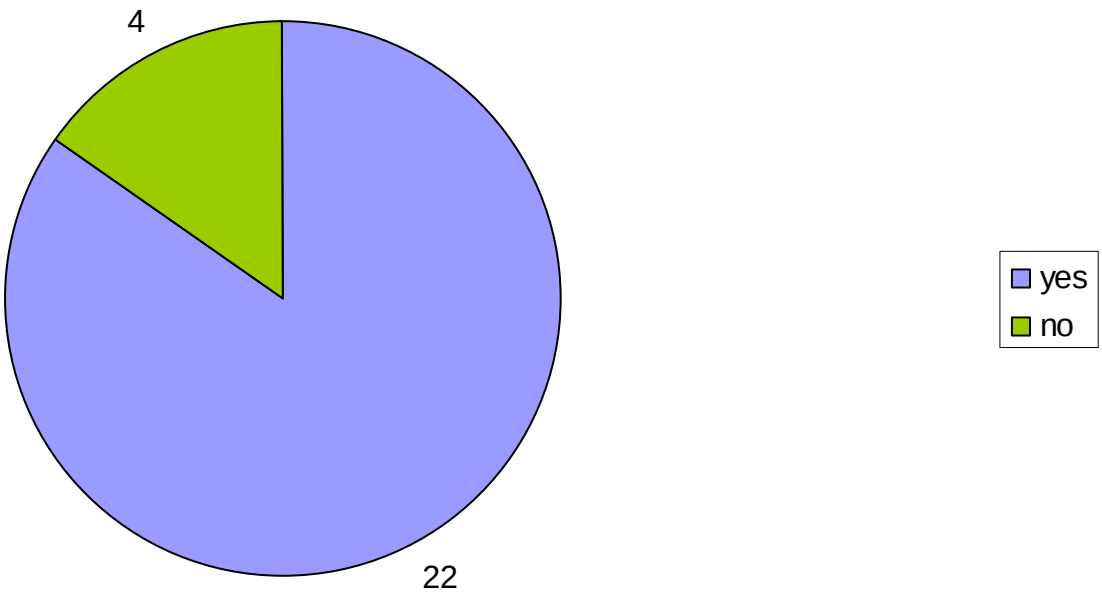
Results



Do you use an authentification system?

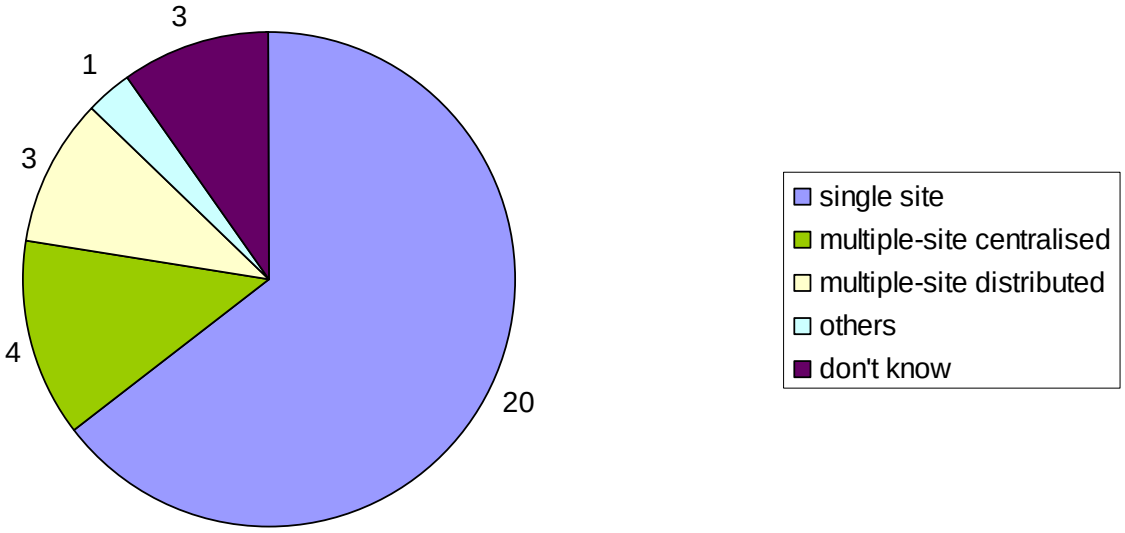


Do you have a corporate firewall?



Questions 12
What is the type of database of test results?

Results



INQUIRY FOR NUCLEAR ENERGY AND CHEMICAL INDUSTRY ACTIVITIES

This set of questions is divided into 15 parts. The detailed results for each question are reported hereafter. The inquiry was sent to 100 nuclear energy and chemical industries around the word. Presently, we received back 29 compiled inquiries, so the percentage of success is 29%. As in the previous set of questions, this means that the statistical analysis of the obtained results must be viewed as indicative since the sample may be not fully representative of the whole stock.

The following table contains the list of the compiled inquiries.

List of compiled inquiries for
Nuclear Energy and Chemical Industry Activities

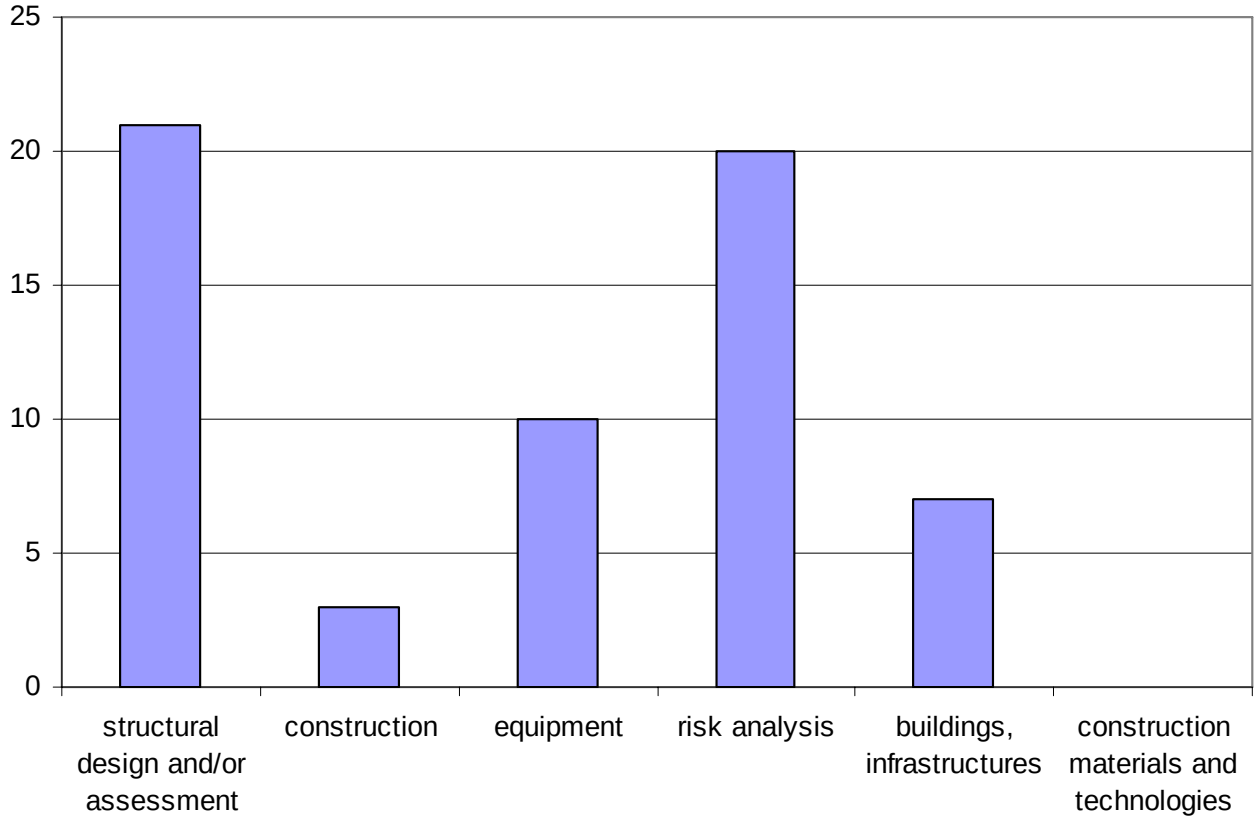
institution	country	contact
AIEA	Austria	Dr. Pierre Sollogoub
NRG	Belgium	Dr. Ferry Roelofs
NPP-Kozloduy	Bulgaria	Dr. Milan Milanov
AECL (Atomic Energy of Canada)	Canada	Dr. Medhat Elgohary
State Nuclear Power Technology Cooperation	China	Dr. Mao Chen
ASN (Autorité de Sûreté Nucléaire)	France	Dr. Dominique Boina
CEA	France	Dr. Ioannis Politopoulos
GDF SUEZ	France	Dr. Paul Rodrive
AREVA NP	France	Dr. Philippe Monette
VGB Power Tech e. V.	Germany	Dr. George Schäfer
GRS	Germany	Dr. Hans-Ulrich Felder
Nuclear Power Corporation of India Limited	India	Dr. A.G. Chhatre
Bhabha Atomic Research Centre	India	Dr. A.K. Ghosh
TERI	India	Dr. Ram Mohan Mulavana Parameswaran
Atomic Energy Regulatory Board	India	Dr. Prabir C. Basu
Indira Gandhi Centre for Atomic Research	India	Dr. S.D. Sajish
ENEL	Italy	Dr. Igino Chellini
Tokyo Electric Power Company	Japan	Dr. Kazuyuki Nagasawa

NSC Netherlands	Netherlands	Dr. G. Vayssier
European Commission	Netherlands	Dr. Paolo Contri
PAEC (Pakistan Atomic Energy Commission)	Pakistan	Dr. Abdul Wahid
Ingenieria IDOM Internacional	Spain	Dr. Gonzalez Antonio Moreno
Basler & Hofmann	Switzerland	Dr. Burkhard Rast
Swiss Federal Nuclear Safety Inspectorate	Switzerland	Dr. Stefan Brosi
Swissnuclear	Switzerland	Dr. Stefan Heuberger
State Nuclear Regulatory Commit.	Ukraine	Dr. S. Bozhko
NRC (Nuclear Regulatory Commission)	U.S.A.	Dr. Andrew J. Murphy
Westinghouse Electric Company	U.S.A.	Dr. Fernando Naredo
EPRI (Electric Power Research Institute)	U.S.A.	Dr. Robert Kassawara

Questions 1

What is your main activity related to the seismic behaviour of structures (you may choose more than one activity)?

Results

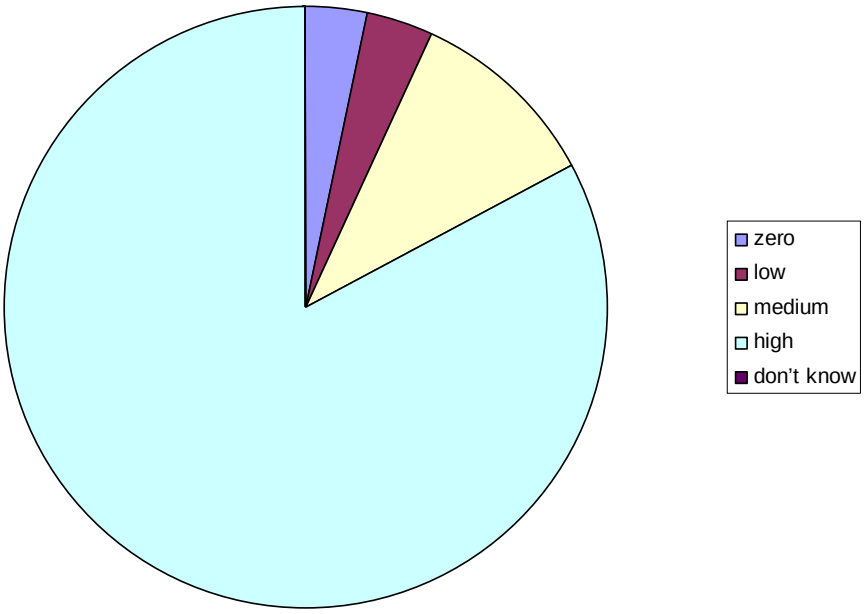


Comment

The responders cover a wide spectrum of activities.

Questions 2
How important is seismic risk in your main activity?

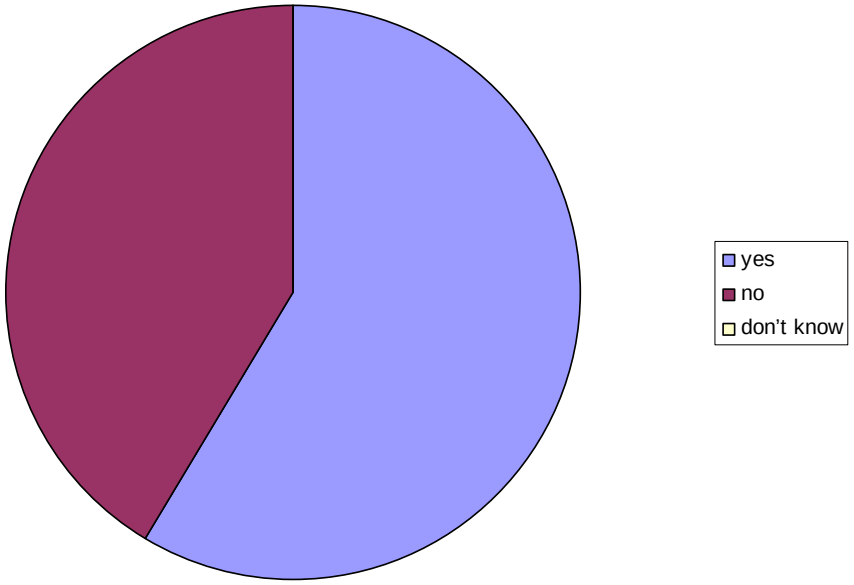
Results



Comment
Seismic risk is very important for most of the respondents.

Questions 3
Is your company directly involved in seismic design or construction of structures, components or equipments?

Results

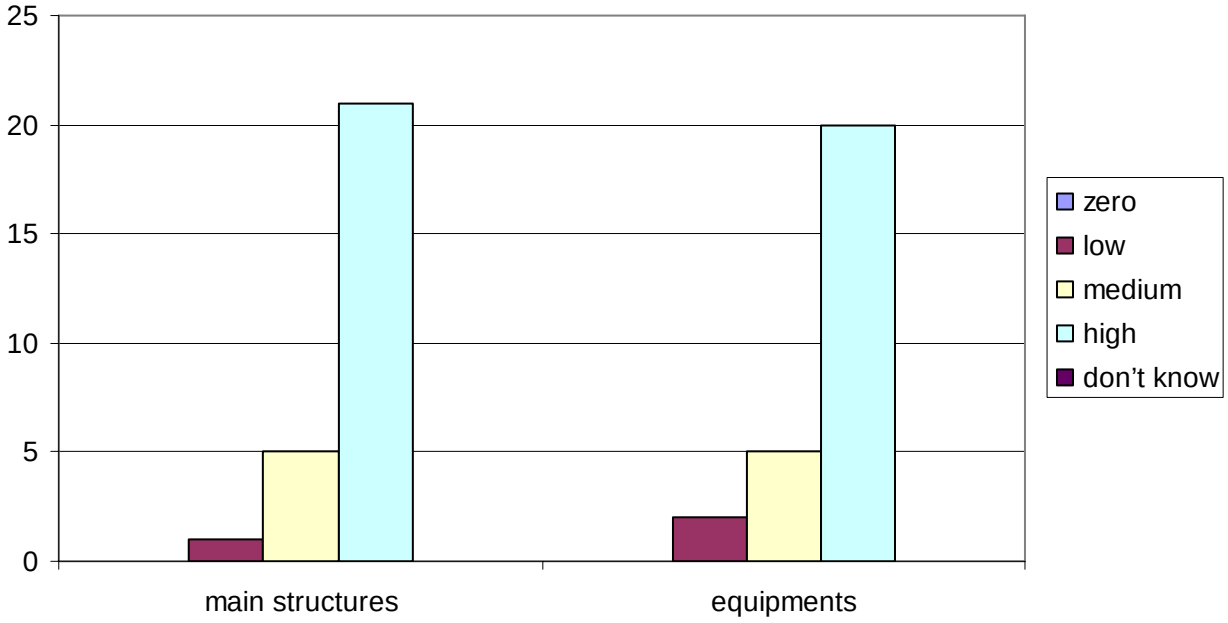


Comment
Most of the interviewed are directly involved in seismic engineering activities.

Questions 4

What is the impact on your institution's activities of the earthquake response of main structures and equipment respectively?

Results



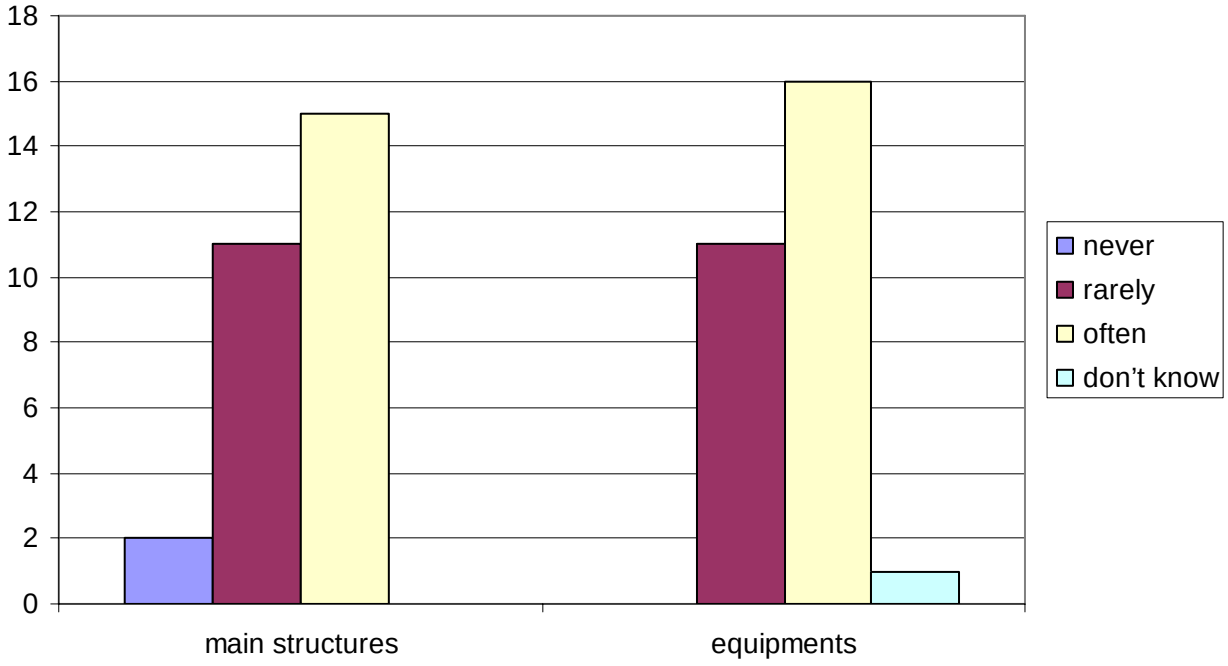
Comment

For most of the companies there is a high interest both in main structures and equipments studies.

Questions 5

How often does your company make reference to results of experimental tests (even if your own institution was not involved in these tests), or to works based on these results?

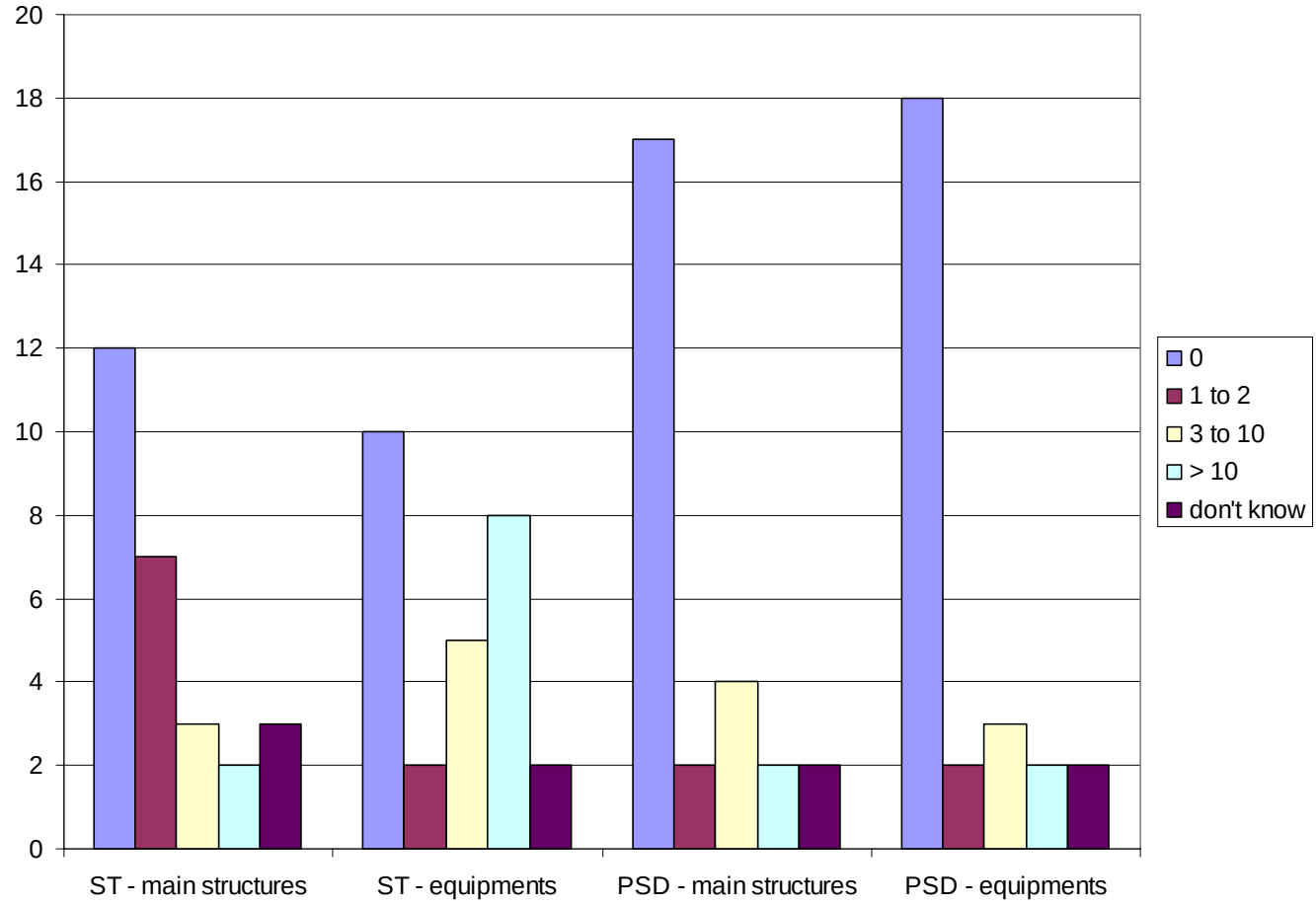
Results



Questions 6

How many test seismic tests did your company carry out by itself or fund during the last 15 years?

Results



Legend

ST = Shaking Tables tests

PSD = PseudoDynamic tests

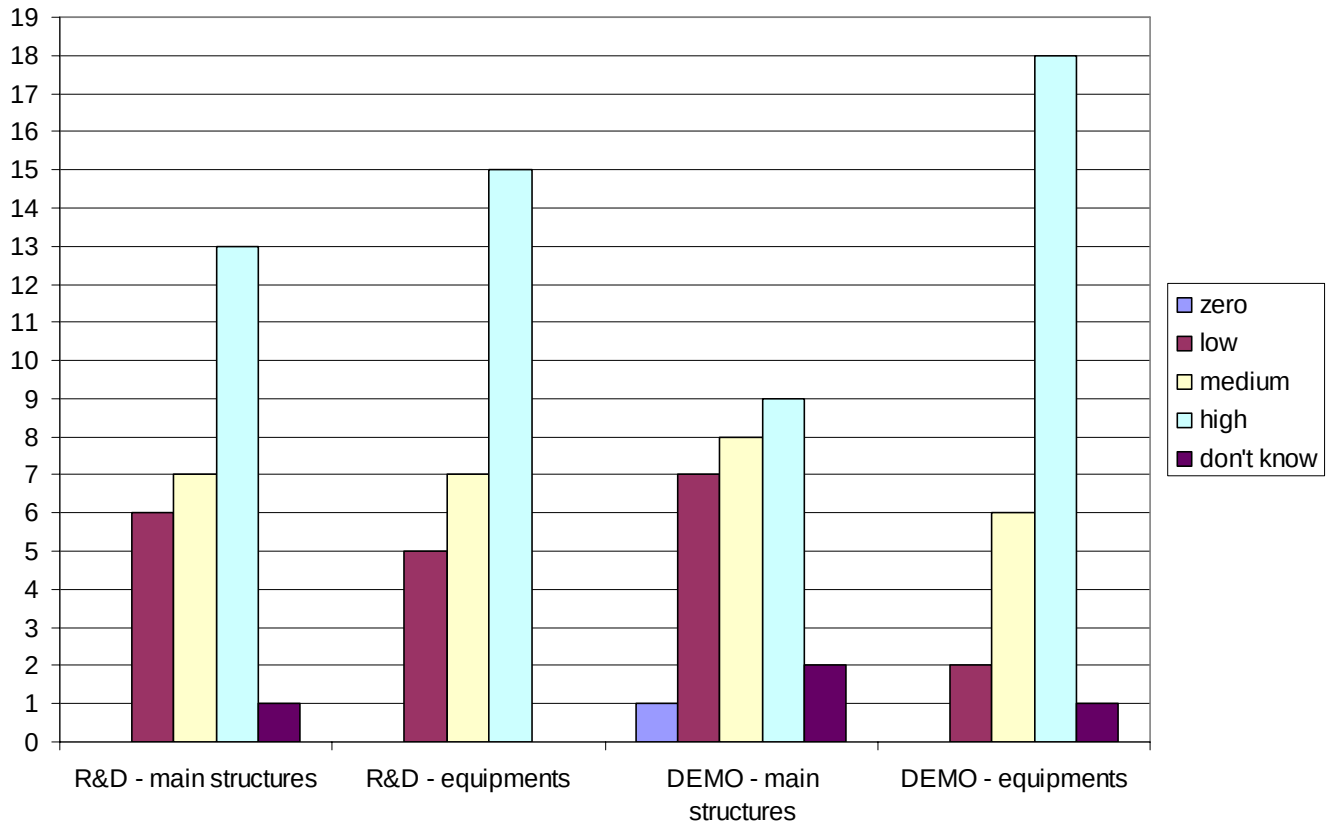
Comment

Very few tests were performed.

Questions 7

According to your company's experience and policy what is the benefit from seismic testing results that are used for research and development (R&D) or demonstration and qualification purposes for structures and equipment?

Results



Legend

R&D = Research and Development

DEMO = Demonstrative projects

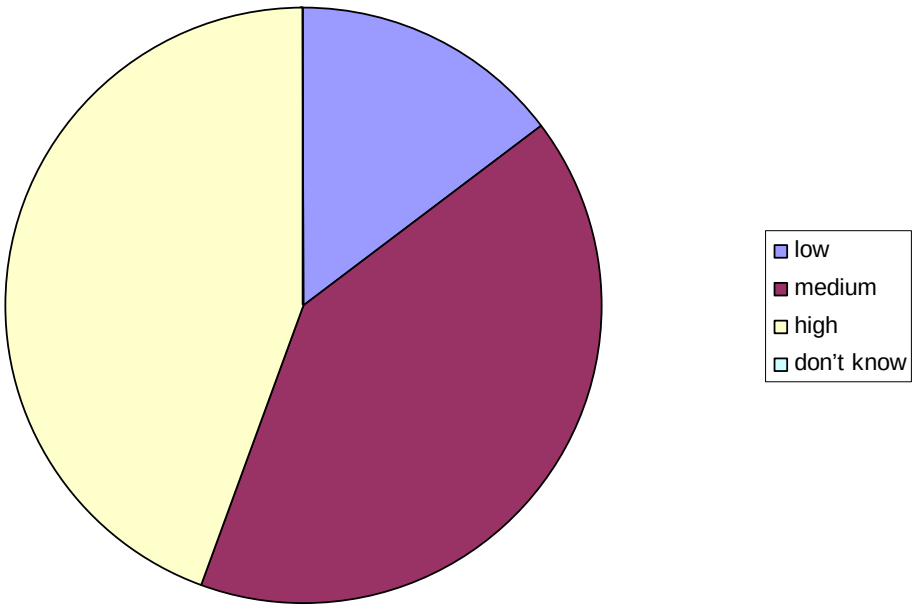
Comment

There is a very high interest for testing.

Questions 8

What could be the benefit to your company from an experimental facility that would enable large-scale seismic testing?

Results



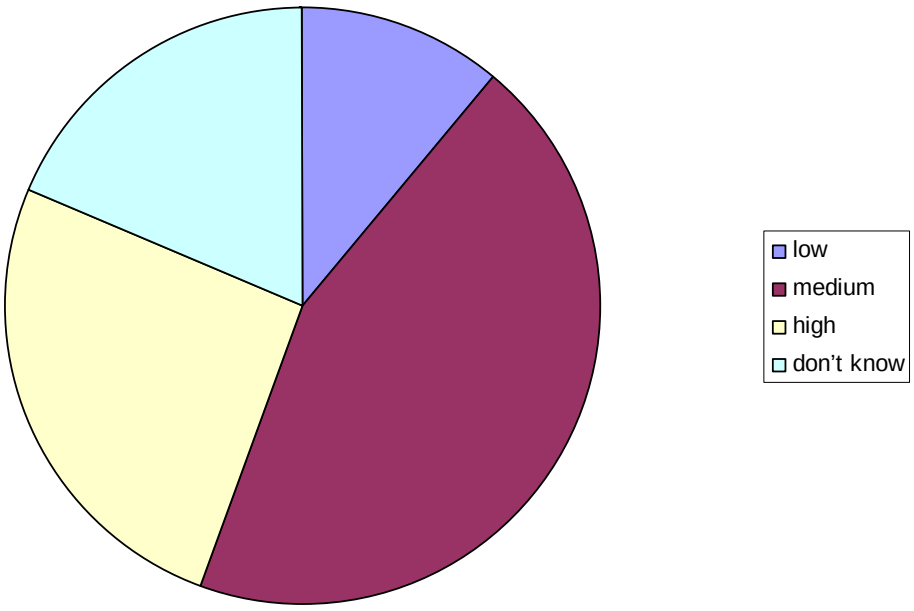
Comment

There is a very high interest for large-scale tests.

Questions 9

What could be the added value for your institution of an experimental facility having a multiple point earthquake input capability?

Results

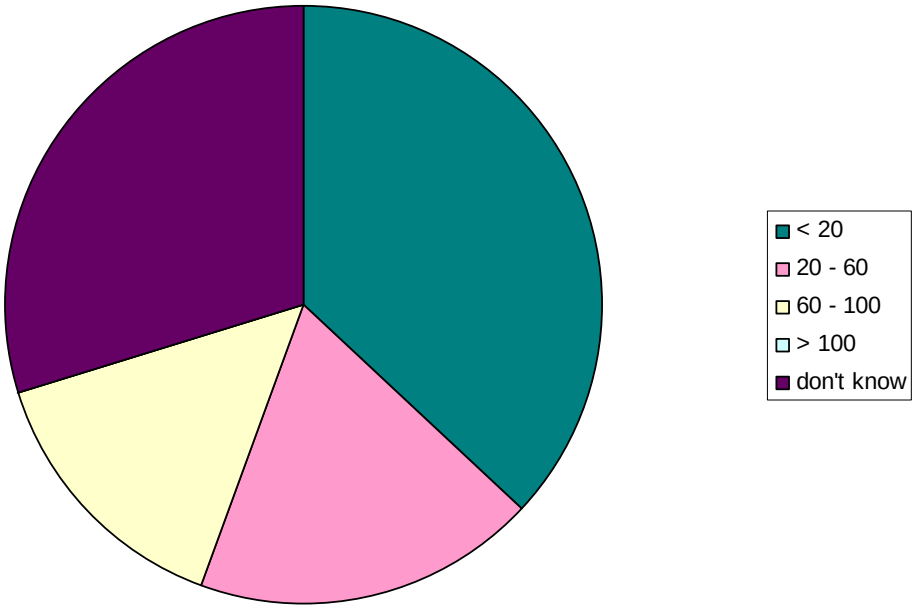


Questions 10

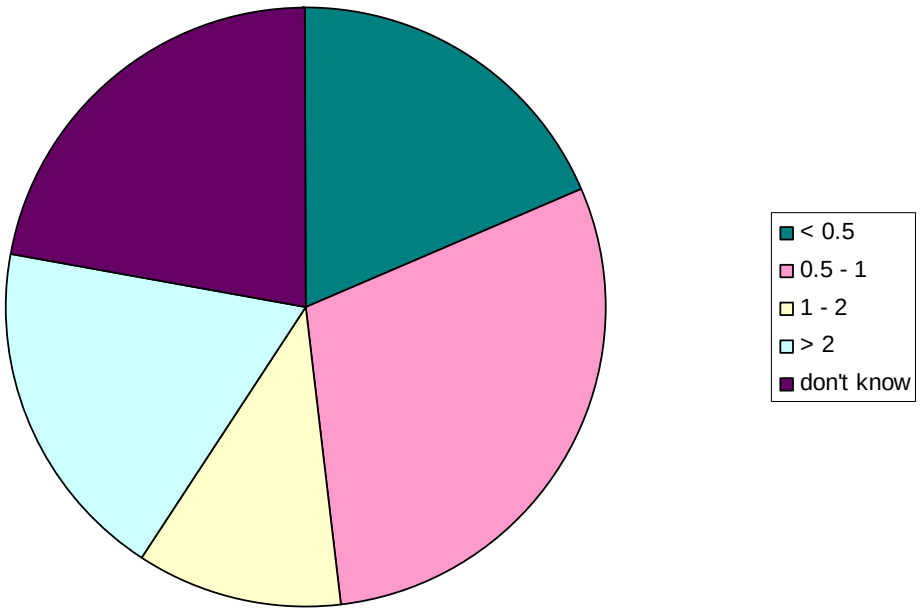
What are the characteristics of the most demanding test your institution has been involved in, in the past 15 years?

Results

Mass of specimen (tons):



Peak acceleration (g):



Comment

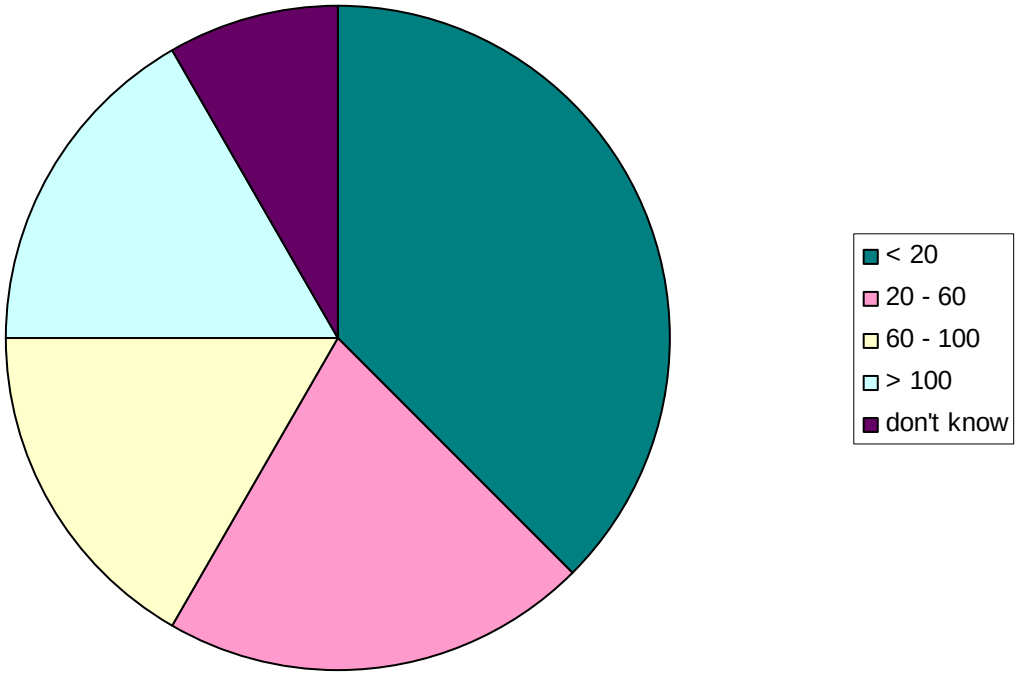
There is a large variety both in what are specimen masses and in the maximum accelerations.

Questions 11

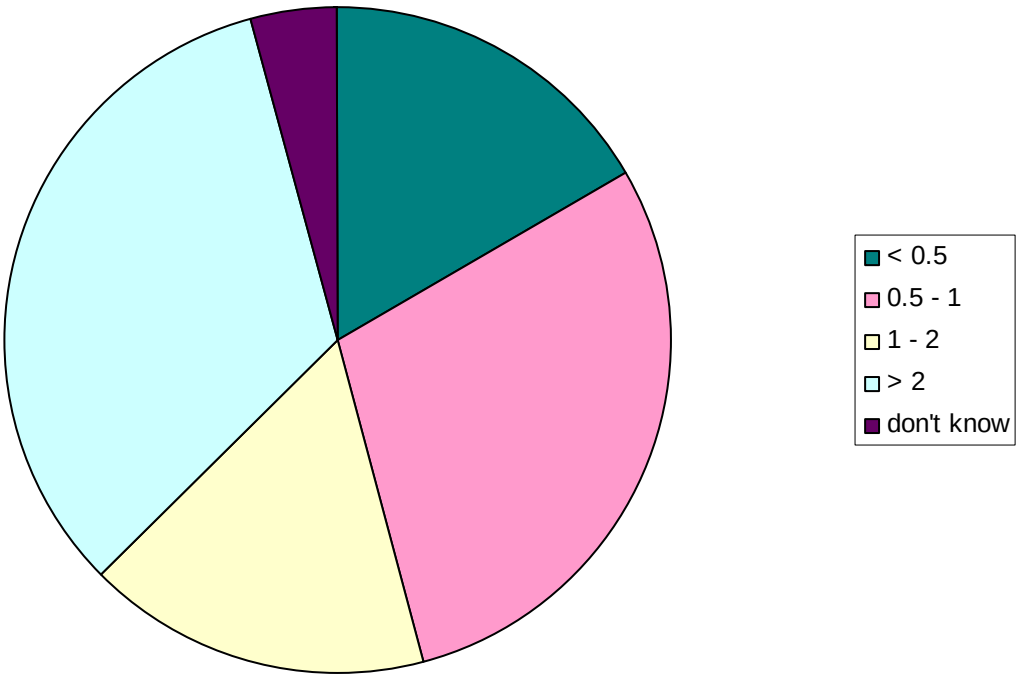
What are the characteristics of the most demanding test in which your institution could be interested?

Results

Mass of specimen (tons):



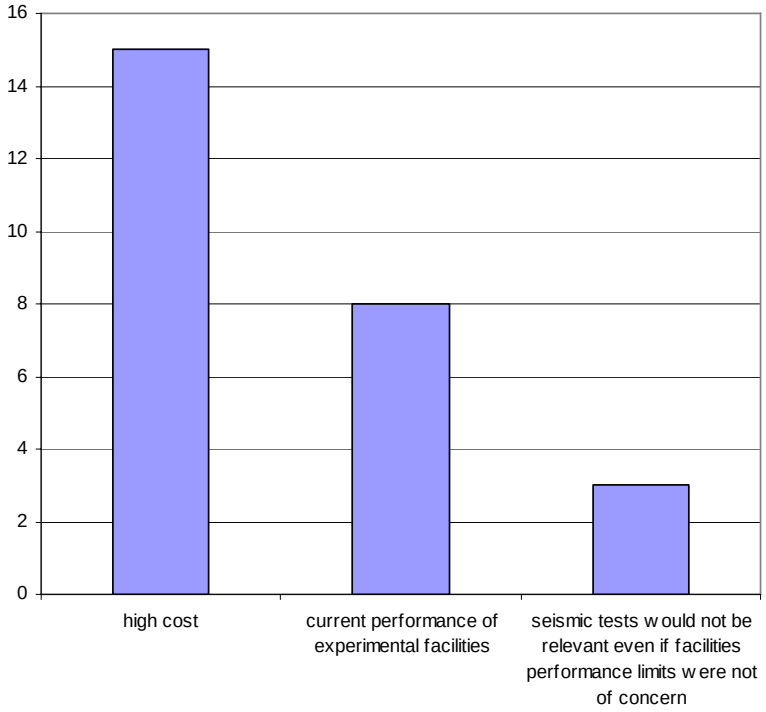
Peak acceleration (g):



Questions 12

What is the main reason your institution does not use seismic testing facilities more often?

Results



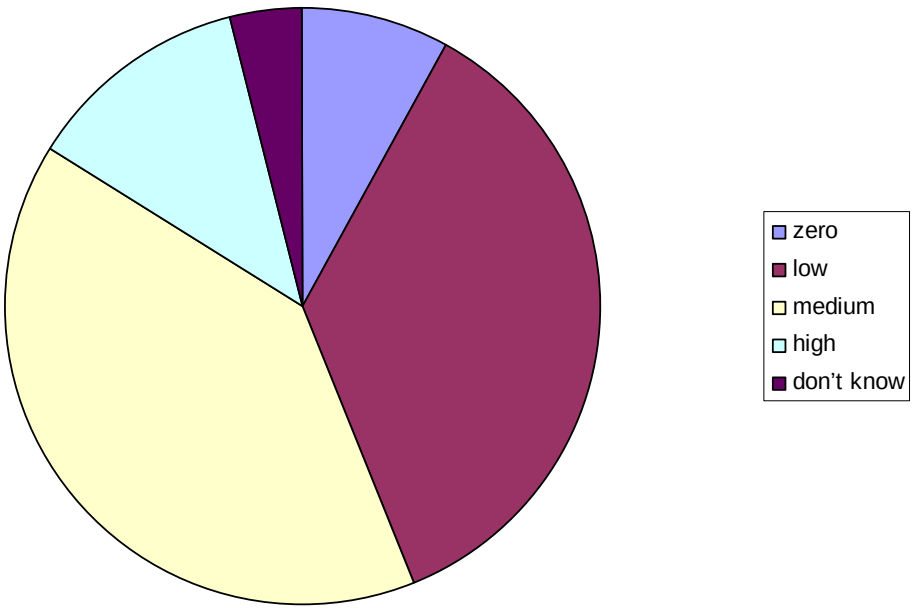
Comment

The main problem is cost, but also the lack in the current capability of the testing facilities is a reason why seismic testing is not used more often.

Questions 13

What is the probability of needing, in the next 15 years, seismic testing taking into account frequency excitation content lower than 1Hz?

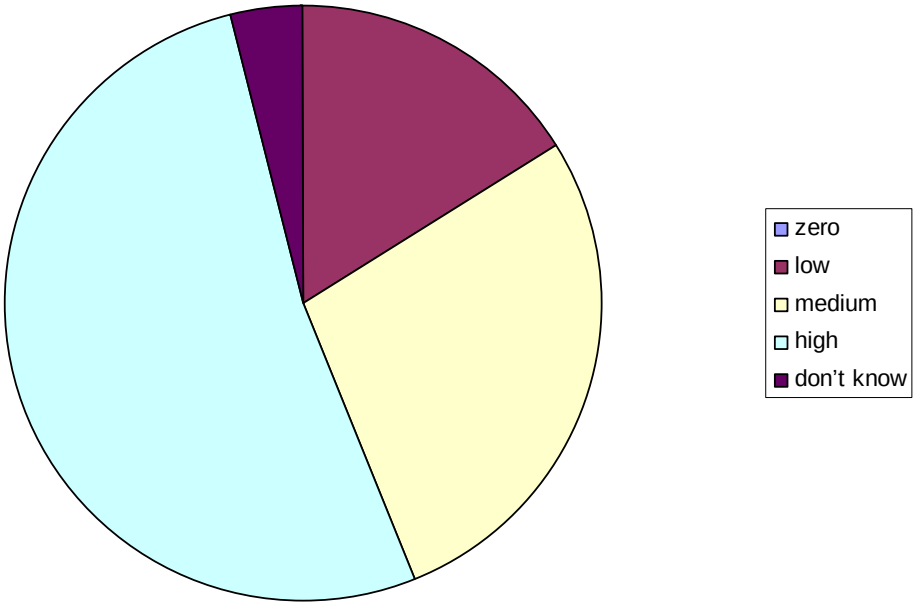
Results



Questions 14

What is the probability of needing, in the next 15 years, seismic testing taking into account vertical earthquake excitation?

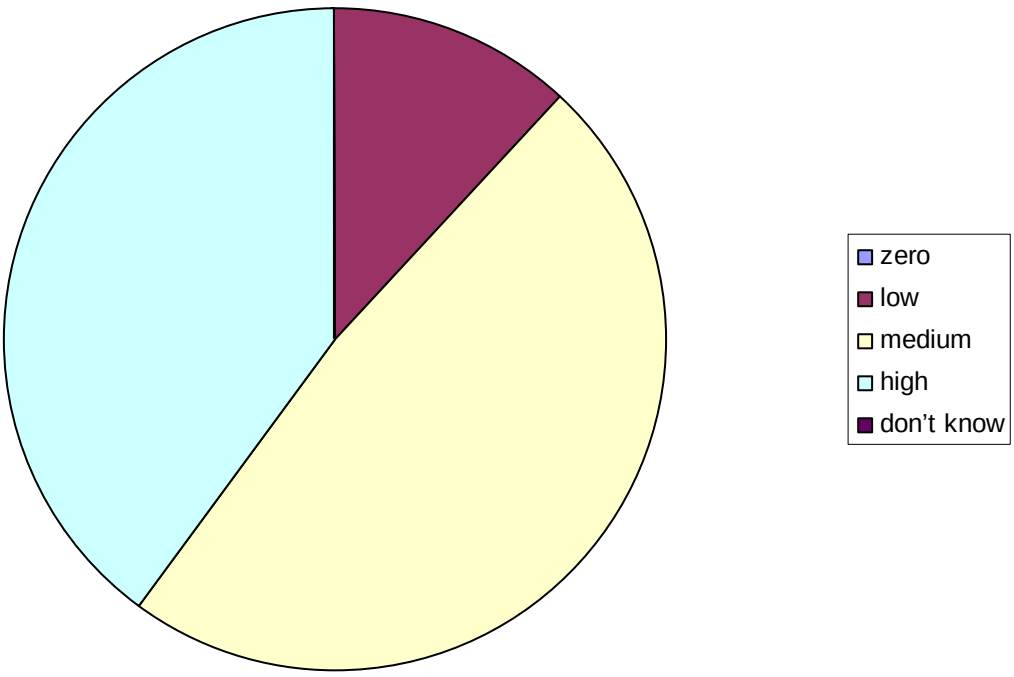
Results



Questions 15

What is the probability of needing, in the next 15 years, seismic testing taking into account excitation intensity up to (or near) collapse?

Results



INQUIRY FOR CONSTRUCTION COMPANIES

This set of questions is divided into 17 parts. The detailed results for each question are reported hereafter. The inquiry was sent to 117 construction companies around the word. Presently, we received back 13 compiled inquiries, so the percentage of success is around 11%. This means that the statistical analysis of the obtained results must be seen as purely indicative because they cannot be representative of the whole stock.

The following table contains the list of the compiled inquiries.

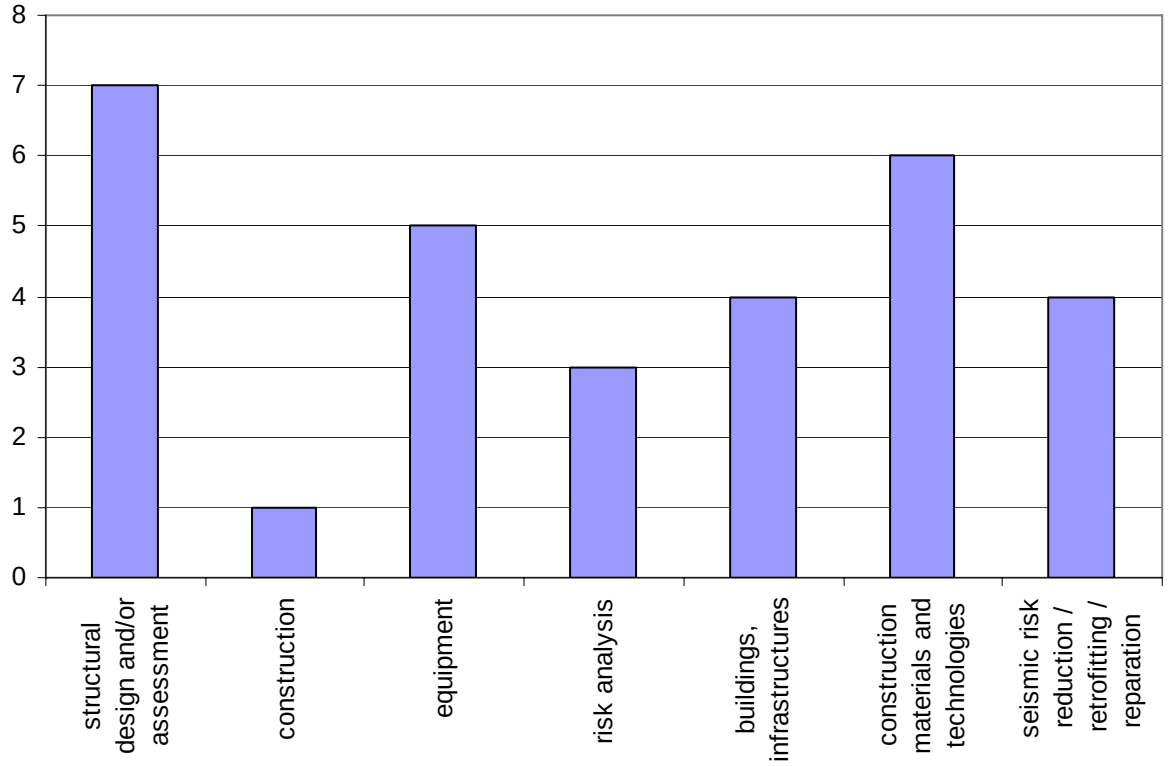
List of compiled inquiries for Construction Companies

company	country	contact
Géodynamique & Structure	France	Prof. Alain Pecker
Paver	Italy	Dr. Michele Antonioli
Agom International srl	Italy	Ing. Crosti
Fischer Italia srl	Italy	Ing. Enrico Di Donato
Boviar	Italy	Ing. Filippo Bovio
C&P Costruzioni Isotex	Italy	Ing. Paterlini Alessandro
Alga spa	Italy	Ing. Marco Colli
Galileian srl.	Italy	Dr. Chersich
Emmedue	Italy	Dr. Omero Bassotti
Freissynet	France	Dr. Salmon
Fip Industriale spa	Italy	Ing. Samuele Infanti
Solgeo srl	Italy	Dr. Limonta
Diagnosis srl	Italy	Ing. Vittorio Longo

Questions 1

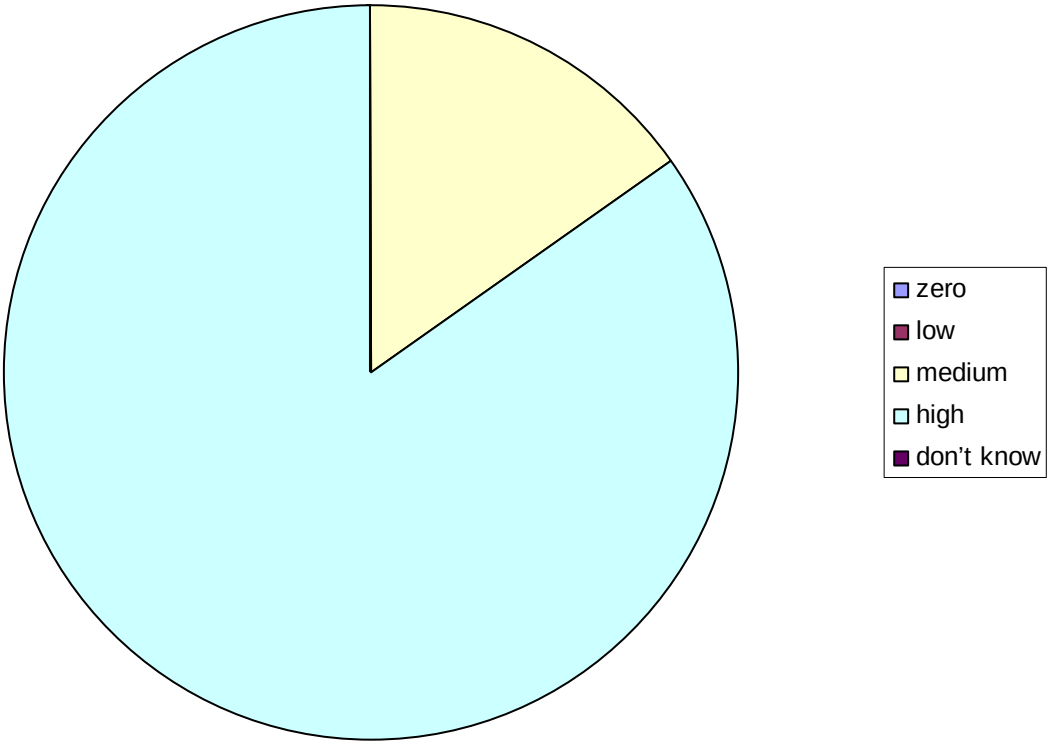
What is your main activity related to the seismic behaviour of structures?

Results



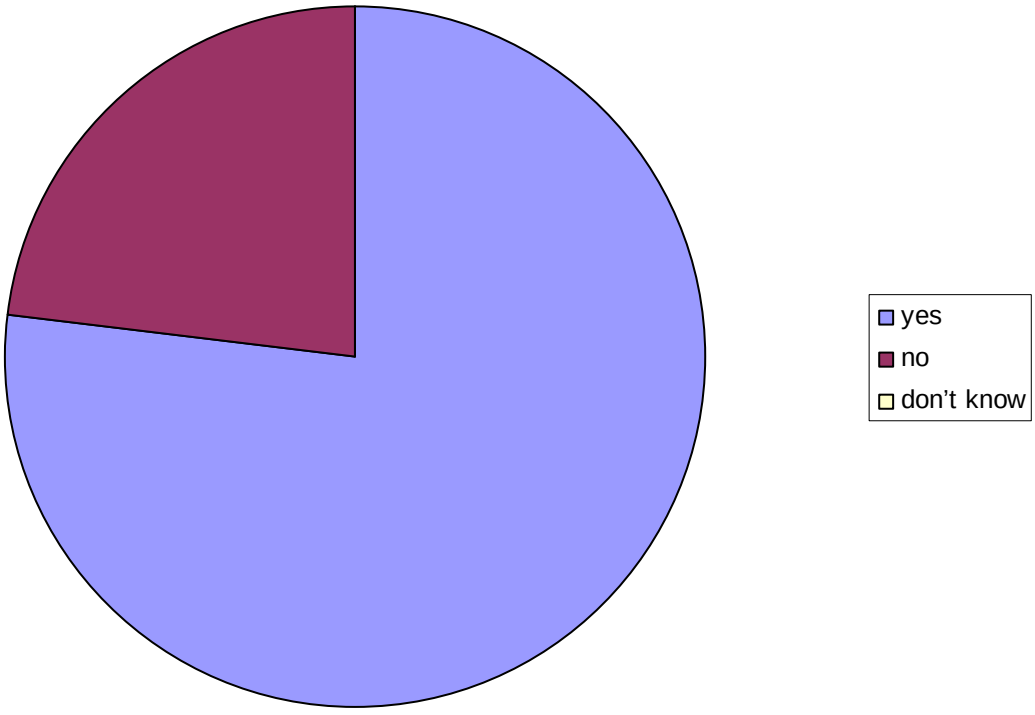
Questions 2
How important is seismic risk in your activity?

Results



Questions 3
Is your company directly involved in seismic design of structures, components or equipments?

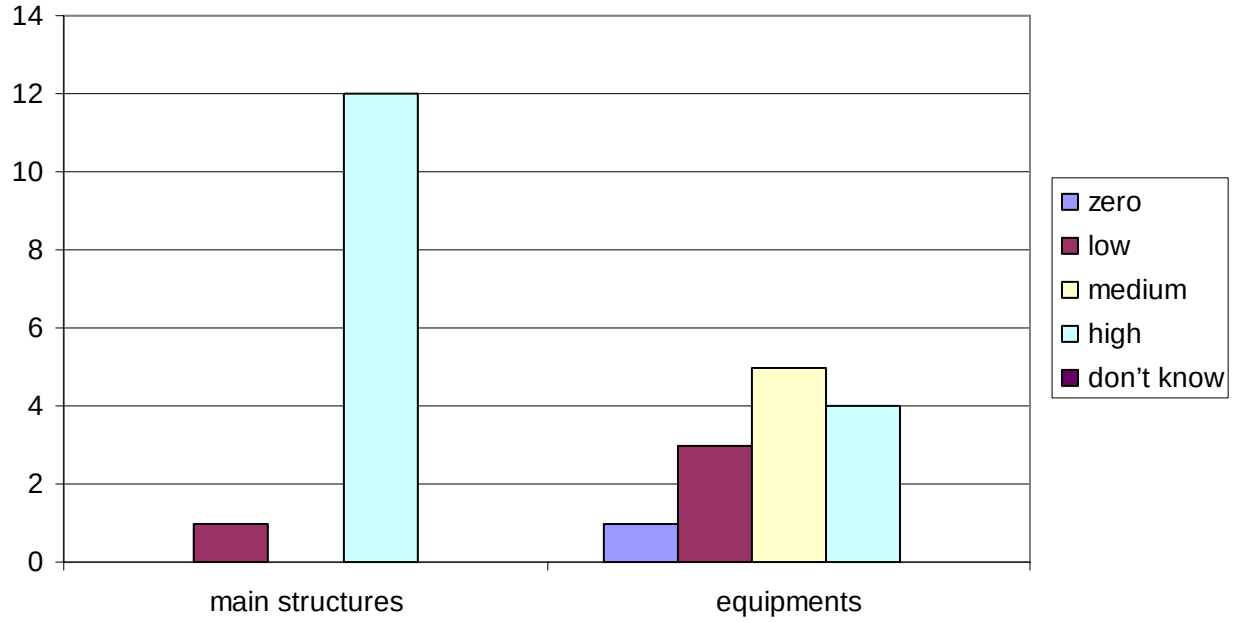
Results



Questions 4

What is your company interest on analysing thoroughly the earthquake response of structures and equipments respectively?

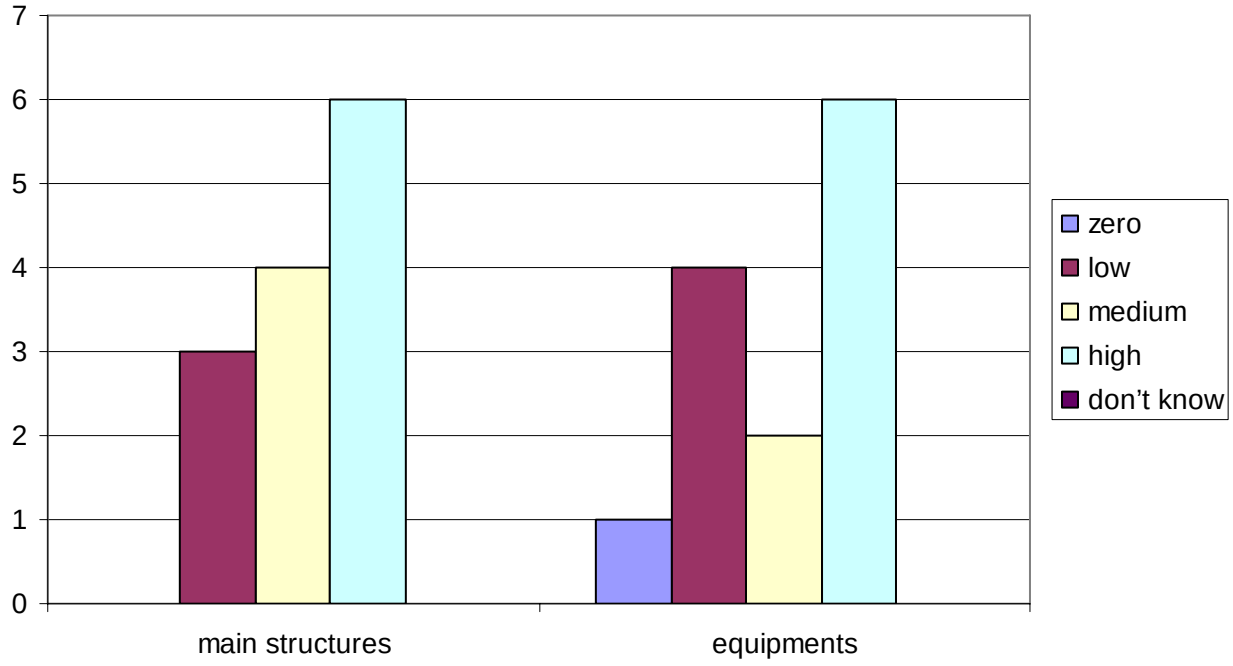
Results



Questions 5

What is your company interest on performing seismic tests on structures and equipments respectively?

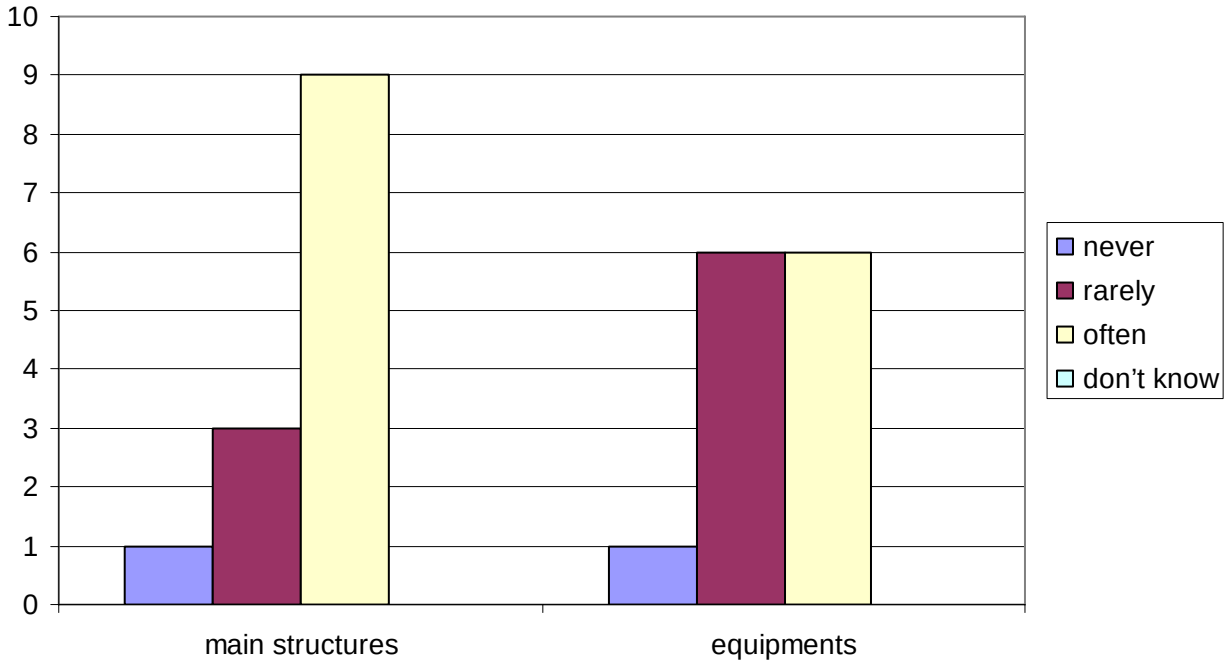
Results



Questions 6

How often does your company make reference to results of experimental test?

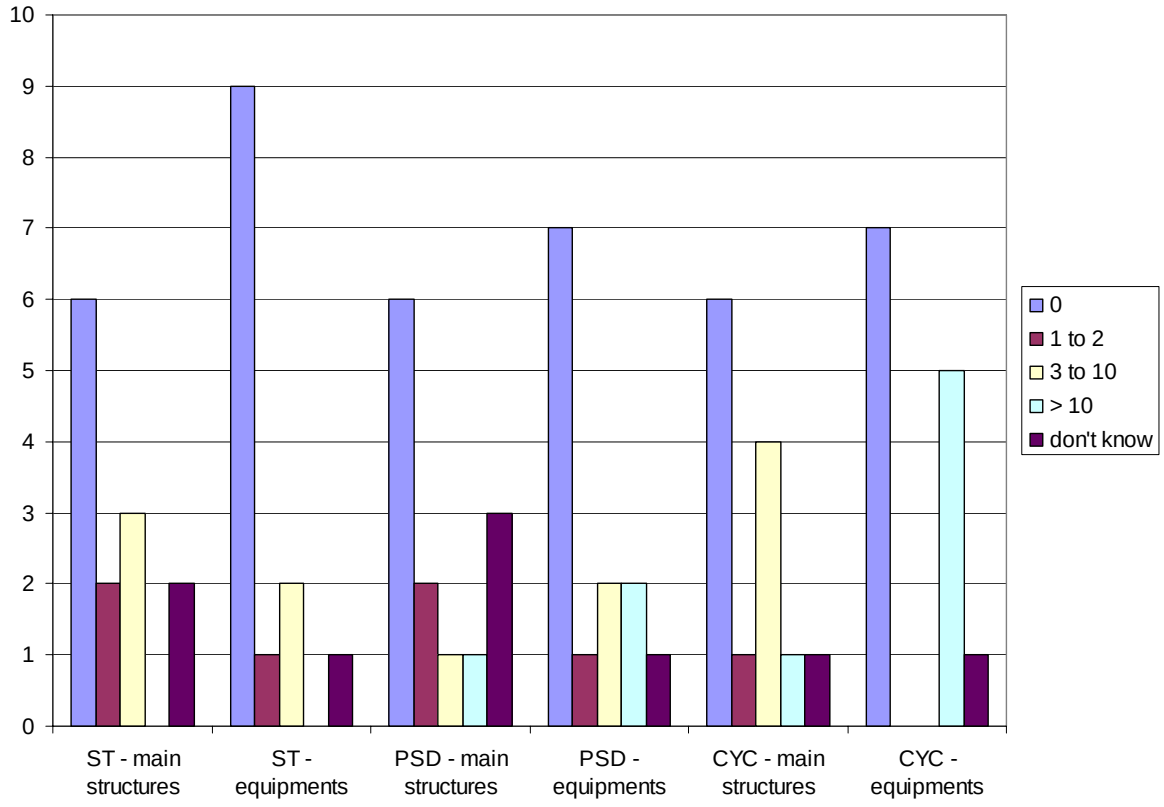
Results



Questions 7

How many test campaigns did your company perform by itself or fund in the last 15 years?

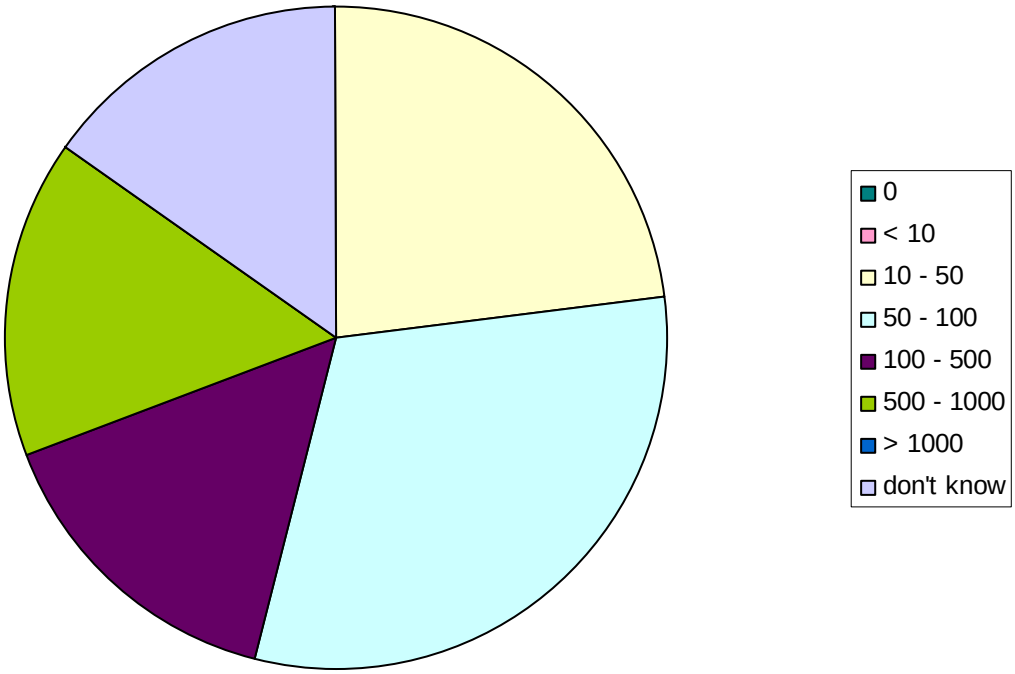
Results



Questions 8

What is the average annual budget for research and development (R&D) activities of your company in the last 15 years (thousands of euro)?

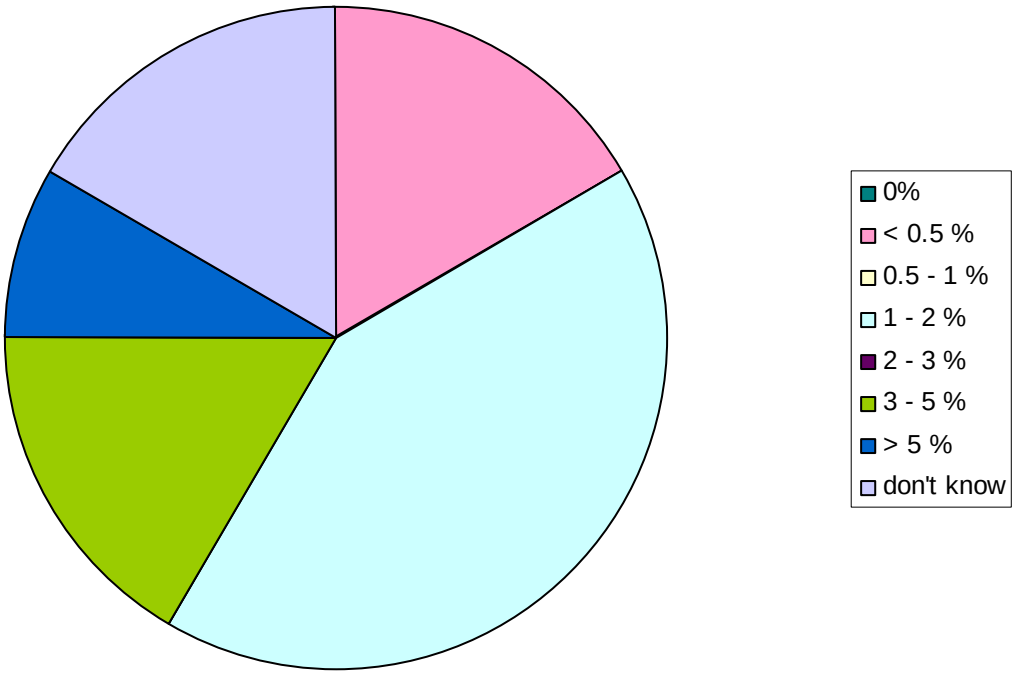
Results



Questions 9

What is the percentage of average annual budget for research and development (R&D) activities of your company in 15 years with respect to the yearly turnover?

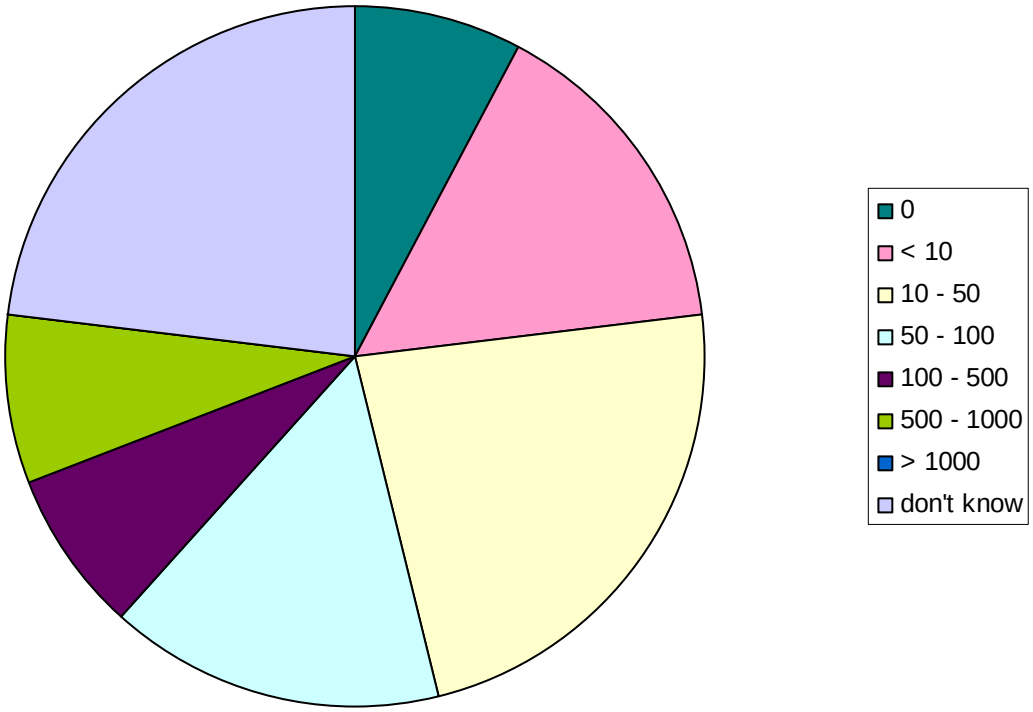
Results



Questions 10

What is the average annual budget for experimental tests of your company in the last 15 years (thousands of euro)?

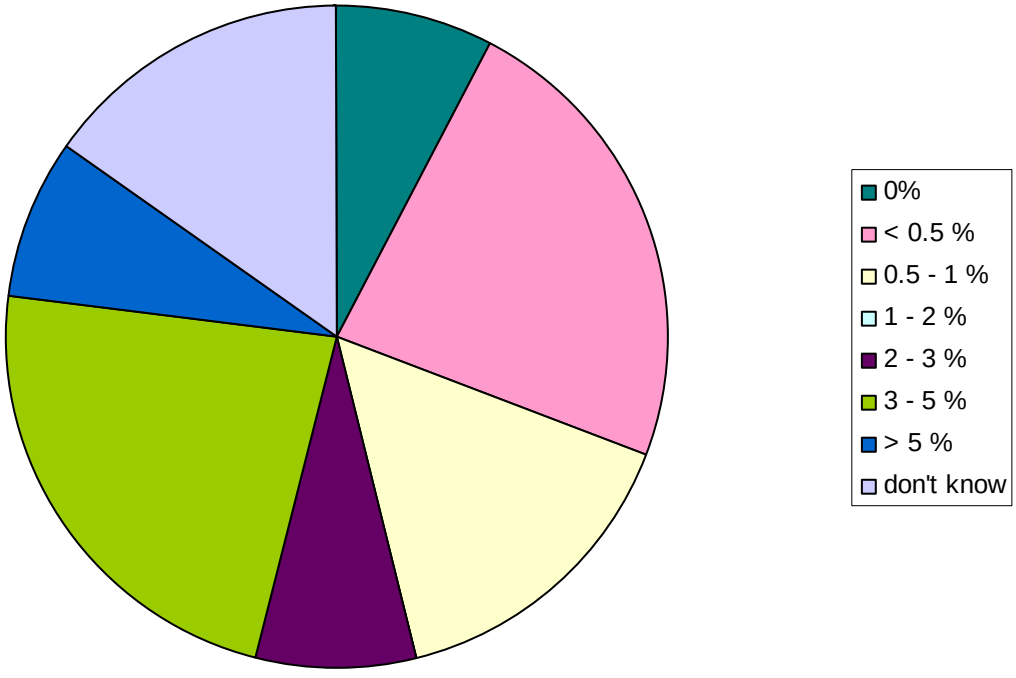
Results



Questions 11

What is the percentage of annual budget for experimental tests of your company in the last 15 years with respect to the overall R&D budget?

Results

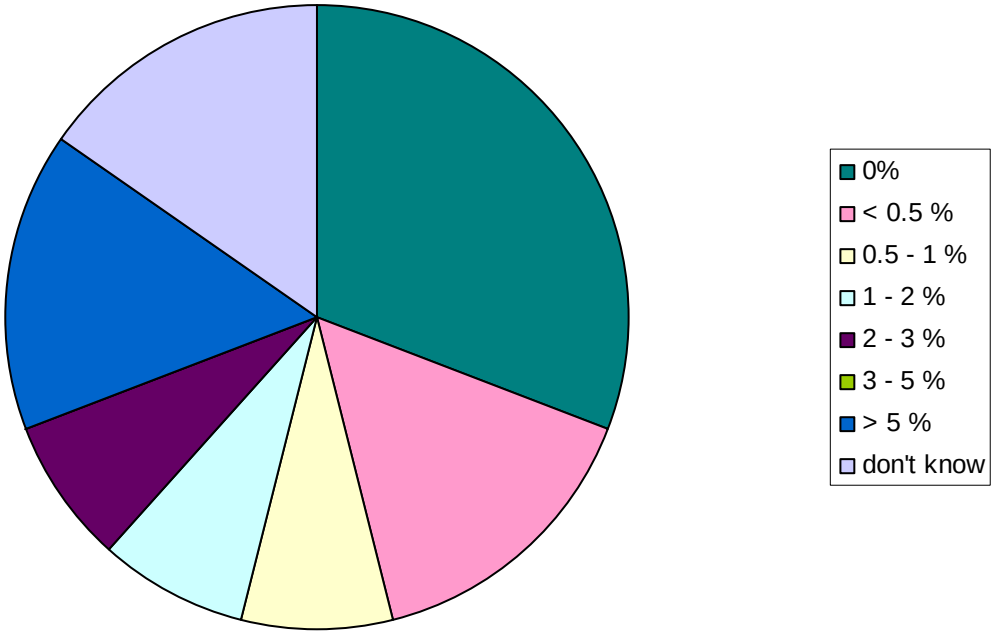


Questions 12

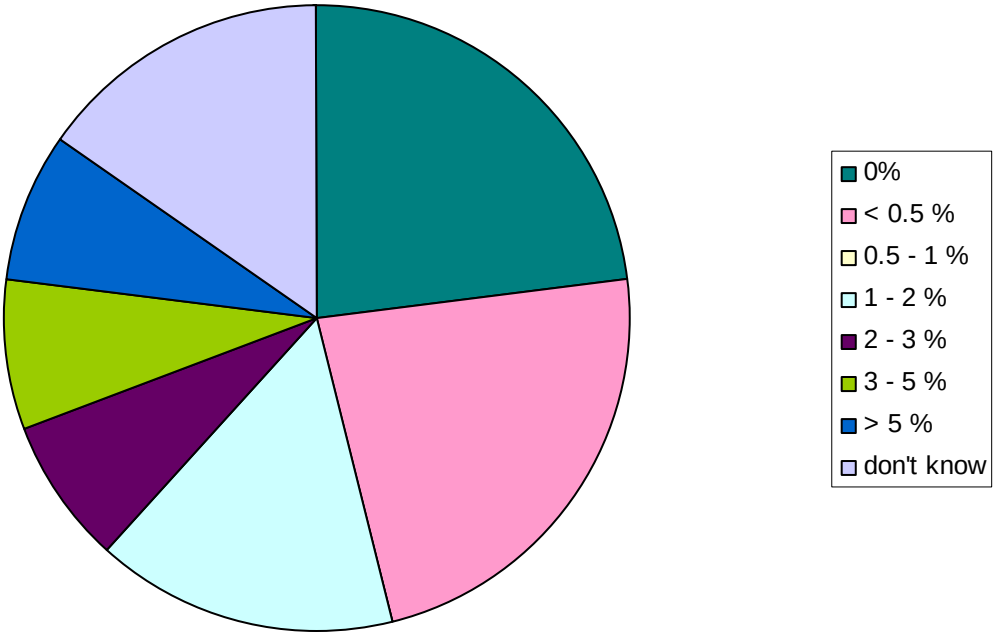
What percentage of your company budget for experimental tests was devoted to seismic testing of structures or equipments in the last 15 years?

Results

Main structures:



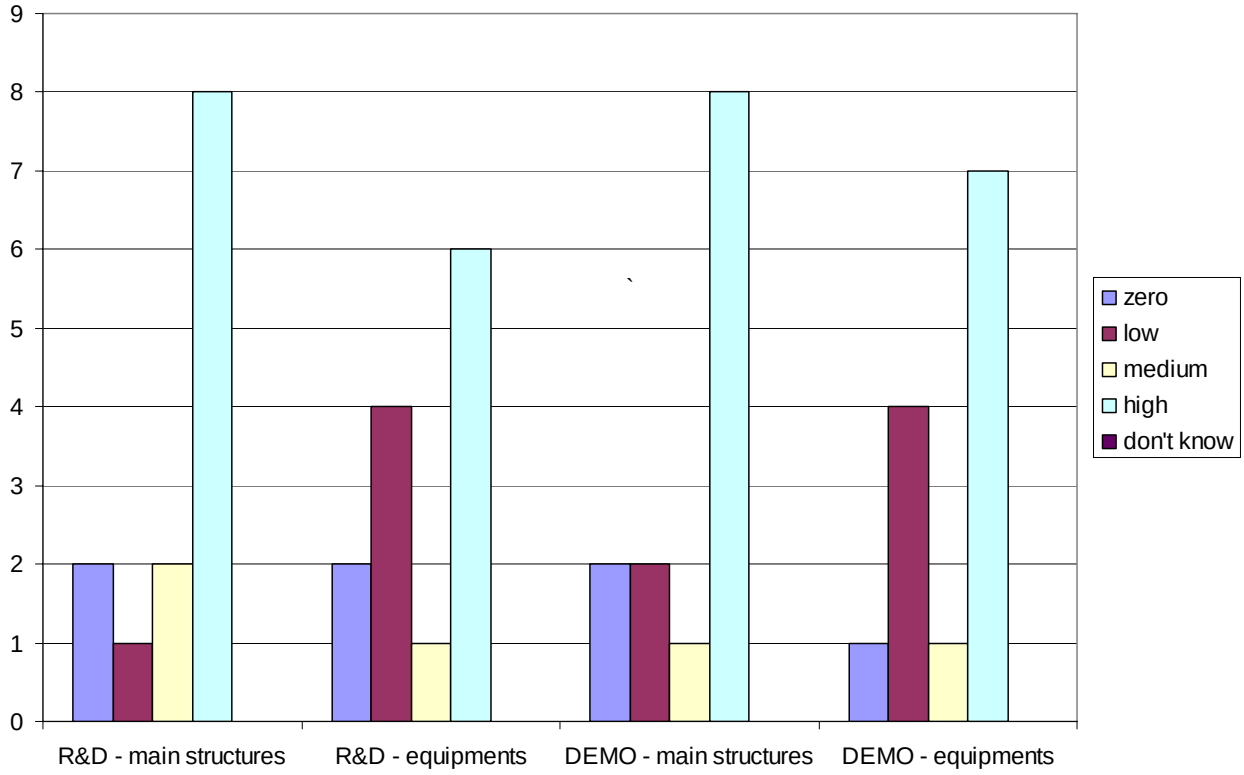
Equipments or secondary structures:



Questions 13

According to the experience and to the policy of your company what is the interest of seismic tests that are used for research and development (R&D) or demonstration and qualification purposes for structures and equipments?

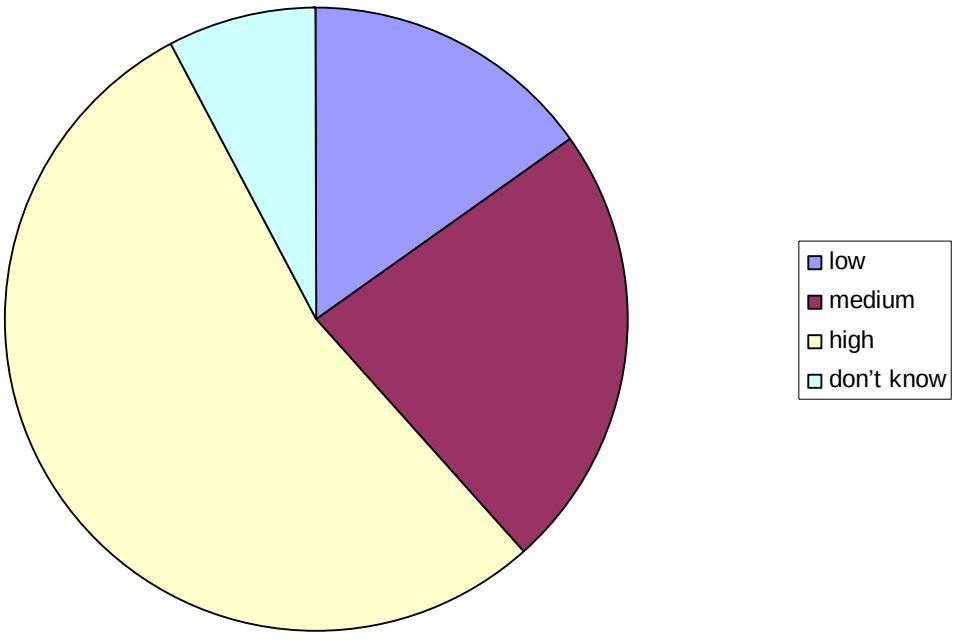
Results



Questions 14

What could be the interest of your company on an experimental facility that allows large-scale tests for earthquake response simulation?

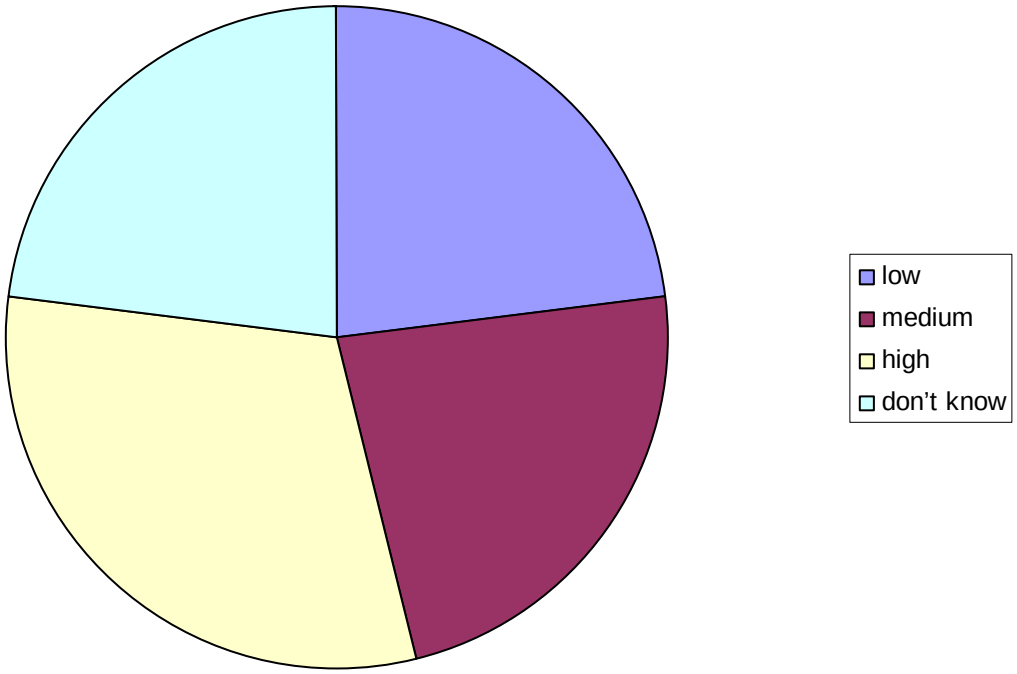
Results



Questions 15

What could be the added value for your institution of an experimental facility having a multiple point earthquake input capability?

Results

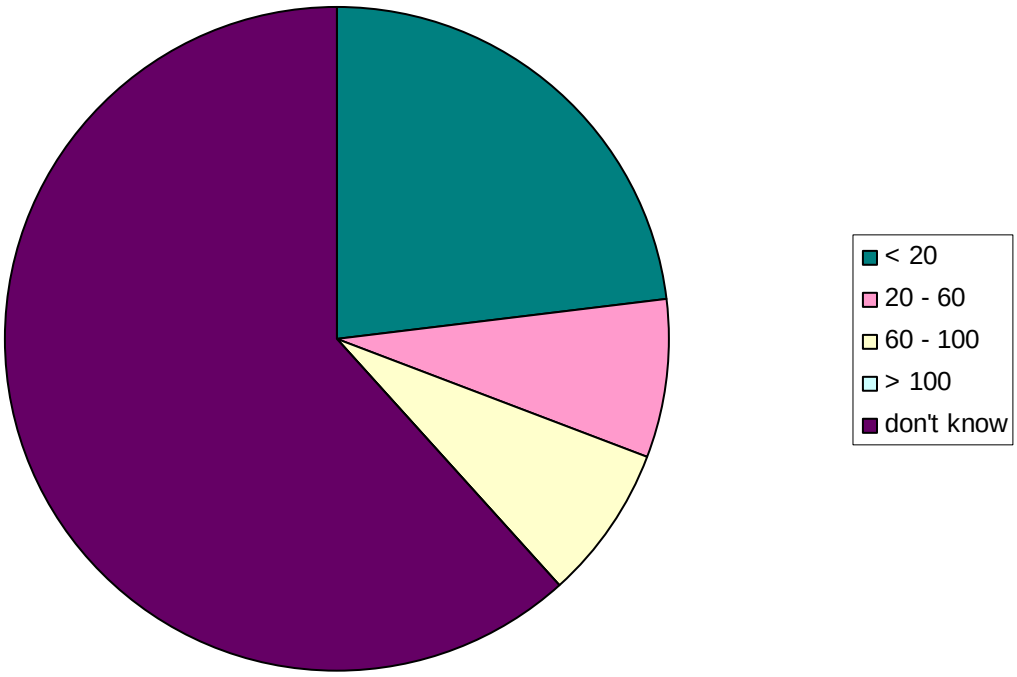


Questions 16

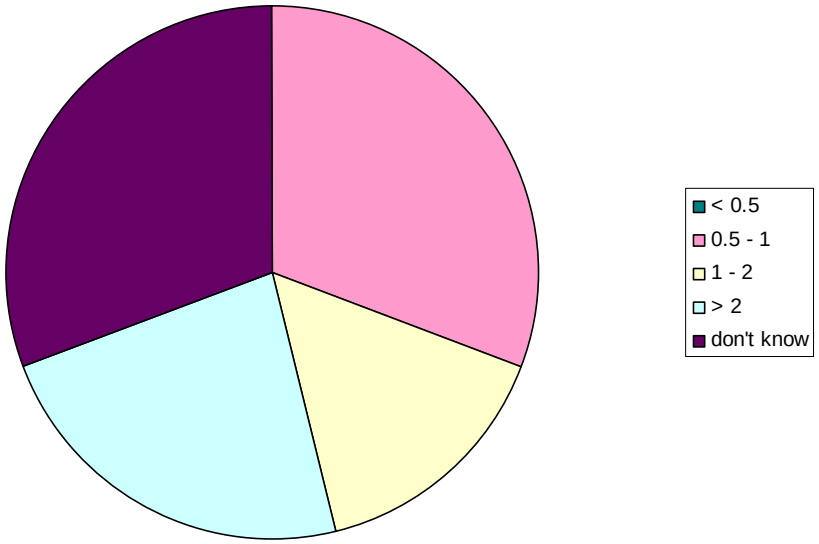
What are the characteristics of the most demanding test your company could be interested in?

Results

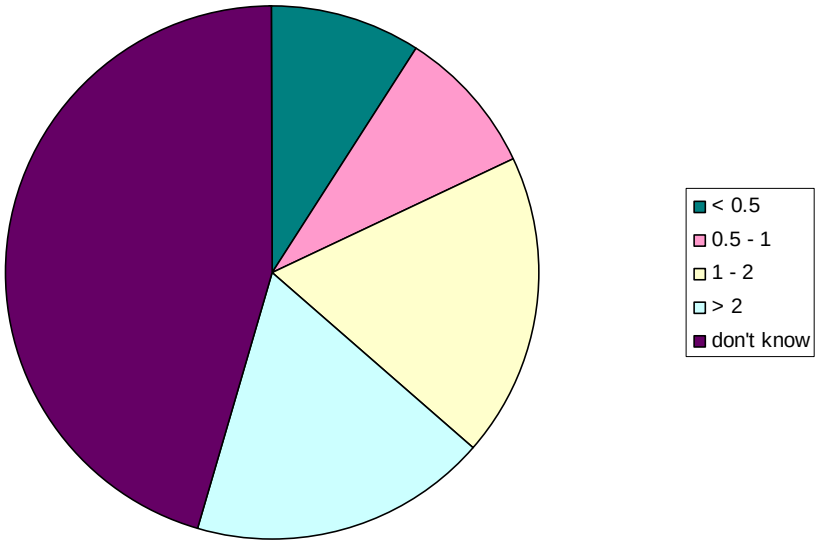
Mass of specimen (tons):



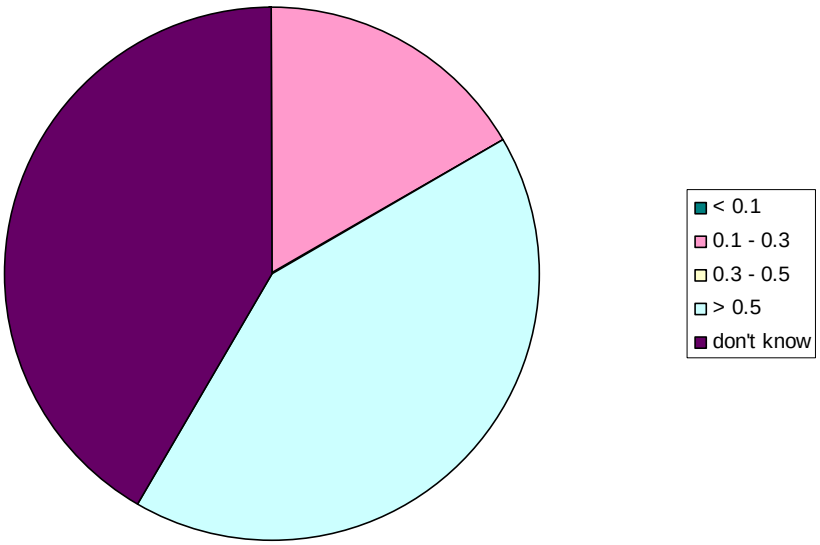
Peak acceleration (g):



Velocity (m/sec):



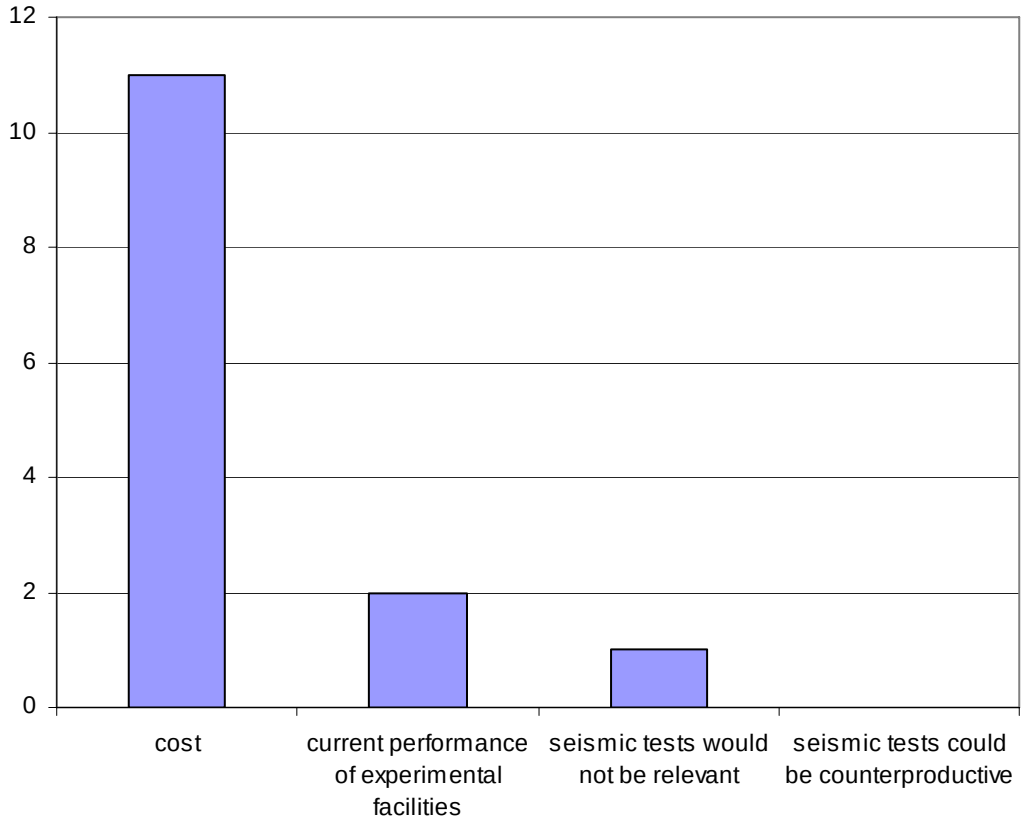
Displacement (m):



Questions 17

What is the main reason your company does not use seismic testing facilities more often?

Results

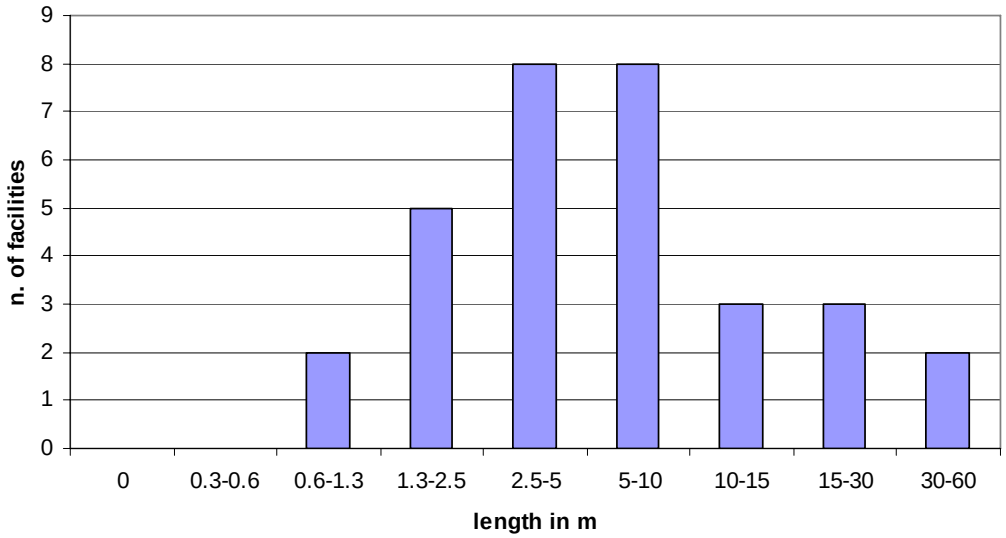


Conclusions

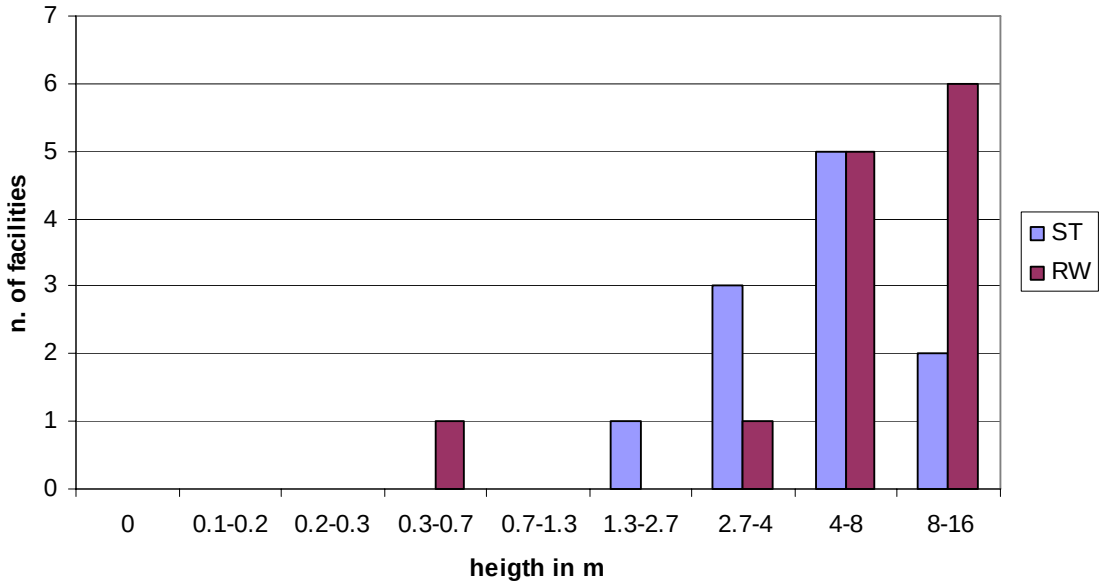
Seismic testing laboratories

The inquiry for seismic testing laboratories was addressed to 108 large laboratories around the word. We received back 35 compiled inquiries, so the percentage of success is 32%. All types of seismic testing facilities (Reaction Walls and Shaking Tables) are well represented.

- The available maximum weight, length, width, height and displacement for each facility are usually distributed over a wide spectrum of values. The following figure shows the distribution of maximum length which applies to specimens to be tested within the interviewed laboratories.

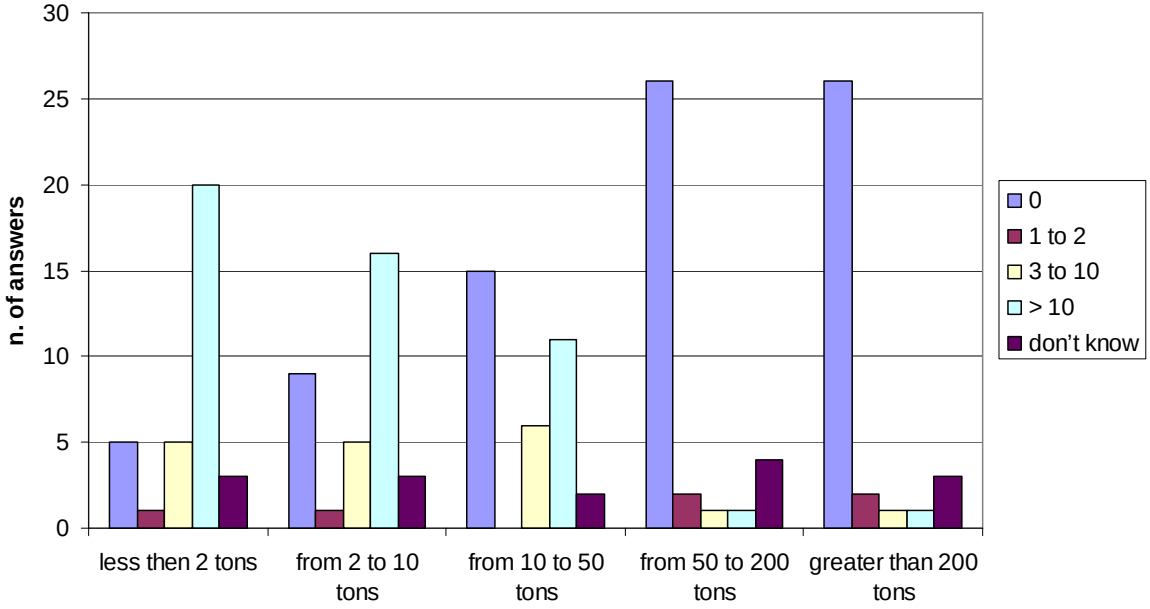


- Regarding the maximum weight, length, width and height (see figure below), often the upper values are for Reaction Walls (RW) facilities, the lower values are for Shaking Tables (ST) facilities.

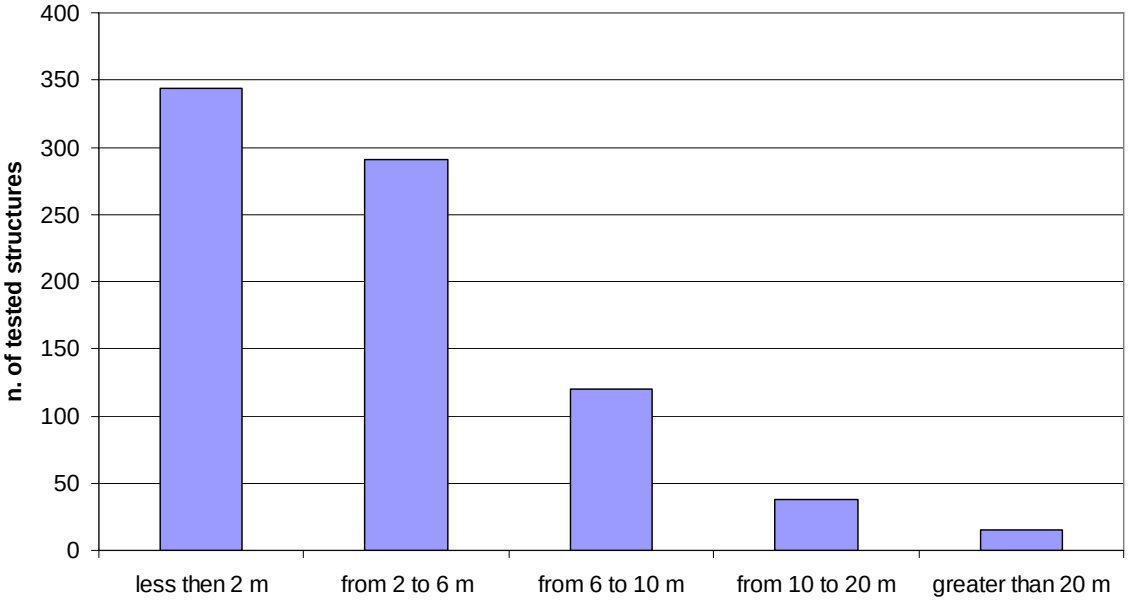


- Regarding the maximum displacement that the testing facility can realize, it is interesting to notice that some facilities cannot perform tests in the transversal and the vertical direction.

- Most of the times the tested specimens are light, small in length and height. The following figure, as an example, shows that a significant number of tests is performed only with small specimens. Heavy (and, a consequence, large scale) specimens are seldom tested.



The following figure shows that more than 40% of the tested specimens have a height smaller than 2 meters. These specimens are often tested with small displacements (the 47% of tested structures were subject to maximum 12.5 cm of longitudinal displacement).



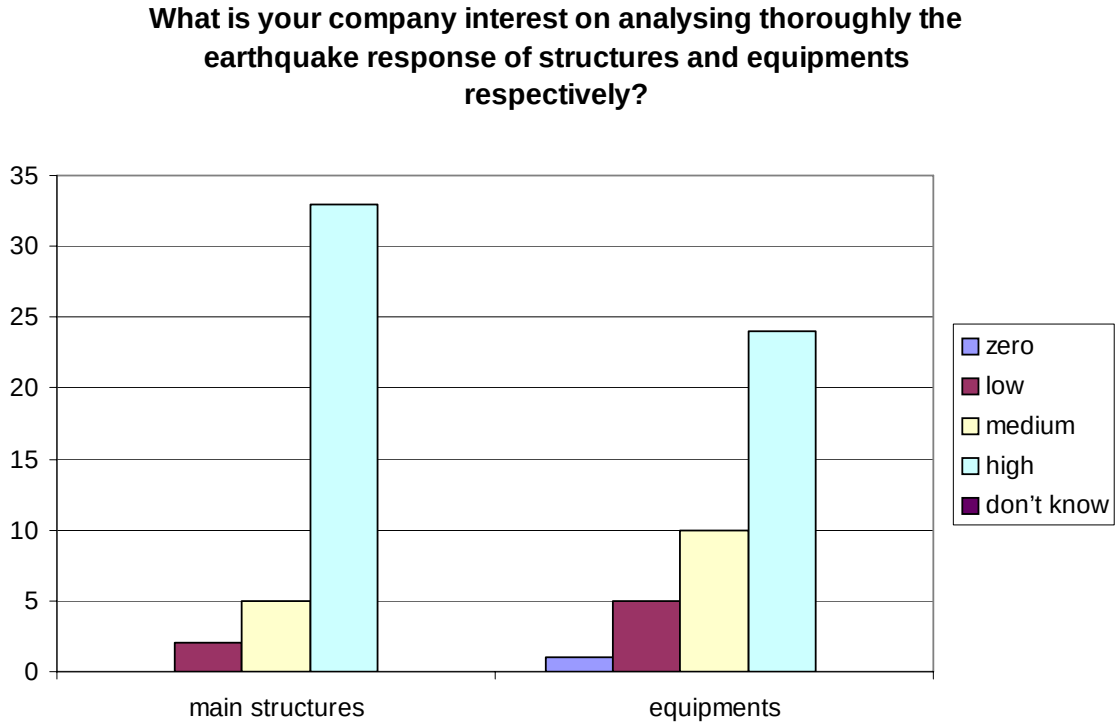
- Only a few structures were tested in transversal or vertical direction. In fact the total number of tested structure in longitudinal direction was around 750, in the transversal direction it was around 400 and in the vertical direction only 340.
- There is a wide possibility for multi-axial tests, but only a few tests were performed in the past with vertical or lateral displacements. On the one hand, this is probably a problem of cost. On the other hand, a question arises: are multi-axial tests really a needed?
- Presently, there is a prevalence of unidirectional excitation tests even if several multidirectional excitation tests were also performed.
- Rigid-base excitation is strongly the most common choice while asynchronous multiple-support excitation tests are very rare.

- Tests are usually performed without substructuring, sometimes with pseudo-dynamic (in slow time scale) substructuring and only in very few cases with real-time (or fast time scale) substructuring.
- Telepresence is sometimes used, but the majority of the conducted tests were without telepresence.
- Tests with inter-facility distributed testing are very rare, the almost totality of the performed tests being without inter-facility distributed characteristics.
- The used database type is usually localised in one site (67% of the answers) and only a few ones have multiple site centralise or distributed database.

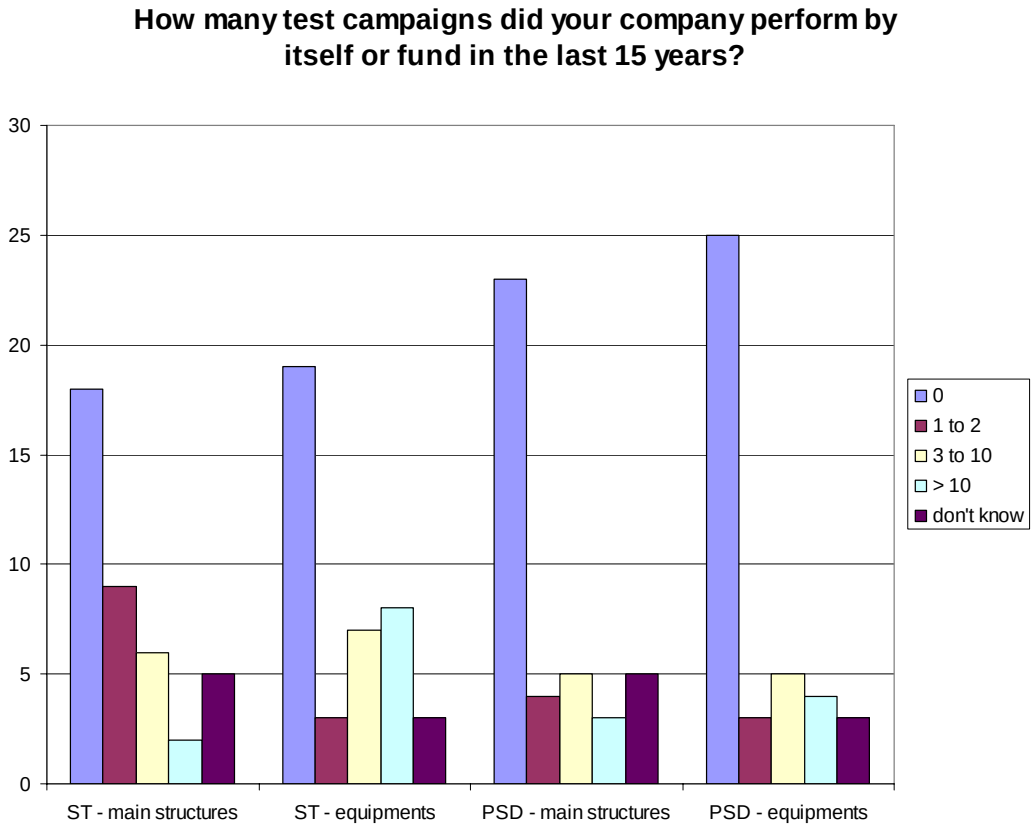
Nuclear energy and chemical industry activities (included construction companies)

The inquiry for nuclear energy and chemical industry activities was sent to 100 nuclear energy and chemical industries around the word. We received back 29 compiled inquiries, so the percentage of success is 29%.
The inquiry for construction companies was sent to 117 companies around the word. We received back only 13 compiled inquiries, so the percentage of success is around 11%. Since many of the submitted questions were similar to those asked to nuclear and chemical industries, we decide to merge the two sets of answers.

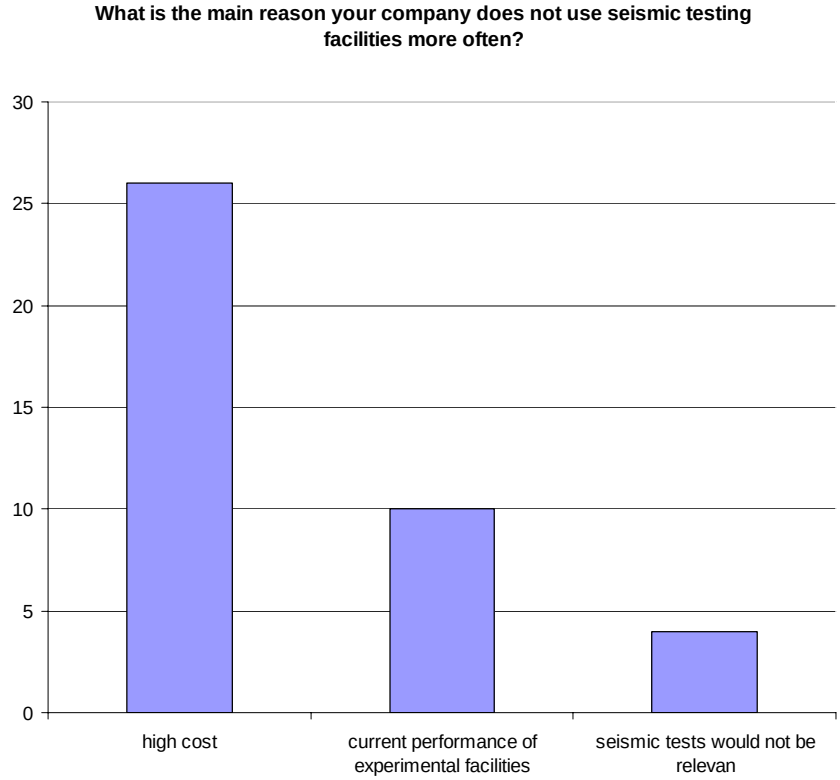
- Seismic risk is very important for most of the respondents, probably also because most of the interviewed are directly involved in seismic activities. They are both interested into main structures tests and in equipment tests (see figure below).



- There is a high demand for tests, but only a few ones were performed in the last years (see figure below). ST is more used for equipments than for main structures.



- The main problem is cost (see figure), but also the lack in the current capability of the testing facilities is a reason why seismic testing is not used more often. Maybe there is also a lack of accessibility.



- Surely there is a high demand for large-scale tests, both for main structures and for equipments (but most of potential users have no clear idea about the desired masses and maximum accelerations).
- These tests have the dual role of improving the research and to serve as demonstrative projects.

Comments, further developments and possible improvements

Some considerations about the way the inquiry has been conducted will help in future activities.

About the number of questions

The number of questions for each type of inquiry and their complexity were kept as low as possible. On the other hand, we wanted to obtain a complete set of information, the more accurate and precise we could. The balance between the required time for completing the form and the obtained amount of data seems to be not perfect: some questions could perhaps be cut off. For example, questions about the level of interest received very often a positive answer, but a positive answer was perhaps given also by people not so much interested. Why to say there is no interest if it doesn't cost anything to say yes? A more realistic demand could have been: How many tests would you expect to commit if you could afford the cost?

About the form structure

Text fields for comments have been seldom used by compilers. Nevertheless, their use for the statistical analysis was impossible. It was also very hard to analyze them in an analytical manner. However, these comments are useful to detect if the question is inappropriate.
Free text fields created problems for several reasons: apart from possible insertion errors, somebody used only integer numbers, some other used decimal numbers with a comma as a decimal separator, others used the point as the decimal separator, there were respondents who put comments just after the answered number and somebody finally answered with formulas instead of numbers. These observations suggest also that questions should always ask for range values; for this purpose, multiple choice questions are the best.
About the first question in the inquiry to laboratories, many of them have several kinds of facility simultaneously. To make the compilation easier, we should have referred the questionnaire the main facility of each laboratory.

Acknowledgments

The Authors thank the project partners for their help in designing and preparing the inquiry. A special thanks to the colleagues of Eucentre for the web implementation of the inquiry and for collecting the answers into their database.

Appendix

Seismic Testing Laboratories web form

Design Study of a European Facility for Advanced Seismic Testing

EFAST Inquiry - Seismic Testing Laboratories

SECTION 1 of 3

1) What is the type of your seismic testing facility ?

- (•) shaking table
- ( ) shaking table system that can work coupled
- ( ) reaction wall, strong floor or reaction system
- ( ) shaking table system coupled to reaction system
- ( ) others (specify in the comment box below)
- ( ) don't know

Comment

Shake...

2) What is the capacity of your facility for a seismic test?

(NOTE : Leave what you don't know blank)

1. Maximum weight of the specimen in ton	45
2. Maximum length in m	23
3. Maximum width in m	1
4. Maximum height in m	78
5. Maximum longitudinal displacement in cm	34
6. Maximum transversal displacement in cm	24
7. Maximum vertical displacement in cm	24

8. Comment

Comment here...

3) Approximately, how many specimens have been seismically tested in your facility for each one of the following ranges of weight ?

1. Larger than 200 tons
   ( ) 0 ( ) 1 to 2 ( ) 3 to 10 (•) > 10 ( ) don't know
2. Between 50 and 200 tons
   ( ) 0 ( ) 1 to 2 ( ) 3 to 10 (•) > 10 ( ) don't know
3. Between 10 and 50 tons
   ( ) 0 ( ) 1 to 2 ( ) 3 to 10 (•) > 10 ( ) don't know
4. Between 2 and 10 tons
   ( ) 0 ( ) 1 to 2 ( ) 3 to 10 (•) > 10 ( ) don't know
5. Smaller than 2 tons
   ( ) 0 ( ) 1 to 2 ( ) 3 to 10 (•) > 10 ( ) don't know
6. Comment

Always bigger than 10...

4) Approximately, how many specimens have been seismically tested in your facility for each one of the following ranges of length ?

1. Larger than 20 m
   (•) 0 ( ) 1 to 2 ( ) 3 to 10 ( ) > 10 ( ) don't know
2. Between 10 and 20 m
   ( ) 0 (•) 1 to 2 ( ) 3 to 10 ( ) > 10 ( ) don't know
3. Between 6 and 10 m

○ 0 ○ 1 to 2 ◉ 3 to 10 ○ > 10 ○ don't know

4. Between 2 and 6 m

○ 0 ○ 1 to 2 ○ 3 to 10 ◉ > 10 ○ don't know

5. Smaller than 2 m

○ 0 ○ 1 to 2 ○ 3 to 10 ○ > 10 ◉ don't know

6. Comment

Continue

Design Study of a European Facility for Advanced Seismic Testing

EFAST Inquiry - Seismic Testing Laboratories

SECTION 2 of 3

5) Approximately, how many specimens have been seismically tested in your facility for each one of the following ranges of height ?

1. Larger than 20 m
   ○ 0 ○ 1 to 2 ○ 3 to 10 ○ > 10 ◉ don't know
2. Between 10 and 20 m
   ○ 0 ○ 1 to 2 ○ 3 to 10 ◉ > 10 ○ don't know
3. Between 6 and 10 m
   ○ 0 ○ 1 to 2 ◉ 3 to 10 ○ > 10 ○ don't know
4. Between 2 and 6 m
   ○ 0 ○ 1 to 2 ○ 3 to 10 ◉ > 10 ○ don't know
5. Smaller than 2 m
   ○ 0 ○ 1 to 2 ○ 3 to 10 ◉ > 10 ○ don't know
6. Comment

6) Approximately, how many specimens have been seismically tested in your facility for each one of the following ranges of peak-to-pea longitudinal displacement ?

1. Larger than 100 cm
   ○ 0 ○ 1 to 2 ◉ 3 to 10 ○ > 10 ○ don't know
2. Between 50 and 100 cm
   ○ 0 ○ 1 to 2 ○ 3 to 10 ◉ > 10 ○ don't know
3. Between 25 and 50 cm
   ○ 0 ◉ 1 to 2 ○ 3 to 10 ○ > 10 ○ don't know
4. Between 12.5 and 25 cm
   ○ 0 ○ 1 to 2 ○ 3 to 10 ◉ > 10 ○ don't know
5. Smaller than 12.5 cm
   ○ 0 ○ 1 to 2 ◉ 3 to 10 ○ > 10 ○ don't know
6. Comment
   Random comment...

7) Approximately, how many specimens have been seismically tested in your facility for each one of the following ranges of peak-to-pe transversal displacement ?

1. Larger than 100 cm
   ○ 0 ○ 1 to 2 ○ 3 to 10 ◉ > 10 ○ don't know
2. Between 50 and 100 cm
   ○ 0 ○ 1 to 2 ◉ 3 to 10 ○ > 10 ○ don't know
3. Between 25 and 50 cm
   ○ 0 ○ 1 to 2 ○ 3 to 10 ◉ > 10 ○ don't know
4. Between 12.5 and 25 cm
   ○ 0 ◉ 1 to 2 ○ 3 to 10 ○ > 10 ○ don't know
5. Smaller than 12.5 cm
   ○ 0 ○ 1 to 2 ○ 3 to 10 ○ > 10 ◉ don't know
6. Comment

Here the data...

8) Approximately, how many specimens have been/will be seismically tested in your facility for each one of the following ranges of peak-to-pea vertical displacement ?

1. Larger than 100 cm
   ○ 0 ○ 1 to 2 ◉ 3 to 10 ○ > 10 ○ don't know
2. Between 50 and 100 cm
   ○ 0 ○ 1 to 2 ◉ 3 to 10 ○ > 10 ○ don't know
3. Between 25 and 50 cm
   ○ 0 ○ 1 to 2 ○ 3 to 10 ◉ > 10 ○ don't know
4. Between 12.5 and 25 cm
   ○ 0 ○ 1 to 2 ◉ 3 to 10 ○ > 10 ○ don't know
5. Smaller than 12.5 cm
   ○ 0 ○ 1 to 2 ○ 3 to 10 ○ > 10 ◉ don't know
6. Comment

Continue Back

Design Study of a European Facility for Advanced Seismic Testing

EFAST Inquiry - Seismic Testing Laboratories

SECTION 3 of 3

9) Approximately, how many specimens have been seismically tested in your facility with each one of the following specific techniques ?

1. Unidirectional excitation
   ○ 0 ○ 1 to 2 ◉ 3 to 10 ○ > 10 ○ don't know
2. Multidirectional excitation
   ○ 0 ○ 1 to 2 ○ 3 to 10 ◉ > 10 ○ don't know
3. Rigid-base excitation
   ○ 0 ○ 1 to 2 ◉ 3 to 10 ○ > 10 ○ don't know
4. Asynchronous multiple-support excitation
   ○ 0 ○ 1 to 2 ○ 3 to 10 ◉ > 10 ○ don't know
5. Without substructuring
   ○ 0 ○ 1 to 2 ◉ 3 to 10 ○ > 10 ○ don't know
6. With pseudo-dynamic (in slow time scale) substructuring
   ○ 0 ○ 1 to 2 ◉ 3 to 10 ○ > 10 ○ don't know
7. With real-time (or fast time scale) substructuring
   ○ 0 ○ 1 to 2 ○ 3 to 10 ◉ > 10 ○ don't know
8. Without telepresence
   ○ 0 ○ 1 to 2 ○ 3 to 10 ○ > 10 ◉ don't know
9. With telepresence
   ○ 0 ○ 1 to 2 ○ 3 to 10 ◉ > 10 ○ don't know
10. Without inter-facility distributed testing
    ○ 0 ○ 1 to 2 ○ 3 to 10 ◉ > 10 ○ don't know
11. With inter-facility distributed testing
    ○ 0 ○ 1 to 2 ○ 3 to 10 ○ > 10 ◉ don't know
12. Comment

10) What is the type of the informatics network internal to your laboratory ?

- ○ ethernet lower than 100Mb/s
- ○ ethernet between 100Mb/s and 1Gb/s
- ◉ ethernet over than 1 Gb/s
- ○ SCRAMNet (specify the frequency and data throughput)
- ○ others (specify in the comment box below)
- ○ don't know

Comment

Comment here

11) What is the type of the informatics network connecting your laboratory with the other laboratories ?

- ○ ethernet lower than 100Mb/s
- ◉ ethernet between 100Mb/s and 1Gb/s
- ○ ethernet over than 1 Gb/s
- ○ others (specify in the comment box below)
- ○ don't know

Do you use an authentification system ?

- ○ yes
- ◉ no
- ○ don't know

Do you have a corporate firewall ?

- ◉ yes
- ○ no
- ○ don't know

Comment

12) What is the type of database of test results?

- ○ single site
- ○ multiple-site centralised
- ◉ multiple-site distributed
- ○ others (specify in the comment box below)
- ○ don't know

Comment

Comment

Submit Back

Nuclear Energy and Chemical Industry Activities web form

Design Study of a European Facility for Advanced Seismic Testing

EFAST Inquiry - Nuclear Energy and Chemical Industry Activities

SECTION 1 of 3

1) What is your main activity related to the seismic behaviour of structures (you may choose more than one activity) ?

- [ ] structural design and/or assessment
- [x] construction
- [x] equipment
- [ ] risk analysis
- [ ] buildings, infrastructures
- [ ] construction materials and technologies

Comment

Comment here

2) How important is seismic risk in your main activity ?

( ) zero ( ) low ( ) medium ( ) high ( ) don't know

Comment

More than zero...

3) Is your company directly involved in seismic design or construction of structures, components or equipments ?

( ) yes ( ) no (•) don't know

Comment

4) What is the impact on your institution's activities of the earthquake response of main structures and equipment respectively ?

1. Main structures (buildings, bridges, monuments, geotechnical structures, etc)

( ) zero ( ) low (•) medium ( ) high ( ) don't know

2. Equipments or secondary structures (eg. Storage tanks, bridge cranes, reactor fuel assembly, pipes etc)

( ) zero ( ) low (•) medium ( ) high ( ) don't know

Comment

5) How often does your company make reference to results of experimental tests (even if your own institution was not involved in these tests), to works based on these results ?

1. Buildings (or parts of buildings)

( ) never ( ) rarely (•) often ( ) don't know

2. Equipments

( ) never (•) rarely ( ) often ( ) don't know

Comment

Continue

EFAST Inquiry - Nuclear Energy and Chemical Industry Activities

SECTION 2 of 3

6) How many test seismic tests did your company carry out by itself or fund during the last 15 years?

1. Shaking tables
   1.a Buildings (or parts of buildings)
   ○ 0 ○ 1 to 2 ○ 3 to 10 ◉ > 10 ○ don't know
   1.b Equipments
   ○ 0 ○ 1 to 2 ○ 3 to 10 ◉ > 10 ○ don't know
2. Pseudodynamic
   2.a Buildings (or parts of buildings)
   ○ 0 ○ 1 to 2 ○ 3 to 10 ◉ > 10 ○ don't know
   2.b Equipments
   ○ 0 ○ 1 to 2 ○ 3 to 10 ◉ > 10 ○ don't know

Comment

Always bigger than 10...

7) According to your company's experience and policy what is the benefit from seismic testing results that are used for research a development (R&D) or demonstration and qualification purposes for structures and equipment ?

1. R&D, validation of numerical models
   1.a Main structures
   ○ zero ◉ low ○ medium ○ high ○ don't know
   2.b Equipments
   ○ zero ○ low ◉ medium ○ high ○ don't know
2. Demonstration, qualification
   2.a Main structures
   ○ zero ○ low ○ medium ◉ high ○ don't know
   2.b Equipments
   ○ zero ○ low ○ medium ◉ high ○ don't know

Comment

Again a comment ...

8) What could be the benefit to your company from an experimental facility that would enable large-scale seismic testing ?

○ low ○ medium ◉ high ○ don't know

Comment

9) What could be the added value for your institution of an experimental facility having a multiple point earthquake input capability ?

○ low ◉ medium ○ high ○ don't know

Comment

10) What are the characteristics of the most demanding test your institution has been involved in, in the past 15 years ?

1. Mass of specimen (tons)
   ○ < 20 ○ from 20 to 60 ◉ from 60 to 100 ○ > 100 ○ don't know
2. Peak acceleration (g)


< 0.5
from 0.5 to 1
from 1 to 2
> 2
don't know
Comment
Continue
Back

Design Study of a European Facility for Advanced Seismic Testing

EFAST Inquiry - Nuclear Energy and Chemical Industry Activities

SECTION 3 of 3

11) What are the characteristics of the most demanding test in which your institution could be interested ?

1. Mass of specimen (tons)

○ < 20 ○ from 20 to 60 ◉ from 60 to 100 ○ > 100 ○ don't know

2. Peak acceleration (g)

○ < 0.5 ○ from 0.5 to 1 ◉ from 1 to 2 ○ > 2 ○ don't know

Comment

12) What is the main reason your institution does not use seismic testing facilities more often ?

☑ high cost

☑ current performance of experimental facilities

☐ seismic tests would not be relevant even if facilities performance limits were not of concern

Comment

Very high costs...

13) What is the probability of needing, in the next 15 years, seismic testing taking into account frequency excitation content lower than 1Hz ?

○ zero ○ low ○ medium ◉ high ○ don't know

Comment

14) What is the probability of needing, in the next 15 years, seismic testing taking into account vertical earthquake excitation ?

○ zero ○ low ◉ medium ○ high ○ don't know

Comment

Comment here...

15) What is the probability of needing, in the next 15 years, seismic testing taking into account excitation intensity up to (or near) collapse ?

○ zero ◉ low ○ medium ○ high ○ don't know

Comment

Submit Back

Construction Companies web form

Design Study of a European Facility for Advanced Seismic Testing

EFAST Inquiry - Construction Companies

SECTION 1 of 3 - General Information

1) What is your main activity related to the seismic behaviour of structures ?

- [ ] structural design and/or assessment
- [ ] construction
- [ ] equipment
- [x] risk analysis
- [x] buildings, infrastructures
- [x] construction materials and technologies
- [ ] seismic risk reduction / retrofitting / reparation

Comment

2) How important is seismic risk in your activity ?

( ) zero (•) low ( ) medium ( ) high ( ) don't know

Comment

Maybe very low...

3) Is your company directly involved in seismic design of structures, components or equipments ?

( ) yes ( ) no (•) don't know

Comment

Again a comment...

4) What is your company interest on analysing thoroughly the earthquake response of structures and equipments respectively ?

1. Main structures (buildings, bridges, monuments, geotechnical structures, etc)

( ) zero ( ) low (•) medium ( ) high ( ) don't know

2. Equipments or secondary structures (eg. Storage tanks, bridge cranes, reactor fuel assembly, pipes etc)

( ) zero ( ) low ( ) medium (•) high ( ) don't know

Comment

Comment !

5) What is your company interest on performing seismic tests on structures and equipments respectively ?

1. Main structures

( ) zero (•) low ( ) medium ( ) high ( ) don't know

2. Equipments or secondary structures

( ) zero ( ) low (•) medium ( ) high ( ) don't know

Comment

NO

Continue

Design Study of a European Facility for Advanced Seismic Testing

EFAST Inquiry - Construction Companies

SECTION 2 of 3 - Policy and Experience on R&D and Testing Activities

6) How often does your company make reference to results of experimental test ?

1. Buildings (or parts of buildings)
   ○ never ◉ rarely ○ often ○ don't know
2. Equipments
   ○ never ○ rarely ◉ often ○ don't know

Comment

Here a comment...

7) How many test campaigns did your company perform by itself or fund in the last 15 years ?

1. Shaking tables
   1.a Buildings (or parts of buildings)
   ○ 0 ○ 1 to 2 ◉ 3 to 10 ○ > 10 ○ don't know
   1.b Equipments
   ○ 0 ○ 1 to 2 ○ 3 to 10 ◉ > 10 ○ don't know
2. Pseudodynamic
   2.a Buildings (or parts of buildings)
   ○ 0 ○ 1 to 2 ○ 3 to 10 ◉ > 10 ○ don't know
   2.b Equipments
   ○ 0 ○ 1 to 2 ○ 3 to 10 ◉ > 10 ○ don't know
3. Pseudostatic (cyclic)
   3.a Buildings (or parts of buildings)
   ○ 0 ◉ 1 to 2 ○ 3 to 10 ○ > 10 ○ don't know
   3.b Equipments
   ○ 0 ◉ 1 to 2 ○ 3 to 10 ○ > 10 ○ don't know

Comment

Again a comment...

8) What is the average annual budget for research and development (R&D) activities of your company in the last 15 years (thousands of euro) ?

- ○ 0
- ○ < 10
- ○ 10 - 50
- ○ 50 - 100
- ○ 100 - 500
- ○ 500 - 1000
- ◉ > 1000
- ○ don't know

Comment

More than 1000...

9) What is the percentage of average annual budget for research and development (R&D) activities of your company in 15 years with respect the yearly turnover ?

- ◉ 0 %
- ○ < 0.5 %
- ○ 0.5 - 1 %
- ○ 1 - 2 %

- ○ 2 - 3 %
- ○ 3 - 5 %
- ○ > 5 %
- ○ don't know

Comment

Maybe 0%...

10) What is the average annual budget for experimental tests of your company in the last 15 years (thousands of euro) ?

- ○ 0
- ○ < 10
- ○ 10 - 50
- ○ 50 - 100
- ○ 100 - 500
- ◉ 500 - 1000
- ○ > 1000
- ○ don't know

Comment

11) What is the percentage of annual budget for experimental tests of your company in the last 15 years with respect to the overall R&D budget

- ○ 0 %
- ○ < 1 %
- ○ 1 - 5 %
- ○ 5 - 10 %
- ◉ 10 - 20 %
- ○ 20 - 50 %
- ○ > 50 %
- ○ don't know

Comment

12) What percentage of your company budget for experimental tests was devoted to seismic testing of structures or equipments in the last years ?

1. Main structures

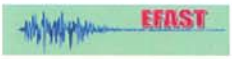
- ◉ 0 %
- ○ < 1 %
- ○ 1 - 5 %
- ○ 5 - 10 %
- ○ 10 - 20 %
- ○ 20 - 50 %
- ○ > 50 %
- ○ don't know

2. Equipments or secondary structures

- ○ 0 %
- ○ < 1 %
- ○ 1 - 5 %
- ○ 5 - 10 %
- ◉ 10 - 20 %
- ○ 20 - 50 %
- ○ > 50 %
- ○ don't know


Comment
Continue
Back

Design Study of a European Facility for Advanced Seismic Testing



EFAST Inquiry - Construction Companies

SECTION 3 of 3 - Interest in Large-Scale Seismic Testing

13) According to the experience and to the policy of your company what is the interest of seismic tests that are used for research a development (R&D) or demonstration and qualification purposes for structures and equipments ?

1. R&D, validation of numerical models
   1.a Main structures
   ○ zero ○ low ○ medium ◉ high ○ don't know
   2.b Equipments or secondary structures
   ○ zero ○ low ○ medium ◉ high ○ don't know
2. Demonstration, qualification
   2.a Main structures
   ○ zero ○ low ○ medium ◉ high ○ don't know
   2.b Equipments or secondary structures
   ○ zero ○ low ○ medium ◉ high ○ don't know

Comment

Always high...

14) What could be the interest of your company on an experimental facility that allows large-scale tests for earthquake response simulation ?

○ low ○ medium ○ high ◉ don't know

Comment

15) What could be the added value for your institution of an experimental facility having a multiple point earthquake input capability ?

○ low ○ medium ○ high ◉ don't know

Comment

16) What are the characteristics of the most demanding test your company could be interested in ?

1. Mass of specimen (tons)
   ○ < 20 ○ from 20 to 60 ◉ from 60 to 100 ○ > 100 ○ don't know
2. Peak acceleration (g)
   ○ < 0.5 ○ from 0.5 to 1 ○ from 1 to 2 ◉ > 2 ○ don't know
3. Velocity (m / sec)
   ○ < 0.5 ○ from 0.5 to 1 ◉ from 1 to 2 ○ > 2 ○ don't know
4. Displacement (m)
   ○ < 0.1 ○ from 0.1 to 0.3 ○ from 0.3 to 0.5 ◉ > 0.5 ○ don't know

Comment

17) What is the main reason your company does not use seismic testing facilities more often ?

☑ cost
☑ current performance of experimental facilities
☐ seismic tests would not be relevant
☐ seismic tests could be counterproductive

Comment


Very high costs...

Submit
Back

European Commission

EUR 23998 EN – Joint Research Centre – Institute for the Protection and Security of the Citizen
Title: EFAST Inquiry
Authors: Francesco Marazzi, Francisco Javier Molina Ruiz
Luxembourg: Office for Official Publications of the European Communities
2009 – 36 pp. – 21 x 29.7 cm
EUR – Scientific and Technical Research series – ISSN 1018-5593

Abstract
This report contains a detailed description of the inquiry activities conducted in the framework of the EFAST project.
EFAST (Design Study of a European Facility for Advanced Seismic Testing) is a joint project financed by the European Commission that foresees the study of all the aspects regarding the design of a major testing facility in Europe that would complement and collaborate with the existing ones. This study aims at identifying the current and future needs in the field, and proposes the concept of a facility using the best available testing technologies.
As a preliminary step, it is very important to know the actual testing capabilities all around the world and the needs of the earthquake community, especially in Europe.
The inquiry targeted three different kinds of entities:
1. seismic testing laboratories;
2. nuclear energy and chemical industry industries;
3. construction companies.

Three different sets of questions and three lists of contact persons were prepared. Each contact received a personal link to access to the inquiry to be completed directly on the web. The inquiry form was very user friendly and could be completed in several step, then submitted to the database.
The data were imported into a spreadsheet and analysed. Each question is here reported and the obtained answers are elaborated into graphics.
The aggregation and interpretation of the obtained answers suggested some conclusions.
For Seismic testing laboratories we obtained that, as regards the maximum weight, length, width and height, often the upper values are for Reaction Walls (RW) facilities and the lower values for Shaking Tables (ST) facilities. Only some facilities cannot perform tests in the transversal and the vertical direction. In spite of the available capabilities, most of the times the tested specimens are light, small in length and height and tested with small displacements amplitude. Even if there is a wide possibility for multi-axial tests, only a few tests were performed in the past with vertical or lateral displacements. Asynchronous multiple-support excitation, multidirectional excitation, substructuring techniques, inter-facility distributed testing and telepresence are not yet common practices even if there are some laboratories which have already started to apply them.
Looking at the nuclear energy, chemical and construction companies, it comes that the seismic risk is very important for most of the respondents, probably also because most of the interviewed are directly involved in seismic activities. There is a high demand for large scale tests, but only a few ones were performed in the last years. ST is more used for equipments than for main structures. PSD is more used for main structures than for equipments. The main problem is cost, but also the lack in the current capability of the testing facilities is a reason why seismic testing is not used more often. Maybe there is also a lack of accessibility. Interviewed said that tests should have the dual role of improving the research and to serve as demonstrative projects.

The mission of the JRC is to provide customer-driven scientific and technical support for the conception, development, implementation and monitoring of EU policies. As a service of the European Commission, the JRC functions as a reference centre of science and technology for the Union. Close to the policy-making process, it serves the common interest of the Member States, while being independent of special interests, whether private or national.