Interdisciplinary development of a support structure for components in building H0705A - A challenge for systematic requirements engineering

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Building H0705A is a branching and crossing point for 8 beam lines in the planned FAIR facility. 2 beam lines are inclined. In addition several components of other beam lines have to be transported via this building to their final installation positions. One also has to take into account that the installation of support structures and components will take place according to project planning in two stages. Furthermore the consideration of the product life cycle takes a fundamental part of the definition of requirements for the support structure.
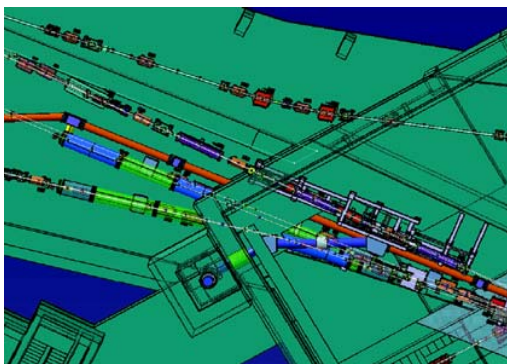

Figure 1: Top view of beam lines in building H0705A.

In a first step all involved departments, so called stakeholders, were identified. In a second step a team with members of magnet department, vacuum department, beam diagnostic department, assembly department, alignment department, power converter department, media supply department, digital mock-up (DMU) department and the responsible machine project leader (MPL) started with a global task analysis. The question had to be solved, what the task of the support structure is, and what this means in consideration of the two project stages and of the product life cycle of the components. The next step included the definition of parameters which influence the system. Not only technical aspects had to be taken into account but also already defined processes for installation and maintenance, as well as safety aspects like length of escape routes and earthquake safety are influencing items. This step was followed by a structural analysis. What areal, staff and organizational structures have to be considered? The analysis of given and demanded infrastructure of the building gives also boundary conditions for the development of the support structure. A main item in the requirement analysis was

the definition of all tasks of the involved departments and the dependencies of and to other tasks. For supporting all functions an analysis of communication shows the flow of needed information [1].

After collection all items have to be classified:

- Functional requirements

- Technical requirements

- Requirements for use

- Quality requirements

- Requirements onto other components, e.g. infrastructure

- Contract and legal requirements [2]

- Requirements of the product life cycle

Due to this classification the specifications for the development, construction and installation of the support structure could be prepared. In addition a time schedule for installation tasks and a course of actions for maintenance purposes could be developed. The validation of results during the development process in reference to the defined and classified requirements helps to ensure that all demands of the stakeholders will be fulfilled at the end of the process.
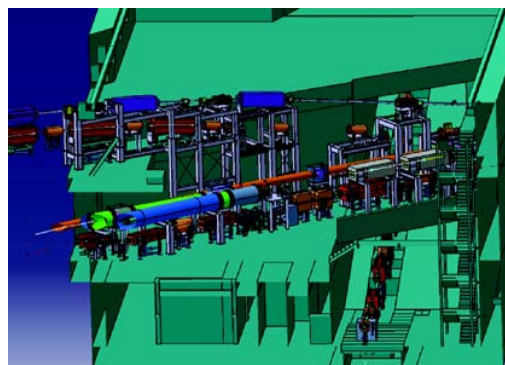

Figure 2: Beam lines with support structure in building H0705A.

References

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[2] C. Rupp, Requirements- Engineering und Management, München, Wien: Carl Hanser Verlag, 2007.

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