

Comparative study of risk analysis methods from a fire safety perspective

-Case study of new underground facilities at CERN

Risks can be found everywhere, but how do we handle these risks if we have limited information? Several methods can be used, but only a few will render in a result that are useful for a decision. More information is often connected with better results. However, when the facility is unique and no data can be found you need to think outside the box. It is then necessary to challenge the standard methods and be more flexible in the risk management.

Risk exists everywhere in our everyday life and society. For example, you are exposed to risks both in the traffic on your way to work and in form of different illnesses. Also the industries around us are associated with different risks. Depending on the situation, these risks are managed in different ways. One of the more unknown areas in risk management is particle accelerators and the risks connected to their technical equipment. Even though particle accelerators are not a part of most people's everyday life, these facilities push the limits of science and our fundamental understanding of the world and materials around us. The research often takes place on the international arena, for example CERN outside Geneva in Switzerland, or MAX IV and ESS, in Lund in the southern Sweden. Their unique features do not only render in new theories and knowledge but also in risks that are not found in many other industries. A result from using unique equipment in these facilities is that there are very limited or no statistical data regarding consequences or probability for the risks. They are often located underground with both large quantities of high voltage equipment and radioactive environment, which leads to that the risk management has to be handled in a unique way. One of the challenges is the possibility of evacuation below ground level.

This thesis tries to find a way to analyse how these unique risks are managed in the most effective way from a perspective of both the quality of the assessment and the time consumption. By applying several different types of risk analysis methods on new facilities at CERN, as a case study, the methods can be analysed and compared.

The conclusion from the thesis is that the different methods are suitable in different phases of the facilities life circle, which is in line with previous research. The risk management could suffer if a predefined method are used that do not fit the specific phase. The conclusion from this is that the risk management needs to be flexible and the purpose of the risk analysis should decide the methodology in order to avoid negative effects in quality and time consumption.

Another part of the thesis was to analyse two different designs of new facilities at CERN in order to see if one design was to prefer from a fire safety perspective. This was done as a collaboration between Brandteknik, at Lund University, and CERN with the aim to support CERN in the evaluation of the pros and cons of the different designs. Based on the results from the thesis, one design was recommended for further evaluation.

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