

Monetary optimization and quantitative risk acceptance criteria: From theory to practice

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Fire safety codes around the world are based on two different approaches to regulate building fire safety: Prescriptive or performance-based design. The prescriptive approach, as implemented in most traditional fire safety codes, allows for a simple and effective risk control for the majority of buildings, but offers little flexibility to the designers and is difficult to apply in specific situations. Performance-based design aims at mitigating these drawbacks but raises new questions regarding the definition of safety goals and performance objectives, in particular quantitative ones. Risk assessment, optimization and quantitative acceptance criteria for decisions affecting life safety can help closing the gaps in both approaches, either by adding flexibility to prescriptive code design or by defining a quantitative framework for risk-based decision-making in the context of performance-based design.

The presentation shows how the basic principles of monetary optimization and societal risk acceptance can be applied in practical fire safety design problems. Special attention will be paid to the maintenance of existing buildings in contrast to the design of new structures, and to the consideration of buildings with special features that prohibit the simple application of prescriptive design rules. The main questions and challenges will be illustrated with practical examples from the area of fire safety design, but also from other areas like e.g. natural hazards protection, as appropriate.

Presenter: Dr FISCHER, Katharina (Matrisk GmbH)

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