# Abstract

Life-safety is a fundamental objective of fire safety engineering. In order to achieve this objective, fire engineers use prescriptive guidelines from guidance documents or employ performance-based engineering to fulfil certain performance criteria as needed. Building pre-flashover design fires is the primary step in performance-based approach, however, the multitude of ways it can be done means that any two engineers will most likely come up with two different design fires for a particular project. This dissertation identifies uncertainties and complications within literature in regards to the methods of analysis, input parameters, codified prescriptions, models for representing fire development, and assumptions made throughout the pre-flashover design fire process. Having established the uncertain nature of the process, the research seeks to identify common practices, with the view to find out if the problems are addressed appropriately, amongst practicing fire engineers through surveys and interviews. The qualitative analysis of the responses shows how predominant the use of t-squared model is, despite having its limitations, and how the uncertainties related to input parameters such as heat release rate, and fire growth rate, are often inadequately understood in design fire context and superficially addressed. Influence of stakeholders, especially regulators, and practicality seems present to some degree in engineer’s minds, possibly limiting the exercise of innovation and engineering robustness.