

## **Example:**            Considering a case that is similar to the WTC event

The design of fire safety systems for high-rise buildings is developed on a series of prescribed criteria and based on an assumed temperature evolution within a post-flashover fire. The scenario of the WTC differs from this approach in that the real temperature evolution might be more severe than the design criteria. An analysis of a building for a similar scenario should be done at five levels:

- 1. Evaluation of the design practices used:**
  - a. Evacuation
  - b. Fire safety systems (passive and active)
  - c. Structural behaviour
  
- 2. Scenario development**
  
- 3. Estimation of potential losses:**
  - a. Reliability of fire safety systems under the proposed scenario
  - b. Potential impact of failure
  - c. Determination of critical/most affected systems
  - d. Proposal for changes
  
- 4. Estimation of the severity of the fire**
  - a. Modelling of the particular scenario
  - b. Comparison with design fire conditions (temperature curves)
  - c. Determine under which circumstances the fire intensity will be beyond the design fire conditions
  - d. Proposal for changes to prevent exceeding design fire conditions
  
- 5. The fire intensity in the WTC did not exceed the design fire conditions, thus the temperature curve approach could be questioned. The only way of assessing the performance of the building under the proposed scenario is to calculate the structural performance with the specific fire load (**full structural analysis**).**

How extended such an analysis will be done depends on the needs, questions, requirements and conditions of the individual case.

Is the interest, as in the here depicted case WTC (11 September 2001), to determine “effect of thermal insulation” one could proceed as follows:

It is claimed that because the thermal insulation was ripped off by the aircraft the steel heated faster and this resulted in the collapse of the towers. WTC 7 contradicts this in a certain way. Nevertheless, this is a good argument to stop at analysis-level 3. If the building is constructed out of reinforced concrete, it is most likely that this will have no effect, thus you will have to go to analysis-level 4. If one deems that analysis-level 4 is not sufficient, then analysis-level 5 should be conducted.