THE COLOSSEUM FIRE: 217AD

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The Colosseum fire - 217 AD

- A NUMERIC SIMULATION OF THE 3° CENTURY AD FIRE
- The combination of the fire of 217 AD with earthquakes and foundation settlements caused serious damages in the Colosseum and required restoration works during the Severian Emperors period.
- The study is a part of a wide research program entrusted by the "Soprintendenza Archeologica di Roma". The aim is to evaluate which contribution and damage level could be caused by the fire to the masonry structure, compared to earthquake and foundation settlements.

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Historic References

- The Fire of 217 (23 august?): The day of the "Vulcanalia" a light primed the fire in the upper gallery (wooden structure).
- An Earthquake in September(?) 217: a strong earthquake of about 5.0 level Richter.
- Various earthquakes in 223: 9, 17 September, 19 October 223.
- Restoration works began in 218 and were carried on during Alexander Severus age from 222 to 235.
- Foundation settlements affected the structure from the 2° century AD

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The numeric simulation of a fire

Mathematical models are required for 3 steps of study:

- The fire is an "action" on the structure. The action is modelled by means of a spatial distribution of a temperature vs. time law of the hot gases due to the fire.
- The thermic fields arising inside the structures, heated at its external surface, must be determined.
- A mechanical model of the structure is required to assess the distribution of stresses and deformations.

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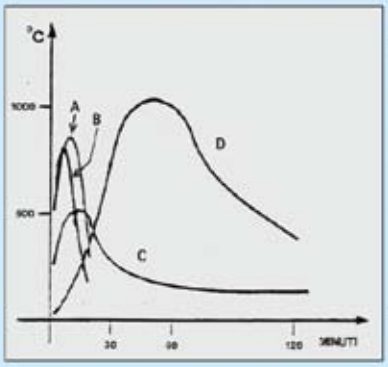

The fire as an "action" on the structure

Temperature vs. time laws of real fires

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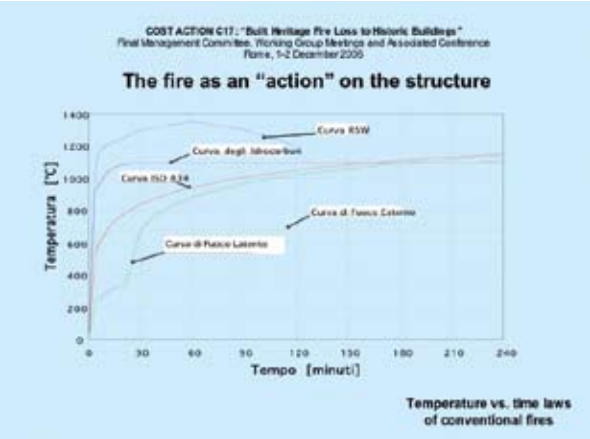

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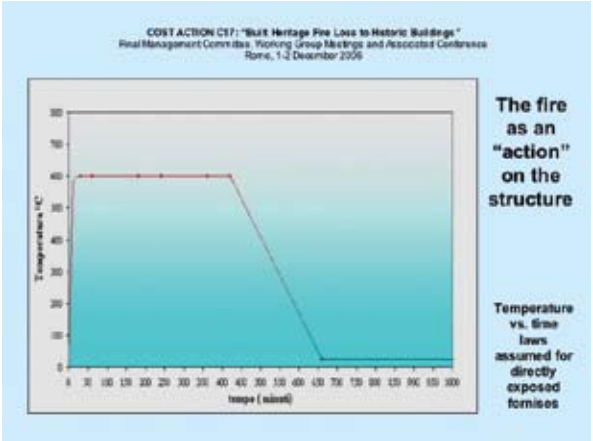

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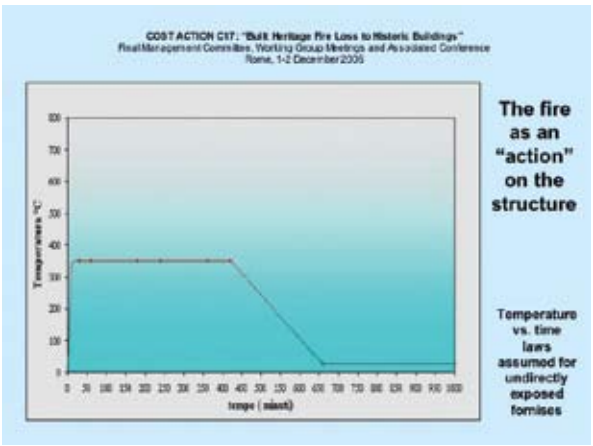

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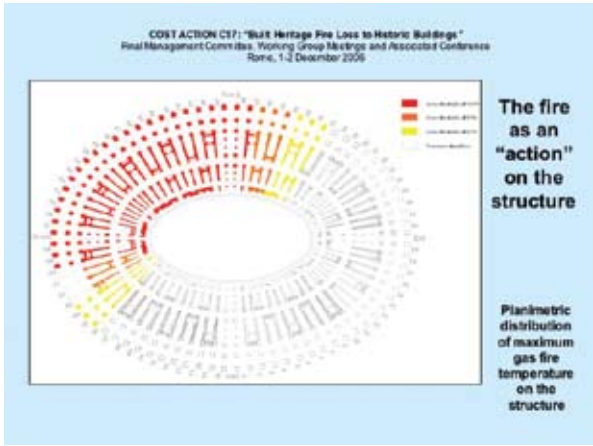

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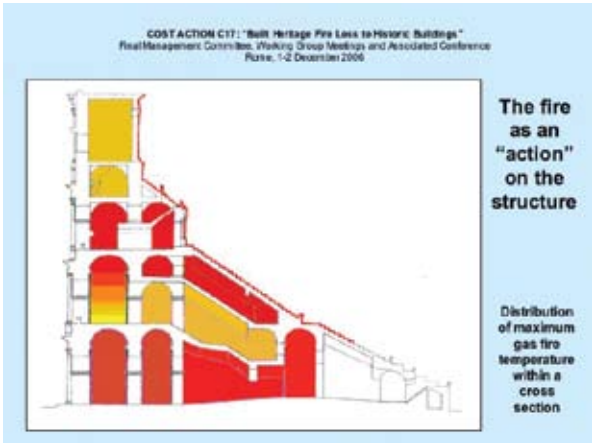

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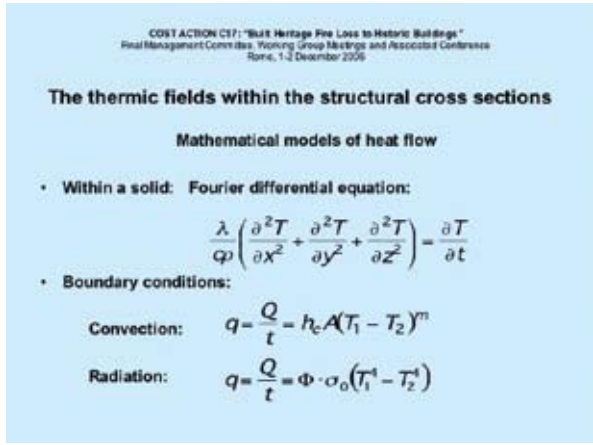

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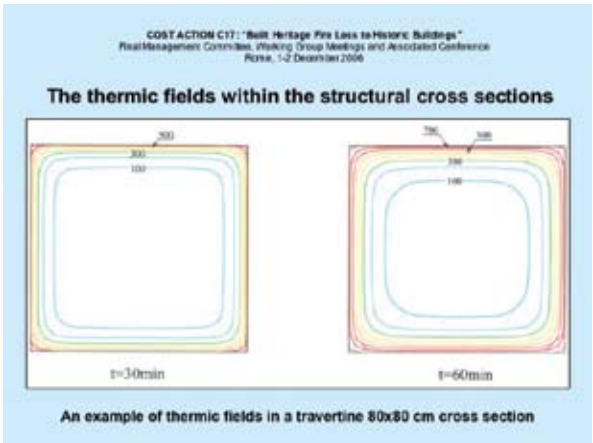

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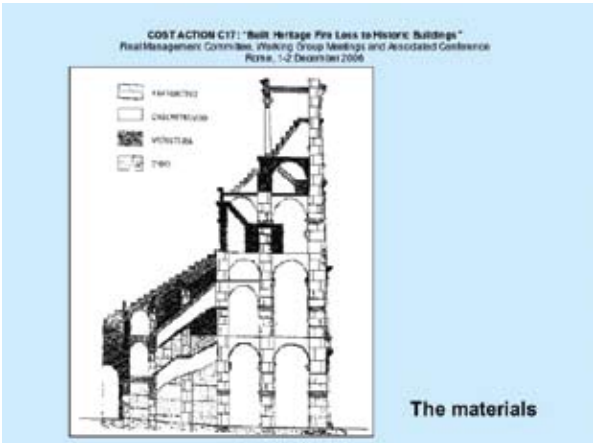
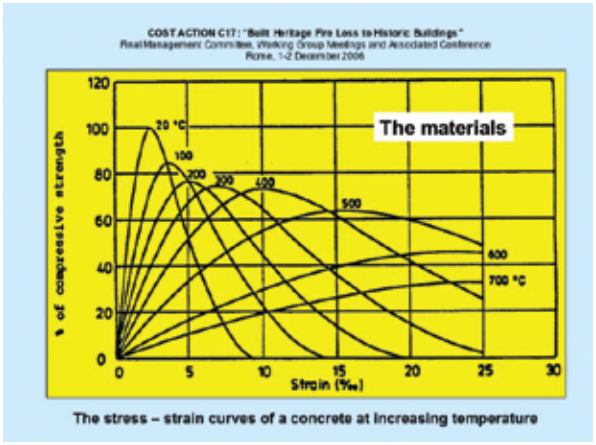
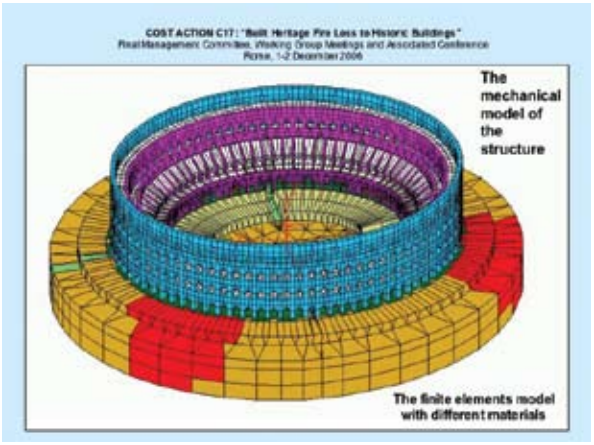




15 The stress – strain curves of a concrete at increasing temperature



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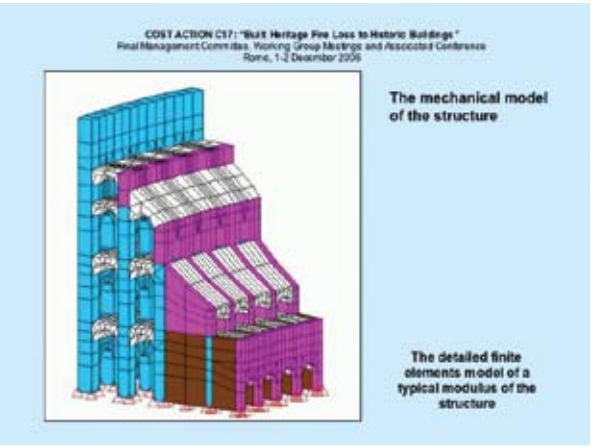

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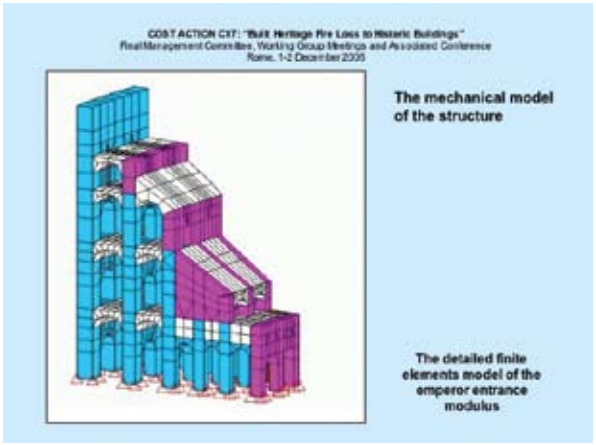

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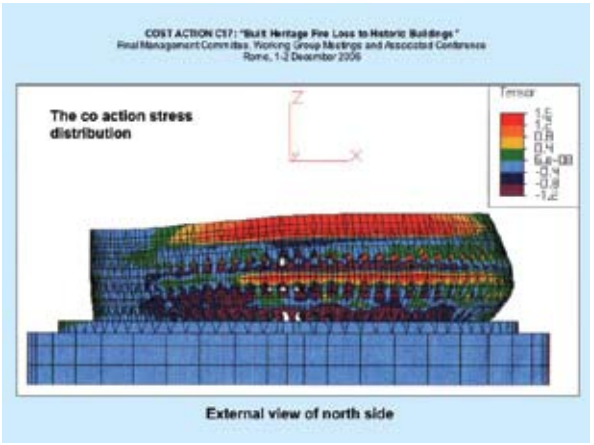
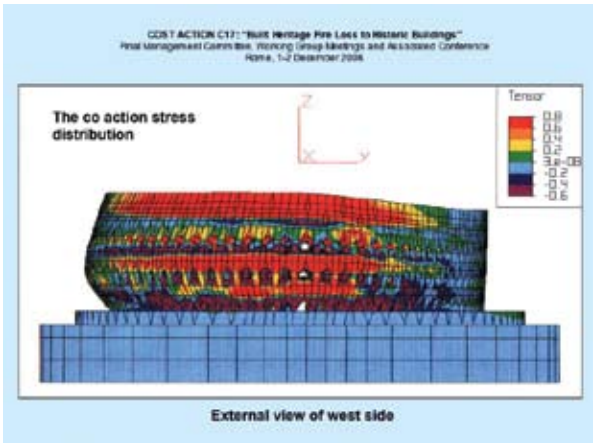
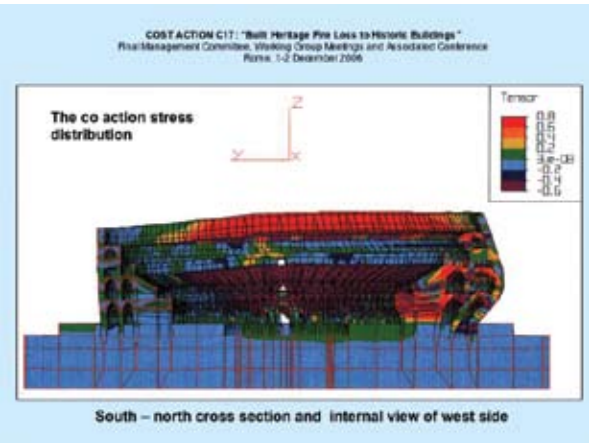


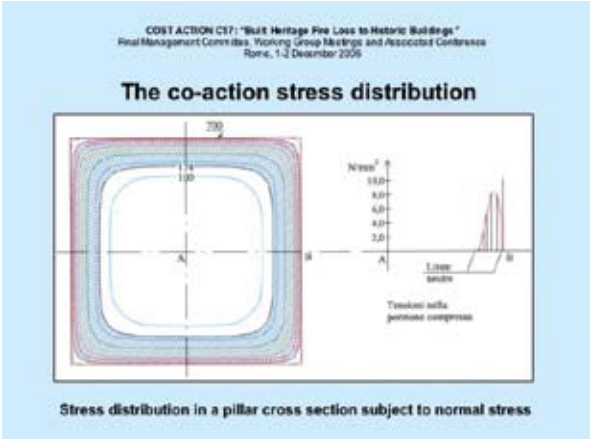
External view of north side 20



21 External view of west side



South – north cross section and internal view of west side 22


COST ACTION C17: "Built Heritage Fire Loss to Historic Buildings"
Final Management Committee, Working Group Meetings and Associated Conference
Rome, 1-2 December 2006
The co-action stress distribution
Stress distribution in a pillar cross section subject to normal stress

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