

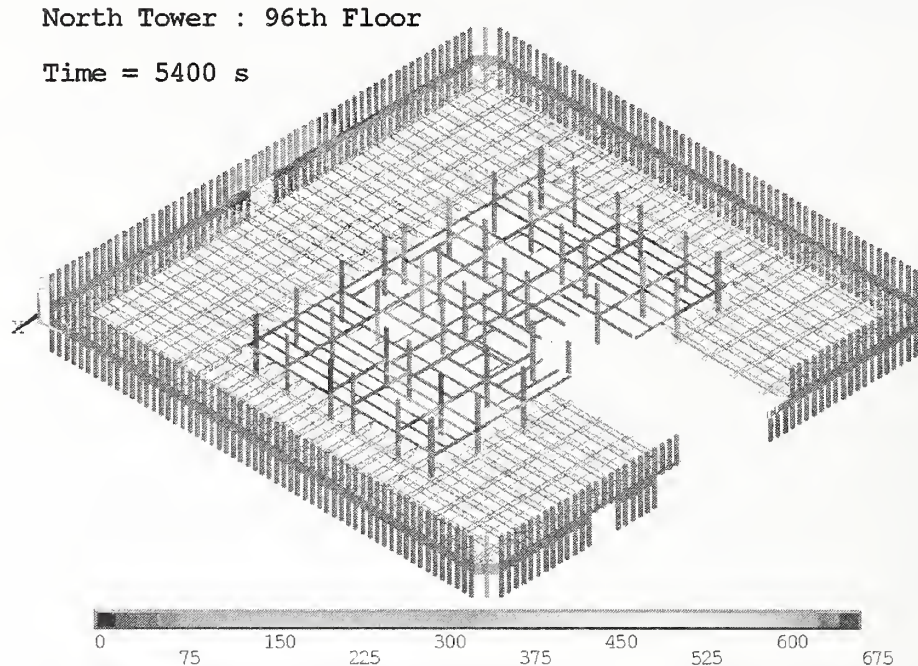


Figure E-4. Thermal response of floor 96 of WTC 1 at 5,400 s after impact, Case B.

The thermal data files then became input for the analysis of the changes in structural performance that resulted from exposure to the fire environments. The FSI calculations were performed at time steps ranging from 1 ms to 50 ms. Use of the resulting data set for structural analysis would have required a prohibitive amount of computation time. Thus, for each case, the instantaneous temperature and temperature gradient for each grid volume was provided at 10 min intervals after aircraft impact. For WTC 1, there were 10 such intervals, ending at 6,000 s; for WTC 2 there were six intervals, ending at 3,600 s. The data files were in a format consistent with ANSYS 8.0.

E.7 FIRE IN AN UNDAMAGED BUILDING

After incurring the direct damage from two different aircraft strike conditions, WTC 1 and WTC 2 stood for 102 min and 56 min, respectively. Structural models of the two aircraft-damaged buildings indicated that, in the absence of weakening by fires or other substantial insult, the buildings would have continued to stand indefinitely. The application of the fire scenarios in Cases B and D to the aircraft-damaged towers led to collapse.

To complete the assessment of the relative roles of aircraft impact and ensuing fires, NIST examined whether an extreme but conventional fire, occurring without the aircraft impact, could have led to the collapse of a WTC tower, were it in the same condition as it was prior to the aircraft impact on September 11, 2001.

The characteristics of such a maximum credible fire could have been:

- Ignition on a single floor by a small bomb or other explosion. If arson were involved, there might have been multiple small fires ignited on a few floors.