

For two of the five exterior panels from the impact zone of WTC 1, the general shape and appearance of the recovered pieces matched photographs taken just before the building collapse. Thus, NIST was able to attribute the observed damage to the aircraft impact. NIST also made determinations regarding the connections between structural steel elements:

- There was no evidence to indicate that the joining method, weld materials, or welding procedures were inadequate. Fractures of the columns in areas away from a welded joint were the result of stretching and thinning. Perimeter columns hit by the plane tended to fracture along heat-affected zones adjacent to welds.
- The failure mode of spandrel connections varied. At or above the impact zone, bolt hole tear-out was more common. Below the impact zone, it was more common for the spandrels to be ripped from the panels. There was no evidence that fire exposure changed these failure modes.
- The exterior column splices at the mechanical floors, which were welded in addition to being bolted, generally did not fail. The column splices at the other floors generally failed by bolt fracture.
- The perimeter truss connectors (or seats) below the impact zone in WTC 1 were predominantly bent down or torn off completely. Above the impact zone, the seats were as likely to be bent upward as downward. Core seats could not be categorized since their as-built locations could not be determined.
- Failure of core columns was a result of both splice connection failures and fracture of the columns themselves.

Examination of photographs showed that 16 of the exterior panels recovered from WTC 1 were exposed to fire prior to the building collapse. None of the nine recovered panels from within the fire floors of WTC 2 were directly exposed to fire. NIST used two methods to estimate the maximum temperatures that the steel members had reached:

- Observations of paint cracking due to thermal expansion. Of the more than 170 areas examined on 16 perimeter column panels, only three columns had evidence that the steel reached temperatures above 250 °C: east face, floor 98, inner web; east face, floor 92, inner web; and north face, floor 98, floor truss connector. Only two core column specimens had sufficient paint remaining to make such an analysis, and their temperatures did not reach 250 °C. NIST did not generalize these results, since the examined columns represented only 3 percent of the perimeter columns and 1 percent of the core columns from the fire floors.
- Observations of the microstructure of the steel. High temperature excursions, such as due to a fire, can alter the basic structure of the steel and its mechanical properties. Using metallographic analysis, NIST determined that there was no evidence that any of the samples had reached temperatures above 600 °C.