



Structural Integrity: Silver Bridge ***The Failure of Eyebars 330***

So what did the forensic investigation conclude had happened to make the bridge fall? Well, eyebars 330 were defective because they had particularly high levels of residual stress left after their manufacture. The design of the eyebars assembly meant that water could pool at the bottom of the eye-hole, and the combination of the tensile residual stress and a corrosive environment had caused a stress corrosion crack to form. Hidden away, the crack had grown slowly, over 39 years, until it was about 3 millimetres long. Also, the steel used in the eyebars had a low toughness at the near-freezing temperatures on the night of the disaster, making it susceptible to brittle fracture. Under a combination of the high live loading on the bridge and the reduced toughness of the steel, the relatively small crack caused a brittle fracture of the eyebars. At the point of failure, a brittle crack grew almost instantaneously down to the outer edge. This overloaded the upper side which separated with some signs of ductility.

The resulting asymmetric load on the pin caused it to twist, and the single eyebars that was left vibrated off the other side of the pin, at which point the chain was completely severed. The adjacent tower, being destabilized, started toppling and fell to the North. The road, below, twisted over and the other tower was pulled down into the river as well.

Jack Fowler

What, uh, what we thought about after the event was how it was inspected, and if it was and you found something, then what do you do to replace it, how do you...how do you get in here and replace one of these eyebars, or one of the joints if suddenly there is corrosion or you sort of found failure, and how do you go about replacing that. But I guess that...that the people at the time had so much confidence in the process of this new high-strength steel that that wasn't a fear, and I'm sure they built in factors, but, you know, we found out later that it wasn't as purported to be.