The Performance and Protection of Bolts in Structural Connections at High Temperature
It Needs Doing Properly
Connection Protection Protocols

- **Constructional steelwork** usually involves bolted connections needing **fire protection**
- **ASFP TGD016 & TGD011** set out the protocols for applying intumescent coatings to bolts
- **BS 5950-8** defines the coating thickness dft for the steel members and the bolts
- **ASFP Yellow Book** stresses that the specifier must understand that bolt preparation conditions **must be within the scope of certification of the intumescent product**
- **BS 5950-8** requires **test evidence** if coating thickness is to be reduced on bolts
- **ASFP method statement (N74)** for treating bolts advises **inspecting bolts** with thickness and adhesion checks
- **Paint manufacturers** advise **several visits** to a connection to ensure meeting fire rating requirements
- **Traditional protocols** stipulate Mordant or T-wash and subsequent rinse and dry before paint application within 4 hours.
Examples Of Where Fire Protection Of The Bolted Connections Has Failed

- Twin towers
Connection Tests

- **Loaded beam tests** show that ONLY if proper recommendations are followed will the painted connections meet the SAME level of fire protection as the beam as per specification – this will take **AT LEAST 100 minutes per connection** plus access time – using bolt caps it is less than 5 minutes.
- Numerous examples exist of poor quality bolted connection protection exist e.g.
  - Bolts with **paint cracking**
  - Bolts with **uneven paint**
  - Bolts with **shiny unpainted threads**
Eliminate Risk & Uncertainty

- **Use a Bolt Cap** → quick and easy

- **Fire tested**
  - 3 hr *Cellulosic* rating per ASTM UL263
  - 2 hr *Cellulosic* rating per BS476
  - 2 hr *Hydrocarbon* rating per UL1709
  - 2 hr *Jet Fire* rating per ISO 22899

- **Installation – 3 Seconds per bolt**
  - Snapped into place
  - Corrosion resistant clips
  - No surface prep or primer

- **Successful Installation History** in external and internal sites with extensive testing

- **Not affected** by extremes of environment

- **Inspection** is visual and easy
Conclusion

- Bolt Caps take 3 seconds per bolt to clip in place with no preparation needed & give 30 year life and certainty of protection to jet fire levels.
- Easy subsequent gloss/colour painting for exposed connections.
- Quality assured protection at minimum cost.
- Cost and time is eliminated if the bolt cap is fitted when floor levelling.
- No acid washing or possibility of enhanced acid/stress corrosion of bolts, no wet trades on site, no messy connections or connections with insufficient paint, no need for several visits, shuttering and drying, scaffolding over the edge for access, costly inspection, time constraints between coatings, and so on.
- Caps give cost saving over the proper painting cost when carried out to the fire certificate test standard.
- Caps give significant time saving (~ 95 minutes per connection), and save significant build programme time as no need for multiple visits.