Fire-resistant plaster coating in Westerschelde Tunnel and Groene Hart Tunnel

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Client: Rijkswaterstaat (Directorate-General for Public Works and Water Management)

So far, the Netherlands is the only country in the world to make a fire-resistant plaster coating for tunnels compulsory, but there is a growing realisation internationally that this approach should be more widely adopted.
In the two largest bored tunnels in the Netherlands CBBN Fireproofing Int. has applied very fast a high quality, fire-resistant coating using an innovative method. The fire-resistant plaster coating prevents the underlying concrete from being damaged in a tunnel fire. The plaster is also quick and easy to repair, which reduces the amount of economic loss.

Robotised method

Stainless steel mesh reinforcement is attached to the high strength concrete to guarantee the coating's long-term adhesion.
The fire-resistant coating used is a modified spray plaster based on vermiculite and cement.

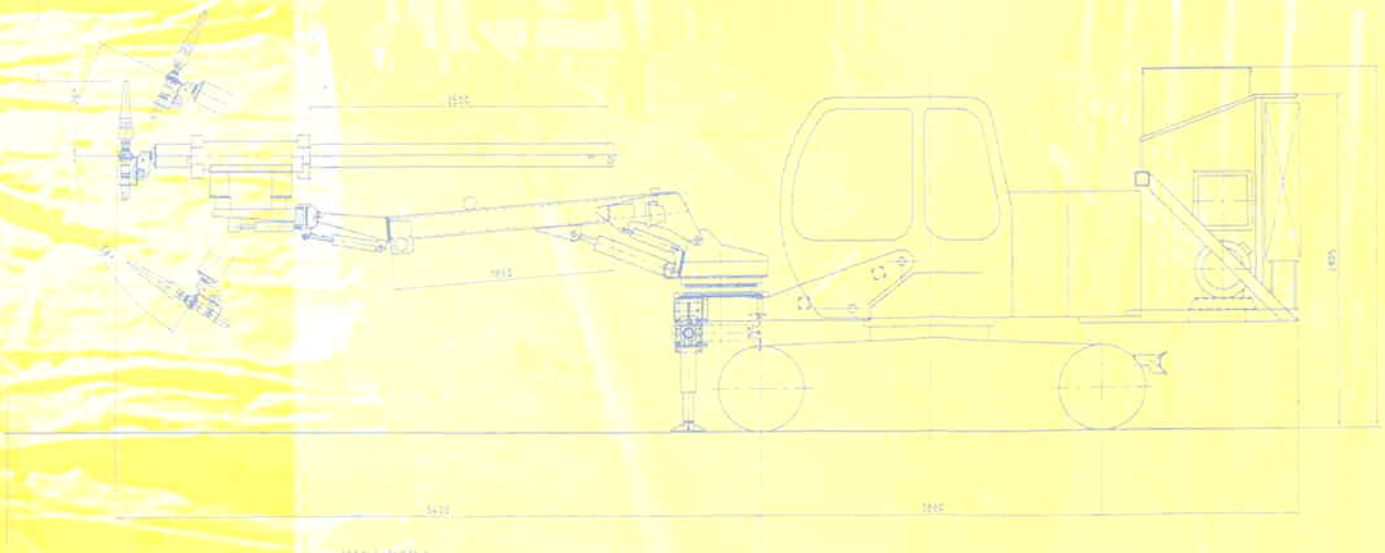
The work is done by a spray robot mounted on the frame of a caterpillar crane. The spray lance is controlled by a laser that continually scans the surface from two angles and stores the data on a computer. The hinged arm then knows the exact shape of the surface to be sprayed. The robot adjusts the position of the spray nozzle and produces a uniform coating. With the mortar mixing truck mounted behind the spray robot, the machine is 35 metres long. The dry, premixed fire-resistant mortar is dumped from big bags into a silo truck, which is connected to the mortar mixing truck. The premix is automatically dosed and mixed with water in the mixing truck, after which the robot sprays a 45 mm-thick layer of the fire-resistant plaster coating on the tunnel wall in 3-metre strips.

Westerschelde Tunnel (road tunnel)

- Length: 6.7 kilometres
- Cross-section: 11 metres
- Treated concrete surface: 240,000 m^2
- Mesh reinforcement: 240,000 m^2 interweaving
- Number of fasteners for the mesh reinforcement: 1,200,000
- RWS fire curve: 1350° C
- Average thickness of the plaster coating: 48 mm
- Project duration: 14 months

Groene Hart Tunnel (rail tunnel – high speed railway line)

- Length: 7.156 kilometres
- Cross-section: 14.5 metres
- Treated concrete surface: 185,000 m^2
- Mesh reinforcement: 185,000 m^2 interweaving
- Number of fasteners for the mesh reinforcement: 1,900,000
- HSL fire curve: 1100° C
- Average thickness of the plaster coating: 40 mm
- Pulling load on the fire-resistant coating: 3 kN/m^2
- Project duration: 6 months
- Special conditions: lack of space in the rail tunnel required the use of small transport equipment



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