

MONITORING THE COENTUNNEL UNDERWATER SEPARATION WALL

CONSTRUCTION OF THE SECOND COENTUNNEL

The new (second) Coentunnel will be sunk in sections into a ditch dredged in the bottom of the North Sea Canal at Amsterdam. The second tunnel will run parallel to the existing Coentunnel at a distance of only 12 meters. To prevent any adverse effects on the stability of the existing tunnel as a result of the construction of the second one, a retaining wall had to be put in place along the full length of the tunnel. As shipping traffic must not be hindered the top of the wall was not allowed to protrude above the bottom of the canal. The wall consisted of 20m long tubular piles with intermediate sheet piles. The tubular piles were put in place using a low-vibration drilling technique.



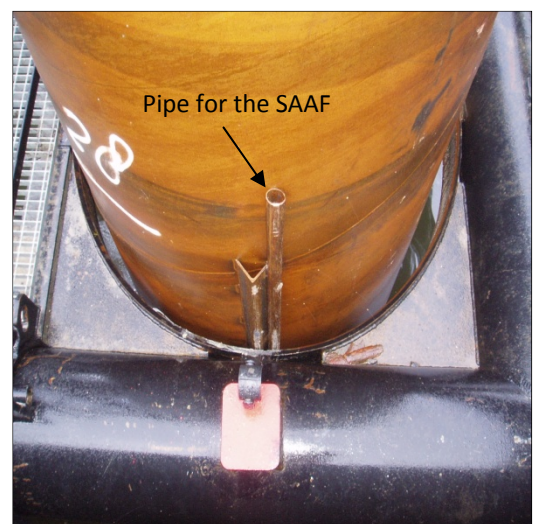
MONITORING THE TUBULAR PILES

The piles were drilled to depth from a floating barge. The water depth of the North Sea Canal at this location is 16m. To ensure that the intermediate sheet piles would fit exactly in the interlocking slots over their full depth it was crucial that the tubular piles were put into position with an extremely small tolerance in relation to the vertical plane. Inventec was commissioned to measure possible deformations and deviations of the piles during the drilling process with its **ANCHORVIEW** technique.

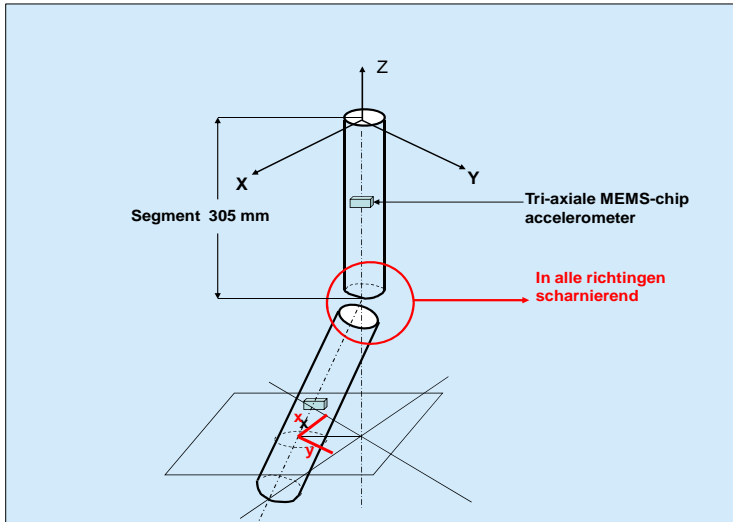


ANCHORVIEW makes use of the **SAAF (Shape Accel Array / Field)** technology. The SAAF consists of an articulated chain of sensor elements (segments). The segments are joined together in such a manner that they can move in relation to each other in all directions but do not twist. Each segment contains a multi axial MEMS-chip accelerometer. This makes the segment act as an extremely accurate inclinometer that determines the angle of inclination in both X- and Y-direction. The length of a segment is 0,305m or 0,500m, the diameter is only 25mm. The readings of all segments together result in the distributed X/Y inclination over the full length of the SAAF.

For the subject project a pipe with an internal diameter of 30mm was welded over the full length of the tubular



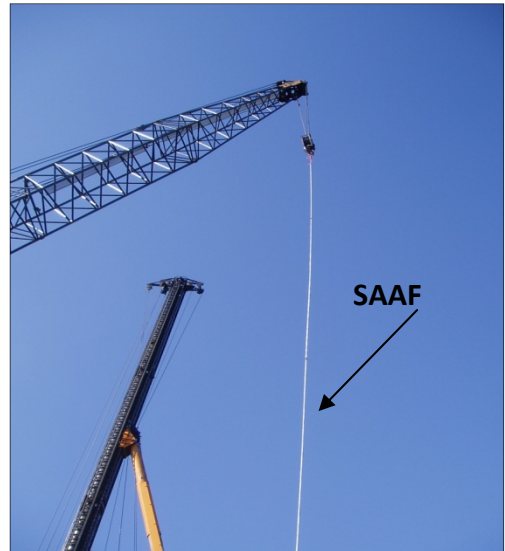
pipe and the auxiliary extension section. At time intervals during the drilling operation a 22m long SAAF (72 segments of 0,305m) was lowered into the pipe and a reading was made. Reading all 72 segments takes only a couple of seconds. In this manner it was possible to determine any deviations from the vertical in X- and Y-direction as well as the distributed deformation over the full length of the tubular pipe with an accuracy of 1mm.



Due to its articulated construction the SAAF is easy to transport on a reel. Its weight is only 0,5kg/m. The SAAF is fully watertight up to 100mwc and measures with an accuracy of 1,5mm over a length of 32m.

TECHNICAL SPECIFICATON

- Can be installed both vertically and horizontally.
- Length up to 100m.
- Measuring range per segment: +/- 45 degrees.
- Accuracy within 20 degrees inclination:
+/- 1,5mm over 32 meters.
- Resolution: 0,001 degrees.
- No drift.
- Operating temperature: -40 to +85 degrees C.
- Waterproof to 100mwc.
- Diameter: 25mm.
- One reading every 0,305m or 0,500m



The SAAF being lowered into the pipe

