

PROJECT REFERENCE
SOUTHALL TO HAREFIELD GAS PIPELINE, UK

1.1 Project Details

History & brief description	The Harefield to Southall Gas Pipeline is a 27 bar, 18.5km gas pipeline in Middlesex, UK, commissioned by National Grid to meet rising gas demands in West London.
Year	2009
Client and Location	National Grid; Southall to Harefield, UK
Type of tunnel	Gas transfer tunnel
Ground conditions	London clay (a stiff overconsolidated clay)
Alignment length	18.5km; Depth approximately 21m
Thrust of TBM	Maximum theoretical thrust: 6800kN. Operating thrust: 2500kN

1.2 Design Approach Adopted

Design method & standard used	
Specified strengths of concrete – compressive and residual tensile	C45/55; flexural strength=5,0 N/mm ² ; Residual post-crack=2,4 N/mm ²
Inner and outer diameter	ID 2.59m, OD 2.95m
Ring segmentation	7 segments +1 key
Dimensions of segments	Thickness: 0.180m, ring length: 1.0m
Type of segment reinforcement	EPC's BarChip macrosynthetic fibres
Fibre type: Length, aspect ratio, tensile strength	-
Quantity of reinforcement per m ³ of concrete	7kg

1.3 Project Benefits

- Off-site segment production: Segments were produced at a local precast factory where synthetic fibre was mixed into the concrete then poured into vertical moulds. The initial segments were preassembled at the plant to form a trial ring to ensure that the correct tolerances were achieved. The segments were then horizontally stacked and trucked to site.
- The use of fibres in these segments proved very effective in meeting all the design requirements as well as ensuring that the segments sustained minimal damage from the jacking rams during installation. The segments have since performed to the specified design criteria.
- The use of fibres has lowered the overall carbon footprint of the project.
- Concerns over corrosion of the segment reinforcement were removed.

Picture Reference



Fig. 1 Segmental lining of macrosynthetic fibre reinforced TBM tunnel

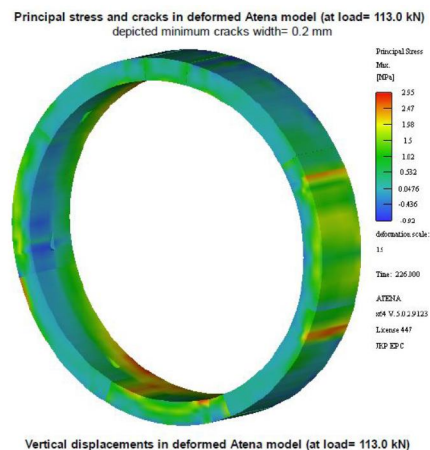


Fig. 2 Finite element analysis designs