



York Society of Engineers

7:30 pm. Thursday 2nd March 2023

Live Lecture

Room P/L/001, Physics/Electronics Building, Campus West, University of York

Tunnelling

by

Ewart Pritchard – Design Manager, Joseph Gallagher Group



There probably is no branch of engineering in which the situations to be met and the difficulties to be overcome are so diverse and so varied as in tunnelling. - Henry S. Drinker's (1878)

The earliest known urban underground tunnels were the subterranean sewers of Mesopotamia. The Babylonians used tunnels extensively for irrigation, and Ancient Egyptians developed copper saws and hollow reed drills used to excavate temple rooms in rock cliffs. The ancient Greeks and Romans used tunnels to drain marshes, and for aqueducts.

The Modern Era of tunnelling began in the 1700s, with use of black powder and timbering.

The most important development in modern tunnelling was the introduction of the tunnelling shield, patented by Marc Isambard Brunel in 1828, with the first crossing of the River Thames. The method wasn't attempted again until the late 1860s.

In 1878, Mr. Barlow advanced on Brunel's shield, with the additions of a cylindrical overlapping skin, cast iron final lining, placement of grout outside the lining, and the use of screw jacks to move the entire shield forward as a single unit. This was the advent of soft ground tunnelling, but not without the culmination of technologies, such as compressed air and the cast iron segmental tunnel lining, developed over the prior decades.

In 1778 John Smeaton used compressed air for repairing the River Tyne bridge foundations at Hexham. And in 1795-6 tubbing in circles was used for the first time at the Walker Colliery on Tyneside, and with cast Iron segments used in the shaft of Percy Main Colliery.

Today, tunnelling is performed adopting old and new technologies. Long tunnels such as the Channel tunnel crossing were constructed largely with TBMs, but there is much use of Shotcrete (a sprayed concrete lining), synonymous with NATM and used extensively on almost all large diameter tunnels in the capital. It is TBMs that have brought the largest strides in H&S to tunnelling, minimising the need for men to work unprotected underground, and surpassing the need for compressed air working.

This lecture will be presented by Ewart Pritchard CEng - Design Manager for Joseph Gallagher, the leading tunnelling subcontractor in the UK, who will present a brief history of tunnelling methodologies and a case history of a mine access tunnel (Drift) designed and constructed for Irish Salt Mining Exploration, in Northern Ireland.

Please note, this lecture will be a live talk in Room P/L/001, Physics/Electronics Building, Campus West, University of York.

Wearing of masks is encouraged (but not mandatory); taking a lateral flow test prior to the meeting (with negative result) is also recommended. There is plenty of space in the lecture theatre for "social distancing".

Please see the Covid-19 guidance below from the University of York:

The safety of our audience members and staff are our priority, and the University of York continues to have strict cleaning regimes and enhanced ventilation in place.

Please note that the University of York is promoting a message of protect, respect and be kind in relation to Covid-19 and we therefore politely ask that all attendees consider wearing a face covering whilst moving around indoors, washing hands regularly and taking a lateral flow test in advance of the event. We also ask that you do not attend if you experience any symptoms that could relate to a Covid-19 infection OR if you are self-isolating. Events staff will wear face coverings (unless exempt) and clear signage will be available to access hand sanitizer and hand washing facilities.