Overcoming hard sandstone beneath the River Roch

Photograph Above. The TES designed 1800 EPB TBM (Library)

25 years ago, the 12-month coal strike had just been broke and the economy was on its knees. We were watching Ann Diamond on Breakfast TV and Simple Minds were in the charts with 'Don't you forget about me', whilst down in Bridgend a forward thinking young man had just set up a new company that would offer tunnelling, pipe jacking and shaft sinking. This man was Steve Williams and the company was B&W Tunnelling.

A lot happens in 25 years; especially in tunnelling. New companies come and go, some older established companies grow old, flounder and go bust, and some go on to be multi-million pound concerns.

If you've never met Steve; then you should. Back in the mid nineties B&W were on a tunnelling job in North Finchley undertaking a 2.10m dia. pipejack for "Green McNicholas", with two men at the front with clay spades mucking out onto a conveyor. It's hard work, but honest work. Tunnelling is like that. Hard and honest.

Then came the hand arm vibration and white finger legislation (HAVS) that caused some major commotion to the tunnelling industry. And while the masses, engineers included, were looking at padded gloves and uprated jigger and clay spade designs coupled with time and motion studies at the face, Steve sought solace from Tunnel Engineering Services UK (TES) of Oldham. TES are run by *Geoff Clarke*, and if you have never met Geoff; then you should.

During the HAVS furore B&W were working up at Howden, just south of Newcastle-upon-Tyne on the construction of a 1.80m dia. tunnel through clay.

In those days a tunnel of that size in clay was generally specified as a hand drive. Donelon's would have subbed it out to the likes of Angleglobe, whilst Miller would have subbed it out to Fineturret, whilst Droicon would have subbed it out to Dolmac and so on, and so on etc.

Here the main contractor was Alfred McAlpine, who were a major player in civil engineering at the time.

B&W didn't go the way of combating the HAVS legislation via uprated or silenced compressed air tools, coupled with gloves you can't work in and a continually changing team at the face. B&W went and procured a 1.80m dia. backacter from TES, which was no mean feat for a specialist subbie at the time. It was seen by a few as being a big gamble, quite rightly justified by the lack of tunnelling work around the country at the time. And as for Steve? He just watched over the drive pit as the pipes were getting jacked and the muck skips were being hauled out and emptied and calmly said: "We should have got one of these years ago."

A few years later Steve was down on his turf so to speak. B&W had got a job constructing a sewer on behalf of David Lewis Civil Engineering and ultimate client Welsh Water. As one recalls it was a miserable wet day in St. Brides Major near Bridgend and there was sludge everywhere, but what was to follow was a picture of speed, efficiency and raw power.

Expecting to see a backacter being jacked through clays on a wet day, the unflappable Steve explained: "We've bought an Akkerman TBM and it seems to be doing okay."

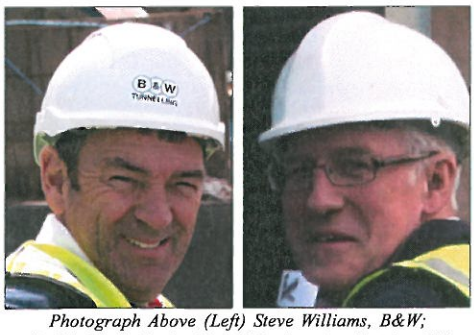
No, they had bought an Akkerman TBM and it was doing more than okay. From a standing start being and lowered into the shaft, within what was less than an hour it was mucking out and several pipes had been jacked. There was mud everywhere but everyone was working for everyone. The sight was awesome. B&W ripped up the record books and created what was to be a major tunnelling feat. They had broken the tunnel drivage record for that spec of machine. A US manufactured machine that had the existing record set by a US company in the good old US of A. A young company from Bridgend in Wales had created a new world record on 'their manor'. And unlike the US, their manor is a place where health and safety play a major part of any contract. It was sheer brilliance, and something everyone involved in should be proud of.

So one wonders, where would you get an Akkerman TBM from in the UK? You could ask *Geoff Clarke* of TES.

A year or so later B&W were undertaking numerous trenchless crossing on the Indian Queens Gas Pipeline scheme in Cornwall. It was mid summer and it was hot. Steve was watching his lads setting up the jacking rig and Akkerman TBM. It was to jack some Buchan pipes beneath a main road. And Geoff Clarke was on site somewhere; but not at this crossing.

TES had just recently negotiated the UK dealership for the tunnel machine manufacturer. A good decision by Akkerman and a good decision by Geoff. Tunnelling, like civil engineering in general is founded on good decisions; make a bad one and you know about it.

Photograph Above. The TES 1800 EPB TBM mucking out the sandstone (Library)



Photograph Above (Left) Steve Williams, B&W; (Right) Geoff Clarke, Tunnel Engineering Services UK

On the other crossing there was a machine sat in all its pomp and glory and there was Geoff. It wasn't an Akkerman TBM or a Backacter. It was white, aggressive and awesome. Geoff had designed Steve and B&W a Rock Boring Machine (RBM) which worked on the thesis of an auger boring unit.

To the independent onlooker auger boring can appear a cheap and nasty if not a complete Neanderthal way of banging a pipe beneath a road when tolerances aren't really an issue.

There was nothing cheap and nasty about this machine. It resembled a Robbins TBM.

In recent years guided auger boring has given the concept a bit of technical glamour, and it was no surprise that Steve went out procured several guided auger boring units. However these weren't just any unit, they were Akkerman manufactured GBM units that were supplied by Geoff.

25 years later B&W's tunnelling and trenchless fleet comprises:

- 4 No. Akkerman TBM's (1200, 1500, 1800, 2000);
- 3 No. Robbins TBM's (2 No 1200 and 1 No 1500);
- 2 No. Akkerman GBM's;
- 6 No. Auger Boring Rig's;
- and a state-of-the-art TES EPB 1800 TBM, which has been designed by *Geoff Clarke* and TES and which was recently unveiled on part a multi-million scheme in Bury.

The Welm Pipeline

United Utilities recently awarded a £125M (EUR. 142.81M) valued scheme to construct a major new aqueduct through the heart of the North West to J Murphy & Sons.

The scheme involves the construction of a water pipeline linking Prescot reservoir in Merseyside and Woodgate Hill reservoir in Bury, to help move water supplies around the region.

United Utilities Managing Director of Capital Programmes, *Ian McAulay*, said of the scheme: "Pipelines like this are the motorways of the water supply network, and this will be one of the biggest engineering projects we have ever undertaken.

"The engineering challenges are big, but the project is vital to give us more flexibility in the future during times of drought or when we need to carry out maintenance on other major aqueducts in the region. For this reason it is important that we construct this scheme."

The 24-month scheme involves the construction of a 55km-long by 1.20m dia. underground pipeline, which will be able to carry up to 100 million litres of water a day between Merseyside and Greater Manchester.

A total of 25 No. tunnels form an integral part of the scheme and are needed to cross obstacles such as the M6, M61, M66, River Irwell, River Roch and the West Coast railway line.

Although J Murphy & Son elected to drop all the drive and reception shafts themselves, they elected to award the specialist tunnelling works to B&W.

Steve explained that their remit involves 2.5km of tunnelling using both the Akkerman and Robbins TBM as well as their newly acquired TES 1800 EPB TBM.

The Akkerman 1500 TBM is to undertake 6 No. drives in lengths between 80m and 250m, whilst the Akkerman 1800 is to undertake 2 No. drives of 280m and 340m. There is also 2 No. drives to be undertaken using the Robbins 1200 TBM.

Due to the length of a couple of tunnel drives at 450m and 650m respectively and due to the variable ground conditions on these drives, which comprise soft clays to hard sandstone and mudstones, Steve explained that he needed an interchangeable TBM, similar to a TBM that is based on the Lovat.

TES designed just such a machine of that spec; an 1800 EPB TBM which possesses two heads - a hard rock head and a soft ground head.

Steve explained "The EPM was chosen over the Akkerman on two drives because of the strength of the rock as the soft ground head can be adapted to deal with clays or rock up to 70Mpa by introducing 50 No B47 picks."

Photograph Above. Mucking out on the Akkerman drive. (Library)

The EPB TBM was recently launched within a 7.50m dia. shaft and was immediately introduced to a hard sandstone.

Steve added: "Due to the differing ground conditions on the overall job advance rates are a bit varied.

"The Akkerman machines are varying from 7m to 20m per shift and although the EPM has only just started it looks as if it could produce high advance rate in the right ground."

All tunnelling kicked off in June 2009 and will be completed in September 2010.