



**Client**  
Network Rail

**Team**  
Murphy, Murphy Plant

**Sector**  
Rail

**Project start**  
02/18

**Project end**  
03/19

**Value**  
£2.4m

**Date**  
24/04/19

**Author**  
Jack Selman

**Innovation Reference**  
ID-00165

## PROJECT OUTLINE

### Whiteball Tunnel

There were approximately 3300 holes to be drilled. Each hole must take a 32mm diameter dowel bar. The team had a 10-day period to complete this work, on a tunnel refurbishment contract for Network Rail.

## TESTIMONY

“The easy adaptation of the of tool and it’s simple use was of a huge benefit to the project. Allowing the drilling of the dowel bar holes at an incline and at varying levels was effortless.”

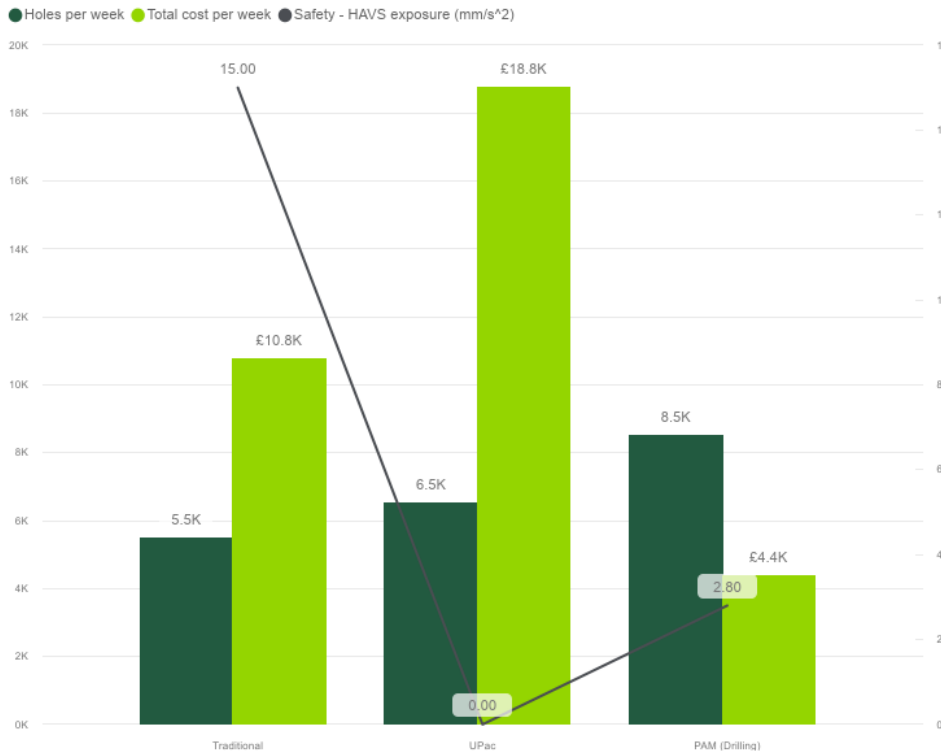
**- Dan Malkin,  
Contracts Manager**

## KEY CHALLENGES

A key challenge on this project was to maintain a high level of drilling accuracy whilst reducing operative’s exposure to harmful vibrations – which contributes to hand arm vibration syndrome (HAVS) – as well as fatigue whilst drilling for the dowels.

There was also a challenge to increase productivity given the short time available to complete the works whilst negotiating the irregular brick work patterns and varying drill heights.

Holes per week, Total cost per week and Safety - HAVS exposure (mm/s<sup>2</sup>) by Technique



**£6,360**  
 Cost benefit per week  
 (compared to hand drilling)

**155%**  
 Productivity benefit (holes  
 drilled per shift)

## SOLUTION / INNOVATION

Trial the use of the Positioner Actuator Manipulator (PAM) machine for drilling holes.

The PAM was mounted on track trolley, then an RRV trailer, for greater mobility and flexibility when mobilising. The RRV trailer had a handrail affixed to it for safety.

The arm takes the weight of tool and a large amount of the vibration. Also, the frequency of vibration arising from use is higher and therefore does less damage to the operator.

## KEY BENEFITS

- Reduction in exposure to harmful vibration (HAVS) from 15 mm/s<sup>2</sup> to 2.7mm/s<sup>2</sup>
- Increased productivity when drilling
- Improved quality of work
- Lower cost
- Reduction in resource requirements

## COSTS / SAVINGS / ROI

In total, the PAM cost £37,000:

- £35,000 – Machine
- £800 – Offset arm
- £1,200 – Drillhead

The PAM was used for four shifts worth of work. The cost benefit of adopting this technique, as opposed to traditional hand drilling methods, was approximately £6,300.

To achieve a 1:1 return on investment, the PAM should be used for approximately 25 shifts, assuming:

- 10 hour long shifts
- 170 holes drilled per shift

**Contact Murphy Plant to find out how you can use this solution to improve productivity, safety and efficiency on your project.**



PAM

60  
More holes drilled per shift

## IDEA ORIGINATOR

David Rouse, Construction Manager suggested the idea when reviewing the scope of works for the Whiteball tunnel project, having seen videos and articles outlining some of the key benefits.

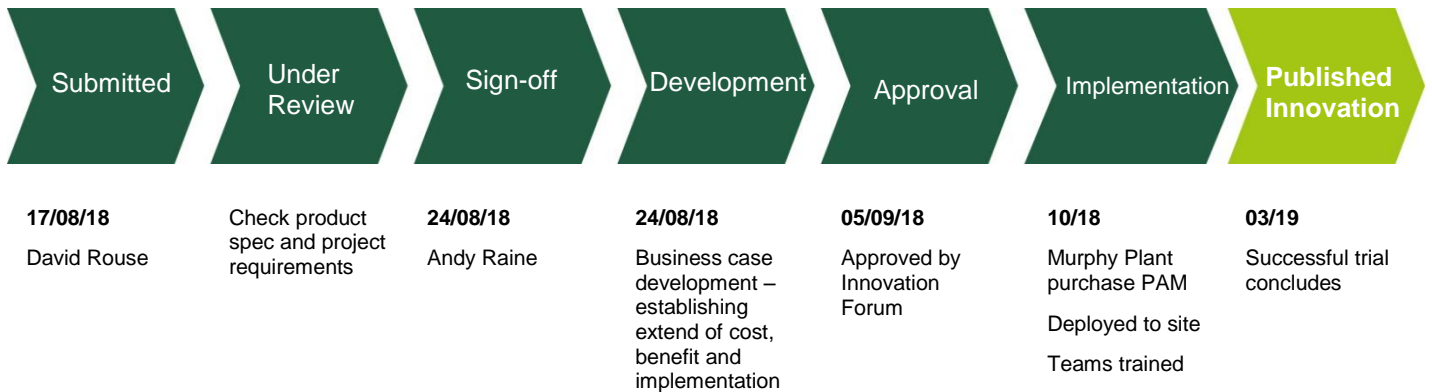
Given the requirement for a large number of holes on the project, David saw the potential in the PAM to significantly reduce exposure to HAVS, whilst at the same time improving productivity and efficiency.

## CHAMPIONS

Brendan Sugrue (Head of Operations) and Alan McDonough (Group SHESQ Director) supported this solution.

They assisted with the procurement, delivery, implementation and training associated with the introduction of this novel piece of technology.

## INNOVATION JOURNEY



## FEEDBACK

The overall feedback from the trial was positive. Whilst there were some initial challenges, these were to be expected with the introduction of a new piece of technology.

However, once the site teams were trained and had gained some experience using the PAM, they all realised the benefits of lower HAVS and higher productivity, allowing them to complete the works in less time than normal.

## FUTURE OPPORTUNITY

There is significant and widespread opportunity to continue to realise the benefits of this technology across the industry. Further work is required to establish the benefits that may be realised by using the PAM for breaking out, as opposed to drilling.

There is also an opportunity to trial the use of different attachments to understand if this method of machine manipulation can bring benefits to other tasks.

