VACUUM EXCAVATOR SOFT TOUCH (VEST) SYSTEM

SGN Lane Rental Industry Publication

TRANSPORT FOR LONDON

INTRODUCTION

Over 400,000 works are carried out in London each year, causing noise pollution, reduced air quality and congestion. All works require a safety zone around the exposed asset, to protect operatives and travelling public. For high pressure gas mains, excavations are also required to be dug by hand due to the risks associated with this type of activity, and the complex nature/locality of other underground assets.

In the UK, the Vacuum Excavator (VacEx) has become routine practice for many utilities when undertaking their replacement, maintenance and repair programmes. Carrying out works in this way reduces site footprint, limits assets damage, improves operative safety, mitigates disruption and speeds up the overall process, particularly in congested areas.

Since 2014, SGN has integrated VacEx into all areas of low pressure operations. In contrast, limited use of the technology has been made for higher pressure mains, especially where electrical and/or optical communication infrastructure is in the vicinity, due to the strict policy regulations for mechanical works near them.

To increase utilisation, a soft touch system was proposed for use in these more complex situations to mitigate potential damage and remove the requirement for hand digging.

THE PROJECT

Working with ULC, the project proposed to develop a soft touch version of the VacEx system, which could be attached to the Robotic Roadworks and Excavation System (RRES) and subsequently trialled to establish performance and safety improvements.

The design would utilise supersonic air distribution nozzles to gently dislodge excavation spoil so the existing vacuuming technology could extract it. This approach would allow the operator to work remotely from the site and quickly exposing the apparatus and mitigate consequential damage to third party assets.

After refinement, a prototype of the excavator head was manufactured in the USA and made ready for shipment to the UK trial team. Upon receipt of the hardware, final integration, testing and calibration was conducted and the excavator head installed onto a VacEx vehicle.

During live site trials, the prototype was used across the Southern Network, in both urban and rural environments, on a number of diverse pipelines. The system was then assessed on a wide range of criteria including, operative and asset safety during excavation, procedural efficiency, and labour requirement.

Upon completion, a comprehensive report of the findings, lessons learnt was produced which, along with feedback, will inform future engineering developments and/or modifications.

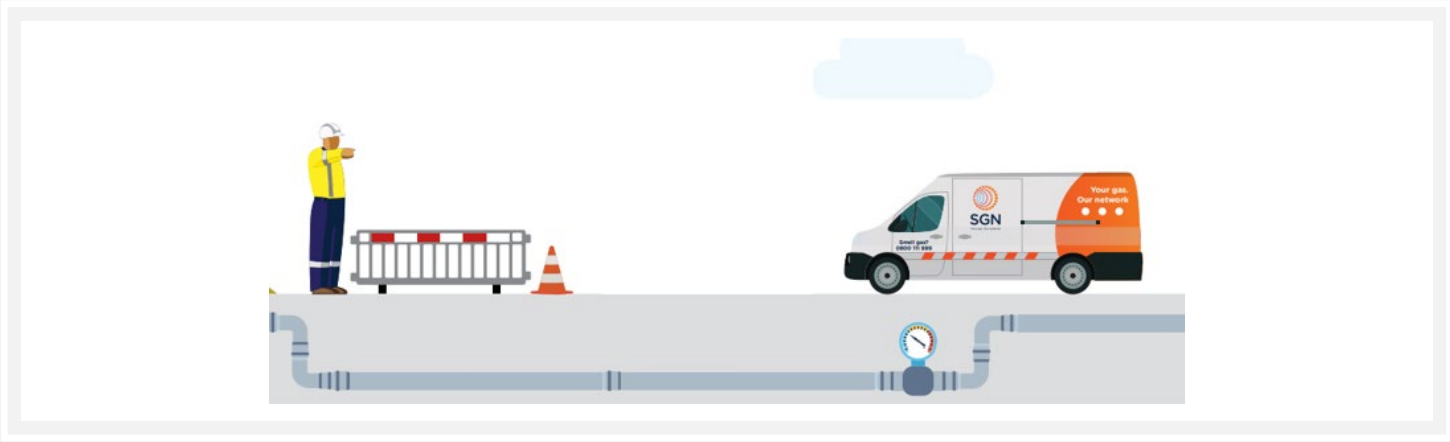
OUTCOMES

VEST proved to be eight times quicker than conventional VacEx systems. With VEST, the excavation could be completed with a single operator, remotely excavating at 0.16m3 per minute. In comparison with conventional excavations, which usually take two days, the VEST system can reduce the operation to just one day, limiting the adverse effects of road works.

LESSONS LEARNT

Shipping the VEST system from the USA to the UK took longer than expected therefore extra time should be factored in for delivery in future.

Continuous improvement of the VEST system was achieved through iterative design changes, tested on a mock road and were critical to the overall project success.

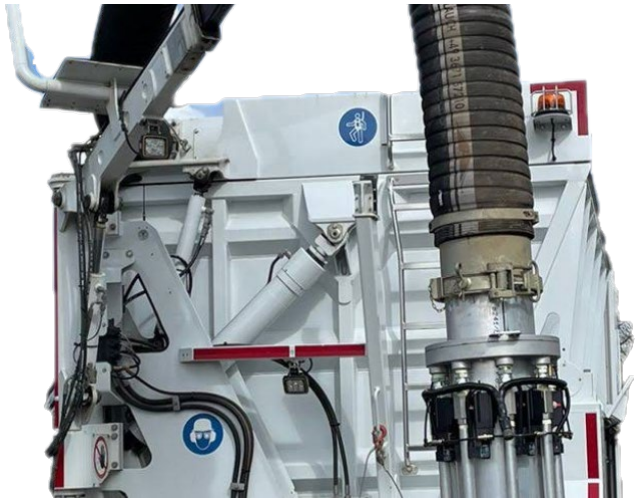


CONCLUSION

The VEST project has collected valuable data on a wide range of criteria, along with useful feedback from stakeholders. This has enabled SGN to clearly demonstrate the improved capability of this system over conventional methods.

The remote working capability and the easy of use has reduced the number of people on site, will improve overall safety and increase efficiency. The VEST system is eight times quicker than conventional excavations, which usually take two days, delivering the same operation within a single day.

The next steps will be to make final design changes before getting to machinery into production. Once embedded within business-as-usual the VEST system will provide a safer and faster solution for SGN as well as other utility companies that excavate across the TfL network.



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