

WINS!

WTIA National Diffusion Networks
Project (NDNP) funded by the
Federal and State and Territory
Governments and industry



AusIndustry

SUCCESS STORY NUMBER W03: REDUCING THE ENVIRONMENTAL IMPACT OF ROCK SAWING, HAMMERING AND BLASTING FOR WATER PIPELINE TRENCHING – *Demonstration of ultra-high pressure abrasive jet assisted drilling to the WA water industry*

Abrasive water jet technology

Abrasive water jet cutting is a process used to cut materials using a jet of pressurised water (20,000 to 60,000 PSI) mixed with an abrasive, like garnet, and passed through a very small opening (0.18 - 0.4mm) typically called the "orifice" or "jewel". This process enables materials to be cut cleanly to close tolerances, squarely and with a good edge finish. Abrasive jets are capable of cutting many industrial materials including stainless steel, Inconel, titanium, aluminium, tool steel, ceramics, granite, bimetallic plates, steel-concrete, armour plate, clad plate and rubber.



Abrasive water jet cut hole in concrete-lined steel water pipe

Installation of water pipes

Government and community concern often focuses on the environment impact of trenching operations for the installation of water pipes and pipelines, and traditional methods of rock sawing, hammering and blasting are known to have an effect on a relatively broad corridor.

Trenching in rock is usually done using saw hammer drilling and explosives to break up bedrock. The process can be noisy and intrusive, is very slow, requires specialised equipment and personnel, and has hazards associated with handling and ignition of explosives.



Where trenching needs to be done through rock in built-up residential areas, the use of explosives is restricted, so that a deviation around the rock may need to be done. This can be exceedingly expensive.

Water jet cutting, or water jet drilling and splitting of the bedrock offer relatively low noise-level and environment-friendly alternatives, but the cost of mobilising the equipment for such operations can make it an expensive solution.

Demonstration to water industry

As an activity of the Water Industry Sectoral Project, WTIA set up a demonstration of ultra-high pressure abrasive jet assisted drilling of sedimentary rock to the Water Corporation of Western Australia and their contractors. The Water Corporation is an active member of the Water Industry Sectoral Project which is also supported by the WA Department of Industry and Resources.

The demonstration showed that multi-hole, ultra-high pressure water jet drilling offers:

- Very low noise pollution;
- No dust pollution;
- Low wear rates – eliminates tool replacement costs;
- Drilling rates comparable with hydraulic drills;
- Safety in use.

Ultra-high pressure water jets penetrate interstices in the sedimentary rock to effectively burst the material prior to the drilling head making contact with it. The drill is rotated at a relatively slow speed to enable the water jets to do their work. Very little reaction force is on the drill stem – the drill just ensures a uniform shape is produced. Wear on the drill head is minimal.

Outcomes

This environmentally friendly and efficient drilling methodology is being promoted to industry through the Water Industry ISP, as well as the WTIA SMART Pipeline Group.

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