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CASE STUDY /// MUNDARING WEIR

CLIENT
Clough (a large Civil EPC contractor)

LOCATION
Mundaring Weir, Western Australia

The Mundaring Weir is the start of a water pipeline that distributes water to agricultural towns in the wheatbelt area and as far as the goldfields, approximately 600 km east of Perth.

It was opened in 1903 and besides a campaign to raise the level of the wall in the 1940's it has remained largely unchanged.

PROJECT BACKGROUND

As part of a large rectification and remediation campaign the original water intakes within the wall were removed and a new intake system installed. The existing dry well is located underneath the heritage-listed 'round house' at the top of the intake tower (see photo). This was to have a 2.7 meter diameter stainless steel liner installed and thereby converted into a 'wet' well. The new well would be flooded by a new penetration through the concrete wall into the main body of water, and this is what Clough approached Proserv to do.

The requirement was to drill a one meter diameter hole through 1.8 meters of 120 year old concrete reinforced with granite boulders. The positional accuracy required relative to the new liner was only +/-10mm, with similarly tight tolerances on the diameter and heading of the hole.

INNOVATION, BENEFITS, ADVANTAGES

The diamond drill drum we designed and built is larger than any currently produced by the usual manufacturers (Husqvarna, Tyrolit, etc) and we believe the underwater application of a diamond drill of this size is a world first.

The scope was originally going to be awarded to one of our competitors (IAS). We were referred by another client and our subsequent bid was technically and commercially superior than our competitor's. We were awarded the scope even though IAS has a successful track record in cutting holes in dam walls, such were the benefits of our proposal.

DELIVERY

6 months

SUBSEA

MINING

ENERGY

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SOLUTION

Following an exhaustive FMECA (failure mode, effects and criticality analysis) in consultation with the client and the Water Corporation the decision was made to deploy the tool down the well and drill outwards, rather than start outside and drill inwards. The analysis also identified the most appropriate cutting methodology and contingency requirements in the event of failure.

One of the greatest unknowns was how the concrete would behave during cutting. 120 years ago the wall was cast in 'lifts' of 300mm and it was unknown how these laminations would behave once cut through. It was also unknown what materials we would find in the wall: granite boulders were likely, but railway line and timber were also possible. A number of trial cuts were conducted on cast concrete blocks of representative strength and filled will granite taken from around the weir site.

The tool had to be compact enough not only to fit down the well, but also through the door of the heritage-listed structure on the top of the wall. The width of the door was only slightly larger than the diameter of the hole to be drilled, necessitating some very clever and 'compact' design work.

Although the scope differed in terms of location and client, it still comprised bespoke underwater engineering and shared a great number of traditional complications often encountered in our more routine scopes: confined spaces, poor visibility, limited intervention and novel technology.

The design also needed to take into consideration possible contamination of the drinking water supply of a large metropolis, and this contributed to the selection of methodology and materials used.

The finished system comprised of two main components:

A landing porch that was installed down the well at the location of the cut by rope access technicians. The porch made use of features within the well to accurately establish the correct cut location, ensuring the high positional tolerance was achieved. The porch served to receive the cutting tool and also provided rope technicians a stable working platform within the well.

The cutting tool was lowered down the well and sat on top of the porch, and then controlled by a technician on top of the wall.

Upon completion of the cut the coupon of concrete was dragged out of the hole and recovered up the well to the surface. The concrete coupon weighed approximately 2.7 tonnes.

QUOTE

"The Perth team have again succeeded in applying their engineering capabilities in novel and innovative ways, and have achieved a successful result for a new client. A great accomplishment."

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CONCLUSION

Successful first scope with a new client in a new sector
Excluded competitor with existing track record

Successfully extended existing technology into new applications and new magnitudes.

PHOTOS

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