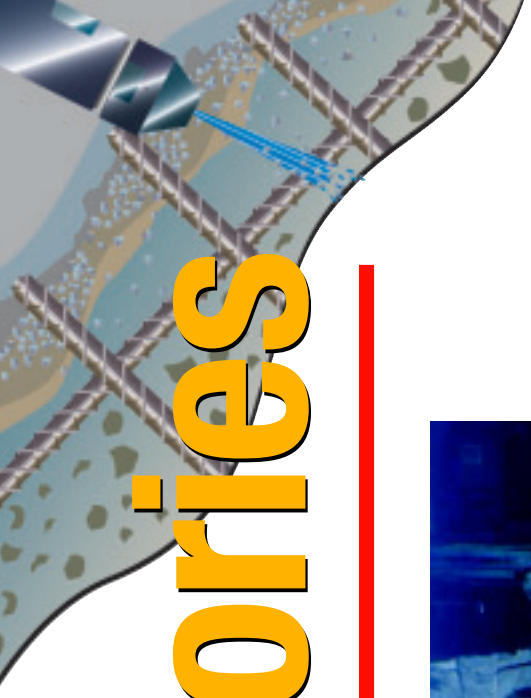

Case Stories

Conjet Robot assists in emergency tunnel repairs

3312 8004 06

The Conjet Robot 362 in position to start the repair.

A Swedish Conjet Robot 362 hydrodemolition machine has played a vital role in successfully assisting the unexpected emergency repairs of the damaged concrete cooling water outfall tunnel at the Bridgeport Harbour coal fired power station in Bridgeport, Connecticut, USA.

Contractor Jet-Blast Hydrodemolition, working as the specialist hydrodemolition sub-contractor for tunnel renovation main contractor Blakeslee Arpaia Chapman, used its Conjet Robot 362 to selectively remove concrete from the top of the square tunnel's exposed walls, prior to replacing it with new reinforced wall extensions and a tunnel roof slab.

"The Conjet Robot 362 is very reliable, easy to operate and performed exceptionally well. It did everything we expected of it," said Jet-Blast Hydrodemolition US regional manager Jeff White. "It removed the concrete and provided a rough, clean surface to give a good bonding for the new concrete. Hydrodemolition doesn't cause any bruising or micro cracks in the good concrete left behind and leaves all the reinforcement intact and cleaned ready to accept fresh concrete."

"Just start it up, and you're ready to go"

Jet-Blast, which has been performing hydrodemolition services throughout North America since 1984, is based in Mississauga, Ontario and South Plainfield, New Jersey. "The Conjet Robot 362 is a very good machine for specialised operations," adds Jeff White. "We've had great success with the 362 and used it on several jobs, including soffits in a parking garage in Nova Scotia, bridge parapet removal and on Bridgeport Harbour Station outfall tunnel."

The 40 metre (130 feet) long tunnel, running directly under the power station, channels hot water from the generators for discharge out into the adjacent Bridgeport Harbour. The tunnel, cast in-situ on the power station's foundations pile cap, is internally 2.14 metres square (7 feet) with 458 mm (18 inch) thick walls and roof slab. During an inspection of the tunnel, just prior to the station's scheduled one month shutdown for routine maintenance, the consulting engineer Spiegel Zamecnic Shah, working for client and power station owner Wisconsin Energy

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and at the base of each of four 2.4 m square pillars. The Robot 362 was also used, instead of circular saws, to carefully remove the crown of the square tunnel at the intersection with the initial section of precast concrete circular tunnel connected to generators' cooling water manifold.

Consortium, found extensive cracking in the reinforced concrete box tunnel. Water pressure during discharge had caused longitudinal cracks at the joints between the upper walls and tunnel crown and needed urgent attention.

Spiegel Zamecnic Shah quickly designed a repair which involved replacing the roof with a new and stronger slab and chamfering the joints between the tunnel crown and walls. The engineer specified hydrodemolition to be used for the emergency repairs and requested the restoration to be done during the power station's routine shut down. Main contractor Blakeslee Arpaia Chapman contacted Jet-Blast and the company worked out a method, agreed a price and rapidly mobilised its hydrodemolition equipment from Oklahoma, Toronto and Halifax Nova Scotia to make an early start on concrete removal.

But before Jet-Blast could put the Conjet Robot 362 to work, Blakeslee Arpaia Chapman first cut out a ground level concrete slab and excavated down 2 metres to expose the tunnel roof. The general contractor, using circular saws, cut away the roof slab where it joined the tunnel walls and placed working platforms inside the open channel. Jet-Blast followed on behind operating the Robot 362 from the platforms removing the concrete from the tops of the two walls. The Robot 362 fitted with a standard arm was adjusted so that its feed beam and water jetting nozzle where slightly angled in such a way to direct water and debris into the tunnel invert for removal.

Jet-Blast's computer controlled, remotely operated Conjet Robot 362 cut the 457 mm wide walls to a depth of 457 mm in just one cutting pass, exposing and leaving behind the forest of cleaned reinforcement. Blakeslee Arpaia Chapman followed on behind, placing additional reinforcement in the walls and fixing new for the tunnel roof, prior to casting the new wall tops and 457 mm thick roof slab.

In addition Jet-Blast also set the Robot's feed beam on the versatile hydrodemolition machine to make a horizontal cut to remove an approximate 300 mm wide by 450 mm high slice of reinforced concrete on one face

"We worked round the clock 24 hours a day for four days to remove the concrete for the general contractor to complete the repair," added Mr White. Jet-Blast removed about 20 cubic metres of 4500 psi 31 MPA concrete with the Conjet Robot 362. "We used a pair of three cylinder Hammelmann pumps operating at a pressure of 1000 bar and total flow of 95 US gallons/min (360 litres/min) with the Robot 362 and were able to remove between 0.8 to 0.9 cubic metres per operating hour, which is really a very good rate for such deep removal."

After casting the new tunnel roof the general contractor backfilled the tunnel excavation, replaced the ground floor slab and completed the emergency repairs within the scheduled month long shutdown.

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Equipment Used
1 Conjet Robot 362 with modified boom head
2 Conjet Power pack 345

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