

A Robotics Case Study

By Hi Tech Industrial Services, June 2015

Scope of works

Hi Tech Industrial Services were engaged by a client to assist in exposing steel beams for cathodic protection. The locations of the steel beams were on the soffit of the bridge deck support beams. The clients' objective was to arrest and control further corrosion of the encapsulated steel within the structure, prolonging the structural integrity of the bridge.

As there was limited head room under the beams it was not possible to utilise a standard hand held lance and operative. To meet the client's needs Hi Tech used a Conjet low profile jet frame to successfully remove 80mm of concrete across the full width and length of the beam soffit, some 5m² in total. This was completed within a 3hr tidal shift window, which also involved erecting the frame and completing all removal. A total of 6 beams require soffit removal.

The robotics Conjet frame was Hi Tech's selected method of concrete removal for this job due to the limited access and tidal conditions.

Benefits to Robotics

Hydro Demolition is the technique used for the controlled removal of concrete from any physical structure using either High Pressure (HP) or Ultra High Pressure (UHP) water jets. Hydro Demolition via remote method is performed by a computer controlled robot or jet frame, which has the ability to adjust settings achieving the desired depth or angle of a cut.

Robotics offers a safe and cost efficient form of concrete removal along with the advantage of removing operatives from the work face due to its technology allowing it to be controlled remotely. The equipment can be fitted with multiple attachments enabling work within and around tight and confined spaces.

Challenges and Hi Tech's Solutions

See below a list of challenges and how these were addressed by Hi Tech's technicians, as they tailored integrated solutions for their client that demonstrates some of the many benefits to robotics;

Challenges	Hi Tech's Solutions
Time Restraints	Hydro Demolition via robot is proven to be faster than hand held lance or conventional hand held percussion methods of concrete removal. There is no need to set up scaffolding, or specialised access apparatuses meaning less set up time and reduced access costs.
Tight and Confined Space	Hi Tech used a low profile robotic frame to enter and safely work in the confined space. Other conventional methods physically would not have been able to access the workable area safely.
Precision in Cutting	Mechanical settings on the robot allowed for precision cutting and eliminated the potential for human error.
Removal of river rock present in aggregate	Due to the increased flow rate of high pressure water achievable with robotic equipment when compared to hand held hydro demolition lances, concrete is able to be removed quicker at a higher rate. Increased flow rates also assist with removal in harder concrete and complex aggregate, in this case river rock. The Robot was able to successfully remove the large, hard river dredged aggregate.

