



Civil Engineering

Case Study

Precision Hydrodemolition



Hunterston Nuclear Power Station Cooling Water Intake Structure – Jetty

GIVING WATER THE CUTTING EDGE



Client: EDF Energy

- **Sector:** Civil Engineering - Energy
- **Task:** Surface preparation and concrete Hydrodemolition services for the repair and refurbishment of the jetty structure
- **Location:** North Ayrshire, Scotland
- **When:** Summer 2012
- **Main contractor:** Mansell Concrete Repairs
- **Hydrodemolition sub-contractor:** RGL
- **RGL plant:** Ultra high pressure portable diesel driven water jetting unit (24 litres per min. /2500 bar) with hand held low recoil safety lance. Single high velocity sapphire nozzle.

RGL'S CONCRETE HYDRODEMOLITION SERVICES

Repair and Sustain an Existing Asset

The very mention of nuclear power has always sparked much debate and controversy, and following the recent Fukushima disaster in Japan, there is renewed uncertainty over the future commissioning of new reactors in the UK.

Even before Fukushima this general uncertainty meant that the operating life of existing power stations had been extended until conclusions were reached on how new capacity could be added to the national network. Hunterston nuclear power station is a good example of a facility that was originally due to be de-commissioned but now is required to remain in operation until 2023.

For owners EDF this has meant a complete re-appraisal of planned structural maintenance to ensure that the facility can efficiently operate for another decade. One of the first programmes of work was the repair and refurbishment of the marine jetty which carries sea water intake to the nuclear plant for cooling purposes.

The jetty was originally built in 1959 and extended in 1976. The marine environment had resulted in high levels of chloride permeating the concrete and resulting in serious defects to the deck soffit, longitudinal beams and cross heads.

Mansell Concrete Repairs were appointed as the main contractor. They had to satisfy the requirements of EDF for the appointment of any sub-contractors – especially for a potentially high hazard application such as Hydrodemolition.

As Jeremy Twigg, Commercial Director, of RGL comments, "Although we had undertaken many projects for our contact at Mansell, it was understandable that EDF wanted to personally vet all subcontractors. We underwent a lengthy health/safety and quality pre-qualification check which involved a visit to our offices by a delegation from EDF. They met with our Operations Team to discuss our ideas on how this project could be undertaken."

There were two key stages to the project. The first

phase was to remove the failed bitumen protective coating from concrete surfaces under the structure. Once this had been completed there were about 30 cubic metres of defective concrete to be precision cut and removed using ultra high pressure Hydrodemolition.



RGL proposed an innovative technical solution which employed a low flow ultra high pressure water jet. By increasing the pressure up to 2,500bar it enabled RGL to halve the water flow required. This resulted in a manageable and permissible reaction force on the operators. This low reaction force meant that operators suffered less work fatigue and it also reduced the risk of injury and accidents.

Furthermore it enabled the concrete to be cut out with a very high level of accuracy. It was this capability that led to a fundamental change in project scope and method of working.

Jeremy Twigg, "There is spin off benefit of using UHP in that you can precision cut concrete. Once you get up to 2,500bar it is possible to cut the rock aggregate



Deck soffit pre-repair, showing the defective and delaminated concrete and bitumen coating



Deck soffit after precision Hydrodemolition and installation of the galvanic anodes

not just the cement matrix. It is also possible to cut to a finer tolerance, still without damaging the steel reinforcement.

“Very soon after the project start it was quickly realised that instead of removing all the concrete from the bay soffits, it would be more cost effective to precision cut patches of defective concrete. It is essential to cut back behind the first layer of steel reinforcement to ensure maximum strength and integrity of the repair.”

Consequently the project was re-scoped from mass high volume concrete removal to a ‘hit and miss’ repair approach which required a greater level of plant and operative mobility as they switched from one jetty bay to another to help maintain structural strength of the jetty.

Paul Franklin, Operations Manager, Mansell Concrete

Repairs, comments, “From the outset Mansell Concrete Repairs knew that to secure the project with EDF a solid team would have to be assembled. We called RGL as we have known them for many years as a reputable and resourceful water jetting specialist. They wholeheartedly embraced the stringent and lengthy Health Safety and Environmental Audit process, firstly with ourselves and then EDF. The “Precision Hydrodemolition” process worked well and greatly assisted Mansell in providing our client with a high quality refurbishment of this critical structure whilst meeting our group goal of “Zero Harm”.”

On the Hunterston project RGL incorporated many of their key capabilities – technical innovation, reliability, project flexibility and excellent health and safety management – on a key part of the national energy infrastructure, where the stakes were high.



“Finished product”. Deck underside with repairs complete and final flash coat applied



A quick guide to hydrodemolition with RGL



Hydrodemolition is now recognised by structural engineers and consultants as the safest, most effective, vibration free method of concrete removal.



- Ultra high pressure water jets are used to remove concrete
- Highly versatile – can be used for most projects/applications
- Cuts to any depth
- Creates no percussive noise or vibration
- Remaining concrete structure suffers no cracking
- Reinforcing steel is left undamaged and not loosened within structure
- Remaining concrete retains its original integrity
- Reinforcing steel can be cut/removed if required
- Can precision cut both cement and aggregate to tight tolerances

Compared to other methods?

- No heat/dust, sparks created or blades to clog or go blunt
- Usually faster than jack hammering
- Less noise than percussive tools
- No HAVS issues – crews can work normal hours without risk

Typical applications



- Removal of incorrectly poured new concrete that's in the wrong place, wrong strength or poured without the steel detail in place
- Removal of existing concrete to allow tying into existing structures e.g concrete pockets can be accurately cut
- Removal of concrete to preserve expensive steel fabrication
- Removal of concrete in close proximity to water/gas mains and high voltage cables
- Removal of concrete damaged by salt or other chemicals
- Removal of concrete under water
- Removal of coatings, laitance, waterproofing, aggregate exposure, spalling or damaged concrete
- Concrete surface preparation for bonding with new concrete
- Preparation and protection of steel structures
- Removal of concrete blockages inside pipes



Water Jetting Association Member



In summary, we will do our utmost to deliver complete satisfaction to you by:

- responding quickly to your enquiries
- working with you to fully understand your requirements
- providing you with the benefit of our experience
- preparing detailed site safety, quality and environmental plans, including method statements and risk assessments
- providing competitive quotations
- delivering on what we promise for project start and duration
- deploying experienced crews and proven, correctly maintained equipment
- working within site safety rules and regulations
- managing the project environment including waste water treatment and filtration
- managing each project through to completion

“What we say
...we do”

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