



## **Conjet assists with repairs to Rio Verde viaduct.**



*Repairs to the Rio Verde viaduct were performed from a special, purpose built cradle and working platform that wrapped round all four sides of the piers and supported by wire ropes connected to winches at ground level.*

The hydrodemolition technique, which uses high-pressure water jets to remove damaged concrete, has played a vital role in the repairs and strengthening of the Italian multi-span Rio Verde Viaduct. The viaduct is one of the tallest in Europe and carries the busy dual two lane A15/E33 Autostrada della Cisa over a steep sided valley in the municipality of Pontremoli. Conjet hydrodemolition equipment was used to remove damaged concrete from the faces of the viaduct's rectangular concrete piers, which rise up to 136m from the valley bottom to the steel deck, followed by replacement with a new and thicker concrete skin.

The 960m long twin steel deck viaduct, which is supported on eight reinforced

concrete hollow pillars, is a major structure in the link between Parma and La Spezia on Italy's Mediterranean coast, 100km south of Genova. The spectacular viaduct was opened in 1975, but inspection by maintenance engineers showed the bridge piers were suffering from extensive calcium chloride decay, forcing the Italian Highways Authority and the Highway Engineering Department of Cisa Ltd to carryout extensive repairs and strengthening.

The specialist hydrodemolition contractor SEI-Idrojet, working for the main viaduct repair contractor A.B.C.Construzioni S.P.A, carried out the concrete removal on one pier at a time. The repairs were performed from a special, purpose built cradle and working platform that wrapped round all

# Case Stories



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## **APPLIED WATERJET TECHNOLOGY**

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*The Rio Verde viaduct is one of the tallest in Europe supported on piers up to 136m high and carries the dual two lane A15/E33 Autostrada della Cisa over a steep sided valley in the municipality of Pontremoli.*

four sides of the piers. The piers are 21m long and 8.5m wide at the base and tapering to 2.5 wide at the apex. The ends of the platform were adjustable to compensate for the changing width of the piers. The whole platform was supported and raised and lowered on wire ropes, which went up to pulleys on a steel support cradle at the top of the pier and back down to four synchronised winches anchored at ground level.

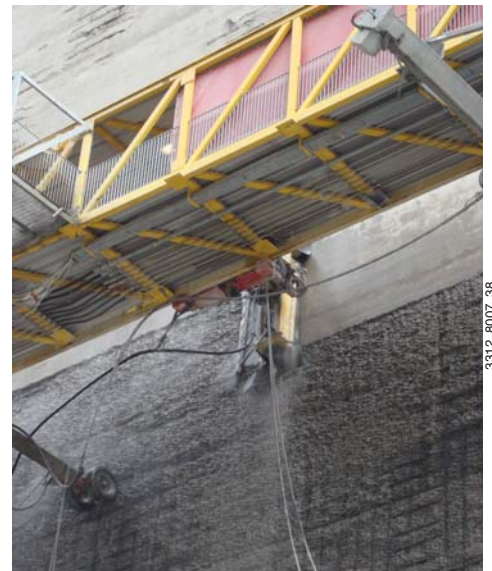
Conjet modified a standard robot feedbeam to fit onto and run along a rack on the inner sides of the platform in the fixed space between the pier and the platform. A Conjet Computer Control Unit, also mounted on the platform, was used to control the feedbeam and integral nozzle. A Conjet 345-400kW Powerpack at ground level provided the high-pressure water at 1000bar and flow of 200l/min to the feedbeam's nozzle. The feedbeam and nozzle, travelling back



**Enrico Mariotti, SEI-Idrojet operations manager**

and forth along the platform's rack, selectively removed damaged concrete to a depth of 70mm and below any exposed reinforcing. The process continued on one face of a pier as the platform was slowly raised to the top. On completion of removal of the concrete from one face, the platform was lowered and the Conjet feedbeam moved to another side of the platform for the process to be repeated on all four faces. The hydrodemolition system was devised and controlled by SEI-Idrojet operations manager Enrico Mariotti

On completion of concrete removal another team followed on fixing additional reinforcement in stages to all sides of the tapering pier.



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*The Conjet modified feedbeam and nozzle, travelling back and forth along the platform's rack, selectively removed damaged concrete to a depth of 70mm and below any exposed reinforcing*

Shuttering panels 1.8m high were then fixed round all faces to support a new 220mm thick skin of self compacting concrete pumped into the formwork from ground level. After the concrete had set the formwork was removed and repositioned for the next 1.8m lift for the process to be repeated to the apex of the pier.

On completion of repairing and strengthening a pier with an additional layer of concrete, the working platform was dismantled and re-erected on the next and then subsequent piers for the hydrodemolition and concrete repair process to be repeated.

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