# Case stories



# Conjet assisted with repairs to italian viaduct







Conjet AB advised CPL to use a platform from SAFI that permitted the light flexible Conjet Robot 322 with a weight of just over one ton to operate on the platform with space enough to operate inside the lifting towers of the platform. Further was the same platform used when the concrete were replaced.

The multi-span reinforced concrete viaduct at Torano, about 100 km east of the Italian capital Rome, is a major structure on the main E80/A24/A25 Autostrada crossing central Italy. The Viadotto Fiume Salto was opened in the late 1960s, but the use of de-icing salts during winter months had caused considerable calcium chloride damage to the structure that forced the Italian

Highways Authority and the Autostrada di Parchi's owner Toto S.p.a. to carryout extensive repairs. The renovation, was funded by revenue from tolls, cost around  $\clubsuit M$  and focused on the pillars and main joints in the concrete deck using the high pressure water jetting technique of hydrodemolition to remove the calcium chloride infected concrete.



### CONJET AB P.O. Box 507 SE-136 25 HANINGE SWEDEN

PHONE: +46 (0)8 55 65 22 40 FAX:

+46 (0)8 55 65 22 60

conjet@conjet.com Website: www.conjet.com

# The advantages of using Conjet technology

Specialist hydrodemolition contractor C.P.L. 2000 S.r.I., in joint venture with Edil C.R.R. and Global Klima S.r.l. and working for Toto, used a Conjet 322 Robot hydrodemolition machine and Conjet Powerpack bought specifically for the repair from Conjet's sole Italian dealer Roald di Codecasa & C.s.n.c based in Milan. "This is a major bridge repair project and hydrodemolition with the Conjet Robot is the only method of removing the damaged concrete," says C.P.L. 2000 S.r.l president Angelino Rinaldi. "Using very high pressure jets of water to remove only the poor concrete does not cause any damaged to the good concrete left behind and if necessary it also takes away concrete from below the reinforcement, which is also cleaned of any rust.

Using breakers would have taken so much longer and also caused damage to the good concrete left behind. Hydrodemolition with the Conjet Robot also has the advantage of producing a very rough surface, which gives a good bond for the new concrete to key onto."

# The Autostada viaduct at Torano

The viaduct carries the busy dual two lane E80/A24 Autostrada across a narrow valley skirting to the south of Torano and just before the E80/A24 forks northeast towards L'Aquila and southeast onto the A25 to Pescara.

The bridge deck is supported on 12 pairs of reinforced concrete hollow pillars up to 40 m high and spaced at intervals of about 42 m across the valley. The individual pillars are spaced at about 11 m centres and each one is topped with its own transverse crosshead, which in turn supports longitudinal precast concrete beams for each carriageway deck.

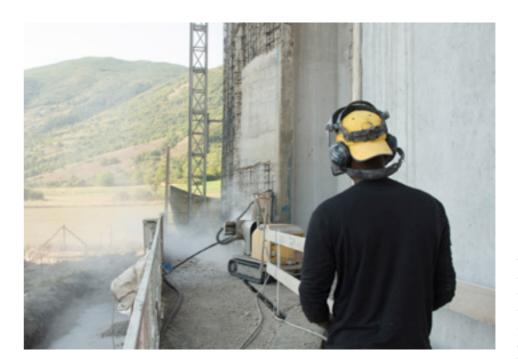
# A climbing platform provided unrestricted access to the damaged pillars

The main focus of the hydrodemolition repair was on the octagonal shaped pillars and their crossheads where the de-icing salt had leaked down from the deck above. The calcium chloride attack on the concrete was inconsistent with a patchwork of



damaged areas over the surface of the 24 pillars totalling about 380 m2. In many instances the de-icing salt had seeped deep into the concrete and the resulting corrosion of the reinforcement had pushed the concrete off and exposed the reinforcing to further corrosion from the elements. C.P.L. 2000 S.r.l concentrated on one pair of pillars at a time and successfully used a special purpose built rack and pinion climbing platform designed and built by Safi, which gave the Conjet 322 Robot unrestricted working access to all faces on each set of pillars. The Conjet 322 Robot was connected to a Conjet Powerpack delivering clean

fresh water at a pressure of about 1,300 bar and flow of 200 litres/min and removed concrete generally to a depth of 30mm to 130mm. In some instances maximum removal depth was as high as 180 mm, but the average on the project was between 70 mm to 80 mm. "We bought the Conjet 322 Robot specifically for this project and has been operated by Yamadu Konate and Vittorio Triuzzo. The 322 has been a very good machine and I can't see how we could have done the job without it," says Angelino Rinaldi.



Conjet Robot 322 removing concrete from the pillar; after the removal is finished at one level, the platform moves up to the second level and perform work at the new level, working its way up the pillar

# Different contractors, all playing their part in the project

After C.P.L. 2000 S.r.l finished concrete removal from one set of pillars the company moved onto the next pair using a separate, but identical Safi working platform.

Another contractor in the joint venture then followed on using the first platform to spray steel fibre reinforced concrete on the patches, which was levelled and float finished by hand. The entire sequence was repeated on all 12 pairs of pillars. C.P.L. 2000 S.r.I also used hydrodemolition with hand lances to remove the damaged concrete from the main joints on the bridge deck

longitudinal beams supporting the deck.

and also directly underneath the

## Conjet's contribution

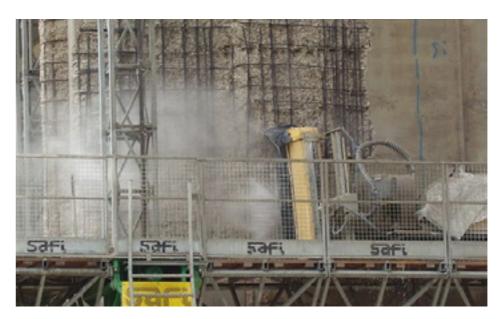
Conjet was involved at an early stage of the project and assisted CPL 2000 S.r.l. in selecting the right type of platform they would need on the tall pillars. Conjet considered the space the robot would require to work in an unrestricted manner and maintain high production during the concrete removal process. CPL 2000 S.r.l. used three platforms and after concrete removal with the Conjet Robot they were also used for the placement of fresh concrete.



# **Finishing touches**

To complete the concrete restoration the repaired structure was finished off with a final coating of protective paint to prevent possible future attack from de-icing salt. The repairs started in June 2007 with the hydrodemolition following on three months later in September. The project shut down during the winter months from December to March and restarted in spring of 2008 and finished on schedule at the end of November.











**CONJET AB** P.O. Box 507 SE-136 25 HANINGE **SWEDEN** 

PHONE:

+46 (0)8 55 65 22 40

Fax:

+46 (0)8 55 65 22 60

E-MAIL:

conjet@conjet.com

WEBSITE:

www.conjet.com

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