

# Lanjarón Viaduct - Spain

*An Innovative Solution with VSL Heavy Lifting for Single Span Bridges*



▲ General view of the structure

The Spanish Ministry of Civil Works (Ministerio de Fomento) decided to improve the access road to the Alpujarras area and build the Lanjarón viaduct in the province of Granada. Its construction represented a relevant engineering challenge.

Due to the depth of the valley to be spanned and the necessity to preserve the rests of a historical bridge built in the 11th century, it was not possible to use intermediate bearings and a launching solution was adopted.

The structure to be launched was a bow string formed by two parallel trusses with a single span of 114 m and a weight of 504 tons.

CTT Stronghold (VSL Spain), backed by the Heavy Lifting expertise of VSL Switzerland, was awarded the contract for the launching works. The scope of VSL included the design, supply and installation of temporary structures (erection towers, , the rental of equipment and the technical assistance during the movement of the structure.

After the construction of the structure the launching operation was carried out in two distinct phases. To cover the first 64 m, the structure was loaded with a counter-weight and was moved with the help of two VSL SLU-70 units. From this advanced position, the cables for the second phase two were installed from the extremity of the bridge to the towers and concrete structures installed at the other side of the valley.

The principle of the movement during the second phase has been compared to that produced by a fishing line that would take one extremity of the bridge from the opposite abutment and would pull it across the valley.

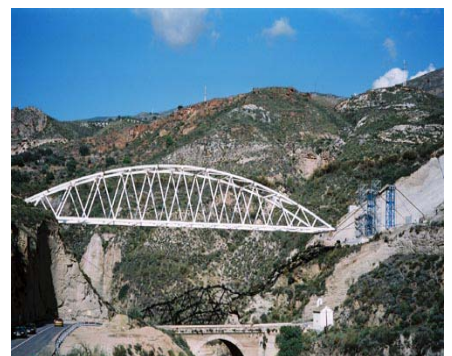
The structure was supported on one abutment on temporary bearings that allowed rotation and longitudinal displacement along sliding tracks. On the other extremity a "virtual support" created by two 31-strand cables linked the free end of the bridge to a system of two towers.

The vertical reaction necessary to equilibrate the weight of the bridge was

thus given by the vertical component of the main cables.

The launching operation was extremely challenging for all those who participated in this impressive project due to the high forces generated in the tensile members and the towers and also to the presence of important winds that were recorded to exceed 120 km/h.

VSL proposed to use an active guiding system formed by two SLU 70/550 units installed on articulated frames to offset a lateral thrust of 70 tons and maintain the alignment of the structure.



The system included also two SLU 440/550 lifting units for the main pulling cable and two SMU 440/550 units at the back of the bridge.

The movement forward was obtained when the two SMU jacks at the back released the load.

The two lateral wind guys, the retention system and the pulling units had to act simultaneously to avoid any undesirable deviation.

The central control unit operated by VSL operated the whole system and informed on its status in real time.

The bridge was finally positioned on its definitive bearings with pinpoint precision.

▼ View of the VSL Heavy Lifting towers



▲ Main cable unit type VSL SLU 440 on a hinged frame



▼ Underview during launching works

This project highlights the advantages of VSL Heavy Lifting technique for the development of innovative construction solutions.



**CLIENT :**  
Spanish Ministry of Civil Works  
Dirección General de Carreteras

**ENGINEER :**  
José Antonio Torroja

**MAIN CONTRACTOR :**  
DRAGADOS OBRAS Y PROYECTOS

**SPECIALISED SUBCONTRACTOR LAUNCHING WORKS :**  
CTT-STRONGHOLD  
(VSL ESPAÑA)

**VSL Headquarters**

**VSL International Ltd.**  
Lyssach, Switzerland  
Phone: +41 - 34 - 447 99 11  
Fax: +41 - 34 - 445 43 22  
<http://www.vsl-intl.com>

**VSL Regional Offices**

**Australia & Pacific**

VSL Prestressing (Aust.) Pty. Ltd.,  
Thornleigh, NSW, Australia  
Phone: +61 - 2 - 9484 59 44  
Fax: +61 - 2 - 9875 38 94

**Asia**

VSL Hong Kong Ltd.,  
Hong Kong  
Phone: +852 - 2590 22 22  
Fax: +852 - 2590 95 93

**Central East Europe & Middle East**

VSL (Switzerland) Ltd.,  
Switzerland  
Phone: +41 - 34 - 447 99 11  
Fax: +41 - 34 - 447 99 65

**Iberian Peninsula, South Africa and Latin America**

CTT Stronghold  
Spain  
Phone: +34 - 93 - 200 87 11  
Fax: +34 - 93 - 209 85 90

**France & Africa French Speaking Countries**

Intrafor - VSL France S. A.,  
France  
Phone: +33 - 1 - 69 26 14 00  
Fax: +33 - 1 - 60 83 89 95

[www.vsl-intrafor.com](http://www.vsl-intrafor.com)

