# Elegant sculpture in flexible shoring

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Press release from: **PERI GmbH - Formwork, Scaffolding, Engineering**

July 2009 - Edificio Ágora, Valencia, Spain - In his hometown of Valencia, the Spanish star architect Santiago Calatrava has realized the ”Ciudad de las Artes y de las Ciencias”. With the Edificio Ágora, the complex is currently being extended with a multi-function centre. At present, a gigantic PERI UP Rosett construction has been erected in the almost 70-metre high interior with a volume of around 141,000 cubic metres. The scaffold is used for different working operations - from the assembly of the remarkable steel-glass construction through to the installation of the lighting technology. The different requirements of the individual tradesmen regarding access means and working platforms require continuous adjustment of the scaffold corresponding to the building progress being made. Flexibility, high load-bearing capacity and wide cantilevers in spite of the small number of diagonals make the PERI UP solution both fast and cost-effective.

For the Edificio Ágora, 49 vaulted steel fins have been arranged in an elliptical ground plan. Along a length of almost 100 metres and a width of 60 metres, the arched supporting structure spans a surface area measuring 5,000 square metres. The particularly ingenious feature here is the folding roof with its lamellae-type construction: when closed, the building´s shape is in the form of a conquistador´s helmet. If the movable part is opened, the Edificio Ágora resembles the helmet of a general. In addition, the hinged glass roof regulates the amount of natural light entering into the room below.

Sophisticated scaffold construction
The key requirement placed on the scaffold was that it should provide safe access means and working areas. The complex design of the building and the range of activities which are carried out from the scaffolding itself have determined the degree of difficulty for this particular task.

For the erection of the load-bearing building construction – assembling the steel segments as well as the welding and coating work – the individual steel fins must be accessible from all sides. These are arranged with two-metre axis centre distances and curved both vertically and horizontally. All access ways and work platforms must be constantly adapted to match this form. For subsequent work such as installing the insulation or mounting the glass facade, the scaffold is limited in size on the inside of the Ágora, i.e. dimensionally reduced in part. For assembly of the steel construction, machinery and the drive mechanism for the sliding roof, the scaffold has to be then extended up to a height of nearly 75 metres.

Due to the scheduled construction period of only 13 months, a particularly fast solution is required. The contractor has to strictly adhere to the planned completion date as the "Valencia Open 500" tennis tournament at the beginning of November 2009 has already been scheduled as the opening event.

The contractors decided in favour of the PERI UP Rosett scaffold system. The modular scaffolding fulfils all requirements and is currently proving its considerable advantages on a daily basis on the construction site through a wide range of applications.

Flexible scaffold erection

With the installation of the steel fin assembly, the height of the scaffold increases in step with the construction progress. The basis is a PERI UP birdcage scaffold with a grid dimension from 3.00 metres by 2.00 metres which varies according to the form and position of the ribs. The 50 centimetre rosette height increments, together with the metric basic grid, provide optimal adjustment options for the height, width and depth. In the direction of the facade, the grid size is halved by simply mounting standards on the ledgers so that the platforms can also be positioned between the steel fins through to the outside of the eventual building shell.

Due to the tapering building form between the individual steel ribs, cantilevered scaffold units are also required for the work carried out on the facade. These cantilevers are assembled using UBK node diagonals and UCB brackets. The brackets are able to carry high loads and can be mounted at any height - regardless of existing decking or ledger levels. In many areas, reinforced UHV ledgers are also used which in turn serve to support the rising standards. This means that the form of the scaffold can be problem-free and optimally adapted to the complex building structure.

As soon as the steel supporting structure is completed, the scaffold is altered to correspond with the construction progress. The wide cantilevers are to a large extent reduced in size so that the outside steel sheeting, insulation and the curtain wall construction can be installed. At the top of the building, the scaffold helps construction crews to attach the glass cladding and to install the movable steel structure including the required machine and drive technology. Also four freight elevators have been integrated without any problem, each offering a lifting capacity of 1,500 kg up to 70 metres.

Easily accessible working areas

Not only do site personnel always have to reach their designated working areas quickly and safely, the required materials must also be efficiently transported to the respective place of work. For integrating the PERI UP stairs, simple adaptive measures to the scaffold is sufficient. Using PERI UP UDI industrial decking with 25 cm width sections, working platforms and access ways are installed throughout without leaving any gaps. The integrated lock against lifting secures the deck without the need of any additional measures, and immediately after being installed. The surface of the decking is perforated as well as non-slip. Even in completely assembled scaffold sections, PERI UP decks can subsequently be removed and re-installed without any problems – a big advantage regarding continuous adjustment, not only for the scaffolding in Valencia.

Safe and fast working

The short construction period of the Edificio Ágora requires an extremely fast assembly procedure. In this respect, PERI logic simplifies and accelerates the erection of the PERI UP scaffold – also at large heights. The low weight of the individual system components and the fact that each system part can be handled by only one person, facilitates fast and energy-saving work operations. The high rigidity of the PERI UP standard connections reduces the number of both bracing levels and required diagonals. All PERI UP system components are compatible with each other. Through this, working platforms, stairways and guardrails are easy to install. The self-locking ledger connection, Gravity Lock, provides a high level of work and assembly safety: when mounting the ledger, the wedge drops automatically into the opening of the rosette through the force of gravity and is securely locked in position. PERI UP is certified and has proven itself over many years, and the modular scaffold fully complies with system scaffold requirements according to EN 12810 and EN 12811.

Ciudad de las Artes y de las Ciencias

The City of Arts and Science is a science centre in Valencia and has been designed by the architect Santiago Calatrava. Started in 1991, the complex has been constructed along almost two kilometres of the old riverbed of the Turia. The area features a number of different buildings including „L'Hemisfèric“ with a 3D cinema and a planetarium. It represents a huge human eye open to the world. With the L'Oceanogràfic, designed by the concrete shell pioneer Félix Candela, the complex also includes the largest aquarium in Europe.

Contractors: U.T.E. Agora, Valencia (Augescon, Lindner, Estrumaher)
Field Service: PERI S.A.U. Sociedad Unipersonal, Spain

PERI Systems In Use

- PERI UP Rosett Flex
- PERI UP Stair Tower

PERI was founded in 1969 and is today one of the leading providers of formwork and scaffolding systems. Along with the headquarters in Weißenhorn, Germany, the company has 47 international subsidiaries and 100 stock yards around the world. The company has over 5400 employees of which 850 are engineers. 2008 revenues was 1,220 million Euros.

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