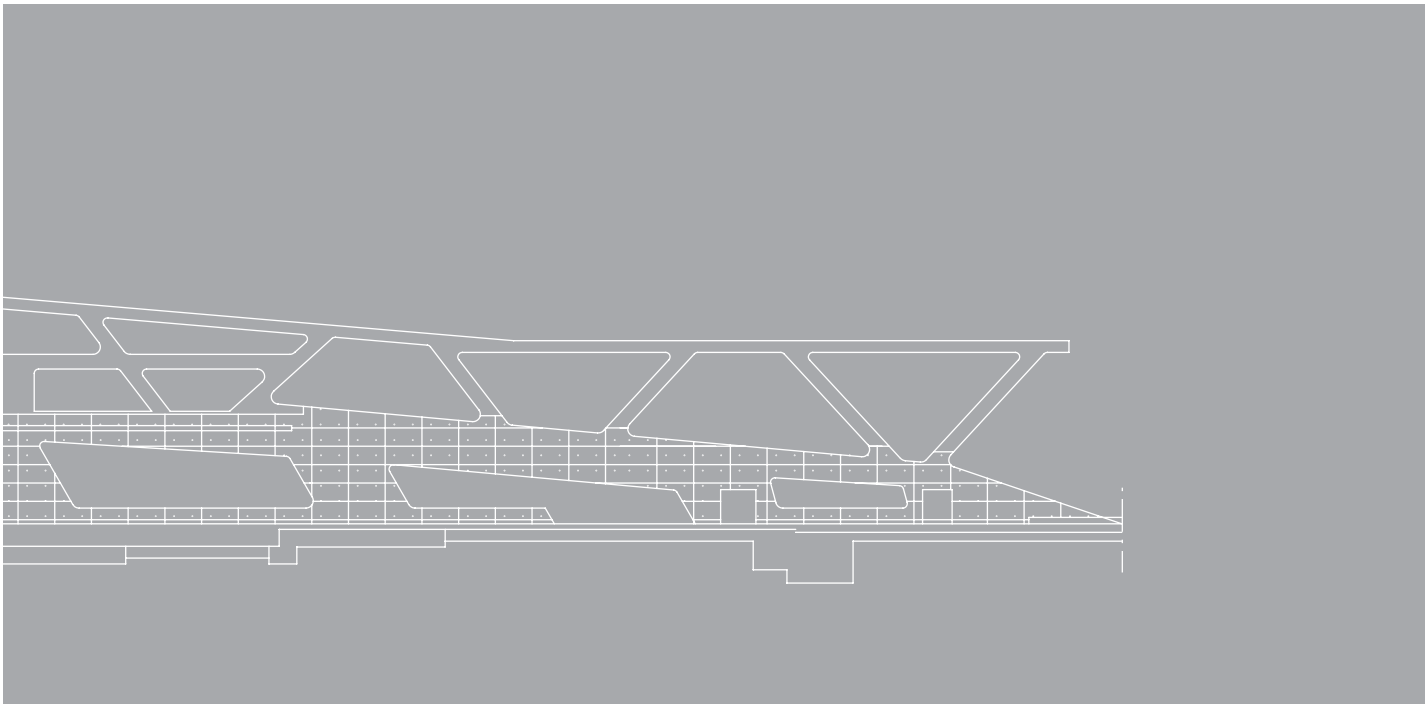
PERI – Your reliable partner

for architectural concrete projects

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Formwork, Scaffolding and Engineering from one source

You can rely on PERI

Focus of our company is the development and manufacture of formwork and scaffolding systems which make working on the construction site faster and safer. However, we do not consider ourselves not only as a provider of efficient system technology but rather as a source of ideas and supporter in order to develop, together with our customers, the best possible solution in each case to meet individual needs.

Because we know our customers, their tough daily working conditions and their competition, it is basically always about our products and services simplifying and accelerating work operations, improving safety and in particular helping to reduce both the time and costs involved. PERI products are therefore so designed that they always result in advantages regarding the handling along with reductions in the workload for the users and building contractors which means additional safety as well cost and personnel savings.

For our supplementary services, we always have our customers' business, their benefits and resulting added value in focus. A PERI solution is always the sum deriving from product, work preparation and execution. With our vast experience from global projects, we support our customers throughout all project phases – from the drawing up of feasibility studies for particularly challenging projects, formwork and scaffolding planning through to provision of continuous support during the entire project. Our system equipment is available in more than strategically located 120 rental parks around the world and thus we provide our customers with a cost-effective option for peak demands or specific project tasks.

To this end, our company goal is ensuring customer satisfaction. Our entire business activity is then focused on realizing this and the resulting strict orientation towards ensuring customer benefits. We want you to profit directly from PERI products as well as the close collaboration with us and have a real competitive edge in the market – both technically and economically.

Thus, we provide our customers with an advantage regarding market opportunities, flexibility and competitiveness in order to positively influence their business over the long-term.

Around 1,300 PERI engineers worldwide work day after day to develop efficient solutions and construction plans. The planning in 3D and animation helps to visualize the solution already during the planning phase.

For us, training seminars and courses on PERI products are an important aspect of our services with added value: users thus learn to efficiently use the systems on the construction site from the very beginning.

Outstanding architecture often requires special and unique shaping. PERI supports the realization of these challenging tasks, among other things, with customized cut-to-size formlining and the assembly of complex formwork units.

Architectural concrete projects

Regardless whether reaching dizzying heights or with extreme forms and structures – the creative ideas of architects for residential buildings, museums, stadiums or traffic facility constructions place the highest demands on the formwork and scaffolding solution.

System formwork can only be used here to a limited degree while special formwork of varying types are very much in demand. For the construction of complex, multi-curved reinforced concrete structures, PERI offers customized freeform formwork. Based on a 3D building model, PERI engineers plan the detailed assembly drawings. In the PERI formwork assembly facility, the formwork units are individually produced. The joining together of the individual elements on the construction site follows a similar process to that of a system formwork.

Museum of Tomorrow, Rio de Janeiro, Brazil

3D formwork solution for meeting the highest architectural demands

Edilson Costa
Site Manager

"The combination of different PERI formwork and scaffolding systems as well as efficient engineering support was the key factor in ensuring that the concrete construction challenges we faced could be mastered. In particular, the on-time deliveries of the pre-assembled formwork units enabled us to realise Rio's new landmark."

Contractor
Consorcio Porto Rio (Odebrecht Engenharia, OAS Engenharia, Carioca Engenharia)
Architect
Santiago Calatrava
Field Service
PERI Brazil, São Paulo and PERI Germany, Weissenhorn

A customized PERI formwork and scaffolding solution with 3,500 project-specific special formwork elements ensured that the realization of this extraordinary museum was carried out within the specified time-frame and budget.

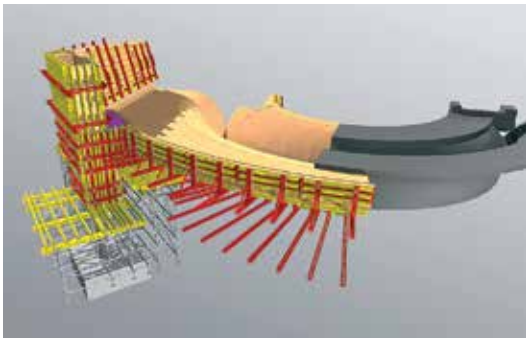
Located on the highly prominent Pier Maua, this futuristically designed building was designed by the Spanish architect and engineer, Santiago Calatrava, and extends 300 m into the sea. The cantilevered roof and facade with moving elements ensure optimum air conditioning. Two storeys are connected by means of inclined ramps and have a total area of 5,000 m² which will showcase trend-setting exhibitions and technologies.

In order to allow the complex concrete design of the museum to become reality, PERI planned, produced and delivered more than 3,500 project formwork elements, mostly double-curved 3D formwork units. For the comprehensive formwork and scaffolding planning together with the assembly of the formwork elements, international PERI teamwork was responsible throughout.

For the 3D planning, the Weissenhorn engineers were supported by experienced specialists from the PERI subsidiaries in Spain and Poland. The respective assembly plans and data provided the basis for the dimensionally accurate CNC-controlled cutting of the formwork units and final assembly at PERI´s facility in Sao Paulo. Here, CNC wood working equipment was used to process around 60,000 m² chipboard to create the formwork units in two-shift operations for the single and double-curved formwork elements. 25 formwork erectors ensured that between 10-20 ready-to-use customised elements were delivered to the site every day – just-in-time according to the construction schedule – over a period of 13 months.

In order to be able to cost-effectively realize such exceptional formworking tasks, a high proportion of system components were used. In addition, VARIO basic elements were selected which allowed efficient handling on the jobsite – similar to system formwork. Furthermore, three supervisors provided support for the extensive on-site formwork operations.

3D planning, assembly and material scheduling were well timed and carefully coordinated to suit the construction process.



At the PERI facility in São Paulo, over 3,500 formwork elements were accurately manufactured in very high quality.

Supported by PERI UP shoring and working scaffolds, as well as a VARIOKIT raised formwork unit, the customised elements could be assembled on-site to form a complete 3D formwork construction.

Realization of the museum was based on a wellthought out modular system concept and completed on time and within budget.

Aquatics Centre, London, United Kingdom

Bold designs and extraordinary architectural concrete

The 3D formwork elements were pre-assembled and ready-to-use by PERI – with formwork units accurately machined on CNC woodworking equipment.

Unique appearance: each 3D formwork unit re-sembled a work of art and the mounting on VARIO basic elements simplified on-site assembly.

General Contractor
Balfour Beatty
Contractor (Shell)
A J Morrisroe & Sons Ltd.,
Borehamwood/London
Architect
Zaha Hadid, London
Field Service
PERI Ltd. United Kingdom, Rugby Office
PERI GmbH Germany, Weissenhorn Office

Designed by Zaha Hadid, the eye-catching Aquatics Centre in London is characterized by its bold designs and extraordinary architectural concrete quality. For this, PERI planned and supplied the formwork and scaffolding solution.

The Aquatics Centre – like many other buildings created by Zaha Hadid – often touches the limits of technical feasibility. The curved shape of the highly visible roof construction is consistently transferred to the inside of the building. The so-called Scoreboard Wall and the Welcome Zone with complex geometries and double-curved surfaces were cast in-situ. For this, PERI planned, produced and delivered more than 200 customized formwork units realized using a 3D design which could be exactly positioned and assembled together on the construction site – supported on a PERI UP shoring and working scaffold. In addition to the high architectural concrete requirements, maximum accuracy with minimum tolerances had to be complied with especially in connection areas to existing structural elements as well as for subsequent glazing work.

For an all-round, uniform concrete finish, PERI engineers compiled the available data regarding the complete element arrangement beforehand. By means of a 3D model, all details such as the joint arrangement and tie positions could be coordinated with the architectural team in London. Furthermore, in order to achieve maximum architectural concrete quality, all formlining that came into contact with the concrete was taped so that no rivet and screw impressions are visible on the concrete surfaces.

The 3D formwork concept consisted of load-bearing basic elements and form-giving formwork units – whilst still taking into account easy on-site assembly and maximum transport dimensions. The basic elements consisted of the variable VARIO GT 24 girder wall formwork system. Timber formers, which had been precision-manufactured using CNC woodworking equipment, were converted during the PERI formwork assembly to create moulds. The in-situ application is similar to system formwork – supported by project-related assembly plans.

Supported by a PERI UP shoring and working scaffold, more than 200 customized elements were assembled on-site to create a complete 3D formwork structure.

After the 2012 Summer Olympic Games, the seating capacity of the swimming stadium was reduced from a temporary 17,500 to 2,500.

Photos top and right: Hufton + Crow

Tony Henry
Senior Project Manager

"With the eyes of the world on London in 2012, the quality and finish of the concrete in the Aquatics Centre had to be of Gold Medal standard. The walls around the pools, particularly the end walls, curved vertically and horizontally whilst changing thickness and needed to be fair faced on both sides. To create the fluid geometry concept intended by Zaha Hadid, the specification required shutters designed and built to millimetre accuracy in 3 dimensions. After using PERI products over many years, we knew this would be "The Job" for PERI. Working rigorously with the PERI engineers installing the 3D modelled formwork, we achieved the high quality architectural finish required."

Centro Cívico del Bicentenario, Córdoba, Argentina

Cost-effective 3D project solution for inclined concrete facades

The project-related assembled VARIO formwork units could be used on-site like a system formwork.

Up to heights of 16 m, PERI UP served as shoring and working scaffold for forming the walls which featured a wide range of inclinations.

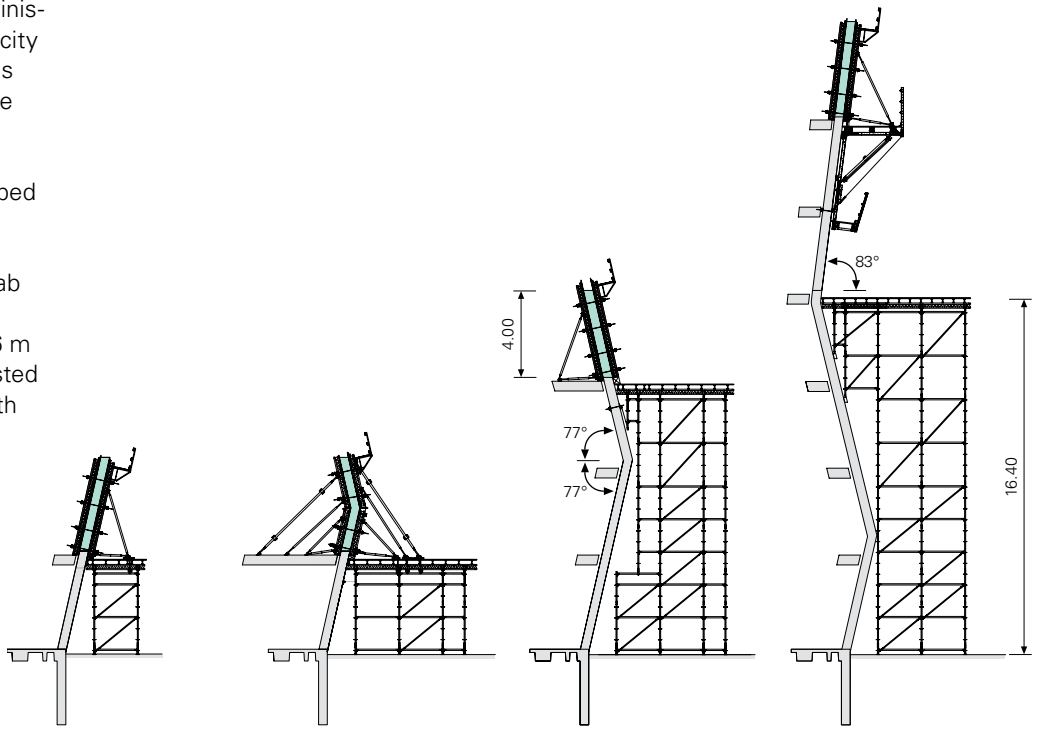
The VARIO formwork on CB 240 climbing brackets climbed heights between 16 m and 45 m.

The PERI formwork and scaffolding solution with prefabricated VARIO customized elements proved to be extremely efficient and led to remarkable concrete surfaces. On the basis of the threedimensional building model and the detailed CAD implementation planning, the formwork elements could be accurately assembled and efficiently used on the construction site – supported and accelerated by a continuous site supervision.

The congress centre with its 45 m high tower is part of the new administrative district of Cordoba, a large city in central Argentina with numerous buildings from the colonial era. The public building stands out through its inclined concrete facades with irregularly arranged, diamond-shaped window box-outs.

The base area and the topmost slab of the 11th storey feature identical, square-shaped floor areas with 26 m side lengths. The floor slab is twisted by 20° between the fourth and fifth storeys at a height of 16 m which results in distinctive sloping edges – modelled on the form of a cut diamond. In the process, the cross-section changes continuously from being square-shaped to that of an irregular octagon, and then back again in the form of a square.

For economical and safe construction, PERI Argentina delivered precision-made prefabricated formwork elements based on the VARIO GT 24 girder wall formwork system to the construction site. The use of SCC self-compacting concrete required their dimensioning in accordance with high concrete loads. In the lower sections, the project formwork was mounted on PERI UP working platforms. Formwork and scaffolding could be optimally adapted to suit the changing geometry with forward and reverse-inclined surfaces. For the raised sections, VARIO was climbed on CB climbing platforms.



With the combination of system and project formwork as well as scaffolding and climbing systems, the inclined external walls could be cost-effectively realized with 4 m standard cycle heights.

Felipe Lascano
Project Manager

"With the PERI solution and the permanent support provided by the PERI specialists, we were in a position to master the great challenges we were faced with: the VARIO formwork units were easy to handle, the schedule could be maintained and the concept was also very cost-effective."

Contractor
Electroingenieria S.A., Córdoba
Architect
GGMPU Arquitectos und Lucio Morini
Field Service
PERI Argentina S.A., Buenos Aires

The reflection on the expanse of water in front of the structure multiplied the effect of the concrete facade with its varying inclinations.

image © claudio manzoni

The Arctic Ring, Copenhagen Zoo, Denmark

Elliptical spiral with inclined joint arrangement

With a 3D planning service and the delivery of prefabricated formwork elements, the high requirements regarding the challenging architectural concrete finish and shaping could be fulfilled. In addition, the use of rentable system components as basic elements made the PERI solution very cost-effective.

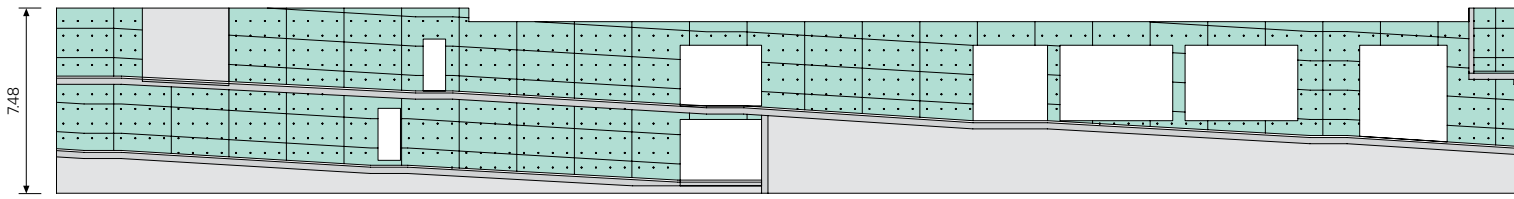
The Copenhagen Zoo has delighted animal lovers and architecture enthusiasts alike. With the Hippopotamus House from the Danish architects Dall & Lindhardtsen and the Elephant House designed by British star architect, Sir Norman Foster, the spacious complex features two architectural highlights. Since February 2013, "The Arctic Ring" has been opened for visitors to experience the polar bears, seals and penguins at first hand on an area totalling 3,200 m².

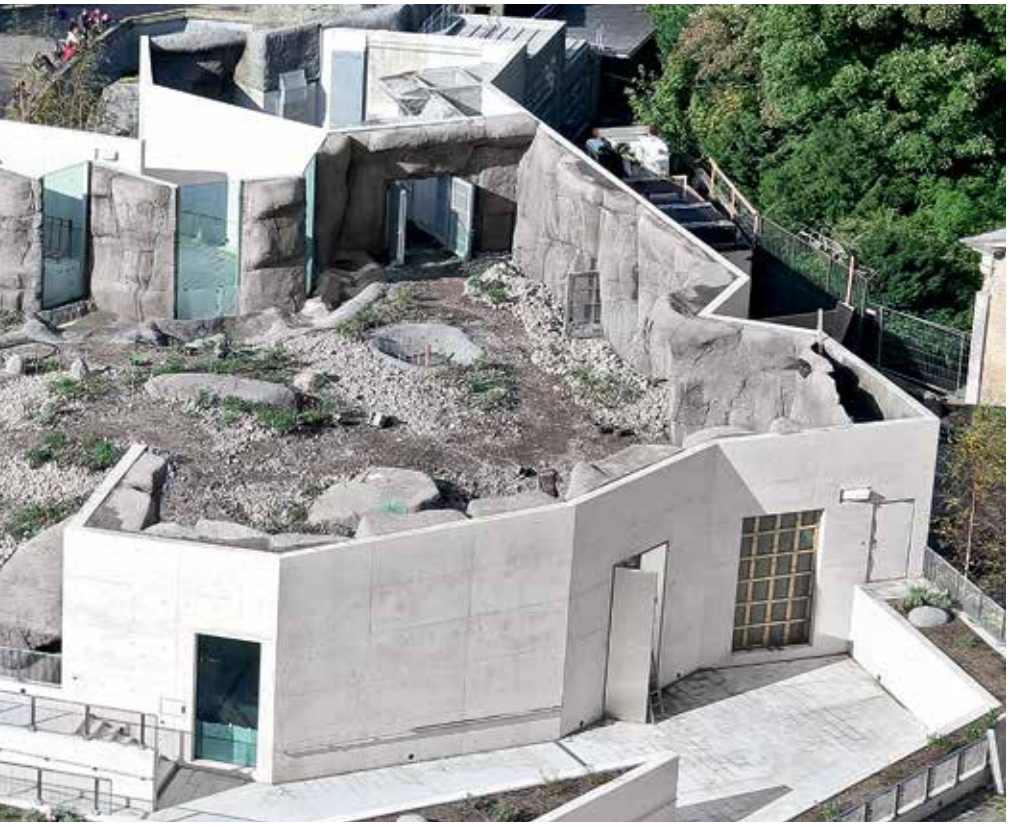
The central component is an ellipticals-haped structure with a covered indoor area and a spiral ramp that provides visitors with new, interesting insights and views time and time again. For the frequently executed reinforced

Precisely defined tie points and formlining joints were part of the overall visual concept that PERI engineers agreed on in advance with the architect.

The internal reinforced concrete ring was to be realized as an axially symmetric four-centred arch with four different radii ranging between 6 m and 14 m.

The formwork units on the basis of the VARIO GT 24 wall formwork system with bonded formlining sheets were delivered ready-to-use to the construction site.





Niels Thorsund
Project Manager

"We decided to use PERI because we had already successfully realized the elephant and the hippopotamus facility with its complex geometrical forms and high architectural concrete requirements together. Prefabricated 3D formwork elements on the basis of the VARIO system were also used for this project. "

concrete walls in the form of ellipses using high architectural concrete quality, PERI designed a 3D formwork solution and delivered ready-to-use prefabricated formwork elements to the construction site. Before this, in close cooperation with the team of architects, a regular tie arrangement was determined, carried out if necessary with blind anchors. In order to align the joint pattern with a uniform length classification to the inclination of the ramp, the parallelogram-shaped formlining was individually cut and then carefully bonded at the PERI formwork assembly facility. As a result, no rivet or screw impressions can be seen on the concrete surface. During the planning phase, PERI engineers additionally took into consideration the conical 10° inclined design of the outer ring, as well as the partly double-shell design, due to the time-consuming insulation measures. PERI UP falsework and reinforcement scaffold units, as well as MULTIFLEX girder slab formwork, supplemented the PERI concept to provide a comprehensive formwork and scaffolding solution. For ensuring a successful completion of the project, along with the planning and assembly service, the competent on-site support and briefings by a PERI supervisor also made a valuable contribution.

The formwork elements were up to 10 m high and were lifted by crane between the reinforcement and PERI UP scaffold.

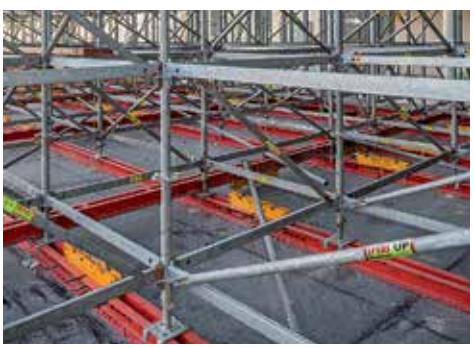
The PERI supervisor briefs the construction crew on the exact and very tight element connection achieved by using the articulated coupling.

Contractor
Jorton A/S, Aarhus
Architect
Dall & Lindhardtsen A/S, Helsingor
Field Service
PERI Denmark A/S, Greve Office
PERI GmbH Germany, Weissenhorn Office

SNFCC Cultural Center, Athens, Greece

Earthquake-proof shoring solution for new iconic structure in Athens

For earthquake-resistant implementation, PERI UP was supported on a load-distributing VARIOKIT construction.



CB Climbing Brackets served as a platform system for the VARIO Wall Formwork.

The retaining walls which separate the artificial hill from the rest of the park are up to 32 m high.

The new cultural centre in the south of Athens is based on the innovative design by the Italian star architect Renzo Piano. PERI supported the construction of this extraordinary project with a comprehensive formwork and scaffolding solution, continuous on-site supervision along with a well thought-out logistics concept.

The two distinctive main buildings – the National Library and Greek National Opera – are located at the rear of a man-made hill which is the side closest to the sea. The sloped roofs of the buildings form, as it were, an extension of the incline.

Similar to a flying carpet, the roof construction of the National Opera is suspended at a height of 40 m above the actual building roof, supported by 30 filigree steel columns. For constructing the 10,000 m² canopy, the PERI UP shoring solution fulfilled a wide range of functions. It served as a support for the prefabricated ferrocement elements and simultaneously allowed the fine adjustment of these modules in transverse and longitudinal directions. In addition, full-surfaceworking levels adapted to match the inclined course of the roof accelerated connecting and supplementary operations with in-situ concrete and provided maximum safety. Specially designed, floating supports minimized the movements of the scaffold construction and reliably provided the required earthquake protection also during the execution phase. Load distribution took place with the help of VARIOKIT system components taken from the PERI rental park.

The VARIO Girder Wall Formwork and the SRS Column Formwork fulfilled the high architectural concrete requirements for the walls and columns. The up to 32 m high reinforced concrete retaining walls which separate the artificial hill from the rest of the park were also realized in an architectural concrete finish. PERI engineers took into account the defined arrangement of the panel joints and anchor points in accordance with the design specifications whilst FinPly formlining screwed on at the rear also ensured immaculate concrete surfaces.

Michalis Papafilippou
Site Manager

"We are extremely satisfied with the PERI systems as well as the comprehensive service – in particular, with the competent application engineering, logistics and the on-site project support. In the process, PERI has helped us to successfully realize this challenging project. Especially the PERI UP modular scaffold with its high degree of flexibility and lightweight components which could be optimally adapted to suit the complex geometry. PERI UP has supported us throughout all construction phases by guaranteeing fast working operations along with providing a high level of safety and efficiency."

Stavros Niarchos Foundation Cultural Center (SNFCC) in Athens: designed by Renzo Piano, the construction of the cultural centre with the National Library and State Opera was provided with substantial support by the Stavros Niarchos Foundation (SNF) – an economic commitment for the future of Greece. The man-made hill with its steadily rising gradient in the direction of the sea forms an alignment with the building´s roofs.

Contractor
JV Impregilo S.p.A – Terna S.A
Architect
Renzo Piano
Field Service
PERI Hellas Ltd., Koropi

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Shoring Systems

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