

## Global Engineering Centers

**Brand Energy & Infrastructure Services**

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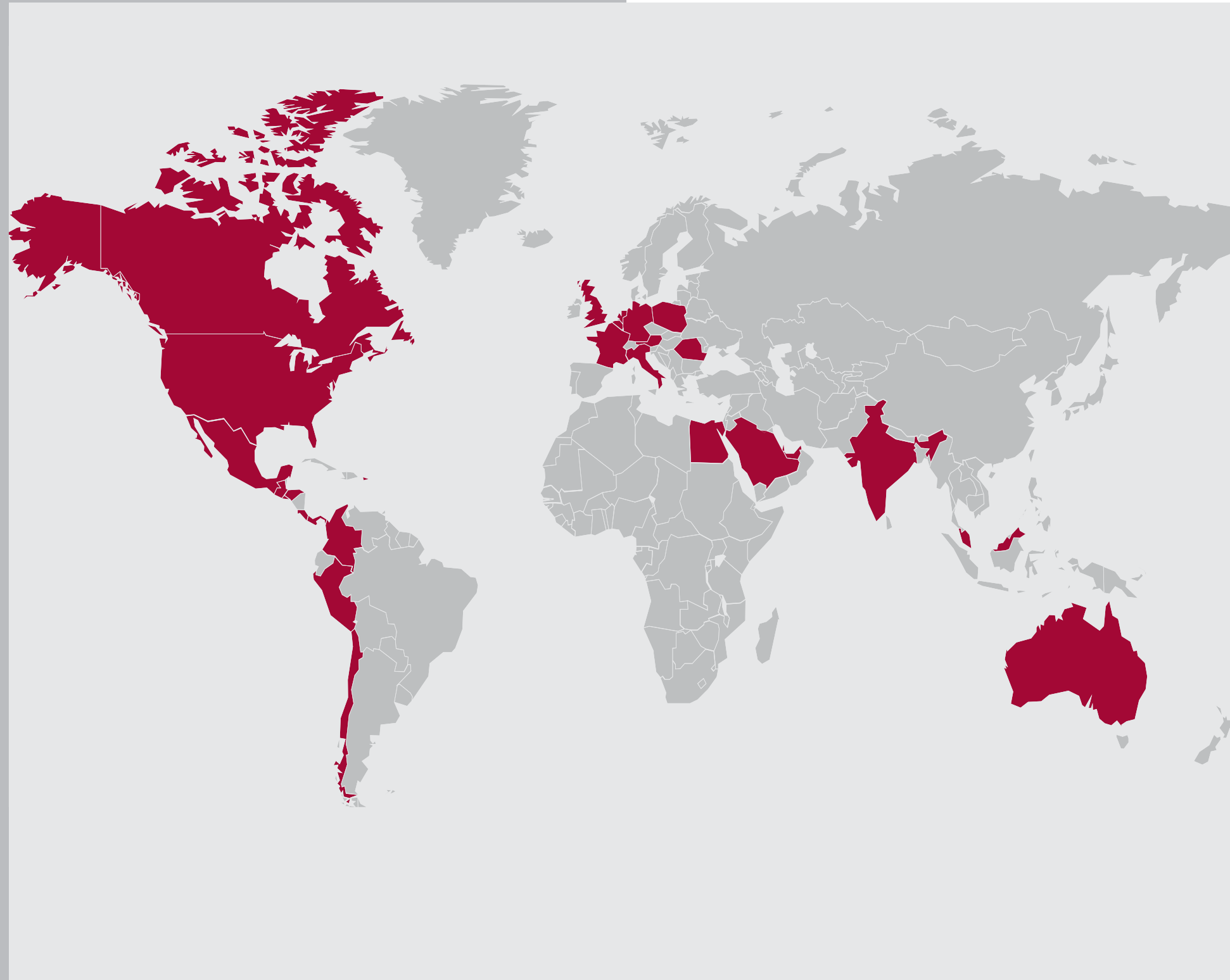
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Brand Energy & Infrastructure Services is a premier provider of specialty services for the global energy, industrial, and infrastructure markets. Its extensive portfolio of specialized service offerings include scaffolding services and access equipment, corrosion protection, insulation, fireproofing, engineering as well as formwork and shoring systems. Customers benefit from a closely knit network of more than 260 branches across the world.



The Brand Group consists of tradition-rich companies that rank among the market leaders in their respective business segments and regions. For the construction sector, these are:



Aluma Systems delivers high-efficiency concrete forming & shoring solutions in North, Central and South America. We are continuously developing concrete formwork product enhancements for increased safety, productivity & customer-specific design requirements.



Hünnebeck is synonymous to formwork, scaffolding and safety products in Europe. We offer services like engineering, job site logistics, cleaning & repair, training and foreman services as well as complete project development.



SGB is across the Middle East, Asia and Europe. The business has built a solid reputation for safety, quality and excellent service. Our expertise lies in formwork and commercial scaffolding services.



We believe that our shared knowledge is our greatest asset. It offers in-built advantages to customers around the world in terms of safety, productivity and innovation—all of which can make a critical difference to the success of your project. To complement the support you receive from local experts, we have developed specialized project application teams offering engineering support for unique and complex projects. We call these Global Engineering Centers, or GEC for short. Based in carefully chosen strategic locations, the GECs are innovation led teams focused on offering an industry-leading solution in our specialized fields. The teams' advanced design tools, innovative thinking & customer-focused attitude are deployed on major projects all over the world.

### Expert global services

Our global teams bring a wealth of knowledge and experience working in difficult terrain, in live transport environments and under tight time and operational constraints. Customers benefit from worldwide experience of finding practical and intelligent solutions, applied locally to your project.

- Dedicated sales support for technical projects
- Basic understanding of global codes, local skills & language barriers
- Skilled site supervisors available offering support for assembly & use, anywhere in the world
- Successful partnerships with manufacturers for time-effective bespoke solutions





Above all else, project management involves precise compliance with deadlines and budgets. Precisely planning the equipment stocked on site and transfer cycle times is decisive here. The key to this is our 4-Phase Strategy.

**Phase 1  
Situation analysis**

Definition and analysis of all of the customer's relevant data, specifications and requirements. For example: bill of materials, deadline planning, working hours per day, working days per week, periods of use of slab and wall formwork, quality of concrete finish, protective scaffolds etc.

**Phase 2  
Technical planning and costing**

To calculate costs, all the details relating to the systems and their implementation are defined. This gives the choice of systems, sequence plan, progress chart, quantities of materials kept on site, number of crews and employees, rough deadline plan, application and assignment drawings, costing of the offered services in accordance with the bill of materials and the price quotation inclusive of technical item descriptions.

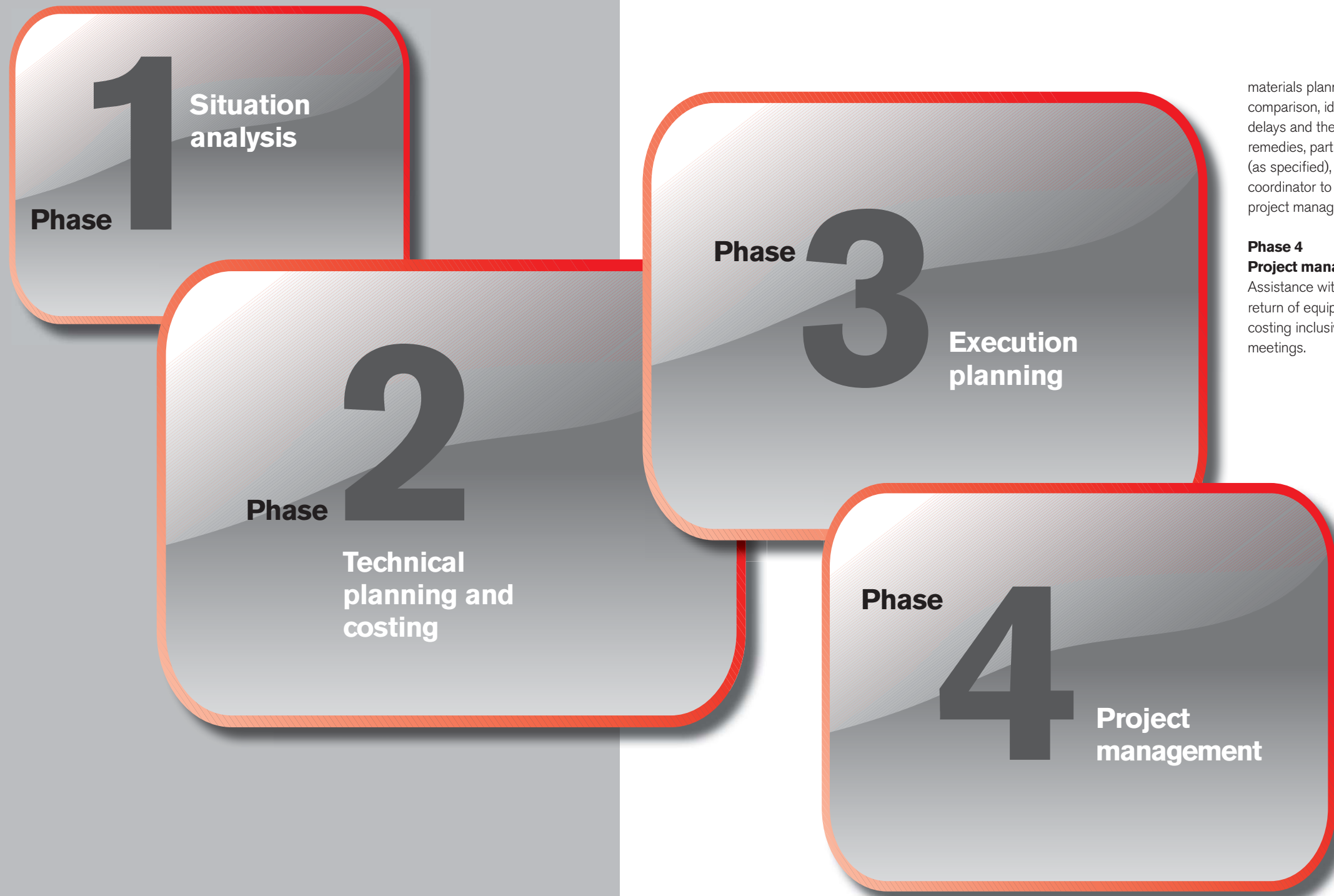
**Phase 3  
Execution planning**

Following the award of contract by the customer, equipment usage is planned with exact timing. This phase of planning includes the detailed technical planning, formwork erection plans with material piece lists, the preparation of elevation and erection plans, static analysis, materials planning and provision. This phase is rounded off with the delivery of all planned equipment, site-adapted

materials planning, target-performance comparison, identification of causes of delays and the recommendation of suitable remedies, participation in site meetings (as specified), and providing a formwork coordinator to ease the pressure on project management.

**Phase 4  
Project management**

Assistance with the final accounting, return of equipment, and post-project costing inclusive of the holding of final meetings.





## Our global competence: Water

Water is one of the greatest challenges facing mankind today and is attracting significant investment from global economies. We have decades of experience harnessing water power, from energy generation to complete infrastructure services for marine and utility applications.

### Hydropower & water applications include

- Dams & culverts
- Seawalls
- Tidal defence barriers
- Water retention
- River deviation
- Power houses
- Piezometric wells
- Water & sewage infrastructure
- Harbour decks & shipyards
- Off-shore moorings & dolphins

There are many special challenges with water projects with pressure to meet demands for safe drinking water, increased energy consumption and the protection of coastal lines. Water projects demand a solution that considers local labor skills, legal conformities for water preservation & handling, and the challenge of shipping or deliveries to often remote locations. Additionally, sensitive environmental issues need to be addressed and projects often face tight financial constraints and even tighter deadlines.



## Case study: Grand Renaissance Dam, Ethiopia



**Challenge:** Design and supply of formwork solutions for dams, spillways, power plants, culverts and draft tubes

### Key figures—the structure

- Output: 6,000 MW
- Area of new reservoir: 1,700 km<sup>2</sup>
- Dam type: roller-compacted concrete
- Dam length: 2 km
- Volume of poured concrete: 12 million m<sup>3</sup>
- Workers: 15,000

### Key figures—our solution

- 25,000 m<sup>2</sup> vertical formwork H20
- 1,800 dam climbing platforms
- 7,000 m<sup>2</sup> horizontal formwork
- 3,000 m<sup>2</sup> RASTO wall formwork
- 3,000 m<sup>2</sup> custom timber formwork

### Our experience

From the outset, we assisted the customer with the planning of this enormous project and developed bespoke formwork and shoring solutions for several structures.

For the funnel shaped walls of the draft tubes downstream from the turbines, we designed special timber forms by using BIM technology. For the walls of the culvert as well, a highly pressure resistant timber beam formwork system was developed to enable the concrete to be poured in two lifts. The tie system is set in the first phase so that the formwork withstands the pressure in the second phase. The slabs of the culvert were shuttered with the aid of a mobile frame whose vertical posts support the beams.

For the other structures like the dam, powerhouse and intake, our teams utilized both our core product range and specialist equipment to set up the most appropriate formwork and shoring solutions.

### Proof of Performance from across the group...

1. MOSE flood protection, Italy
2. La Vegona hydroelectric power plant, Honduras
3. Barrage des Toules dam, Switzerland
4. GIBE III hydropower plant, Ethiopia
5. Bujagali dam, Uganda
6. Susu dam, Malaysia
7. Maryport storm water tank, United Kingdom
8. Val de la Mare reservoir dam, Jersey
9. Blowering dam, Australia
10. Pirris hydroelectric plant, Costa Rica



## Our global competence: Transport

Connecting countries, states & towns with reliable, cost-effective transport is a challenge facing the world—made complicated by increasing populations, innovative developments and international travel costs. Our teams have experience of transport projects focused on the construction of new transport links for developing countries, as well as the maintenance and replacement of existing infrastructure to tolerate further demand and climate changes.

The construction and maintenance of road, rail, airports, bridges or tunnels place special demands—working in difficult terrain, in live transport environments and under tight time and operational constraints. We have developed an extensive range of high-productivity formwork solutions for concrete slab, wall and bridge construction whilst our access designs ensure safe, effective circulation and work progress on the most demanding structures and locations.

### Bridge applications include: Pier and pier heads

- Special steel formwork
- SCF Self Climbing Formwork
- SKR guided climbing system

### Deck

- FCS form traveller
- ILS incremental launching system
- T50 heavy-load truss beams
- Heavy-duty shoring towers
- Composite bridge for carriage
- Formwork for deck cantilever
- Travelling forms for bridge edge parapets
- Special steel formwork for precast beams

### Tunnelling applications include:

- Special round travelling form
- Special full round form
- Special travelling form for arch
- Special travelling form
- Cut-and-cover—travelling forms
- Mining tunnels—special solutions for stations and secondary tunnels



## Case study: Hardanger Bridge, Norway



**Challenge:** Total climbing formwork package to construct the two piers which rise over 180 metres above sea level.

### Key figures—the project

- Height of pylons: 202 m
- Total length: 1,310 m
- Width: 3 lanes
- Longest span: 1,310 m

### Key figures—our solution

- Eight brackets per leg from the outside, 4 from the inside = 48 total
- Platform width of 3.25 m provides enough working space
- SCF can cope with wind velocity of up to 129 miles per hour
- Complete enclosure for trailing platform to ensure early concrete hardening under controlled conditions

### Our experience

We provided a variety of Self Climbing Formwork (SCF) systems, plus MANTO® wall formwork, link beams, hoists and other associated equipment to help create the 1,310 m suspension bridge with one of the world's longest individual spans measuring 1,310 m.

Our ability to draw on considerable experience of similar projects to help design a practical, safe and efficient access solution was critical. Enabling a number of significant challenges to be successfully overcome, including the need to accommodate the changing dimensions of the bridge pylons as they rise, and the requirement to construct SCF units that would operate inside the bridge pylons. These tasks are made more demanding by the difficult weather conditions on site, which at times can produce wind speeds of 36 miles per hour. We were able to coordinate the delivery of all the formwork, hoists and consumable materials to the site as required.

### Proof of Performance from across the group...

1. Sidney Lanier Bridge, United States
2. Control Tower, Berlin Brandenburg International Airport, Germany
3. Terminal 3, Dubai International Airport, United Arab Emirates
4. Slavjanski Boulevard underground station, Russia
5. Aglio Viaduct, Italy
6. Forth Road Bridge, United Kingdom
7. Russky Island Bridge, Russia
8. Atlantic Bridge, Panama
9. Xaltaya River Bridge, Guatemala
10. Hochmosel Bridge, Germany



## Our global competence: Power and Energy

Global investment in the power and energy sector is due to be in the trillions by 2035. A focus towards alternative sources of power, renewable sources and emerging locations leads to a number of new challenges for contractors. We have developed extensive experience in power and energy projects through our capabilities for construction and industrial maintenance services with new-build projects in emerging markets, upgrades or decommissions in existing areas.

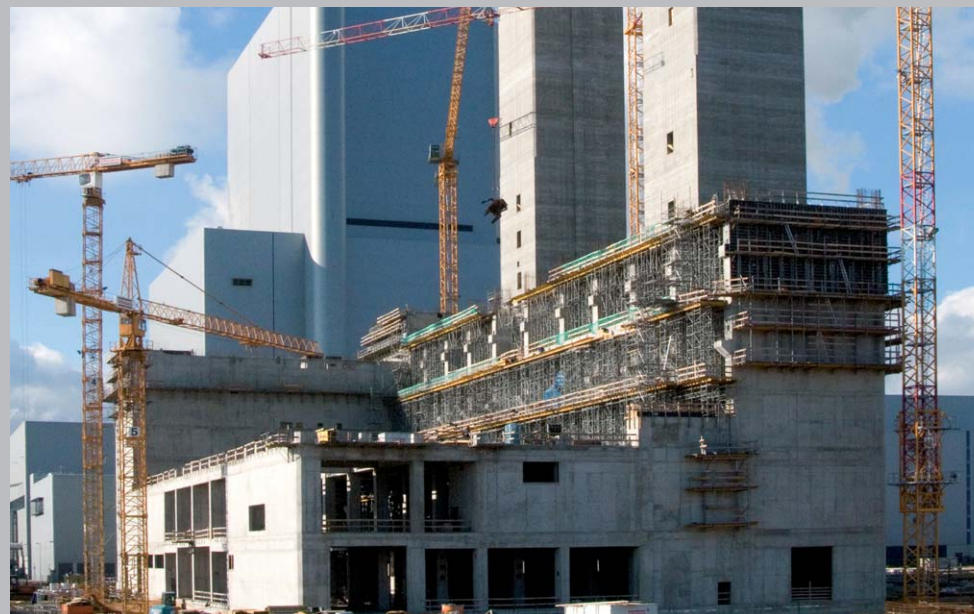
### Our capability includes

- Oil
- Gas
- Nuclear
- Hydropower energy generation
- Maintenance and decommissioning

Our concrete formwork teams have designed and supplied innovative solutions for the construction of major power stations, waste recycling plants and water treatment works all over the world. We devise high-productivity schemes which allow faster pour cycles and improved quality and finish using our range of industry-leading formwork systems.

In power station construction in particular, for example on cooling towers, as well as on large waste water tanks or LNG terminals where liquefied natural gas is converted back into its original gaseous state, the construction teams have to erect tall structures. The size and height of these structures pose special challenges including where high loads have to be discharged.

During the construction process this calls for complex solutions customized for the specific building situation and adapted precisely to it. This is where our experience of developing and implementing such custom solutions is advantageous.



## Case study: Energy from Waste plant, Oxford, UK



**Challenge:** Design and erect a unique access and formwork solution to construct the entire industrial plant.

### Key figures—the project

- State-of-the-art Energy from Waste plant
- Process 300,000 tonnes of non-recyclable waste per year
- Generate up to 24 MW of electricity—enough to power 38,000 homes

### Our experience

We designed and supplied the formwork required for the creation of the 24 m deep reinforced waste bunker which will accommodate up to 5,000 tonnes of waste. The bunker was constructed using a combination of wall formwork, MULTIFORM® climbing brackets to create access platforms, and lightweight GASS® aluminum shoring. The GASS system is used to provide safe working access for the creation of the numerous intermediate concrete floor slabs included inside the waste bunker.

Other products and services supplied include EXTRAGUARD™ edge protection system, to ensure maximum site safety, plus DU-AL™ and Mk II Soldier aluminum beams to create a variety of structures for wall and soffit support. These were complemented with CUPLOK® to create temporary staircases up to 24 m in height.

We have a sole supplier agreement in the UK with the customer, Clugston, for formwork and falsework requirements and worked with them on other waste-related projects in Lincoln, Shropshire and Stafford. The project illustrates our ability to provide comprehensive solutions designed to meet the specific requirements of each individual site.

### Proof of Performance from across the group...

1. Beles power plant, Ethiopia
2. Thermoelectric power plant, Turceni, Romania
3. Lignite power plant, Boxberg, Germany
4. Energy from Waste plant, Suffolk, United Kingdom
5. Premnitz power plant, Germany
6. Biomass power plant, Dumfries and Galloway, United Kingdom
7. Virginia City Hybrid Energy Center, USA
8. Sanmen nuclear power plant, Zhejiang, China
9. Pumped storage power plant, Luxembourg
10. Hydro renewable energy generator, Honduras



## Our global competence: Urban

With 70% of the world's population expected to live in cities by 2050, there are substantial opportunities for inner-city developments. Urbanization is expected to generate demand for efficient and improved transport links—both into the city and across the country.

In the commercial environment clients demand fast-track construction programs, rigorous cost control but no compromise to building quality. At the same time architects produce increasingly daring designs which bring engineering challenges of their own as they strive to create buildings which are more distinctive and energy efficient than ever before.

### Our expertise includes

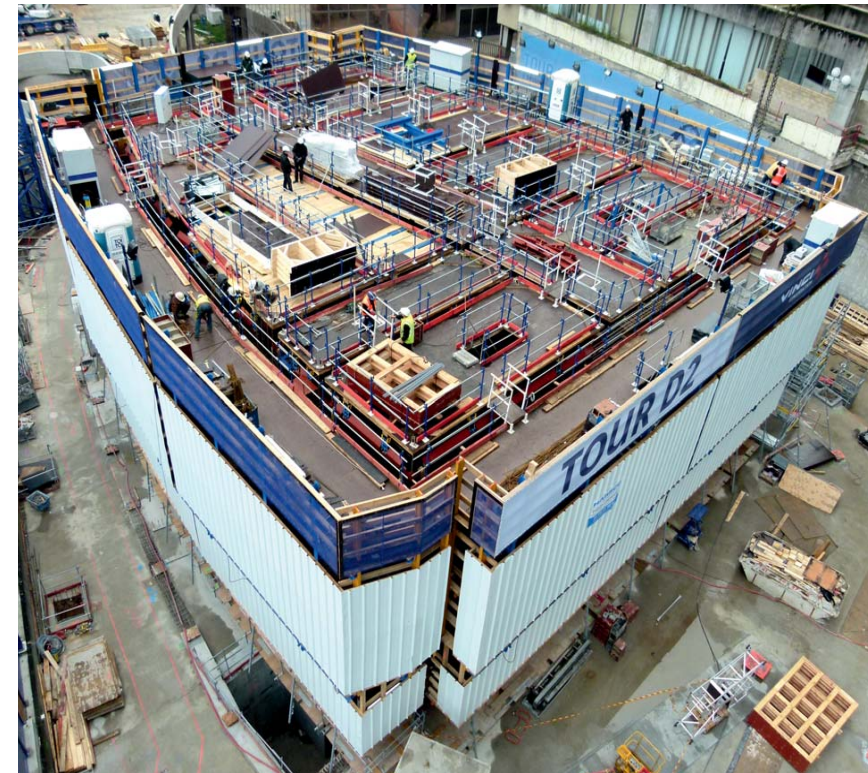
- Subways
- Metros
- Commercial developments
- Inner-city projects

A number of our global locations are situated close to major cities to support these growing demands where space restrictions often apply. Our track record for supplying high-productivity formwork solutions and innovative designs ensures that construction can proceed speedily, efficiently and above all safely.

For high-rise office or urban construction, our Self-Climbing Formwork (SCF) system allows work to proceed faster, more efficiently and less intrusively than other climbing formwork systems—crucial where time is restricted. Removing the necessity for a crane is a significant additional saving.



## Case study: Tour D 2, France



**Challenge:** Development of a formwork solution for a sophisticated geometrical structure on confined space

### Key figures—the structure

- Height: 172 m
- Number of storeys: 37
- Space: 55,500 m<sup>2</sup>
- Standard complies with Green Building Standard HQE

### Key figures—our solution

- 58 SCF brackets
- 25 SCF platforms
- 44 climbing lifts
- 2,000 m<sup>2</sup> formwork surface in a 5-day cycle
- 500 t material in use

### Our experience

The tailor-made formwork concept comprised all of the formwork solutions for the walls and slabs of the building core, as well as the five basement stories. The material was delivered just-in-time to the construction site. Each pouring cycle took five days. On day one, the completely enclosed platforms climbed along the external walls of the core. On days 2 and 3 the reinforcement cages of the exterior walls were delivered and installed. The fourth day was used for closing and aligning all of the formwork, as well as the installation of the formwork ties. On the fifth day the walls were then concreted.

### Proof of Performance from across the group...

1. Dubai Metro, United Arab Emirates
2. Warsaw Metro, Poland
3. Naples Metro, Italy
4. Riyadh Metro, Saudi Arabia
5. Doha Metro, Qatar
6. Junction City, Yangon, Myanmar
7. Jamal Abdul Nasser Street, Kuwait
8. One St Peters Square, Manchester, United Kingdom
9. Tour T1, Paris, France
10. Urban Development and the Environment Agency (BSU), Hamburg, Germany



## Our global competence: Social

Leading edge building technologies are pushing architectural boundaries like never before. The demand for hi-tech, complex developments are leading to a reliance on engineering expertise to construct buildings that are bigger and better than the last.

Social infrastructure projects offer an impressive portfolio to those involved—partnering with leaders in innovation will emphasize capabilities for future projects.

### Our competency includes

- Hi-tech buildings
- Museums
- Auditoriums
- Convention halls
- Civic centers
- Arenas
- Sports halls

The development of large public facilities imposes many specific constraints.

Working on a confined site, minimizing disruption or providing a flexible, cost-effective package for a range of different trades on a major development are all situations where we have a wealth of experience and ideas to contribute.

We combine innovative designs and our range of highly efficient formwork products provide a solution that will save time and money on site—without compromise to safety.

Public buildings have their own range of construction issues, from highly technical construction specifications to late design developments due to complex client organizations. Working within public environments also demands care, experience and a total commitment to site procedures. Our teams employ rigorous training and safety management procedures which have ensured that our safety record across all sectors leads our industry.



Source: Gardens by the Bay



## Case study: Beta Sciences University Faculty, Utrecht, The Netherlands



**Challenge:** To engineer solutions for an architecturally complex university facility

### Key figures—the project

To bring a faculty that had previously been housed in various buildings under one roof, the administrative board of the University of Utrecht decided to construct a new building with a complex architectural design.

### Key figures—our solution

Designed and delivered a complete solution from powered access to scaffolding, roofing, encapsulation, formwork, shoring and edge protection.

- 65,000 m<sup>3</sup> of GASS® aluminum towers
- 2,500 m<sup>2</sup> of our MANTO®
- 500 t material in use

### Our experience

Formwork was required for a total of 14,500 m<sup>2</sup> of concrete. For this we supplied 65,000 m<sup>3</sup> of GASS® aluminum towers ranging from 2.50 m to 7.50 m high to support the ceiling slabs. 2,500 m<sup>2</sup> of MANTO® large-frame formwork and shaft corner system were used for the rapid, economical creation of lift shafts. Safe protection for all work was provided by EXTRAGUARD™ edge protection system.

We also provided the largest rolling temporary roof of its type ever to be used in the Netherlands which shielded the site from the weather so that construction work could remain on schedule. The rolling roof was designed to be opened and closed by the on-site scaffolding team during the construction work so that materials could be craned into the building. Towards the end of the project the 1,446 m<sup>2</sup> roof was raised by an extra storey to create sufficient space for the final construction stage to take place.

### Proof of Performance from across the group...

1. BMW World, Germany
2. The Wave apartment block, Denmark
3. Golden Terrace, Warsaw, Poland
4. Mainz Synagogue, Germany
5. Grand Canal Theatre, Dublin, Ireland
6. Olympic Swimming Pool, Opole, Poland
7. Marlins Park baseball stadium, Miami, United States of America
8. Gardens by the Bay, Singapore
9. Bordeaux Auditorium, France
10. Zayed Sports City, Abu Dhabi, United Arab Emirates



## Specialist Expertise: Monolithic formwork

For reinforced cast-in-place construction, we developed a monolithic formwork system, "Aluma EasySet", offering time-saving and cost-efficiency. EasySet allows for forming of windows, doors, stairs, and a wide range of architectural features monolithically.

EasySet is an integrated forming and shoring system that offers a lightweight and cost-effective solution that can be used in virtually any application in which reinforced cast-in-place concrete is the specified method of construction. This system does not require plastering/rendering used in the traditional system of blocks/brick. The use of concrete provides an excellent texture and appearance without end 'bellies' or bad finishes, achieving a clean and smooth concrete surface.

The system was designed to be used in monolithic construction as well as two stage construction methods, offering the flexibility to suit any application and any building layout, from single-storey buildings to high-rise apartments.

EasySet's design eliminates 80% of the welding required compared to similar systems and produces a product that is technically and commercially above and beyond what other systems have to offer.



### Montalban Housing Project, Venezuela

**Challenge:** Development of a formwork solution for 4 towers—10-storey walk up buildings with 60 apartments each.

#### Key figures—the project

"The Great Venezuelan Housing Mission"

- Scope: 100,000 houses in 10 months, a total of 1,000,000 houses in 5 years

#### Key figures—our solution

- Pour cycle: one every three days (crew of 15-20 workers)
- Total m<sup>2</sup> area for the EasySet: app. 1,164,30 m<sup>2</sup>

### Our experience

We supplied one set of equipment which included enough formwork to pour the walls and slabs together—covering half of the building floor plan, including the central stairway as well as complex and unique exterior facade and architectural features around the window. The formwork would then be cycled horizontally to the second half of the floor plan.

## Specialist Expertise: Climbing formwork

To benefit continued operation, crane utilization and high-rise projects, we offer a comprehensive range of Self-Climbing Formwork (SCF) to lift to the next pour level. With the aid of an inbuilt hydraulic device, SCF climbs step-by-step without the need for a crane, matching the pace of construction. SCF can take up and discharge all forces up to a maximum vertical load of 150 kN per bracket. With a maximum influence width of 8.5 m per bracket, formed surfaces up to 5.5 m high or 17 m wide are possible.

SCF is customized to the specific needs of the project. The team develops the technical design, plans the work cycles and offers site support globally—including training staff in safe assembly and disassembly, as well as the safe operation of the formwork systems. The team takes care of the whole project management from design over manufacturing, cost monitoring and project reviews.

### Typical projects for heavy SCF systems:

- Building cores and facades with 80 m+ height
- Bridge piers and pylons with 80 m+ height
- Airport control tower with 60 m+ height
- Other tall structures, e.g. watch-tower, etc.



### Russky Bridge, Russia

**Challenge:** Development and supply of weather-independent self-climbing formwork solution.

#### Key figures—the structure

- Span: 1,104 m
- Height: 320,9 m (pylon), 50–100 m (piers)
- Lanes: 4

#### Key figures—our solution

- 64 SCF brackets
- 65 climbing lifts for pylon
- 12–20 climbing lifts for piers

### Our experience

Our solution provided a fully enclosed temporary working environment which protected against extreme weather conditions during construction of the pylon and its 70 m tall approach piers. The SCF unit provides seven work levels with a total height of 19 m, with the top two used for upstream steelfixing. As both the external—and unusually also the internal—working platforms are all full-scale, steelfixing can proceed immediately after concrete pouring, thus saving time and increasing safety. On the next two levels, work is carried out on the formwork and the concrete surface can be heated from here if necessary. To accelerate work flow, the formwork level also has separate projecting materials platforms served by a crane.

The three trailing platforms round off the rigid, steel-frame climbing pier production unit. These platforms allow the concrete to be protected from the weather for two complete cycles after pouring, and again, heated if necessary.



## Specialist Expertise: Modelling and 3D Design

Our engineers apply their ingenuity and specialist expertise, along with the latest software technologies to design solutions that both solve/pre-empt problems and save money for you.

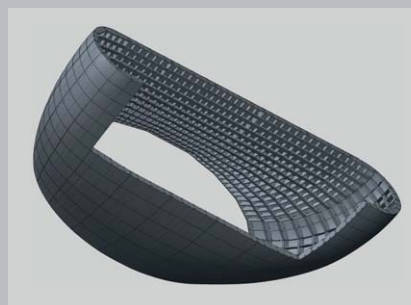
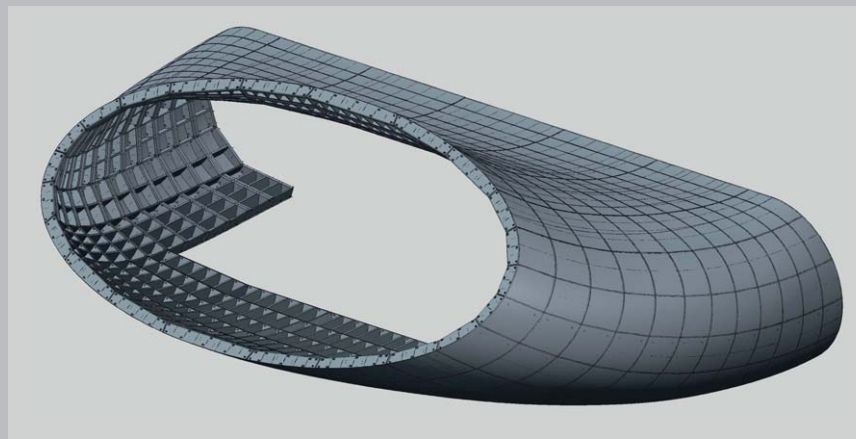
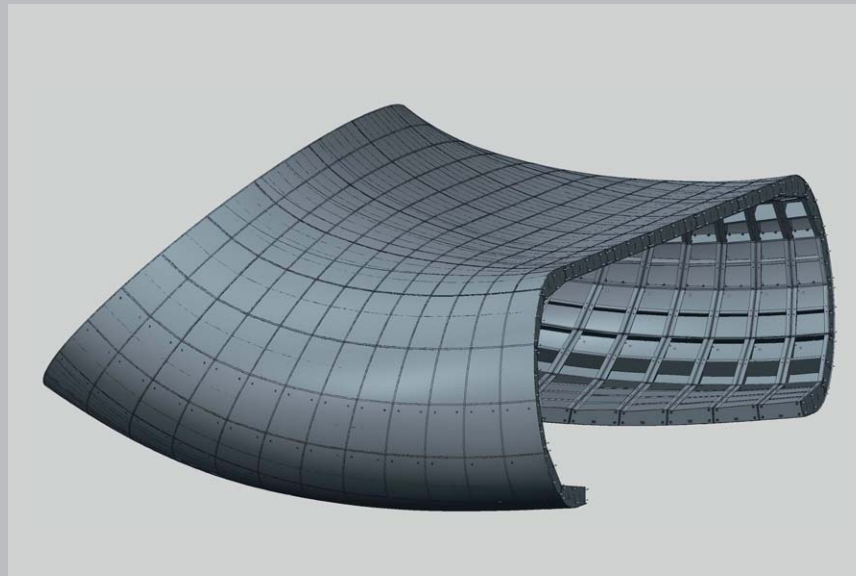
Critical to our success are our dedicated research and development teams, which are constantly striving to develop more innovative and efficient solutions to everyday problems found by our customers. We can help you with our specialized 3D parametric modelling designs which illustrate our solution with maximum visual impact. 3D designs offer precision in the early stages of complex construction and add significant value in designing the best solution—taking all aspects of the project into consideration.

In addition to this, we can provide a prototyping model to visualize the exact working process. This has proved crucial on projects where unique structures need to be planned to exact standards such as draft tubes in dam construction.

We can design the most complex projects on your behalf quickly and thoroughly. Starting with the ground plan and facade dimensions, we produce the required structural drawings, determine the precise quantities of materials and supply all the required quantity lists.

### Double curvature draft tube formwork:

- Special steel formwork
- Parametric design
- Advanced design with BIM technology
- More engineered solution compared with wooden carpentry -> reduction of unpredictability



## Specialist Expertise: Specials

Based on your project requirements, rather than our catalogue, we develop a bespoke plan based on the most appropriate formwork solution for every concrete pour. Our solutions can be based on any combination of formwork and shoring, from walls, slabs or bridge formwork to shoring, climbing and edge protection—all from one supplier.

Our in-house engineers and designers have in-depth knowledge of the specific regulations, requirements, codes and qualifications required. In addition, they have years of experience working on some of the world's largest and most complex and multiphased projects, where the design of low-impact solutions are critical to success.

The flexibility of our product range increases our versatility, and we are adept at finding intelligent solutions for the most complex projects.





