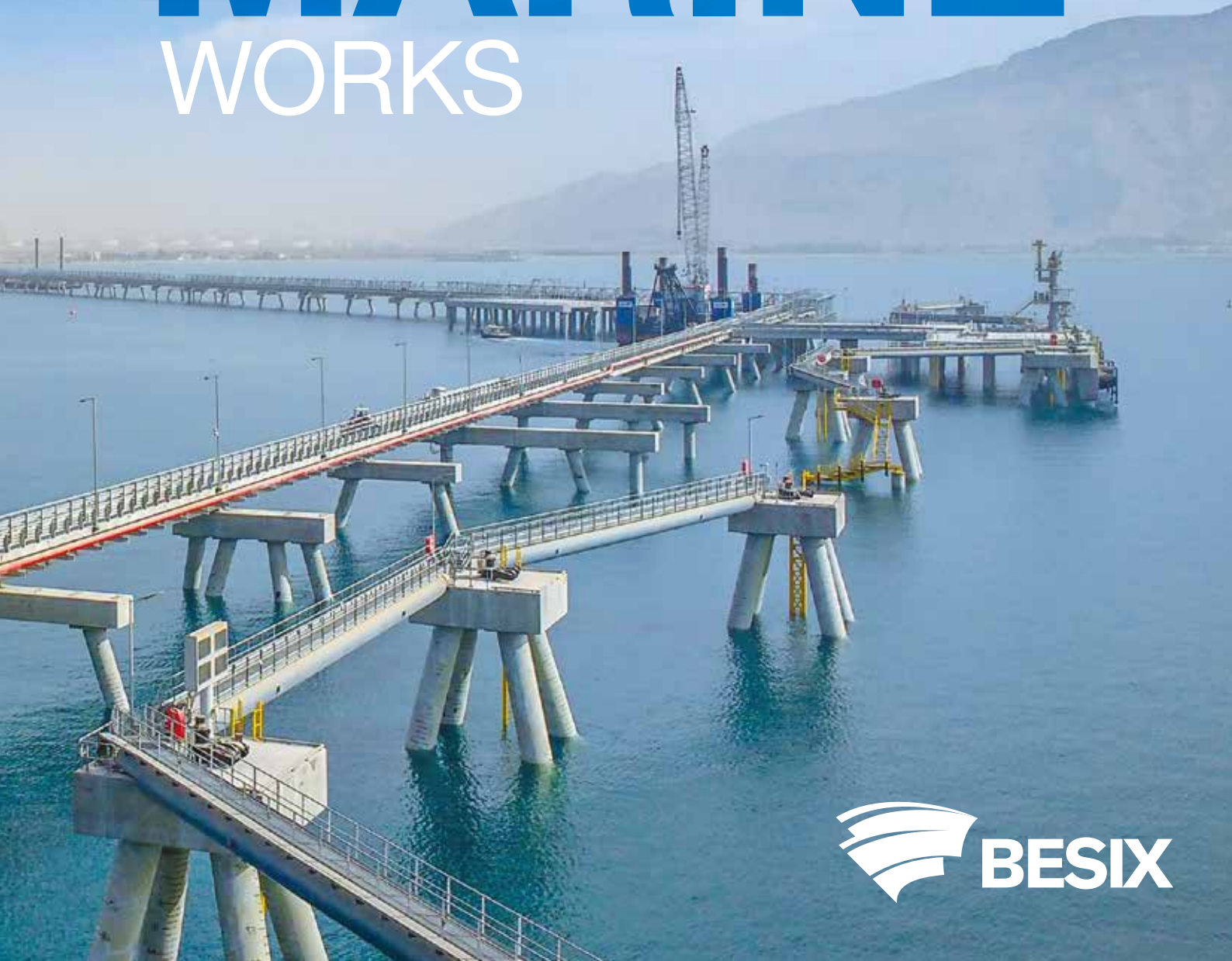


MARINE WORKS





MULTIDISCIPLINARY EXPERIENCE

Since 1909, the Belgian company BESIX Group has grown into a multidisciplinary company with a leading position in its markets: construction, property development and Concessions & Assets.

As our clients entrust us their plans, we deliver (high-rise) buildings, infrastructure, coastal marine projects, wastewater treatment plants, sports and leisure facilities, and more, all over the world.

We are truly at our best when we can develop a partnership with our clients that goes beyond the build. Leveraging on our wide range of expertise covering pre- and post-construction solutions and on our in-house engineering teams, we are able to take complete ownership of a project.

100+
YEARS EXPERIENCE

65%
ACTIVITIES ABROAD

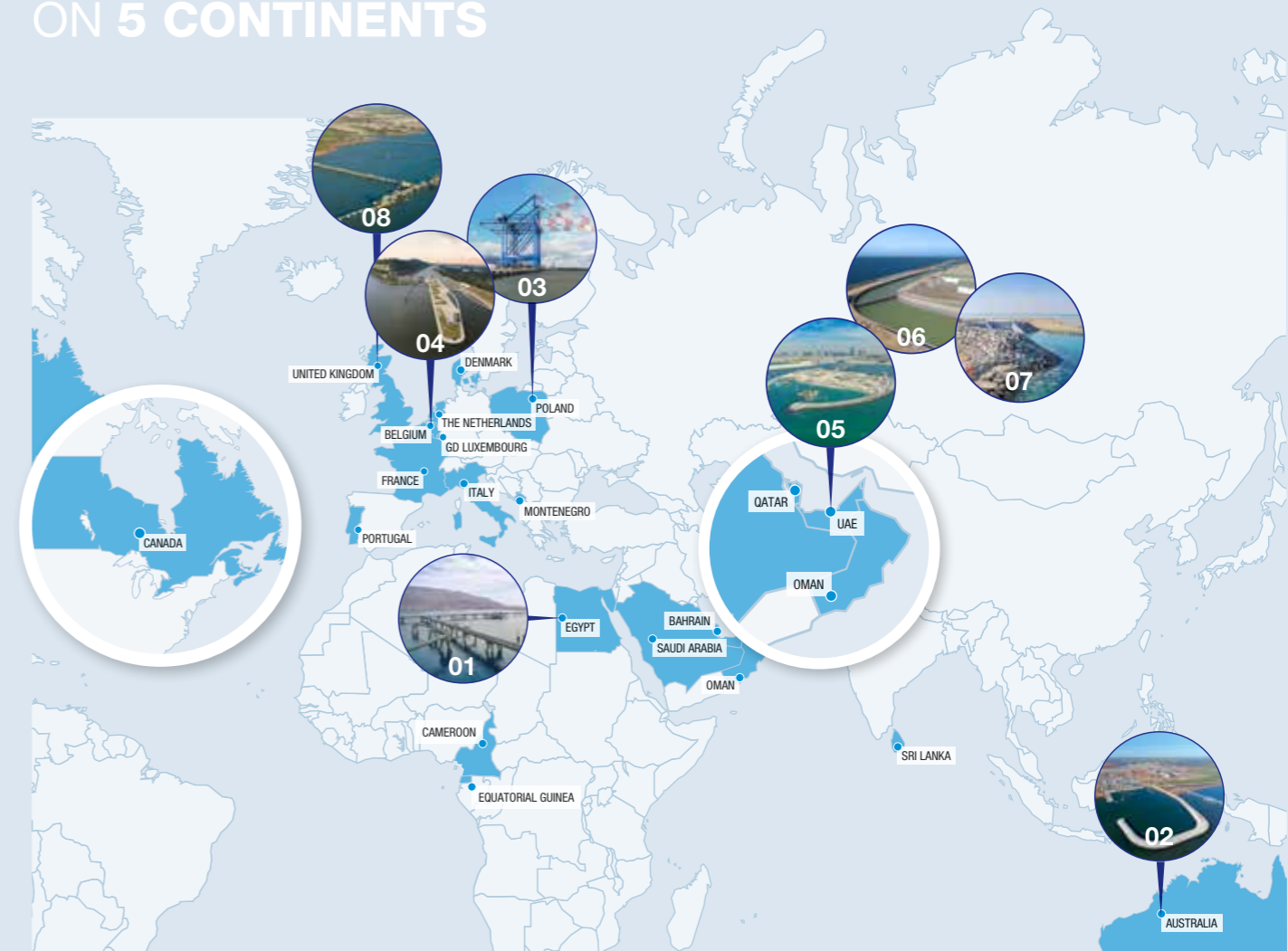
65+
YEARS IN AFRICA

±15,000
EMPLOYEES WORLDWIDE

55+
YEARS IN THE MIDDLE EAST

€2 billion+
TURNOVER

WE OPERATE IN 22 COUNTRIES ON 5 CONTINENTS



01 | Ain Sokhna Product Hub
Gulf of Suez, Egypt
See page 06

02 | Wheatstone
Onslow, Australia
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03 | Gdańsk Deepwater Container Terminal
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04 | Fourth Lock of Lanaye
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05 | Jumeirah Private Island
Jumeirah, Dubai, United Arab Emirates
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06 | Hamriyah Power & Desalination Station
Sharjah, United Arab Emirates
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07 | Das Island
Abu Dhabi, United Arab Emirates
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08 | South Hook LNG Terminal
Milford Haven, United Kingdom
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PROVEN SKILLS ON COASTAL MARINE WORKS

The market for modern port infrastructure is one of the most dynamic in which BESIX operates. After WWI we rebuilt the Belgian ports and waterways and ever since our expertise and experience have continued to grow.

Today, we carry out coastal marine works all around the world in no less than 8 areas of expertise: Breakwaters, Jetties, Locks, Quay Walls, Marinas, Water Intakes, Shore Protection and Refurbishment.

Benefiting from our in-house engineers' know-how, we mostly carry out projects on a Design & Build basis.

We own and operate our own specialised floating equipment. This comprehensive design and equipment approach yields considerable cost savings.

↳ Visit the webpage
www.besix.com/en/activities/marine-works



OUR AREAS OF EXPERTISE



Jetties
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Breakwaters
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Quay Walls
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Marinas
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Water Intakes
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Shore Protection
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Refurbishment
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OUR STRENGTHS

Marine Equipment
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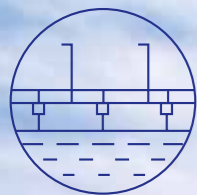
Engineering & BIM
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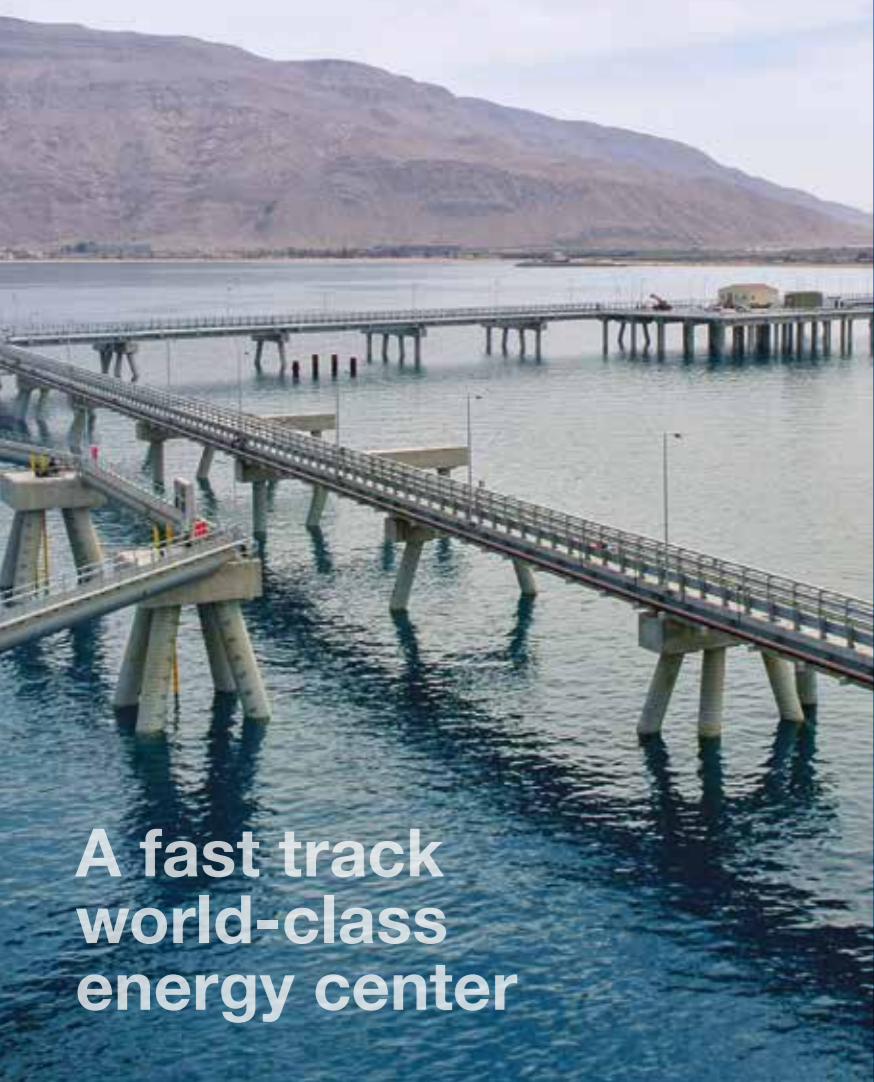
SUSTAINABILITY

Quality, Health, Safety & Environment
PAGE 28

Corporate Social Responsibility
PAGE 30



Jetties



A fast track world-class energy center

AIN SOKHNA PRODUCT HUB

AIN SOKHNA, GULF OF SUEZ, EGYPT

Project value Approx. €100 million
Client Sumed
Period 2016 - 2017

The joint venture BESIX-Orascom was awarded the construction of the Ain Sokhna Product Hub, a 3 km F-shaped jetty. This facility, located in the Gulf of Suez, is of great strategic importance to the region.

The fast track nature of the project combined with the additional M&E works represented a major challenge in terms of timely design, procurement and construction. In addition, completing the remaining part of the works whilst live gas supply and regasification was ongoing, had its own constraints.

It only took 5.5 months to deliver a fully operational first berth, counting from the first pile being driven until completion, including all M&E works and commissioning. For this, 221 piles were driven in 126 days.

The first 500 metres of the jetty were originally designed as a rock dumped causeway. Due to liquefaction issues encountered during the soil investigation, this was changed last minute to a piled jetty.

The original contract comprised two berths: one for LNG through an FSRU and one for LPG and fuel oil. The client subsequently awarded an order for a 3rd berth.

Visit the webpage
www.besix.com/en/activities/marine-works/jetties



BAHRAIN LNG IMPORT TERMINAL

MUHARRAQ ISLAND, BAHRAIN

Project value Approx. €130 million
Client GS E&C for Termco
Period 2015 - 2018



EG LNG LOADING TERMINAL 1 BIKO

BIKO, EQUATORIAL GUINEA

Project value Over €50 million
Client Bechtel for Marathon Oil Corporation
Period 2004 - 2007



VLCC JETTY N°1 – PORT OF FUJAIRAH

FUJAIRAH, UNITED ARAB EMIRATES

Project value Approx. €60 million
Client Port of Fujairah
Period 2014 - 2016



JETTY FOR Wafa COASTAL PLANT

WEST OF TRIPOLI, LIBYA

Project value Approx. €130 million
Client JTS (JGC/Tecnimont/Sofregaz) for Agip Gas
Period 2002 - 2004



Breakwaters



WHEATSTONE ONSLLOW, AUSTRALIA

Project value Over €200 million
Client Bechtel for Chevron Australia
Period 2011 - 2015

BESIX and its partner Thiess (Best joint venture) were entrusted with the engineering, procurement and construction of two quays protected by a 1-km breakwater.

The works had to be executed in a very remote location, often over open water and under difficult environmental conditions. The design also incorporated construction elements that had never been applied to offshore structures.

The presence of a paleo-channel under the footprint of the breakwater led to ground liquefaction in case of a cyclone or surge. The BEST JV team relied on its expertise in creative solutions to combine offshore stone columns with partial soil replacement to keep costs down as a mitigation measure.

Taking a methodical approach with the usual focus on safety-in-design, the JV was able to complete the project 3 months ahead of schedule with zero safety or environmental incidents. Chevron's new offloading facility is designed to last half a century, even in the face of cyclones, extreme waves and seismic activity.

Innovation over open water

Visit the webpage
www.besix.com/en/activities/marine-works/breakwaters



FUJAIRAH NAVAL BASE FUJAIRAH, UNITED ARAB EMIRATES

Project value Over €20 million
Client UAE Armed Forces
Period 2001 - 2004



DABHOL LNG TERMINAL DABHOL, INDIA

Project value Over €120 million
Client Enron for Dabhol Power Company
Period 1998 - 2001



BAHRAIN LNG IMPORT TERMINAL MUHARRAQ ISLAND, BAHRAIN

Project value Approx. €130 million
Client GS E&C for Termco
Period 2015 - 2018



DAS ISLAND ABU DHABI, UNITED ARAB EMIRATES

Project value Approx. €120 million
Client Hyundai Heavy Industries for ADGAS
Period 2011 - 2012



Quay Walls



A container terminal giant in the Baltic Sea

GDAŃSK DEEPWATER CONTAINER TERMINAL GDAŃSK, POLAND

Project value Approx. €90 million
Client Deepwater Container Terminal Gdańsk
Period 2015 - 2016

In 2016 Gdańsk's international port doubled its deepwater container handling capacity to 3 million TEU to make it the largest container terminal in the Baltic Sea. This follows the commissioning of the new T2 terminal, designed and built by BESIX and NDI, and the extension of the existing terminal T1 facilities.

The new T2 terminal includes a 656 m mooring quay with a draft of 17 m. BESIX and NDI also designed, built and equipped approximately 25 hectares of platforms, storage depots, technical installations and workshops. To be operational within the given deadlines required establishing and sticking to a meticulous schedule which took account of the complex design process, soil pre-remediation and the harsh Polish winter.

In 2017 BESIX received an award from the Pomeranian Regional Chamber of Construction Engineers (Poland) for the outstanding work on this project.

Visit the webpage
www.besix.com/en/activities/marine-works/quay-walls



AMAZONE HARBOR A1, A2 AND A3 ROTTERDAM, THE NETHERLANDS

Project value Over €60 million
Client Port of Rotterdam
Period 2012 - 2014



OCHZ QUAY WALL ZEEBRUGGE ZEEBRUGGE, BELGIUM

Project value Approx. €40 million
Client MBZ (Port of Zeebrugge)
Period 2011 - 2015



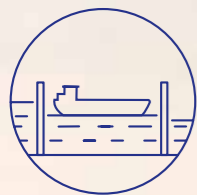
TANGIERS MED I TANGIERS, MOROCCO

Project value Approx. €100 million
Client Tanger Méditerranée 2 Special Agency
Period 2005 - 2009



TANGIERS MED II TANGIERS, MOROCCO

Project value Over €220 million
Client Tanger Méditerranée 2 Special Agency
Period 2010 - 2014



Locks



A vital Belgo-Dutch crossing point

FOURTH LOCK OF LANAYE LANAYE, BELGIUM

Project value Over €100 million
Client Sofico
Period 2011 - 2015

The 4th lock of Lanaye connects the Albert Canal and the Meuse river and straddles the border between Belgium and the Netherlands. The massive 225x25 m lock, extending over a 14 m drop, is the largest civil engineering project in Wallonia in the last ten years.

The lock is made up of a reinforced raft and 3 m thick concrete walls, impressive lateral aqueducts (with 6x6 m sections) and a drainage system that spans the entire complex. In addition to the necessary demolition, piling and redevelopment works around the site, BESIX also built a pumping station and a state-of-the-art hydroelectric plant, a 200-m bridge across the channel, a control centre and several kilometres of quay walls and roads.

Not only did BESIX adhere to the strict environmental regulations, it also created new spawning grounds and natural banks along the village of Lanaye to offset the impact of the project on the local fauna and flora.

Visit the webpage
www.besix.com/en/activities/marine-works/locks



BERENDRECHT SEA LOCK ANTWERP, BELGIUM

Project value Over €230 million
Client Ministry of Public Works
Period 1982 - 1988



BEATRIX LOCK NIEUWEGEIN, THE NETHERLANDS

Project value Approx. €200 million
Client Rijkswaterstaat
Period 2016 - 2019



LIMMEL LOCK MAASTRICHT, THE NETHERLANDS

Project value Approx. €40 million
Client Rijkswaterstaat
Period 2015 - 2018



BORN, MAASBRACHT & HEEL LOCKS BORN, MAASBRACHT AND HEEL, THE NETHERLANDS

Project value Approx. €200 million
Client Rijkswaterstaat
Period 2008 - 2014



Marinas



Maritime marvels in Dubai City

Visit the webpage
www.besix.com/en/activities/marine-works/marinas

JUMEIRAH PRIVATE ISLAND - 3 MARINAS

JUMEIRAH, DUBAI, UNITED ARAB EMIRATES

Project value Approx. €50 million
Client Dubai Municipality
Period 2016 - 2017

Overlooked by the world's tallest building, the Burj Khalifa tower, the private artificial island built by BESIX encompasses three marinas for private yachts and leisure crafts, and 317 piles for the water villas.

The installed marine facilities are comprised of revetment works with a concrete crest wall, promenades with service tunnelling, two RO-RO jetties to operate the logistics and a cantilever helipad-deck on the breakwater groin.

The private beaches were carefully trimmed with immaculate white beach sands for the future VIP guests.

As part of the temporary works, BESIX constructed a combination of cofferdam and pontoons, creating a floating bridge to ensure the access to the island situated 500 m from the public beach for the developer. To reduce the impact of the construction activities on the residential beach front area, the structural elements were brought in over sea by our own marine equipment and auxiliaries.

A sequential well-planned progress of the works allowed a smooth hand-over to the client, mitigating the interface risks for the contractor constructing the housing on the island.



YAS ISLAND RACE TRACK MARINA

ABU DHABI, UNITED ARAB EMIRATES

Project value Approx. €50 million
Client Aldar Properties PJSC
Period 2007 - 2008



DUBAI WATER CANAL

DUBAI, UNITED ARAB EMIRATES

Project value Over €250 million
Client RTA, Dubai's Roads and Transport Authority
Period 2014 - 2016



Water Intakes

Visit the webpage
www.besix.com/en/activities/marine-works/water-intake

HAMRIYAH POWER & DESALINATION STATION

HAMRIYAH, SHARJAH, UNITED ARAB EMIRATES

Project value Approx. €25 million
Client Sharjah Electricity and Water Authority
Period 2013 - 2014

In order to meet growing market demands and boost capacity, this facility was developed in several phases, boosting the power level (phase I) and introducing 20 MGD reverse osmosis technology in the desalination plant (phase II), which processes incoming seawater. After the removal of the existing breakwater and protective core-locs in front of the temporary cofferdam, we built a new 280 m breakwater to open up the reclaimed land. Precast core-locs (2,000 nos) were transported to the site by barge. In addition to the new basin revetment, the team also installed navigation aids and an oil boom.

The outfall system of nearly 1 km consists of three parts: a reinforced concrete upper channel (16,000 m³, 2,000 tons steel reinforcement); a transition structure using a secant pile wall and an underwater concrete slab; and the lower channel with rock protection along the banks.

A mix of master skills to generate potable water



EL AIN EL SOKHNA THERMAL POWER PLANT

SOKHNA, EGYPT

Project value Approx. €70 million
Client East Delta Electricity Production Company
Period 2012 - 2014



ZUARA WATER INTAKE

WEST OF MELLITAH-ZUARA, LIBYA

Project value Approx. €10 million
Client Sidem for Gecol
Period 2004



Shore Protection



Well-coordinated
marine logistics
in Abu Dhabi

Visit the webpage
www.besix.com/en/activities/marine-works/shore-protection

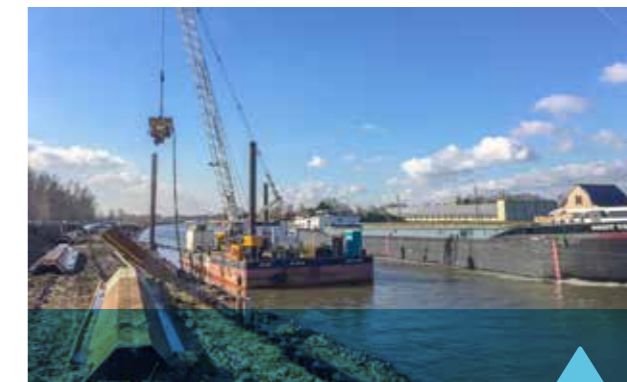
DAS ISLAND ABU DHABI, UNITED ARAB EMIRATES

Project value Over €110 million
Client Hyundai Heavy Industries for ADGAS
Period 2011 - 2012

Used as a location for the production of oil and gas products by the Adgas company, DAS Island was artificially extended in 2011. To complete the task, reinforced concrete blocks were produced, transported and installed by BESIX. Approximately 30,000 concrete armour units were needed to add volume to DAS Island, which required specialised marine transport. Coordinating the transport, unloading and assembling large quantities of water, cement, aggregates and other concrete elements was a challenging undertaking.

BESIX fabricated concrete blocks of various sizes off-site at a production facility in Ajman (UAE). The blocks weighing up to 100 tonnes each were loaded onto barges and transported to the island. As it was operating in a remote location, the BESIX team made sure that enough spare parts were available on site in case of breakdowns, keeping the supply chain running smoothly and completing the project on time.

This project also included the construction of a quay wall and a breakwater.



DYKE REINFORCEMENT KINDERDIJK SCHOONHOVENSEVEER (KIS) ZUID-HOLLAND, THE NETHERLANDS

Project value Approx. €60 million
Client Waterschap Rivierenland
Period 2014 - 2017



NAREEL ISLAND ABU DHABI, UNITED ARAB EMIRATES

Project value Approx. €40 million
Client Aldar Properties PJSC
Period 2008 - 2009



Refurbishment

Demolition and construction amongst the coral

Visit the webpage
www.besix.com/en/activities/marine-works/refurbishment

SOUTH HOOK LNG TERMINAL MILFORD HAVEN, UNITED KINGDOM

Project value Over €250 million
Client CB&I for South Hook LNG Terminal Company
Period 2005 - 2011

The South Hook LNG Terminal project encompassed:

- Refurbishment and retrofit of a 910 m long access jetty (including assessment, repair works, protection and strengthening);
- Demolition of the existing structures of the berthing line including the removal of concrete and steel piles and large concrete structures;
- Construction of a new 200 m jetty extension and a 1 km long double berth.

Some of the main challenges:

- Devising a plan to protect local wildlife (seals, dolphins, porpoises, basking sharks and the occasional whale). This includes "soft starts" before pile driving activities and the presence of competent "mammal observers".
- Concrete repair of old structures, including the removal of unsound concrete up to the exposure of the reinforcement.
- Performing a complex cathodic protection, including the protection of old refurbished concrete structures, old abandoned steel structures and new structures.

The new platforms and dolphins were all fabricated using an optimised precast element layout. This limited the number of manipulations, ensured safe working environments for the workers, and eliminated the need of formwork. This is a typical result of safety-in-design, constructability review conducted at an early stage. It also illustrates the equipment tailor-made design achieved by in-house engineering, optimising the dimensions and weight of the precast elements.



RAS LAFFAN PORT EXPANSION – EPC OF REHABILITATION OF DOLPHINS DOHA, QATAR

Project value Over €30 million
Client Qatargas Operating Co.
Period 2013 - 2014



FIFTH HARBOUR DOCK ANTWERP ANTWERP, BELGIUM

Project value Approx. €20 million
Client Port of Antwerp
Period 2013 - 2016

MARINE EQUIPMENT

Since the acquisition of its first self-elevating platform in 1998, BESIX has continued to increase and modernise its marine construction equipment fleet in order to best suit the requirements of its coastal marine projects.

The overall fleet comprises two 1,100-ton capacity self-elevating platforms fitted with 250-ton cranes, two backhoe dredgers, tugs, multicats and workboats, as well as crane and transport barges.

The fleet is based in and deployed from the marine base in Ajman, UAE, that offers all the required facilities, including a slipway, to properly maintain, repair, prepare and mobilise the vessels.

Thanks to its know-how, its in-house Engineering Department and the variety of its fleet, BESIX is able to offer its clients tailor-made solutions for the construction of coastal marine facilities.



CLIENT CENTRIC ENGINEERING & BIM

At all times our clients and site teams can rely on the expertise and creativity of BESIX's in-house engineering department, with offices in Brussels (Belgium) and Dubai (UAE). Today we have over 150 dedicated people with the right attitude, skills and experience to maximise the value of our projects for and with our clients. We honor the following principles:

- **Expertise** at the service of our client's objectives.
- **First time right.** Preparation and collaboration are key in achieving this.
- **Result oriented.**
- **Agile.** We see flexibility and agility as core competences to create value.
- **Focus on what we do best,** and link to the rest.

By aligning our expertise with client demands, the BESIX Engineering teams have developed centres of excellence, including one dedicated to marine works.

In order to ensure an entire supply chain approach, our teams include architects, MEP engineers, structural and geotechnical engineers, façade and sustainability experts, concrete specialist, BIM managers and BIM experts. Besides its strong commitment to constructability and safety, the BESIX Engineering department can rely on the expertise of an integrated methods and planning department.

By uniting the knowhow of our experts, many of which are also academic authorities in their field, we can offer full-fledged solutions addressing all of our clients expectations and beyond.



BIG IN BIM

Since 2010, BESIX has been embracing the new opportunities BIM (Building Information Modeling) has brought to the construction sector. We have created a strong team which has been involved in more than 70 tenders and projects worldwide.

BIM is currently used to provide visual support during simulations, design development, material approvals, communication with project stakeholders, 3D printing and prototyping, digital mock ups, 3D method statements and 4D construction schedule simulations. It also enhances the quality of quantity take offs, clash detection and resolution, and drawing production. Hence, to us, BIM is much more than a design tool. During the construction, operation and maintenance phases the BIM databases are also game changing when it comes to progress reporting, quality control and asset management.

BESIX's early adopter position and BIM expertise is widely recognised. We are elected as first chairman of the national technical committee on BIM&ICT from the Belgian Building Research Institute, frequently supervise master and doctoral theses, and internships. Since 2014, we also act as invited lecturer at different academic institutions.

Since the end of 2017, BESIX is certified BIM level 2 by meeting the criteria of the PAS 1192-2 standard.

Client centric engineering creates maximum value

VALUE ENGINEERING

BESIX is experienced in providing 'value engineering'. This is a creative and holistic design approach that combines the insights of our multidisciplinary teams, benefiting the entire life cycle of a project. The goal is to reduce costs, risks and prolong a project's life span without compromising the functional objectives. This is how we make a difference for our customers.



BEATRIX LOCK: PUTTING THEORY INTO PRACTICE

On the Beatrix lock project (the Netherlands), virtual reality was used to create an environment which could be visited by maintenance technicians, allowing them to provide their input early on in the design process in order to optimise the maintainability of the lock doors. The VR model was connected to the command and control system, giving the traffic managers of our client a 100% realistic experience of the functionality and UX (user experience) of the future lock.

- Visit the webpage www.besix.com/en/about/in-house-engineering-and-bim



OUR EXPERTS



DESIGN MANAGER
Ensures development of an integrated design



BIM MANAGER
Transforms the project's needs into clear guidelines



GEOTECHNICAL EXPERT
Specifies site investigations, analyzes results and establishes a geotechnical design



PRODUCTION CENTER
Takes care of producing the necessary drawings and models



METHOD & PLANNING ENGINEER
Ensures constructability of our designs in terms of safety and productivity



SUSTAINABILITY EXPERT
Develops concepts and solutions to improve the performance of our projects regarding environmental impact and energy consumption



STRUCTURAL ENGINEER
Is responsible for all engineering aspects



CONCRETE EXPERT
Specifies the requirements of the concrete mix in accordance with the design

INNOVATION

The environment in which we operate is changing faster than ever, and with it our industry. Globalisation, ecological changes, new technologies and new business models are some of the main drivers of this change. To keep up with the pace of expectations of our markets and clients, we are continually looking for new ways to further develop our creative and innovative spirit. BESIX Group employees are given the opportunity to submit their ideas through the 'Unleash' innovation program. In the final stage, the best ideas are presented to the Innovation Board, who selects and rewards the winning ideas.

'Unleash' is not an isolated initiative. BESIX has always been innovative and will continue to promote innovation which can actively help us reach our objectives. But if innovation has often been concentrated internally under the seal of industrial secrecy, today the model is evolving and moving towards more open collaboration and partnerships.

➤ [Visit the webpage](https://www.besix.com/en/about/innovation)
<https://www.besix.com/en/about/innovation>



QUALITY, HEALTH, SAFETY & ENVIRONMENT

We believe in a BESIX Group that operates as one team, focused on sustainable growth and recognising local differences whilst building on Group leverage. This leverage is created as a result of excellent client relationships and added value delivery in existing and new markets. As such we offer a fully integrated solution to our clients, with attention to quality and respecting safety and the environment.

The organisation as a whole and every individual employee in particular plays an important role in guaranteeing an incident free working environment and preventing any adverse impact of the activities on the environment, whilst ensuring the level of quality expected our clients.

BESIX Group's commitment related to Quality, Health & Safety and Environment is set out in the corporate QHSE policy statement which, together with our policies on good governance, form the basis for our Integrated Management system (IMs).

Linked to QHSE, this system is a combination of processes and procedures that describe how BESIX Group implements QHSE in its daily operation, and a number of objectives and targets to ensure continual improvement of our QHSE performance:

- **Quality management**
BESIX Group ensures that its client's needs are assessed and that every employee understands these and is motivated to meet them. Our employees are actively encouraged to look for feedback from both external and internal clients regarding our services, and to strive for continuous improvement.

- **Safeguarding our workers**
Any incident, accident or occupational illness is unacceptable. Being active in a high risk sector such as marine construction is an incentive for BESIX Group to protect employee integrity by managing and mitigating risks in a proactive manner, learning from mishaps and applying best practices in our operations. We expect of all our employees a demonstration of leadership and teamwork with regard to health and safety.
- **Protecting the environment**
Our activities must be undertaken with respect for the environment. Based on an Environmental Impact Assessment, measures are taken to use energy and natural raw resources sparingly, to minimise pollution, to limit the use of hazardous substances and waste generation and to investigate alternatives. Initiatives are taken to re-use and recycle materials and to introduce and apply best practices wherever practicable.
- **Meeting standards**
BESIX Group constantly develops, implements and maintains a documented Integrated Management system that aims to meet the various norms and standards, and will ensure the analysis of the impact of strategic decisions on this system in terms of risk management and compliance management.

↳ [Visit the webpage](http://www.besix.com/en/about/qhse)
www.besix.com/en/about/qhse

CORPORATE SOCIAL RESPONSIBILITY: GIVING BACK

BESIX Group wants to contribute to a safer and greener planet and build a better place in which to live. The goal is to go beyond the legal requirements in the social (People), environmental (Planet) and economic (Growth) areas, and that on a voluntary basis. As a global player the Group integrates the specificities and the environmental requirements of each country while developing its CSR approach.

Our CSR priorities are focused on four pillars:

- **People**
BESIX is committed to guaranteeing the well-being and safety of its employees. At the same time, we endeavor to offer enough career development opportunities and social involvement possibilities.
- **Engineering**
Our engineers strive to create sustainable building solutions.
- **Environment**
We aim to minimise our impact by reducing CO₂ emissions and waste, while attempting to obtain certifications (LEED, BREEAM,...) for our projects.
- **Business Behaviour**
BESIX Group is committed to purchase sustainably and to follow its codes of conduct.

↳ Visit the webpage
<https://www.besix.com/en/about/csr>





Avenue des Communautés 100
1200 Brussels – Belgium

-  www.besix.com
-  marine@besix.com
-  [@BESIX Official](https://twitter.com/BESIXOfficial)
-  www.linkedin.com/company/BESIX
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