

The logo consists of the word "RAMBOLL" in white, uppercase, sans-serif font, centered within a blue rectangular background. The background of the entire page is a low-angle, upward-looking photograph of a complex, white, geometric metal truss structure, likely the interior of a large stadium or arena, with a prominent diagonal beam in the foreground.

RAMBOLL

MIDDLE EAST COMPANY PROFILE

**WE DESIGN  
A BETTER FUTURE**

# CONTENTS

WHO WE ARE  
MARKETS  
BUILDINGS  
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We are **engineers, scientists** and **consultants** who believe in the power of design to **create a better future**.

Our design philosophy is to always make room for the **human experience**. Ultimately, we measure our success by how well people and communities are served by what we have done.

At its best, **good design** can regenerate communities, protect natural environments, and connect people across vast distances; it can provide new energy solutions and **create buildings that people are happy to be in**. Good design is also robust and long-lasting.

We share this design approach with the world's leading architects and developers – with whom we regularly collaborate, often as a preferred partner.

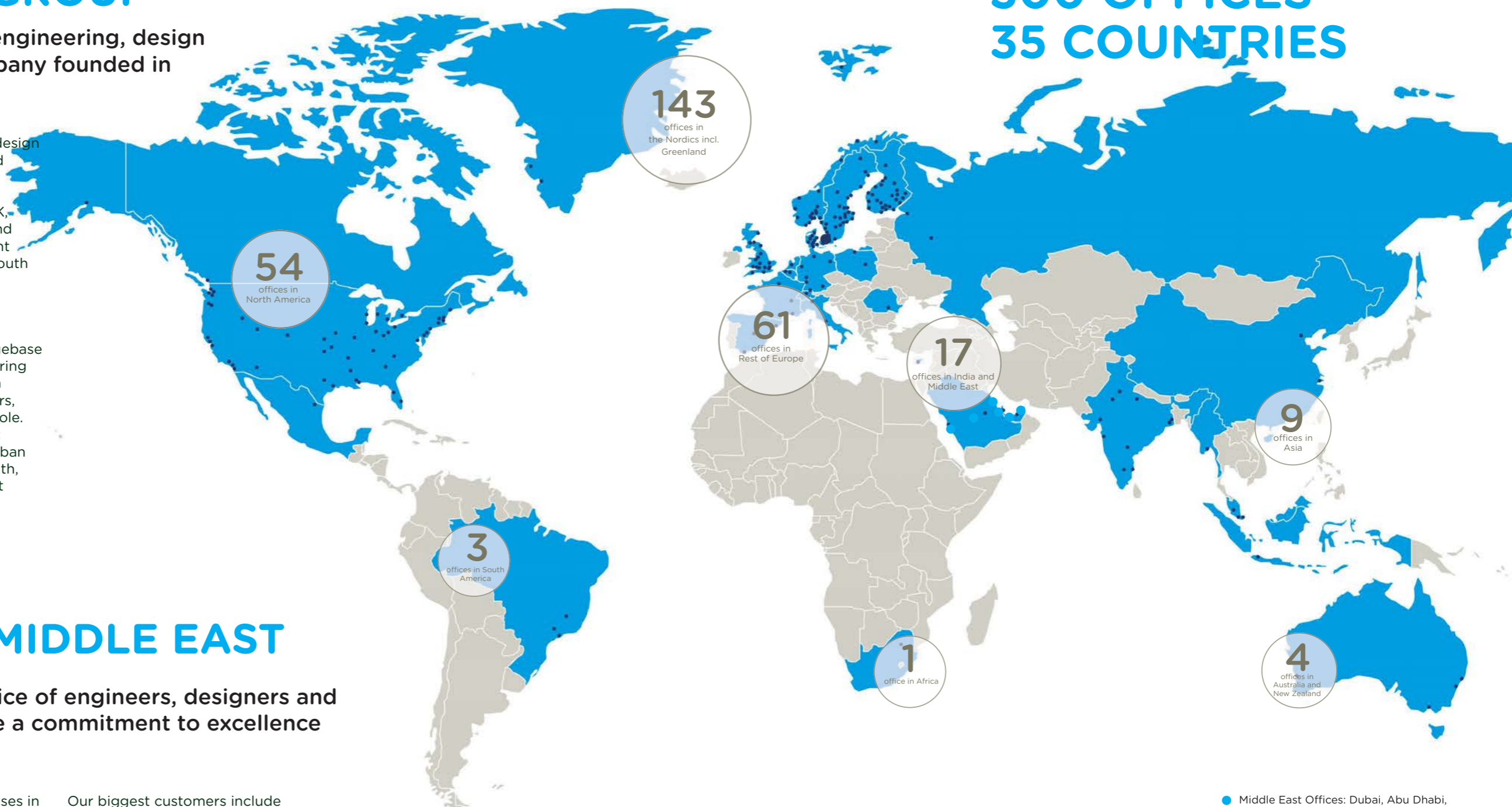
# RAMBOLL GROUP

Ramboll is a leading engineering, design and consultancy company founded in Denmark in 1945.

Ramboll is a leading engineering, design and consultancy company founded in Denmark in 1945. The company employs close to 13,000 experts in the Nordics, North America, the UK, Continental Europe, Middle East and India, supplemented by a significant representation in Asia, Australia, South America and Sub-Saharan Africa.

With more than 300 offices in 35 countries, Ramboll combines local experience with a global knowledgebase constantly striving to achieve inspiring and exacting solutions that make a genuine difference to our customers, the end-users, and society as a whole. Ramboll works across the markets: Buildings, Transport, Planning & Urban Design, Water, Environment & Health, Energy, Oil & Gas and Management Consulting.

**13,000 EXPERTS**  
**300 OFFICES**  
**35 COUNTRIES**



# RAMBOLL MIDDLE EAST

We are a global practice of engineers, designers and consultants who share a commitment to excellence in everything we do.

Ramboll in the Middle East specialises in structural engineering, building services, sustainability and environmental services, transport services and oil & gas services. We have five offices located in Dubai; Abu Dhabi; Doha, Qatar; Jeddah and Riyadh, Kingdom of Saudi Arabia.

Our biggest customers include Presidency for Meteorology and Environment (Saudi Arabia), Qatar Foundation/Mshereib Properties (Qatar), Government of Fujairah (UAE), Damac Properties (UAE) and Al Naboodah National Contracting Group (UAE).

With nearly 450 international experts in the Middle East, Ramboll is regarded as one of the key players in the region. With a thorough understanding of regulatory frameworks both locally and globally we are able to provide clients with complete, integrated and multi-disciplinary solutions.

● Middle East Offices: Dubai, Abu Dhabi, Fujairah - UAE, Doha - Qatar, Riyadh, Jeddah - KSA

## FACTS

### MISSION

Through the inherent ability of our people, our decency and exacting business principles and values, Ramboll strives to create solutions to our customers that balance human and commercial needs and are genuinely insightful and progressive.

### VISION

Ramboll is committed to helping create inspirational and longstanding solutions that allow people and nature to flourish.

### OWNERSHIP

The Ramboll Foundation is the main owner (97%) of Ramboll Group A/S. The remainder of the company is owned by Ramboll employees.

### HEAD OFFICE

Ramboll's Group Management and head office are located in Copenhagen, Denmark.

### REVENUE

Ramboll Group 2014 revenue was EUR 1.1 billion.

### GEOGRAPHICAL SPREAD

The Nordic market is considered Ramboll's home market and includes Denmark, Sweden, Norway, and Finland. We also have a strong presence in the UK, India and the Middle East.

### RAMBOLL PROJECTS PER YEAR

Ramboll participates in approximately 40,000 projects per year.

### STRONG CUSTOMER RELATIONSHIPS

We have worked with each of our top ten customers for an average of 50 years.

### VALUES

- Insight
- Integrity
- Empathy
- Enjoyment
- Empowerment

‘AN INSPIRED ENGINEERING SOLUTION IS NOT WHEN THERE IS NOTHING LEFT TO ADD BUT WHEN THERE IS NOTHING LEFT TO TAKE AWAY.’

## BUILDINGS

Ramboll has worked on some of the most recognisable buildings in the Middle East and abroad.

From the iconic Shining Towers to the massive Ferrari World Theme Park, the new Cleveland Clinic to the exclusive Yas and Rotana Hotels: our engineers have made their mark on some of the most forward-thinking buildings in the world today.

We offer a **full range of engineering services** from structural, façade and fire engineering to building services, geotechnical, infrastructure and acoustics. Central to our approach is the return to first principles on each and every design problem we face. We test and re-test our assumptions, constantly challenging ourselves to create more relevant designs that serve our clients and their communities well.

We aim to **integrate our designs** across disciplines from an early stage. Our work on the Ferrari World Theme Park in Abu Dhabi is a good example of this. The Theme Park project was driven by its fast track design and construction programme. Using our network of teams and offices in both the UK and UAE, we developed a flexible approach to the engineering that enabled us to meet the programme level, where the Ferrari-themed attractions are located. Columns are set matching the challenges. Under the roof, we engineered three concrete frame levels; the undercroft at ground level, a mezzanine and the plaza piling grid below. This supporting structure takes the weight of the 19 separate steel frame buildings that house the rides.

Our building services engineers worked with both the shell and core and theme park architects to ensure that all the systems could function together for different purposes, from the strict tolerance demand on electrical supply for rides to providing comfortable conditions for attractions and large value circulation areas.

One roller coaster is F1-style and uses a winch to slingshot the cars similar to craft launch systems. The second is GT-style. Each coaster has a steel and concrete framed station building consisting of an observation deck, load/unload platform, queue corridor, maintenance structure and overhead gantry crane. Ramboll designed the coaster foundations and buildings, integrated services and high voltage design, and the perimeter and maintenance roads.

At a time when the construction industry was facing immense challenges, we brought an **enthusiasm for the pure invention of engineering** coupled with a long-standing reputation for unlocking project potential.

### OUR SERVICES

- Acoustics
- Building physics
- Building services
- Digital design
- Electrical engineering
- Facade engineering
- Facilities management
- Fire & safety
- Ground engineering
- Lighting design
- Mechanical engineering
- Project management
- Refurbishment
- Structural engineering
- Survey
- Sustainability services
- Technical due diligence

### FACTS

**REVENUE IN 2015**  
409 million EUR

**NUMBER OF EMPLOYEES**  
3,600 worldwide

**GEOGRAPHICAL SPREAD**  
More than 100 offices in 10 countries

**RANKINGS**  
Ramboll is among the top three buildings designers in Europe (source: ENR)

**OUR CUSTOMERS**  
Our customers include leading architects, developers, contractors, building owners, private corporations, universities, government institutions (incl. health and culture), and municipalities.

# BUILDINGS SPECIALISM

## Acoustics

Ramboll specialises in architectural acoustics, environmental acoustics, noise control, acoustic modelling and vibration isolation. We operate in a wide range of sectors including education, culture, healthcare, transport, environment, public buildings and commercial developments. We are pioneers in acoustic modelling and encourage clients to listen to aural demonstrations to experience their project during the design process, be it a railway station or an opera house. Ramboll core expertise include acoustics for performing arts, architectural acoustics, building acoustics, environmental acoustics, noise control, vibration control, acoustic modelling.

## Building Information Modelling (BIM)

We are at the forefront of digital design, offering the most advanced intelligence in computational analysis, laser aided modelling and BIM. We are skilled at applying advanced computational analysis to the design of structures, delivering value beyond what would have been possible using traditional engineering techniques. Recently we pioneered the integrated use of laser scanning with other modelling techniques within the BIM environment. Ramboll's HQ building in Copenhagen is a standout BIM project, where the use of a single integrated model produced major energy savings and cost benefits.

## Façade Engineering

Our façades team combines experience from architectural, structural engineering and high-rise façade construction fields. With expert knowledge of the complex methods and techniques our façades team understands the implications of different façade solutions in terms of geometry, structural adequacy, performance, energy efficiency, procurement, program and whole life costing. We design elegant, fully integrated building envelopes: a major element that often accounts for over 25% of the construction budget. We assist developers, architects and contractors and drive efficiency by constantly appraising and incorporating the optimal design, latest research and most suitable technology. We specialize in high rise design, climate adaptive design (cold and hot climate), international codes, advice on international suppliers and procurement routes.



## Fire & Life Safety

Fire engineering can start with either the codes or with the design. With a codes-driven approach one should expect to compromise elements of the architectural vision in making the design code compliant. With a design approach, which is our approach, fire engineers give themselves the far more difficult task of protecting the vision by creating a bespoke strategy through fire engineering. It is a scientific approach that uses the statistics of real fires, calculation tools and studies of human behaviour. This preserves the architectural design and provides value by reducing over-specification caused by conservative codes and allows the fire protection to be deployed where the risk is.



## MEP & Sustainability

Our MEP engineers work with their building physics colleagues to produce efficient, comfortable buildings in which structure and systems seemingly interface. We design energy-efficient and water conserving solutions for: speculative office developments, educational and research buildings, housing, healthcare projects, arts and leisure projects, public sector buildings. Our MEP design engineers work in a fully integrated manner with the entire design team to ensure all discipline requirements are satisfied with a tremendous focus towards energy and water conservation within the built environment. Our design selection process and working philosophy are continually striving for the most creative sustainable cost effective solutions. We set and meet stringent targets for energy use, CO<sub>2</sub> emissions and consistently outperform current international standards in these areas. Our team is very highly qualified with chartered and professional engineers recognized by CIBSE and ASHRAE. We also have a vast array of qualified staff to deliver building rating system requirements such as LEED, Estidama, GSAS and BREEAM.

## Project Management

Successful construction projects depend on the swift resolution of numerous challenges. Often, such projects require contact with the owners and end users of the properties concerned, as well as with public authorities, planners and contractors. We supply project and construction management services for all types of building, industrial and civil engineering projects.

## Structural Engineering

Structural engineering means more than transferring loads from a building's structure to its foundations. Structural engineering has always been at the core of our strength and success. We strive to achieve a balanced design by adopting a holistic approach right from the feasibility studies deep down to the detailed design and project supervision stages. We use state-of-the-art technology and software to ensure a reliable, robust and yet economical design. We seek value engineering through any aspects of design, from the soil-structure interaction and site-specific hazard studies down to element design. We can also provide Performance-Based Design in our structural solutions.

# RAMBOLL PROJECTS ON YAS ISLAND, ABU DHABI

## 01 FERRARI WORLD

Multi-disciplinary services

## 02 YAS LINKS ACCESS ROADS

Infrastructure and site supervision.

## 03 YAS LINKS

Infrastructure and water resource management for golf course

## 04 YAS ROTANA HOTEL

Facade engineering

## 05 YAS CENTRO HOTEL

Facade engineering

## 06 YAS MARINA

Design of access roads



## DOHA MARINA MALL

Provision of engineering services for retail and leisure facility

The Doha Marina Mall is a 180,000 sqm retail and leisure facility that includes over 70,000 sqm leasable retail space over three main levels, a hypermarket, cinema and family entertainment centre. The project is aiming for 5 star under QSAS, Qatar's sustainability rating tool. As Lead Structural Consultant for the project, Ramboll is providing multidisciplinary services including structural engineering, MEP, infrastructure, fire & life safety, façade maintenance, transport planning, waste management and acoustics. To integrate all engineering services precisely within the structure, BIM was embraced by the Project Team to deliver a 3D solution using REVIT.



## SHARJAH CITY CENTRE

Expansion and refurbishment of the Majid Al Futtaim owned Sharjah City Centre mall to include additional retail units, car parking and a 12 screen cinema complex

Ramboll was selected by Majid Al Futtaim (MAF) to provide full structural engineering design and supervision consulting services for the existing mall expansion and refurbishment. The expansion builds over the existing at-grade car park immediately adjacent to the present Sharjah City Centre Mall and comprised a two storey structure incorporating retail and a cinema complex and an adjoining three level car parking structure.



## YAS ROTANA & CENTRO HOTELS

Our engineers designed two façades within a tight schedule and to exacting specifications

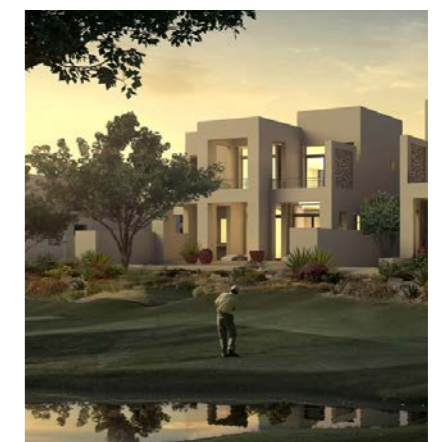
Part of the cluster of seven hotels next to the race track, the Yas Rotana and Centro hotels provided a total of 567 rooms in time for guests at the first Abu Dhabi F1 Grand Prix, reaching 100% occupancy rates over the weekend. Our team worked on the project from June 2007, assisting the architect with fast track system design specifications, façade details and overseeing the contractor's work on site, until final inspection in November 2009. The design had to work in the local climate and we used materials that could be sourced within the timetable, a challenging task when added together.



## GOLF COURSE COMMUNITY

124 hectare multi-use development in Doha, Qatar

The development is envisioned as a low rise, community with a mix of villas and townhouses integrated with the main 18-hole golf course and its facilities such as the golf academy, a training 9-hole golf course, a club house, tennis courts and swimming pools. Ramboll is providing multi-disciplinary services to develop a low rise, low/medium density, gated and fenced community incorporating the following objectives: The design of the golf course and academy will be in line with PGA standards and USGA design guidelines; Design of all buildings will be fulfilling LEED/Sustainability certification requirements; The development should represent international best practice and enable the staging of international golf tournaments; Implementation of sustainable solutions where possible.



# SHINING TOWERS

## Multidisciplinary award-winning project

Ramboll completed the Shining Towers project in 2012. The project comprised of two towers of 33 and 42 storeys respectively, and won the GCC tower of the year at the 2010 Construction Week Awards.

The concept of the project is based on a pair of dancers moving together without touching, and therefore they appear to lean in different directions. The curved residential tower and leaning effect of the office tower provided us with considerable structural design challenges, with slab thicknesses varying to accommodate bending and shear forces on varying spans.

In addition, the Ramboll façade team faced considerable design challenges on this project, and through independent research and development the team designed and engineered a 'cold bent' façade, where a typical flat curtain wall is bent post production to conform to the inclined and twisting façade. This

solution eliminated the need for costly glazing curved in two directions.

The bespoke curtain wall system is capable of accommodating high wind loads, as well as accommodating very high floor to floor heights in the podium. Additional reinforcements are hidden within the system, allowing the office tower and the podium to utilize the same system for cost efficiency and visual consistency.

This project showcases Ramboll's progressive multidisciplinary engineering capabilities where we have implemented highly innovative solutions to facilitate a complex architectural structure.

*"From a supervisory perspective, James Cubitt & Partners worked very closely with Ramboll on the Shining Towers project. The project was delivered successfully and enabled Ramboll to showcase their ability to deliver innovative and complex solutions. Ramboll's highly skilled team provided multi-disciplinary services to execute this project and their engineering expertise was evident in their response to the numerous structural challenges we faced." Marcin Kowalski, Senior Site Architect, James Cubitt & Partners*

### LOCATION

Abu Dhabi

### CLIENT

Foresight

### ARCHITECT

Aedas / H+H

### PERIOD

October 2012

### ENGINEERING SERVICES

Structural engineering  
Building services  
Façade engineering  
Fire & life safety  
Site Supervision



## THE CHANGE INITIATIVE

Commercial establishment in Dubai achieved the highest LEED Platinum rating in the world from the US Green Building Council

Securing 107 out of 110 available credits has made the Change Initiative building the most sustainable building globally under the LEED Commercial Interiors (LEED CI) rating system. The Change Initiative is a non-profit organisation that provides environmentally healthy solutions and products, and has incorporated environmental considerations into all aspects of their 4,000 sqm head office, from the roofing and energy-efficient lighting to the water system. Ramboll was appointed to offer mechanical, electrical, plumbing and LEED services via sub consultancy agreements through HOK, the lead architect and consultant on the project.



## SANCTUARY FALLS

Teamworking is essential to this luxury 99-villa community as we ensure all contractor and interior design requirements are met

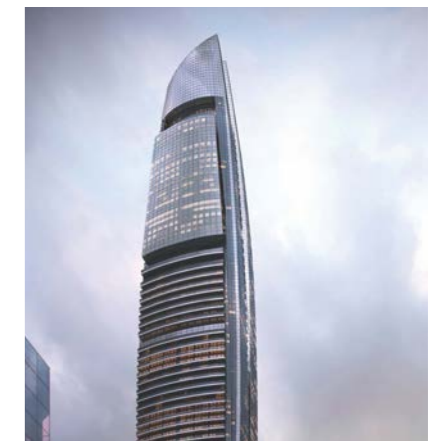
Sanctuary Falls is a community of 99 exclusive 5 and 6-bedroom villas. Ramboll is providing building services engineering for the development. In all there are nine individual villa designs in the complex, plus mirrored versions of each. Ensuring cost-effective design with so many different layouts has proved a significant challenge for our engineers. Taking on the design of the villas from a previous consultant, our team is value engineering the designs, whilst also ensuring authority approval is secured.



## DAMAC HEIGHTS

Two undulating, curved buildings on a small plot provided challenges for all of our disciplines

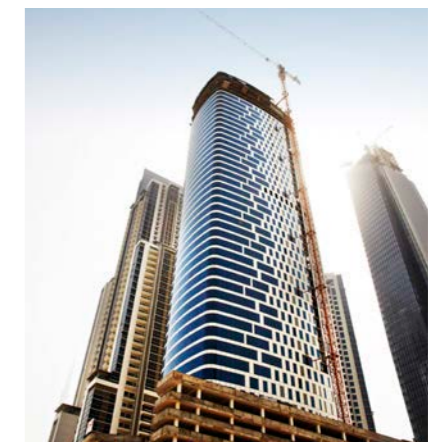
As seen from the sea, this eye-catching superstructure is curved between the base and tip: narrowing at both ends like a banana. We are the lead consultants on this project to construct a supertall tower directly on Dubai Marina, just 5m from the quay wall. The frame has concrete on the lower levels, with steel framed storeys above — a combination that meets both structural and budgetary requirements. As a further aesthetic feature, a tall steel mast is fixed to the highest point of the building. Given the structural implications of the innovative architectural form, we implemented a particularly rigorous programme of modelling and peer review to test the building's behaviour now and in the future.



## BAYGATE TOWERS

55-storey office tower with complex curved roof structure

Sitting at the Sheikh Zayed Road entrance to Dubai's Business Bay, this 55-storey office tower has been planned as the perfect skyscraper. Ramboll was the lead consultant for this project. Our structural engineers designed the building with a concrete structure and post-tensioned floor slabs, identified as being the most cost effective solution. The curved and tapered roof structure, crowning a large rooftop atrium, was designed in steel to maintain the architect's vision. Our building services engineers provided a central cooling system for internal temperature control. By enabling us to locate the plant off site, this solution maximizes the lettable space available.



# KHALIFA UNIVERSITY EXTENSION PHASE 1

Multidisciplinary services for 120,000 sqm extension

The Khalifa University Extension Phase 1 Project will add an additional area of 120,000 sqm to the existing 34,500 sqm campus.

The University will serve a total of 3,000 students and 762 faculty and staff, when completed. The new campus will include Abu Dhabi's first Medical School, an integrated Engineering College and Research & Development Facilities.

This new extension will also provide students with world-class facilities like an Auditorium, Students Centre and Sports Centre. The University intends to enlarge their current Discovery Centre to 2,000 sqm to encourage public involvement in Science & Technology.

Ramboll Middle East is providing the following services: civil engineering, structural engineering, geotechnical engineering, infrastructure, MEP, façades, sustainability, waste management, environmental, traffic and local consultancy.

## LOCATION

Abu Dhabi, UAE

## CLIENT

Khalifa University

## ARCHITECT

RSP Architects

## ENGINEERING SERVICES

- Structural engineering
- MEP
- Façades
- Sustainability
- Fire & life safety
- Geotechnical engineering
- Infrastructure
- Civil engineering
- Waste management
- Environmental
- Traffic
- Local consultancy



KHALIFA UNIVERSITY

Image courtesy of RSP Architects



## DUBAI MARINA PLOT 5JJ

Dubai Marina 5JJ plot is located at the south western tip of the Dubai Marina District and is currently being used as a boat maintenance facility

The project consists of an area of 12,578 sqm. Emaar appointed M/s Dewan to develop the scheme design of a twin tower development on the plot. The two towers comprising of residential apartments above level 5 with five common levels of combined podium. Each tower has a MEP floor located at level 24. Ramboll appointed by Dewan to provide structural engineering services up to end of schematic stage and also to develop a concept design that meets the applicable fire and life safety requirements while maintaining the architect's vision.



## U-BORA TOWERS

Mixed use project offers 56-storey commercial tower, a 16-storey residential block and a 7,000 sqm retail space on Business Bay

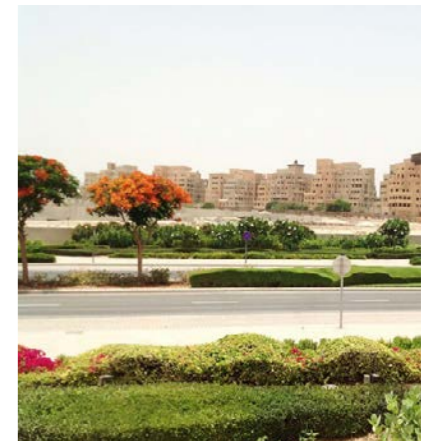
Ramboll was appointed as the structural, building services, and fire & safety engineers. The residential building has a sweeping roof, starting from the 12th storey close to the tower, moving up to the 16th storey, minimizing the water-facing accommodation and retail space. The design of the commercial tower, with the floor area increasing as you move up through the building, is again designed to maximise prime space. 70% of the main tower's 80,000 sqm sits in the top half of the building, looking out over the lake at Business Bay. Ramboll's structural engineering experts ensured the stability for this design through the core walls along with inclined columns and beams to resist the lateral load.



## AL BADIA HEIGHTS

Masterplanning development with luxury villas and high-end apartments

The Masterplan for the Al Badia scheme is a mix of apartments, townhouses and villas in a complimentary style that has its own identity and soul, taking maximum advantage of the man-made contours and views that these afford. The design needs to reflect the market and create a portfolio of luxury villas and apartments that take maximum advantage of the setting, overlooking a Championship Golf Course. Ramboll provided services in infrastructure, transportation and highway engineering.



## CLEVELAND CLINIC

Cleveland Clinic, Abu Dhabi is the future of healthcare in the Middle East

This 7-star, state-of-the-art, 22-storey facility promises to set the benchmark in this sector for years to come and in the UAE such a beacon of progress deserves to be eye catching. We were commissioned to check the engineering of the façade systems, including complex double skin arrangements, glass fin walls, skylights etc. As is often the case in a project of this scale, with a rapid building schedule, the design remit evolved. Flexibility and the ability to respond intelligently and intuitively to design challenges have long been by-words of the Ramboll brand. waste management.





'WE CAN DESIGN ON ANY SCALE,  
FROM A SMALL FOOTBRIDGE TO  
A NEW CITY FOR HALF A MILLION PEOPLE.'

## TRANSPORT

Ramboll is associated with some of the most respected, fully integrated infrastructure and transportation projects in the world.

Scotland's Queensferry Crossing (Forth Replacement Crossing), the Fehmarn Belt Tunnel linking Denmark to Germany, St. Petersburg's Pulkovo Airport — Ramboll's recent list of transport projects includes some of the **biggest, most challenging schemes** currently being developed. With a rich history in delivering complex infrastructure schemes, we are well placed to advise clients on all aspects of a development, from feasibility and planning to construction and long-term maintenance.

We have engineered highways, ports, railways, bridges and airports all over the world. **Our projects have set records** (the Øresund Crossing: the longest road and rail bridge in Europe; the Fehmarn Belt: the longest submerged tunnel in the world). We have also bridged vast distances, supported the growth of sustainable communities, and created iconic structures.

Whilst we have the broad expertise necessary to plan and design projects at the mega-scale, **attention to detail** is central to our ethos. Ramboll can offer the client a complete service from concept design to asset management.

The majority of our projects in the Middle East are multidisciplinary. During the design phase of the Yas Island Development in Abu Dhabi, we demonstrated our capability to deliver innovative design solutions. Not only for the iconic Ferrari building, but for the other elements of the built environment, such as Yas Links Golf Course and the highway to Yas Marina.

The specific areas of design carried out by our local Transport team within the Yas Island Development included highway design – geometric design, pavement, lighting, road signs and lines, storm water drainage and safety barriers, and design of utilities – potable water, sewerage, district cooling, power and gas. Our local teams in the UAE were able to demonstrate the capability to deliver multidisciplinary value engineered design solutions linking all elements of this world class development.

In addition to the above, our Transport team also provided geotechnical expertise relating to the design of dewatering solutions and foundations for structures and road pavement designs.

At Ramboll, we are able to provide our customers with a unique combination of wide ranging services, a holistic business approach, and global knowledge and experience coupled with a local presence. Our spearhead services within Transport include aviation, roads & highways, bridges, ports, rail, tunnels, master planning, landscape architecture, transport planning and traffic engineering, ground engineering and infrastructure asset management.

### OUR SERVICES

- Acoustics & noise
- Aviation
- Bridge engineering
- Ground engineering
- Infrastructure Asset Management
- Landscape architecture
- Masterplanning & urban development
- Ports & marine structures
- Project & construction management
- Rail engineering
- Road & highway engineering
- Transport planning, traffic engineering and traffic safety
- Tunnel engineering

### FACTS

**REVENUE IN 2015**  
323 million EUR

**NUMBER OF EMPLOYEES**  
2,926 worldwide

**RANKINGS**  
We rank as no. 14 over global transportation consultancies (source: ENR 2015)

**OUR CUSTOMERS**  
Our customers range from public authorities at the national, regional and municipal levels, to contractors, investors, transport operators, and other private companies.

# TRANSPORT SPECIALISM

## Masterplanning and Urban Development

Our in-house services for Masterplanning are supported by our Buildings, Transport, Energy and Environmental departments as the project brief requires. A team of dedicated specialists with an appropriate mix of skills and experience from each Ramboll discipline is selected for each project opportunity. The team is led by an experienced project manager who acts as a primary point of contact, organising overall project coordination and communication. Our Masterplanning team has extensive experience working as a lead consultant (coordinating a range of internal Ramboll disciplines) as well as operating in a support role with external design consultants.

## Transport Planning

Ramboll Middle East benefits from a local team of specialist transport planners and engineers, with exceptional experience of the interaction of land-use and transportation systems. Our transport planning team works to maximize the efficiency of movement and accessibility of people and goods within the built environment, making the best use of available resources and opportunities for sustainable development. We deliver a range of services under Transport Planning, including transport modelling, walking/cycling studies, development planning and design services, public transport, Transport Master Plans and Traffic Impact Studies, and parking design and analysis amongst others.

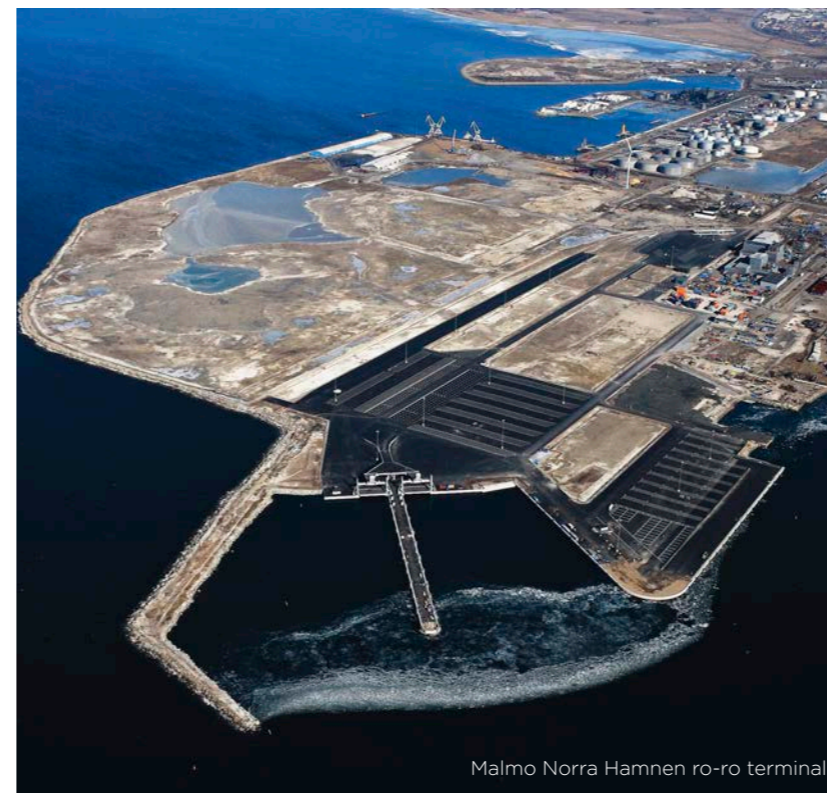
## Roads & Highways

Ramboll has the in-house expertise to undertake geometric and pavement design for all types of road networks including streets, collector roads, arterials and expressways. Ramboll uses the latest version of geometric design and analysis software to undertake road projects in compliance with international standards. Our road consultancy team delivers services which includes design of new highway and street networks, strengthening and rehabilitation of existing road networks in all types of terrain, design of complex multi-level interchanges, roundabouts, grade separators, tunnels and viaducts, grading and balancing of site earthworks (cut & fill) pavement design and road safety audits.



## Utilities

In delivering infrastructure projects, Ramboll uses various software packages including WaterCAD for all pressurized potable water, irrigation, firefighting and sewerage networks and spreadsheets developed in-house to design gravity sewerage and storm drainage networks. MicroDrainage and MIKE are also used where the design of more complex gravity networks are required. Our utility consultancy services include sewerage networks, storm water drainage, potable water systems, firefighting networks, irrigation systems, street lighting, power (HV, LV, ELV) networks, district cooling systems and telecoms (civil works).



## Ground Engineering

Within the Transport team are a dedicated team of geotechnical engineers and geologists, providing expertise in; Seismic Analysis, Rock Mechanics, Soil-Structure Analysis, 2-D and 3-D finite element modelling, Geotechnical Design including; Deep Excavation & Dewatering, Retaining Walls, Earthworks, Pavements, Foundations, Reinforced Earth, Soil Nailing and Anchors, Slope Stability, Risk Assessments, Site Investigation Design & Management, and associated Reporting.

## Ports & Marine Structures

Ramboll's world leading ports and maritime expertise are well represented within the Middle East offices, with extensive experience locally based and a strong group of European expertise to call upon as required. Whether working with existing assets or developing a greenfield site the team are able to assist Client's in all stages, from the earliest concept work through to detailed design and site supervision. Additionally our extensive experience of working with Design & Build Contractors means we are well placed to add value through economic and robust design solutions are implemented to the satisfaction of all parties.

## Aviation

Ramboll has extensive experience in the delivery of airport infrastructures, evident of the 200 completed projects worldwide. We are known for producing innovative airfield designs that deliver long term performance and safety at a reasonable cost. Our solutions often combine a minimised and highly targeted airside engineering programme with a rigorous monitoring regime to ensure consistent performance over time. This streamlined approach ensures solutions are never over-engineered, keeping materials use and capital cost to a minimum.

## Rail Engineering

Ramboll provides professional consultancy services within railways and other public transport - including a complete range of rail-based systems, from high-speed railways to transport systems.

# FUJAIRAH 2040 FRAMEWORK PLAN

With a coastline on the Gulf of Oman, Fujairah is a gateway to the Indian Ocean and a place of significant geopolitical importance for the region. Coupled with far reaching strategic opportunity and a range of internal development and growth pressures, the Emirate is proactively seeking to develop and implement a strategic direction that considers the Emirate's potential economic, environmental and development needs beyond 2040.

Ramboll has been commissioned by the Government of Fujairah to develop an Emirate wide Framework Plan for Fujairah - one of seven Emirates making up the United Arab Emirates (UAE). The Framework Plan for the Emirate - 'Fujairah 2040' will present the strategic direction for an integrated sustainable growth encompassing the realms of economic, social, urban, rural, infrastructure, environment, cultural heritage and sustainability in the local and regional context. Ultimately, Fujairah 2040 will enable the Government of Fujairah to successfully deliver and implement a vision for the future.

## Fujairah 2040 Local Area Planning

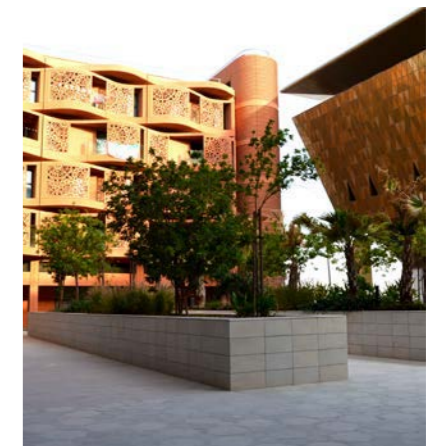
As part of the Fujairah 2040 Framework Plan, four settlements were selected for a Local Area Plans (LAP) including Tawian and Qidfa-Murbah under Fujairah Municipality and Dhadna and Al Bidiya under Dibba Municipality. These LAPs were established in order to structure, guide and recommend future development and growth patterns.

Extensive community workshops took place within each local area to guide the LAPs, to gain insight and consult local residents on what and how they would like to see their communities developed and enhanced. This is a first for the UAE and a great success in ensuring future proposals and recommendations keep local residents at the forefront of local plans.

## MASDAR ABU DHABI MASTERPLANNING

Building the world's most sustainable community

The project's goal is to deliver an overall landscape plan and conceptual landscape design for Masdar City's public realm, and establish a city-wide guidance for the design, selection and assessment of landscape elements. The Masdar City Landscape Plan and Conceptual Design is a significant project for Ramboll in the Middle East, and is being undertaken by Ramboll Middle East's inter-disciplinary Master Planning team and Atelier Dreiseitl. The two teams have a common goal of creating forward-thinking, innovative designs coupled with precise engineering to meet our client's vision to "build the world's most sustainable city".



## SHEIKH ZAYED NATIONAL MUSEUM

The Zayed National Museum is a unique project with an innovative, culturally sensitive landscape theme. In his lifetime, Sheikh Zayed cared deeply about the environment of the Emirates

This national legacy is the inspiration behind the sustainable landscapes designed on and around the new Zayed National Museum building. The spacious galleries of the Museum create a raised mound from which 5 towers protrude like the wings of the desert falcons. A naturalistic landscape garden wraps around the museum building. This challenging environment is essentially a steep, green roof where bio-engineering and water-wise irrigation are essential in the tough, xero-tropical climate and where the interface with the museum logistics and security requirements are complex. This project was carried out by Atelier Dreiseitl, a Ramboll company.



## MIXED USE COMMERCIAL ZONE IN EDUCATION CITY, DOHA, QATAR

This site, located within the heart of an existing Education and Recreation based master plan at Education City, aspires to create a mixed-use development that actively engages adjoining land parcels of the overall master plan

Ramboll provided specialist Transport Planning input to HOK to assist in development of various Master Plan options for the site. These included considerations for internal road planning, assessment of trip and parking loads, connectivity to adjoining roads and master plans, internal provisions for pedestrians and cyclists, and proposals for the master plan's road hierarchy.



## KING ABDULLAH MEDICAL CITY, JEDDAH, KINGDOM OF SAUDI ARABIA

Transportation planning consultancy services for a medical city near Makkah, Kingdom of Saudi Arabia

King Abdullah Medical City is proposed on a sprawling area covering more than 3.5 million sqm in the Shumaisi area, along the highway between Jeddah and Makkah. The medical city is being developed to the world's highest standards with state-of-art facilities being provided to satisfy local and regional needs. Ramboll provided specialist Transport Planning and Traffic Engineering input to development of the project master plan, which included design of parking facilities in excess of 7,000 spaces, internal road planning, modelling analysis and traffic management plans.



# RAS LAFFAN PORT EXPANSION

## Front End Engineering Design (FEED) for Port and Berth Infrastructure, Phase 2

Ramboll was appointed by Qatar Petroleum (QP) for providing multidisciplinary services for the Front End Engineering Design (FEED) to prepare tender documents for an Engineering, Procurement, Installation and Commissioning contract (EPIC 3) for Phase 2 of the Ras Laffan Port Expansion Project. The existing port, built in 1996 and expanded in 2012, is being further developed to handle larger export volumes of liquid hydrocarbon products and containerized solid petrochemical products. The overall intent of project is the development of the Container Yard facilities including equipment and associated facilities, and expands the existing facilities by two liquid product berths.

The Ramboll FEED provided multidisciplinary services for the design of the container yard, including all container terminal equipment, container management system, buildings and substations, access road to buildings,

water and drainage, parking, power supply including area lighting, communication and security systems. The design for two additional small tanker berths were also carried out, including design for land reclamation works, mooring dolphins, quay walls, metering platforms, pipe racks, berth furnishings, oil spill containment equipment, deluge systems and road and drainage infrastructure.

The FEED also included two 50m tall Leading light towers for the south channel of the port to facilitate vessel navigation into the port, one is offshore and another on reclaimed land. In addition to the core deliverables, Ramboll provided designs for ancillary items including port operation building, common facilities for existing berths, car parking canopies, fuel stations, guard houses, installation of isolation valves on the existing potable water line, etc.

### LOCATION

Ras Laffan Industrial City, Qatar

### CLIENT

Qatar Petroleum (QP)

### SUB-CONSULTANTS

EPL, SKM, 3D Reid, TEP

### PERIOD

2012-2013

### ENGINEERING SERVICES

Architecture  
Building services  
Civil & Infrastructure  
Electrical  
Environment  
Geotechnical  
Ground engineering  
Instrumentation & Control  
Loss Prevention  
Marine  
Piping  
Process  
Structural  
Telecoms and Security



## DAS ISLAND LAND ALLOCATION AND RE-ZONING STUDY

Das Island (Abu Dhabi) is co-owned by ADMA-OPCO & ADGAS and caters the receiving and off-loading facilities for crude oil & LNG

Ramboll was appointed by ADMA-OPCO (Abu Dhabi Marine Operating Company) to provide integrated master planning services for Das Island – a strategic oil and gas infrastructure facility for UAE. With the key objective of maximizing land area for future industrial developments and increasing operational efficiency, the master planning services included a detailed review of all non-industrial facilities, future industrial and non-industrial expansion requirements, safety studies and development of re-zoning options over short, medium and long term periods.

## SHIPYARD EXPANSION AT KING FAISAL NAVAL

Extension of Shipyard at King Faisal Naval Base, Jeddah

The project is part of the fleet extension program of the Saudi Navy and is being managed by one of the largest defense contractors from France. Ramboll's client has been appointed by the defense contractor to provide the building and infrastructure support for the fleet extension program. The project consists of refurbishment of the existing quay wall, construction of new mooring dolphins and working platform, floating dry docks, workshops, warehouses, office building, desalination plant, waste treatment plant and service buildings. Ramboll will also design the infrastructural works such as roads, wet utilities and electrical networks.

## AL MARYAH ISLAND

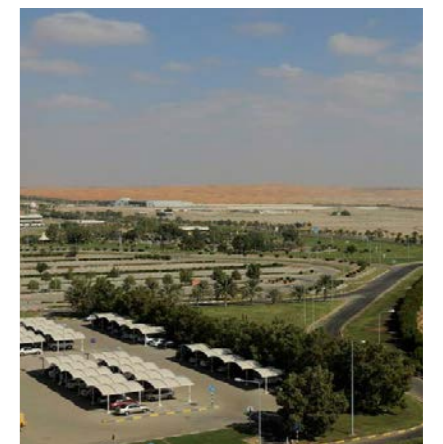
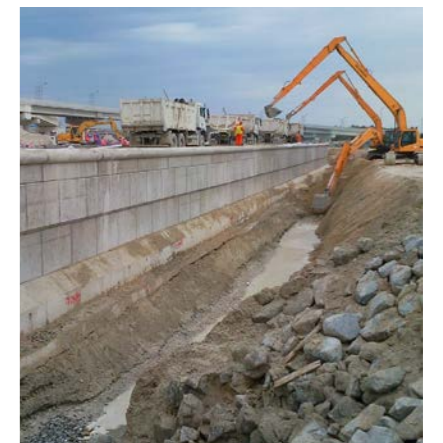
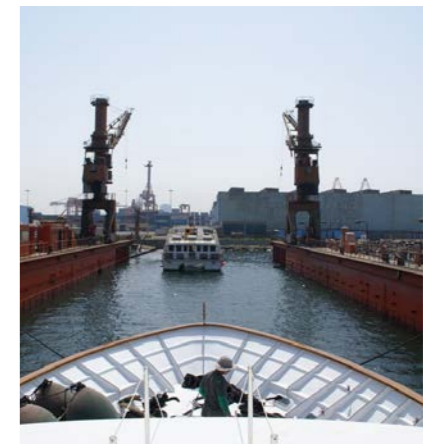
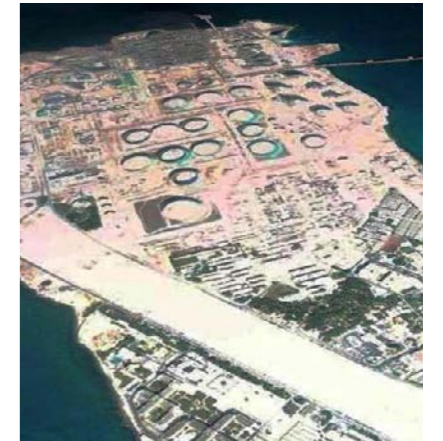
Ramboll was commissioned by the Contractor to provide detailed design and construction site support services for a perimeter wall to the prestigious Al Maryah Island Development in Abu Dhabi

The original design produced by the Client's designers was for a mass concrete blockwork wall. However, Ramboll worked closely with the Contractor to develop a diaphragm wall solution, providing considerable savings in both cost and construction programme. Utilising the experience of several large scale diaphragm wall schemes completed internationally Ramboll's marine engineers, geotechnical specialists and durability experts designed a robust well engineered solution that satisfied the Client's concerns about using an alternative to blockwork. This included the aesthetic inclusion of concrete fascia panels to maintain visual consistency with adjacent blockwork.

## AL AIN STADIUM AND MASTER PLAN

Mixed-use residential and recreational development in Al Ain

Al Ain Stadium and Master Plan is a major mixed-use residential and recreational development in the city of Al Ain for developer AAFAQ, linked to the Abu Dhabi royal family. Along with a stadium, it will also include a hotel, offices, and sports centre. The project is located on a 50ha site in Al Ain at the intersection of Zayed Al Awwal Street and Hamdan Ibn Zayed Al Awwal Street. Client-approved development and infrastructure masterplans have already been prepared for the project. Ramboll is providing engineering services such as Infrastructure design, engineering and Estidama.



# DOHA METRO GREEN LINE

As part of an ambitious plan to develop a railway based public transport in Doha, Qatar Railways Rail has appointed a Joint Venture comprising PORR, the Saudi Binladin Group and HBK Contracting for the design and construction of Green Line Underground.

The design and construction process requires of an independent certification of the works by a Design Verification Engineer (DVE).

The JV has appointed Ramboll to act as the DVE for their works; which comprises six underground stations, two switch boxes, escape shafts and 18.7 km of connecting twin bored tunnels. As the DVE for the works, Ramboll is required to:

- Confirm that the design complies with QRail's Employer Requirements
- Undertake independent analysis and calculations
- Undertake detailed checks of drawings and schedules

The design verification works are multidisciplinary with Ramboll providing design services for tunnelling, deep excavations and temporary works, structural engineering, architecture, and MEP. The project involves close collaboration with the JV and their designers to facilitate the programme; Ramboll has provided a core local team representing each of the required disciplines, supported by specialists primarily from based in the UAE, but also from other parts of the Ramboll Group. The experience and knowledge that Ramboll has brought to the project has provided QRail with the necessary confidence in the design to enable the construction works to progress within the required programme.



## LOCATION

Doha, Qatar

## CLIENT

Saudi Binladen Group, PORR, HBK, Qatar Rail (QRail)

## PERIOD

2013-2015

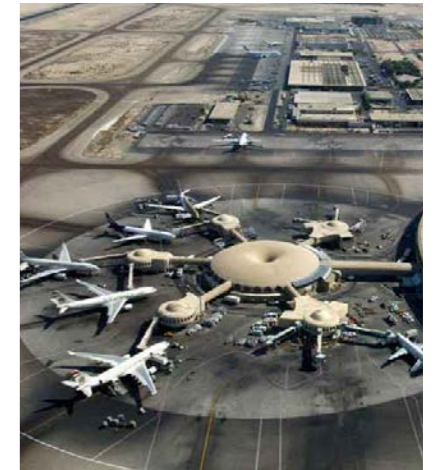
## ENGINEERING SERVICES

Structures  
Infrastructure  
Geotechnical  
MEP

## ADIA 9 HARDSTAND AREAS

The Abu Dhabi International Airport (ADIA) is undergoing a major programme of expansion under the management of Abu Dhabi Airports Company (ADAC)

As part of these developments, Ramboll has been involved in various projects providing design and consultancy services. These include the ADIA 9 Hardstands project, which involved design services for a Design and Build contract for Al Naboodah National Contracting Group (ANNCG). Multidisciplinary design input were provided within the fields of aviation, infrastructure, drainage and utilities, geotechnical and structural engineering. The project required the design and construction of 600m of retaining walls, pavement design, drainage earthworks and associated utilities, and also involved the investigation and remediation of underground cavities in areas adjacent to the hardstands. The project also required the management of the jet fuel line design and electrical and telecoms design prepared by others.



## HELICOPTER HANGAR

Construction of Helicopter Hangar at Das Island, Abu Dhabi

Ramboll provided consultancy services to the design and build contractor for the construction of helicopter hangar and apron for Bell 412EP helicopters for Abu Dhabi Maritime Authority. The Hangar is an extension to the new terminal building and is planned to be completed in a very short time to align with the completion date of the terminal. The building provides facility for parking one helicopter and open air service for two. Ramboll provided architecture, structural engineering, MEP, infrastructure and aviation.



## YAS VICEROY BASEMENT REMEDIATION

Rambolls innovative and creative thinking provided real added value to our client on this prestigious building

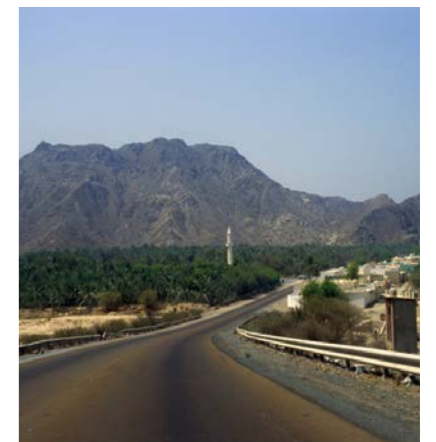
Following completion of the construction of the Yas Viceroy Hotel, groundwater levels in the surrounding area have risen due to extensive irrigation resulting in severe water ingress and damage to the basement car park. Ramboll designed a unique solution to reduce the water pressures acting on the basement with a gravity-driven system using the existing slab drainage network, and provided construction supervision to ensure the works were undertaken without disrupting the hotel usage during the Formula 1 weekend events.



## DIBBA KHOR FAKKAN BYPASS (AQAH TO SHARM)

Complex infrastructure and geotechnical project

Ramboll Middle East carried out a preliminary engineering study for a new bypass north of Khor Fakkan in Oman. Working for the Ministry of Public Works, Ramboll brought together talented colleagues specialising in highway, drainage, geotechnical, BIM, structural and tunnels. The project delivered a fast track summary of the key project issues for the new bypass alignment. Set in the foothills of the Haji Mountain range, one of the most exciting aspects of the project was the potential for a 900m twin bore dual carriageway rock tunnel. Ramboll's technical expertise in rock engineering and tunneling was recognized by the Client as being a key aspect for our involvement.



# ENVIRONMENT

Ramboll's 2,000 environmental specialists produce bespoke solutions that help clients integrate sound environmental practice while achieving their project aims.

In an increasingly complex regulatory and ethical culture, we offer clear guidance on how to deliver projects that are in harmony with their environment. Water supply mapping, climate change adaptation, flood risk assessment, waste resource management and environmental impact studies: our work is diverse and often innovative.

Whatever the context, we provide the expertise necessary to support our clients to navigate the full spectrum of environmental risks with confidence, protecting the value of their assets.

We advise our clients in all stages of projects from acquisition and feasibility to planning during construction, site operation and aftercare. With our in-house expertise available all over the world, we are capable of handling all specialist services without the need for outsourcing. This way we are able to offer a fully integrated project team, whose understanding of project opportunities and constraints is deeply rooted in experience.

We communicate our scientific findings clearly, and can advise on the legislative, commercial and social implications of our analysis.

Known in the industry for our **problem-solving approach**, we excel at unlocking project potential despite obstacles that others consider to be insurmountable.

Shiebat Watah is a national housing community development in Al Ain, UAE. An existing historic landfill site was located adjacent to the plot boundary, which dated back 20 years. The site was only brought to the attention of the municipality and our client after we conducted a topographical survey and ground investigation.

Ramboll's Environmental team carried out further investigations due to concerns about the risk to human health. Our engineers and scientists developed a plan that would analyze the level and impact any contaminants may pose on future users of the site. Soil and water tests were undertaken and showed no signs of hazardous material specifically leachates. We proposed an immediate and long term action plan which included an environmental monitoring system and a detailed stability assessment.

## OUR SERVICES

- Air quality
- Climate change
- Environmental Due Diligence
- Environmental impact assessment - EIA
- Environmental and Social Masterplanning
- Environmental management
- Flood risk assessment
- Geophysical surveys
- Health & occupational safety
- Industrial environment
- Land use planning & development
- Noise
- Soil & groundwater
- Strategic environmental assessment - SEA
- Waste
- Waste water
- Water resources management
- Water supply

## FACTS

**REVENUE IN 2015**  
331 million EUR

**NUMBER OF EMPLOYEES**  
2306 worldwide

**GEOGRAPHICAL SPREAD**  
126 offices in 28 countries

**RANKINGS**  
Ranked 8th by Environment Analyst amongst the world's environmental consultancies in relation to size, geographical diversity and global ambitions

**OUR CUSTOMERS**  
Private and public sector clients around the world, with key clients from among the industrial, utility, oil and gas, property, financial and legal sectors, as well as municipalities, state institutions, agencies and the regulatory and academic communities

'WE ARE SCIENTISTS FIRST AND FOREMOST AND WE RESPECT FACTS — FACTS THAT ARE RIGOROUSLY SOURCED, HONESTLY EXPRESSED, AND THEN USED TO FORM THE BASIS OF PRACTICAL DECISIONS.'

# JEDDAH DEVELOPMENT & URBAN REGENERATION COMPANY (JDURC)

Ramboll's Environmental team in Jeddah is working with the client to help assess and improve solid waste management in Jeddah's Al Balad and Historic Area

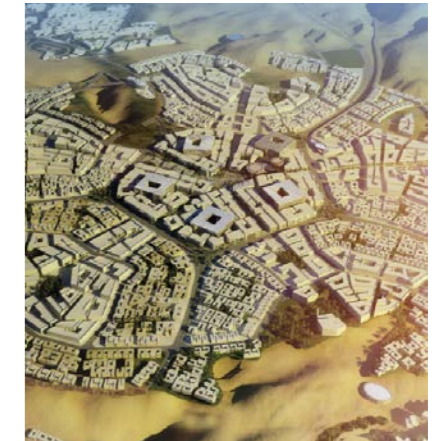
JDURC has embarked on a mission to improve the environmental condition of the Historic and Al Balad areas located in central part of Jeddah. The project will assess the current solid waste management (SWM) system and develop the most efficient, practical and sustainable SWM system, evaluate the feasibility of the system, provide the necessary advice and structure on how best to involve the private sector, prepare the required tender documents and administer the tendering process, evaluate the bids, select the most suitable bidder and make recommendation to JDURC.



## KACARE

Ramboll was asked to develop water management and water supply solutions for a new sustainable city outside Riyadh, Saudi Arabia

The 100mm of precipitation that falls annually in the region far exceeds what would typically be required to supply a city with an integrated water management system. Our design focused on land management to capture and exploit this natural water resource. The key to our strategy was to maximise shallow aquifer recharge and retention throughout the site. In time, this could make the city self-sufficient in its water supply, and provide the platform for a truly sustainable urban community.



## SCOTT BADER

Ramboll commissioned to conduct environmental review and assessment

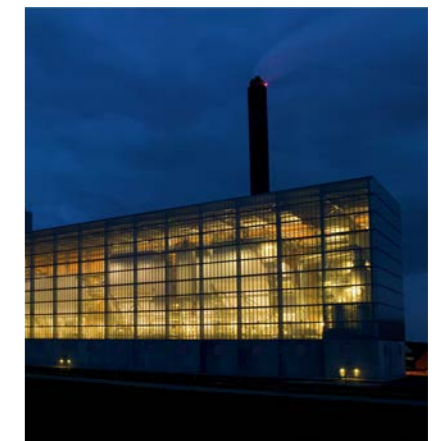
Scott Bader Middle East (SBME) has commissioned Ramboll to prepare an Environmental Impact Assessment (EIA) for the proposed expansion of their existing polyester resin production facility. The studied plot is located at Jebel Ali Free Zone Authority (JAFZA) in Dubai. The vision of the proposed development is to expand the existing facility to meet future SBME business expansion plans. SBME intends to have an environmental upgrade of their polyester resins production plant. The proposed expansion has necessitated a review and assessment for the environmental impacts of the entire site.



## WASTE-TO-ENERGY FACILITY IN NÆSTVED, DENMARK

Extension of existing combined heat and power producing waste-to-energy facility by a new unit with steam production

I/S FASAN, now AffaldPlus, is a waste management company owned by six municipalities in Denmark. It owns and operates nine treatment facilities, a materials recovery facility, 22 recycling stations and two sites for garden waste. In response to increasing waste, I/S FASAN extended its existing combined heat and power producing waste-to-energy facility. Ramboll's services included planning of the new unit, liaison with the authorities, tendering and contracting of mechanical equipment, design of civil works, project follow-up and in-house consulting.



## SHEIBAT AL WATAH

Ramboll's Environmental team in the Middle East has been commissioned to provide environmental consultancy services for the high profile new Shiebat Al Watah development in Al Ain, UAE

Al Ain is traditionally known as an oasis in the UAE, with a comparatively moderate climate and with an infrastructure that contains a well established network of underground water springs. It is imperative that environmental concerns are considered with any new build, which is why Ramboll has been commissioned as a consultant on this delicate new project. We were chosen due to our understanding of the community and environment we serve and our expertise, which will help provide solutions that are sympathetic to the unique ecosystem of Al Ain.



# JEDDAH ENVIRONMENTAL ASSESSMENT AND JEDDAH ENVIRONMENTAL SOCIAL MASTERPLAN

Environmental assessment and social masterplan studies covering 15 disciplines and services across the city of Jeddah.

The Jeddah Environmental Impact Assessment (JEA) and the Jeddah Environmental Social Masterplan (JESMP) are part of the Jeddah Government's plan to oversee a comprehensive series of engineering, environmental and social activities that include studies to resolve current and future environmental problems. The studies will identify environmental issues and their impact in connection with Jeddah on a regional scale.

Ramboll has been awarded the role of Environmental Consultant for the complete JEA and JESMP projects and we will report directly into the Jeddah Storm Water Drainage Program team (JSDP) and the Presidency of Meteorology and Environment (PME). This is the largest environmental project ever won in the Middle East region and will require a team of 40 teamRamboll ME, Ramboll UK and Ramboll Denmark staff to support it.

The study's scope will cover the required environmental and social studies in Jeddah over an area of approximately 4,600 sq km.

The JEA will provide and cover a baseline of existing environmental conditions which will include the natural and cultural resources and environmental and environmentally related socio-economic problems that Jeddah is facing. The complete assessment will provide information on corrective actions in terms of prevention and mitigation of adverse impacts.

## LOCATION

Jeddah, Kingdom of Saudi Arabia

## CLIENT

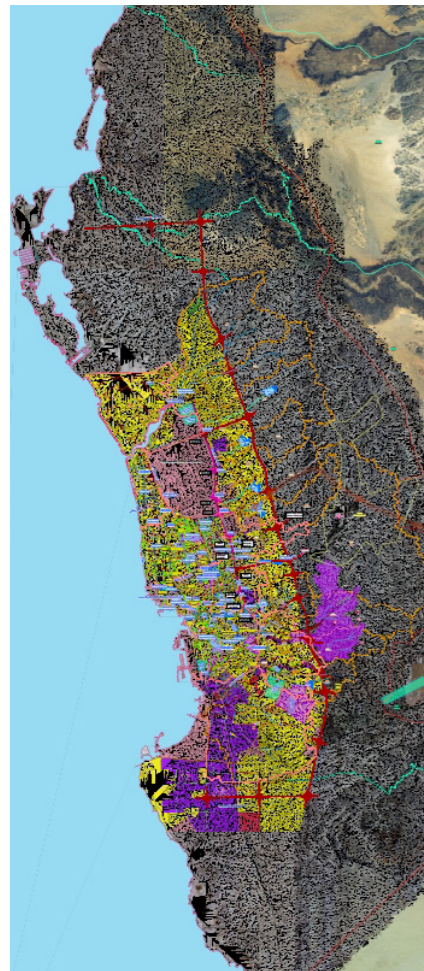
Jeddah Storm Water Drainage Program Team (JSDP) and Presidency of Meteorology and Environment (PME)

## PERIOD

2012-2013

## ENGINEERING SERVICES

- Air quality
- Marine and Thermal Pollution
- Surface water
- Waste water
- Ground water
- Transport
- Solid waste and radioactivity
- Socioeconomics
- Land use
- Public health
- Energy/climate
- Natural hazard
- Noise
- Terrestrial ecology
- Archaeology



## FAIRMONT HOTEL

Environmental consultancy services for a 5-star hotel in Abu Dhabi

National Investment Corporation intended to develop Fairmont Hotel and Serviced Apartments within the Marina City Development, Abu Dhabi. Ramboll has been commissioned to provide a preliminary structural peer review, an environmental review and a natural system assessment. The project is targeting a 1 Pearl rating under Estidama Pearl Rating System. The project is implementing a number of sustainable strategies such as solar hot water, energy efficient design, water efficient landscape and high efficiency water fixtures.

## ZAKUM ISLAND - ZAKUM ISLANDS - ENVIRONMENTAL IMPACT ASSESSMENT OF IMPACTS ON CORALS AND SEAGRASS

Ensuring minimal environmental impact from constructing four artificial islands

Upper Zakum Field was discovered in July 1963, and is located approximately 84 km offshore northwest of Abu Dhabi in the Arabian Gulf. Stretching over some 1,200 square kilometres it is one of the largest oil fields in the world with a current expected operating life exceeding hundred years. In view of ZADCO requirement to increase oil production, an expansion study is undertaken by ZADCO to install a number of artificial islands in ZAKUM Field. An environmental impact assessment is part of this expansion study.

## SUNGEI BULOH WETLAND PARK

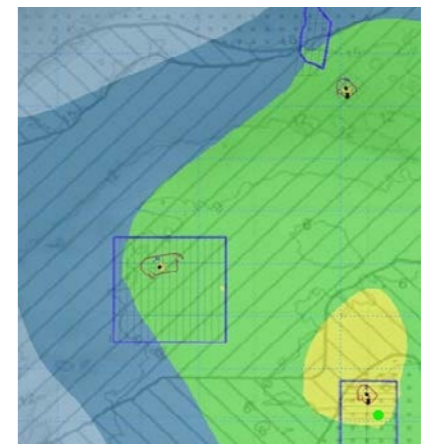
The masterplan aims to anchor Sungei Buloh's position in international nature conservation while still meeting the local recreational needs of Singaporeans

The masterplan defines a spatial strategy which protects an inner core. A sustainably designed activities loop with interactive and educational stations lets local people experience this outstanding natural environment while still conserving the site's sensitive, natural characteristics. The masterplan also looks beyond the site itself, identifying future possibilities for a linked nature network beyond the Sungei Buloh area. The Sungei Buloh Wetland Park helps make Singapore a great place to live and is an attractive global destination showcasing the reserve's rich biodiversity. Services we provided are Environmental management, landscape architecture and spatial planning, nature and rehabilitation. This project was carried out by Atelier Dreiseitl, now member of the Ramboll Group.

## INTERNAL MANAGEMENT OF MEDICAL HAZARDOUS WASTE

Technical assistance project for management of healthcare waste in Romania

Waste management, and especially healthcare waste, is a major problem in most countries. In recent years, healthcare waste disposal has presented more difficulties with the use of disposable needles, syringes and similar items. This type of waste affects the environment by contaminating soil, air and water resources. Romania has approximated the environmental legislation with EU norms and standards, but a clearer picture of the situation is needed. Within this framework, Ramboll Romania implemented this project, the first of its kind and succeeded in evaluated the corresponding Romanian legislation, evaluating the costs implied by the implementation of an effective system for the management of healthcare waste, training approximately 900 employees from the system and implementing an awareness campaign at national level.





'RAMBOLL HAS BEEN WORKING IN OFFSHORE WIND FOR A LONG TIME SO WE TEND TO BRING A PRACTICAL UNDERSTANDING OF WHAT WORKS AND WHAT DOESN'T.'

## ENERGY

Ramboll has vast experience in the planning, design and implementation of renewable energy solutions.

Our international team of energy and climate specialists provides expertise on the full spectrum of renewable technologies including solar, district heating, CHP, waste-to-energy and wind. Our consultancy unites the best of global knowledge in the renewable energy field with a practical understanding of how regulatory culture varies from one region to another. We are well placed to advise clients on all aspects of a project from planning through to engineering design and long term maintenance.

Our roots in the energy market run deep. Ramboll was there in the early history of offshore wind. We developed the first monopile design for offshore oil rigs — an incredible feat of optimisation when you consider the extraordinary length of these piles, located far out at sea, and the multiple loading pressures they withstand. Our approach was later used as a model for the design of monopile offshore wind turbines. Now more than 50% of the world's offshore turbines rise from foundations engineered by Ramboll.

We are keenly interested in the possibilities tidal stream power generation has to offer. Long-term experience has taught us that the success of any new energy technology depends on the delivery of economic structures that can be easily installed. We were recently selected by Tidal Generation Ltd. to engineer its first 10MW tidal turbine test array because of our established track record for creating innovative solutions that unlock the marine environment.

In other areas, too, we lead the way. Our experience in waste-to-energy is unparalleled. We have planned, procured and supervised the implementation of more than 60 waste-to-energy plants and retrofits in 30 countries around the world.

At a time when energy security is at the top of the political agenda we offer an intelligent consultancy, tested by years of hands-on experience, in which both private and public sector clients can place their trust.

### OUR SERVICES

- Biogas
- Biomass
- Combined heat and power
- District cooling
- District heating
- Energy and climate
- Energy efficiency
- Energy strategy and planning
- Geothermal energy
- Hydro, tidal and wave power
- Offshore wind
- Onshore wind energy
- Power
- Power transmission
- Solar energy
- Waste-to-energy

### FACTS

**REVENUE IN 2015**  
117 million EUR

**NUMBER OF EMPLOYEES**  
Ramboll has approximately 990 people across the company working with different aspects of energy, including oil and gas and energy efficient buildings, 700 of whom are part of Ramboll Energy

**GEOGRAPHICAL SPREAD**  
25 offices in eight countries: Denmark, Sweden, Norway, UK, Germany, Poland, Switzerland, and Canada

**RANKINGS**  
In 2014, Ramboll was ranked no. 1 in Solid waste and Towers & antennae, no. 2 in Wind and no. 5 in Co-generation in the ENR survey of top international design firms.

**OUR CUSTOMERS**  
Our customers include energy utilities, local authorities and operators.



# TIDAL TURBINE ARRAY FOUNDATION DESIGN

Ramboll was recently appointed by Rolls Royce's Tidal Generation Ltd. to design the foundations for its planned 10MW tidal turbine array

To date, no one has developed a tidal turbine array anywhere in the world, though numerous individual turbine units have been prototyped. This project, once completed, may well be the first of its kind, paving the way for a more widespread application of this exciting renewable technology. Our marine specialists are currently conducting a review of potential design options, measuring each one against a matrix of criteria that includes cost, buildability, maintenance requirements and installation logistics.

## LINCOLNSHIRE WASTE-TO-ENERGY FACILITY

A new facility set to generate enough electricity to power 15,000 homes

Our work on this project dates back to the earliest stages, when we were involved in preparing a technical options assessment and outline business case. Later we prepared the design for the waste-to-energy facility. Part of our work at this time was to support communication, consult on alternative funding options, conduct site visits to relevant waste-to-energy facilities and provide advice on district heating. We gave technical advice during the procurement and will continue to advise the council through the current phase of construction and into commercial operation.



## GWYNT Y MÔR

On completion this will be the second largest wind farm in the UK

Ramboll is designing the foundations for the UK's second largest offshore windfarm, destined for Gwynt y Môr in North Wales. The wind farm is to be constructed in two phases. The first phase, which we are working on now, involves 92 turbines out of a planned total of 160. The final installation is intended to generate enough electricity to power 400,000 homes, saving 1.6 million tonnes of CO<sub>2</sub> every year as compared with coal-fired power generation. Our work includes liaison with the independent certifying authority, DNV, to arrive at an approved design.



## GREENWICH PENINSULA ENERGY NETWORK

Low carbon energy infrastructure serving a major new development in London

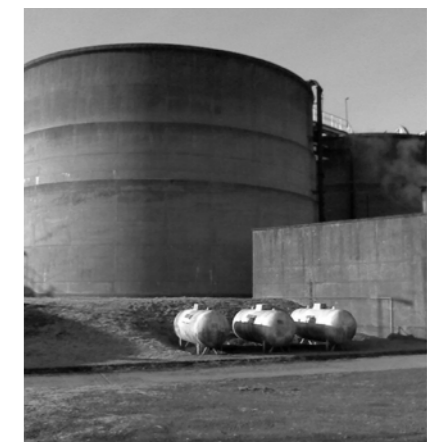
A major regeneration scheme at the Greenwich Peninsula will see the creation of 10,000 new homes and multiple commercial spaces. Ramboll Energy has been commissioned to work on the implementation of a low-carbon site-wide energy infrastructure, principally consisting of an energy centre and a district heating network. Our work involves concept and detailed design phases, a fuel and technology assessment, procurement and construction site supervision.



## DALDERSE WASTE WATER TREATMENT WORKS

Feasibility study on the treatment of excess biogas at a sewage processing plant

The Carbon Trust and Scottish Enterprise funded this study to identify the best process for treating the excess gas produced at the works. The existing sewage treatment plant consists of two anaerobic digesters that process 408 cubic metres of indigenous and imported sludge every day. Our study showed that excess gas could be diverted easily by pipe through an upgrade plant to clean the methane of contaminants. Our full study included a financial model for the options investigated and recommendations for further design development and procurement.



# WASTE-TO-ENERGY PLANT IN ABU DHABI

Addressing the objectives in the Abu Dhabi Vision 2030, the United Arab Emirates has decided to build its first ever Waste-to-Energy facility in Abu Dhabi.

The new WtE facility will reduce CO<sub>2</sub> emissions by more than 1.5 million tonnes per year, supply more than 20,000 households with electricity and play a key role in achieving its 80% landfill diversion target.

TAQA, the National Energy Company, has set out to develop a world class waste management system and build up a knowledge base within the Waste-to-Energy industry to meet the increasing challenges of growing landfills.

To build up the necessary know-how, Ramboll works closely with the client and partners to ensure knowledge sharing and a high efficiency throughout the development process.

To maximise resource recovery, the new Waste-to-Energy facility also allows for the recycling of metals and reuse of the residual ashes in the local construction industry.

### Project Facts

- Capacity: 1,000,000 tonnes per annum
- Waste: Commercial and Municipal Solid Waste
- Energy performance: 100 MW
- Furnace/boiler: Grate fired furnace and horizontal 4-pass boiler
- Steam Parameters: High pressure steam

- Turbine: Condensing turbine
- Flue gas treatment: Semi-dry flue gas treatment, including activated carbon infusion solution and desulphurisation system
- Procurement: Standard procurement process based on pre-qualification and evaluation
- Commissioning: 2016

### Value added for the customer

Ramboll's involvement in the project started at the project definition stage, and our responsibilities have included:

- Conceptual design, technical specifications and project definition
- Management of procurement process, preparation of tender documents, bid evaluation and contract negotiations
- Overall supervision and planning

### LOCATION

Abu Dhabi, UAE

### CLIENT

Abu Dhabi National Energy Company PJSC (TAQA)

### COMPLETION

2012-2014

### ENGINEERING SERVICES

Waste-to-energy



## DONG ENERGY OFFSHORE WIND FARM

Largest offshore wind farm in Denmark, Anholt

Ramboll provided a complete failure mode effect critical analysis (FMECA) of the largest offshore wind farm in Denmark, Anholt. The wind farm consists of 111 wind turbines, and the analysis prioritised all maintenance activities from a consequential point of view. The result was a recommendation for new maintenance strategies for each single component based on function description, failures, failure modes, MTBF and STTF intervals and consequence matrix. Furthermore, Ramboll developed a detailed maintenance manual including all FMECA results. The services included specification of operation and maintenance details for foundations and scour protection for all 111 wind turbine installations.



## FEASIBILITY STUDY OF DISTRICT COOLING WITH UTILISATION OF EXCESS HEAT

Ramboll was hired to make a screening of the district cooling potential in Gentofte municipality by identifying potential customers and estimating their cooling demand

The potential benefits of using heat pumps and groundwater cooling were assessed and different district cooling solutions were compared to conventional individual cooling solutions. Two potential district cooling areas were identified in the municipality. These areas were subsequently validated by contacting key customers, and a socio- and private economic analysis was carried out. Based on this feasibility study, Gentofte municipality will be able to decide whether to produce and distribute cooling as an integral part of the existing district heating network.



## HALDOR TOPSØE PRODUCTION PLANT

Haldor Topsøe A/S is one of the world's leading companies within process technology, research and development in heterogeneous catalysis for oil refineries, chemical production and green tech

Over a period of 18 months, Ramboll carried out a major stock analysis and stock design project, which optimised Haldor Topsøe's management of spare parts. The project covered : Stockholding analyses, cost benefit considerations, physical design, dimensioning of insurance spares, consumables and spare parts, classification and spare parts strategy, education and training of key personal, design and description of a procedure spare part manual and Implementation of KPI structure for spare part handling.



## ARC WASTE-TO-ENERGY PLANT

Amager Ressource center's old waste-to-energy units are scheduled for decommissioning in 2017

The primary purpose of the project was to define the exact right extent of maintenance to enable the plant to operate until then, ensuring that the client will only have to spend what is absolutely necessary on maintenance while maintaining reliable operation until decommissioning. In 2017, a new plant will be ready for operation, and the second phase of the project was to prepare all operation and maintenance strategies, with the purpose of creating a high level O&M organisation. Ramboll used an ambitious set of analysis tools combined with cost-benefit calculations in order to solve this assignment. In addition, Ramboll developed a LCM (Life Cycle Maintenance) plan containing all activities 30 years ahead. This plan consisted of organisational activities, systems, techniques, methods and training.



## OIL & GAS

As global energy consumption continues to grow, oil and gas will continue to play an important role in the world's energy mix.

Ramboll has acted as an independent engineering consultancy to the Middle East oil and gas industry since the 1990s. We have made a name for ourselves through our involvement in the Al Shaheen Field Development Project in Qatar, which is one of the most complex and extensive offshore field development projects ever undertaken. We have also have our footprint on the ambitious Zakum development project, which involves the construction of a number of artificial islands for drilling and process activities off the coast of Abu Dhabi. Our client portfolio includes significant players such as Maersk Oil Qatar, Zadco, Qatar Petroleum, ORYX GTL and Total.

As global energy consumption continues to grow, oil and gas exploration and production activities will continue to play an important role for many years to come. Still, the industry is facing major challenges, including the exploration and development of new fields in remote areas, the adjustment to the increasing shift from oil to gas production, and the maintenance of production in mature fields.

Our roots in the energy market run deep. With more than 40 years of experience in providing oil and gas solutions, our expert knowledge and services have evolved with the needs and challenges facing the industry both offshore and onshore.

Ramboll is a truly people-based organisation. We believe that the key to our success lies in the motivation, persistence, skills and commitment of our employees.

We base our services on integrity, deep specialist insight, and absolute independence of third party providers. In this way, we contribute to the safe, responsible and sustainable development of the oil and gas market.

Civil engineering and other consultancy disciplines are a part of our combined service portfolio in the Ramboll Group. With our staff of some 1,000 oil and gas experts backed by our 10,500 colleagues in the Ramboll Group, we are able to mobilise large project teams across geography and disciplines.

### Responsible and sustainable development

Our approach to sustainability is multidisciplinary and integrated in all of our services.

### OUR SERVICES

- Financial studies
- Environmental studies & regulatory compliance
- Conceptual studies
- FEED
- Detailed engineering
- EPC projects
- Project management
- Modifications & maintenance
- Decommissioning
- Cost estimation
- Safety
- Process engineering
- Piping & mechanical engineering
- EI&T
- Structural and civil engineering
- Procurement
- 3D laser scanning & survey
- Weight monitoring

IN TODAY'S FAST PACED AND COMPETITIVE OIL AND GAS MARKET, COMPANIES DEPEND ON **ADVANCED TECHNICAL SOLUTIONS** THAT COMBINE **ECONOMIC EFFICIENCY WITH STRINGENT HEALTH, SAFETY AND ENVIRONMENTAL (HSE) SAFEGUARDS DURING THE PRODUCTION AND DISTRIBUTION PROCESSES.** THESE ELEMENTS FORM AN **INTEGRAL PART OF RAMBOLL'S INDEPENDENT AND MULTIDISCIPLINARY CONSULTANCY SERVICE,** WHICH COVERS THE ENTIRE PROJECT LIFE CYCLE. WE EXCEL IN ONSHORE CONSULTANCY AND HAVE DESIGNED OFFSHORE STRUCTURES FOR INDUSTRY GIANTS SINCE THE 1970S.

### FACTS

**REVENUE IN 2015**  
84 million EUR

**NUMBER OF EMPLOYEES**  
784 oil and gas specialists worldwide

**NUMBER OF OFFICES**  
9 offices in the UK, Denmark, Norway, Qatar, U.A.E, India and in the US

**RANKINGS**  
Ramboll ranks in 28th place on ENR's list of top 150 International design firms (2015)

# AMAZING AL SHAHEEN

Al Shaheen is a production oil and gas field off the North East coast of Qatar in the Arabian Gulf. The oil field lies over the North Gas Field; the largest gas field in the world. Al Shaheen has been developed by Maersk Oil in what constitutes one of the largest and most complex offshore oil and gas projects undertaken in the world today.

Maersk Oil Qatar operates Al Shaheen under a production sharing agreement with Qatar Petroleum, on behalf of the state of Qatar. In 2005 Maersk Oil initiated an ambitious development plan calling for 15 new platforms with at weight of over 140,000 tonnes steel; the drilling of more than 160 production and water injection wells, and numerous modification jobs on the existing platforms.

In 2006, Maersk Oil assigned Ramboll to carry out the brown field design including design of modifications of existing platforms and a discrimination study that would ensure a smooth tie-in of the new platforms to the existing power system. Ramboll set up a dedicated team for this project, which at peak times counted 130+ people working full time for Maersk

Oil. By establishing a dedicated design office at Maersk Oil premises, it was possible for Ramboll to bring value to the project by acting as an integrated part of the Maersk Oil organisation. The dedicated design office was supported by Ramboll's main office in Qatar and our sourcing office in Chennai, India.

The original field development project was followed by more projects, and in total Ramboll worked on Al Shaheen for seven years making it the most extensive project in Ramboll history. By 2012, the Al Shaheen field consisted of 35 platforms, and produced around 40% of Qatar's oil and gas output.

### LOCATION

Arabian Gulf

### CLIENT

Maersk Oil Qatar

### COMPLETION

2013

### ENGINEERING SERVICES

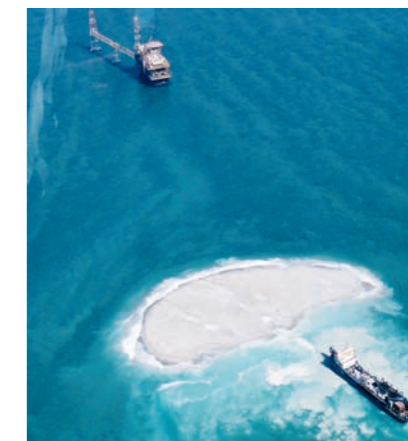
- 3D scanning & survey
- Electrical, instrumentation and telecom
- Maintenance
- Mechanical
- Piping and layout
- Process
- Project management
- Risk and technical safety
- Structural



## ZAKUM ISLAND, ABU DHABI

Ramboll was deeply involved in the development of the Upper Zakum oil field off the coast of Abu Dhabi. The Zakum field stretches over some 1,200 square kilometres - making it one of the largest oil fields in the world with a very long expected operating life.

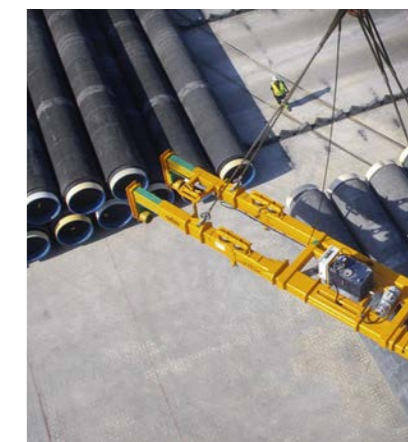
With the purpose of increasing the oil production, operator ZADCO decided to develop the Zakum Field - one of the largest oil fields in the world - by establishing a series of artificial islands as an alternative solution to establishing numerous platforms. The decision was based on extensive Ramboll studies of the effectson existing facilities and environment.



## THE NORD STREAM PIPELINE PROJECT

It has been hailed as one of the most important new import routes for natural gas to Europe, and is called a 'benchmark in EU-Russia cooperation'

The project, which involves 9 nationalities, called for comprehensive approval processes and Ramboll has been involved in several phases, such as assistance in the overall authority management for environmental impact assessments (EIA) and permitting, including, for example, full EIA reports according to the Espoo Convention and national EIAs for Sweden and Finland. As part of the approval procedure, Ramboll was deeply involved in public hearings and debates. Furthermore, Ramboll provided assistance to the developer, Nord Stream AG, in relation to route planning and optimisation, preparation of work scope and contracting, and supervision of marine survey activities.



## TYRA EAST RATIONALISATION PROJECT

The Tyra Field is the largest gas field in the Danish North Sea sector - it is operated by Maersk Oil, and has been producing since 1984. Ramboll was part of the Tyra East Rationalisation Project; just one phase in a series of Optimisation Projects in the field

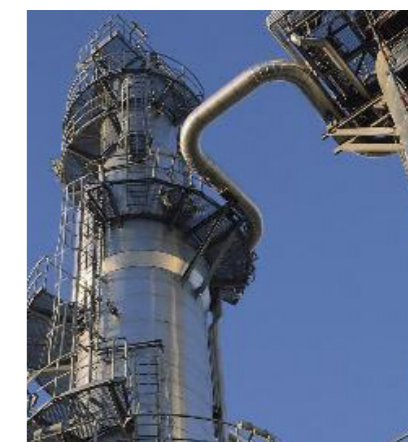
The mature Tyra Field is the largest gas field in the Danish North Sea and faces lower reservoir pressure and a decline in production. In order to reduce operation costs, the project included optimisation of the complex and gas infrastructure by reducing capacities to match production forecasts. The tail end production was accelerated by adding additional wellhead compression, increasing the overall recovery from the field. Ramboll provided detailed engineering and project management.



## STATOIL REFINERY

Statoil has executed large scale extension and modification environmental-friendly projects on their refinery in Kalundborg, Denmark

The level of harmful substances in gasoline and diesel oil was reduced at Statoil's Kalundborg refinery after a long line of green projects including major modifications on the existing facility with the aim to reduce hydrocarbon discharge into the atmosphere. Ramboll provided HSE studies, concept studies and detailed design for key elements of the various projects i.e. the installation of a degasser module, a visbreaker train, a new splitter and diesel reactors, improving the production facilities and benefiting the environment.



photography/renderings on both pages - Maersk Oil Qatar, Nord Stream

# RECENT AWARDS

Over the years we have won hundreds of awards recognising excellence across all our services. Listed below are a few highlights of recent achievements.

- 01 MEP Middle East Awards 2015 **Electrical Project of the Year**, Jeddah Corniche Towers, Jeddah KSA  
  
Highly commended: **Young Engineer of the Year**, Rana Itani, Senior Building Physicist
- 02 MEP Middle East Awards 2014 **Mechanical Project of the Year** - Khalifa University, Abu Dhabi, UAE
- 03 MEP Middle East Awards 2013 **Specialist MEP Consultant of the Year** - Khalifa University Phase 1, Abu Dhabi, UAE
- 04 MEP Middle East Awards 2012 **Sustainable GCC Project of the Year Award**: The Change Initiative, Dubai
- 05 GCC Construction Week Qatar Awards 2012 **GCC Engineer of the Year**: Andrew Darlington - Doha Marina Mall, Qatar Project
- 06 GCC Construction Week Awards 2010 **GCC Tower Project of the Year 2010**: Shining Towers, Abu Dhabi
- 07 GCC Construction Week Awards 2009 **GCC Engineering Consultancy of the Year**: Eco-Arish, Liwa Oasis, Abu Dhabi
- 08 Ground Engineering Award: **Consulting Firm of the Year 2012**: BBC Broadcasting House W1 and Ferrari World Theme Park, Abu Dhabi



photography — HOK architects, RSP Architects, JKMM Architects  
photography, U+A Architects

- 09 Civic Trust Award 2012, **National Panel Special Award** for the The Hepworth Wakefield, UK
- 10 **Steel Construction Award, Sweden 2011**: for Ryaverkets waste water treatment plant in Gothenburg.
- 11 RICS South West Award 2012, **Project of the Year and Building Conservation Award** Tyntesfield restoration works ReDesigning the Terrace competition, winner
- 12 Statens Byggeskikkpris 2012: **National Building award 2012** for Vennesla library project
- 13 **European Award for Steel Bridges, 2012**: Acrobaten (footbridge at Oslo Central Station)
- 14 BREEAM Award 2012: **Education Project of the Year 2012** for Ashmount Primary School and Bowlers Nursery, Crouch Hill Park
- 15 Tekla Oyj: **Tekla Global BIM Award 2011, 1st Prize** for Skanska Finnish Headquarters, Hensilki
- 16 RICS South East Regional Awards — **Project of the Year 2011 Building Awards Public Building Project of the Year runner-up 2011 ICE South East — Engineering Excellence Award — Sustainability and Community Benefit 2011**: Aylesbury Waterside Theatre
- 17 Ramboll is among the **top 3 buildings designers** in Europe (source: ENR)

