And exactly what is the basis of Hydronamic’s capabilities?

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Through courses, study and special training, Hydronamic strives for continuous improvement of its capabilities. Convinced of the importance of exchanging knowledge and opinions with professional associates, training and education in Hydronamic’s own specialist fields are also a part of the company’s service proposition.
Hydronamic’s specific fields of expertise are:

- dredging and reclamation
- soil mechanics
- coastal and shore protection works
- ports and waterways
- marine environment
- offshore earthworks and mining
- morphology and hydrology

Within these fields, Hydronamic provides the following services:

- project studies, advice and design works
- project preparation and construction support
- project development studies
- research studies
- training programs

With a broad variety of studies and consulting tasks, Hydronamic holds a strong position in this area of specialist technology. The organisation and the people are innovative, creative and flexible. As a result, we can provide tailor-made solutions of reputed quality, within strict budget and time constraints. All activities are certified in accordance with ISO 9001.
Hydronamic, independent Port and Waterway Engineers

Hydronamic, independent Port and Waterway Engineers, provides specialist consulting services in the field of ‘wet’ civil engineering. Founded in the late 1960s, the company has gained a thorough knowledge of the behaviour of water—under both natural and forced flow conditions—and of the interactions of water and its surrounding environment. This encompasses the knowledge domains of hydraulics, morphology, hydrology, coastal and river engineering, port construction, environmental engineering and offshore technology.

Studies are performed with the aid of physical and mathematical models, both ‘in house’ as—in close cooperation with the client—on site. Thanks to our association with Royal Boskalis Westminster, world leading dredging and construction contractors, the advisory skills of Hydronamic engineers are complemented by a thorough understanding of the actual execution aspects of construction projects, gained by active on site participation.

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Questions and Answers

Associated with Royal Boskalis Westminster, Hydronamic is a contractor’s engineering company. But why does a contractor need an in house engineering company? And why should these engineering specialists provide consulting services to third parties? Two questions, one answer:

Because preparation and execution of a construction project requires both theoretical knowledge and a scientific approach, as well as practical experience and real-life construction insight. Clients such as project owners, other consultants and contractors can all benefit from this unique combination of ‘thinking and doing’ offered by Hydronamic. This experience proves especially valuable in the preparation of ‘design and construct’ projects. That’s why!

Clients in many areas of the ‘wet’ civil construction field cope with many other questions. Hydronamic provides them with the answers. You’ll find some of these questions and answers in this brochure. If you have any other questions, let us know!
**Infrastructure projects**

- **Port projects**
  - **Publix, Netherlands**: Detailed design of embankment construction for new railway line, geotechnical analysis for crossing areas and new self-substituting and establishment of operational procedures within very specific environmental zones.
  - **Groningen, Netherlands**: Analysis of requirements for deepening and widening of the access channel, using self-place excavating simulation for navigational aspects.
  - **Rosario, Argentina**: Site engineering, method statement and engineering for 60 km long Rosario – Victor Fiel Link, considering all their bridges and causeways over soft subsoils.
  - **San Francisco, U.S.A.**: Concept design study and feasibility analysis of San Simeon and each fifth platform construction for needed reclamation of international airport.
  - **Benghazi, Libya**: Design study for new artificial island in the North Sea to alleviate traffic pressure on existing airport.

- **Wave study, quay wall**
  - **Betuwelijn, Netherlands**: Design of port upgrading, including improved by restoring lakes?
  - **Deltaplan Maas, Netherlands**: Concept design study and simulation modelling for navigational aspects.
  - **Kerteh, Malaysia**: Design study for coastal protection using geotextiles and stone pitching.
  - **Bahia Blanca, Argentina**: Design and site engineering for coastal protection using geotextiles and stone pitching.
  - **Tonverlegung, Germany**: Engineering for slope protection of new-made canals, using sand and their permissible limits and changes.
  - **Link consisting of a series of bridges and causeways over soft subsoils**
  - **Gulf Islands, Abu Dhabi**: Engineering for slope protection of new-made canals, using sand and their permissible limits and changes.
  - **Dubai Terminal, Trincomalee**: Technical and constructional design of terminal infrastructure, including design of shore protection and in combination with wheel-strengthening for useful.
Hydronamic

The Answer Provider

**Infrastructure projects**

How can we cope with the world's ever-growing need for more infrastructure, while environmental concerns call for limited development?

Who has insight in technically complex marine projects like immersed tunnels or artificial islands?

What can land reclamation mean for the development of airports, commercial ports, road and railroad links and industrial projects?

Who has experience-based knowledge on marine works for fixed links?

What functional structures can help reducing costs of marine transportation projects?

In recent years, Hydronamic has developed technical and commercial concepts for a variety of infrastructural solutions. Many of these proposals have resulted in the actual preparation and execution of projects. Others are being used as underlying studies for developments aimed at relieving traffic congestion.

**Slope protection projects**

When do coastlines, shores or riverbanks require slope protection works?

How heavy must this protection be and can it be constructed with minimal disturbance of the present situation?

Will bottoms of canals or ports be eroded by currents from manoeuvring vessels or by flows around structures?

Can bottom protection with mattresses or stone filter constructions prevent these effects?

The typical Dutch craftsmanship of protecting the low-lying land from high seas and rivers belongs to the strongholds of Hydronamic. Dimensioning is provided for constructions and construction elements, often in combination with a selection of suitable quarries or other sources for materials.

**Water management projects**

What financial structures can be guaranteed for maintenance requirements in 100 years?

While water can be vital to local communities, how does water management contribute to optimally utilise – often scarce – resources?

Could water flows be guided into more useful directions?

Can training works be performed to divert rivers or should structures of sluices and dams be used to control level changes?

Can storage reservoirs be inserted without damaging downstream development?

How can water quality be improved by restoring lakes?

Although not every natural flow of water should be tampered by man, better utilisation to the benefit of nature and mankind is often possible. Based on mathematical models, calibrated by field measurements and supported by studies of historical riverbed development, Hydronamic can accurately predict where and how interference will be most effective with least disturbance of the natural environment.

**Port projects**

What defines the operational effectiveness of a port?

How can safe access for vessels be assured?

How much wave intrusion occurs as a function of the layout and will this affect the navigability to a great extent?

What are the requirements for maintenance dredging operations, from current behaviour and sedimentation patterns in the port?

To identify critical points and to provide solutions, Hydronamic employs mathematical models and computer manoeuvring simulations. Where knowledge and know-how end, physical models in laboratories and test flumes are implemented. Even field measurements like sedimentation monitoring during early stages of construction can be applied to define final adjustments of the design.

**Gulf Islands, Abu Dhabi:**

Design and site engineering for slope protection of man-made islands, using sand and other locally available materials.

**Niger River, Nigeria:**

Design of bank protection schemes, using stone and other locally available materials.

**Sohar, Oman:**

Conceptual design of seawater feed for new embankment port and deepening port in Khawal, Oman, to provide shelter against waves in 12 m deep approach channel and harbour basin.

**Torrevieja, Spain:**

Development of infrastructure to increase safety against flooding of new, in combination with optimal use of water as a resource and renewal resources.

**Gara River, Bangladesh:**

Design study, technical design and site engineering for design solution to zero flow conditions on Gara River, allowing transport of cargoes up to 250 ton in length.

**Niger Study, Nigeria:**

Possibility study for improvement of navigability of river for shipping of ore.

**Lez Nord, Tunisia:**

Hydraulic studies of flushing performance of unlined flumes geometry to improve water quality.

**Tunisian Reservoirs, Tunisia:**

Technical design and economic appraisal of rehabilitation schemes for all reservoirs.
Coastline projects

Q How will coastlines develop over time, with granular materials migrating by current and waves? Will nourishment schemes be economically justifiable and how can sediment be prevented from returning to deeper waters? Should foreshore nourishment be preferred over traditional schemes?

A Based on experience from field measurements and model studies, Hydronamic has developed a range of tools for the prediction of coastline behaviour and the design of coastal protection schemes.

Mining projects

Q Depending on the conditions, can ‘wet mining’ be more efficient than ‘dry mining’? How can large volumes of overburden best be removed by dredging techniques? Is it feasible to transport and handle tailings by hydraulic pipeline processes?

A Based on studies and large-scale trials, has in many cases led to (more) profitable mining.

Environmental projects

Q To what extent does a marine construction impact the environment? How much sediment plume will dredging generate? Where will dredged spill migrate, and how can it be prevented from returning to deeper waters? How attractive are artificial stone reefs to shellfish, lobsters and seabirds? And to fishermen?

A Hydronamic has studied all these questions for several projects in various parts of the world. Advice given, based on studies and large-scale trials, has in many cases led to (more) profitable mining.

Offshore projects

Q What are the options for platform seabed preparation? How can offshore pipelines for the energy industry be stabilised and protected by means of large-scale natural materials? Can these materials also be used for thermal insulation?

A For these and other complex aspects of pipeline and platform intervention, Hydronamic is able to provide innovative viewpoints. Based on thorough understanding of dredging and trenching processes, and of sea-bottom behaviour, Hydronamic has prepared cost-effective schemes, several of which have found their way to industry-wide implementation.
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Environmental projects

Q To what extent does a marine construction project impact the environment? How much sediment plume transport will dredging generate? Where will dredged spill migrate, that originates from offshore processes or outlet boxes?

A Hydronamic, in close cooperation with other group members, operates at the forefront of studies and developments to answer these questions. Investigations are initiated at projects under construction to learn and benefit from experience. A wealth of knowledge and state-of-the-art technology are the basis of design and construction advice.

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Q What are the options for platform seabed preparation? How can offshore pipelines for the energy industry be stabilised and protected by berms of granular material? Can these materials also be used for thermal insulation?

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Q What can be the options for disposal of tailings? How can long-term assurance of a safe burial depth be achieved? Is it feasible to dredge or plough trenches for pipeline burial or for lanslats and outfalls?

A Hydronamic is able to provide technical advice for contaminated sediment remediation projects: dredging, treatment and beneficial use, either ‘as is’ or after treatment.

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