

MARINE INFRASTRUCTURE

Independent technical expertise for efficient ports, terminals and waterways

SECURE GROWTH ON STRONG FOUNDATIONS

New ports and terminals, waterways and other marine infrastructures are milestones for macroeconomic development, enabling trade and logistics especially in areas with potential for more development. Highly industrialized countries expand and modernize their infrastructures to remain competitive.

Well-performing infrastructures are essential to economic growth
Environmental, social, financial, and economic aspects are crucial to ensure the development of sustainable and commercially-viable assets and operations. The performance and quality of marine infrastructure are key enablers in a global and competitive logistic environment.

Complex project and operations demand multidisciplinary technical expertise
Planning, designing and operating large marine infrastructure projects have always been complex and demanding undertakings. They require understanding of the shipping and maritime sector, expertise in civil construction on the waterfront and in the water, and knowledge of custom-engineered structures. Ports and terminals rely on seamless operations with increasing requirements for automation as they become progressively digitalized.

A technical powerhouse to support marine infrastructure planning, development and operations
As the leading technical advisor to the maritime, oil and gas and energy industry, DNV GL brings a broader view to complex business and technology risks in marine infrastructure projects. Our combined technical expertise covers all phases of marine infrastructure developments.

Building on 150 years of deep industry experience in maritime and oil and gas, we are involved in major marine projects around the world, ranging from LNG terminals to special cranes and harbor equipment, as well as water locks and the development of entire mega ports. The know-how gained from such projects enables us to identify and transfer best practices, making us the trusted partner in complex and large marine infrastructure undertakings.

Through our work we provide our customers with assurance of a successful project outcome with respect to schedule, quality and cost, as well as secure sustainable solutions over a long lifetime. From the concept & feasibility phase to operation of marine infrastructures, our independent experts enable our customers to foster future growth on strong foundations.

We work closely with asset owners and investors as their trusted independent partner for technical assurance and advisory support, ensuring that the project—either upgrades and extensions or new-builds— is delivered to a high quality, on time and according to budget.

COMPREHENSIVE TECHNICAL EXPERTISE

■ Ship traffic and marine logistics

■ Civil engineering

■ Geotechnical engineering

■ Hydraulic engineering

■ Structural engineering

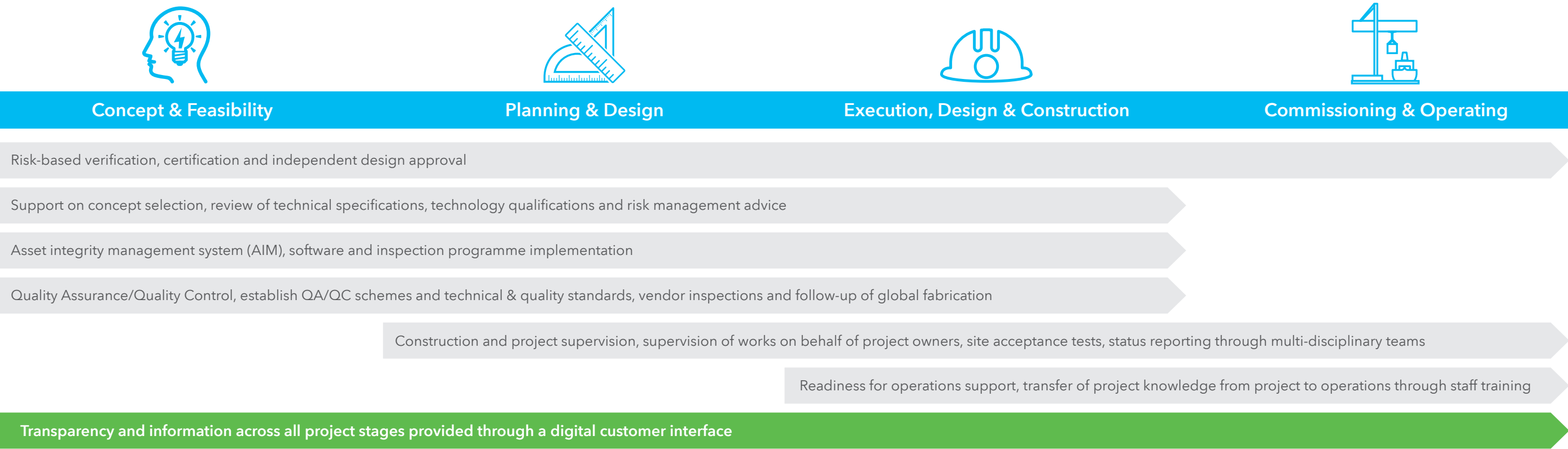
■ Surface construction

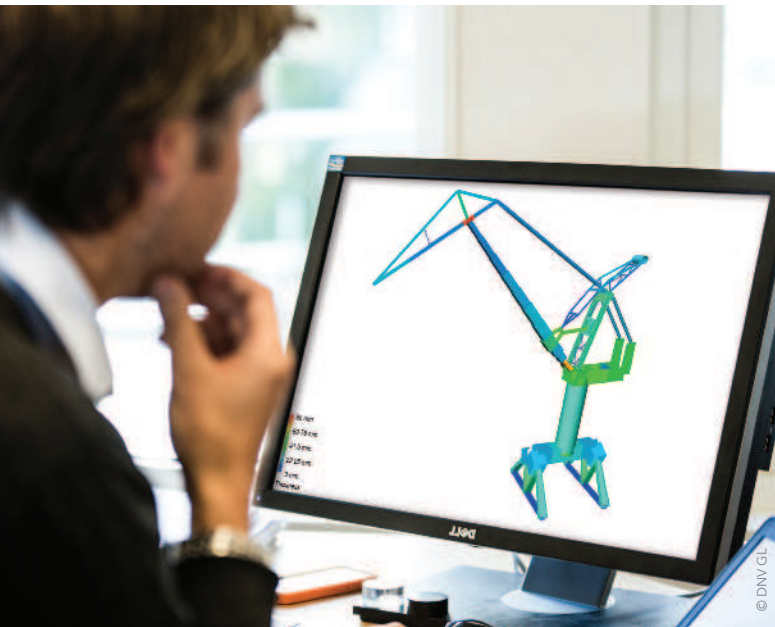
■ Cranes and lifting appliances

■ Power distribution

■ Control and automation systems

End to end solutions for complex marine infrastructure projects





Addressing critical aspects early on with a trusted independent partner

DNV GL provides its independent expertise in technical assurance roles working for the project owner, investor or operator. We support the project with design verification, safety concepts and risk analysis related to the operation, helping our customers to build or upgrade an asset in a cost-efficient way and to secure its compliance to appropriate rules and standards. Our work helps to increase transparency and quality.

We enable our customers to achieve a cost-effective design without over-engineering. For all large and complex projects, the early identification and mitigation of risks are a prerequisite to achieve overall cost savings.

Quality assurance and certification for a wide range of assets

Our maritime heritage enables us not only to deliver quality assurance and certification services on an end-to-end basis, it also allows us to cover all major asset types within marine infrastructure projects.

In-depth asset expertise

COMPLETE PORTS AND TERMINALS	Bulk and break bulk terminals Oil and gas and hazardous goods storage and terminals	Container terminals Passenger terminals Special cargo terminals
LARGE HYDRAULIC CONSTRUCTIONS	Ship lifts Water locks Weirs and dams	Port facilities and quays Docks Floating locks
EQUIPMENT FOR PORTS AND TERMINALS	Container cranes Gantry and jib cranes Offshore cranes	Railway bridges Roll-on/roll-off ramps Passenger boarding bridges
SPECIAL CONSTRUCTIONS	Large flood gates Special bridges (e.g lift bridges) Submarine tunnels	Precision steel construction for bearing foundations and machine foundations

Staying ahead of the competition through operational excellence

Ports and marine infrastructures need to maintain and strengthen competitiveness by continuously improving availability and quality of services towards customers. Smooth port operations with reduced harbour idle times require ongoing upgrades of a port's physical and digital infrastructure, resulting in state-of-the-art operations.

Through DNV GL's independent verification of safety concepts and risk analyses related to automated operation, our customers can maintain and improve operational performance. Our experts develop and implement asset integrity systems on behalf of our customers by applying risk-based inspection schemes supported by our trusted software if required. Our work is executed in accordance with internationally recognized rules and standards, as well as specific customer requirements.

The future is digital

Control systems are gradually taking over manual work, allowing for automated or even fully autonomous operations in container and bulk handling. More robust and wireless sensor technology along with mesh networking, cloud-based solutions and smart algorithms are key enablers in this digital transformation and will be an integral part of the port of the future. As software drives both safety and operation-critical systems, the quality and reliability of IT infrastructure and software, as well as connectivity, is becoming a key success factor for modern ports and marine infrastructures. DNV GL is a world leader in the verification and testing of automation and control software, and works closely with customers to ensure that software and IT system interfaces meet functional requirements.



THE UNKNOWN COST

"Planners are seeking cost effective solutions in their layouts of ports and terminals but hidden challenges are sometimes not easy to discover and can have a large impact on cost. In one project in the Mediterranean we have helped our customer to identify such saving potential: Together we were able to identify a more cost effective layout of access roads and improved the use of shared infrastructures within the port's industry cluster. We also used our asset integrity management tool to identify and optimize operational cost early in the game. Our expertise is helping to save our customer cost and we are proud of being able to add considerable value to his business."

Mathias Hietel, Senior Civil Engineer, DNV GL

WHY PARTNER WITH DNV GL?

Drawing on 150 years of deep industry experience from maritime and oil and gas, DNV GL supports owners, investors, operators and insurers with independent expertise across all phases of marine infrastructure and port construction projects. Our independent advice enables companies to make the right choices and helps to solve complex technical issues.

Global expertise with a local presence

DNV GL offers access to technical experts around the world drawing from our broad knowledge and skills in oil and gas and maritime. We have offices and run projects in all major harbours around the world. Through our global network of multi-disciplinary experts, we are able to bring best practices to our customers and work at the forefront of technology and innovation.

Regulatory foresight to secure cost-efficient marine infrastructure projects

We enable customers to master a changing business environment and to prepare for upcoming developments to secure sustainable operations. By knowing what's coming in the future, understanding technologies and economic trends, our customers can adapt quickly to changing requirements and stay at the competitive edge.

Sharing knowledge and setting the standards

Throughout decades, DNV GL has developed rules and standards based on modern safety theory and practice and the latest advances in design and dimensioning principles, setting the benchmark for global best practice in marine operations. DNV GL's Noble Denton marine services have supported the marine industry for more than 50 years, helping customers to reduce risk and enable safe, reliable and enhanced performance, solving hazardous operations associated with working on the waterfront and in the water. We can provide both guidance and services to enable alternative solutions and ensure project safety by finding the right balance between safeguarding project quality and high technical integrity and cost efficiency.

We invest in innovation for safe, efficient and digitalized marine infrastructures

Ports and harbours become an integral part of the digital transformation. Success will depend on new ways of working. Reducing complexity and streamlining processes for greater quality and cost efficiency, while analysing increasing volumes of data to manage risks and generate safer, more sustainable operations. To support research and innovation development, we invest around 5% of our annual revenue in research and innovation.

SMART CUSTOMER COLLABORATION



At DNV GL, we ease project collaboration with our customers through customised, secure web portals for status reporting and document sharing. This provides transparency and insight into project processes from start to finish.

For more information visit: www.dnvgl.com/mis or email us at mis@dnvgl.com



www.dnvgl.com

About DNV GL

Driven by our purpose of safeguarding life, property and the environment, DNV GL enables organizations to advance the safety and sustainability of their business. We provide classification, technical assurance, software and independent expert advisory services to the maritime, oil & gas and energy industries. We also provide certification services to customers across a wide range of industries. Combining leading technical and operational expertise, risk methodology and in-depth industry knowledge, we empower our customers' decisions and actions with trust and confidence. We continuously invest in research and collaborative innovation to provide customers and society with operational and technological foresight. With origins stretching back to 1864, DNV GL's reach today is global. Operating in more than 100 countries, our professionals are dedicated to helping customers make the world safer, smarter and greener.