The welfare of our planet depends on the existence and maintenance of ports, rivers and safe estuaries. So dredging - and all it involves - is indispensable.

We all feel our responsibility to future generations. Our legacy must be a world in which they can prosper: a clean and safe earth with sustainable energy, abundant natural life and economic opportunities.

So the IHC Systems mission is to optimise dredger performance and operations. To reduce over-dredging, spillage, energy consumption, emissions, turbidity, ecological side-effects and operational costs. And, ultimately, to improve the global present and future.

Our instrumentation & automation, knowledge, expertise and experience are dedicated to this aim. They are our contribution to IHC Merwede and to a sustainable future for all our stakeholders.
Efficient Dredging

as a concept

‘Efficient Dredging’ is a total concept that allows contractors to deploy dredging equipment for the lowest possible costs, generating the highest possible economic and ecological benefits, and maximising satisfaction for the people who work with that equipment. It underlies everything we do: our thinking, our processes, our software, our hardware and our services.

The optimal utilisation of onboard equipment, the reduction of dredging time, a smoother dredging process, the simplification of fault diagnosis and facilities to reduce downtime and wear, the prevention of under- and over-dredging: these are the operational benefits of Efficient Dredging.

Even after the shipbuilder has built reliable and efficient equipment, and even after all the efforts of the contractor to optimise the utilisation of that equipment, the Efficient Dredging concept continues to make a significant contribution, providing dredgers with extra ‘senses’ and ‘hands & feet’.

Relatively modest investments in instrumentation, automation, and surveying techniques lead to major improvements in efficiency and accuracy. The normal curve of human performance means that human alertness declines substantially during a working shift; computers, however, stay awake as long as power is switched on. So automation under dredge master supervision can yield production improvements of 15-25%, or even more, depending on the circumstances.

To implement the concept, IHC Systems draws on all kinds of conventional control, automation and presentation technologies. But also on innovative technologies like model-based control, artificial intelligence, real-time simulation and remote system diagnosis & upgrading. We also exploit the vast knowledge and resources of the entire IHC Merwede group in the areas of shipbuilding, mechanics, soil mechanics, dredging, mining and so on.

The concept is honed in close alliances with clients to achieve outstanding operations, and worked out in specific products, systems and services for every category of dredger and every field. Needless to say, the products can cope with all dredging conditions: temperature and humidity changes, shocks, dust, abrasive materials, pressure variations and vibrations.

Our website supplies more detailed product brochures.
The Efficient Dredging concept on trailing suction hopper dredgers optimises:

- the suction process during trailing
- the settling process in the hopper
- the accuracy of the location to be dredged
- the dredge cycle time in relation to sailing time
- the pumping process during pumping ashore or rainbowing
- the utilisation and distribution of available power
- the relations between these processes
- crew training with IHC Systems simulators.

A wide range of hardware and software products are available for this purpose, starting with robust pressure, production and position measurements for, among other things, pump performance, overflow ducts and suction pipes. Moving up a level, monitoring systems present the position of suction pipes and the loading status of the hopper, and include automatic controllers for this equipment and for the dredging pumps. Dredge track presentation systems supply information about the location where the dredger is working and can be used to prove that the job has been done right.

Control systems of the first level provide manual or semi-automatic control for the hydraulically or electrically operated equipment: sluice valves, bottom doors, winches and so on.

However, these systems can be expanded and combined with the functionality of the monitoring systems to produce fully integrated presentation, control and automation systems. This is the third application level for Efficient Dredging. It serves the total dredge and sailing process, including navigation, engine room monitoring and automation, power management, one-man-operated bridges and class-approved DP/DT systems.
The Efficient Dredging concept on cutter suction dredgers optimises:

- the cutting and swing process
- the anchoring and spud changing process
- the suction and pumping process and the total mixture transport chain, including boosters
- the accuracy of the location and the dredging profile
- the utilisation and distribution of available power
- the relations between these processes
- crew training with IHC Systems simulators

A wide range of hardware and software products are available for this purpose, starting with robust pressure and production measurements, as well as position measurements for the spud carrier and the ladder, for example. Moving up a level, monitoring systems present the position of the cutter in its local grid and provide automatic controllers for profile dredging and pumps. Dredge track presentation systems supply information about the location where the dredger is working and can be used to prove that the job has been done right.

Control systems at the basic level provide manual or semi-automatic control for the hydraulically or electrically operated equipment such as winches, sluice valves, spuds and so on. However, these systems can be expanded and combined with the functionality of the monitoring systems to produce fully integrated presentation, control and automation systems. This is the third application level for Efficient Dredging. It serves the total swinging, cutting and mixture transport process, including control of available boosters, engine room monitoring and automation, and power management. Additional functionality, such as navigation control and autopilots, is available for self-propelling cutter suction dredgers.

Although the bucket line dredger is becoming rare in dredge operations, automation for these vessels is quite similar to cutter suction dredgers and IHC Systems can also provide it.
The **Efficient Dredging** concept on excavator dredgers optimises:

- the accuracy of the location and the dredging profile
- the safety of cutting and slew operations
- outreach, pontoon and swing protection
- the relations between these processes
- self-learning automation of routine jobs
- crew training with IHC Systems simulators.

The ‘brain’ here is a dedicated monitoring system known as XPM. It draws on input from rugged position transmitters to present the excavator in its local grid, enabling the operator to do the job efficiently. A wide range of options include: automatic profile dredging, automatic tooth angle, automatic safe limits of movements and any specific automation requested by the client. Connections to dredge track presentation systems supply information about the location where the dredger is working and can be used to prove that the job has been done right. Very high dredging accuracies are entirely feasible.
Efficient Dredging
and hydrography

Efficient Dredging is more than just perfect instruments and automated equipment. It also means dredging in the right place and avoiding under- and over-dredging, regardless of the type of dredger. Careful planning, online verification and confirmation of the quality of the work are the keywords.

IHC Systems has developed the essential tools for this purpose, providing customers with even more effective ways to:

• determine exactly where to dredge and to forecast material quantities
• present the dredger in a digital terrain model (DTM) and bathymetric charts
• update chart data online during dredging
• immediately deliver proof of performance and a basis for payment upon completion
• hook up a wide range of position information apparatus easily
• install 3D terrain and dredger presentation add-ins.

With input from gyrocompasses, echo sounders, tidal transmitters, DGPS and other positioning systems, dredge track presentation system (DTPS) packages are suitable for operations on board survey vessels and dredgers to tolerances, defined on the basis of both cost and job requirements, that can be to within centimetres.

The package also includes fully equipped survey vessels, multi-channel telemetry systems, sonar/multi-beam sonar, sub-bottom profilers and so on. As well as simulation and training for crews and operational staff. The packages also allow operators to do their own training on board during downtime.

IHC Systems is fully prepared to cooperate with customers in providing innovative solutions for any kind of challenge. We are a value-adding reseller and a system integrator for many manufacturers in the field.

Careful planning, online verification and quality confirmation
IHC Systems’ life cycle support (LCS) is an integral part of the Efficient Dredging principle. It maximises equipment uptime, and therefore the capacity to earn back the investment in return for the lowest possible costs of ownership.

This starts in the sales, specification and design stages, with reliability, availability, maintainability and safety (RAMS) as vital components of every system. Production, test stage and commissioning under Quality Management control make further contributions.

Once in operation, the uptime of the equipment depends heavily on operator skills, how easily errors are detected, the right maintenance and the logistics for spare parts. The condition-based maintenance system (CBMS) is an excellent tool for this purpose. Its model-shaped algorithms combine operational and technical, OEM and sensor data about wear with ship management systems. The system can, for example, generate recommendations about preventive maintenance systems. The system can, for example, generate recommendations about preventive maintenance systems. There is a web portal so that all information can be accessed easily worldwide by all the partners, who can then combine OEM knowledge and operational knowledge and make optimal use of those costly assets, the dredgers.

Electronic systems regularly require upgrades. Increasingly, software upgrades take place online using the IHC Connect protected data infrastructure. Hardware upgrades usually involve dedicated operations, an area where IHC Systems has a proven track record.

Sustainable operations, durable relationships and innovations by our clients all benefit from this practical effect of the Efficient Dredging philosophy. Special products and services in this field are available or can be developed in close concert with customers. LCS is available 24/7.
Dredging contractors are constantly facing up to new challenges in the fields of legislation, sustainability, greater operating depths, remote locations, and more extreme sea and climatic conditions. Regular product development at IHC Systems keeps pace with these evolutions.

For the more intricate and long-term challenges, IHC Systems has an independent research department of dedicated professionals with sound academic and practical credentials. They include people with doctorates, as well as doctorate students exploring cutting-edge advances. Others have years of experience with the fundamentals of dredging, the equipment and the processes.

The research department participates in leading IHC Merwede corporate research platforms, studying sustainability, artificial dredging intelligence, deep sea technology, integrated participation and life cycle support technology.

In our own field of Efficient Dredging, the research department is an active pioneer at the frontiers of dredge process automation and instrumentation; it pushes those frontiers back, setting new standards in the field. These activities are often conducted in intensive partnerships with customers and suppliers, generating benefits for all.

Examples of recent research are:

- a patented force algorithm that allows the IHC Systems DP/DT system to keep track, irrespective of the forces exerted by suction tubes and drag heads
- a new generation of control for cutter suction dredgers using Extended Kalman Filtering and advanced sensor diagnostics
- a virtual environment and physical models that make it possible to set up training simulators for every kind of dredging equipment
- complete, reliable and clear à la carte dredge process automation developed in consultation with the crews, making it possible to install one-man-operated bridges on trailing suction hopper dredgers
- Artificial Intelligence and model-based control applications that facilitate complicated mixture pumping processes and hopper settling information
- new sensors, for example to measure spill.

In many research projects, IHC Systems also works with the corporate knowledge institute MTI Holland and other knowledge institutes, with Dutch and Flemish universities, with parties from the maritime cluster in the Netherlands and with government institutions such as SenterNovem.
IHC Systems

Dedicated to Efficient Dredging

With over 40 years of experience and a highly experienced workforce, IHC Systems is the market leader in the development, manufacture, simulation and supply of instrumentation, control, automation and simulator systems for the dredging industry, the alluvial mining industry, sand and gravel mining and related industries.

With its location in Sliedrecht, the heartland of dredging, IHC Systems’ workforce of about 100 is dedicated to the concept of Efficient Dredging and its proven benefits for the users of dredging equipment.

To fulfill this commitment IHC Systems builds all kinds of electric, electronic and information technology systems, from robust sensors and transmitters to complete integrated control, monitoring and automation systems, as well as simulators/training simulators, and hydrographical and survey equipment. Services range from sales support and system integration management to training and worldwide field service - all conceivable activities in between.

IHC Systems operates in compliance with the standards of ISO 9001: 2000 and is fully certified to do so. All the knowledge and experience needed to make Efficient Dredging work are available in-house or from IHC Merwede colleagues: ranging from maritime electrics and electronics to soil characteristics, shipbuilding, mechanics and any other knowledge involved in the building and control of dredging, mining and offshore equipment.

The IHC Systems crew manages all the activities needed for the creation and successful operation of Efficient Dredging products and systems, such as pre-feasibility and feasibility studies, design, research and development activities, engineering, drawings, work preparation and logistics, manufacturing, testing, system integration, commissioning, simulator-supported training, spare parts management and any other aspect of life cycle support.

Our strategic partnership with Imtech Marine & Offshore means that we have in-depth resources in the field of industrial instrumentation and control technology. Our incorporation in the structure of IHC Merwede allows IHC Systems to be represented in nearly every country in the world.

IHC Merwede

The technology innovator

IHC Systems is a member of the IHC Merwede group, which comprises three divisions: Dredging & Mining, Offshore & Marine, and a group of sector-related products and services. The third division is the meeting point for technological expertise, and so it is known as Technology & Services.

Each division operates both individually and in complementary ways so there is a high level of synergy between related IHC Merwede units. The group is a genuine one-stop shop for the whole range of equipment in the fields referred to here.

IHC Merwede stands out as the technology innovator. Highly developed knowledge, experience and craftsmanship generate outstanding products, systems and services. A substantial part of the annual turnover is dedicated to R&D to maintain our pole position.