FORGING
HEAVY DUTY
SOLUTIONS

DREDGING EQUIPMENT HAS TO WORK IN INCREASINGLY DEMANDING CONDITIONS.
And that means larger, truly heavy duty dredge pumps, with castings up to 30 tonnes, for highly abrasive mixtures.

DYNAMICS OF NATURE

THE CHANGING FOCUS OF CIVIL WORKS CONSTRUCTION.
Can dredging equipment keep up with the rapidly developing fields of eco-engineering and geotechnics?
Port authorities looking to making the switch to sustainable silt dredging and treatment technology can’t look past AMORAS, the Antwerp super project that is now four years into its 15-year exploitation phase.

DEME Design and Construction Manager Joury van Gijseghem led the successful completion of the AMORAS project’s initial phase in 2011. SeReAnt, a joint venture of DEME, Jan De Nul and their respective subsidiaries DEME Environmental Contractors and Envisan, had just 30 months to design, build and commission arguably the largest silt dredging and treatment project in the world, representing a construction investment of EUR 118 million.

After AMORAS, Mr Van Gijseghem moved on to a new role as General Manager of DEME Blue Energy, but he recalls with precision the challenges then in front of him.

Huge project, short timeframe
The project scope was complex with several large treatment plants, settling basins and several kilometres of transport pipelines. Plus, the project required two separate dredge installations, as Mr Van Gijseghem explains from his office at the DEME Group headquarters near Antwerp.

“It was a combination of the dredger and, on the other side of the site, two pumps for the dredging gantry over the settling basins. We needed very reliable equipment to operate with minimum downtime over a long 15-year period. The response from Damen to our call for tender, plus the first discussions that took place – that went very well and we had the idea that it was going to work with Damen. In the detailed engineering we worked very closely together – it was a very close and fast collaboration. It had to be fast, because we were under time pressure. In the end, Damen delivered the custom-designed equipment within 14 months.”

Sustainable public works
The AMORAS project, initiated by the Flemish Government and the Port of Antwerp, treats dredged spoil and stores up to 500,000 tonnes of dewatered silt and sludge each year in a new and sustainable manner. The process limits the environmental and ecological risks compared to alternatives, such as dumping on quays or lagooning. It reduces the space required for disposal and protects the port area from sea, air and groundwater pollution.

As Mr Van Gijseghem confirms, the super project is performing well and the uptime of the dredger has been a critical factor. If the dredging spoil is not pumped ashore in time, the whole project stands still.

“AMORAS has been going strong for several years now and the dredging equipment has been extremely reliable. There’s condition monitoring of the dredger as well, to make sure we can plan maintenance, with parameters for preventative and predictive scheduling.”

Unique benchmark project
The 30-hectare AMORAS storage site has capacity for filter cakes of dewatered silt up to a height of 50 metres, providing an operational lifespan of at least 30 years. Meanwhile, research into circular economy applications for the uncontaminated filter cakes is ongoing, such as for clay granules, bricks or road construction.

In the four years since operations began, this unique project has received widespread attention from around the world, proving a successful solution for not just lack of space but also for a more sustainable future.

“It was quite a big project. I think it’s the biggest, or one of the biggest, mechanical dewatering facilities at any port in the world. There are a lot of places with such challenges, Hamburg for example, so many ports have been interested in how we managed to solve it here.”
CSD Amoris
Damen custom-engineered stationary Cutter Suction Dredger type ECSD450

Features
- Capacity of 3,000 m³/h of mixture, for both the cutter action as well as the barge unloader
- Dredging depth of max -18 metres
- Dimensions 34 metres by 9.5 metres

Dredge installation
- 2 x inboard Damen dredge pumps – Type BP45 1100 – electrically driven
- 450 mm diameter discharge, 300-metre line connecting to the sand separation plant
- Powered by high voltage shore cable supplying total power on board of 15.75 kV at 1,800 kVA
- Heavy duty cutter ladder swings by means of hydraulic cylinders instead of anchor and side wire winches
- 4 x spuds and 2 x hydraulically operated spud carriages

In the plant, membrane chamber filter presses produce 500,000 tonnes of dewatered filter cake a year, while the water is purified and discharged back into the harbour.

Fully automated rotating 175-metre gantry has two mobile Damen DOP dredge pumps, which operate independently along the entire span, to transport silt for dewatering.

Rotating Gantry with integrated DOP submersible dredge pumps
- Movable span of approx. 180 metres
- 2 x controllable trolleys with attached Damen ladder
- 2 x identical and interchangeable 150 kW hydraulically driven standard Damen DOP dredge pumps, type DOP2320
- Dredging pump capacity of 1,000 m³/h per pump
- DOP pumps are movable over the radius axis and the working angle can be adjusted by means of a hydraulic cylinder
- Maximum dredging depth of -6 metres
- Hydraulically driven auger head to maximise the mixture concentration
Abeko Dredging & Marine Contractors is a growing company – offering its skills to small and medium sized dredging projects such as capital and maintenance works, sand dredging and trenching. The Netherlands-based company by no means limits itself to Dutch projects; its clients are based from Kent to Qatar.

“In 2010, we decided that we needed a TSHD to supplement our three backhoes,” begins Abeko Managing Director Evert Sprengers. “We didn’t want to compete directly with the big dredging companies – but having a TSHD in our fleet would really complement some of the contracts that we were tendering.” This decision reflects Abeko’s overall business strategy of being a full service provider.

Kick-off
A new build vessel was not in Abeko’s plan, so the company looked at converting an existing vessel – one in the form of an 88-metre coaster. “With a conversion, you have to make compromises,” continues Mr Sprengers. “For us, the decision was a financial one. The price difference between buying a new ship or converting an existing vessel was a major factor. After approaching a number of companies, including the vessel’s original builder and another Dutch dredging shipyard, about the practicalities of converting a vessel, Mr Sprengers knocked on Damen’s door. “From day one, they were enthusiastic and they took us seriously. They had the engineering capacity and the willingness to make the project a success. We knew that if we were going to take this further, then it would be with Damen.”

Purchasing power
To reduce the costs of drydocking, the conversion process was meticulously planned: “We pre-fabed everything so that we only had to go on the slipway for a few days to fit it all.” The scope of work required was obviously comprehensive: “Basically, we stripped it. New engines, dredge pump, water jets, trailing suction pipe and auxiliary generators – all from Damen. They have such buying power, that we bought all this equipment through them.”

The conversion demanded close cooperation between Damen and Abeko’s chosen shipyard. “I can honestly say that Damen’s engineering was superb,” enthuses Mr Sprengers. “They delivered on time and on budget. And we ended up with a very modern ship – one that is more than a standard TSHD.”

In charge
Abeko has been operating this vessel for three years now, mainly for maintenance dredging contracts in Germany, Denmark and the UK. “But we haven’t needed to replace a bottom door seal yet. And with four azimuth thrusters and two spuds, the vessel is very manoeuvrable. This means good positioning, productivity and fuel savings.”

Finally, what name did Abeko choose for its newly converted TSHD? “Well, we named her Contender,” concludes Mr Sprengers. “Because, within our peers, we wanted to be in charge of our own destiny.”

A growing team
Abeko has a fleet capable of all aspects of dredging. “Our vessels work together,” explains Mr Sprengers. “By combining our backhoe dredgers, our multifunctional Multi Cat and now the TSHD, we can offer our clients the total package.”

THE GREAT CONTENDER
ABEKO EXPANDS FLEET WITH DAMEN’S DREDGING KNOW-HOW
“The hopper bottom won’t need to be replaced again – that was a once in a lifetime job,” begins Britannia Aggregates Marine Superintendent Chris Andrew. “This was a big job - using about 26 tonnes of steel.” He is talking about the refit of the Britannia Beaver at Damen Shiprepair Amsterdam. The vessel is a 100-metre trailing suction hopper dredger whose task is to keep her owners (a 50/50 Joint Venture between the Brett Group and Tarmac UK) supplied with marine aggregates.

Mr Andrew knows the vessel inside-out: after all, he’s been in his present job for coming on 15 years. “The old girl is 25 years old now, but she’s in good condition considering the aggressiveness of the aggregates that she works with. The wear and tear is considerable – for example we have to change the dredge impellers every 6 months or so and the casings every 12.” With more than four decades of marine engineering experience under his belt, Mr Andrew is certainly well qualified on the subject.

Returning customer
This major refit wasn’t the Beaver’s first visit to Amsterdam. “We have used the yard a lot in the past,” he says. “A few years back we replaced the sides of the hopper there and saw that the bottom would soon need replacing as it was so worn out from the wear of the buckets.”

As a one-vessel company, two crucial factors are important to Britannia Aggregates. Firstly, maintenance is paramount and secondly, they cannot be hanging around too long in the drydock while the maintenance is carried out.

The nature of the business
“It’s very important that the work is done on schedule,” Mr Andrew continues. “And Damen’s yard has a reputation for completing the job on time as well as for good steelwork. We did have some unforeseen jobs pop up as they normally do, but that’s the nature of the business – you never know what you’re going to find when you take things to pieces. We had a problem with the rudder stock – the rudder shaft needed machining. However, the on-site facilities at the yard are very capable of handling these bigger engineering jobs.”

Problem solvers
For Mr Andrew, the fact that Damen Shiprepair Amsterdam has a consistent team also plays a significant role. “The project managers have been there for a long time – this is important to us,” he explains. “They know how we work and they know what we are after - taking on the work very well. This takes a lot of pressure off us. You go to them with a problem and they say, ‘yes, we can manage that’. They can solve almost any problem.”

This cooperative relationship between Britannia Aggregates and Damen Shiprepair Amsterdam has resulted in a fruitful lifetime extension of one the oldest members of the UK’s dredging fleet - something that the ‘old girl’ can now look forward to.
In 2012, after the opening of the new North Sea beach at Maasvlakte 2, Mr Langendoen’s childhood fascination for fossils was reawakened. While strolling over the sand, a darkened fragment of ancient bone caught his attention. The chance discovery was one of the enormous number of North Sea fossils among the dredge spoil discharged over several years of civil engineering construction.

The fossil bug had bitten. At the time Mr Langendoen was the owner of a shop in a nearby village, so he took to the beach before and after work, spending hours a day foraging for fossils and returning with an ever greater collection of objects. But what exactly were these fragments of bone?

**Advancing science**

Curious to learn more, he approached the scientific community, including the Natural History Museum in Rotterdam and the Naturalis Biodiversity Center. Among the fossils, paleontologists identified wooly mammoth molars, giant Irish elk antlers, squirrel jaws and sabre tooth tiger bones from the last Ice Age.

“Fishermen still net the impressive big bones, complete jaws and skulls in the North Sea, but what they don’t find are the small fossils, which are actually often more important for scientists. For example, the fossilised hyena droppings, officially called ‘coprolites,’ tell us a lot about the landscapes that connected the UK with the Netherlands until less than 10,000 years ago. Because of the hyena’s diet, the droppings are high in calcium and they fossilised. By analysing these droppings, scientists can not only better understand how the animals lived, but also how the plants grew and even how the climate changed.”

**Sharing discoveries**

Although he wasn’t the first fossil hunter at Maasvlakte, Mr Langendoen’s curiosity and passion for paleontology and archaeology have increasingly brought the world of fossils to the general public’s attention. His finds have featured on Dutch television and in newspapers, exhibitions in museums across the Netherlands and Belgium, schools and permanent displays at the FutureLand information centre and HistoryLand Hellevoetsluis.

“The greatest find”

One of his most important finds was a skull fragment from a Stone Age Homo sapiens, the first definitive proof that humans lived between the UK and the Netherlands 10,000 years ago. “I think there’s a good chance that Neanderthals also lived there, around 50,000 years ago. That would be a great find. But really, the best finds are things that I can’t immediately identify. It could be a new animal or new archeological evidence. Sometimes it’s the very small fossils that I find on my hands and knees. Those are the ones I take with me and try to find out what they are. If they’re new to science, that’s very rewarding. I don’t see it as my own collection. These fossils and artifacts belong to science.”

“We probably won’t find any big fossils today,” Walter Langendoen explains, pointing out the footprints of fossil hunters weaving up and down the Maasvlakte beach in Holland, plus the occasional evidence of upturned driftwood. In the distance a couple intensely scours the sand at low tide. Yet, despite the increased competition, Mr Langendoen seems quite pleased by the turnout. After all, this growing phenomenon is largely the result of his infectious enthusiasm.”
“Going on board dredgers would help me better understand the fossils’ route from seabed to beach.”

MOVING FOSSILS

Constructing Maasvlakte 2, a huge 2,000 hectare extension of the Port of Rotterdam, required an enormous amount of sand – approximately 365 million m³. Most of this sand came from dredging carefully selected areas of the North Sea seabed, including the deepwater ‘Eurogeul’ shipping route. By dredging up to a maximum depth of 20 metres, the PUMA construction venture avoided disturbing large sections, but they also reached deeper into the seabed’s history and brought its hidden Stone Age fossils to the surface: the woolly mammoth bones and other fossils found today on the new Maasvlakte Beach.
“We have been in the Middle East for more than ten years now,” begins Maritime Craft Services Managing Director Menno Kuyt. “Our first vessel there was a Damen Shoalbuster 2609 – the MCS Nikki – that went out to work on a dredging project.” Within a few years, the company expanded its activities considerably in the region. Crucially, the location served as a stepping stone to contracts even further afield. The MCS Nikki, for example, has worked on projects in India and the Maldives.

Double advantage
Maritime Craft Services continues to grow in the Middle East – its latest fleet acquisition concerns a Damen Multi Cat 3013 called MCS Elly II that is currently providing dredging assistance to one of its customers there. The order was based on market demand, explains Mr Kuyt: “As soon as we heard that our client wanted a particular size of Multi Cat that we didn’t have in our fleet, we knew where to look.”

As is so often the case with such contracts, time was of the essence. Enter Damen Shipyards Sharjah – one of the latest additions to the Damen Shipyards Group. By bringing Damen’s capabilities to customers in the Middle East, the yard can provide the double advantage of reduced delivery times and mobilisation costs. With Damen Shipyards Hardinxveld in the Netherlands providing the engineering and management support, Maritime Craft Services could look forward to a rapid response.

So, just how important was a quick delivery? “Very important,” says Mr Kuyt. “If the vessel hadn’t been built in the Middle East – but by Damen in Holland for example – then I don’t think that we would have gone ahead with it because the time to mobilise would have been too long.” Due to Damen’s strategy of building for stock, the delivery time speaks for itself – MCS took delivery less than a month after signing the contract.

A productive decade
In addition to a quick delivery, there was another aspect to consider. “The key factor for this job was the crane capacity,” states Mr Kuyt. “The cranes are used mainly for pipeline work – connecting the dredger to the pipeline. Our client is using quite a large diameter pipeline so we needed a larger crane capacity in case of emergencies.” For this purpose, the MCS Elly II is equipped with two 33 tonne @ 9.4 metre cranes. “We can get the pipeline on deck quickly and safely, if and when it’s necessary.”

MCS Elly II is not the longest Multi Cat in the Maritime Craft Services fleet (that credit goes to the 42-metre MCS Ailsa). “But in terms of power, she’s the biggest. What’s more, she is our tenth vessel working in the Middle East,” concludes Mr Kuyt. Ten vessels in ten years – now that’s something to be proud of.
The UKD Bluefin, a 98-metre TSHD, was using the original dredge monitoring system installed during its construction in 1997. “It was old, and parts of the system were becoming increasingly unreliable and difficult to support,” informs UK Dredging Operations Manager Paul Mitchell. “Rather than install a complete new system, where possible we wanted to utilise existing sensors and cable runs, such as draught transducers and angle sensors that were proven and functioning perfectly well. Time and cost were critical to us.” To reduce downtime and keep costs to a minimum, UK Dredging planned to schedule a refit of the dredge monitoring system during the vessel’s routine maintenance drydock at the end of 2014.

Seamless installation

“We approached Damen in January 2014 with an indication of what we wanted to do. They very quickly understood what was required and came up with a proposal that matched our needs,” continues Mr Mitchell. “They were very flexible – something we were tremendously impressed by – they were able to adapt the systems, utilise some of the existing equipment and marry it up with the new system.”

“After a technical visit to the vessel, Damen did a lot of preparatory work leading up to the drydocking. This meant that they could come on board and get to work very quickly with decommissioning the old system, removing unnecessary hardware and installing the new equipment. They did all this seamlessly – in a limited time frame with zero downtime.”

The refit, notably, was performed at a non-Damen yard. “That was critical for us. We had to take full advantage of the planned drydocking and Damen’s engineers helped us do that. They were familiar with the area and knew the facilities and resources available. From a time perspective, this meant a significant cost saving for us.”

Remote solutions

The UKD Bluefin’s first campaign after the refit was a maintenance dredging contract in the Port of Sunderland. “After a short passage from drydock UKD Bluefin arrived on site, put the dredge pipes in the water, and the system worked straight away. That was just over a year ago and it has worked well ever since. We did have a few little glitches, but I must say that Damen were able to sort them out very quickly. Part of the installation includes remote access through a 3G modem so Damen were able to log in to tweak the system if necessary. This ability to remotely log in and quickly solve the problem was fantastic – none of the vessel’s original equipment could do that. If the vessel needs to stop because of a problem, then the costs can build up pretty quickly. This really is a cost effective way of maintaining and supporting the system.”

The vessel’s captain and crew are very pleased with the new system, according to Mr Mitchell. “The user display is very clear and straightforward to operate. It is also reliable and accurate. These are all big advantages for us. With her new dredge monitoring system, the UKD Bluefin is a great asset – we are looking forward to having her in our fleet for many years to come.”

Keeping costs down and maximising uptime: two crucial factors in any maritime business. No less so for UK Dredging, which keeps its well-equipped fleet up to date through a programme of continual capital investment. When one of the company’s TSHDs needed a new dredge monitoring system, they turned to Damen.

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How has Van Voorden Castings developed over the decades?
We started off making mostly ship propellers over a century ago. But over recent decades, dredging components have become a big part of our portfolio, such as high-alloyed dredge pump casings, impellers, double walled pipeline systems, anything with high wear-resistance properties. A few years ago we became part of the Andus Group, which is a large industrial holding with 15 operating companies in manufacturing, contracting and service and maintenance. That gives us a strong backing for further expansion – for example, in August we opened a new hall for storage of our clients’ wooden casting patterns.

Has the current dredging market impacted Van Voorden Castings?
We work a lot with the big dredging contractors, and of course the last couple of years haven’t been easy for the industry. But this year has started off well and we’re seeing more investment again. There are a lot of fast developments in the market – new technical challenges that our clients need to solve.

Can you give some examples, and what is the foundry’s role in developing innovations?
Dredging equipment has to work in increasingly demanding conditions. And that means larger, truly heavy duty dredge pumps, with castings up to 30 tonnes, for highly abrasive mixtures. Our focus is on matching those product applications with the right alloy properties to make our clients’ solutions technically feasible. We have our own lab and metallurgist and with that we have more and more contact with our clients during product development. For example, with Damen Dredging Equipment we’ve had an intense collaboration on a new half axial pump, which is something quite special. Together with the molding department and Damen engineers, we carefully developed very precise patterns from the 3D models to ensure the highest quality pump casing, impeller, suction mouth and wear plates.

How do clients decide the right alloy for the job?
If you look at alloyed castings made around the world, the fact is that there are big differences in quality and wear resistance, but the specifications depend on what the end client ultimately needs. We have a lot of experience and we can advise on the right alloy composition for the job. It depends on the whole mechanical configuration, flow rates, those sorts of factors. In any case, for every casting we test the melts and keep adjusting the composition until it’s perfect.

Are you seeing more pressure on price from global competition?
All our production is here in the Netherlands and we don’t compete on price with China, that’s clear. But we can compete on quality and response time. That’s why our clients choose a foundry in the Netherlands. We’re close to the world’s biggest dredging contractors and OEMs and we can think with the client, to find solutions together. Those are really the three main factors for our clients. Our short response time, cooperation as a partner, and the level of quality.

So is the outlook positive for Van Voorden Castings?
The equipment that we cast alloys for ends up at work all over the world, so we’ve followed the growth of the global dredging industry closely. In the short-term, while the global market is still picking up, the big dredging companies are mainly using their existing stock of spare parts and equipment first. So looking at our order book, you can see that the main growth comes from OEMs like Damen, with new products and innovations. The demand for high quality wear-abrasive equipment is there, and it’s growing and that has a positive impact on us.
Bangladesh is an up and coming country, widely believed to have the potential to develop into one of the world’s largest economies in the 21st century. However, there are many obstacles hindering its economic, and social, progress. Perhaps one of the most significant challenges facing the country stems from its combination of climate and geography, which result in regular natural calamities such as floods and cyclones. The Damen Dredging Journal met up with Damen Sales Manager Asia Pacific Rabien Bahadoer at Damen’s headquarters in the Netherlands to learn more about this resilient country.

The majority of Bangladesh is dominated by the Ganges-Brahmaputra-Meghna Delta – named after the country’s three major rivers. The Delta, home to two thirds of the population, consists of a vast network of interconnected rivers. It is not surprising that low-lying Bangladesh is sometimes known as ‘The Land of Rivers’.

**River maintenance**

Road and rail infrastructure in the region is limited. Rivers, therefore, play a vital economic role in trade and travel. “Rivers actually replace the roads,” explains Mr Bahadoer. “But floods are an annual occurrence. And because the land consists of fine sediments, flooding leads to erosion. This leads to problems in river navigation.”

With more than 8,000 km of inland waterways, Bangladesh depends on a functional river network. “For the rural population, river transport is the cheapest means of getting around,” continues Mr Bahadoer. “However, all of Bangladesh’s rivers carry and deposit a lot of sediment – mainly silt. This silt needs to be managed and maintained.”

**Mobility = Economy**

Safe and effective navigation, therefore, brings considerable economic advantages. “Dredging – deepening and maintaining rivers to allow bigger vessels – unlocks the potential of rural areas. It gets the goods from A to B. What’s more, dredging provides the proper foundations for civil engineering works like bridges and railways.” A prime example of such a venture? The prestigious Padma Bridge Project: a multipurpose road-rail bridge that will increase mobility and, on completion, is set to be the country’s longest bridge. This major civil engineering project was preceded by extensive dredging works.

**40 years on**

The Netherlands and Bangladesh face similar challenges concerning flood management, high population density, increasing urbanisation and intense pressure of the road and rail networks. In fact, Bangladesh’s delta region commands a significant position on the political stage – seen by the two countries’ governments and the World Bank Group signing an agreement mid-2015. The resulting partnership aims to create a long-term vision for delta management – achieving Bangladesh’s goal of becoming a middle-income country by 2021.

So, what role does Damen – a Dutch company – play in Bangladesh? “As for Damen, we have been an active presence in Bangladesh since the early 1970s,” informs Mr Bahadoer. “There are several Damen vessels operating there – and I am proud to say that some of them are more than 40 years old and still going strong. It’s an unmatched track record that is underpinned by quality, performance, life cycle support. That’s what our customers appreciate.”

**Long term partners**

Damen’s customers include reputed government bodies such as the Bangladesh Navy, the Bangladesh Inland Water Transport Authority and the Chittagong Port Authority, as well as private companies. After decades of building strong contacts, Damen is looking forward to growing stable long-term business relationships: “We want to support growth in Bangladesh – by playing a vital role in tackling the challenges of this beautiful and developing country. Keeping the rivers and channels navigable with quality equipment, dedicated services and proper training,” says Mr Bahadoer.

Training, in particular, is crucial – demonstrating Damen’s commitment to nurturing local skills as well as optimising a vessel’s entire life cycle. In fact, Damen Technical Cooperation (DTC) takes this principle a step further – by constructing Damen vessels at Bangladeshi yards, the company is contributing to the valuable transfer of technology and skills to a country looking to develop its own shipbuilding expertise and knowledge. Looking at the accomplishments so far, in addition to the future possibilities, it’s clear that Bangladesh and Damen are on a path to shared success.
Can dredging equipment keep up with the rapidly developing fields of eco-engineering and geotechnics? To rise to the challenge, R&D cooperation across the industry is key, says Johan Pennekamp. He is R&D Manager Water-Soil-Interaction at the Dutch applied research institute Deltares, as well as Vice President of the Central Dredging Association (CEDA) and Chair of CEDA Netherlands.

Last century’s colossal construction projects underpin the Netherlands’ infrastructure and coastal defences. Yet, these engineering wonders have also left their scars. In some cases such as Lake Markermeer, dams, dikes and reclaimed land have cut off waterways, leading to turbid waters and dramatic declines in fish and bird populations. It’s a long way from today’s focus on ‘Building with Nature’, comments Mr Pennekamp.

“From the Middle Ages, the people here in the Lowlands have been maintaining rivers and canals. But it was during the sixties and seventies that we began looking at how nature organises itself, the effects of silt agitation, rock breaking and transporting different mixture densities. That period became the roots of today’s fundamental knowledge in the Dutch and Belgian dredging industry.

“I think our prime achievement from those years has been providing the dredging industry with insight into physical dynamics. That led to a change in the technology and the process of dredging. Back then, dredging was a matter of craftsmanship, where the highly experienced dredge master listened to the pumps, read the manometers and felt it in his gut. The performance came down to experience, not...
necessarily something you could predict or control. Now we have a very good understanding of those dynamics and energies. That’s not only a great headstart for dredging contractor productivity and efficiency, it’s also become something we can teach. Dredging used to be an art, now it’s also a science.”

Applying fundamental dredging research, contractors can better understand the dredging process, calculate conditions and evaluate risks.

However, today’s focus is shifting from mechanical construction to eco-engineering and geotechnics. Why? Because contractors face increasing regulatory and societal demands to reduce the environmental impact of population growth and economic development.

“These fields combine dredging knowledge with natural ecological dynamics, extending toward biological and chemical processes in dredging solutions. This is where Deltas is increasing our understanding of unconventional construction materials – from soft soils to organic solutions. Chemical compositions, salinity – these are very important factors to get the proper results with the productivity required from the dredging industry.”

As expertise in these areas increases, so too does the demand on the industry to develop new technical innovations. Mr Pennekamp believes Joint Industry Projects (JIPs) hold the future of important technology breakthroughs. He says that while the industry’s top players remain fierce competitors, when it comes to pre-competitive cooperation, they have shown pragmatic consensus.

“The Dutch and Belgians tend to join hands when they can’t reach it on their own. Whether sharing each other’s findings or financial investment in innovation, my experience is that there is very good sparring between contractors at a very high level and that is pushing successful innovation.”

As far turbid Lake Markermeer, the future looks clear with a new project starting in 2016. The “Marker Wadden” project (pictured) will construct islands, marshes and mud flats from the accumulated sediment to form a unique ecosystem and boost biodiversity.
THE RIGHT EQUIPMENT FOR THE RIGHT JOB
FIT FOR PURPOSE AT EVERY STAGE

Cutter Suction Dredgers
Damen’s wide range of standard, stationary cutter suction dredgers are designed for durability and power, with extremely high output and fuel efficiency. The vessels have an ergonomic cabin for comfortable operations. The on board systems offer continuous, simultaneous usage. Damen CSDs are dismountable for easy transportation to even the most remote of locations.

DOP Dredgers
This dismountable, modular dredging system is highly versatile with a range of options for operating at varying dredging depths with various suction devices. They are easily transportable and can reach remote areas such as hydro power dams.

DOP Submersible Dredge Pumps
At the heart of this versatile tool is a wear-resistant, hydraulically or electrically driven dredge pump. Different types of suction heads can be provided to suit any dredging situation.

Booster Stations
Damen Booster Stations easily bridge the important discharge distances of large job sites. Placed in the discharge pipelines of stationary dredgers or DOP pumps, Booster Stations ensure the execution of any challenging project. A heavy-duty standard range is available with various options, including remote control.

Trailing Suction Hopper Dredgers
The Damen Trailing Suction Hopper Dredger range offers a capacity up to 2,500 m³ and a dredging depth capability up to 22 metres. Damen also supplies complete trailing pipe packages to third-party yards and, on request, can convert existing vessels into TSHDs.

Stan Tugs
The Damen Stan Tug series can cover pushing, push-pull, berthing and pipeline-handling operations amongst other things, perfectly suited for assisting dredging operations.

Shoalbusters
The Damen Shoalbuster has a versatility of work scope capabilities that includes dredger assistance. The multi-purpose vessel can be applied to harbours, inland and coastal waters. Shoalbusters have an impressive lifting capacity and ample deck space.

Multi Cats
Multi Cats are a standardised, multi-purpose vessel for the dredging industry. These compact vessels take care of push and pulling of the dredger, anchor and pipeline handling, repair works to cutter and pipelines, crew and fuel transport, etc.
DAMEN’S LARGEST TSHD BUILT IN INDONESIA

Barito Equator, a Damen TSHD 2500, was delivered in May 2015. The 2,500 m³ capacity vessel is not only the first of its kind to be built in Indonesia, but is also the largest standard hopper dredger that Damen has built. Indonesian shipyard Steadfast Marine built the Barito Equator with assistance from Damen Technical Cooperation.

The local yard has helped advance Indonesia’s maritime ambitions through transfer of technology during the complex build with numerous companies within the Damen Shipyards Group. Gysbert Boersma, Damen Sales Manager Asia-Pacific: “It is a huge accomplishment that wouldn’t be possible without strong local partnerships.”

CUTTER DREDGERS FOR SAUDI ARABIA

Damen recently delivered two cutter suction dredgers to the Saudi Arabian Border Guard Authority. Set to perform various maintenance dredging tasks at different border guard stations in the Kingdom of Saudi Arabia, the full option vessels were built to a customised Damen CSD 450 design.

The contracts were comprehensive: included are floating and shore pipelines, a full set of spares and a crew training programme. Due to Damen’s strategy of building a wide range of dredgers on stock, the client could benefit from a short delivery time.
Oil sands are loose sands that are saturated with bitumen – a heavy and sticky form of crude oil. The oil produced from the sands is often referred to as unconventional oil. The largest deposits are found in Canada, Kazakhstan and Russia. One significant by-product of oil sand surface mining is the large volume of tailings. These are held in oil sands tailings ponds containing a mixture of water, clay, residual hydrocarbons and mature fine tailings (MFT).

“These ponds are between 10 to 25 metres deep,” says Mr Garnett. They are also very large – anything up to 20 km long. “Therefore, depending on the application, a tailings floating pipeline can also be up to 20 km long.”

Know your specs
MFT dredging plays a vital role in the management of the tailing ponds. “Therefore our client was looking for someone with a pedigree and proven expertise with dredging,” explains Mr Garnett. “And when it comes to dredging, there’s no better place to go than the Netherlands.” Aecon made its first contact with Damen in October 2013. As always, a thorough comprehension of the project’s requirements were vital. “We understood what our client’s parameters were,” he continues. “For example, the consistency and density of their product. How much debris it contained and also how far they wanted to move it. Then we approached Damen with this set of requirements.” Damen’s response? Such a substantial project would require two of their largest cutter suction dredgers – the Damen CSD 650. With an installed power of 2,800 kW, this design is capable of production levels of 7,000 m³ per hour.

Dredging partner
Aecon is Canada’s largest publicly traded infrastructure development and construction company. Included under its wide umbrella of business is a shipyard in Nova Scotia, on the Canadian east coast. Therefore, the company has all the necessary shipbuilding skills in-house to manage such a ship construction project. “We fabricated all the structural steel components and piping for this dredging vessel contract.” Damen’s involvement concerned the dredging engineering and design: “They provided all the major dredging parts like pumps, cutter heads and agitator heads. Aecon provided the fabrication expertise but we left the dredging design up to Damen. After all, we didn’t want to reinvent the wheel – that’s why we have a partner in Damen.” The fact that Aecon’s shipyard is located approximately 5,000 km from the oil sands site raised the question of transportation. “We fabricated modularised components here at the yard and sent those to the site by truck. Once there, we assembled the vessels on site.”

No welds, just bolts
Aecon’s client in the Canadian oil sands was looking for a piece of equipment that they could transport between sites. “The vessels’ modular aspect means they can move the dredgers from one application to another,” says Mr Garnett. “Modularisation also reduces the amount of time and energy on the job site – this is also something that our client really likes. If you can get something on site and get it together very quickly, you can reduce a fair amount of the overheads. It also minimises risks in terms of both productivity and safety.” One explanation regarding the safety aspect: “The advantage is that there’s no welding on site,” he says. After all, the oil sands is an area of oil production. “The modules are designed to minimise site welding requirements so all the connections are bolted – not welded.”

Growing relationship
Delivered in summer 2015, these two CSD 650 vessels represent the first cooperation between Aecon and Damen. The Canadian company doesn’t limit itself to dredging though: “We are also involved in custom fabrication of modules and piping servicing for the oil & gas industry and renewables sectors as well.”

“We’ve been working with Damen for two years now. When we started working with them, we knew that the Canadian culture was were very similar to that in the Netherlands. It’s important to build relationships and build trust. That’s where we are at now – at the acceleration point. We are looking forward to moving forward with Damen – maybe we can start building some other vessels together.”