

# A promise fulfilled

From the first event taster over three years ago, the CEDA organising committee promised that WODCON XX would be an unforgettable mix of networking, technical sessions and visits – it was that and more, writes **Lisa Maher, Penny Thomas, and Tony Slinn**

During the four-day event, attended by 474 delegates from 31 countries, there were 95 technical presentations, three enjoyable social networking events, a choice of three technical tours, and the chance to talk with 45 companies at the focused exhibition.

“We were concerned about the economic situation,” organising committee chairman Eric Van den Eade stated as he welcomed attendees at the 20th World Dredging Congress opening ceremony, “but we have succeeded in attracting delegates and the exhibition sold out,” he said, introducing the first keynote speaker, Belgian transport and public works minister Hilde Crevits.

“Our four major seaports rely on dredging for access,” she pointed out, highlighting the Scheldt campaign that’s given Antwerp added depth, along with the port’s Deurganckdock lock (see panel) which will be the world’s biggest when completed in 2016.

“The AMORAS project [see *IHS DPC* Feb 2012], which deals with the 500,000 tonnes of material dredged annually from the Scheldt, is a further example of how we’ve switched to modern, sustainable technology,” she added, noting the contribution of Belgium’s major dredging contractors Jan De Nul and DEME.

“Look overseas, in Panama, Vietnam, Saudi Arabia, and more, and there you’ll find our Flemish contractors,” Crevits continued.

“With the two giants from the Netherlands, they make up the dredging industry’s ‘Big Four’ and have 50% of the world market.”

Turning to climate change, the minister stated that action must be taken now – “on coastal defences, for example. Dredging contractors will be challenged once again.”

World Dredging Association (WODA), and Central Dredging Association (CEDA) chairman Anders Jensen then took the floor to welcome attendees. “We have over 90

papers presented by speakers from the world over. Without the speakers, there would be no WODCON,” he reminded the audience.

Technical papers committee chairman Prof Cees van Rhee echoed that theme, asking: “Is dredging an art or a science?” He looked at the range of presentations and advised that both were represented – “Let’s explore them together,” he said. And concluded by introducing a slide show highlighting scenes from 46 years of WODCONs, dating from WODCON I in 1967 in New York.

## Keynotes continue

David McGillewie, Transnet National Port Authority’s deputy chief engineer, was our second keynote speaker and discussed not only the history of the South African authority and its dredging objectives, but the host of current and future port expansion projects – not least the channel widening

WODCON’s home – The Square

Tony Slinn



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Convinced – Eric Van den Eede



Sustainable – Hilde Crevits



Welcome! – Anders Jensen



Art or science? – Cees van Rhee



Huge projects – David McGillewie



Panama Canal – Rogelio Gordón

and deepening at Durban and Ngqura.

“There’s a potential 89.2M m<sup>3</sup> of dredging in South Africa,” he stated, pointing out that of that, 68M m<sup>3</sup> would need removing during the four-phase new Durban ‘dig-out’ port alone – “The start date is 2014,” he stated, “and it’s the most ambitious project Transnet has.”

It’s by no means the only one: projects are also planned at Ngqura for a tanker and general cargo berth (1.2M m<sup>3</sup>), at Saldanha for an iron ore quay (3.1M m<sup>3</sup>), and at Richards Bay for a coal quay and general expansion (16.3M m<sup>3</sup>).

“The art of dredging is alive and well in

the southern tip of Africa,” McGillewie said.

The Panama Canal Authority’s (ACP) dredging chief Rogelio Gordón was our final keynote speaker and he began with facts & figures from the canal’s history – not least the total 28,000 people who died creating the canal during both the French and American projects before it opened in August 1914.

Perhaps not so well remembered, but still running today, was the building of the ‘dry canal’ – the coast-to-coast rail link that claimed up to 10,000 lives during its five-year construction period in the 1850s and cost \$8M. “A one-way ticket even then was \$25, it

became an extremely profitable business,” Gordón commented.

Turning to the current \$5.25Bn expansion (see *IHS DPCs* passim and especially the May 2013 issue), he listed the components, including the Gatún Lake, Atlantic and Pacific channel dredging and of course the huge new locks that alone cost half the budget. “This is truly an enormous project to build new navigation channels and locks that will take 13,000-14,000teu ships,” he stated.

And a close harmony performance by Belgian folk group Laïs brought the opening ceremony to a close.

### The sessions

Split into two and even three simultaneous streams, the sessions were covered by Lisa Maher, Penny Thomas, and Tony Slinn. Forgive the brevity of our reports, though we’ve tried to cover salient features, but the presentations and full papers will be available in the CEDA Digital Library – [www.dredging.org/digitallibrary](http://www.dredging.org/digitallibrary) – from 1 September 2013. And proceedings can be ordered now from CEDA (€90.00 for CEDA, EADA, and WEDA members, €135.00 for non-members).

Lisa Maher reports from the first session – *Developments in dredging equipment*.

Chaired by Prof Cees van Rhee, the session was kicked off by Lv Yuan Fu from China-based Shijiazhuang Kinda Pump Industry Group with an overview of ‘TSHD [trailing suction hopper dredger] pump operation condition analysis’. His study’s conclusion was that his team’s analysis of the pump’s properties informed efficiency, while soil properties impacted design.

Gao Wei of CCCC Tianjin Dredging, China, gave the next paper: ‘A study on the standard operation of the cutter suction dredger [CSD] in a dredging project’. “Productivity can be increased by optimising operation methods,” he stated. “Ultimately, percentage improvements in efficiency depend firstly on the CSD’s condition and secondly, on the skills of the operators,” adding that his results

## » In the beginning

As WODCON XX proper got under way, the chairmen of two of the three associations that make up the World Organisation of Dredging Associations, together with the event’s two premium sponsors, took the chance to meet the press.

WODA chairman and CEDA president Anders Jensen said he was “very satisfied with the number of delegates – nothing can replace face-to-face discussions and debate, which is why events like WODCON are essential.”

EADA chairman Capt David Padman echoed his thoughts: “WODCON is the gathering of dredging industry professionals to share their knowledge and a forum for new technology information exchange. And we have an opportunity to meet old friends and make new ones.”

WODCON executive committee chairman Eric Van den Eede made that point that: “Dredging is playing a significant role not only for navigation and trade, but also for flood control, shore protection, generation of renewable energy, and climate change mitigation measures in general. This is the *leitmotiv* that’s going through WODCON XX presentations.”

Premium sponsors Jan De Nul Group and DEME were represented by Bernard Malherbe and Alain Bernard respectively: “Pushing the limits of marine world developments requires ever better equipment



Press conference panel (l to r): Bernard Malherbe, Alain Bernard, Eric Van den Eede, Capt David Padman, and Anders Jensen

and skills that are able to mitigate environmental impacts,” Malherbe stated. “The future will most probably contemplate a larger diversification of the fields of dredging and maritime works – integrated coastal zone protection, deepsea mining, alternative energy-production – and a consolidation of the existing specialities.”

Bernard agreed: “In the future, the dredging industry has a crucial and constructive role to play responding to such challenges. Likewise, the rapidly evolving renewables market has been, and will be, an important driver for the industry’s marine construction specialists in the coming years.”

Questions from the floor followed, ranging from deepsea mining challenges through to climate changes, vessels’ emissions control and overall environmental sustainability. Perhaps Bernard best summed up the panel’s feelings: “We want our future generations to be proud of us.”



Preliminary results – Gao Wei



Opportunities – Stef Kapusniak



Close co-operation – Dirk-Jan van Ramshorst



Stepping in – Guo Jun Hong



Flow regimes – Robert Ramsdell



Technical – Sape Miedema

are preliminary and more research is needed.

‘Developments in mining equipment and pumps for subsea and inland submerged deposits’, came next, with Stef Kapusniak of Soil Machine Dynamics, UK, seeing major changes arising from equipment development over recent years. “The separate, but parallel, technologies being developed could open up a world of opportunities,” he stated.

Dirk-Jan van Ramshorst of Dutch company Loggers gave the fourth paper: ‘Development of a solution that isolates all harmful and annoying vibrations in CSD *Athena*’s accommodations’. Close co-operation with owner Van Oord and builder IHC Merwede, led to *Athena*’s deckhouse being placed on vertical air springs and horizontal stabilisation air springs, isolating it from the hull.

The final paper – ‘Development of a new type plough-shaped tooth’ – was read by Guo Jun Hong of CCCC Shanghai Dredging Co, China, on behalf of QM Lou *et al* of CCCC Key Laboratory of Dredging. It detailed studies that included resistance at controlled cutting depths, and Guo said the new teeth appeared to have a very high efficiency rate but added that more tests were needed.

**Session 2** included the Dredging Debate and presentations of WODA’s technical guidance on underwater sound, plus the CEDA information paper on ecosystem services and dredging – see the *Dredging Debate* panel.

### Session 3

Chaired by Michel de Nijs of Van Oord, the session covered *Modelling hydraulic transport*. Complementary papers from Robert Ramsdell of US contractor Great Lakes Dredge & Dock and Prof Sape Miedema of Delft University of Technology (TUD), the Netherlands, got us under way, writes Lisa Maher.

Ramsdell’s ‘Overview of flow regimes describing slurry transport’ looked at studies that had identified nine flow regimes “out of an infinite number” and distinguished three particular scenarios that highlighted

constant volumetric spatial and transport concentration. He noted that the correct flow regime could be predicted in the lab when the scenarios were constructed, but stressed that real life continued to be a little less predictable.

Prof Miedema’s paper, ‘A head loss model for slurry transport based on energy considerations’, arose because “current models are not accurate enough to predict head losses for large diameter pipes, so a new model for heterogeneous flow was developed”. He noted that this approach had yielded two additional terms for energy dissipation – potential energy losses and kinetic energy losses – and correlated well with experimental data.

TUD’s Joop Goeree gave us ‘Numerical simulation of hydrodynamical behaviour of

sand water mixtures’, a study carried out “to provide a thorough understanding of sediment’s hydraulic transport in order to analyse and design better dredging equipment.” While results were promising, he concluded, more validation was needed.

Guo Jun Hong came back to the podium to conclude the session on behalf of TB Zhao *et al* of CCCC Key Laboratory of Dredging to give us ‘Experimental study on applying a hydrocyclone for improving the loading efficiency of a TSHD’. After eight field tests, higher efficiency – by more than 10% – was achievable by using the hydrocyclone technology, he said, as the centrifugal force increased sedimentation concentrations.

### Session 4

IHS DPC editorial advisory board member Mike Costaras of UK-based consultancy HR Wallingford took the chair for *Use of dredged sediments*, introducing first speaker Bram Van Renterghem of Belgian soil and groundwater treatment company Envisan, writes Tony Slinn.

“So, we have sediments, why can’t we build dykes with them?” Van Renterghem asked, addressing his topic of ‘Use of engineered sediments for construction of a compartment dyke’ as part of the Sigma Plan (*see panel*). He described the geotube dewatering system and fly ash-based additives – “we tested 22 types” – used to stabilise the material.

“Sediments dredged right now are in the dyke tomorrow morning and tests have found it won’t move for 50-100 years,” he said.

Ayumu Matsumoto from Penta-Ocean Construction looked at ‘Land reclamation using a mixture of dredged soil and converter slag’, which began “with a small-scale experiment in 2010,” and moved to a major reclamation in 2012. “It’s still in progress and should be completed in September this year. Slag-stabilised soil doesn’t influence the environment and while we continue studying we want to promote this method in the future,” he concluded.

## » The Exhibition

...was a sell-out with over 45 companies taking the opportunity to discuss their products and services with 474 delegates from 31 countries.

Exhibits included dredgers; oceanographic services software; satellite-based positioning systems; rubber hoses; winches and steering gear; instrumentation and automation systems; offshore marine engineering; hydrographic and geotechnical surveying, and measuring and monitoring systems.

The exhibition hall was treated as WODCON’s ‘living room’ – the Ice-Breaker and all refreshments were staged here – which gave delegates and exhibitors alike plenty of time to mingle and network.



WODCON’s ‘living room’

Tony Slinn



Promising results – Joop Goeree



Building dykes – Bram Van Renterghem



Tested for strength – Ayumu Matsumoto



Shrinkage problems – Stefan Cantré



Quality control – Sofie Van Zele



Good potential – Koen Geirnaert

Rostock University's Stefan Cantré was next up, his subject: 'Fine-grained organic dredged materials for dyke cover layers – material characterisation and experimental results.'

Under the EU-backed, Rostock-led 'DredgDikes' programme ([www.dredgdikes.eu](http://www.dredgdikes.eu)), those experiments are taking place in the south Baltic region – Germany, Poland, Lithuania, and Latvia – and began with two test dykes, each 125m long by 45m wide separated into three polders. Cantré described the innovative processes used – "We still have some problems with shrinkage," he admitted, as well as compaction, and more tests are needed." And you can hear more

about the results in April 2014 at a Rostock conference on the subject.

Envisan's Sofie Van Zele wound up session four with 'Using waste for landfill closure', a four-part project that began in 2011 and centres on two lagoons covering 25,000m<sup>2</sup> and taking 50,000m<sup>3</sup> of material annually.

She worked with Flanders-based waste control company Imog and used an Envisan-devised sealing layer called 'Hydrostab' – "You have 72 hours to get it to site and compact it. And we've a patent pending on this product," she stated. Results are still to be evaluated.

## Session 5

Lisa Maher covered *Monitoring the dredging process* with Prof Ni Fusheng of China's Hohai University in the chair. Taku Saitoh of Japan's Toa Corp kicked off with 'Construction of a perimeter bund using the PM-CLAY method'.

He explained the company's activities in producing a construction material from previously disposed-of 'waste' that was now used in large-scale marine construction work. By mixing water and stabilisers with dredged material, a lightweight construction product with an adjustable strength and character was produced – with a life expectancy of 30-50 years, he stated.

## » The dredging debate

Chaired by CEDA Environment Commission chairman Polite Laboyrie, the debate was designed as an interactive session challenging participants to consider – and take a stance on – hot topics.

The panel included Katherine Harris and Gerard van Raalte from CEDA, John Dobson from EADA, Craig Vogt of WEDA and Harald Koethe representing the International Navigation Association (PIANC). Each put a question to the audience – taking a fairly controversial stand in the process:

- Van Raalte on beneficial use of dredged material: "Beneficial? Who says? For whom? I only love this beneficial use show as long as the project goes on."

CEDA's Nick Bray responded: "But if you use the material – especially if it's contaminated – for something else, you must get a better result?" But Port of Hamburg's Heinz-Dieter Detzner, who has 500,000m<sup>3</sup> of silt to dispose of annually, asked: "Where's the market? Sometimes hundreds of kilometres away. The best solution is when the material's clean and can be used on beaches."

- Vogt on project planning involving stakeholders – "I'm in favour of the earliest possible involvement otherwise permitting and other regulating authorities can derail your project. As we say in the US – no surprises!"



John Dobson replied: "It looks like I'm the only person in the room against this! You *always* find people will pop up later – fishermen for example – if they feel their interests are threatened. Politicians change their minds too if they feel there's too much opposition and they'll lose votes."

- Harris on using natural processes for sustainable project development: "There's no doubt working with natural processes enhances opportunities."

And this time, the floor agreed – "If you can build beaches rather than solid seawalls, it's far better to do so," commented an audience member.

- Koethe asked if adaptive management was a

suitable tool for environmental protection during dredging projects?

Van Raalte thought so, though for major rather than small projects: "Those with adaptive management have nearly always been completed on time and within budget," he advised. But WEDA chairman elect Ram Mohan felt it remained a difficult issue: "If you go back to the roots of project management, there are many problems to define – it's very complex, though I think it's a good tool."

The audience agreed: no one was sure you could ever understand all the facets in dealing with natural processes, but felt adaptive management was still a good tool for large projects.

- Dobson on strict environmental regulations forcing the industry to look for new approaches – "Call me old-fashioned, but I like to know what the regs are and why."

Harris too felt that prescriptive regulations didn't help stakeholders and others to find the best solutions. The audience agreed: "Regs don't take into account the dynamism of nature," commented a member. "What if you can come up with a better solution? Regulation can kill innovation."

WODA technical guidance on Underwater Sound in Relation to Dredging (see IHS *DPC* July 2013) and the CEDA paper *Ecosystem Services and Dredging and Marine Construction* were also presented.



Variations – Peter Staelens



Post-earthquake – Ei Fujiyama



Collaboration – Herve Bréquel



Variability – Francois Couturier



Washing – Stany Pensaert



State-of-the-art – Heinz-Dieter Detzner

Koen Geirnaert of Belgium’s dotOcean gave us ‘Innovative free-fall sediment profiler for preparing and evaluating dredging works and determining the nautical depth’. Using Rotterdam and other European ports as examples, he highlighted the profiler’s features: for pressure, strength, and bulk density measurements and how it could complement acoustical measurements in profiling sediments and features. “Rheology of mud shows good potential to model forward movement of a vessel into underwater mud layers,” he concluded.

‘Monitoring the consolidation process of mud from different European ports in a full-scale test facility’ was the complementary paper given by Peter Staelens, also from dotOcean, which further amplified the last point: the relationship between a moving object and bulk density. He also highlighted variations discovered and the investigations undertaken to find out why or how they occurred.

The session’s final speaker was Ei Fujiyama of Japan’s Shinko Construction, offering ‘Pinpoint underwater grab bucket navigation system applied to restoration work of great east Japan earthquake’. He highlighted the speed and increased work efficiency of the system for port restoration projects, particularly for obstacle removal.

### Session 6

*Treatment of sediments* was the theme, Anchor QEA’s Ram Mohan was in the chair and we began with a two-hander from Herve Bréquel of Belgium’s Centre Terre et Pierre and Francois Couturier of SNF France entitled the ‘Solindus experimental dredged material treatment platform’ – Tony Slinn reports.

“The basic principle is to take dredged material with five fractions for valorisation,” Bréquel opened. “Solindus has proved that simple chemical techniques can deal with sediment variability,” Couturier added. At present the project remains at a local level in

Wallonia, but “we are open to collaboration,” Bréquel commented.

‘Soil washing techniques for sediment dewatering and sand recycling’ was Stany Pensaert’s topic. The DEME R&D chief looked at problems dealing with sediment – and how soil washing can virtually pay for itself.

“There’s 30 years’ experience in Europe with millions of tonnes washed and enormous savings can be made,” he pointed out, citing projects such as AMORAS in Antwerp (see *IHS DPC* Feb 2012) and highlighting the huge landfill costs in the USA.

Hamburg Port Authority’s Heinz-Dieter Detzner took the floor next with ‘20 years’ experience of large-scale sediment treatment at Hamburg’s METHA plant’. “We have to dredge up to 5M m<sup>3</sup> every year,” he stated, “and in the 1970s, contamination meant we had to do something more.”

Today, with cleaner material, METHA treats 1M m<sup>3</sup>/year, the remaining sediment being relocated. The project began with a pilot and Detzner took us through the stages leading to METHA II and the ongoing research: “In 20 years we’ve changed the METHA process five times, but I believe it’s still state-of-the-art,” he concluded.

US-based Genesis Water’s CEO

Michael Hodges wrapped up the session – and the day – with ‘High-speed dewatering of ultra-fine sediments’.

“The challenge is to keep up with the dredge project’s output in real time,” he stated, describing the process used by Genesis, which has mobile and scalable plant.

And with that, it was off to Brussels city hall for a cocktail and a tour (*see panel*).

### Session 7

Chaired by Kees Jan Verkaik from IHC Merwede, the first session on Wednesday, 5 June, had the theme *Modelling of dredge pumps* – Penny Thomas reports.

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Last resort – Kris Pynaert

‘Numerical simulation of the motion trajectory of sediment particles in a dredge pump’ saw Guo Jun Hong back on the floor with an overview of a simulation project set up to analyse how particles of three different sizes travelled through a dredge pump, using a 3-D model. Simulation predictions compared with practical performance, he noted.

TUD’s Max van Fulpen gave us ‘Restratification in hydraulic transport: is it a bend effect?’ He commented that restratification is not included in any flow models, and the conclusions of his project revealed that, among other points, published data sets do not include distances of upstream inlet conditions.

Next up was Hasan Bugdayci from IHC Parts and Services with the ‘Latest developments in dredge pump technology’. Dredging conditions can vary considerably, he argued, highlighting a cutter suction dredger delivered to the Panama Canal Authority – “conditions were much harder than expected,” he said, and rocks blocked the pump. That led to the development of a new dredge pump that’s 30% better,” he concluded.

Prof Robert Randall from Texas A&M University wrapped up the session with ‘Estimating production and booster pump location for long-distance pumping’.

“Production’s evaluated as a function of pump flow rate, concentration by volume and dredging efficiency,” he told delegates. He explained that an Excel spreadsheet was developed as part of the project and he considers it a useful tool for estimating production.

### Session 8

Pierre-Yves Belan of CETMEF, France, took the chair for *Dredging for navigation* – kicked off by Katherine Basford of Royal HaskoningDHV, UK, with ‘Licensing navigation dredging – developing a proportionate, risk-based approach’, writes Lisa Maher.

She detailed a study carried out on behalf of

the UK’s Marine Management Organisation (MMO) to determine which dredging activities needed licensing and to what degree. The study found that 86% of projects were already subject to licensing and recommended that small-scale dredging be exempted or be fast-tracked.

“Treating the highly contaminated sediments from the industrial canal Ghent-Terneuzen: towards a cleaner environment with maximum re-use of materials’, was given by Envisan’s Kris Pynaert and looked at Flemish regulations – “which offer lots of opportunities for reusing sediments.”

His conclusions were that “disposal should be the last resort when no other post-treatment reuse is possible – or if the cost of treatment’s too high.”

Contaminated sediment also featured in Henrich Röper’s paper: ‘Recent developments in sediment management in the Port of Hamburg’, which complemented Heinz-Dieter Detzner’s earlier paper. He explained that the tidal Elbe River carried huge volumes of contaminated sediment from other upstream countries, so maintenance work and treatment is constantly needed.

The final paper, on Ponta da Madeira, was

cancelled as the speaker couldn’t attend.

### Session 9

*Dredging for port development* was the theme and with CCC’s Sun Mengxin in the chair we got under way with Dr Robert Nairn’s look at ‘Development of a preliminary dredging plan for the Vale Ponta da Madeira pier IV export facility in Brazil’, writes Tony Slinn.

From Canada-based WF Baird & Associates Coastal Engineers, Nairn’s task was to design a dredging plan that minimised interruptions for Valemax bulk ships loading/unloading operations.

“Those vessels draw 23m so we needed 25m depth minimum,” Nairn stated. Challenges included sand waves, rock, clay, and a heavy tidal flow – “After our first test dredge, the 345,000m<sup>3</sup> removed came back in two to three months,” he said. “But it was too late for a structural solution, the only answer was a sediment trap.”

Worse was to come, including 200,000m<sup>3</sup> liquefaction slides that led to a revised dredging plan increasing the trap size. “The project is ongoing,” Nairn concluded, “and we’re looking for 100% berth occupancy in October this year.”

DEME Group’s Daan Jumelet followed with ‘The expansion of Botlek tank terminal: a sustainable solution in the Port of Rotterdam’. The challenges included a 2ha land reclamation with 500,000m<sup>3</sup> of sand and a 400m quay wall over two phases, with completion scheduled for 2014.

“Key to the project was minimum settlement – no more than 30cm after 30 years. Measurements indicate it will only be 22cm, so we’ve met the client’s requirements,” Jumelet noted.

The scheduled next paper, on dredging Izmir Bay, was cancelled and replaced by Pol Hakstege’s ‘Climate change as it affects the dredging industry,’ a CEDA position paper. From Dutch transport and infrastructure ministry Rijkswaterstaat, Hakstege stated: “Climate change is a fact, but there’s still a lot

## » Sponsors

CEDA’s grateful to the following companies for their generous support of WODCON XX:

- **Premium** – DEME and the Jan De Nul Group
- **Silver** – Brusselle Enterprises, C-Nav, Detlef Hegemann Dredging, Seatools, and Waterwegen en Zeekanaal
- **Bronze** – Cable Arm, Hamburg Port Authority, IHC Merwede, IMDC, iPS Powerful People, and Van Oord Dredging & Marine Contractors.



Tony Slinn



Constant treatment – Henrich Röper

Lisa Maher



Sand waves – Robert Nairn

Tony Slinn



Expanding – Daan Jumelet

Tony Slinn



Climate change – Pol Hakstege

Tony Slinn



Dredging plan – Maria Terese Sá Pereira

Tony Slinn



Accuracy – Kazuhiro Yamamoto

Tony Slinn

of uncertainty about its effects.”

He gave examples of how the Netherlands is preparing with such projects as the Sand Engine and other coastal nourishment campaigns (see *IHS DPCs* passim). His key message was: “Climate change brings both challenges and opportunities, but dredging remains an important tool.”

‘Port of Lisbon maintenance dredging in a sensitive environmental system’ was presented by the port’s head of hydrographics Maria Terese Sá Pereira.

“We have a high rate of siltation and need to dredge two or three times a year, but the Tagus estuary [where the port’s situated] is a RAMSAR site, protected internationally and one of Europe’s richest.” And she went on to explain how a five-year dredging plan was developed with permitting authorities “so we don’t have to ask for permission every time we want to dredge.”

### Session 10

Chaired by Dravosa’s Roberto Vidal, *Methods and equipment case studies* was the session’s theme, writes Tony Slinn, and Tomac Corp’s Kazuhiro Yamamoto was first up with ‘Installing blocks of fish reefs in the deep sea’.

“A major challenge was the rough conditions in the Sea of Japan,” he said, “including 8m to 10m waves – and we only had six months for the project.” The tetra block reefs were placed in 200-300m of water and looking at how the challenges were met, Yamamoto described placement techniques that gave +/-30m accuracy.

‘Use of encapsulated sand elements for beach protection’ was Edwin Zengerink’s theme and the TenCate Geosynthetics executive looked at protecting restaurants on the world famous Cannes’ la Croisette beach, which suffers from high waves and erosion.

“We used geotubes rather than rock berms – more people friendly for swimmers,” he said, explaining how local sand grain size affected geotube material choice. “Stability is vital and we worked with Deltares in the

Netherlands, carrying out flume tests, to check it,” he added.

China Dredging Association secretary general Yang Zunwei followed with a ‘Study of a combined dredging concept for a twin-hull trailing suction dredger with self-propelled barges’.

Though still in early research stages, the design already has a patent, an estimated cost of around €80M and a cost-comparison with a standard TSHD. “At 33nm, costs are about the same,” Yang stated, “but they come down with our design when working further offshore.”

‘Improving the capacity of Mexico’s Port of

Altamira by dredging’ was SiPort21 naval architect Jose Iribarren’s theme and he described the port’s “problems with interaction between ships in terminals because of the narrow width of channels.”

ROPES methodology (see *IHS DPC* Jan 2013) was used, he stated, “to set acceptable passing distances and speeds, taking into account vessel sizes to optimise the dredging project.”

Piedroba Consulting Group’s Jelle Prins gave us ‘Cuttability and abrasivity of rocks in capital dredging: applicability to the Port Miami dredging 2013-2014’.

He discussed the development of cuttability and abrasivity indexes, the former

## » Time to relax

Opportunities for networking, relaxing, and having a good time with friends were not forgotten and WODCON XX’s social events kicked off with an ice-breaker in the exhibition area on Monday, 3 June – which included a Belgian cheese and beer discovery tour.

On Tuesday, we had a chance to tour the beautiful and historic Brussels City Hall and enjoy a cocktail, while on Wednesday, delegates and guests were invited to the gala dinner at Autoworld to celebrate the successful congress and the 20th anniversary of WODCON with a birthday cake.

As the name suggests, Autoworld is a fascinating museum of 250 cars dating back 100+ years – did you know that Belgium had its own version of the Rolls-Royce?

“It’s always a challenge for organisers to find



WODA chairman Anders Jensen cuts the cake

Tony Slinn



Magnificent – Brussels’ city hall

somewhere unique for a gala dinner,” said organising committee chairman Eric Van den Eade, “but I think we’ve done it.”

We also enjoyed a foretaste of the European Dredging Association’s 20th anniversary, which will be officially celebrated in November this year. Chairman Marc Stordiau commented: “EuDA was born to represent the dredging industry to the EU, and today we are daring to build things we couldn’t have imagined 20 years ago. Think Maasvlakte 2, much more sand and much less rock.”



Beach protection –  
Edwin Zengerink

Tony Slim



More research – Yang  
Zunwei

Tony Slim



ROPES methodology  
– Jose Iribarren

Tony Slim



Cuttability in Miami –  
Jelle Prins

Tony Slim



Beneficial reuse – Jan  
Brooke

Lisa Maher



Think differently –  
Gerard van Raalte

Lisa Maher

based on tunnel boring projects, and how this could be applied to dredging calculations. “This is very much a preliminary paper and we look forward to input from industry experts to further the research,” he stated.

### Session 11

Themed simply *With nature...* and chaired by Deltares’ Johan Pennekamp, the session began with ‘Working with Nature: applying the philosophy to maintenance dredging’ by UK consultant Jan Brooke, writes Lisa Maher.

Carried out for Mersey Docks and Harbour Co, her study looked at opportunities for reusing material from the Mersey estuary.

Boskalis’ Gerard van Raalte followed with ‘Building with nature works!’ He covered several studies under the Building with Nature scheme – “Each project takes environmental elements as the basis rather than an additional element,” he noted. “It requires that you start thinking differently

about projects – act differently, be transparent and work for win-wins!”

That theme was reiterated by Rijkswaterstaat’s Ronald Waterman with ‘Aquapuncture: adaptation and optimal use of inland waterways and their waterfronts’. His assessment of the spatial relationship between waterways and urban developments highlighted the renaissance of the importance of rivers and ports economically and for tourism – and how a holistic view of the interconnectedness of working with nature can provide a blueprint of practical measures that enhances all aspects of modern life.

Jan De Nul’s Bernard Malherbe followed with ‘Flanders Bays: smart beach and dune nourishments to achieve an integrated and sustainable reinstatement of beach barrier systems’. He focused on “using insights into the natural processes” to implement beach protection, illustrated by the Flanders Bay project with 65km of

strengthened coast through “smart beach and dune nourishment.”

‘Dredging for flood management in river systems: opportunities and dilemmas’ by Pol Hakstege was the session’s final paper, and he stressed the role of dredging in “enhancing the spatial quality of the river area – dredging can be an intermediary between navigation, floodlands, economy, ecology, structural measures, and morphological effects.”

### Session 12

Themed *Environmental dredging* and with Eric Van den Eede in the chair, the session kicked off with Rebecca Gardner on ‘A critical review of the lessons learned after nearly three decades of environmental dredging in the US’, writes Penny Thomas.

“You need to find ways of removing contaminated materials that come back,” she stated, adding that dredging might not be the best option. “Focus on risk-reducing hybrid technologies,” she suggested.

Stany Pensaert from DEME spoke next about ‘Environmental dredging of chromium contaminated sediments in the Swedish fjord of Valdermarsvik’. Outlining the challenges, he said the plan is to dredge about 400 tonnes of chromium, which will hopefully reduce the spread of the metal by 90%.

From chromium to zinc with Dr Suk Hyun Kim’s ‘YH Bay clean-up project involving marine sediments in Busan’, which focused on a three-year project. Kim, who works for the Korean Institute of Ocean Science and Technology, described the three types of soil washing techniques that were evaluated, the dredging campaign and the problems of sediment disposal.

Next, a Netherlands perspective focused on an ‘Environmental dredging project remediation of Ketelmeer-west’ – a lake at the mouth of the IJssel river. The presentation was delivered by DEME Group’s Jan-Mark van Mastwijk and he stated that the Dutch water authorities wanted “maximum value for money, early involvement, innovative ideas,

## » Best papers

“We are a public relations and communications association and our task is to inform,” commented International Association of Dredging Companies (IADC) secretary general René Kolman. “The IADC Young Authors award winner, Max Radermacher, did just that with his presentation *The art of screening: effectiveness of silt screens*.”



Michael Gerhardt (l) presents Thijs van Kessel with the DCA Best Paper award

Tony Slim

Apart from a certificate, Delft University of Technology student Radermacher also took home a €1,000 cash prize.

Kolman’s thoughts were echoed by Dredging Contractors of America assistant director Michael Gerhardt, who presented the DCA Best Paper award, worth \$500, to Thijs van Kessel for his paper *Far-field and long-term dispersion of released dredged material*. “A good paper and a good presentation,” Gerhardt stated.



Max Radermacher (r) receives his award from IADC secretary general René Kolman

Tony Slim





Aquapuncture – Ronald Waterman



Best option? – Rebecca Gardner



Cutting chromium – Stany Pensaert



Communication vital – Suk Hyun Kim



Innovation – Jan-Mark van Mastwijk



Standardising – Julie Droit

as well as a project that would not generate any complaints from the community!”

Julie Droit from CETMEF, France, followed with an overview of her country's 'Human health risk assessment guidance for dredging and disposal at sea of marine and estuarine sediments'. She explained that in order to “standardise practices, and to provide port authorities, consultancy companies, and administrations, with a common frame of reference, the studies and observation group on dredging and environment (GEODE) decided to produce guidelines.”

### Session 13

Prof Sape Miedema took the chair for *Modelling optimisation of equipment*, introducing IHC Merwede's Peter de Graaff who gave us 'Half a century of changing the design of a dredger: market pull or technology push?', writes Tony Slinn.

That dredger was the Beaver series, born in 1963, and De Graaff will also celebrate its half-century in a future issue of *IHS DPC*.

Guangzhou Dredging's chief engineer Cao Xingbo followed with 'Study and application for high-precision excavation by a grab dredger', detailing work on the Hong Kong-Macau tunnel project (see *IHS DPC* June 2012). “Deviations came from the tide, wind, waves, current, load changes, and the team's skill,” he stated. “We replaced the former with an RTK and an upgraded mechanical system and introduced training for the team to reduce deviations.” The system was installed on 30m<sup>3</sup> grab dredger *JinXiong*, which will continue on the project through to 2015.

'Optimising drive train design for TSHDs using dynamic simulation models' came next, presented by IHC Dredgers' Leonard den Boer.

His case studies included comparing fixed and controllable pitch propellers – “We measured five ships at 11 dredging projects mostly working at 35% power and found the fixed pitch gave a 20% fuel saving,” he stated.

And that was to prove the final paper of

the session as the last scheduled speaker could not attend.

### Session 14

Chaired by Hamburg Port Authority's Axel Netzband, *Treatment of sediments* was the session title and kicked off with Philippe Dhervilly of Sedigate standing in for an absent colleague, writes Lisa Maher, to present 'Use of fibres waste in sediments stabilisation/solidification'.

Work over the last three years tried various combinations of treatment, he said, using two types of fibre: natural (linen) and geosynthetic. The key finding was that length of fibre is critical to success but, echoing a common refrain, more research was needed, he concluded.

'Investigation and implementation of sediment remediation at the An-Shun [mercury] remediation site, Tainan City, Taiwan', was given by Brian Mastin of the US Southern Research Institute. “All stakeholders have different objectives, but you should look upstream or downstream to see if others are doing projects that could be integrated with yours,” he advised.

Back for more presentation punishment was Philippe Dhervilly with his colleague Lionel Mancioffi. Their technical paper, 'Breaking technology for dewatering and valorisation of sediment in France', highlighted 'Nemeau' – “a new process for dewatering, that's mobile [transportable by rail or road], takes just eight hours and is suitable for all harbours, large or small.”

The final technical paper of the session was presented by Takashi Enomoto of Tokyo Construction – 'Soil decontamination and soil volume reduction technologies for benthic sediment in lakes, reservoirs, and other bodies of water'. Studies undertaken with radioactive material suggested the company's dredger “can minimise water contamination”, while its separation technologies had “a success rate of 98.7%. A process volume reduction

facility reduced volume to 40% and cut contaminated soil to 20% of the original amount,” Enomoto stated.

### Session 15

*Dredging in the Westerschelde* was the theme and with Marc Sas from Belgium's International Marine & Dredging Consultants in the chair, Youri Meersschaert from the Flemish government gave an introduction to the session, stating that it was important that material dredged from the River Scheldt was put back in the same part of the river – Penny Thomas reports.

Maarten Van Esbroeck of the Flemish government's maritime access department gave an overview of the AMORAS project (see *IHS DPC* Feb 2012) that dewaterers and reuses the Port of Antwerp's dredged sediment. And his colleague, Frederik Roose, then focused on the port's current-deflecting wall that “reduces sedimentation at the Deurganck tidal dock and allows vessels of up to 13.1m to enter, independent of the tide.” While construction costs totalled about €30M, he noted that it will only take 12 years to break even, such are the dredging savings.

Staying with Antwerp and the Deurganck dock, Boudewijn Decrop from International Marine & Dredging Consultants gave the last presentation on monitoring the deflecting wall – a project that will last six years. Decrop said he believes a siltation drop of 10-20% will be achieved, although it's “still early days.”

### Session 16

Japan Workvessel Association's Naoki Nakazawa took the chair for *Methods, equipment and techniques: dealing with silt*, introducing Mridul Sarkar from the Australian Maritime College who gave us 'Turbidity caused by spillage from dredging/mining transverse axis cutter', writes Tony Slinn.

Describing laboratory and inland navigation projects, he said the study was ongoing and the future focus would be “improved shroud



Half-century – Peter de Graaff



Reducing deviations – Cao Xingbo



Testing – Leonard den Boer



Double duty – Philippe Dhervilly



Integration – Brian Mastin



Dewatering – Lionel Mancioffi

design, different materials, auger geometrics, varied RPM and depth of cut.”

“The art of screening: effectiveness of silt screens’ by TUD’s Max Radermacher was to prove the IADC award-winning paper for its young author (*see panel*).

He studied both standing and hanging screens and when to use them – “you need to look at local conditions as well as the dredging project,” he advised. “But the most important question is how effective they are in reducing the environmental impact potential.” And he felt hanging silt screens in an open configuration would not achieve that.

Singapore Nanyang Technical University PhD candidate Thu-Trang Vu continued the theme with “Towards a comprehensive design for silt screens in open configuration – from the hydraulics perspective’.

“Our approach was to identify hydraulic patterns around silt screens and how they influenced silt distribution,” she said, describing lab and field tests. Her conclusions were that among other considerations, configuration, project distance and environmental conditions all had a part to play in screen design.

‘A study on dredging at the head area,

and utilisation of sediment resources, in China’s Three Gorges reservoir’ was Hu Xiqohong’s offering. From Hubai Changiang Dredging Research, Hu described the dredging challenges – “Not less than 12M m<sup>3</sup> annually, roughly 50% sludge, 40% sand, and 10% pebbles,” she said – and then tackled the problem of what to do with the dredged material.

### Session 17

Assessment and monitoring was the theme, Stephanie Doorn-Groen of DHI Water & Environment was in the chair and

## » Technical visits

We had a choice of three, Antwerp’s €482M AMORAS project to treat clean and contaminated dredged material (*see IHS DPC Feb.2012 for a full report*), the Scheldt basin anti-flood Sigma plan and Antwerp’s Deurganckdock lock project.

The latter, writes Tony Slinn, was hosted by joint venture contractor Jan De Nul and led by Bernard Malherbe. When complete in 2016, the €382M lock will be the world’s biggest – and the statistics are suitably impressive:

- The lock will be 500m long, 68m wide, 17.8m deep and able to take vessels up to 200,000dwt
- To create it, 4.7M m<sup>3</sup> of material is being excavated, 740,000m<sup>3</sup> of concrete poured and 20,000 tonnes of steel used – and around 500 people are working onsite daily.

The lock will connect Antwerp’s Waasland Port



Sigma – one of the sluice gates

docks on the left bank of the River Scheldt to the Deurganckdock, which already has direct Scheldt access.

“We’re at phase two [of five],” Malherbe commented, “with almost all the 4.7M m<sup>3</sup> excavation completed. Backfilling of about 2.7M m<sup>3</sup> of sand is starting and the concrete works are well ahead.”

Phases three to five include rail, road, and buildings construction; lock gate and machinery installation; quay wall construction on both sides of the lock, and dredging of access channels to open the lock for use.

It was an excellent tour – followed by an excellent lunch – and a real chance to see one of Europe’s biggest infrastructure projects coming to life.

### Sigma Plan

On a sunny morning, our host Eric Van den Eede took us by coach to the flood control area of Kruikebeke-Basel-Rupelmonde – the largest of 13 flood control areas (FCAs) in the Scheldt basin, writes Lisa Maher – where we boarded the *Blauwe Reiger* for a short journey along the river before we arrived at our visit site.

Overall, the 600ha site comprises an HQ; inlet/outlet sluices; 300ha of mudflats and marshes; 150ha of meadow area and 92ha of alder marsh



Deurganckdock lock – scale of the project

forests. The area’s intended to draw in sustainable tourism as well as local hikers and cyclists – and already the information plaques are being put in place to serve all who visit. This whole FCA is expected to be complete by the end of 2013.

We strolled the half-kilometre to the sluice inlet/outlet gates that will not only allow controlled flooding of certain areas, but will also maintain wetland environments in some places. In the event of flooding – water overtopping the dykes – the sluices are designed to let water drain back into the river at a controllable rate.

Better informed, we strolled back to watch an informational video before taking the coach to a superb restaurant for lunch – dredging’s such a hard industry sometimes!



Cutting contamination  
– Takashi Enomoto



Put it back – Youri  
Meersschaut



AMORAS – Maarten  
Van Esbroeck



Break-even – Frederik  
Roose



Less silt – Boudewijn  
Decrop



Auger geometrics –  
Mridul Sarkar

MarineSpace's David Lloyd Jones got us under way, writes Lisa Maher.

‘The UK marine aggregate regional environmental assessment (REA): an effective model for regionalised dredging areas worldwide?’ was his topic and he gave a concise overview of REAs, running through key features and offering potential solutions that might apply to wider regions.

HR Wallingford's Katherine Harris gave us ‘A method for identifying a new offshore dredging disposal site based on environmental sensitivity’, a paper that complemented Lloyd Jones' presentation. She provided an overview of the designation process for new offshore sites; a site-selection methodology, including 10 receptors and a sensitivity index; plus the strengths and limitations of that methodology.

In what turned out to be the final paper as a scheduled speaker couldn't attend, Harris' colleague Mark Lee gave us ‘Design and implementation of marine monitoring studies with reference to dredging projects: essentials’.

‘It's not all bad,’ he noted, ‘monitoring can also make clear if impacts are less than expected, so production can be increased.’

### Session 18

Part two of *Dredging in the Westerschelde* was the theme and Marc Sas stayed in the chair, writes Penny Thomas, introducing Kirsten Beirinckx from the Flemish government who spoke about ‘Dredging works in the Western Schelde to deepen the navigation channel and to create ecologically valuable areas: status after three years of monitoring’.

‘Each sandbar has its own conditions,’ she said, ‘and material from created dunes migrates with currents, but overall stability of the dunes is fine.’ She added that the Flemish government is ‘looking for more sustainable solutions.’

Gerard Dam from Svašek Hydraulics in the Netherlands spoke next about ‘Long-term modelling of dredging strategies on morpho-

and hydro- dynamic developments’.

The project has simulated conditions covering a 37-year period from 1965 to 2002, and an erosion and sediment pattern has been calculated. In his conclusion, Dam noted: ‘Human interference in the Western Scheldt has had an influence on its morphology.’

Marcel Taal from Deltares then considered ‘Tidal evolution in the Scheldt estuary and its interaction with dredging works’.

‘Why focus on tidal evolution?’ he asked. ‘Because development of a tide is the development of an estuary.’ And it affects a river's level of safety, accessibility, and naturalness, he concluded.

TUD's Johan Winterwerp was the session's final speaker, offering ‘Impact of human interventions on estuarine dynamics – towards a regime shift in the Scheldt?’

During the Q&A he was asked whether ports should go along with shipowners and provide access for increasingly large ships? ‘We look at the cost of containers but we don't take into account societal costs...’ Winterwerp replied.

And with that, it was off to Autoworld for an extraordinary gala dinner (see panel).

### Session 19

Thursday, 6 June was to be our last day of technical sessions and, with Prof Robert Randall in the chair, the first session of the day looked at *Optimising the dredging process*, writes Tony Slinn.

DHI Australia senior engineer Victor Hoa got us under way with ‘Decision support system for dredging and reclamation environmental monitoring and management plans (EMMPS)’, explaining how the DHI-devised ‘Gateway’ EMMPS system could be used on major projects.

‘We wanted to automate routine functions, but still keep things flexible,’ he said, comparing two projects where Gateway was, and was not, used. ‘With Gateway, the number of reports resubmitted due to errors was 8.6%,’ he stated. ‘Without it, 23.7%.’

‘Towards a faster and cleaner fairway maintenance of Dutch rivers’ was Deltares' Dr Arno Talmon's offering. ‘We found it relatively easy to gain a 10% efficiency improvement by optimising a TSHD for use on rivers,’ he noted, before describing studies of sand relocation via a plough towed by a tug – including the use of water jets in the plough – in what is an ongoing project.

IHC Systems' Jacco Osnabrugge was next up with ‘Optimising manpower and reducing fuel consumption while increasing dredging production’. He used a TSHD to explain the process, which involves an optimiser that checks optimisation 500 times a second.

MTI Holland's Stephan Hannot concluded the session with a ‘Validated tool for evaluating the design and predicting the workability of dredgers’. Model and full-scale field trials with both TSHDs and CSDs were used to check the tool, which involves three physical fields: hydrodynamics, multi-body dynamics, and soil mechanics.

### Session 20

The second of three *Assessment and monitoring* sessions, this focused on plumes – and with Dirk Roukema of Blue Pelican in the chair, Lynyrd de Wit kicked off, writes Lisa Maher.

‘Detailed full scale simulations of near field overflow plume mixing’ was the title of his presentation, which focused on why suspended sediment moves up to the surface when the natural inclination is for it to drift down. Using models, he considered propeller turbulence, air entrainment and air bubbles, finding a correlation between the impact velocity of a jet and the amount of entrained air.

Boudewijn Decrop of Belgium's International Marine & Dredging Consultants gave us ‘Physical modelling-based assessment of some influence factors on overflow plume behaviour’.

It echoed some of the previous paper but Decrop provided additional detail about the datasets and the laboratory experiments.



Hydraulic patterns –  
Thu-Trang Vu

Tony Slinn



Three Gorges – Hu  
Xiqiong

Tony Slinn



Key features – David  
Lloyd Jones

Lisa Maher



Site-selection  
– Katherine Harris

Lisa Maher



Monitoring is not all  
bad – Mark Lee

Lisa Maher



More sustainable –  
Kirsten Beirinckx

Penny Thomas

‘Trial monitoring of dredger plumes using a multibeam echosounder’ followed, by Christopher Brett of HR Wallingford. A case study of a RESON multibeam echosounder being trialled, he looked at the challenges – not least much more post-processing, in part because of the huge volumes of data generated.

The session’s last paper – which subsequently won the Dredging Contractors of America Best Paper Award (see panel) – was provided by Thijs van Kessel of Deltares: ‘Far-field and long-term dispersion of released dredged material’. Rather than looking at single plumes, it considered the cumulative effects of many plumes on a single event or environment.

### Session 21

Jan De Nul’s Bernard Malherbe took the chair for *Numerical simulation of dredging processes*, introducing Yang Zj from Tianjin Dredging Co, writes Tony Slinn.

‘A study of fine silt loading characteristics for a TSHD based on the computerised fluid dynamics method’ was Yang’s highly technical subject, looking at how hopper velocities and vortexes affected overflow densities.

Hohai University’s Prof Ni Fusheng stood in for colleagues to give us ‘A numerical simulation of the current drag force on the hull of a cutter suction dredger’ – again, another very technical paper. “We defined two forces, lateral and longitudinal, on the hull,” the professor stated, showing how they created flow fields, the impact of different current velocities and the influence of the vessel’s cutter ladder and spuds.

Prof Sape Miedema came back to the floor with ‘Constructing the shields curve part C: cohesion by silt’, which maintained the technical theme. “The shields curve is based on inert particles without cohesion-like effects such as electro-chemical forces or Van der Waals forces,” he stated. “This way, the behaviour of sand with a silt fraction

cannot be explained.” The solution, he added, was an extension of the shields curve based on Van der Waals forces – “With it, the new shields curves match experimental data,” he stated.

Van Oord’s Michel de Nijs wrapped up the session with ‘On self-emptying at high discharge mixture densities’. De Nijs’ aim was to achieve higher unloading production with less jet water and he explained how to achieve that.

### Session 22

Part three of *Assessment and monitoring* was the theme, writes Lisa Maher, and with Australian Marine College’s Neil Bose taking the chair, we were under way with ‘Development of a numerical modelling module for dredging activities in COHERENS’, from the Flemish government’s Chantal Martens.

She offered insight into the development of a user-friendly simulation module specifically designed for the government’s research needs to integrate with the free source code COHERENS (coupled hydrodynamical ecological model for regional shelf seas).

‘Environmental monitoring and control of sediments around dredging and reclamation works, Thames, UK’ was presented by Dredging International UK’s Katherine Read, whose account of the study of suspended sediment samples provided an interesting additional aspect of the London Gateway port being developed by DP World (see *IHS DPCs* passim).

YQ Wang of Tianjin Dredging Co was next up, offering ‘The application of three-dimensional geological modelling in a dredging project’, which detailed his use across several models of specifically developed software to differentiate sediments and depths for dredging purposes.

To round off the session, invited speaker Polite Laboyrie, chairman of CEDA’s Environment Commission, spoke about ‘WODA’s role in revising the ‘Dredged

Material Assessment Guidelines of the London Convention and its 1996 Protocol and regional sea conventions’.

### Session 23

Chaired by Gerard van Raalte, this session on *Alluvial and deepsea mining* proved fairly technical, writes Lisa Maher, with the first three papers being more theoretical while the last provided a practical case study.

‘Porosity calculation in discrete element modelling of sand cutting process’ by TUD’s Xiuhan Chen got us under way, the author explaining that some of the technology is more than 45 years old, but “the use of modern computing power has made simulation possible”.

Studies extrapolating from macroscopic behaviour were carried out to simulate microscale sand particle behaviour, which provided a working theorem.

MTI Holland’s Jort van Wijk presented ‘Advances in the modelling of vertical hydraulic transport by a continuum description’, which described some sediment behaviours during fluidisation and dispersion experiments. He also looked at plug causes for large particles and the use of volumetric concentrations as an indicator of flow velocity.

In ‘Cutting through hard rock-like materials – a review of the process’, TUD’s Rudy Helmons described how existing rock-cutting models lacked fluid-interaction for deepsea mining, so a new model at meso scale was considered and tested.

“One of the problems is that hydrostatic pressure is much smaller than the strength of the rock itself,” he said, adding that the solution was to include the effect of fluid pressure inside rock and, separately, to develop a new numerical tool.

Boskalis’ Sander Steenbrink completed the session with ‘System design for sustainable phosphate mining operations at the Chatham Rise’. This combined a status report with a new technology showcase in developing the



Human interference  
– Gerard Dam



Tidal evolution – Marcel  
Taal



Societal costs – Johan  
Winterwerp



Automation – Victor  
Hoa

multi-disciplinary, multi-partner project – for example, extending the reach of a TSHD to 400m of water depth.

### Session 24

WODCON's final technical session was themed *Management and economics* and had CEDA president Anders Jensen in the chair, writes Tony Slinn.

IMDC Belgium's Kathleen De Wit kicked off with 'An overall applicable general strategy for optimising maintenance dredging works: a case study for the Port of Bayonne'.

"Sometimes there's a problem if you have many contractors working for you over the years – do you get clear reporting?" she asked, going on to explain the parameters involved in creating her general strategy and how it worked in Bayonne – and could work in practically any port.

'Development, implementation and results of CSD operator competence & certification system (DOCS)' was on offer from Training Institute for Dredging's (TID) Alex Roosendaal.

"A good operator must acquire about 51 competencies in 10 categories," he stated. "DOCS is a dredging tool, but is also used for crew selection," he added, explaining that TID worked with client Guangzhou Dredging Co's experienced dredgemasters to formulate the system.

Blue Pelican's Dirk Roukema followed with 'Dealing with price fluctuations in dredging contracts'. "Right from the start, the client will benefit from lower bids," he stated, explaining how such factors as fuel prices and pan-European crew wages that affect contract costs are often beyond contractors' control. He advised the use of escalation clauses, especially for contracts lasting three months or more – "Include fuel at the very least," was his advice.

That left Van Oord's Pieter van der Klis to wrap up the technical sessions with 'Carbon neutrality? Blue carbon provides opportunities for the dredging industry'.

"What is blue carbon?" he asked. "Well, it's similar to green carbon. Storage of carbon in sediment is highly effective, and coastal ecosystems – salt marshes, sea grass, mangroves – play a much more important role than was considered in the past."

He explained how, by the restoration or extension of coastal ecosystems, the dredging industry could play a role, but emphasised that political recognition of blue carbon's role was needed: "The dredging industry can't do it alone," he concluded.

### Finally...

Eric Van den Eede led the closing ceremony: "I hope you've all enjoyed the technical sessions and social programme – thanks for coming to Brussels!"

But we still had one further technical note, Polite Laboyrie introducing the WODA *Principles of Sustainable Dredging*, a statement on 21st-century dredging agreed by CEDA, EADA and WEDA.

Signed by WODA chairman Anders Jensen, the Principles capture the common values to which each association subscribes, emphasising the need to work in harmony with natural processes and the site-specific characteristics of ecosystems. The Principles also state that beneficial use of dredged materials should be a priority.

And you can find them at: [www.dredging.org/documents/ceda/downloads/2013-wodaprinciples-signed.pdf](http://www.dredging.org/documents/ceda/downloads/2013-wodaprinciples-signed.pdf)

Paper awards followed (*see panel*) – and Craig Vogt won the major 'door prize draw' prize of complimentary registration to WODCON XXI, which will be held in the WEDA region.

Finally, it just left Anders Jensen to formally hand over the WODA chair to incoming WEDA president Ram Mohan.

"Belgium was indeed quite special," Mohan said, "but we have 200M m<sup>3</sup> annual dredge volumes in the US, 360 ports and \$46Bn in projects through to 2018.

"Don't miss WODCON XXI!" **DPC**

## >> Quotes

- "Belgium and Antwerp, numbers one and two in Europe for traffic jams!" – **Eric Van den Eede** warning delegates of the travel joys to come
- "I'm the minister for traffic jams, so I have a lot of work to do!" – keynote speaker **Hilde Crevits**
- "I don't know where I went wrong..." – **Prof Cees van Rhee** on the theme of dredging as an art and **Leonardo da Vinci's** quest to find out if men could fly using their legs
- "Obviously it's not there anymore, much to the disgust of the people of Durban!" – **David McGillewie** on the demise of a bar-restaurant called Thirsty's, a casualty of channel widening
- "It's always difficult to trust people who work underwater, but we behave" – EuDA chairman **Marc Stordiau** at the gala dinner
- "You'll have eternal fame – in the dredging world at least!" – **René Kolman** presenting **Max Radermacher** with the IADC award
- "As an older person, I began when dredging really was an art and not a computer game!" – EADA treasurer **John Dobson**
- "The only living things that gave us a problem were some cows" – **Bram Van Renterghem** on Sigma Plan flooding
- "We have a lot of dredged spoils – oops! I know that's a term I mustn't use" – **Stefan Cantré**
- "Now that's modern art!" – **Heinz-Dieter Detzner** displaying photos of Hamburg's METHA plant
- "I was in awe of the power" – **Michael Hodges** describing the first time he saw water pumped during a dredging project
- "As many of you know, modelling sand waves is very difficult" – **Robert Nairn** on dredge challenges at Ponta da Madeira
- "Authorities always question the way we do it" – **Maria Terese Sá Pereira** explaining Port of Lisbon's dredging plan
- "Tourists on the beach only want to see the beach!" – **Edwin Zengerink** discussing structural coastal protection
- "It's like going to a Barcelona soccer match and seeing the 'B' team" – **Jelle Prins** bemoaning the fact his co-authors were unable to join him
- "I asked for a day, but they've only given me 18 minutes!" – **Peter de Graaff** on the length of his presentation
- "The title's a bit long, it should have been 'the art of grab dredging' – **Cao Xingbo** on his presentation
- "You don't want it too small nor too big – that's when things break!" – **Leonard den Boer** on starting a dredge pump with a diesel engine