

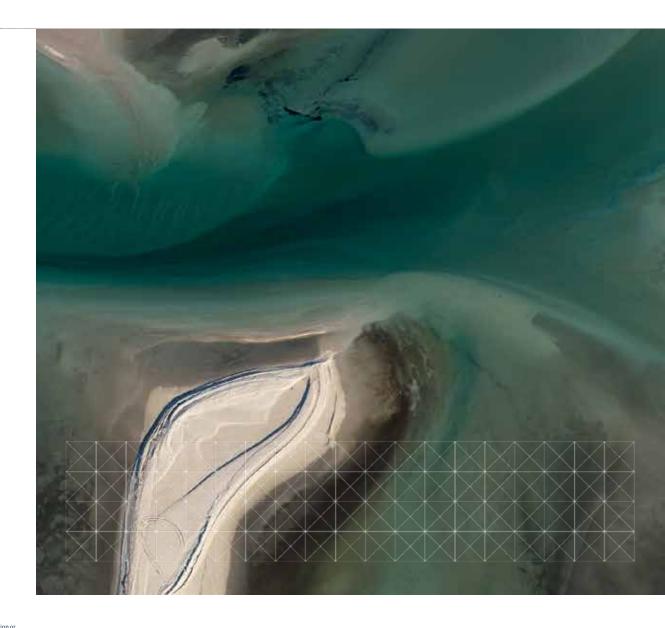




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Ports and Technology: <u>Now What?</u> 20/02/2023

Konrad Mech, Sales Director Coasts, Ports, Inland Waterways

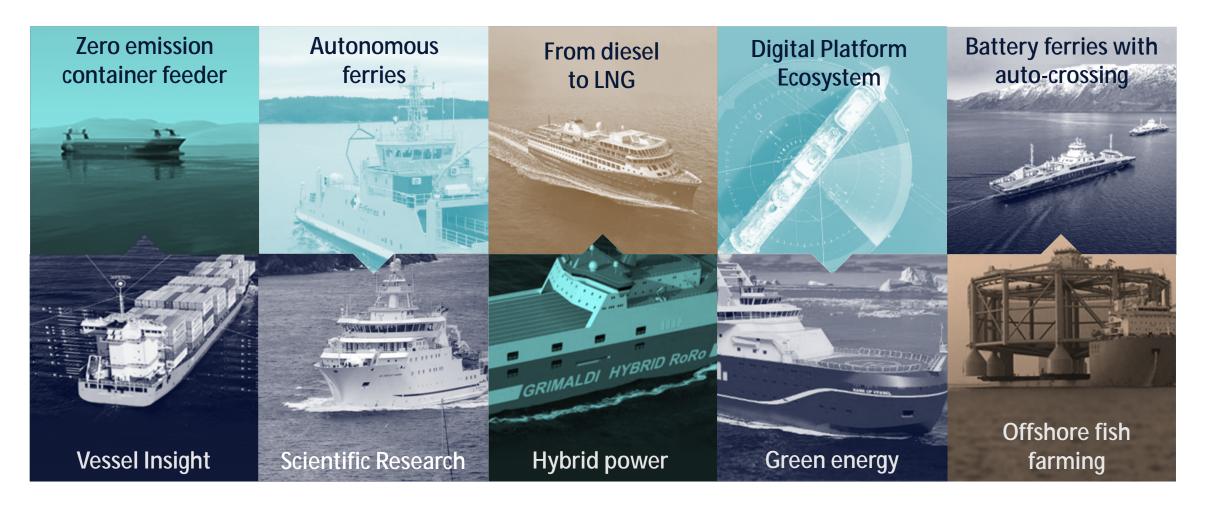


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New technology brings new benefits

KONGSBERG'S digital vision in practice





Characteristics – Global Ports and Waterways

Infrastructure upgrades Cycling droughts and floods Workforce demographics

Environmental stewardship





Characteristics of Pacific Ports

Ring of Fire Typhoons Tsunami Big vs Small Ports





Trends impacting Port Operations

Empty Containers JIT Vessel Management Digitization





MARAD Town Hall 2021

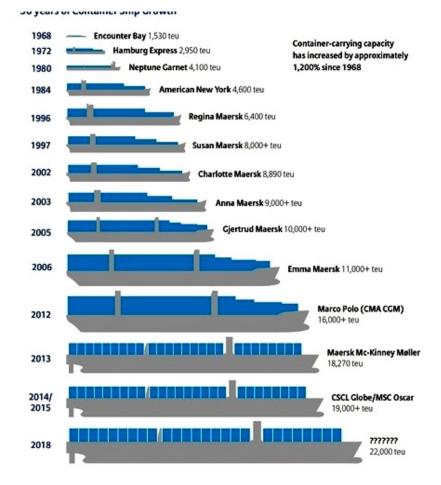
Vessel Congestion Road, Rail congestion COVID Carrier Diversion





Trends Impacting Port Investment Decisions

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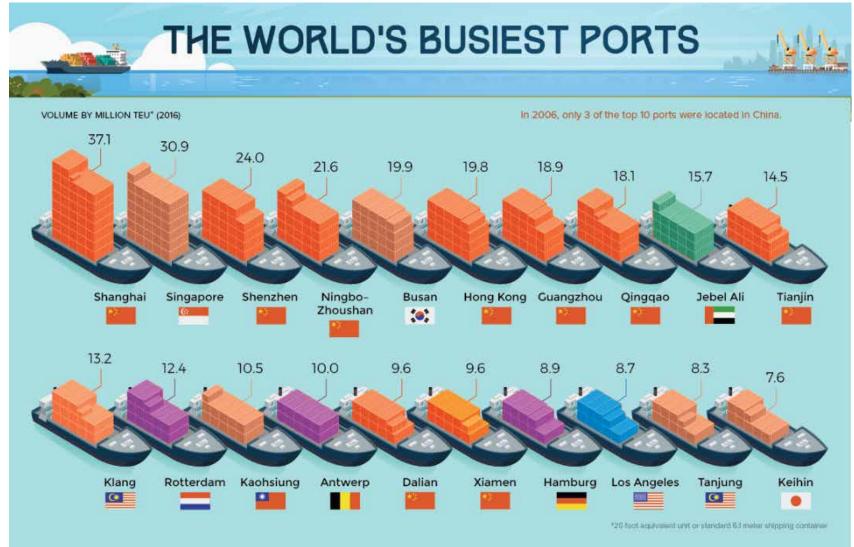
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Changes to Vessel Visits?



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Largest firms; largest ships ÷ m KONGSBERG A 35,000 TEU Container Ship? Development (Rank TEU* 20,000 3 15,000 4 10,000 5 3 ilds 3,126 T 6 5,000 e TEU 7 8 9 1970 19 10 Source: ITF (2015) PUBLISHED NOV 6, 2015 6:11 PM BY HARRY VALENTINE

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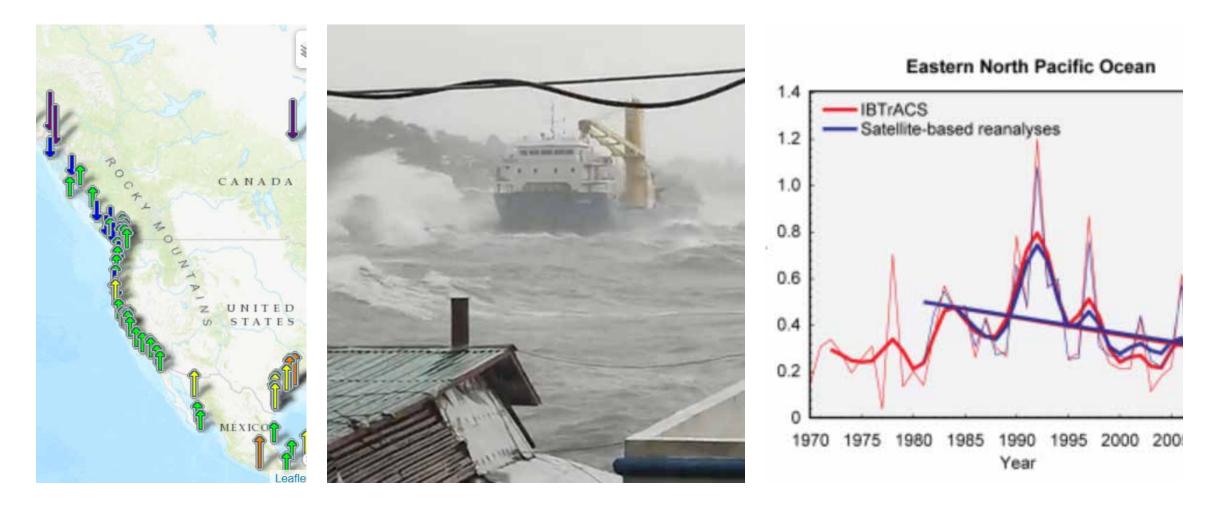
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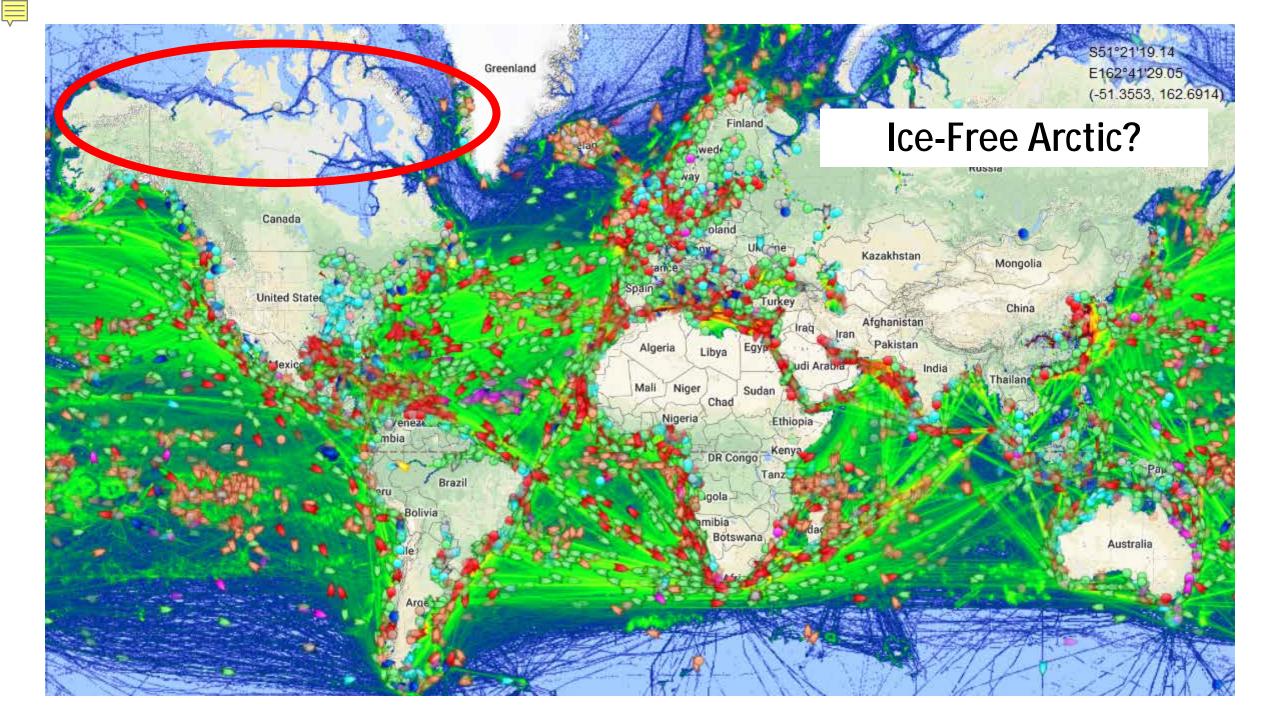


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Climate Change Impacts?

https://tidesandcurrents.noaa.gov/sltrends/







Staffing?

nature Explore content ~ About the journal ∨ Publish with us \checkmark Subscribe Aging wor nature > book reviews > article Decr BOOK REVIEW 04 April 2022 Correction 07 April 2022 **Global population is crashing,** soaring and moving From Japan to Yemen, India to Ukraine, rates of births, deaths and displacement are reshaping nations. 1950 1980 2000 2100 2020 2040 2060 2080 Source: United Nations - Population Division (2022) CC BY



Big Ships, Big Challenges:

The Impact of Mega Container vessels on U.S. Port Authorities (Noel Hacegaba, POLB)

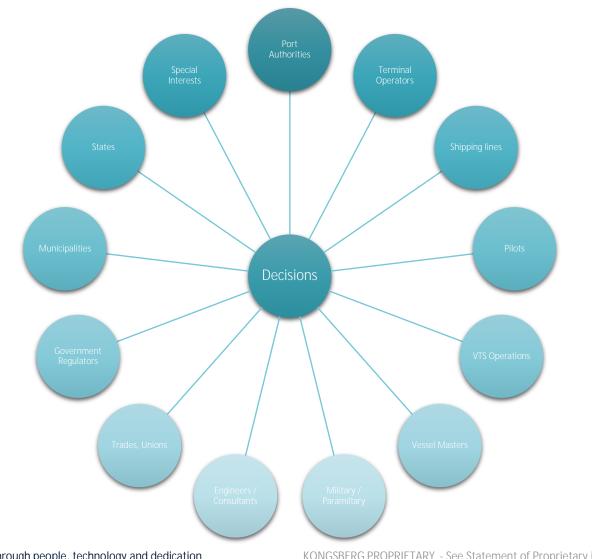


- **§** Access channels width and depth
- § Air draft
- **§** Depth alongside
- § Quay length
- § STS height, outreach and width
- Increased exchanges of containers from each ship
- § Landside capacity
- **§** Yard equipment and TOS
- § Road, rail and barge access
- Hinterland connections
- S Capacity to expand
- Source: Rothberg, 2013

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Complex Stakeholder Environment



Discrete Bilateral Communication paths:

 $(13^{*}12)/2 = 78$

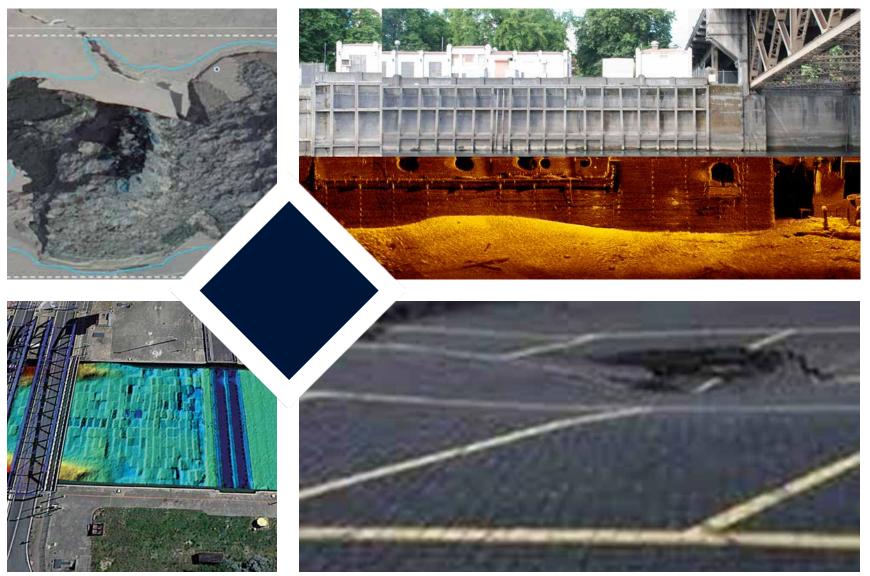
Sales reality:

- Cautious •
- Conservative
- Slow to act •



Many competing project priorities

Channel, berth survey Dredging Deck repair, replacement Pier element inspection, assessment STS / gantry cranes





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Implications: Anticipating Change; Risks

Risks are Bets – You can win and you can lose

Autonomy **Fuel Types** Vessel size Investment decision Project execution

How to make the best decisions?



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It's All About Workflow

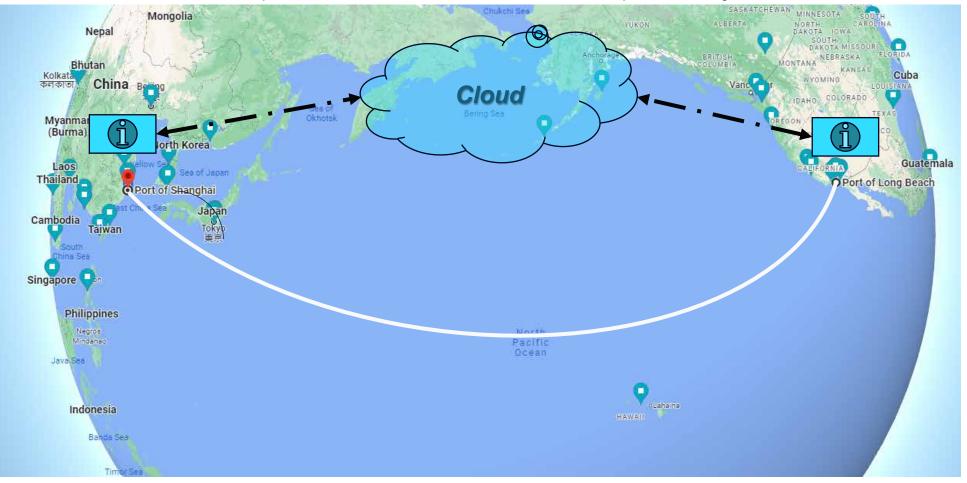
Client Scope			
Anticipate impact of	Workflow		
trends	Lever Technology	Client Output	
Understand Client's desired outcomes	Safer work practices	Better Outcomes	
	Same or lower costs	Built for Future	
	Same or faster deliveries		
	deliveries	_	



Example: Green Shipping Corridors Multiple Stakeholders – How to turn concept to reality?

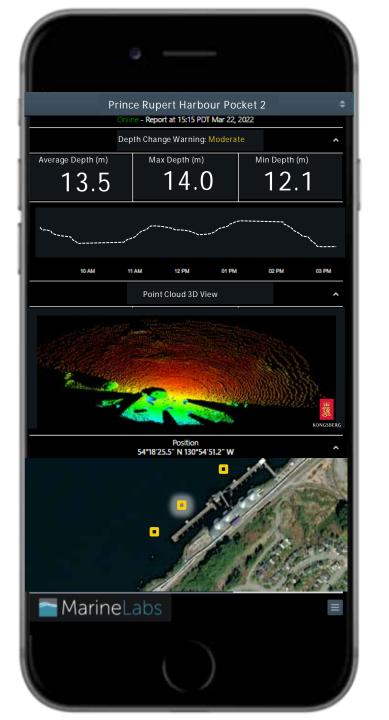
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BerthWatch – Dashboard

- Select berth pocket
- Check for Δ warnings
- View latest pocket depth summary
- 3d pan rotate point cloud
- Check another berth
 pocket





Confidential. MarineLabs Data Systems Inc. 2022



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Green Shipping Corridor Workflow

Client Scope			
Reduce CO2 emissions	Workflow		
Reduce time at anchor	Real-time berth depth	Client Output	
Optimize road, rail traffic	Real-time wind, wave data Trigger for dredging	Operational efficiencies	
Optimize cargo i.a.w. safe UKC		Happier communities Fewer allisions,	
Better info for Pilots	Accelerate post-storm recovery	groundings	
		Achievement of emissions targets	



Shallow Survey Customer Focus: Shallow Survey and Inspection

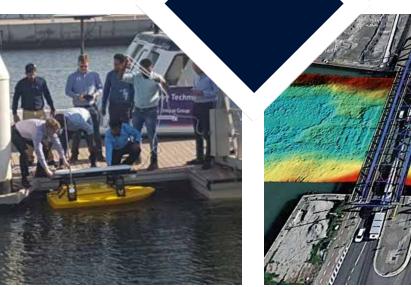
C YouTube "

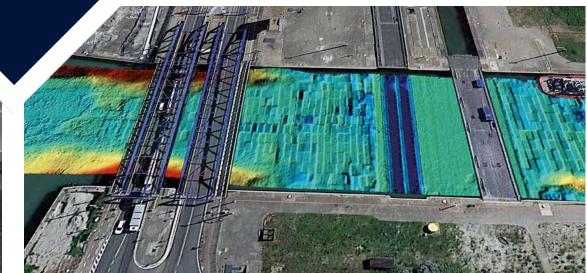
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Customer Benefits:

- Small form factor ٠
- High performance for Low Price ٠
- Integrated with Hypack, EIVA, Qinsy, Sonarwiz ٠



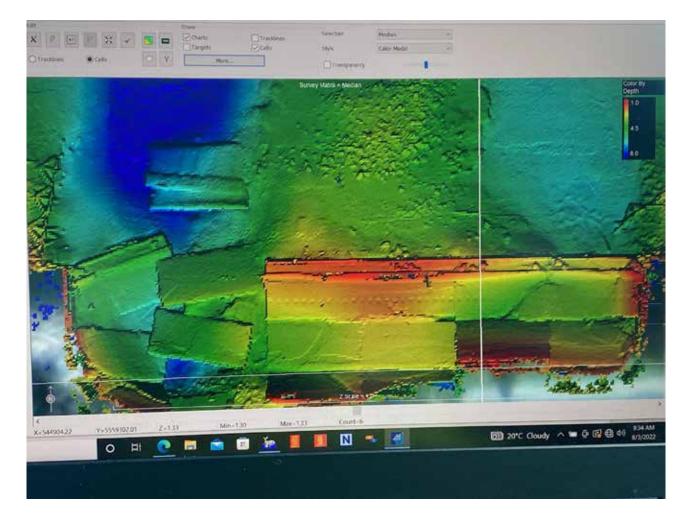


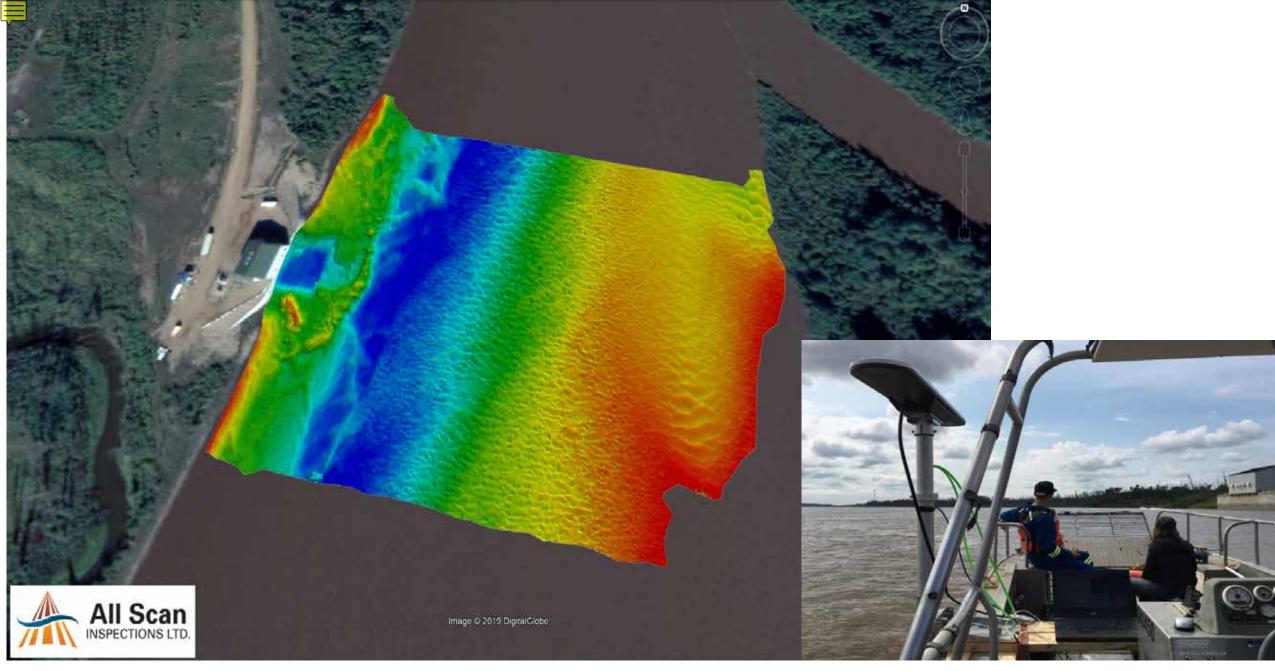




3 HF Sonar for Bottom Scans



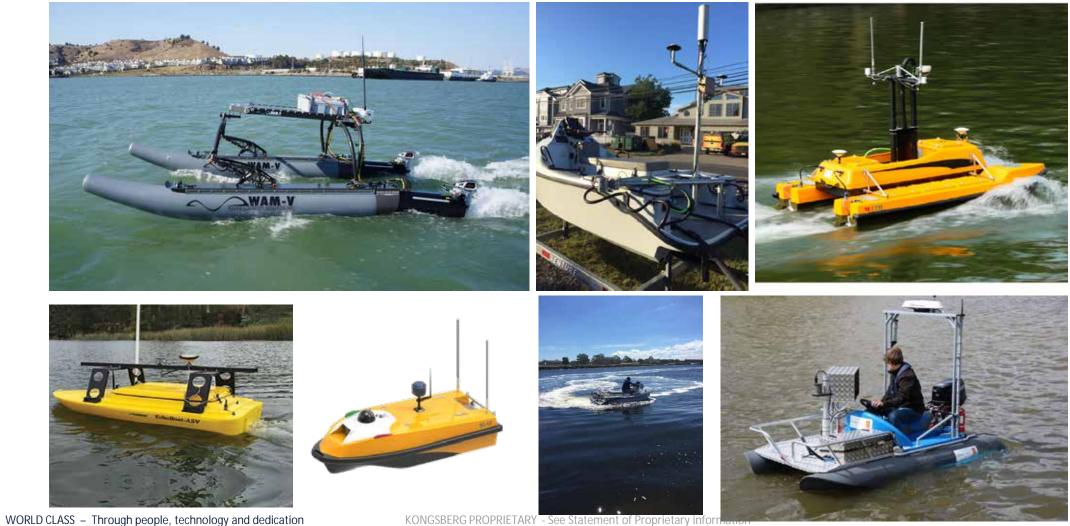






USV/ASVs already integrated with the M3 Sonar

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Mapping Workflow

Map riverbeds / locks and canals /	Workflow		
dam reservoirs	Faster deployment Lighter system weight Easier assembly and disassembly Faster data collection Faster post-processing Better user interface Faster operator training	- Client Output Higher resolution images More accurate depth data	



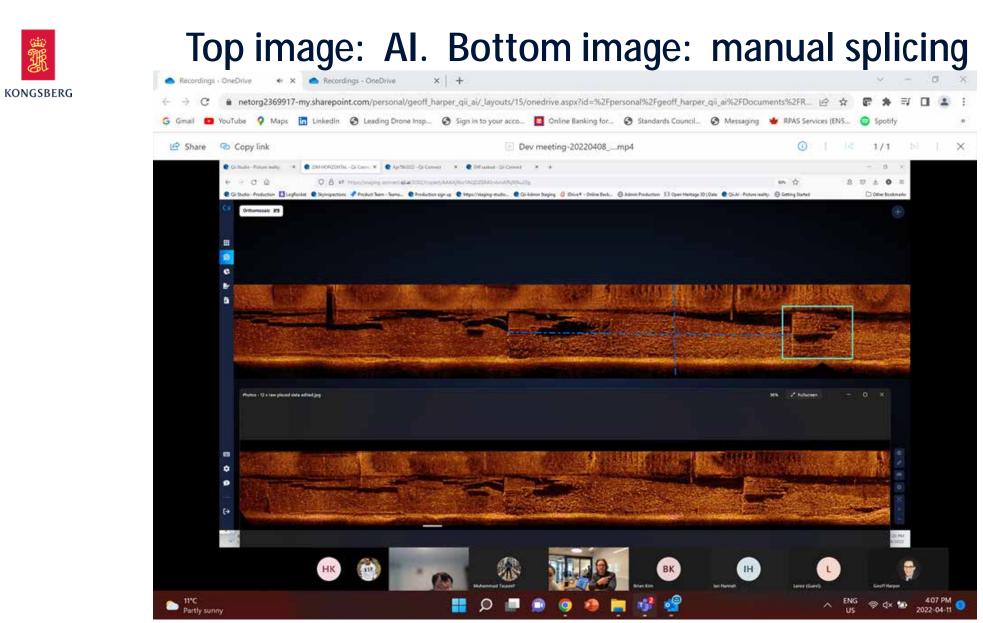
Infrastructure Survey

Customer Focus: Civil Engineers

Customer Benefits:

- Faster image
 processing
- Better mosaics
- Feature I.D.





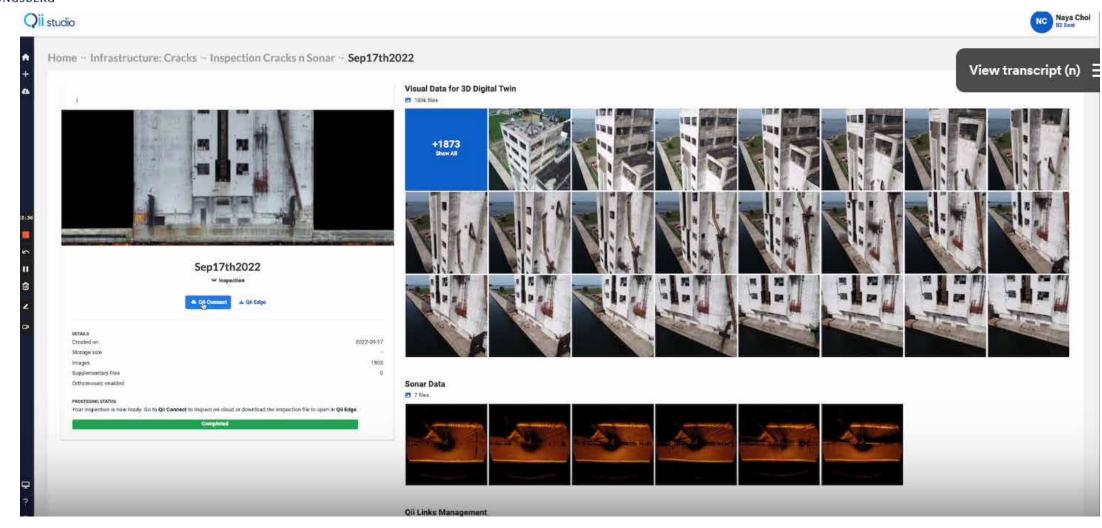
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Adding Arial Drone Data

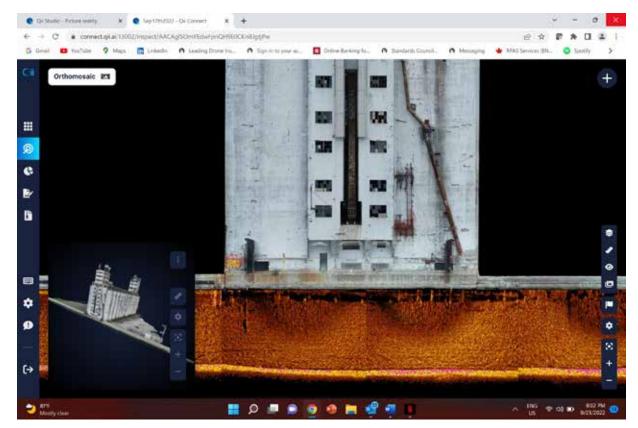


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Data collection and GIS information storage



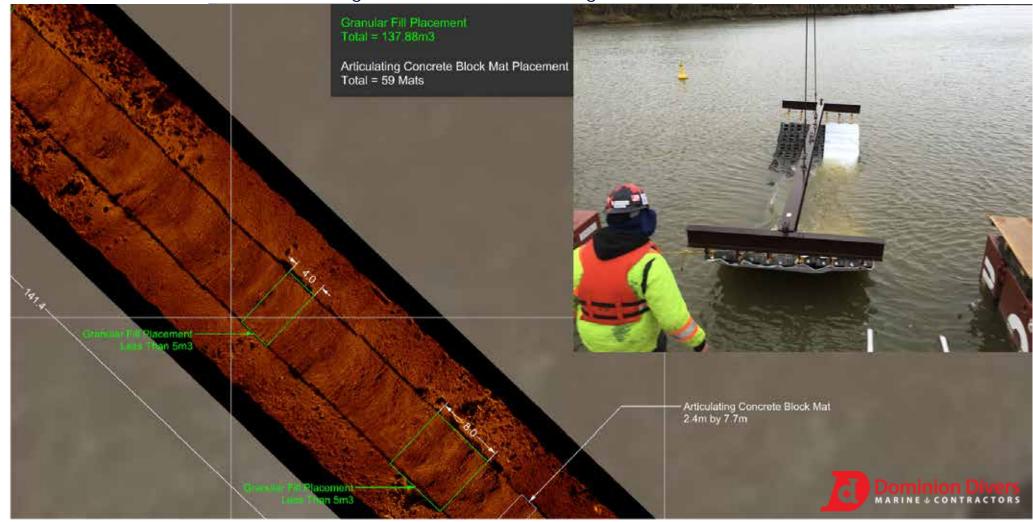




Mat installation

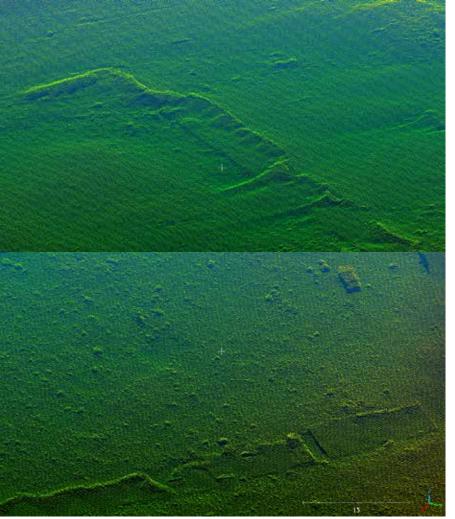
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1171 High Resolution Scanning Sonar – As-Built



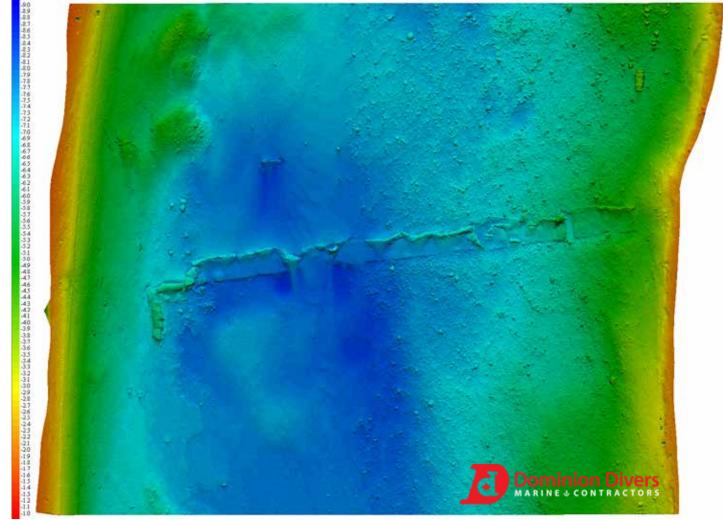
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M3 Sonar HF

Mat inspection

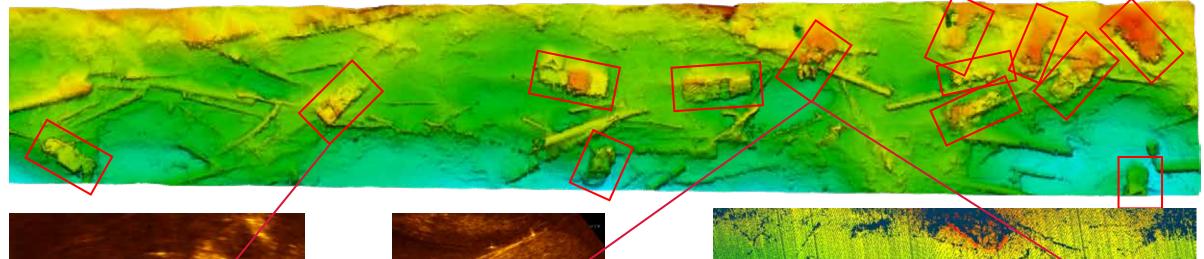


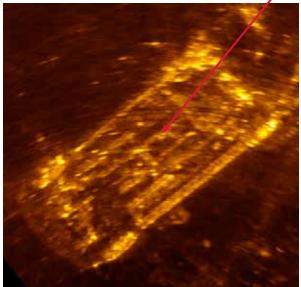
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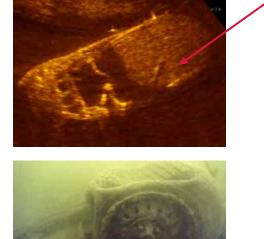
M3 Sonar HF

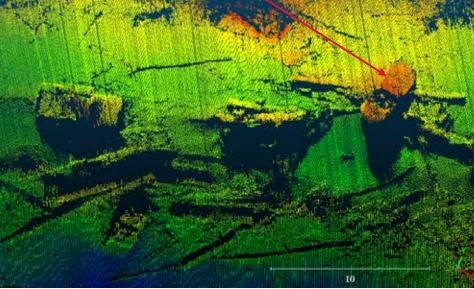
Abandoned Car Search





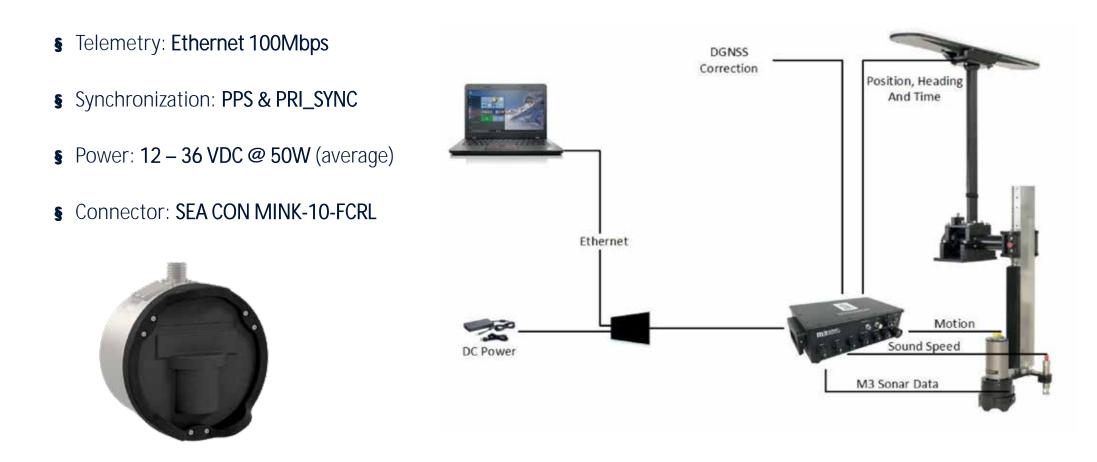
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M3 Sonar HF Surface Vessel Interface

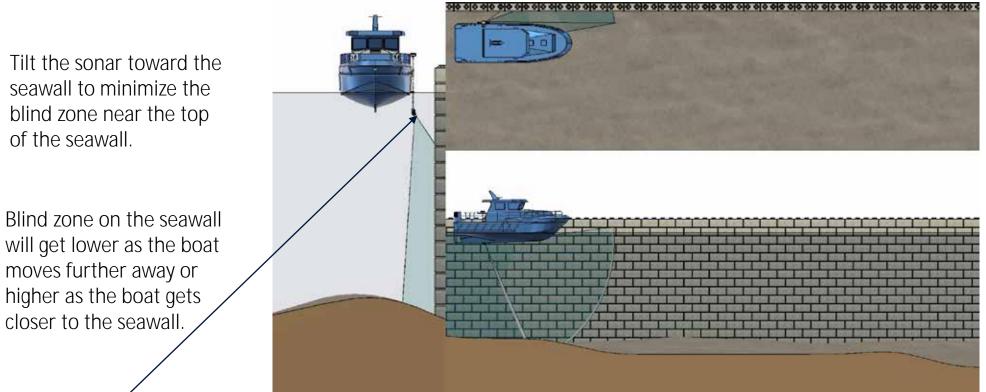




of the seawall.

Mosaic – Elevation View

Forward looking



Frequency: 1200kHz Beam: 75° x 21° Yaw = -10° (toward wall) Pitch = -30° (tilt down) $Roll = 90^{\circ}$ (vertical) Range = ~1.2 x depth

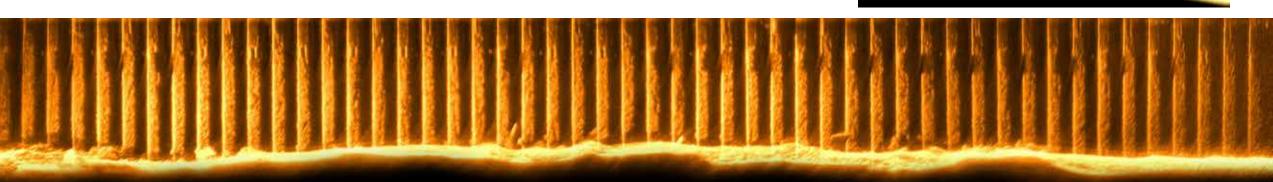
Blind zone on the seawall will get lower as the boat moves further away or



M3 Sonar HF Sheet Pile Wall



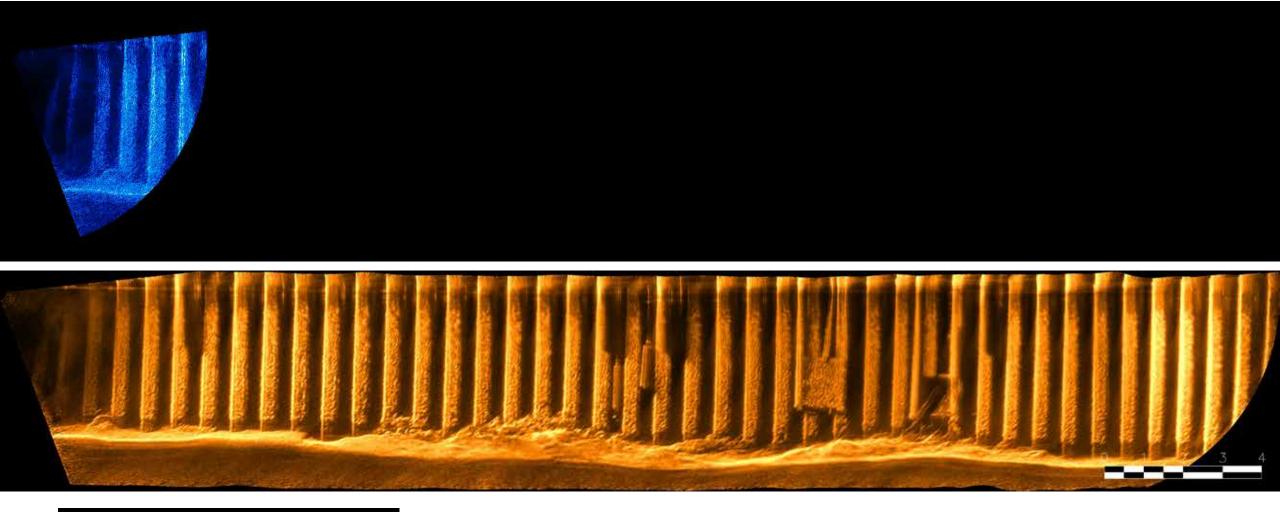






M3 Sonar HF

Sheet Pile Wall

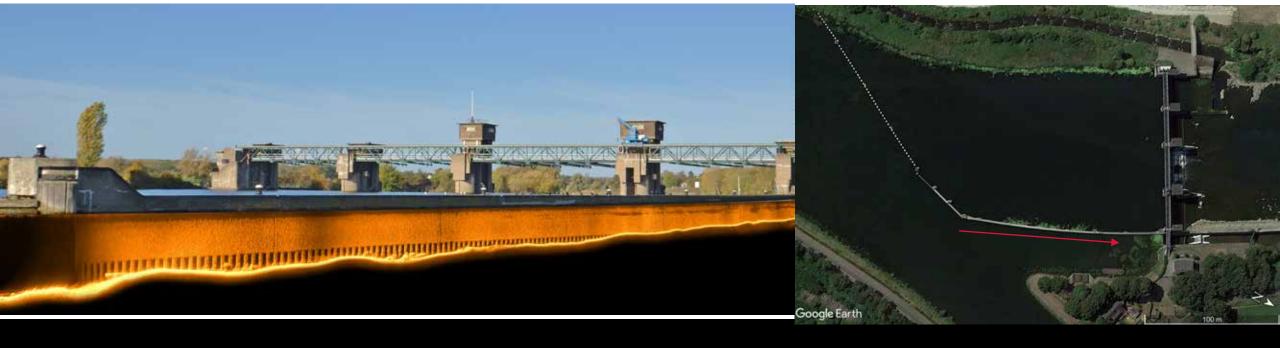


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M3 Sonar HF

Stuw Borgharen – Meuse Canal

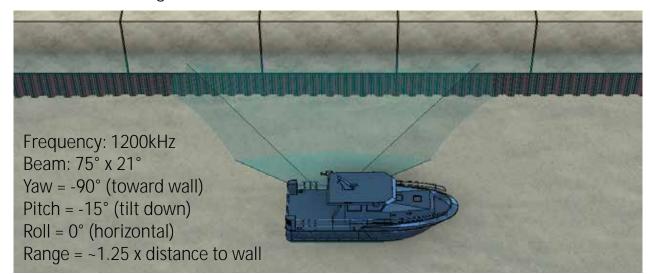


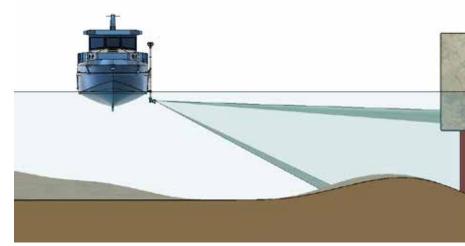
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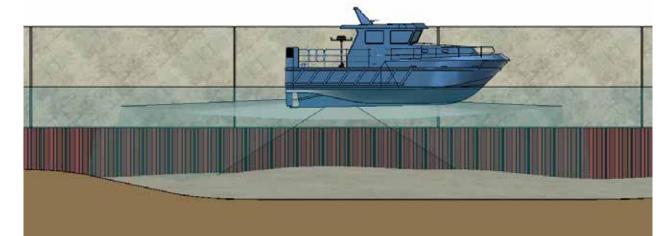


Mosaic – Plan View

Side Looking



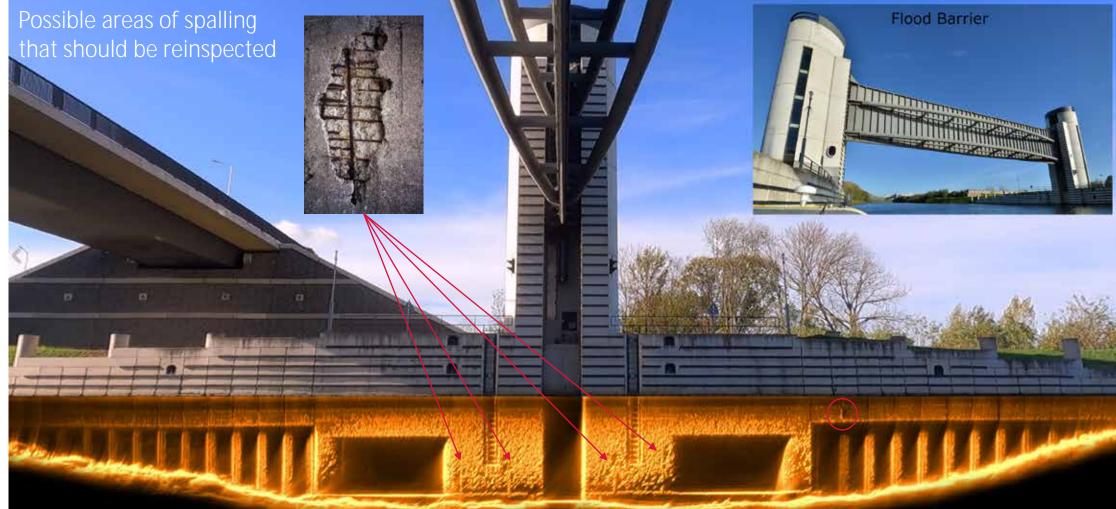






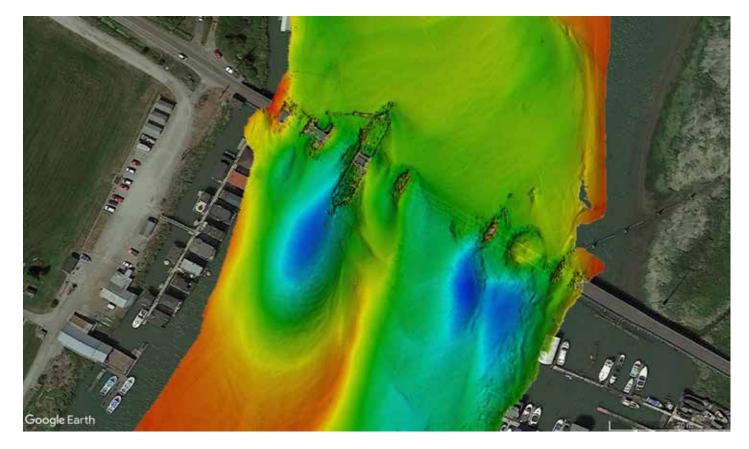
M3 Sonar HF

Keersluis Limmel – West Side Elevation View





Bridges



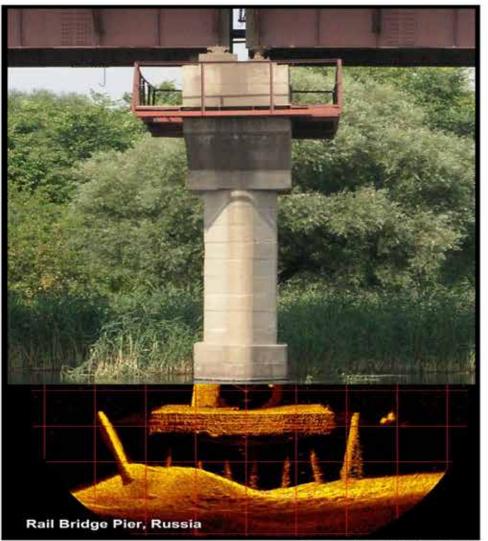
§ Bridge Pier scour

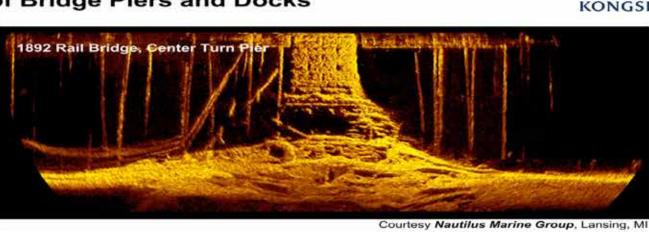
- Real-time monitoring with DAS with K-Observer
- Periodic inspection with Hires sonar
- § Bridge structural inspection
 High Res Sonar; Multibeam sonar
 - ScanFuse powered by Qii.Al

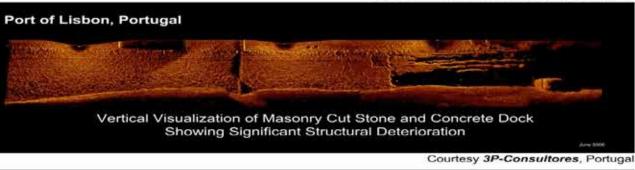
www.kongsberg-mesotech.com

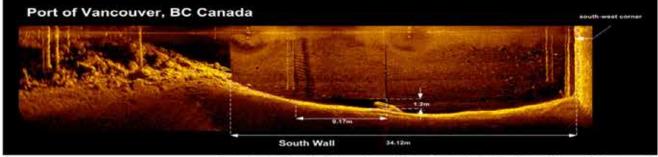
Scanning Sonar Used to Identify Scour, and Structural Deterioration of Bridge Piers and Docks











Courtesy Peter Diving, Russia

Data Collection by Kongsberg Mesotech Ltd., Port Coquitlam, BC, Canada

Data Collected Using MS 1000 and 675 kHz High Resolution Scanning Sonar Head with 30 Degree Fan Beam Transducer

Kongsberg Mesotech Ltd.



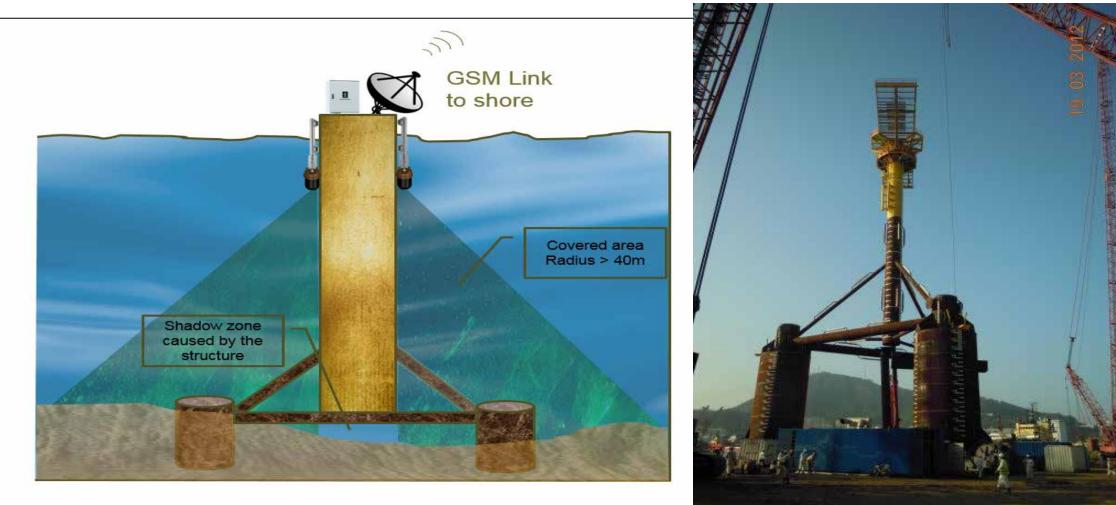
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Scour Monitoring System



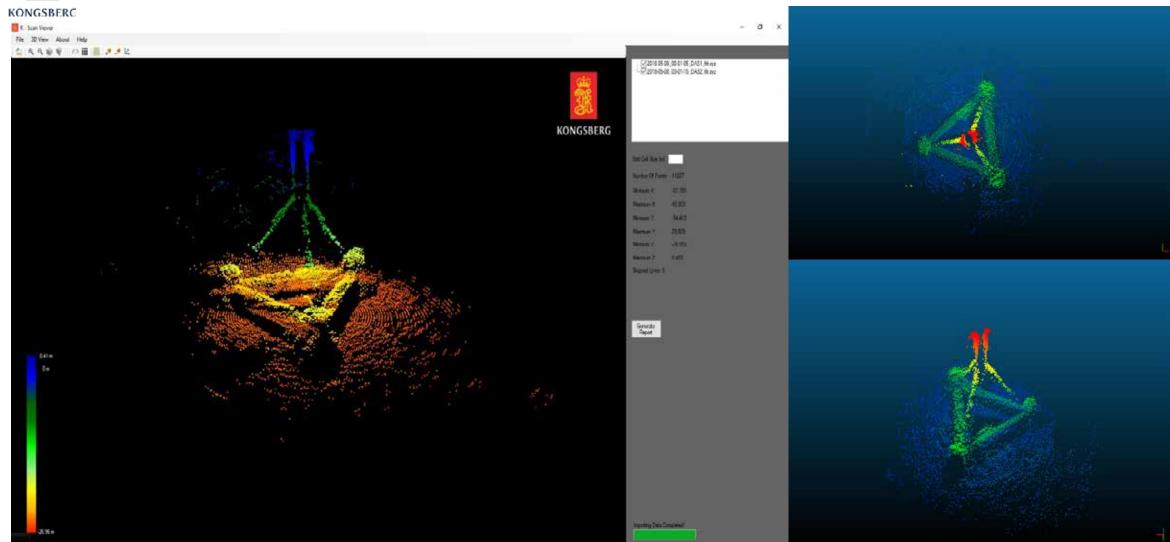
Set-up with 2 Dual Axis Scanning Sonars







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Infrastructure Inspection Workflow

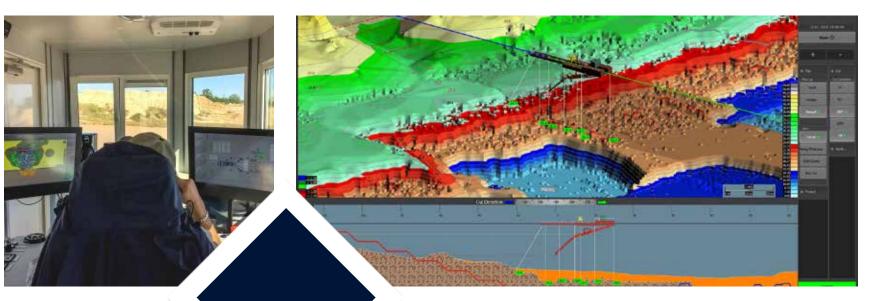
Client Scope			\square
Inspect and assess port / lock and canal / bridge infrastructure Full asset inspection above and below waterline	Workflow Pre-survey for dive planning Hazard identification prior to dive Diver supervision during dive Focus on pre-identified problems	Client Output Higher resolution images Georeferenced data for quick access	
	Simpler field operations Integrate with drone images	Historical record of past inspections and assessments for trend analysis Full 3-D asset model for better decision-making	



Real-Time Dredge Monitoring Customer Focus: Dredge Operators

Customer Benefits:

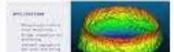
- Contract Compliance
- Time Savings
- Eliminate Excess
 Dredging





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SONAR







Example – dredging risk



Mega-ships - Harwich Harbour will be able to make way for huge ships Picture: Stephen Waller



Share 🕤 😏 🛅

A CONTRACTOR has been appointed in a project worth £120 million which will deepen Harwich Harbour to make room for mega ships.







Destabilizing Cyclopean Wall Foundation

PAVING EL. +13.0 EL. 0.00 M.L.L.W. EXTENSIVE VOIDS 2'-0" CONC. FACE CYCLOPEAN MASS W/ NOT FOUND WEAK CONCRETE LARGE BOULDERS FROM WALL -4' OF ACCUMULATED SILT -EL. -33.0 ~=



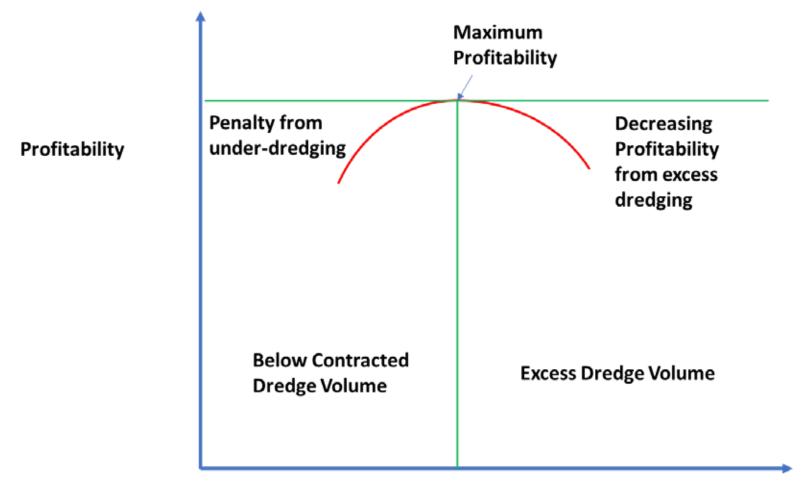


How DOES IT WORKED Cutter Suction Dredging



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Challenges for Dredge Operator



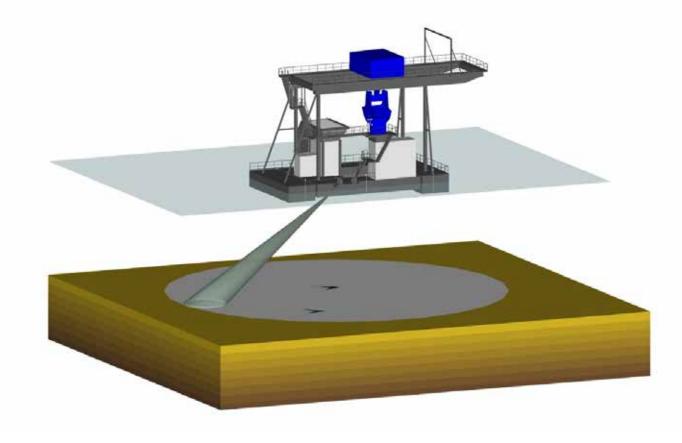
Contracted Dredge Volume



360° DAS scan

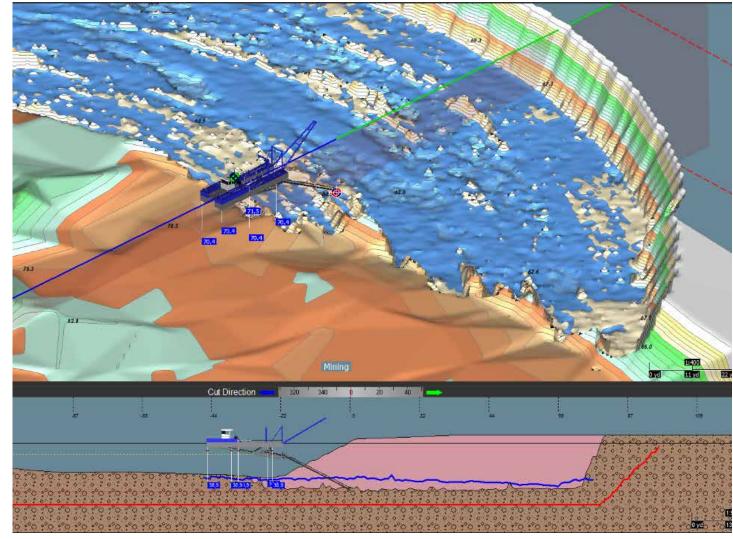
Scans the bottom of the work site and provides a high-resolution three-dimensional terrain model.







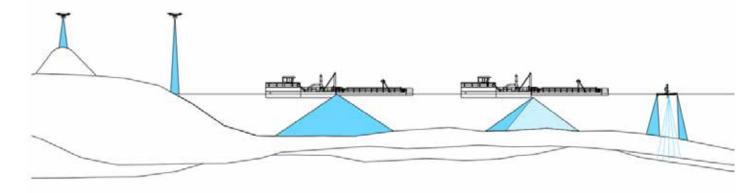
Making the Dredging Operation Visible







Total Awareness during Dredging Ops



- § Pre- and Post-Dredge QA Survey
- **§** Real-time dredge monitoring
- S Dredging mission asset assessment and planning



Real Time Dredge Monitoring

	Workflow	
Dredge to the contracted depth		Oliopt Output
Manage fuel costs	Simple user interface – allows	Client Output
Perform to schedule	lower skill operator to succeed Verify material removal to design horizon Confirm no slip-back or subsidence during dredging operation	Digital Terrain Map Georeferenced evidence of completion Records to justify a charge-back
	Take immediate action if obstacle detected	



Port Security from Waterside

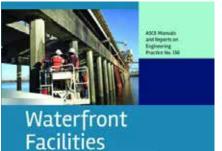
Underwater drones Arial drones





Management Infrastructure Decision Toolbox

KONGSBERG



Inspection and Assessment







Information visit asce.org/copri





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It's All About Workflow

	Workflow		
Anticipate impact of		Client Output	
trends	Lever Technology	Chefit Output	
Understand Client's desired outcomes	Safer work practices	Better Outcomes	
	Same or lower costs	Built for Future	
	Same or faster deliveries		





Thank you!

konrad.mech@km.kongsberg.com