

Development of Mega Dredgers & Related Projects in Canada



WEDA Dredging Summit & Expo Vancouver 2017

Michael Fitzsimons

Introduction

Overview

- Market Drivers
- Main Players
- Historic Development
- CSD Development
- TSHD Development
- Canadian Projects



41 MW CSD under construction - Croatia

Market Drivers - Connection Population Growth to Dredging

- World population: growth 1.1% - set to continue
- Seaborne trade: growth running around 3% per year
- Global energy growth: Increasing 1.0% per year
- Land reclamation: for living and industrial use
- Coastal protection: natural erosion & climate change
- Tourism and travel: cruise terminal, airports, beaches



Panama Canal New Locks

Main Players - Today (2015 Figures in Euro's)

Rank (2015)	Company	Country based	Working area	Total sales (EUR m)	Dredging sales ¹⁾ (EUR m)
1.	CCCC (CHEC)	 China	China (mainly)	57,863	4,805
2.	<u>Boskalis</u>	 Netherlands	Global	3,240	1,727 ²⁾
3.	Van Oord	 Netherlands	Global	2,579	1,622
4.	Jan De Nul	 Belgium	Global	2,245	1,610 ³⁾
5.	DEME	 Belgium	Global	2,286	1,349
6.	Great Lakes Dredge & Dock Co.	 USA	USA (mainly)	772	614
7.	National Marine Dredging Co.	 UAE	UAE/ME	469	469
8.	<u>Penta Ocean</u>	 Japan	Asia/ME	3,709	160 ⁴⁾
9.	Toa Corporation	 Japan	Asia	1,511	130 ⁴⁾
10.	Rohde Nielsen	 Denmark	Europe	130	130 ⁵⁾

Data courtesy of Rabobank

Source: Company websites

Note 1) Composition of dredging sales per company can differ significantly, i.e. including niche services or not, sand winning for onshore activities or not, etc.

Note 2) Including Inland Infra activities

Note 3) Including Offshore

Note 4) Dredging sales based on fleet size and estimated for Penta Ocean and Toa Corporation

Note 5) 2014 figures

Historic Development of Dredging Technology

<1800 Pre-industrial : Powered by man/horse/wind, 'Mud Mills'

1769 : Steam engine invented by Watt

1800 to WWII : Age of steam powered bucket dredgers and grabs

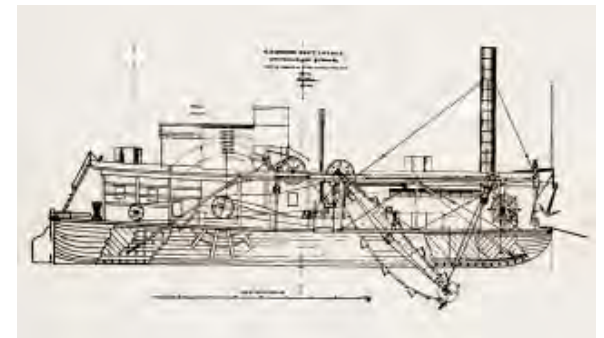
1851: Centrifugal pump first used for hydraulic dredging

1857 to today: First hopper dredger using steam powered pumps

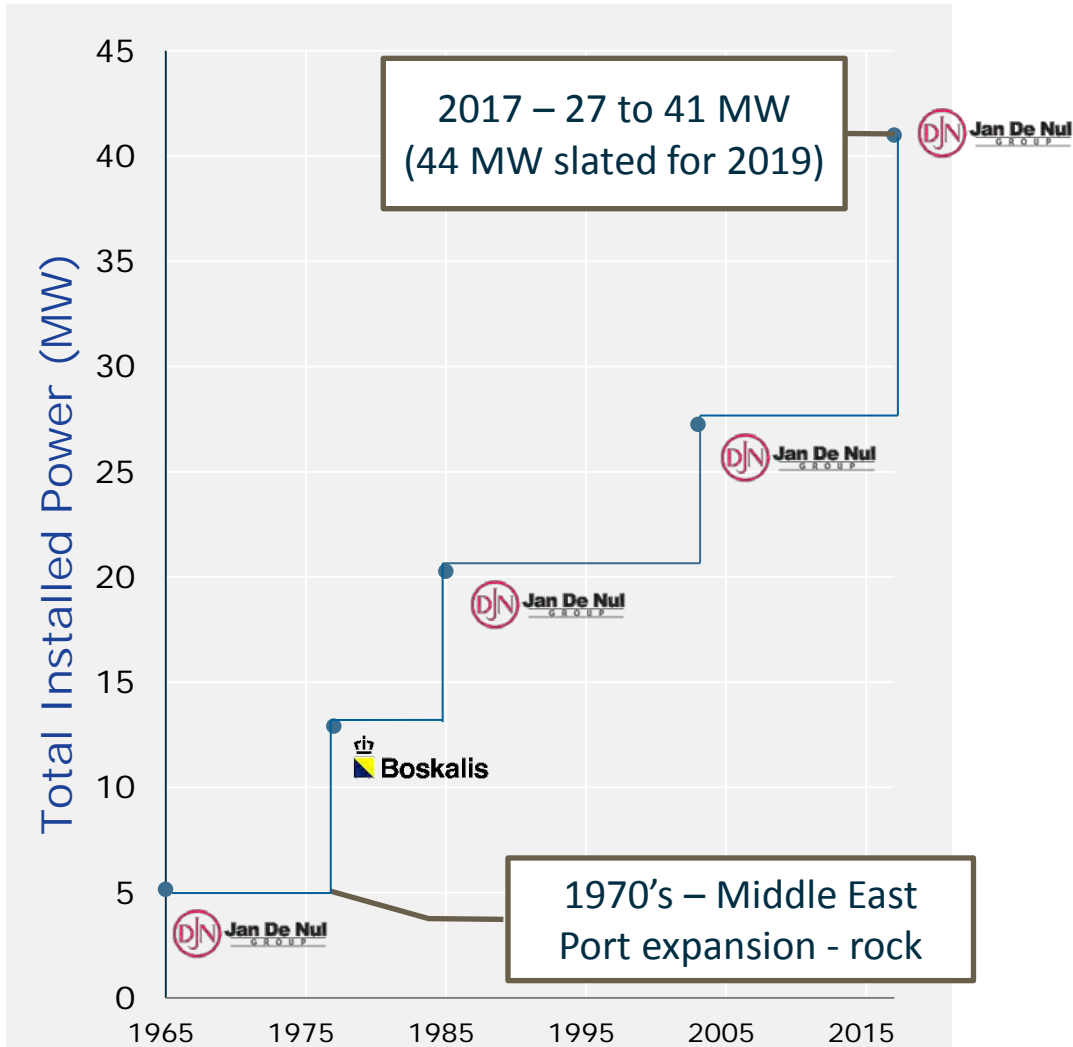
1892: Diesel engine invented

>WWII : Diesel fully replaced steam

1970's : Digital control bringing precision and control to vessels and surveys

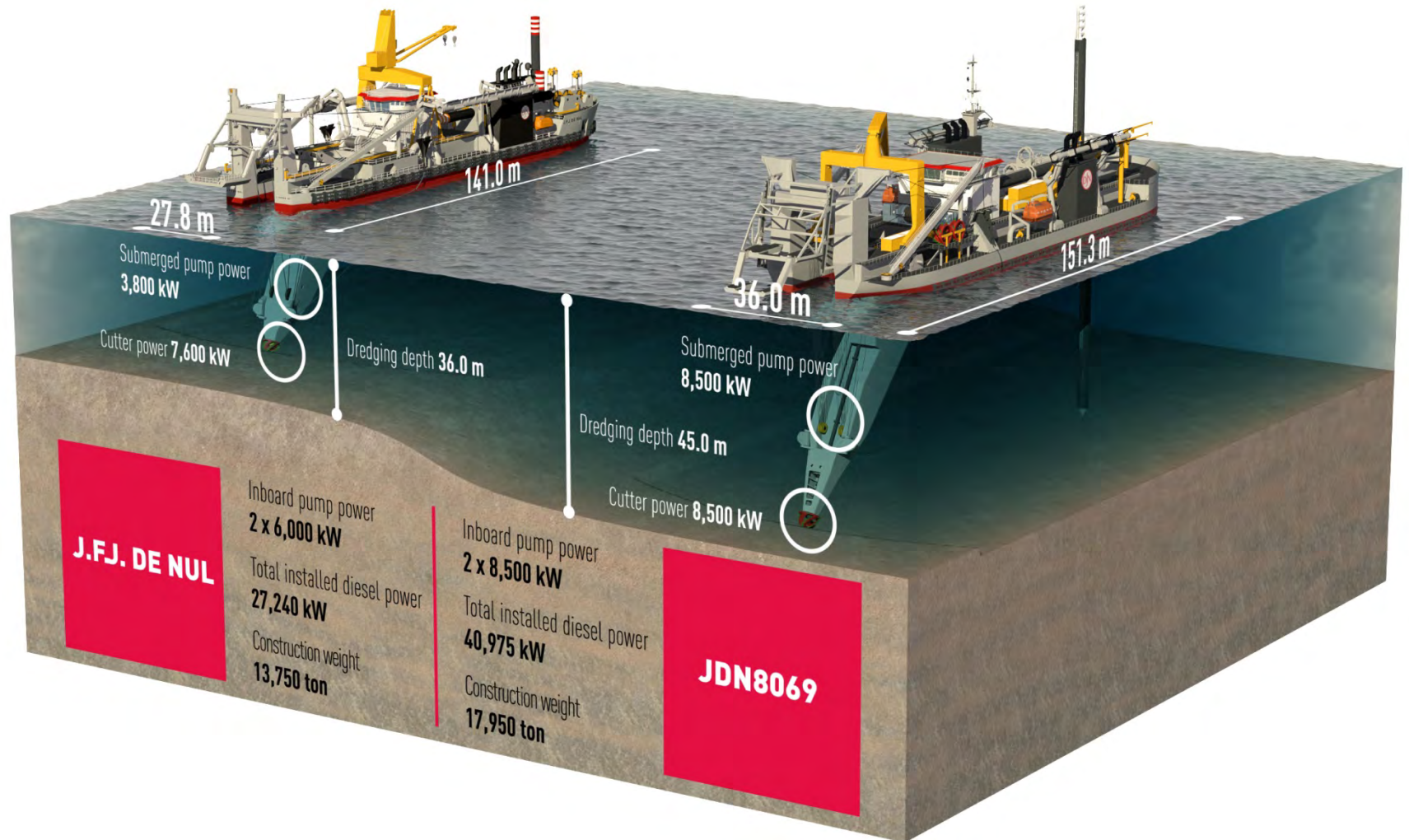


CSD Development – Increase in Power 1965 to 2017



Source: Company websites

CSD Development – 2003 to 2017



CSD Development - Comparison of Suez Canal Dredging - 1864 to 2014



Suez 1: 1854 to 1869 – 15 years

10 years dry excavation 15 million m³ men, camels and donkeys.

5 years from 1864 steam-powered bucket dredgers dredged **60 million m³**

Total power fleet 10,000 HP

Average production 180,000 m³ /month

6,000 m³ /day



Suez 2: 2014 to 2015 – 9 months

22 vessels mainly CSD's

Total volume **259 million m³**

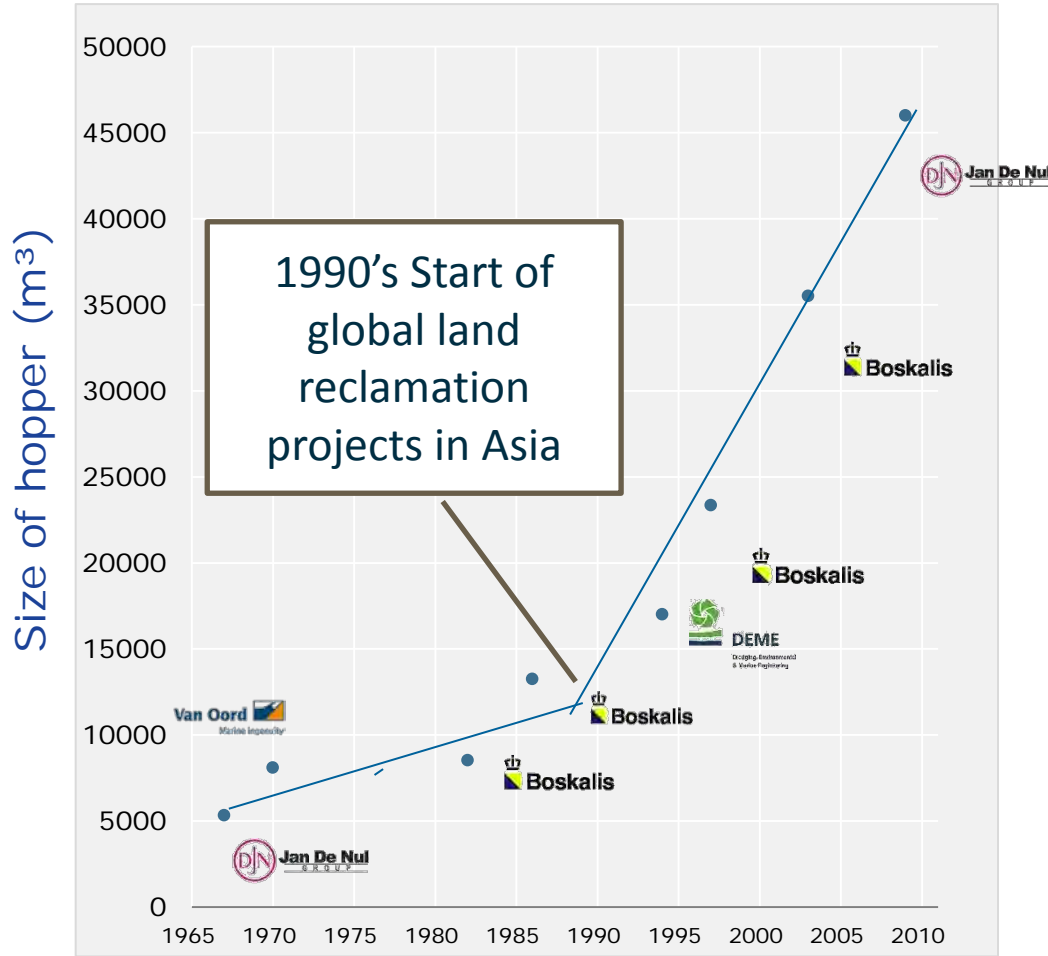
Highest daily output CSD dredger (*Ibn Battuta*) achieved 230,000 m³

Highest output of the combined fleet was

1.73 million m³/day

(figures from Suez Canal website)

TSHD Development – Increase in Size 1965 to 2010



Trend 2010 to 2017:
Hoppers: 3,500 m³ to 14,000m³
.....with engine emission control

Source: Company websites

TSHD Development – 1977 to 2010



Year Launched	2010	1977	Increase
Hopper Size (m ³)	46,000	6,000	x8
Length (m)	223	146	
Dredge depth (m)	155	26	x7
Draught loaded (m)	15	7	
Dia. Suction pipe (m)	1.3	0.9	
Suct. Pumps (MW)	13	2	x6
Disch. Pumps (MW)	16	2	x8

TSHD Development – Performance – Example project



Nigeria – 2016

20 sq km site requiring 2.5m of fill - 50 million m³

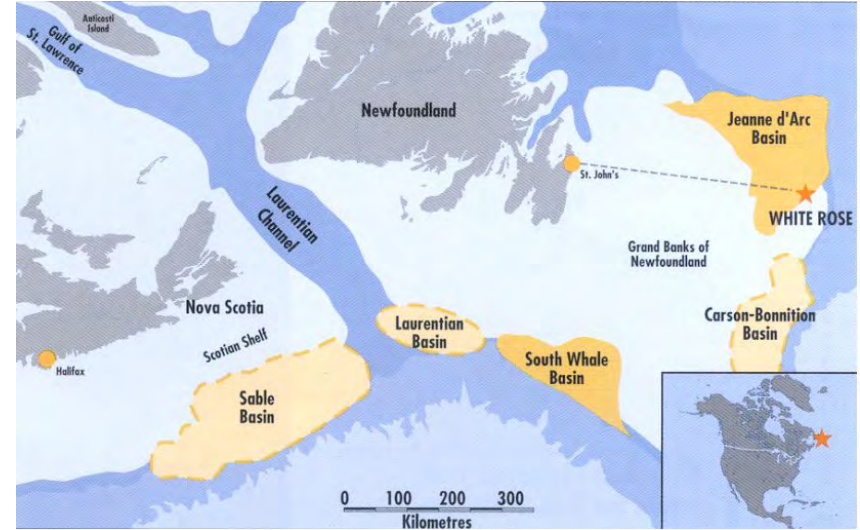
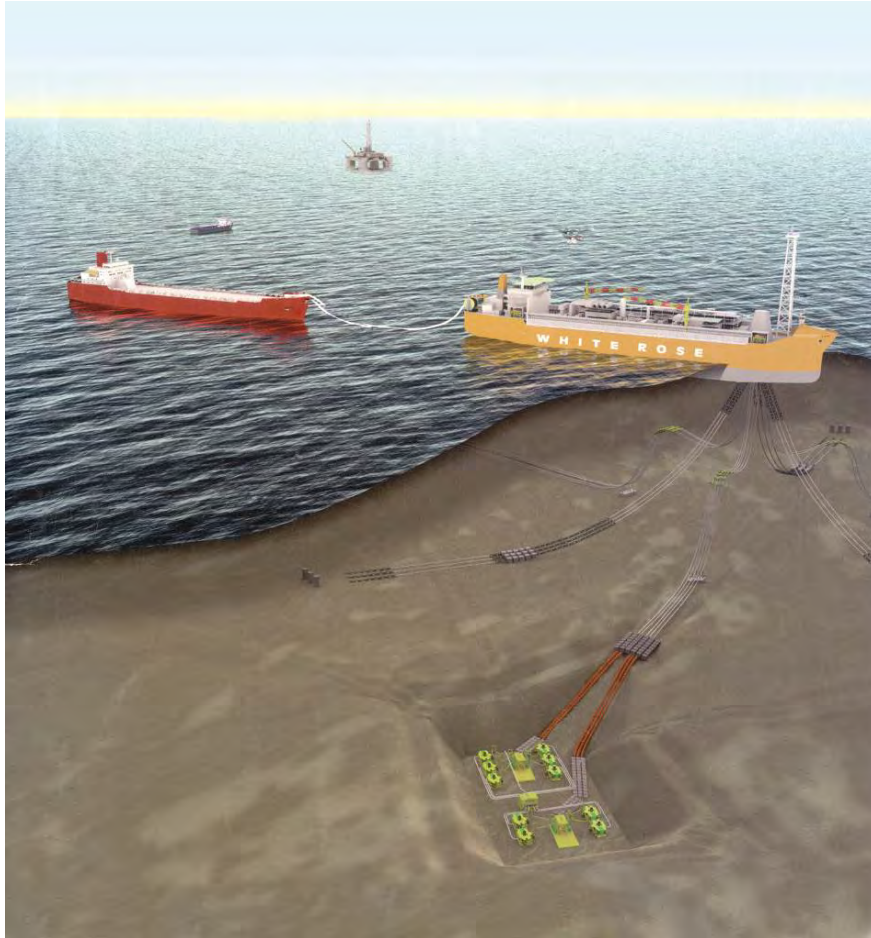
Sand dredged from 10 to 20 km offshore

Pump ashore distance 9,740m

Hoppers: 2 x 46,000m³ - 2.5 million m³/month/vessel

1 x 18,000m³ - 800,000 m³/month

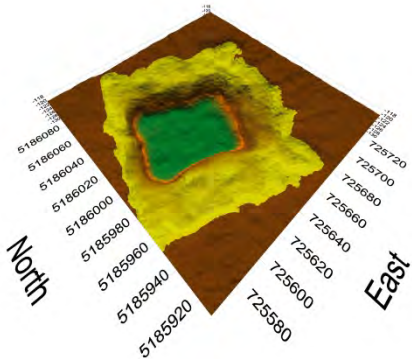
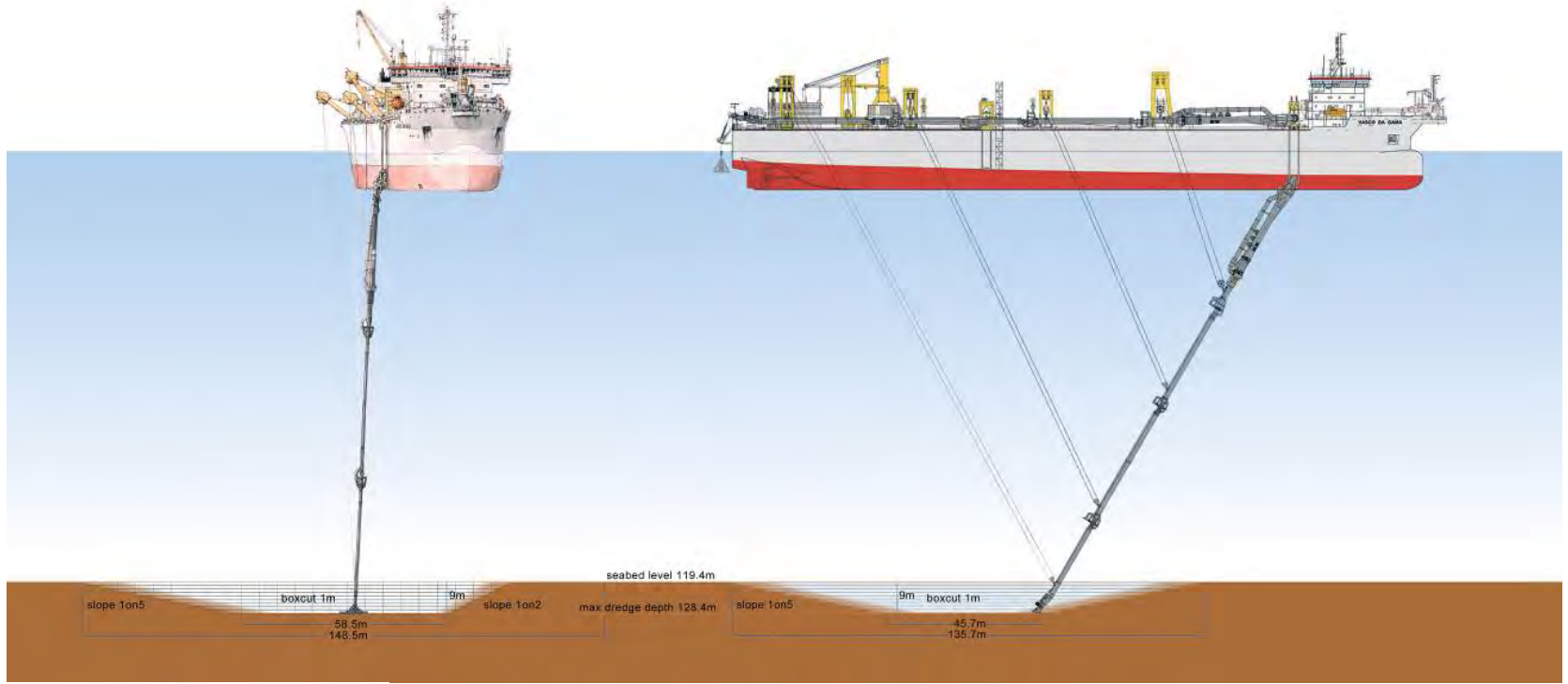
Canadian Projects – White Rose Glory Holes



33,000 m³ TSHD *Vasco Da Gama* – in St Johns



Canadian Projects – White Rose Glory Holes



Canadian Projects – Hebron Bund Removal

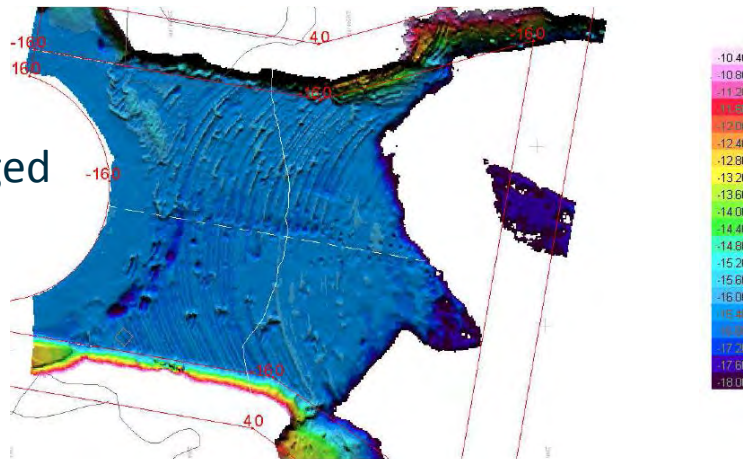


Canadian Projects – Hebron Bund Removal



250,000m³ dredged
in 18 days

Final survey results



Conclusions

- The fundamental drivers that fuel the dredging market are strong for the foreseeable future.
- The main players in the big dredger market need to be strong financially with a global reach of projects.
- Cutters are continuing to increase in size offering new levels of production and new limits of technical capability.
- Hoppers have not increased in size for the last 7 years but dredging companies are investing in new vessels in the range 3,500 to 14,000 m³.
- Mega dredgers also offer solutions for special case small volume projects as demonstrated in the example projects carried out in Canadian waters.

Thank you for your attention

Michael Fitzsimons



Brazil - 23 MW CSD loading 14,000 m³ Hopper