Deep Water Dredging and Construction

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Deep water Excavator for Dredging and Construction

• Introduction
• Underwater Positioning
• Monitoring the operation
Introduction

Requirements for deep water projects are demanding more from equipment and operator
• Maintenance of objects at deep water
• Environmental issues
• Main issue: Safe Handling
Environmental issues

• Debris at the seafloor might be a hazard for pipelines and platforms
• Removal of material from existing platforms
• Material that remains after decommissioning
Safe Handling

• Safely operate near objects
• Safely maintain objects
• Monitoring movements of the tools
• Continuously during the entire operation

• How do we achieve safe handling?
How do you achieve it

– Deep water excavator
– Achieve best possible accuracy
– Monitoring the operation
– Set alarms during operation
Deep Water Excavator

• Reefsubsea formerly known as Scanmudring requested RESON to assist with a new system
• They have several deepwater excavators
• Can be fitted with dredge tools, cutting tools, breaking tool etc.
• Used for soil removal decommissioning etc
Measuring Movement of the Excavator

- Sensors to measure boom, stick, tool angles
- Motion sensor
- Heading sensor
- Position
- Software
- Internal accuracy better than 5 cm
Equipment on the excavator

- Digital sensors to reduce the number of cables
- Special housings to cope with the depth
Different tools for different operations
Under water positioning

USBL/SBL/LBL positioning

- Each system has advantages and disadvantages
  - LBL: Accurate but needs installation of transponders at seafloor
  - USBL: Easy installation not accurate at depths
- USBL used during descent to seafloor
- LBL for accurate measurement of position
- Slow update of position
- Need for calibration
Under water positioning system

• Accuracy depends on
  – Water depth
  – Accuracy of position of transponders at seafloor
  – Accuracy of the position of the vessel
  – Sound velocity profile
  – Frequency used
  – Multipath especially around objects

• Accuracy could vary between 10 cm and several meters
Improve positioning supported by PDS2000

• Switch from absolute to relative positioning by:
  – Measure position from known points at the seafloor by placing the tool at a known position and enter the position manually or select a point from a waypoint list.
Other systems to improve the performance

- SeaBat 7128 FLS
- SeaBat 7125 ROV2
Forward Looking Sonar SeaBat 7128

- 400 Khz Forward looking Sonar
- 0,5° beamwidth
- Ranges up to 500 m
- Image shown in PDS2000

- Also available with 200Khz
SeaBat used during dredging

- SeaBat shown in and operated from PDS2000
- Forward looking as well as bathymetry
Multibeam system 7125

- Can be combined with forward looking system
- 200/400 Khz FM
- At 400 Khz 0.5°
- 512 beams EA, ED and combination
- Flex mode
- Easy operation to monitor the area necessary
SeaBat installed on ROV
Data shown at the vessel

• A Video wall shows the information
• PDS2000 Software combines the equipment
Construction and Guidance Software - PDS2000

• Interfaces the sensors from:
  – ROV
  – Crawling Excavator

• Shows ROV, Excavator and vessel

• Shows objects

• Visualisation of the environment

• Real time monitoring of the movements
Warning near objects

>> SLOWLY less than 1.2 meter<<
Summary

• Deepwater dredging and construction follow the trend of better accuracy and environmental conscience
• Combination of FLS/MBES system and guidance software shows that it is possible
• RESON provides it all!