Innovative Technology
Focus Area
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ERDC

Presentation Outline

• Define Innovative Technologies (IT)
• Describe IT Focus Area
  - Evaluations and Cooperative Demonstrations
  - Dredging Operations Decision Support System
  - Silent Inspector
  - Fluid Mud Measurement
• Summary
Definition of Innovative

“1: The introduction of something new. 2: A new idea, method, or device.”
Webster’s Ninth New Collegiate Dictionary

Definition of Technology

Webster’s Ninth New Collegiate Dictionary

“1: Technical language
2: a. applied science
   b. a scientific process for achieving a practical purpose
3: The totality of the means employed to provide objects necessary for human sustenance and comfort”
IT Objective

• Identify, evaluate, and develop innovative technologies *and provide the guidance for their use* to help the field user improve operation and management of dredging activities in federal navigation projects.

IT Focus Area

Work Units

• Evaluations and Cooperative Demonstrations
• Dredging (Operations) Decision Support System
• Silent Inspector
• Fluid Mud Measurement
Evaluation and Cooperative Demonstrations (ECD)

Why?

• New Technology Continually Developed
• Districts have low tolerance for risk
• Few Objective Evaluations
• Need Clearing House
• Need objective evaluation on Corps Projects
• Need Technical Transfer of Information

ECD Objective

• Provide the “missing link” between Corps problems and use of innovative technology
ECD Role in Technology Demonstrations

- Identification/Evaluation
- Match Technology and Sponsor
- Assist in Demo Planning
- On-site Monitoring Funds
- Evaluation
- Technical Transfer
- Guidance

ECD Thrust Areas

- Demonstrate Innovative Dredges
- Demonstrate Innovative Rehandling/Beneficial Uses at CDFs
- Demonstrate Innovative Tools/Techniques
- Technology Evaluation/Technical Transfer/Guidance
Flexible Discharge Dustpan Demo at Head of Passes

**PROBLEM:**
- LA loses 25 sq miles of coastal marsh annually
- @ Head of Passes use hoppers for traffic, rigid pipeline dredges too slow
- 4.5M yd³/year disposed in water w/o BU – pump-out too costly

**IMPACT:**
- Loss of BU opportunity
- Have to re-dredge same material later

**SOLUTION:**
- Dustpan with flexible discharge capable of:
  - safely maneuvering in HOP traffic
  - efficiently pumping material far enough for BU

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Dredged Material and Recycled Glass

Blending Innovation and Engineering
Dredging Operations Decision Support System (DODSS)

- A system that monitors and analyzes ongoing events and provides recommendations for action to human managers.
What does DODSS do?

- Synthesis of past and present data from databases
- Executes mathematical models and simulations
- Reason with heuristic knowledge
- Evaluate multiple solutions
- Combined visual presentation

DODSS Objectives

- Schedule maintenance dredging
- Optimize cost-performance of dredging
- Anticipate episodic and emergency dredging
- Real-time planning for emergency response
- New work planning
DODSS Questions & Answers

<table>
<thead>
<tr>
<th>Who are the users?</th>
<th>Dredging Operations Managers</th>
</tr>
</thead>
<tbody>
<tr>
<td>How does it work?</td>
<td>A continuously operating Web server that sends email advice</td>
</tr>
<tr>
<td>How will it help Dredging Managers?</td>
<td>Save time, heads up, more data &amp; options</td>
</tr>
</tbody>
</table>

Silent Inspector (SI)
Automated, standardized, dredge monitoring system designed to improve dredging contract administration

- 80- 85 % of Corps Dredging by Contract
- Fewer Inspectors
- Greater Scrutiny
- Claims
- Want Improved Efficiency
How does it work?

• Contract specs provide detailed implementation guidance
• Uses contractor’s sensors and instrumentation
• Contractor hardware - Corps Software
• Corps does QA and analysis

Hopper SI Measurements
Email Load Report

Pipeline Dredges
SI Scows

Standard Reporting; Contractor requirements
**Fluid Mud Measurement**

**Fluid Mud** (Teeter 1997)
- \( \rho = 1.05 \) to \( 1.35 \) g/cm\(^3\)
- solids 50 to 500 g/l
- 2-13% percent solids by volume
- contains silt and clay-sized materials with clay minerals and organic material

- fluid consistency?
STEMA Densitune and Silas
Vicksburg Densitune Testing 22 May 2003
**Column test with Barge Canal Mud**

<table>
<thead>
<tr>
<th>Valve #</th>
<th>Handheld Density</th>
<th>Densitune Density</th>
<th>Relative Difference %</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.998</td>
<td>1.000</td>
<td>0.2</td>
</tr>
<tr>
<td>2</td>
<td>.998</td>
<td>1.000</td>
<td>0.2</td>
</tr>
<tr>
<td>3</td>
<td>.998</td>
<td>1.000</td>
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<td>4</td>
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<tr>
<td>6</td>
<td>1.004</td>
<td>1.022</td>
<td>1.8</td>
</tr>
<tr>
<td>7</td>
<td>1.259</td>
<td>1.319</td>
<td>4.5</td>
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<tr>
<td>8</td>
<td>1.284</td>
<td>1.361</td>
<td>5.6</td>
</tr>
<tr>
<td>9</td>
<td>1.295</td>
<td>1.362</td>
<td>5.0</td>
</tr>
</tbody>
</table>

**Insitu Density**

**Complete reflected signal**

**Amplitude/Viscosity**

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**Note:** The table and graphs are related to the column test with Barge Canal Mud, showing various density measurements and their relative differences. The graphs illustrate data trends and amplitude changes with depth.
SILT LAYER SURVEY GULF PORT BILOXI
DIGITAL RECORDING OF ODOM ECHOTRACK MK III
24 kHz FREQUENCY

DIGITAL RECORDING LINE 17

LEGEND
- TOP SILT LAYER
- 1.200 kg/liter DENSITY LEVEL
- TOP CONSOLIDATED MATERIAL

Gulf Port - Biloxi, week 33, 2002.
Survey Date: 13th of August, 2002.
Thickness layer 1.025 to 1.200 kg/ltr.
Summary

- ECD
- DODSS
- SI
- Fluid Mud Measurement

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