BED LEVELING AND DRAG HEAD MOTION TRACKING THROUGH THE USE OF A SMART PHONE'S BUILT IN FEATURES

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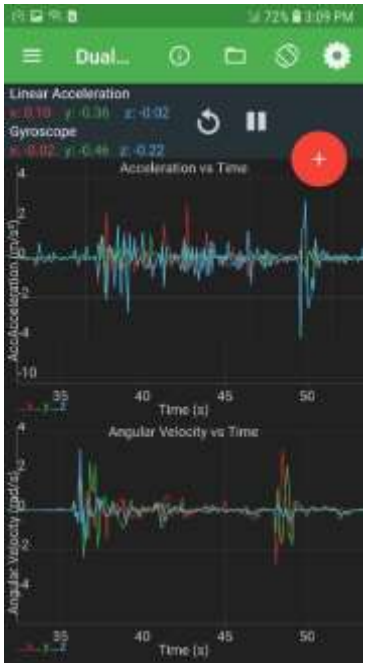
Bed Leveling

- A method to grade the seabed, remove scour marks, and maximize pay material by dragging a beam along the sea floor
  - H-Beams, Spud Pipe, Plows, etc.
- Tests:
  - Proof of Concept Yard Tests
  - Thimble Shoal Channel, Maintenance Dredging, Hampton Roads, VA
  - Galveston Harbor, Channel, and Houston Ship Channel, Hopper Dredging

Methodology

- Modern Smart Phones contain a plethora of systems to record information about their orientation and shape
- Physics Tool Bar Suite
  - Free application that allows recording of cell phones sensors
  - Accelerometer data and Gyroscope data recorded
- Recorded data was used to estimate the magnitude of the forces the cellphone experienced while used in operation



Proof of Concept – Scaled Tests

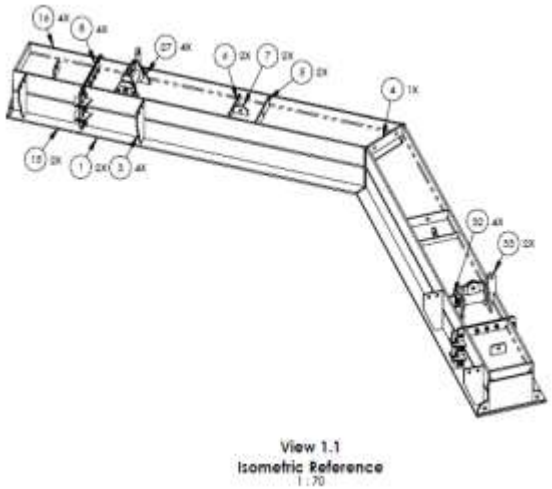
- Two scaled tests were conducted at Manson's lay down yard in Jacksonville, FL

Drag Head - Test

- Confirm mounting arrangements
- Confirm battery life
- Confirm data logging

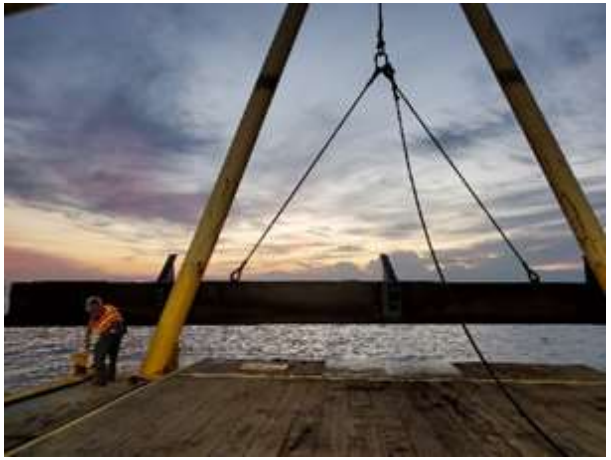
Thimble Shoals – Drag Bar Operations

- V Shape Bar as required by specifications
- Angle of attack 135 degrees



Galveston – Drag Bar Operations

- Horizontal Drag Bar

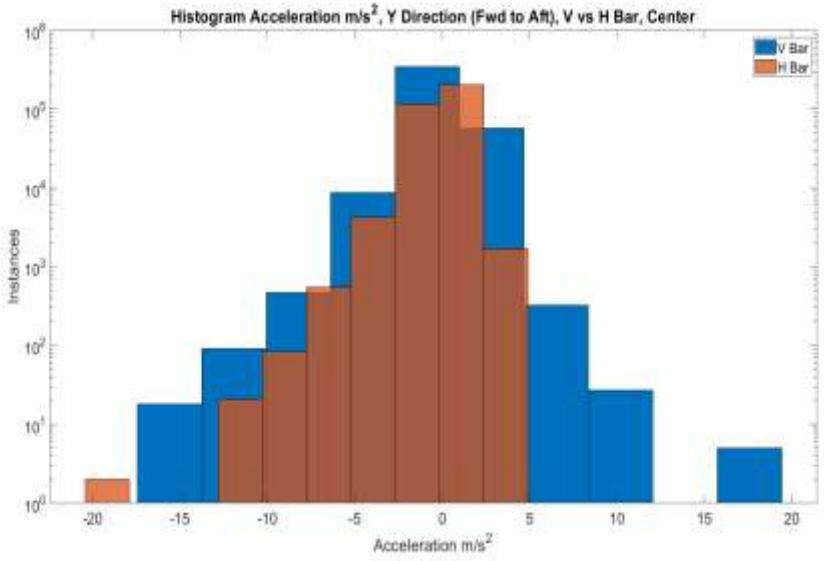


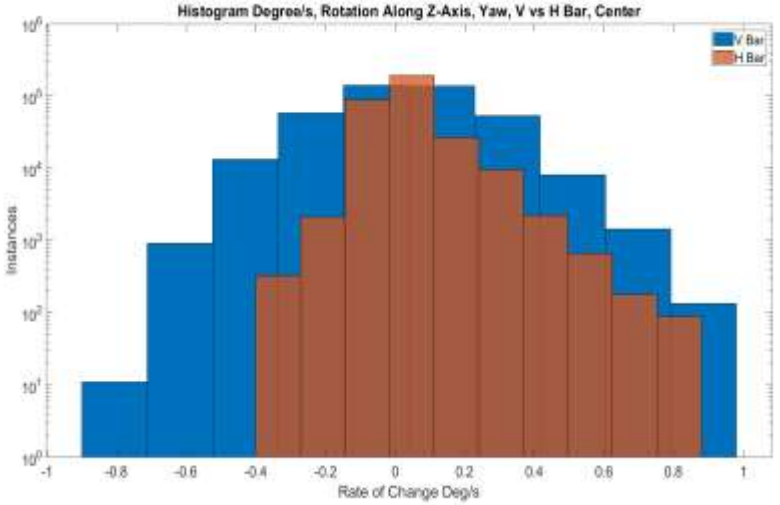
Sensor Placement

- Horizontal Drag Bar & V Bar

Scaled Test Results

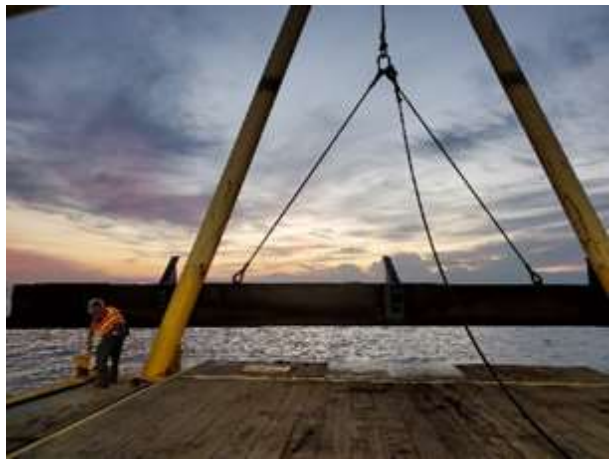
- The V-bar had wider range and larger magnitude of accelerations (forward to aft) and rotation around the z-axis

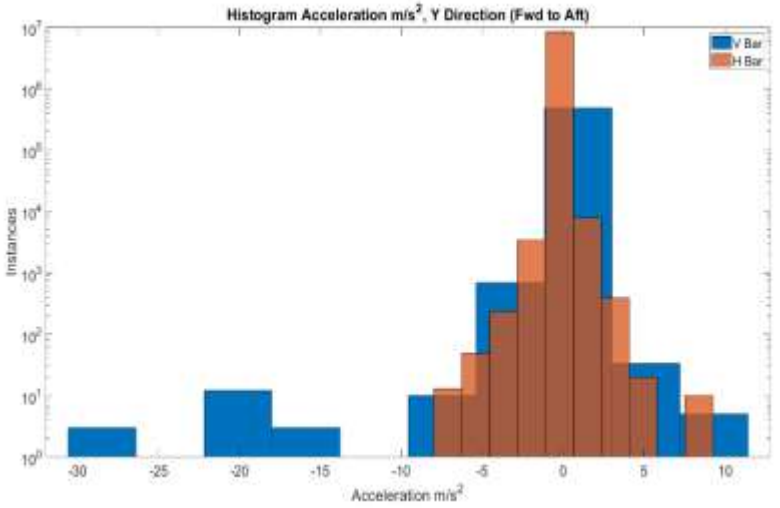


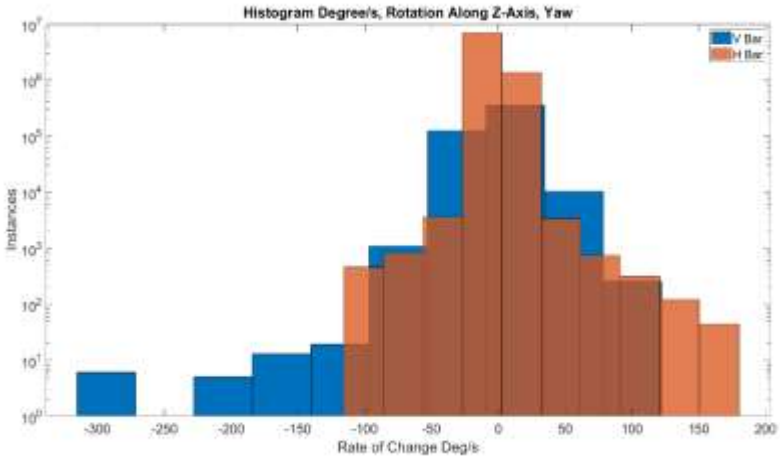


Field Results

- Thimble Shoal and Galveston Results
- The V-bar had wider range and larger magnitude of accelerations (forward to aft) and rotation around the z-axis







Conclusions

- Smart Phones are cost effective tools for experiments
- Horizontal Bar is operationally easier to use
  - Effectively helped grade the navigation channel
- V bar is operationally difficult to use
  - Presents a safety hazard to crew operations
  - Not as predictable
- Horizontal bar maintained lower linear accelerations and lower rotation speeds

Questions?

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