PORT INFRASTRUCTURE AND HYDROGRAPHY

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Director Nautical Management
AGENDA

• Available depth of water/dredging concerns vs. dynamic draft considering squat and heel angle
• Desire of better instrumented ports (Port Ecdis)
• Pilots and ports: Coordination- Standard systems for precise e-navigation
AVAILABLE DEPTH OF WATER/DREDGING CONCERNS VS. DYNAMIC DRAFT CONSIDERING SQUAT AND HEEL ANGLE

Safety Depth Calculation

Static Draught 8.5m
Squat (+) 1.3m
Safety Margin (+) 2.6m
Dynamic Draught (=) 12.4m
ZOC (+) 1.6m
*Tide (-/+)-2.0m

**Safety Depth (=) 12.0m

Dynamic Condition

Draft Variations

Static Condition

Waterline

+/- Tide

Static Draft

Dynamic Draft

Draft Increase/Decrease due to Water Density
Draft Increase due to heel/list
Draft Increase due to Pitching
Squat when making way- Formula or your table/value

Safety Margin/Minimum UKC (10%-20%-25%-50% of Static Draft)

ZOC Correction for ENC

Safety Margin/Minimum UKC

Under Keel Clearance (UKC)

Sea Bottom
Available Depth of Water/Dredging Concerns vs. Dynamic Draft Considering Squat and HFEL Angle

Open Water:

\[ (1 \times C_b \times \frac{V^2}{100}) \text{m} \]

\[ C_b = \text{Block Coefficient} \]

\[ V = \text{Speed (knots)} \]

Squat OW

Squat
AVAILABLE DEPTH OF WATER/DREDGING CONCERNS VS. DYNAMIC DRAFT CONSIDERING SQUAT AND HEEL ANGLE

Prismatic Channels:

\[(1.43 \times C_b \times \frac{V^2}{100}) \text{ m} \]

\[C_b = \text{Block Coefficient}\]

\[V = \text{Speed (knots)}\]
AVAILABLE DEPTH OF WATER/DREDGING CONCERNS VS. DYNAMIC DRAFT CONSIDERING SQUAT AND HEEL ANGLE

Safety Margin
AVAILABLE DEPTH OF WATER/DREDGING CONCERNS VS. DYNAMIC DRAFT CONSIDERING SQUAT AND HEEL ANGLE

Zone of Confidence
## Swept Path

Distance Stern from the Center Line

Angle $\alpha$

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<th>Vessel Length (LOA) m</th>
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DESIRE OF BETTER INSTRUMENTED PORTS

Sample of weather buoy
PILOTS AND PORTS: STANDARD SYSTEMS FOR PRECISE E-NAVIGATION
PORT ENC

• The chart requirements for maneuvering big ships in narrow fairways (harbor access channels) and harbors and for the port maintenance go far beyond the current ECDIS standard in scale, accuracy, chart objects and attributes ("object catalogue", in future "feature catalogue") and call for a specific "Port ECDIS". The development of a Port ENC standard focuses on high precision operations in ports.

• Valuable tool to maximize Port and channel usage
  –
  • Wave and tide (spatial) forecasts
  • High resolution topographic and bathymetry data
HI-RES ENCS

NOAA data streams can support a precision navigation support tool, such as PROTIDE
VISION OF THE FUTURE OF NAVIGATION

- Port ECDIS
- Harmonized coordination between Ship’s Operator, Pilot, Association, VTS (Vessel Traffic Services), working on the same ECDIS navigation platform.