
Global organization with 4,200 employees in 15 offices and onboard 150 vessels.

Largest crude oil tanker company measured by market capitalization, enterprise value, and fleet size.

Carrying over 10% of the world’s sea borne oil trade in 150 vessels (41 shuttle tankers).

On a yearly basis we ship more oil than BP and ChevronTexaco combined produce in a year.

World leader in offshore loading, shuttle tanker business, and dynamic positioning (DP) technology.
Worldwide operations
Major Operational Risks

- Fire / Explosion
- Collision / Contact
- Grounding / Stranding
- Loss of containment - pollution

Could result in:

- Loss of life
- Loss of Cargo
- Loss of Ship
  - Loss of customer
  - Loss of business
International Oil Spill Statistics

Tanker accidental oil pollution - ITOPF

Trade in Tonne-miles

000 tonnes spilled in tanker accidents (ITOPF)
Management of Operational Risk

Health, Safety, Environment, and Quality (HSEQ)

<table>
<thead>
<tr>
<th>People</th>
<th>Processes</th>
<th>Equipment</th>
</tr>
</thead>
</table>

Environmental factors

Risk based approach
People

- Stringent competency requirements
- Training programs include:
  - Shore based training,
  - Onboard training,
  - Peer supervised operations
  - Computer-based training (CBT)
- Extensive safety program
Processes

- Marine Operations Management System:
  - ISO 9001 Quality
  - ISO 14001 Environment
  - OHSAS 18001 Occupational Health & Safety
  - ISM Code
- Emergency response Plans
- Security plans
- Structural Assessment Program
- Preventive Maintenance Strategy
- Sophisticated incident investigation + cause analysis
Ship design:
- Double-hull
- Redundant equipment
- Specialized state-of-the-art software + hardware

Computer based Planned maintenance program

Sophisticated Condition-based maintenance program
Environmental factors

- Typhoons/Hurricanes, etc.
- Rogue waves
- Tsunamis
- Ice and icing conditions
- Tidal factors
- Fog and restricted visibility conditions
- Ocean currents
Environmental factors
Environmental factors

Be weather wise
Our quandary

- Is there a positive co-relation between environmental conditions and the occurrence of incidents onboard our vessels?
  - Insufficient and inaccurate data based on observations rather than measurements.

- Relevant (on-site) environmental data would enhance the accuracy of our risk models, hence support...
  - Operational and management decisions.
  - Investments.
  - Allocation of assets and resources.
  - Strategic plans.
  - Risk management and mitigation plans.
  - A more predictive/proactive approach.
Does accurate environmental data improve management of operational risks?
- We believe it would - YES

What can IOOS / GOOS offer in addition to weather routeing?

What is the cost?

What are the operational benefits?
Data collection

➢ Where do we get the data?
  ➢ IOOS / GOOS?
  ➢ Ships?
  ➢ Private companies?

➢ Weather sampling devices?
  ➢ Is there value in installing these aboard ships?
  ➢ What is the cost?
  ➢ Can these benefit IOOS / GOOS?
Questions of IOOS

➢ Is there a business case for private industry?

➢ Is it more academic in nature?

➢ How do we bridge the gap?
Questions