1.10 Leveraging M&S software to build Marine Survival Craft Training Simulators

MODSIM WORLD Conference & Expo

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Leveraging M&S software to build Marine Survival Craft Training Simulators

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Statistics

- **16%** - Percentage of total maritime lives lost over a 10 year period that were attributed to lifeboat accidents
- **12.5%** - Percentage of lifeboat drills that were performed unsatisfactorily during a 2009 inspection campaign
- **1.4%** - Percentage of ship inspections that identified lifeboat deficiencies serous enough to warrant detention

"*Anyone using a lifeboat, be it in a drill or genuine evacuation, runs a risk of being injured or even killed.*"

UK Maritime Accident Investigation Branch – 2001

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Lifeboat Training

Defined by

- International Maritime Organization (IMO)
- Offshore Petroleum Industry Training Organization (OPITO)
- Flag State Maritime Authorities

Current Limitations

- Dangerous to replicate evacuation conditions and scenarios
- Requirement to demonstrate "Methods of launching a survival craft into a rough sea" not being met
- Mariners are put to sea having never been exposed to the situations they may encounter

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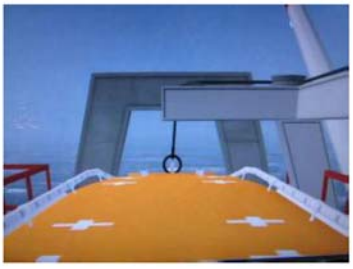
Lifeboat Training Gap

Emergency Conditions

Training Conditions



Lifeboat simulation

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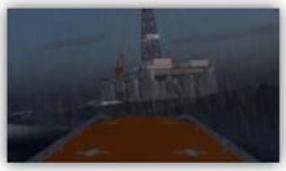
Lifeboat Simulation



Simulator Objectives

- Mitigate training and operational risk
- Increase realism of emergency training scenarios
- Maximize the training objectives that can be achieved through simulation
- Achieve certification/accreditation from regulatory agencies

Technical Challenges

- Stimulation of lifeboat equipment
- Simulation of lifeboat hydrodynamics

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Open Programming Architecture

- Create applications using supplied wave models or use your own custom wave models
- Incorporate completely foreign wave simulation algorithms and have them incorporated automatically into the provided rendering environment
- Apply the same calculations to the visual and non-visual (i.e. host computer calculating ships motions, forces, and dynamics)
- Produce complex wave models using an open and intuitive interface

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Multiple Ocean Types

- Position to any view point
  - Fixed location
  - Observer-centered
  - Surf zone
  - Large Area / Round Earth



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Synthesized Surfaces

- Physically correct wave model out of the box
- Maritime effects
- Customizable pre-defined ship motion strategies
- Short and Long crested waves
- Environmental and local reflections

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Synthesized Surfaces

- 13 sea states described by the Beaufort scale
- 9 sea states described by the Spectral Ocean Wave Model

- Multiple user-defined ocean definition parameters

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Surf Zone

- Shallow water modeling and coastline effects
  - Breaking waves
  - Cusp Surf
  - Sandbars
  - Depth and shoreline transitions
  - Wave effects on vehicle motion
  - Correct wave behavior
  - Seamless Transition from shallow to deep water

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Marine Effects

- User-defined vessel characteristics:
  - Bow waves
  - Stern
  - Hull
  - Size and shape correspond to the size, shape, and speed of the vessel
  - Interaction with the ambient water waves
  - Visual aid in determining the speed, maneuvering, and turning of the vessel
- Customizable ship motion strategy for correct behavior of objects / vessels on the ocean

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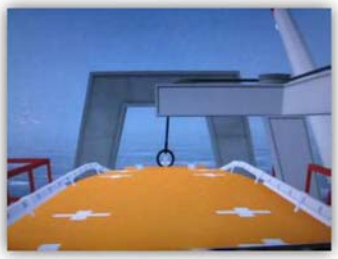
Survival Quest

Simulator Features

- Enclosed cabin to maximize "presence"
- Configurable to specific lifeboat models and hardware
- Simulates lifeboat motion in variable sea states



International Recognition

- Det Norske Veritas
  - Certified Class "S" Simulator
- International Maritime Organization
  - STCW Amendment, June 2010
- Transport Canada
  - Modification of TP 4957 - Marine Emergency Duties Courses
  - Model Course for Lifeboat simulation training developed

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Looking Ahead

High Speed Boats

- Training for Coast Guard, Navy and Waterborne Law Enforcement
- Vessel planing at 40+ knots
- Launch and recovery in chaotic wave environments

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Thank You

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