The LiftShip 2 Team
The Beginning

Shipyard worker killed in crane accident

A shipyard worker died yesterday morning when he became tangled in machinery while servicing a crane. The 30-year-old employee was pronounced dead at the scene. According to the coroner, he was killed instantly as a result of trauma injuries.
The Overarching Problem

Lift Failures:

- Personnel Safety
- Rework due to structural failures
- Schedule delays due to rework
- Lost profit from added efforts to:
  - Perform the assessment on the incident
  - Document and initiate the rework / repair effort
  - Perform the rework / repairs
  - Develop a recovery schedule
  - Assess the impacts on the shipyard schedule
Potential Causes

The Why:

- Equipment issues
- Environmental issues
- Calculation errors
  - Assumptions due to incomplete information
  - Assumptions due to a complicated lifting arrangement
- Changes to the structure after the calculations were performed
  - More time on the hill – time to add more outfitting
  - Using the structure as a mobile warehouse
What if....

- Develop the accuracy and benefits of a Finite Element Analysis to eliminate the local yielding / buckling rework with significantly reduced labor?

The How....

- Automatically derive the Finite Element mesh from the 3D design / production model.
LiftShip
Project History

LIFTSHIP 2
Research Announcement
218-451-003

LIFTSHIP
Research Announcement
2018-438

Improving the 3D CAD-to-FEM Interface for Shipbuilding Needs
Panel Project
2017-416
LiftShip (the original)

It automated the process of developing the Finite Element Analysis Mesh Model from the 3D design model

3D Model -> Magic -> FE Model
The Continuation....

LiftShip 2
LiftShip 2 (the continuation)

✓ Perform analysis on Lifts with Turns / Complex Lifts
✓ Provide a user-friendly method to change the Level of Detail of the Finite Element Mesh to suit the intended analysis
✓ Develop Enhanced Visual Reporting of the analysis to support the Stakeholders
LiftShip 2

Analysis on Lifts with Turns
LiftShip 2

Level of Detail
LiftShip 2

Visual Results Reporting

Contour Plot
Element Stresses (2D & 3D) (vonMises, Max)
Global System
Advanced Average
-5.566E+04
-4.939E+04
-4.321E+04
-3.704E+04
-3.087E+04
-2.469E+04
-1.852E+04
-1.235E+04
-6.174E+03
7.738E-01

No result
Max = 5.566E+04
Grids 30776
Min = 7.738E-01
Grids 5318

Subcase 1 (Load Case 1) : Static Analysis : Frame 0
LiftShip 2

Where we are:

PHASE I

Software Installation & Training

Use Case Analysis (Lifts & Turns) (Level of Detail) (Enhanced Visual Reporting)

Initial Software Enhancements Initial Test & Evaluation

PHASE II

Software Enhancements Team Test & Evaluation

Final Workshop, Training, and Demonstration
Current Status:

- Team training continues leveraging the original LiftShip project and FEA software

- Technical Team is reviewing Use Cases for Lift Arrangements to understand the Shipyard’s processes regarding Complex Lifts and Complex Lifts with Turns

- Team is fully engaged with nearly 2 dozen attendees on the biweekly Team Meetings

Additional Benefits Realized:
- Utilization of LiftShip to support efficient FEA for other areas / needs in addition to lifts
LiftShip 2

Technical Status: ShipConstructor

- Reviewing the Use Cases
- Enhancing the user experience from the original LiftShip project
- Working with ATA and Altair to streamline the data translation workflow to increase efficiency
  - Removing excessive data folders
  - Eliminating unused data
- Performing training on ShipConstructor
LiftShip 2

Technical Status: Altair Engineering

- Reviewing the Lift and Turn Use Cases
- Enhancing the HyperWorks LiftShip user interface and feature set
- Streamlining the workflow for ShipConstructor data exchange
- Lift and turn analysis method development
- Performing HyperWorks training
LiftShip 2

Technical Status: ATA Engineering

- Discussing lift/turn with shipyards to ensure that the LiftShip tool captures each yard’s best practices
- Enhancing the LiftShip data transfer from ShipConstructor to FEMAP
  - Graphical user interface for setting up data transfer
  - Additional features like rotated stiffeners, corner cutouts, level of detail, etc
- Developing tool for streamlined lift/turn simulation and visual reporting
- Provided on-demand training resources for FEMAP and LiftShip
QUESTIONS?
Thank you

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