Case Study

BALANCED MACHINES

adragroup
clever practical solutions

Shiploader Upgrade

- Inspection, assessment and implementing engineering works through to project completion.

The issue

In 2017, Adra managed a major upgrade of a 40-year-old slewing shiploader to extend its life. Adra's involvement began with a routine inspection of the shiploader and we remained the owner's engineer throughout the project.

The solution

Adra took a three-phase approach to the shiploader upgrade:

Assessment and planning

- Analyse the loads and run the applicable load cases to audit compliance to AS 4324
- Create a stability model that was used to help specify the replacement slew bearing and confirm expected jacking loads during the shutdown
- Laser scan survey of the boom and leg structures. CAD and FEA models were created from the survey point cloud data
- FEA analysis of the leg structure and root cause analysis of existing deformation
- FEA analysis of the boom structure to identify over-utilised members. Member reinforcement was prioritised as approximately 1,500 kg of new steel was added to the boom structure

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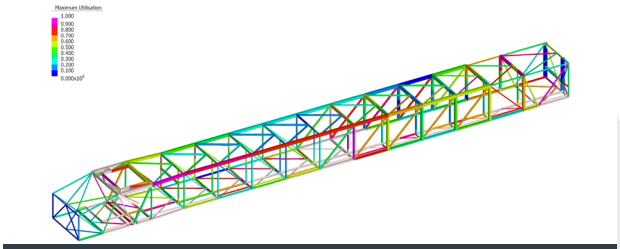
Specifications and procurement

- Develop repair methods for defects such as corroded and deformed members, and confirm the quality of the repairs during construction
- Develop a load spectrum for the new slew bearing. The load spectrum includes the range of loads on the bearing along with percentage of time that the bearing will be subject to each load case. This was used in the specification for the new bearing
- Test the loads on the winch rope using a load cell to verify the load cases and develop the specification for the new winch
- Analyse the slew drive torque for each applicable operating load case and develop the specification for the new slew drive
- Detailed shutdown planning including prioritisation of works to suit the shut window between ship arrivals
- Project engineering, procurement and project management services

Construction and commissioning

- Develop a Machine Control Requirements block diagram which defines the interlocks required for safe operation, and test / verify each scenario during commissioning
- Design a crane mounted lifting frame to manoeuvre the jacking system into place
- Check improvised tools that were found on the worksite. When the tools failed the engineering checks, substitute tools were designed
- Check the existing gangway to lay down the ship loader "jet slinger" during construction, helping to balance the shiploader
- Superintendent and construction manager role with full time staff on site

New winch



FEA analysis of the boom structure

New slew bearing

The results

The shiploader was upgraded as planned. Adra delivered:

Quick facts

In time for the first ship arrival after the shutdown.

Nil significant safety incidents.

20-year extension of life, providing the client a highly reliable asset for 60+ years, delivering certainty of operation and significant efficiencies in cost.