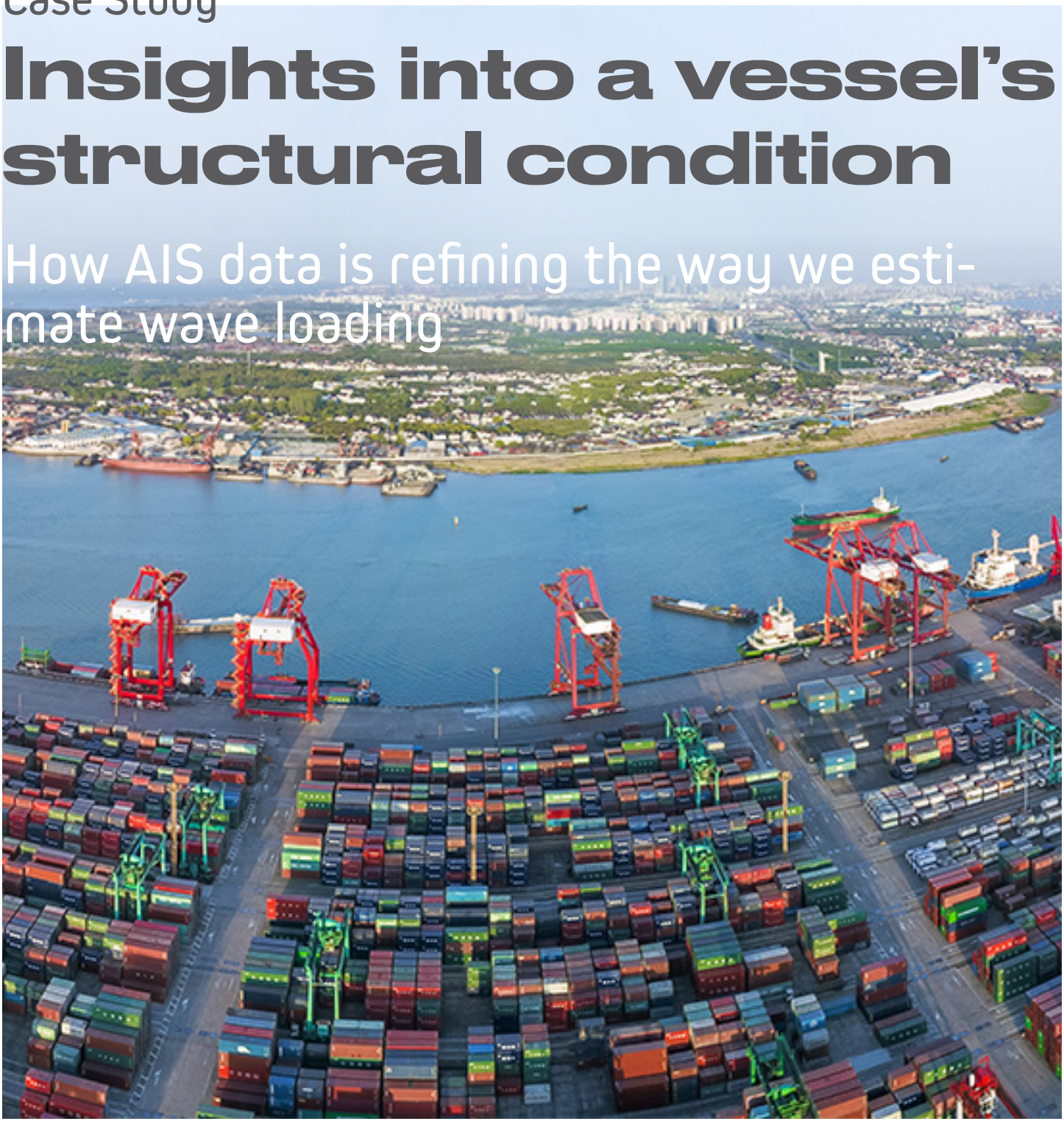
spire MARITIME

Case Study

Insights into a vessel's structural condition

How AIS data is refining the way we estimate wave loading



EXECUTIVE SUMMARY

ABS, a leading global provider of classification and technical advisory services to the marine and offshore industries, is committed to setting standards for safety and excellence in design and construction.

Focused on safe and practical application of advanced technologies and digital solutions, ABS works with industry and clients to deliver accurate and cost-effective compliance, optimized performance and operational efficiency for marine and offshore assets.

The ABS digital team is leveraging a robust cloud-based data platform, data analytics models, and visualizations to unlock vessel performance and **more accurately predict structural vulnerabilities and risks**. Multiple data sources are combined to provide vessel-specific insights to deliver targeted inspection planning and enhanced predictive maintenance capabilities. One example of using data to drive vessel-specific insights is calculating the vessel's structural risk profile based on its actual operations.

Spire's automatic identification system (AIS) data for the vessel's specific routes is matched with the corresponding historical wave conditions to provide an actual representation of the wave loading experienced by the vessel. The resulting insights will be used to create targeted inspection plans and support life extension decisions.

- Improved vessel-specific wave loading estimation by 30%
- Targeted survey plan for both potential overload and fatigue damage
- Supports dry-dock planning and schedule adherence

CHALLENGES

As a Class Society, ABS performs surveys throughout the vessel's life to confirm that the structural condition continues to meet a set of minimum requirements. This includes identifying anomalous structural conditions, such as areas of damage and fractures resulting from fatigue, which may rep-

resent a risk to the safety of the asset. Historically, critical areas selected for surveys were based on engineering analysis and domain expertise acquired from decades of experience in observing where such failures commonly occur.

ABS recognizes how additional data, such as vessel-specific routes derived from AIS, can be combined with analytics to develop further insights that refine our understanding of the current vessel condition. If a vessel's actual operations vary from the historical data, knowledge of the variation in wave loading experienced by the vessel, supports a more targeted and vessel-specific survey of the damage-prone areas.

HOW SPIRE HELPED

Fatigue critical areas of a vessel are traditionally identified by running engineering analysis, where historical wave statistics are applied as design loading on the structure with the outputs of the analysis identifying areas of the vessel with the highest risk of fatigue related fractures.

Spire's AIS data feed was integrated into this process to achieve a vessel-specific result. The routes traveled by the selected vessel were derived from Spire's AIS data. Based on the position information for these routes, the corresponding wave data for each position and time was retrieved and summarized into a set of vesselspecific wave statistics.

This revised set of wave statistics was then input into the fatigue analysis to provide a refined estimation of the vessel-specific fatigue risk as well as exposure of the vessel to extreme loads from heavy seas and storms which identify overload risk from extreme conditions.

RESULTS, RETURN ON INVESTMENT AND FUTURE PLANS

Integration of Spire's AIS data allows ABS to develop insights required to support condition-based surveys focused on the actual condition of critical structures. Merging Spire's AIS data with ABS' extensive knowledge of marine and offshore assets and advanced analytics, enabled ABS to develop

a more comprehensive, real-time picture of a vessel's condition.

For this particular case study, the vessel-specific **wave load estimations were improved by 30%**. The resulting engineering analysis led to a targeted survey plan which will be used to support dry-dock planning and ensure schedule adherence.

In the future, the continued results from the vessel-specific AIS data and analysis can support operational decisions based on comparative rankings of vessels within a fleet. • Improved vessel-specific wave loading estimation by 30% • Targeted survey plan for both potential overload and fatigue damage • Supports dry-dock planning and schedule adherence

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