

CUSTOMER CASE STUDY

BAE Systems and AVEVA[™] PI System[™] help the Royal Navy reduce fuel consumption

BAE Systems

Partner - James Fisher & Sons, University of Southampton, Furgo Industry - Transportation, Marine

Goal

• Help the Royal navy achieve an 18% reduction in fuel consumption and emissions by 2021

Challenge

• Reducing fuel usage involves many factors, including fuel burn rate, hull condition, vibration, weather, routes, and more

Results

- Reduced fuel costs by 5% to 20%
- £35 to £140M in annual savings

Solutions

AVEVA PI System

When the United Kingdom's Royal Navy developed a goal of reducing its vessels' fuel consumption and emissions by 18% before 2021, it turned to its partner, BAE Systems, a British multinational defense, security, and aerospace company. The company knew that reducing fuel usage involved not only energy efficiency but also factors such as fuel burn rate, hull wear and tear, vibration, equipment maintenance, shifting weather conditions, and routes. BAE Systems developed a new system for data monitoring, analytics, and insights to enable ship crews to make data-driven decisions and help the Royal Navy accomplish its goal. To support this system, the company turned to AVEVA PI System.



Public-private partnership produces advanced architecture

BAE Systems' Ship Energy Assessment-Condition Optimization and Routing Enhancement System (SEA- CORES) does more than just predict a ship's energy use. Using a broad array of sensor and environmental data, the SEA-CORES system delivers insights into three key factors: It monitors the effects of weather and maintenance on asset conditions. It also tracks how different routes affect the amount of stress on the hull. In addition, it helps analysts evaluate whether there are tradeoffs involved between fuel efficiency and equipment wear and tear.

SEA-CORES emerged from a multidisciplinary publicprivate collaboration led by BAE Systems. The team includes AVEVA PI System software architects; James Fisher & Sons, a commercial shipping company that provided a trial vessel; the University of Southampton, renowned for maritime expertise; and the Dutch geotechnical firm Furgo, which provides weather data and remote positioning systems.

As the SEA-CORES system has evolved, it has become a more powerful and versatile engine for optimizing onboard decision-making. "We started off with an energy-efficiency module," said Chris Courtaux, BAE Systems' head of engineering and energy services. "We then added in the weather routing, vibration, hull condition, drag, and stress and strain to give a better, richer picture, not just of energy and fuel efficiency. We can produce a set of outputs that allows operators onboard and ashore to understand the business case of their decisions."

SEA-CORES utilizes sensors that are already onboard typical large shipping vessels. These sensors gather data automatically and store it centrally. However, the ships use the data only to control the ship, not to understand ways to make the ship more efficient.

The sea is the Most changeable environment on earth. A typical SEA-CORES installation delivers a wealth of data covering the essential parameters of a voyage. For example, the system provides data for the crew on the Most econoMical speed profile, including the fuel used per nautical Mile in each sea state. It also provides readouts on how Much fuel is used by each engine in different configurations as well as fuelendurance configurations that Measure accelerations and decelerations. SEA-CORES also gives crews and offshore operators insight into the tradeoffs involved in optimizing a ship's course for different variables.

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Chris Courtaux Head of Engineering and Energy Services, BAE Systems





The architecture of the SEA-CORES platforM relies on the PI System, which acts as a data-abstraction layer

Data-driven decisions cut fuel costs, save money

In field testing, SEA-CORES has produced fuel cost reductions of between 5% and 20%. For a fleet of 25 vessels that spends £700M a year on fuel, a 5% reduction in fuel translates to an annual savings of £35M. These savings can be reinvested in fleet equiPMEnt or used for other business priorities.

On one vessel tested by BAE Systems, the SEA-CORES system delivered some surprising results. According to the ship's designers, the vessel was designed to run best at 12 knots. Vessel commanders thought slowing the ship down would yield greater fuel efficiency. However, the SEA-CORE field tests yielded a different result: "When we did some analysis, the data showed that we should drive that ship quicker," Courtaux said.

In the future, BAE Systems is planning to build on the success of its trial project with the Royal Navy and James Fisher & Sons to begin deploying SEA-CORES software onboard both military and commercial fleets worldwide.

For more information about AVEVA PI System please click here.



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