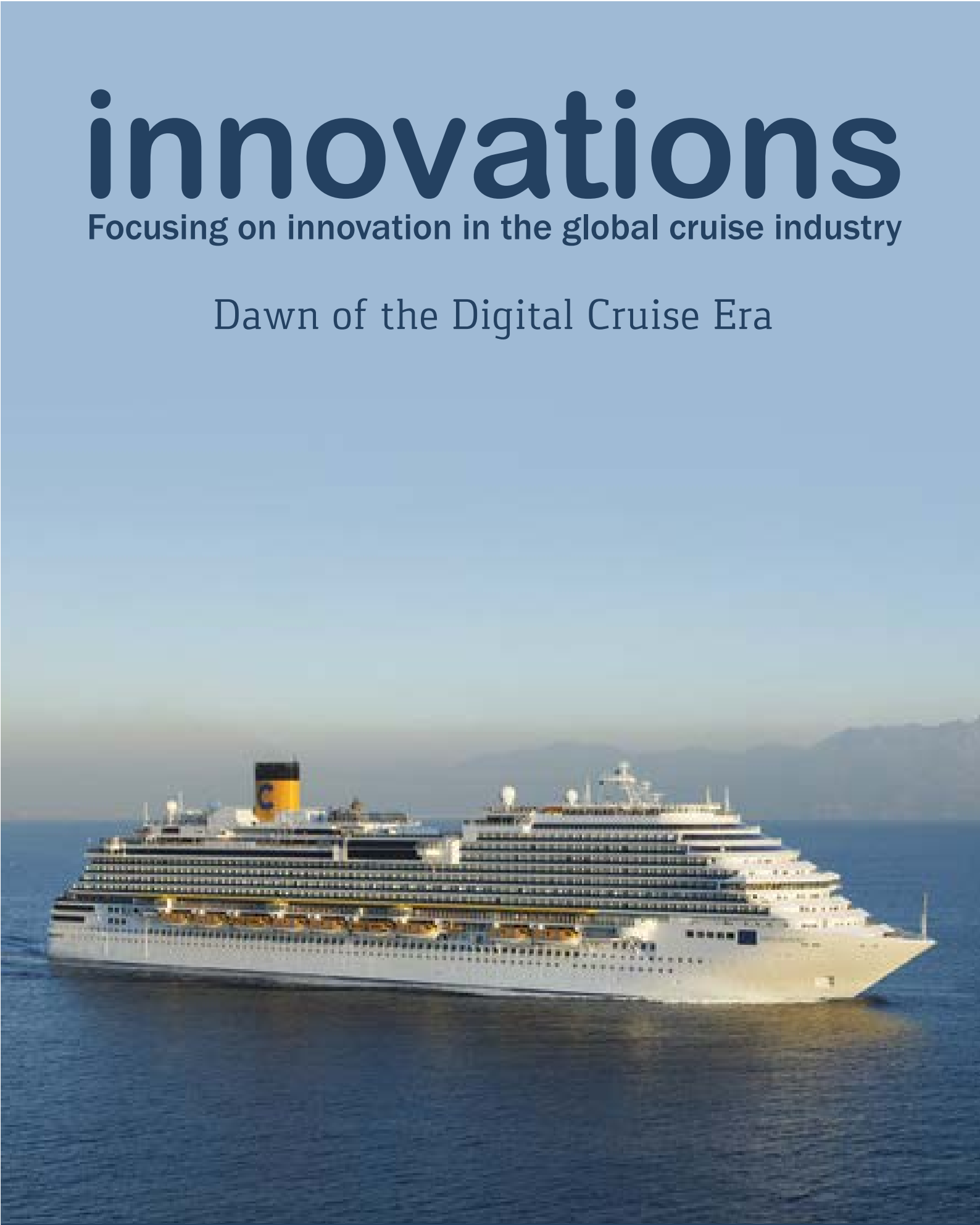
# innovations

## Focusing on innovation in the global cruise industry

## Dawn of the Digital Cruise Era



**Special Report**

International Cruise Ship Industry

INTERNATIONAL CRUISE SHIP INDUSTRY
Focusing on innovation in the global cruise industry
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# GE keeps the cruise ships sailing

# Dawn of the digital cruise era

At the recent Fort Lauderdale Seatrade Cruise Global 2016 exhibition, GE's Power Conversion's marine solutions leader, Jean-Philippe Chaignot, gave a few thoughts on the way forward for this sector.

Despite is continued rapid growth, in the past few years, the cruise shipping sector has not always hit the headlines for the right reasons.

Negative environmental stories, brand damage, revenue loss and occasional incidents costing passenger lives, have prompted the US Senate to review safety, security and environmental practices in the cruise industry.

How does the cruise industry step up to tackle these issues? And how can technology developments contribute to the future success of the industry?

In order to sustain the current growth, cruise operators need to ensure that incidents are a thing of the past. A focus on maintenance and timely upgrades certainly contributes.

According to the regulations, cruise ships need to be drydocked every three to five years for a major maintenance and overhaul cycle. This can be hugely expensive; cruise ships do not make money unless they are operating.

The revenue loss, when you consider that the largest ships on order accommodate more than 6,000 passengers, can be significant. In addition, upgrades and refurbishment costs themselves are substantial.

The financial impact of upgrades can be a real challenge for some operators. In some cases, operators may even choose to sell the ships rather than upgrade them.

Unplanned downtime, such as that caused by a system failure, poses an even greater financial burden on operators. In addition to the costs of repairing a system failure, operators can incur additional revenue loss from the damage done to brand reputation.

## Better maintenance

The high costs mean it's crucial for the turnaround time to be as short as possible.

One example is GE's Marine Solutions' real-time simulator, which is specifically designed to secure electric propulsion upgrades and therefore dedicated to reducing this upgrade time.

It can simulate various changing environments and therefore test and validate new hardware and software architectures around converters, power plants and propulsion systems. This allows equipment to be fine-tuned in advance, leaving little commissioning work to be done by systems engineers on a ship. Ultimately, this shortens the time that the ship spends in drydock.

Moreover, in the past, GE's Marine Solutions has equipped more than 60 ocean-going cruise liners. Worldwide, GE has over 200 service engineers ready to support clients whenever and wherever necessary, 50 of which are based in the North American region. A local warehouse in the Gulf area also allows fast service for spare parts.

The use of digital software analytics can promise an even more prosperous cruise era.

Imagine having instant access to a holistic view of the ship, real-time data of weather patterns and currents and other parameters, which lead to better operational decisions and optimised fuel efficiency.

In addition, the intelligent software analytics on board a cruise ship can show if a certain part of the vessel is exhibiting wear. This alert, delivered direct to the central control room, tells the engineers if it is likely to fail in the coming months. As a result, the operator can adjust the system to decrease usage of the part, avoiding potential damage and extending the maintenance cycle.

Such visibility might sound like wishful thinking, but much of the technology is readily available today.

Made possible by GE's patented SeaStream Insight, the powerful software is shedding new light on data and is set to help optimise the industry by enabling data-driven efficiency. Instead of just using data for post-incident analysis, SeaStream Insight can harness the power of data and help provide 'predicitivity' to vessel operators.

A digital model, called 'the digital twin,' can be built based on years of a cruise vessel's data history. By comparing asset to asset and vessel to vessel from 'the digital twin,' the software is able to search for anomalies and give early warnings of a potential failure, enabling the industry to shift from planned to condition-based maintenance.

This predictivity is what can make a real difference to cruise owners, operators and passengers, as it can help save the industry from potential incidents, reduce downtime and offer significant cost savings.

It's not science fiction, as the industry has evolved. Progressing towards a whole new digital cruise era, future cruise vessels are set to become safer and more efficient.

## Older ships need upgrading

An increasing number of cruise ships are entering a later stage of lifetime cycle, creating an growing need for older ships to be updated with the latest technology making them safer, more efficient, more reliable and cleaner.

As an illustration, GE's Marine Solutions successfully provided upgrade services for three cruise vessels—'Pacific Pearl', 'Pacific Dawn' and 'Pacific Jewel'—owned by the Carnival group and operated by Carnival Australia.

Thanks to the services provided by GE, the vessels' propulsion systems will have an extended life.

"GE remains one of Carnival Australia's experienced and trustworthy partners. They have a long history of providing high-quality solutions for the safety and comfort of our passengers. Thanks to these critical upgrades provided by GE, we have been able to breathe new life into three of our key cruise ships," said Rhys Hounslow Carnival Australia electrical and technical superintendent.

GE provided hardware and spare parts, project management, design engineering and shop tests on the real-time simulator. GE also upgraded the propulsion documentation and drawings and supervised the work from installation to sea trials. Training was provided to the customer in Australia using the Mobile Training Centre designed by Belfort Centre of Excellence for Merchant Marine.

"The vessels' analog controllers were still operating correctly 20 years after its delivery. However, the availability of their critical electronic components was no longer guaranteed, and the skilled engineering expertise required to troubleshoot issues was slowly disappearing," said Chaignot. "Such issues had the potential to extend a vessel stop, which could have caused the possible shut down of its control system resulting in severe financial loss for the customer."

In order to make the upgrade safe, new controllers were installed and commissioned while the vessels were at sea, one drive at a time, with the ability of switching the propulsion back to previous controls at any point during the commissioning phase.

The analogue controls were decommissioned only after the digital controls were successfully tested at sea. Existing I/O boards and relevant cabling remained unchanged, keeping costs down and shortening the duration of installation and commissioning.

Following the successful upgrade of the propulsion controls, the machinery control and monitoring controllers were updated. The new hardware, based upon new controllers, features many advantages such as a direct access to an Ethernet network and new P1200 human machine interface, modern technology, an improved computing power density, as well as increased user friendliness, reliability and availability.

The upgrade work on the 'Pearl', 'Jewel' and 'Dawn' were all successfully completed last year.

Commenting on these successful upgrades, Tim Schweikert, president & CEO, GE's Marine Solutions, said, "GE has been a long-standing partner of the Carnival group working together for 20 years and has equipped more than 30 Carnival Group vessels with its electric power and propulsion systems.

"Our success lies in the success of our customers, and we're proud of providing long-lasting and high-quality solutions backed with reliable services that help our customers maintain their competitive edge," he concluded.