

DIGITAL TRANSFORMATION

2016



**BUREAU
VERITAS**

Move Forward with Confidence

DIGITAL TRANSFORMATION

2016

P.2

Higher performance

Our flagship digital project, in collaboration with Dassault Systèmes, brings faster compliance and, from 2017, holistic asset integrity management via a powerful 3D platform.

P.4

Faster service

New apps now enable our clients and surveyors to access information and to provide inputs, anytime and anywhere, in paperless mode.

P.6

Greater protection

Partnerships with specialists are helping us deliver new services to meet the growing requirements for cybersecurity.

P.8

Improved efficiency

New software help owners improve the efficiency of their operations, and the performance of their assets.

Running faster

Digital is transforming the marine and offshore industries, bringing opportunities - but also risks.

At Bureau Veritas, we have put digital transformation at the heart of our growth strategy. This transformation focuses on two main axes.

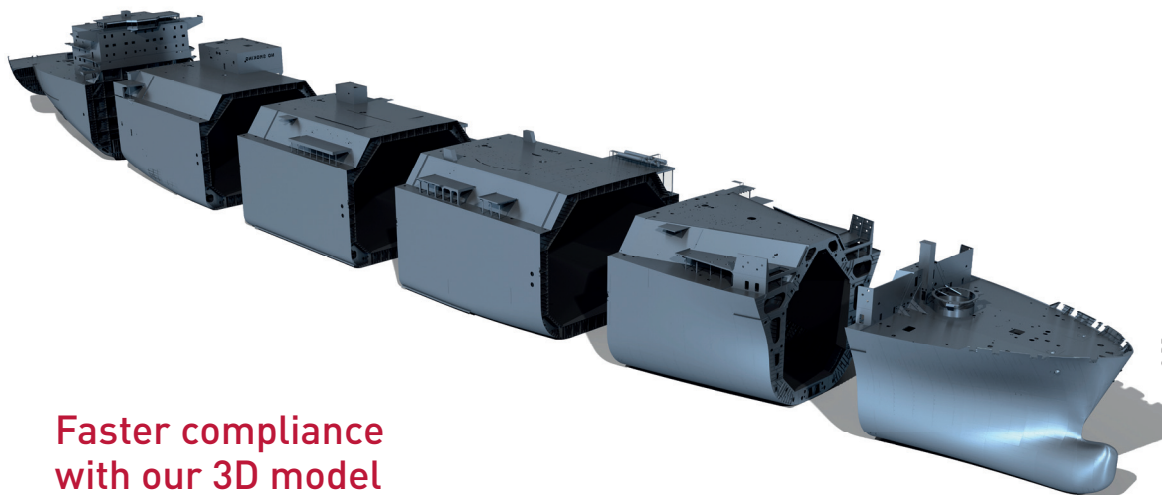
The first is innovating to develop truly added value tools for our clients that help them achieve their objectives: from higher performance and safety, to optimized costs, throughout the life cycle of their asset.

The second is equipping our workforce with the tools they need to become more productive, and deliver better, faster service to our clients.

2016 was the first year of our five-year digital transformation strategy, and one in which we launched some major projects.

Higher performance 3D solutions

Our strategic partnership with Dassault Systèmes is revolutionizing the way we work with owners and yards throughout the lifecycle of a ship or offshore asset.



Faster compliance with our 3D model

A new powerful modeling tool enables Bureau Veritas to cut design review times dramatically. The solution, based on Dassault Systèmes' 3DEXPERIENCE platform, builds a detailed 3D model of the proposed vessel and optimizes the calculation process by directly interfacing the 3D model with all Bureau Veritas calculation tools, including structural and stability software. This means that no data has to be entered twice, resulting in improved accuracy and a reduction in structural computational and verification times for large vessels from around three months to under four weeks.

Launched as a pilot with Chinese design institute SDARI on two new oil tanker projects in 2015, the 3D model is now used by our design review teams on newbuilding and conversion projects. In 2016, teams in China, Japan, the Netherlands and France worked on six projects from a range of segments: gas carriers, oil tankers and passenger ships.

→ 3D MODEL AND CSR-H

IACS' most recent Common Structural Rules for tankers and bulk carriers impose finite element computation of the whole cargo area, effectively doubling the workload for designer and verifier compared to the previous standard. Using our 3D model tool, together with an updated version of Veristar Hull, we can reduce that complexity and neutralize the time increase.



Digitizing asset integrity management

Veristar AIM^{3D}, a holistic Asset Integrity Management solution launched in Spring 2017, takes the 3D model one step further. It begins by generating a geometrical model of the ship, floating structure or platform: a virtual twin. This is then used throughout the life of the asset: from design checking calculations through to inspection activities and future modifications. Inspection results are automatically uploaded, ensuring the model is continually up-to-date with the known condition of the asset. The 3D model and latest condition status can also be exported to numerical analysis software for FEM.

The ultimate goal is to provide holistic asset integrity support covering six key parameters: safety, business, environment, regulatory compliance, occupational health and operational performance. To do so the tool will be able to exchange with existing IT systems already used in the industry, such as ERP, DMS and CMMS.

Veristar AIM^{3D} is the natural extension of Bureau Veritas' digital transformation of its Asset Integrity Management services portfolio. These services are already provided to clients such as Total, Shell, BP, ConocoPhillips, PTTEP, Woodside, INPEX and others.

VERISTARAIM^{3D}
 A BUREAU VERITAS SOLUTION POWERED BY DASSAULT SYSTÈMES

Faster service

New apps

In 2016 we made a decisive move to handheld devices, with apps targeting a central goal: faster access to information and superior quality service for our clients.



My Jobs

Ship surveys have traditionally been done on paper, with data then re-entered and reports generated back at the office. This all changes with the My Jobs app: a fully digitalized survey tool for Bureau Veritas surveyors offering up-to-date information and live reporting.

Our surveyors are equipped to perform surveys using My Jobs from 2017. The launch of the app is in line with our aim to improve both the quality of our service and our productivity.

All the information required for the survey is included in the app, alongside functions including survey code selection, searches, and the ability to generate checklists or digital documents for signature. As such, time onboard is optimized: the surveyor can focus on delivering quality service and on providing quick answers to your questions. Paper processing onboard is also reduced.

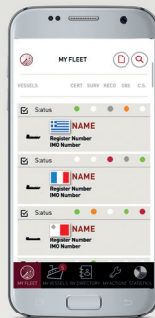
Back in the office, data is synchronized with our integrated reporting system, and the report finalized. The result is higher quality reporting and faster report delivery.



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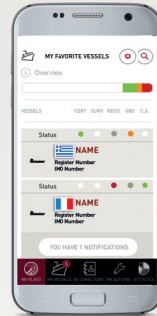
My Chronos

My Chronos is an integrated online scheduling tool enabling Bureau Veritas to efficiently schedule all surveys, audits and inspections. Our aim: to provide the client with the right surveyor at the right time. Managers and planners can check surveyor availability and qualifications and quickly book a surveyor following a client request. Surveyors have access to their agenda anytime and anywhere thanks to the My Chronos mobile app and shipowners can monitor the status of their request online. Following a pilot phase, the platform will be rolled out from Spring 2017.



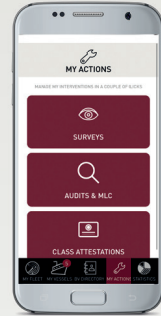
MY FLEET

Manage all your vessels. Check current and upcoming surveys.



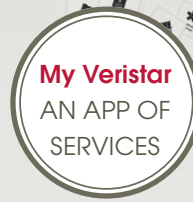
MY FAVORITE VESSELS

Locate and monitor each of your ships. Download survey reports.



MY ACTIONS

Request surveys, audits and class attestations.



My Veristar

My Veristar is an app that enables clients to monitor their fleet, plan surveys and access class and statutory information through a user-friendly interface. Launched in Summer 2016, it already has over 3,500 users.

Clients are able to access a statutory snapshot and visual timeline of their fleet as well as detailed vessel information and documents, survey reports, visual survey planner and a timeline view of activities.

My Veristar also allows to request surveys, audits or class attestations through the “My Actions” menu. Client requests are then sent to the most appropriate Bureau Veritas office.

Fleet managers and superintendents are able to closely monitor selected vessels thanks to customizable and push notifications, and locate their vessels in real-time. My Veristar users can preview and access the latest class and statutory news, search for and contact Bureau Veritas experts and access Bureau Veritas fleet statistics.

My Veristar is available through the Apple and Google Play stores.

Greater protection

Cybersecurity

Cybersecurity is rising up the agenda for owners of ships and offshore assets. In 2016 we worked on guidelines and developed partnerships to deliver new services focused on keeping our clients' assets safe.



Leadership of IACS working group

Modern ships and platforms run using increasingly complex information technology. Systems and infrastructure are highly integrated, and collect extensive data, which is accessible remotely.

As such they present an attractive target for hackers, whose motivations can range from financial gain to terrorism or a desire to gain access to intellectual property.

Bureau Veritas is leading an IACS working group on cyber safety and security. This aims to provide a joint response to cybersecurity issues beyond those addressed in IACS' revision of UR E22, which mainly deals with safety and reliability.

We have also published a new rule note (NR 632 Hardware in the Loop Testing) setting out how safety critical systems should be tested using a proven advanced test methodology for control systems to meet the new IACS UR E22. The latter comes into force in July 2017.



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Cybersecurity supplier certification

Bureau Veritas is working on a cybersecurity supplier certification scheme for marine systems. This scheme will be used for naval and commercial vessels.

Dedicated cyber security services

Bureau Veritas is developing a dedicated cybersecurity offer for our clients, based on a rigorous approach covering five key areas: human factor, network, software, systems and material. This approach is based on recognized international standards, our internal guidelines and BIMCO's guideline on Cyber Security Onboard Ships, presented at IMO in 2016.

To deliver these services, we have partnered with organizations offering specialist cyber security expertise. Audits of security policy management and security risk assessment are carried out by our external partners APSYS, an Airbus company, and Orange Cyber. Our partnership with CEA List also enables us to carry out tests on clients' source code, on site at the manufacturer, using the organization's FRAMA-C suite of tools.

Improved efficiency

New digital services

In 2016, Bureau Veritas and its subsidiaries launched new software to help owners improve the efficiency of their operations, and the performance of their assets.



Veristar Dangerous Goods & Bulk

IMO imposes strict safety regulations to protect ships and crew from the hazards associated with carriage of dangerous goods. These regulations are complex and subject to continued evolution.

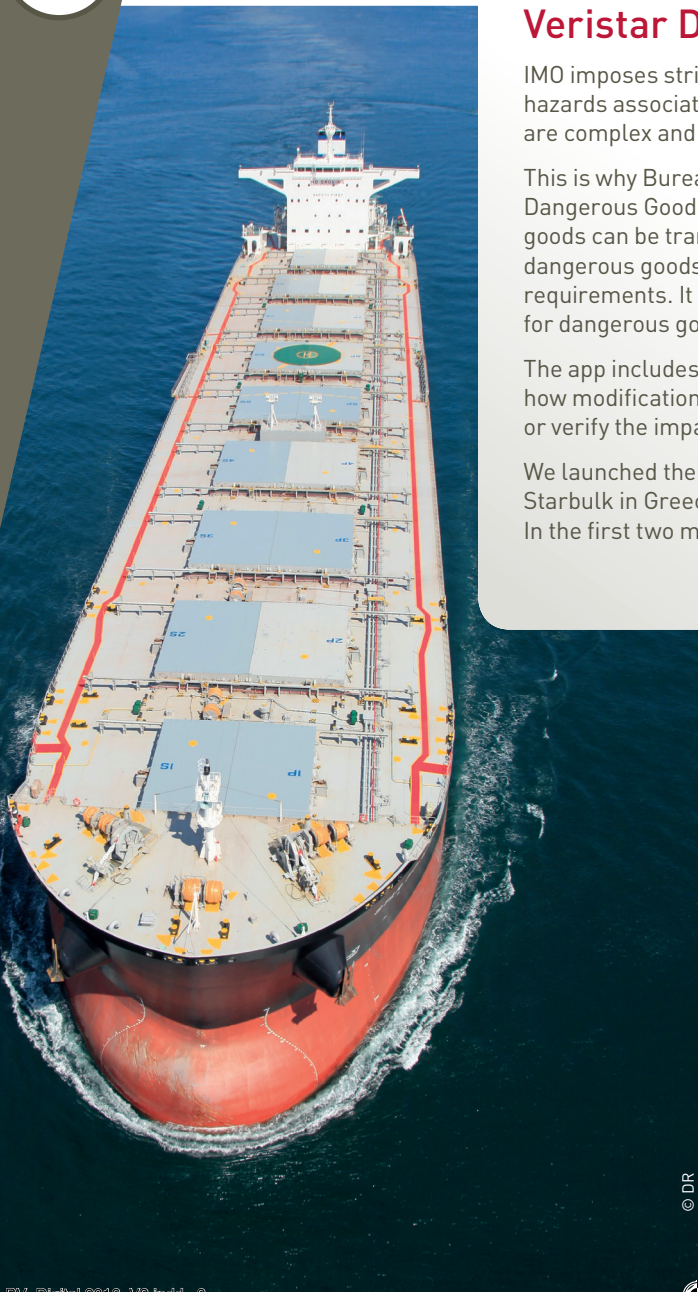
This is why Bureau Veritas has developed a web application, Veristar Dangerous Goods & Bulk. It provides clients with a clear view of which goods can be transported, optimizing the management of ships carrying dangerous goods by ensuring automatic application of the in-force requirements. It also simplifies the generation of documents required for dangerous goods shipments.

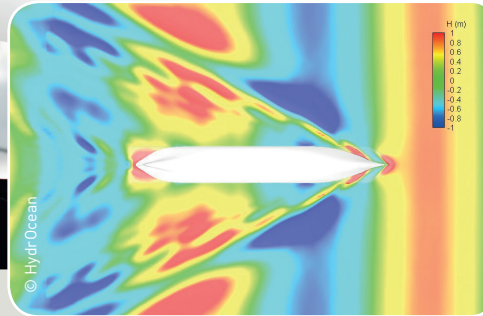
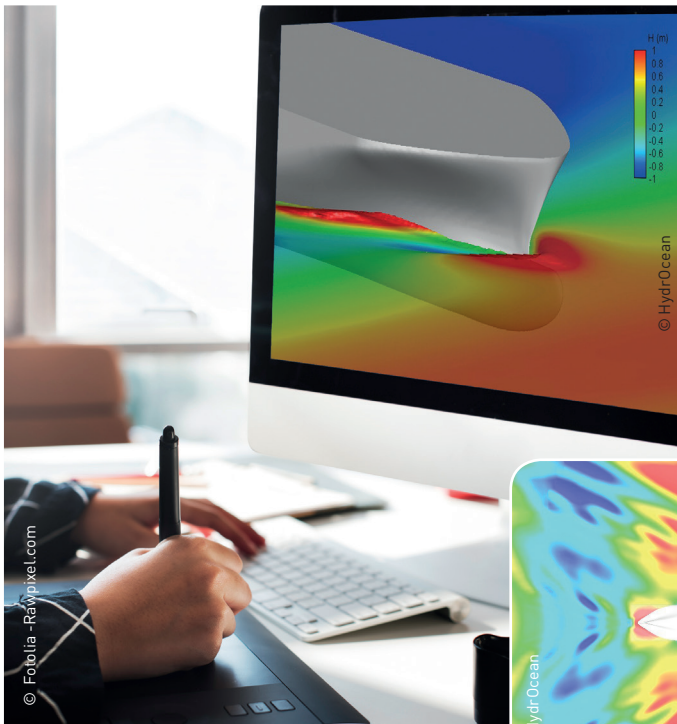
The app includes a simulation tool enabling clients to, for example, check how modifications may impact the list of transportable dangerous goods, or verify the impact of a new regulation.

We launched the software with two pilot clients, CMA CGM in France and Starbulk in Greece, before rolling it out to the whole Bureau Veritas fleet. In the first two months of launch, 270 users joined the platform.

Product Carriage Response Service (PCRS) internal community

Bureau Veritas receives around 3,000 enquiries each year that can be summarized in one question: "Can we load this cargo?" With clients requiring a rapid answer, we have created a collaborative internal community to enable our experts to share knowledge, delivering fast service and helping our clients avoid delays to operations.





HydrOcean optimization software

Trim optimization is considered one of the most easily achievable and cost effective fuel saving practices, as it requires no modification to ships.

Bureau Veritas subsidiary and CFD expert HydrOcean had previously developed and made available trim optimization software, which modeled calm water situations. HydrOcean sought to improve the software's accuracy by taking into account the propeller effect, which can reduce fuel consumption by up to 3%.

It also considered wave effects on optimal trim. These investigations will enable Bureau Veritas to develop new energy efficiency services in real-life weather situations.

Real-life scenario modeling with SEECAT

New developments within our SEECAT tool model solutions to save time, optimize costs and meet new regulatory requirements in an efficient way. For example, as the Ballast Water Management Convention comes into force, a pilot project for bulk carrier operator Setaf-Saget modeled the ship's ballast water circuit, enabling the owner to compare the impact over operation time and costs of different treatment systems and pumps.

A second pilot project for Total focused on optimizing the energy efficiency of a Suezmax tanker. We used SEECAT to study the impact of using three devices: a waste heat recovery boiler alongside a diesel generator, variable speed sea water cooling pumps and variable speed engine room ventilation fans. For each device, we measured the impact using a complete operational profile of the ship, and calculated the potential return on investment for Total.

Front cover: Global strength and fatigue analysis of a 230 m ro-pax vessel
owned by Balearia and being built by La Naval shipyard.
Courtesy of Balearia and La Naval



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