

The Cruise market through
the eyes of big players

The Jewel in the crown:
Chinese market potential

InfoSHIP® big data
hooks cruise lines

SEAVIEW



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MAGAZINE

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Editorial

Welcome to RINA SeaView! This edition of RINA's acclaimed annual magazine focuses on the thriving cruise market. Join us as we review the state of the international cruise market, the latest innovative technical advances and explore the ever-growing commercial opportunities in the Chinese market.

2015 was an exciting year as we saw an increase in the use of alternative design and subsequent classifications and certifications, as the marine industry continued to demand bigger and more environmentally-conscious ships, and as the first LNG cruise ships were classed by RINA.

However, the importance of safety, security, environmental responsibility, asset performance maintenance and the use of competent personnel remain key areas of focus for the marine industry. To respond to this clear market need, RINA further developed its asset management software solution InfoShip EGO.

We would also like to thank our customers Costa Group, Silversea Cruises, Fincantieri, and T.Mariotti for their contributions.

"Wow factor" stimulates cruise ship market

Analysts used to say that the cruise industry is the only leisure market with demand driven by offers. In reality, despite the financial crisis in 2008, the recession in 2012 and slow global growth in 2016, the cruise industry shows no signs of slowing down. Forecasts are decidedly optimistic: according to CLIA, 24 million passengers are expected to sail in 2016, a steady increase of 60% since 2006.

Today, the global cruise fleet amounts to almost 400 ships, totalling 19 million GT, with a capacity of 500,000 lower berths. The majority of capacity (around 90%) is provided by contemporary and premium cruise segments, in which large ships, capable of accommodating over 6,000 passengers are deployed. The high capacity of such ships allows economies of scale to be realised, thus giving the possibility of reducing both operational costs and cruise prices.

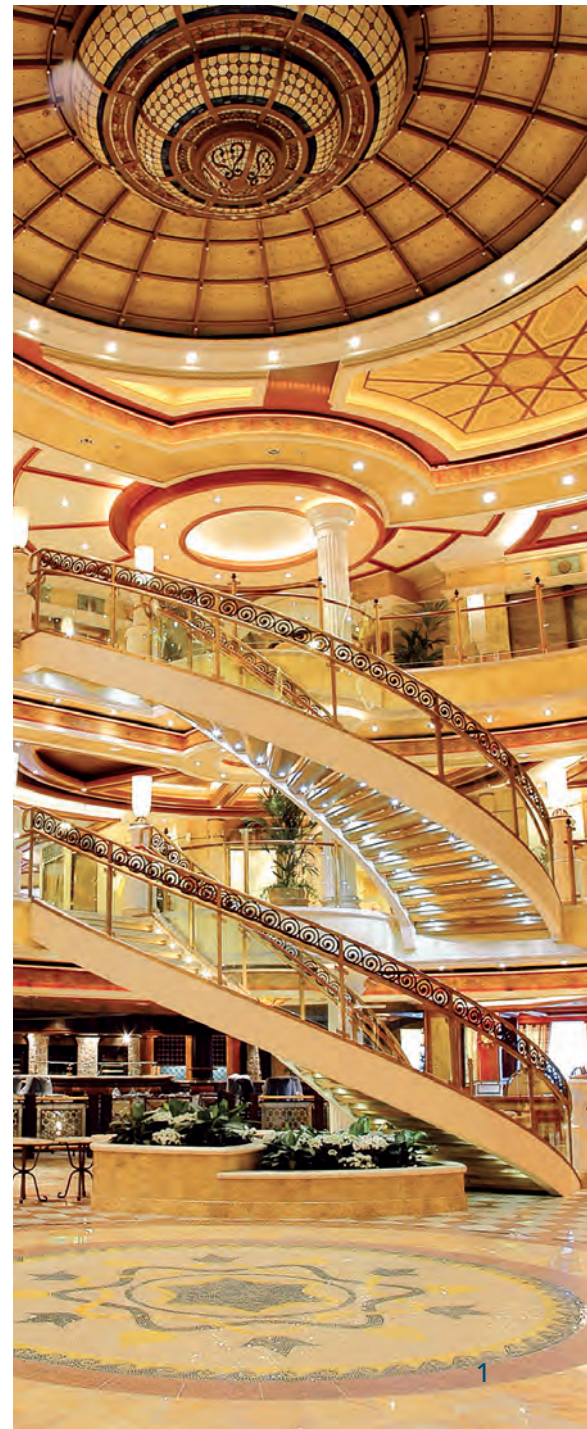
Over recent years, major cruise brands have launched impressive new build programmes to boost the continual growth of the cruise market and new orders have been placed by "newcomer" brands, further confirming the high potential of the cruise industry.

The cruise order book amounts to almost 6 million GT to date, equivalent to 30% of the current global cruise fleet in service. This means that, allowing for a small number of planned disposals, the capacity of the global cruise fleet will increase by over 25% in the next five years.

The main growth from new cruise ships entering into service will be in the contemporary and premium segments, but a number of new builds intended for the upper-premium and luxury segments are also currently active, demonstrating a positive trend in growth for all segments of the cruise industry.

New orders from major brands were placed almost exclusively at European shipyards, demonstrating the importance the region plays in delivering know-how and specialist expertise to the cruise industry. For example, a Hong Kong based cruise operator recently acquired a German yard that specialises in cruise ships.

As well as recently launched new build programmes, major operators have started undertaking frequent and extensive refurbishments. When choosing a cruise, customers are increasingly driven by the "wow factor" of the ship and its features, so operators need to ensure their ships are well equipped with the latest features expected by their customers and those specific to the markets in which they are deployed. For example, USA and European brands moving to the fast growing Chinese market, have carried out refits on a number of cruise ships, to ensure the vessels are fitted with all the features Asian customers look for when choosing a cruise. If we consider that 5 million Chinese cruise passengers are expected for 2020, we can expect a lot of refurbishment works, particularly at Asian shipyards, over the next few years.





Michael Thamm

Cruise industry's course set by innovation

In the last decade the cruise industry successfully positioned its product as a very desirable vacation for many different target groups and the market still has great potential for development. Despite the fact that the number of guests keeps growing, the market penetration remains low in many countries. In Europe, slightly more than 1% of the population enjoys cruising and the Chinese market is recording a double digit growth, bringing tremendous opportunities to the entire industry.

But how can we further stimulate the potential of the market?

I believe that we need to take a look backwards in order to begin to answer this question. Cruise companies pioneered the idea of travelling for pleasure visiting many different places and not just as a mere passenger transportation from one place to the other. The destination remains an important element of the voyage, but the concept of cruising has evolved and the ship has become an attractive destination. In fact, by experiencing the cruise, guests started to enjoy the journey itself and the time spent on board of beautiful vessels.

The cruise industry is one of the most innovative sectors in the holiday business, as evidenced by the dynamism shown by every cruise line. A cruise can meet the expectations and demands of all ages. Truly there is a cruise for everyone, from a kid of 4 to a grown-up of 90!

In recent years, companies have nurtured the cruise sector with innovations which have enlarged the boundaries of what is possible on board a cruise ship, the result being that a cruise is now the most relaxing, luxurious and affordable vacation option.

I think that a simple formula to exploit market potential is to strive for innovation. This we do by defining our future and planning strategically as we design the onboard experience. This makes the experience unique and gives it an integral motor for sustainable growth.

Innovation, therefore, is not only technological or digital transformation. In 2006,

BIOGRAPHY

MICHAEL THAMM, CEO Costa Group

As CEO, Michael Thamm has headed the Costa Group, which comprises Costa Crociere, Costa Asia and AIDA Cruises brands, since 2012. With 27,000 employees and 25 ships with a total capacity of 68,800 beds, the Costa Group is Europe's leading cruise operator. The fleet will be further strengthened by six new vessels by 2020. Thamm began his career in the maritime industry in 1984 when he joined Deutsche Seereederei in Rostock/ Germany. From 1993, he was a key player in the development of AIDA Cruises, the market leader in the cruise sector in Germany. He was the President of AIDA Cruises from 2004 to 2012, during which period he initiated a newbuilding program which saw the fleet grow by one vessel each year between 2007 and 2013. In 2012, he was appointed CEO of the Costa Group. He is a member of the Executive Board at CLIA Europe. Michael Thamm was born in Dresden / Germany on 1963 and lives in Hamburg.



courtesy of Costa Crociere

when Costa decided to open the Chinese market it seemed a risky idea. However, we were ultimately proved right and we are now market leader in the fast growing Chinese market. Costa Asia has currently 4 ships and AIDA will position its first ship in Shanghai in 2017, capitalizing on the growing consumer demand that is expected to make China the second largest cruise market in the world by next year. This represents an important new milestone for Costa Group and in the rapid further development of our business in Asia. Furthermore, I think that our growth plan, which expects to add 8 new spectacular and innovative ships to our fleet by 2021, will allow Costa Group to further strengthen its leadership in Europe and Asia and reap the rewards due to the most innovative industry players.

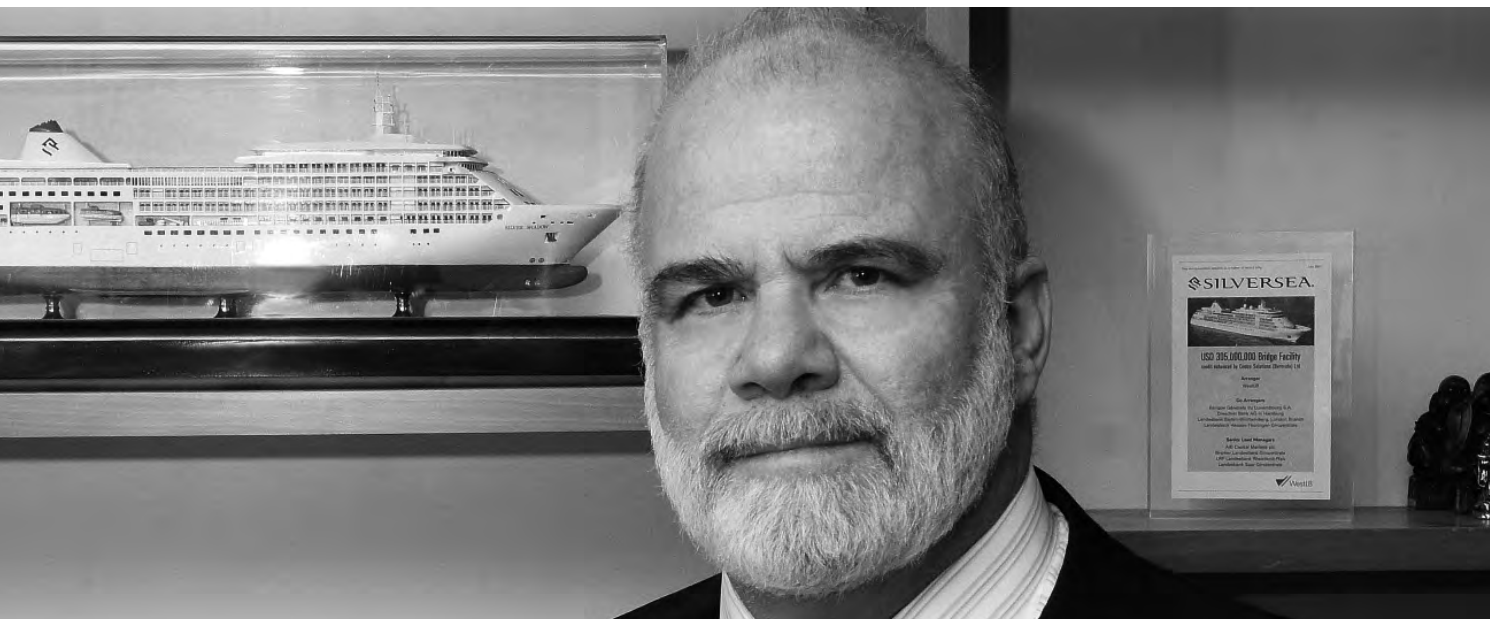
The Costa Group is constantly engaged in exceeding guest expectations and providing the highest level of product. We continuously invest in areas such as entertainment, food quality and variety, leisure programs and in the dedication and professionalism of our crews. Costa and Costa Asia are fully committed to offering the best Italian experience tailored to the markets they serve, while AIDA meets the expectations of the German market in stunning style and is ready to export a "Made in Germany" premium offering to China from next year. Furthermore, our Group uniquely leverages digital technologies to engage, entertain and interact with our guests. For instance, onboard our ships Costa Diadema and AIDAprima, our guests will soon be able to interact with "Pepper", the world's first onboard robot that uses Artificial Intelligence, statistical analysis and multiple sensors to interpret human emotions. "Pepper" will be able to understand our customers' intentions and both entertain and aid them in a personalized way. An exciting world first that once again emphasizes the Costa Group's tradition of innovation!

Finally, pristine seas and destinations are the underlying essentials for a successful cruise experience. This is why the cruise industry has undertaken significant investment into researching and implementing new technologies to reduce the volume of garbage, waste water and air emissions. Costa Group and Carnival Corporation have invested as much as USD 400 Million to significantly increase the installation of industry-first

exhaust gas cleaning technology on more than 70% of the entire fleet.

In line with our innovative role and our attention to the environment, we will build the first-four cruise ships ever to be powered by Liquefied Natural Gas (LNG), the world's cleanest burning fossil fuel. Pioneering a new era in the use of sustainable fuels, these ships will be the first in the cruise industry to use LNG in dual-powered hybrid engines to power the ship both in port and on the open sea. I believe that Carnival Corporation's investment in this industry-leading technology will set a new course in environmental protection and cleaner air for years to come. Increasing environmental sustainability is one of our most important corporate goals. These new systems on our ships will be another effective way for us to meet that objective.





M. Lefebvre D'Ovidio

An outlook on the luxury cruise market

I am expecting a very healthy future for the demand in the Luxury Cruise Market for the next 5 years due to an important number of Global trends working in its favor, these are: the growing focus that affluent customers have towards experience versus durable goods consumption; the increasing opening of emerging markets for travel, a market that's of particular interest is the growing Chinese outbound market; the continuous demographic trend towards an older but still affluent population.

The only short-term tension I can see for the demand in the luxury cruise market is uncertainty on the stock exchange, which typically creates short-term weakness in the North American market, which is a key market source for the sector.

In addition to the above the market could also see an increase in profitability if the continuous weakness of the oil market persists.

Let's now drill a little deeper into global trends in favor of the luxury cruise market.

The cruise business in general will continue to grow globally at a very healthy pace, I am expecting the growth to come principally from emerging markets such as Asia where cruise is proving a very popular way to explore the world. I am also expecting products to continue to differentiate, to cater to growing niches of customers. Silversea is continuously improving its product through its new building programme and is a leader in product differentiation and creating new markets through its Expedition division.

Luxury cruising will become much more global and thanks to the evolving demographics we are expecting continuous growth. We are also expecting growth from contemporary cruisers who decide to upgrade their cruise experience and move to the luxury segment.

BIOGRAPHY

Mr. Manfredi Lefebvre d'Ovidio de Clunieres de Balsorano took control of Silversea Cruises, a family company and Global Leader in Luxury Cruising, in 2001 and became Executive Chairman. He transformed Silversea from a cruise line with three vessels to the market leader with 8 ships cruising around the world. The fleet continues its expansion and is currently building his 9th ship, the Silver Muse. Further he expanded the Product range of the company by adding the «Expedition sector » quickly becoming leader of Luxury Expedition as well.

He is a recognised leader of the Global Cruise Industry and served key roles, ranging from European Chairman to Member of the Global Executive Committee, in the industry association CLIA. He is a member of the World Economic Forum of Davos and is EVP in Charge of Europe for the World Travel and Tourism Council.



Expedition will continue to grow more and more as luxury customers are looking for new frontiers of travel and more and more countries are opening up for sustainable tourism. Silversea is strongly committed to remain the leader in this sector.

A large number of studies are increasingly leaning towards a global shift in experiential luxury. In 2012, Boston Consulting Group was estimating that experiential luxury would attract more than 55% of the total luxury spent. This trend has become even stronger since then.

This is also true for a brand-obsessed market such as China where, according to BCG, experiential goods purchases are continually growing by 28% every year.

The future looks very bright for experiential goods providers as when looking at the Y generation more and more interest is being shown towards owning "experiences" over goods. This shift is also very clearly underlined by the continuous growth of sharing economy services.

The growth of outbound travel from emerging markets such as China will completely change our industry in the next decade. We are seeing an unprecedented number of affluent travelers wanting to efficiently see a world they have never had a chance

to see, whilst in a protected group setting. This represents a unique opportunity for luxury cruising as we are seeing growing numbers of Chinese customers who want to be pampered on a visit around the whole of Europe, without having to continuously pack and unpack their luggage. Luxury cruising represents an ideal opportunity to cater to these customers because it allows for them to be accompanied by personnel who speak their native language and to provide them with customised food preferences.

If we look at the demographic trend of developed economies such as Europe, Japan and the United States, the same consumers who drove purchases in the 90s are now at a stage in life at which they are not interested in owning "stuff" anymore. Instead they want to use their purchasing power to "experience" things. These people also have a lot of time available and the travel industry is currently profiting from, and will continue to greatly profit from this shift. Of course luxury cruising is perfectly placed to take advantage of this growing demand particularly through its unique experiences and "money cannot buy" offers.

So I am very positive about the future of the Luxury Cruise Market overall, and particularly about a brand such as Silversea, which continues to grow to offer tailor made products for the growing demands of experiential travellers.



Giuseppe Bono

Great challenges for the ships of tomorrow

Today as never before, the world is asking for quick adaptation and constant regeneration capacity in the light of tight competition and a demanding market that puts pressure on prices and requires new products with very high quality and performance standards.

In order to be successful and anticipate competitors, in today's globalized world companies have to be ahead of the game by focusing on innovation, flexibility and dynamism. Fincantieri's strategic positioning of high technology and high added value products, combined with the competitive globalized context in which the company operates, call for significant and constant efforts in terms of research and development of new technologies and new products.

The ships designed and built by Fincantieri are not just standard products. Each vessel is tailor-made and created according to the owner's needs, and represents the state of the art in terms of technological solutions and innovation, particularly in the contexts of safety, energy efficiency, emissions and noise reduction, as well as life cycle cost and payload.

Cruise shipbuilders have to face challenges which include not only the requests from customers, but also new safety and emissions control rules and regulations coming into force, which all contribute in making ships more complex.

Safe-return-to-port, alternative design and arrangements, are only some examples of this complexity. In fact, rules and research go hand-in-hand, and being at the forefront means having the possibility to offer insight into what is going to happen with forthcoming legislation. Therefore all the new buildings are part of a constant "steps-forward" drive: Fincantieri is engaged in creating something new every day, by being as creative as possible, meeting and anticipating customer requirements in order to provide them with the best and most advanced solutions, and by creating the best product at the best price while using new technologies and complying with rules and regulations.

BIOGRAPHY

Giuseppe Bono, Chief Executive Officer of FINCANTIERI S.p.A.

Married, two children, he holds a M.A. Degree in Business and Economics and a Degree honoris causa in Naval Engineering.

His expertise in strategic planning, corporate finance and management control, has allowed him to hold a number of key-roles with increased responsibility.

After his appointment as CEO of Aviofer and General Manager of Efim, in 1993 Giuseppe Bono joined Finmeccanica S.p.A. as CFO; in 1997 he was appointed General Manager, and in 2000 CEO and General Manager, contributing to the re-organization of the whole Group.

As from April 2002, he serves as Chief Executive Officer of FINCANTIERI S.p.A., known worldwide as one of the most relevant and diversified - cruise, merchant and naval - shipbuilding groups

- CEO of FINCANTIERI S.p.A.
- Chairman of the Board of Vard Holdings and Vard Group AS.
- President of Confindustria Friuli Venezia Giulia
- Member of the BoD of Fondo Strategico Italiano S.p.A.
- Member of the Council of Confindustria



courtesy of Fincantieri



This is why over the past years our Group has enhanced its approach to research and development, adopting a more formal process. R&D has been aligned with the Group strategy, which foresees the monitoring of the evolution of systems, components, know-how, platforms and new concepts. Cruise ships, ferries, offshore vessels, mega-yachts, naval vessels and repairs offer unique opportunities for cross-fertilization of ideas. Our R&D activities, for which the Group invests every year an important part of its revenues, are a fundamental driver for the strengthening of Fincantieri's competitive position in a market where innovation of product and process is a key factor of success.

R&D is conducted along three main channels: the development of technologies and innovations applied to a specific contract to satisfy the customer's requirements, off-the-shelf solutions to anticipate the requirements not directly connected to a specific customer, and long-term innovations directly aligned with the Group's technology vision to both maintain the edge and enter new markets. Among the various off-the-shelf innovations on which Fincantieri concentrates there are, to name but two, the maximization of energy efficiency so as to reduce a vessel's life-cycle costs and the maximization of the payload and guest comfort joined with safety enhancements. Fincantieri's R&D vision focuses on four main areas: customer experience, including security and safety on board; connectivity, access control, monitoring of passenger movement and video surveillance; zero environmental impact, centered on energy efficiency enhancement, waste management, water consumption optimization and fuel reduction; platform building and fitting-out of enhancements through automation and integrated shipyard control rooms.

Playing a key role in such context is Fincantieri's corporate research center, CETENA (Italian Ship Research

Centre), which supports the shipbuilder's product and process innovations by working closely with universities and research organizations, by conducting researches, by developing new technologies in the naval and maritime fields, and by offering consultancy services. The Group's innovation, however, does not come only from its internal departments, but also from its supply chain, with which, in the past years, the company has started developing long-term innovation agreements.

All the above considered, given the importance of innovation, high-technology solutions and high added-value products, we cannot allow ourselves to reduce our commitment in research and development activities if we want to make sure that Fincantieri remains fully competitive and consolidates its leadership in the shipbuilding industry.





Marco Bisagno

The next decade of cruise new builds

The favorable US Dollar/Euro currency exchange and lower fuel price recently contributed to the expansion of the cruise market. It's hard to predict what will happen over the next decade in the cruise new build market, but three main trends are currently evident. Firstly, an increasing number of large orders for super-giants are being placed by major players, such as Carnival Group, Royal Caribbean/Celebrity, Norwegian Cruise Line and MSC. Secondly, explorer vessels with 300 passengers, including ice-breakers, are becoming more and more popular to discover new routes. Thirdly, the cruise ship segment has seen a revamp with an increasing number of new shipowners commissioning ships with 2000-2500 passengers.

The ultra-luxury small and medium size ship and river cruise industries also remain healthy niches.

"From our side, Genova Industrie Navali, the holding company that T. Mariotti is a part of, offers expert services that enhance the specialist skillsets of our sister companies. The variety of supporting services we can offer are a clear advantage for us when working on new builds and managing our clients' existing fleets to high standards," said Marco Bisagno, Chairman, Genova Industrie Navali.

Genova Industrie Navali holding consists of several independent companies, including specialists in shipyards, outfitting and furnishing, industrial electrical systems, design and conditioning and ventilation.

With a view towards future decades, Genova Industrie Navali's strategy is to focus its activities on specialist projects.

BIOGRAPHY

The Chairman of Genova Industrie Navali, Marco Bisagno, was born in 1948, in Genoa. He graduated as an engineer in preparation for a career in computer automation, but after a visit to his father in law's ship-repair yard, he soon discovered his passion for ships and has never left the naval industry since.

In the early '90s he and his business partner, Paolo Zanetti, successfully transformed T. Mariotti, part of the holding group Genova Industrie Navali, from a ship-repair company into a new builder company, turning it into a key player in the ultra-luxury ship industry. T. Mariotti shipyard now specialises in ultra-luxury shipbuilding and mega yacht construction.

Established in 2008, the Genova Industrie Navali holding consists of several independent companies, including T. Mariotti, San Giorgio del Porto and Chantier Naval de Marseille (shipyards), Gerolamo Scorza (outfitting and furnishing), Ortec Industriale (industrial electrical systems), Studio Engineering (design) and Tecnavi (conditioning and ventilation). With a total production value of over 250 million euros in Genoa and Marseille, Genova Industrie Navali is one of the most important shipbuilding and repair groups in the Mediterranean.



Today, the main challenges for cruise new builds include a need to focus on improving on-board experiences and developing new routes, both for tourism and as an answer to the current worldwide situation in which some traditional market certainties are question marked.

Efficiency, in combination with a reduced draft design, represents a major challenge. Recently the new build market has effectively seen considerable growth in interest concerning alternative energy, environmental compliance and better endurance.

"A focus on safety, efficiency and environmental consciousness needs to be seen at the core of any new project or idea to improve the sustainability of new builds," noted Mr Bisagno.

T. Mariotti believes that ultra-luxury shipbuilding is an "industria con un cuore artigiano" (an industry with a

craftsmanship heart), and therefore successful new build projects come from sound relationships and partnerships, in which shipowners, shipyards and subcontractors share expertise and know-how.

The shipyard is currently involved in a luxury new build project that is protected by a strict confidentiality agreement, and is in advanced stages of negotiation with three other new build project teams.

Genova Industrie Navali is currently focusing on innovative and special projects to enhance the specialist offering of the holding group. It is currently investing in Forme 10 of Marseille, the third largest graving dock in the world, which will soon be ready to accommodate nearly 100% of the world's cruise fleet, and in other large areas closer to its Genoa headquarters that will shortly be available.





courtesy of Uniworld River Cruises

Floating Hotels and Eye Level Views

The world's rivers are fast becoming hotspots for travellers. River cruising is a niche sector of the global cruise industry, mainly used by Western and English speaking passengers. European river cruising has boomed in the last decade, considerably faster than the ocean cruise sector. In the last five years, the number of river cruise passengers grew by 25% per year versus a 7% increase in ocean cruise passengers, while river cruise lines continue to expand to more exotic and interesting parts of the globe every year. Today around 200 ships are deployed in European rivers and the order book for new builds has reached 28 vessels.

River and ocean cruising are two entirely distinctive experiences with completely different atmospheres and target audiences.

Ocean cruises allow passengers to see the coastline and ports, whilst the leisure facilities of these large resort ships make them a destination in their own right. River cruises, on the other hand, rarely offer much time at sea but provide a unique way to explore countries, with tight sightseeing schedules arranged around a ship's time in port. This industry emerged to introduce an entirely new concept to Europe: floating hotels that can journey between destinations.

On river cruises land is always in sight and the scenery can continually be admired at eye level, with impressive views from the majority of cabins. As the vessels are generally small (they rarely carry over 200 people) passengers can step on land almost as soon as a ship has docked.

In the early '90s, the completion of the 106-mile Main-Danube Canal allowed vessels to travel from the North Sea to the Black Sea, along more than 2,200 miles of river and generated extensive cruise itineraries from Amsterdam to Budapest, and beyond.

The fastest growing river cruise market is Russia, which has a well-developed network of internal waterways and riverside stations at most of the country's big cities, including Moscow, Saint Petersburg and Samara.

A large portion of major river cruise shipbuilders can also be found in Germany,



courtesy of Unworld River Cruises

a country traditionally specialised in building inland waterway vessels, including Meyer Werft, Lloyd Werft and Neptune Werft and in the Netherlands with Vahali Shipyard Gendt and De Hoop, just to mention a few.

However, Asian destinations such as Cambodia, India and China are becoming increasingly attractive, with major operators deploying a fast-growing number of vessels into the market - current order books total 12 ships.

RINA recently developed new rules for the classification of inland

waterway ships. As a company with extensive experience in the classification of passenger and cargo river vessels in Italy and South America, RINA was recognised by the EU as a classification society for inland waterway vessels in 2012.

Thanks to RINA's extensive presence in Germany and the continual expansion of its experience in the cruise industry and inland navigation, RINA has become a dependable partner for the river cruise industry.

■ mario.colosini@rina.org



courtesy of Unworld River Cruises



The Jewel in the Crown

China's cruise market began in 2006 with Costa Cruises becoming the first international cruise company to enter the market. After nearly a decade of growth, the market continues to show huge potential, attracting an ever-increasing number of international cruise companies. In parallel, local cruise companies have begun "springing up" and cruise homeport development has accelerated to meet demand.

The number of Chinese outbound cruise passengers reached almost 1.4 million in 2014, rising to nearly 1.9 million in 2015. The Chinese outbound cruise market maintains a high growth rate of approximately 20%-30% per year. Experts estimate that by 2020 China will become the largest cruise market in the Asia-Pacific region and the second largest cruise market worldwide.

China has three shipbuilding companies actively involved in the construction of cruise ships: Shanghai Waigaoqiao Shipyard, Wuchang Shipyard and Xiamen Shipyard. Wuchang Shipyard belongs to CSSC group, which established a joint venture with China Travel Service (HK) Limited (CTS) to develop and build a cruise ship in China, which will be classed by RINA.

RINA China began focusing on promoting China's cruise market in 2009. RINA is currently the only foreign classification society to have classed a Chinese-owned cruise ship. With RINA's technical expertise the conversion design of a second-hand cruise ship purchased from Europe by Chinese owner Diamond Cruise was finalised. Construction of the ship is ready to start and is due to be completed in April 2016.

In 2015, RINA China signed a strategic cooperation agreement with Sdari, one of four ship design institutes in China involved in cruise ship design and development work, to strengthen collaboration between the two companies.

China now has the world's largest shipbuilding industry and is capable of building all existing types with one exception: cruise ships. Building cruise ships successfully is regarded as the 'jewel in the crown' by the Chinese ship building industry.

The Chinese cruise market is still at an embryonic stage but its development potential is huge. Chinese enterprises are well-funded and have strong government policy support. Recent policies announce that 12 cruise homeports will be established in China before 2030 and promote the development of designing and building a Chinese built cruise ship independently.

However, there is a substantial need for the development of management and crew expertise in China. Investors in the Chinese cruise market have high expectations, which can only be realised through adequate training.

RINA has held three successful technical cruise ship seminars in China and provided valuable technical training for a number of Chinese shipowners and shipyards. With many partners and substantial projects in China, RINA is building an increasingly high profile and reputation in the Chinese cruise industry.

Mixing innovation with alternative design



Over recent years RINA has been actively involved in supporting shipyards and ship owners in the development of alternative designs to be applied to new cruise passenger ship projects.

In some of the studies being undertaken RINA played an active part in the design teams as Flag's representative which smoothed the project approval process. In other cases RINA's role was to support the development of the studies themselves. Liaison with Flag Administration is a constituent part of RINA's service.

RINA has been involved in developing alternative designs regarding critical issues. For example, RINA has developed alternative designs for main vertical zones with dimensions exceeding those set out by industry standards, use of combustible materials, lifeboats with capacities of over 150 people, the maximum capacity currently allowed by the LSA (International Life-Saving Appliance) Code and, more in general, new innovative features. Nowadays, these alternative designs are commonly considered a routine assessment. Several studies and discussions on their application to different ships have led to similar conclusions, showing the need for the adoption of the same mitigating measures to cope with these new innovative features.

For example, the increased capacity of lifeboats has been regulated by the adoption of propulsion and steering redundancies and enhanced living conditions achieved by means of a ventilation system for the lifeboat, as well as enhanced launching appliance systems and specific operational procedures.

A need for shipyards to build bigger and more complex ships has been a long-term trend for the cruise industry and one that is expected to continue over coming years. This means that the adoption of innovative solutions to face these challenges is expected to grow as well as the consequent need to verify and finally approve alternative designs from very early project stages to demonstrate that the safety level of the design is equivalent to prescriptive rules.

As further confirmation of this trend, the International Convention for the Safety of Life at Sea (SOLAS) 74 has allowed for alternative designs to be adopted not only for fire related matters (Chapter II-2) and for lifesaving appliances (Chapter III), but also for machinery installation (C), electrical installation (D) arrangements, and additional requirements for periodically unattended machinery spaces (E) (Chapter II-1).

The recent New Code of Safety for Ships using Gases or other Low flashpoint Fuels (IGF Code) also presents opportunities for the adoption of alternative designs.

To meet industry demand RINA offers a reliable technical team capable to assist in analysing the proposed arrangements, studying the necessary mitigating measures to be put in place and carrying out engineering analysis using robust and advanced tools.

Risk assessment for first LNG cruise ship

D'Appolonia, part of RINA Group, is currently supporting Meyer Werft in developing a Risk Assessment for the first cruise ship powered by LNG (Liquefied Natural Gas) ever built, which is part of Carnival Corporation's fleet. Being the cleanest burning fossil fuel, LNG is the key to achieving a "green cruising" design for a series of new buildings within the corporation's fleet.

The development of relevant safety concepts and approaches for risk assessment have closely followed the development of LNG as an alternative to heavier fossil fuel. The installation of LNG storage, bunkering and propulsion systems on-board a huge cruise ship presents special challenges for all stakeholders involved in projects such as this. New scenarios and technical requirements need to be addressed and clearly documented. Ship-owners face the challenge of managing new risks, whilst classification bodies must account for new aspects implemented under the IGF Code (International Code of Safety for Ships using Gases or other Low flashpoint Fuels), and engineering disciplines, not usually used to working together, need to cooperate to ensure the safest and most reliable design.

D'Appolonia's HSE team faces several technical challenges during the project, including the presence of passengers on-board during bunkering activities, the large LNG storage capacity required by the ship to satisfy its energy demand, the accessibility of technical spaces for inspection and maintenance, and the safe design of the containment systems.

The aim of this risk assessment is to identify, characterise and rank risks relevant to LNG installation on-board the cruise ship. A key element of this is identifying and designing prevention and mitigation solutions to address high-risk scenarios. It is therefore essential to utilise highly accurate modelling, if risk is underestimated, this could lead to poor or ineffective risk control solutions. Conversely a large overestimation could lead to a waste of resources or a technically unfeasible solution.

Computational Fluid Dynamics (CFD) has therefore been used to model consequences of given critical accidental scenarios. These scenarios have been identified and agreed during a series of dedicated Hazard Identification workshops. CFD provides a full simulation of the three-dimensional environment of the domain in question. Analysis shows the effect of the geometry, presence of wakes, eddies, recirculation or stagnating point, all of which could heavily influence the dispersion of Natural Gas in the enclosures of the cruise ship.

This project allowed D'Appolonia HSE team facing new challenges and building up more detailed knowledge in the LNG Safety and modeling technique. Cooperation with RINA people set up a solid working group able to manage even the most demanding technical requirements.



courtesy of Meyer Werft

The necessity of competent personnel



In July 2015, RINA issued, "Rules for the certification of the competence management system". A general qualification is just a license; it does not guarantee that a person has the competence to carry out a specific role. The basic, but fundamental concept driving our society to design and issue these rules is that personnel with qualifications are simply not enough; competent personnel are a necessity. All too often the findings of incident investigations indicate a lack of competence as a root cause. To prevent this companies must maintain the highest standards ensuring that the competence of the crew is adequate to carry out their assigned roles, and that they are supported by competent ashore personnel too.

Nowadays, shipping companies recognise the importance of management systems and have implemented many of them (SMS, quality, environment - to name just a few), but it's essential that they are aware that competences never stand still. They need continuous improvement as a result of new jobs, client requests, business, software and technologies and equipment installed to comply with the latest rule requirements etc. To keep up with the continuous pace of change, the development of a structured tool that guarantees a high standard of competence among company personnel, including crew coming from manning agencies, has become essential. What's more, enhancing the competences of a company's human resources benefits the company by improving business through reducing risk.

RINA's rules for the certification of competence management systems are applicable to ship owners, ship managers, crew managers and their suppliers. The rules follow the basic

concepts of international management systems standards, (policy, objective and performance indicators, assessment, planning, implementation, checks, monitoring and continuous improvement), so that a company's competence management system can be easily integrated with its other management systems.

Identifying the gap between the current level of competence within a company, and the company's competence target plays a key role in the construction of a competence management system. Although the verification of an individual's competence is outside the scope of the certification, this service can be provided by RINA Academy.

The competence management system certification process is very similar to others known by our clients; an initial audit, divided into two stages ashore and on-board, an annual audit (both ashore and on board) and a renewal audit after three years. Certified companies may use a specific logo on their website or documents to ensure their certification can be easily recognised by their stakeholders.

RINA's identified the need for the certification of competence management systems and following its introduction we have seen growing interest amongst our clients. In just a few months three companies have been already certified and RINA is now receiving many new applications.

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Your Cruise Ship: Safe and Clean

For several years communication channels, including media, newspapers, trade magazines and research articles, have shared findings covering onboard hygiene and illnesses caused from contaminated water, air and food on ships. The confined space of a ship, together with a large number of people, can facilitate contamination causing potentially dangerous health hazards.

The question is: how clean are cruise ships? Fortunately, many are maintained to the highest standards of cleanliness. But, according to government reports, the risk of catching a disease leading to nausea, vomiting and in some cases worse illnesses, represents a real potential threat to a company's brand, which has to be prevented. Factors contributing to outbreaks are numerous: *Escherichia coli* can arise from water that has not been properly chlorinated or cold foods that are served over multiple days; spa pools, water supply and air conditioning systems can contribute to *Legionella's* disease. A wide range of infections stem from a lack of hygiene, or cross contamination in kitchens due to infected raw food.

In the US, recent reports issued by the Centers for Disease Control and Prevention (CDC), showed that in 2015, over 20 illness outbreaks were reported on cruise ships calling at US ports, resulting in a total of 2570 infected people. The main cause of these incidents was the Norovirus, a very common, highly contagious virus affecting the stomach and large intestines. It is spread when people eat or drink contaminated food and beverages, touch contaminated surfaces or through close contact with someone who is already sick. There are more than 21 million cases reported annually in the US, with outbreaks mostly occurring in crowded places, including schools, hospitals, dormitories, big resorts and bigger passenger ships. However to put this issue in perspective, despite close conditions, infected cruise ship passengers only make up a fraction of the 21 million affected by the virus in the U.S. every year. Also global rates of acute gastroenteritis on cruise ships have decreased in recent years, nevertheless attention from the industry on cross contamination and diseases from water, air and food is very high and ship operators should continue to be vigilant. This clearly demonstrates the necessity to address contamination risk factors by conducting stringent tests that include a HSE risk assessment specifically for ship management systems. Each year RINA provides 1200 microbiological and chemical samples and conducts 5000 tests. RINA's technicians usually carry out these tests onboard ships, especially cruise ships, to support HSE monitoring of the process. RINA supports its clients with test facilities around the world, Europe, North and South America, MENA and Asia Pac, by checking water, air and food chain quality onboard cruise, passenger and commercial ships.



AIM to increase performance

RINA believes that marine Asset Integrity Management (AIM) has come of age, with companies now recognising the benefits that asset life extension can bring, through the utilisation of improved maintenance and monitoring systems.

The business case to adopt (AIM) is particularly strong in the cruise industry. When a cruise holiday is sold, the ship, its propulsion and its passenger services must all be continuously “available”. Any holiday cancellation or shortfall in service during the holiday will result in reputational damage for the operating company and its agents. The effective scheduling of repairs and the reduction of unplanned maintenance are key factors, in increasing profitability and building a good business reputation.

Conducting a detailed risk analysis, (safety case), is central to the RINA approach to AIM. The safety case is built on a thorough understanding of the ship and its components and results in a set of criteria that form a specification to minimise risk. Performance targets are established in cooperation with the ship owners covering metrics such as, critical asset availability, performance and maintenance scheduling. Advanced techniques are used to monitor critical areas such as hot spot assessment in machinery spaces. For example, thermography provides the data to reduce

fire risk by monitoring equipment operation temperatures. Any deviation from pre-defined temperature parameters will be reported to the AIM system so that the appropriate remedial action can be taken.

AIM is often associated with the monitoring of machinery but the role of an AIM system in the cruise industry is far broader. In order to be effective the system must also monitor the quality of the food chain, water and air conditioning. This data can play a key role in the prevention of illness, ensuring that passengers enjoy a trouble free cruise experience. RINA customers also have the peace of mind that the company has a network of laboratories worldwide should additional analysis be required.

Of course AIM is in essence a management tool, so investing in the correct operator training is essential, if a company is to obtain the huge benefits that the system has to offer. The RINA Academy offers courses that cover all aspects of the AIM system but are customised to focus on those issues that are of particular importance to a customer.

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InfoSHIP® big data hooks cruise lines



InfoSHIP®, an Italian fast response technical management system, has recently been adopted by Costa Crociere's sister company AIDA and one of the largest cruise companies in the world, based in Miami.

RINA has a strong commercial partnership with IB, the asset management solutions company that designed and developed InfoSHIP®. This partnership focuses on software and consultancy in the marine industry, with particular attention given to technical management and energy efficiency issues.

InfoSHIP® solutions cover all technical fleet management requirements and support ship-owners and ship management companies in day-to-day operations, business organisation, cost control and regulatory compliance.

IB launched the new InfoSHIP® Evo Event Reporting System (ERS) module, developed through the extensive experience gained from dealing with TECH (Technical) and HESS (Health, Environmental, Safety and Security) event reporting. The system provides a new technological framework delivered through an architectural and operational upgrade from previous systems. The system can classify and manage all types of on-board events. A follow-up can be created for each event being managed at any stage and accessed on-board and ashore.

ERS provides a "preview" of the next generation of InfoSHIP®, the web-based InfoSHIP® Evo. This software will offer enhanced features incorporating smart modules that manage a wide range of processes, such as crews, hotels, maintenance and purchasing. "Our deep understanding of marine industry processes allows us to continuously enhance our InfoSHIP® software to support

and anticipate the needs of the cruise market," explains Daniele Bottazzi, Marine and Industrial Division Managing Director, IB. Alessandro Canepa, USA CEO, IB adds, "Nowadays considering the complexity of the latest generation ships, management are asking for new standards similar to those used by the land-based industrial sector. One of the most challenging aspects of our job is that we need to think about asset control and ensure our systems comply with the latest regulations".

Another software product resulting from RINA and IB's cooperation is InfoSHIP® EGO (Energy Governance). This powerful tool collects big data related to ship performance. Using a series of key performance indicators (KPIs) EGO keeps technical staff fully informed about ship operations and allows them to view live or historical data quickly and easily.

The software's KPI monitoring has recently been extended to encompass an entire fleet. Fleet data can be analysed to compare the performance of different vessels, or the same vessels over different time periods to analyse the real long-term payback period of a refit.

With the launch of version 2.0, EGO is now fully compliant with the requirements of the new EU MRV Regulation, which regulates the monitoring, reporting and verification of CO2 emissions from maritime transport.

More than 60 systems have been installed and 200 orders taken.

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Training: tradition and innovation

The pace of technological innovation and its increased acceptance within the shipping world is set to shape the industry's future.

It is essential for maritime industry to maintain its reputation as a safe and efficient means of transport if it is to maximise profitability. To meet this goal a total commitment to safety, security and environmental protection must be demonstrated at all levels. It is therefore essential that a ship management team and crew are trained to the highest level with an excellent working knowledge of all regulations pertaining to the operation of the ship and the care of its passengers. The RINA Academy, part of RINA Group, provides a wide range of training courses across the spectrum of management and crew job functions within the marine and general industry sectors. The experience and breadth of those services has been recently strengthened with the ESA Group becoming an equity partner in the RINA Academy. The Enterprise Shipping Agency specialises in research, maritime staff selection and management.

The RINA Academy can train a ship's company worldwide. Successful completion of a RINA Academy course provides ship-owners with the assurance that all crew are technically qualified and operating in compliance with the appropriate institute standards.

RINA's experience in ship classification and certification, which stretches back over the centuries, provides a unique perspective to training allowing course customisation to meet a customer's specific requirements. In-house, standard, advanced or premium courses are available together with specialist courses. For example the approach of the "Company and Crew Competence Assessment" will verify the gap between the actual and required level of competence within a company. Custom courses can be designed to meet the business goals for a particular company, supplemented by additional education at universities and technical colleges, where students can use both engine and deck simulators. An important example to be mentioned is a six-week "Tug Master" course attended by Emirates navy cadets, with the theoretical and practical modules taking place in Genoa and Dubai, in association with TASNEEF.

RINA's experience in blending practical and academic studies results in a superior learning experience and higher levels of competence across the spectrum of on-board and ashore crew. The RINA Academy believes the way to improve business results and to improve safety is to create a learning organisation committed to the continual development of competence within all human resources.



RINA expands in Germany



RINA recently opened a new office in Hamburg, which will provide its ever-growing portfolio of clients with enhanced marine services, business assurance certification and consulting engineering, and support its aim to become a reference partner for the German market.

RINA has already strengthened its German Plan Approval Centre and launched a brand new Business Assurance office in order

to better assist its German clients with new specialist expertise, including Asset Integrity Management and Technology Qualifications. Over the next year in the region, RINA plans to launch a brand new Centre of Competence for software and digital supporting tools, strengthen its Passenger Ship Centre of Excellence and Container Ship Centre of Expertise, add specific competences for mega yachts and further develop its Business Assurance Network.





RINA acquires **new** software competences



RINA SERVICES has recently taken a minority equity stake in IB S.r.l., a specialist Italian asset management solutions software company. This close partnership will provide the shipping industry with a unique asset management software solution and a range of consultation services, for cruise ships. The RINA SERVICES equity stake follows a long period of cooperation between the two companies, which began in the year 2013 and led to the development of the new "InfoShip EGO" software solution.

For more than 30 years IB has been dedicated to the planning, production, distribution and development of world class marine maintenance software in addition to organisational consulting for the technical management of strategic assets RINA SERVICES in IB. RINA SERVICES can now provide its customers with strengthened expert IT competences internationally.

SEAVIEW

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