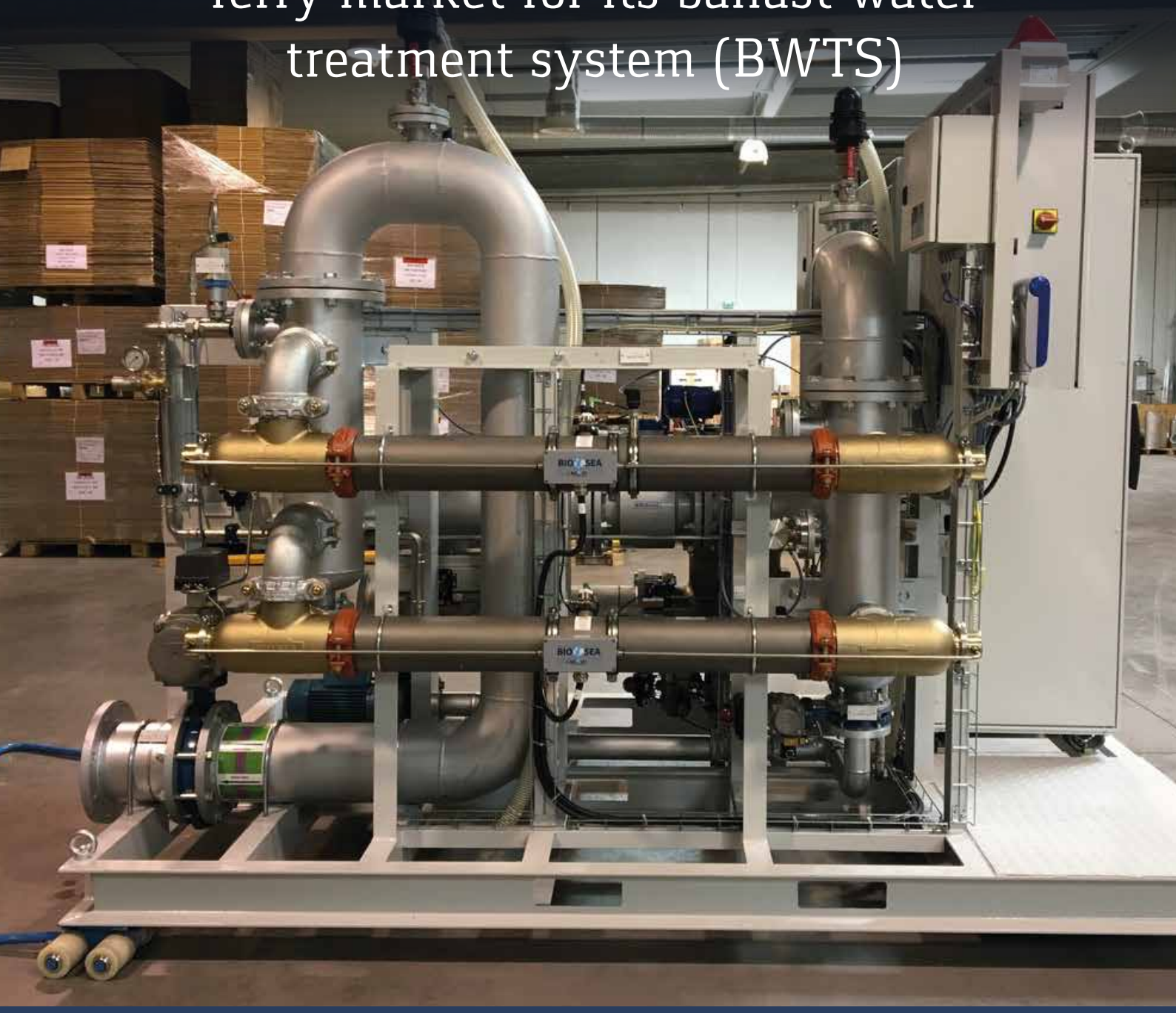
innovations

Focusing on innovation in the global cruise industry

BIO-UV sees success in the cruise and ferry market for its ballast water treatment system (BWTS)



Special Report

International Cruise Ship Industry

INTERNATIONAL CRUISE SHIP INDUSTRY
Focusing on innovation in the global cruise industry
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Orders begin to ramp up as shipping industry wakes up to the Ballast Water Management Convention regulations.

French-based water treatment company BIO-UV has enjoyed recent success in the cruise ship and ropax markets with its ultra-violet (UV) BIO-SEA ballast water treatment system (BWTS).

The BWTS has been specified for six MSC newbuilding cruise ships at STX St Nazaire, including the latest 'Meraviglia' and the new 'World' class cruise ship projects.

In addition, the company has won orders for RCCL's subsidiary Celebrity Cruises' 'Edge' class newbuildings at the same shipyard and carried out retrofits on two Le Meridionale operated ropaxes at Marseille - one in drydock ('Kalliste') and the other while alongside a quay ('Girolata').

Due to a cruise ship's low ballast requirements, each of the new units will have a capacity of just 300 cu m per hour, while the ropaxes were fitted with a BWTS of 400 cu m per hour each.

BIO-UV was founded in 2000 as a specialist water treatment equipment supplier and started to look at shipboard ballast water requirements in 2011. This resulted in a design of a UV-based BWTS, aimed at the smaller to medium size ballasting requirements of the shipping markets.

The company's BWTS gained IMO Type Approval in 2013 for capacities of between 30 to 2,000 cu m per hour and in June, 2018, received a US Coast Guard Type Approval certificate at operating rates of between 50 to 1,400 cu m per hour.

The system is not X-proof and therefore cannot be installed in hazardous areas on board ship. Neither can it be installed in US flag ships. However, this does not apply to the cruise or ferry sectors.

BIO-UV Chairman and Founder, Benoit Gillmann

At the time of receiving the certificates, BIO-SEA was the only system on the market with no holding time in fresh water, 24 hours in marine water and three days in brackish water in USCG mode. A zero holding time in fresh water is ideal for vessels transiting the Great Lakes, the company claimed.

In a presentation at Lunen, near Montpellier, attended by ICSI's Editor, Founder and Chairman, Benoit Gillmann said the company was aiming to offer zero holding time for both marine and brackish waters.

Both Type Approvals were obtained with the help of successful tests on board several containerships, with

A Bio-Sea BWTS seen installed on board ship

flow rates from 500 to 2,000 cu m per hour in every ocean around the world, he explained.

BIO-UV has been working with containership company CMA CGM since 2011 on system development and testing. Class societies DNV GL and Bureau Veritas were involved in the Type Approval processes and today, the company has equipment approvals from BV, ABS, DNV GL and LR.

Core element

One of the core elements in the system is a 20µm screen retaining filtering component in duplex stainless steel, for suspended solids and zooplankton. Its extended filtering surface allows an efficient retention rate, Gillmann explained.

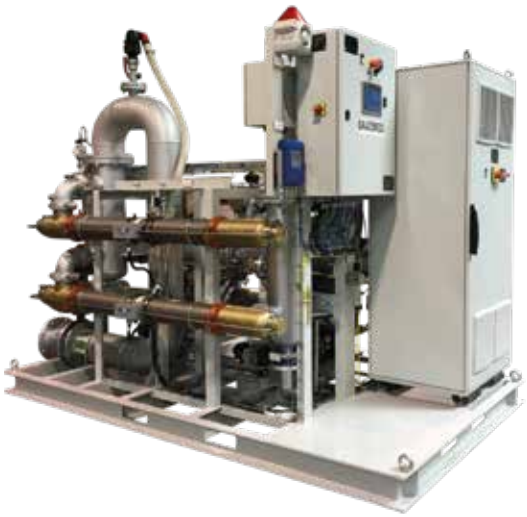
BIO-SEA's bronze aluminium construction guarantees high durability, he said and the system can be sized to scale (by increasing the filter size), taking into account the space constraints particularly for retrofit projects.

One major problem at present is the ability to acquire the requisite number of filters, as orders start to ramp up worldwide ahead of the IMO BWTS fitting cut-off dates. For example, delivery times can be up to six months. This problem is not unique to BIO-UV, as several other BWTS' suppliers have also voiced their concern about sourcing enough filters to meet their orderbooks.

As for the BIO-SEA system, during cleaning, there is no disruption of the filtration process and no significant variation of the treated flow rate, Gillmann said, adding that it is capable of high efficiency backwash.

An automatic backwash pump is included with every BWTS, as from the company's experience and testing, this helps the filter to breath quickly and to face pressure losses along the line, ICSI was told.

The UV lamps fitted, only one of 22 kW per BWTS, are protected in quartz sleeves. To avoid metal ions and calcium carbonate deposits on the quartz sleeves, BIO-SEA provides a Cleaning-In-Place (CIP) system. This



The BWTS can be delivered skid mounted or in parts

The company is to fit BWTS on board MSC's 'Meraviglia' class cruise ships

solution has many advantages: it allows deeper cleaning of UV reactors without crew interference and the risk of scratching or breaking the quartz sleeve.

Gillmann said that at present the use of LED type lamps was not possible but they could be available in five to 10 years time.

Control cabinet

He explained that the 22 kW lamp is contained in a box and the system comes with a control cabinet with just a red and a green button to keep it simple to use. The treatment process is fully automatic – there is no manual intervention required. A large touch screen also simplifies the maintenance process.

Thanks to the different communication protocols available (dry contacts, RS 485, auxiliary touch screen), the system can be fully integrated with all ship automation systems and the touch screen display unit can be installed anywhere on the ship, such as the bridge or engine control room.

Its design reduces moving parts, which results in a lower operational maintenance costs, as the need to keep on board spares is reduced.

Each UV reactor works independently, allowing the system to stay operational should one of the reactors require maintenance.

After ballasting/de-ballasting operations, the BWTS is automatically cleaned using citric acid.

Units can be purchased off-the-shelf from the Lunen manufacturing plant, or within two months for a delivery. A Bio-Sea BWTS can be delivered totally dismantled for installation on board ship or skid mounted for ease of access in a plug + play type configuration.

For fitting on board ship, the engineering phase will take around a month to complete. This consists of an on board survey using a 3D laser scanner or another system. For example, a 3D model can be overlaid in an engine room and the data scanned.

Discussions are then held with the ship's technical management at which the final drawings and material

inventory are agreed. This is normally followed by class approval, system integration, commissioning and crew training.

Engineering agreements are in place with LTH Baas, Choice, Damen, Kloska, Ocean and RMS Marine Service in China.

As for servicing, BIO-UV provides full support to the ship's crew so they have a complete understanding of the system's function - from detailed documentation to tailored servicing. The company has built up a worldwide service network using partnerships.

BIO-UV or the partners can undertake face-to-face training during commissioning and the first ballast operation, or offer a multi-level computer-based training program (CBT).

Shipowners technical superintendents, crew and other stakeholders involved in the operation of the company's BWTS are also welcomed at Lunen for hands-on operational training, Gillmann said.

UV Technology

According to BIO-UV, UV technology is a well proven system not impacted by water salinity or by water temperature.

It is claimed to be safe, as it is chemical free with no explosive gas, no induced corrosion in the pipe nor in the ballast tanks and no active substances.

The power consumption is regulated automatically, giving warnings of UV and filter performance.

The sun emits natural ultra-violet light and this natural phenomenon is reproduced thanks to lamps of different types (low pressure or medium pressure) that emit UV-C rays.

At 254nm, UV-C radiation penetrates into the heart of the cells of micro-organisms and disturbs their metabolism until they are totally destroyed (inactivation). They cannot then reproduce.

UV-C radiation is effective against bacteria, moulds, algae, viruses, etc.

The intensity delivered is called the dose (mJ/cm^2), which is that necessary to eradicate a particular micro-organism.

BIO-UV in a nutshell

BIO-UV Group was founded in May, 2000, as a water treatment specialist SME by Benoit Gillmann, who today is Group Chairman.

From the outset, the company chose to focus on the ultraviolet light (UV-C) technology for disinfection of water pants.

For almost 20 years, the company has been designing, manufacturing and marketing disinfection using UV-C concepts and systems to a large number of applications: recreational waters, swimming-pools and spas, aquaculture, drinking water, waste water, re-use, industrial processes, etc.

Today, more than 50% of the total water treatment systems produced are exported.

The company added a ballast water treatment (BWTS) solution to its portfolio in 2011, which over the past seven years has gained both IMO and USCG Type Approvals, plus several class society approvals.

Down the years, the Group has invested over €10 mill in bringing the BWTS to market.

BIO-UV has its own manufacturing and administration premises at Lunen, near Montpellier in the South of France and is a public listed company on Euronext with Gillmann holding 33.4% of the shares, while around 33.6% are held in historic funds and the remainder in public shareholding.

At Lunen, BIO-UV has a 4,300 sq m production factory, plus 900 sq m of offices for its 70 employees. In the offices is an R&D department employing 10 engineers, including two with CFD experience.

All of the design work is undertaken in-house using adapted software from Siemens, although some of the components are obviously bought in, including the lamps, the Filtrex filters and Grundfoss pumps for backwash draining operations.

Next month, the Group is expected to open a BWTS assembly plant in Asia to be near the shipyards. A Hong Kong marketing office was opened last year.

The Group's consolidated 2018 turnover was €12.4 mill, compared with €10.2 mill for the previous year and €9.8 mill in 2016. In 2018, marine sales made up about 42% of the revenue.

Gillmann said that the company was looking to turnover around €40 mill by 2022, of which BIO-SEA will account for €25 mill, or 60%.

Last year, around 20% of the BWTS orders received were for newbuildings and this year that percentage could drop to 10% with the remaining 90% being retrofits, due to the rush by shipowners to comply with the impending regulations.

Peak demand is expected in 2020-2022 with 2023 being stable and then ramping up again in 2024, as those shipowners who have not invested in a BWTS will have to act fast, Gillmann warned.