The "Oasis of the Seas": a cruise ship of superlatives

"We Build the Incredible"

The "Oasis of the Seas" is the new queen of the seas. Royal Caribbean's new luxury liner is the largest cruise ship ever built and launched by a shipping company. The construction of the liner involved technical challenges on a scale hitherto unknown. Encouraged by their excellent experience with Bender technology, the ship owners once again opted for the reliable electrical solutions offered by the Gruenberg company for the construction of this amazing miracle of engineering.

>> With an overall length of 361 m, a width of 47 m and a height of 65 m, the "Oasis of the Seas" has the capacity to carry 6360 passengers and 2100 crew members. The second ship of this class, the "Allure of the Seas", is scheduled to be delivered in November. Packed with energy-efficient energy, automation and drive technologies, the "Oasis of the Seas" is not only the largest, but also the most expensive, comfortable and innovative cruise ship in the world (construction costs approx. 900 million euros).

The list of amenities onboard the "Oasis of the Seas" reads like an advertising brochure featuring the attractions of a major tourist destination on shore:

> Theatre auditorium with 1358 seats
> Aqua theatre with 580 seats
> 2 additional stages
> 2704 passenger cabins
> Casino
> 9 restaurants
> 8 shops
> Large pool (more than 5 m deep)
> 20 smaller pools (some with sandy beaches)
> Amusement park
> Rock-climbing walls
> Parks and gardens
> Fitness facilities
> Surfing wave pools
> Sports courts for ball games
> Ice skating rink
> Several areas for young people
> Internet connections
> Nightclub
> Jazz bar
> Cinemas.

On 5 December 2009, the "Oasis of the Seas" set off to her successful maiden voyage from her home port in Fort Lauderdale in Florida (USA). In its first year, the cruise ship will undertake 19 consecutive seven-day sailings in the Caribbean, calling at ports in the Bahamas, Jamaica and Mexico, amongst others.

Energy and efficiency

The power and process heat for the "Oasis of the Seas" is supplied by a diesel-powered generator system. This system comprises two groups of engines, one with three V12-cylinder engines (each producing 13,860 kW) and one with three V16-cylinder engines (each producing 18,480 kW). These six medium speed 4-stroke Wärtsilä 46 diesel engines operate with common rail injection technology, cutting exhaust emission significantly compared to conventional diesel generators. For this reason hardly any exhaust gases are visible, even at full speed. The system's total output rating is more than 97 MW.

These engines drive three 15,800 kVA generators as well as three 21,000 kVA generators. The electrical system was developed and built by ABB. It includes the six main generators with all necessary switchgear, three drive systems of the ACS6000 series with corresponding additional

INFO

Impressive key facts:

> Approximately 250 km of piping and 5310 km of electric wiring installed
> Approx. 100,000 power sockets installed on the ship
> 600,000 litres of paint required for the paint finish
> The 21 pools hold approx. 2.3 million litres of water
> 4.1 million litres of fresh water is generated every day
> 12,175 plants exist on board; some trees are more than 7 m high
> The ship's maximum width exceeds the wingspan of an Airbus A340-300
> The ship is more than three times the length of a football pitch.

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components, as well as the drives for the four bow thrusters. The emergency power generators are driven by two 16V4000 MTU diesel engines.

The ship is propelled by three stern-mounted ABB Azipod propeller pods, which can be rotated by 360° degrees for steering and manoeuvring. Each propeller pod contains an electric motor which transmits an output of 20 MW directly to a five-blade fixed pitch propeller (diameter 6.1 m) installed forward-facing in the direction of travel. In order to provide excellent mobility and manoeuvrability in ports and at low speeds, the ship is equipped with four bow thrusters with a total output rating of 22 MW.

Proven quality from Bender

The ship of superlatives was built by the Finnish shipyard "STX Finland Oy" and was designed and constructed using electrical low voltage switchboards from ABB LVS in Vaasa (Finland). Owing to their positive experience with Bender products when fitting out the "Voyager of the Seas", the ship owners "Royal Caribbean Cruises Ltd." decided once again to use Bender components for monitoring important electrical circuits installed in the "Oasis of the Sea". The safety of persons and machinery are of particular concern when dealing with such huge dimensions and complex structures, especially in a sea-going vessel.

Gigantic voltage distribution systems – robust system protection technology

In addition to the drives, tens of thousands of other electrical loads and around 100,000 power sockets are supplied with power – using more than 5300 km of electric cables. The generators feed a 11 kV rail from which the various systems are supplied via transformers. The main power supply is laid out as a ring, with all important systems redundant.

Essential Bender components installed in the "Oasis of the Seas":

> A-ISOMETER® IRDH575 in combination with EDS460 insulation fault location systems for

a) monitoring 440V IT systems in different high voltage and emergency power stations for supplying compressors, bilge pumps, sprinkler systems and waste processing, and

b) monitoring 230 V IT systems supplying cabin distributions, kitchens, heating, lighting, emergency power stations and emergency lighting.

> Residual current monitoring system RCMS460:
For monitoring earthed power systems (TN-S systems) such as lighting and socket-outlets in cabins.

During the construction of the "Oasis of the Seas" our Finnish representative, Heikki Neumann, visited the shipyard. He offered advice and support to the designers and machine shops at ABB and was always at hand when questions or problems needed to be solved. Bender's presence on site during the design and construction phases was a major reason for the ship owners' overall satisfaction – in addition to the proven reliability of the Bender technology. Our team at Bender is proud to have played a part in such an impressive and absolutely unique monumental engineering project. "We build the incredible" was the ship owners' project slogan. "We make the incredible safe" was our own mission. ■

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