



Press Release

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First High-Pressure SCR System Seals Class Approval

- PBST-branded SCR-HP (Selective Catalytic Reduction-High Pressure) system enables MAKITA's low-speed engines to meet Tier III environmental regulations

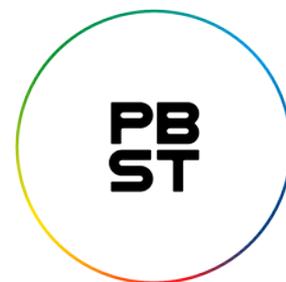
[Augsburg, 23.01.2020] – MAKITA Corporation and MAN Energy Solutions have announced that the first ever PBST-branded and -built cluster-3 SCR-HP system has passed its ClassNK approval test at the MAKITA works in Japan.

- The most compact of its type in the market, the SCR system is one of four – originally ordered in 2018 and 2019 – for vessels featuring MAN B&W two-stroke engines with two now delivered and the others currently en route to customers. An MAN B&W 6S46ME-B8.5 engine will power each vessel, with the SCR-HP system making each vessel Tier III-compatible. The first engine was ordered by Kanax Corporation and installed in a newly developed 39,000-dwt bulk carrier built at Shin Kurushima Toyohashi Shipbuilding Co., Ltd.

PBST's Ralph Klaunig – Vice President of Sales & License Turbochargers & Exhaust Gas Treatment – and MAN Energy Solutions' Daniel Struckmeier – Head of Exhaust After-treatment – attended the class test in Japan at the invitation of Yu Makita, President at Makita Corporation.

- Klaunig said: "The results from the engine shop test were quite spectacular with the PBST SCR-HP system able to undercut the currently valid IMO III NO_x values of 3.4g/kWh by more than 1g/kWh, which compares very favorably with the rest of the market. Working closely with MAKITA, just a little over a year passed between landing the first order and the handing over of the engine with the SCR-HP system to the shipyard. Accordingly, I would like to thank Makita for its great cooperation in delivering such a quick turnaround."

Yu Makita added: "We express sincere gratitude to everyone involved in this project at MAN and PBST for the excellent support and cooperation which lead to the successful launch of the world's first MAN SCR-HP. Representatives of our client, Toyohashi Shipyard, were quite satisfied with what we have achieved. Now we are able to offer a strong and environmentally friendly Makita Mitsui MAN-B&W engine, even in the current, tough market."



PBST

The PBST brand was formed in 2019 through the joining of the famous MAN Turbocharger and PBS Turbo brands. Headquartered in Augsburg, Germany, PBST designs and produces turbochargers and after-treatment solutions for low-, medium- and high-speed engines.

MAKITA Corporation

MAKITA Corporation is a marine diesel engine manufacturer with more than a hundred years of experience, located in Japan. MAKITA manufactures marine engines for 10,000 to 40,000 ton class ships. MAN Energy Solutions' and MAKITAs' cooperation dates back to 1981.

SCR-HP background

MAN Energy Solutions first introduced the SCR-HP concept in 2017. The development of the new system is based on MAN's in-house competence with four-stroke engines, for which it can already reference more than 650,000 operating hours.

MAN's SCR-HP is sold under the new PBST brand. It is available for two-stroke engines and reduces – through internal catalytic reaction – NO_x exhaust emissions to IMO Tier III limits. With specially developed honeycombs and honeycomb materials, as well as an integrated mixing unit, the overall size of the reactor has been drastically reduced compared to typical market designs and its medium-speed counterpart. The SCR-HP comes in six frame sizes, covering engines up to 25 MW with one reactor for the entire exhaust stream.

The system consists of the reactor – including mixing unit, urea injection lance, honeycombs and soot blowers – along with a module-based supply system, as well as the reactor's control unit that communicates with the engine-control system.



Illustration of the new SCR-HP system



Team celebrating SCR-HP success!



SCR-HP cluster 3 mounted on the engine during engine shop test

PBST is your dependable partner for holistic air-management systems. We provide advanced and inspiring air-management systems for applications on water, rails, as well as on the ground. PBST has its roots in Germany and Czech Republic and has more than 80 years of experience in designing and manufacturing turbochargers and after treatment solutions. We push the limits to create high performance technologies, such as two-stage turbocharging, the EGR blower and SCR systems for all applications, in order to meet



current and future challenges for our customers. Global after-sales services are provided by our authorized service partner MAN PrimeServ.

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