

WinGD records successful early running on X-DF-A ammonia-fuelled

Swiss marine power company WinGD has seen key parameters in line with expectations during early testing of its new X-DF-A ammonia-fuelled engine design. A 52-bore single-cylinder version of the X-DF-A engine is running at the company's Engine Research and Innovation Centre (ERIC) in Winterthur, with final validation to be completed in time for the first engine deliveries in June 2025.

Single-cylinder testing will allow rapid validation of the ammonia combustion system under engine conditions, as well as optimisation of emissions and performance. It follows earlier combustion tests and validation of critical systems on dedicated test rigs and multiple class approvals of the safety concept. In the coming months, a multi-cylinder engine test at WinGD's Global Research Centre in Shanghai will validate the full-scale engine, turbocharger configuration and control system before the engine enters production.

WinGD Vice President Research & Development, Sebastian Hensel, said: "The single-cylinder X-DF-A concept is running well, with combustion efficiency, emissions and pilot consumption within our range of expectations. This milestone is a testament to our uniquely rigorous approach to innovation and the fantastic work of our development team and partners."

The company's dedicated ammonia development programme began in 2019. In 2022 the project progressed to experiments using WinGD's one-of-a-kind spray combustion chamber (SCC). This was followed by a deep investigation of key engine components on the test rigs housed within ERIC's Future Fuels Lab.

WinGD Head of Testing and Validation, Sotiris Topaloglou, said: "In previous tests, we verified that SCC results were transferable one-to-one to the results on our test engines, which is why we invest so much time on these early testing phases. As a result, we are in a strong position to make rapid progress through validation of our ammonia technology."

Even before the single-cylinder engine tests started, the X-DF-A ammonia fuel injectors were tested on test rigs to validate the functional, mechanical behaviour and reliability, and on a multi-cylinder methanol engine at 100% load. The later test using methanol allowed WinGD a further opportunity to verify the ammonia injection concept under harsh engine conditions and thermal stress and make improvements before testing with ammonia.

The development process has combined proven technology with a meticulous approach to innovation. The X-DF-A platform is based on the diesel-cycle concept that has been well-established for several decades on WinGD's diesel-fuelled engines. New innovative technologies have been developed to inject and burn ammonia in the most efficient way, controlling and minimising engine out emissions. Huge efforts have also been undertaken to develop the whole fuel handling and safety concept, which is especially challenging due to the characteristics of ammonia as fuel.

The engine safety concept will also be verified on the test engines. WinGD has secured approvals in principle for the concept from several class societies and collaborated with fuel technology

providers to develop a tailor-made fuel system. It is now working closely with shipyards and early customers to translate safe design into safe installation and operation.

WinGD has already secured nearly 30 orders for X-DF-A engines in the bulk carrier, containership, tanker and LPG/ammonia carrier segments. The first engines will be built for four LPG/ammonia carriers owned by Exmar LPG and ten bulk carriers operated by CMB.Tech.

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WinGD in brief

WinGD advances the decarbonisation of marine transportation through sustainable energy systems using the most advanced technologies in emissions reduction, fuel efficiency, hybridisation and digital optimisation. With their two-stroke low-speed engines at the heart of the power equation, WinGD sets the industry standard for reliability, safety, efficiency and environmental design, backed by a global network of service and support. Headquartered in Winterthur, Switzerland since its origin as the Sulzer Diesel Engine business in 1893, today it is powering the transformation to a sustainable future.

WinGD is a CSSC Group company.