



H+H Engineering

Effective emission control
through sensor technology



Clean shipping

H+H Engineering relies on ifm products for exhaust gas aftertreatment systems

Global trade, as we know it, would be unimaginable without shipping. The worldwide fleet consists of more than 100,000 vessels, transporting around 90 per cent of all internationally traded goods across countries and continents. With its innovative solutions, H+H Engineering & Service GmbH is helping to make this form of transportation significantly more environmentally friendly, both now and in the future.

According to the International Maritime Organisation (IMO), shipping currently accounts for around three per cent of global CO₂ emissions. However, this is set to change: The IMO's goal is to reduce emissions from the global merchant fleet to net zero by 2050. Also in focus are the emissions of nitrogen oxides (NOx). Here too, the IMO has defined limit values. The currently applicable stage, Tier III, must be met by vessels operating in designated Emission Control Areas ECAs. Such ECAs already exist off the coasts of the United States and Canada, as well as in the North Sea and the Baltic Sea. Starting in 2025, an additional ECA will come into effect off the coast of Norway. Other regions, such as the Mediterranean, Central

America, Japan, and Australia, may follow. However, the strict limit values are only mandatory for more modern vessels whose keel was laid after a cut-off date individually defined for each ECA. The Tier III limits do not apply to older vessels.

On vessels and in cars: exhaust gas purification with urea

Still, the message is clear: Shipping companies that want to remain competitive in global trade – or operate in ECA waters – must invest in cleaner vessels. Selective catalytic reduction (SCR) systems, such as those developed and integrated by H+H in Sonnefeld, Germany, offer a practical alternative to converting the entire fleet.

"The diesel engines on vessels are not designed to meet NOx limits internally. This is why exhaust gas aftertreatment takes place outside the engine, using SCR systems," says **Arne Tädcke**, Project Manager and Sales Marine SCR at H+H.

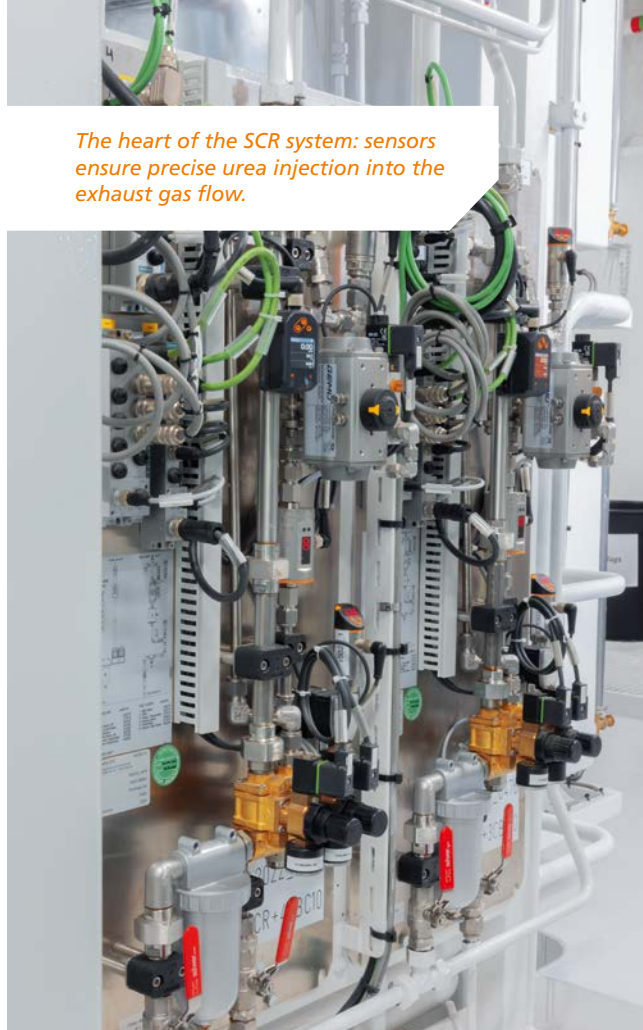
"We use urea for the aftertreatment, just like in the automotive industry. The urea is converted into ammonia in the exhaust gas flow, which in turn reacts with the nitrogen oxides on the catalytic surface, converting them into molecular nitrogen and water."

"In practice, the sensors from ifm have convinced us due to their reliability and measuring accuracy. Both are essential in maritime exhaust gas aftertreatment."

This process relies on accurate dosing: *"We have to inject the urea very precisely. On the one hand, we want to comply with the strict NOx regulations; on the other hand, overdosing must be avoided as any excess ammonia would be released unused into the atmosphere. And ammonia is just as harmful to the environment as nitrogen oxides."*



As nitrogen oxides cannot be broken down within the engine, this process takes place in the downstream SCR system.



The heart of the SCR system: sensors ensure precise urea injection into the exhaust gas flow.

Precise sensors for precise dosing

The SCR system from H+H uses sensors from automation specialist ifm to ensure accurate dosing. *"We measure and control the pressure and flow of both urea and compressed air in order to continuously ensure the exact supply of urea," says Tädcke. „In practice, the sensors from ifm have convinced us due to their reliability and measuring accuracy. Both are essential in maritime exhaust gas aftertreatment. If our system were not consistently accurate, vessels could either be fined for exceeding emission limits or denied access to an ECA. Either scenario would result in significant financial losses for the shipping company."*

Emission-reduced use between wind turbines

One of the vessels that depend on a reliable SCR system is the Norwind Hurricane. As a Commissioning Service Operating Vessel, the vessel commutes on the North Sea between Eemshaven in the Netherlands and the offshore wind farms off the West and East Frisian Islands. The Norwind Hurricane is therefore located in the centre of an ECA. For vessels with keels laid after 1 January 2021, the use of an SCR system is one way of achieving compliance with the Tier III NOx limit values. But that was not the only reason for the Norwegian shipping company Norwind Offshore to operate its five service vessels to date with as few emissions as possible with the help of the exhaust gas aftertreatment system from H+H. After all, the fleet indirectly contributes to the successful energy transition.

"All five vessels, as well as the three currently under construction, are involved in green projects and contribute to the expansion and maintenance of wind energy infrastructure," says Jon Carlos Farstad, Chief Engineer aboard the Norwind Hurricane.

"This is another reason why our shipping company strives to minimise the environmental impact of our vessels. This is achieved through advanced SCR systems and by running our engines as efficiently as possible. Advanced energy and power management systems help us to run the diesel engines in the optimal and most efficient mode to keep our emissions as low as possible."

SCR systems reduce social costs

Jürgen Müller, Managing Director at H+H, explains in the video magazine "Impulse - the ifm show" how much the reduction of nitrogen oxide emissions benefits not only the environment but also society: "Recent studies from the EU and the USA have shown that one tonne of NOx causes social costs of around 10,000 euros. This is because nitrogen oxides do not simply dissipate. They enter various atmospheric layers and can also be carried by the wind from the high seas to the mainland, where they pose a risk to human and animal health. Our SCR systems are capable of reducing Noxx emissions by more than 90 per cent. If we look at the emissions reduction of the Norwind Hurricane alone, we have calculated that the average operation of the vessel saves around 700,000 euros in social costs every year."

Conclusion

With its SCR systems, H+H is helping to significantly reduce the burden on the environment and society. This is also made possible thanks to the precise and reliable sensors from ifm.



Watch episode 18 of "Impulse - the ifm show" to discover the latest in ship automation:
ifm.com/cnt/impulse-ship

Thanks to the reduced nitrogen emissions, the Norwind Hurricane has a significantly lower impact on the environment – and is also authorised to operate in ECAs.

