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MAN ENERGY SOLUTIONS INCREASES EFFICIENCY WITH HARDNESS TESTER

MAN Energy Solutions, one of the world's leading suppliers of marine industry engines, wanted to boost the efficiency of hardness testing of thermal spray-coated parts. The solution was an automation of hardness testing with Duramin-40. The lab technicians of MAN Energy Solutions can now complete micro- and macro-hardness testing with selected microscopy tasks on the same equipment with significant improvements in efficiency.

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- ✓ **Faster** hardness testing of thermal spray coated parts
 - ✓ **Higher** accuracy with in-built imaging
 - ✓ **Greater** efficiency with one machine for all steps in the process
 - ✓ **Time savings** give technicians more time for other tasks
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IN BRIEF

CHALLENGE

Efficiently hardness test thermal spray coated cast iron parts.

SOLUTION

The Duramin-40, a versatile hardness tester that can be used for micro-testing, macro-testing and imaging.

RESULTS

A faster and more efficient process performed on one machine.



About MAN Energy Solutions

MAN Energy Solutions engineers systems for deep decarbonization in sectors that matter most and provides a unique portfolio of technologies, including low-emission marine engines driving half the world's trade. Headquartered in Germany, it employs around 14,000 people at over 120 sites globally.



Duramin-40 AC3

Struers Duramin-40 AC3 fully automatic hardness testers perform accurate and efficient Vickers, Knoop and Brinell traverses. Fully automated hardness testing eliminates operator error and saves considerable time, improving result consistency and throughput.

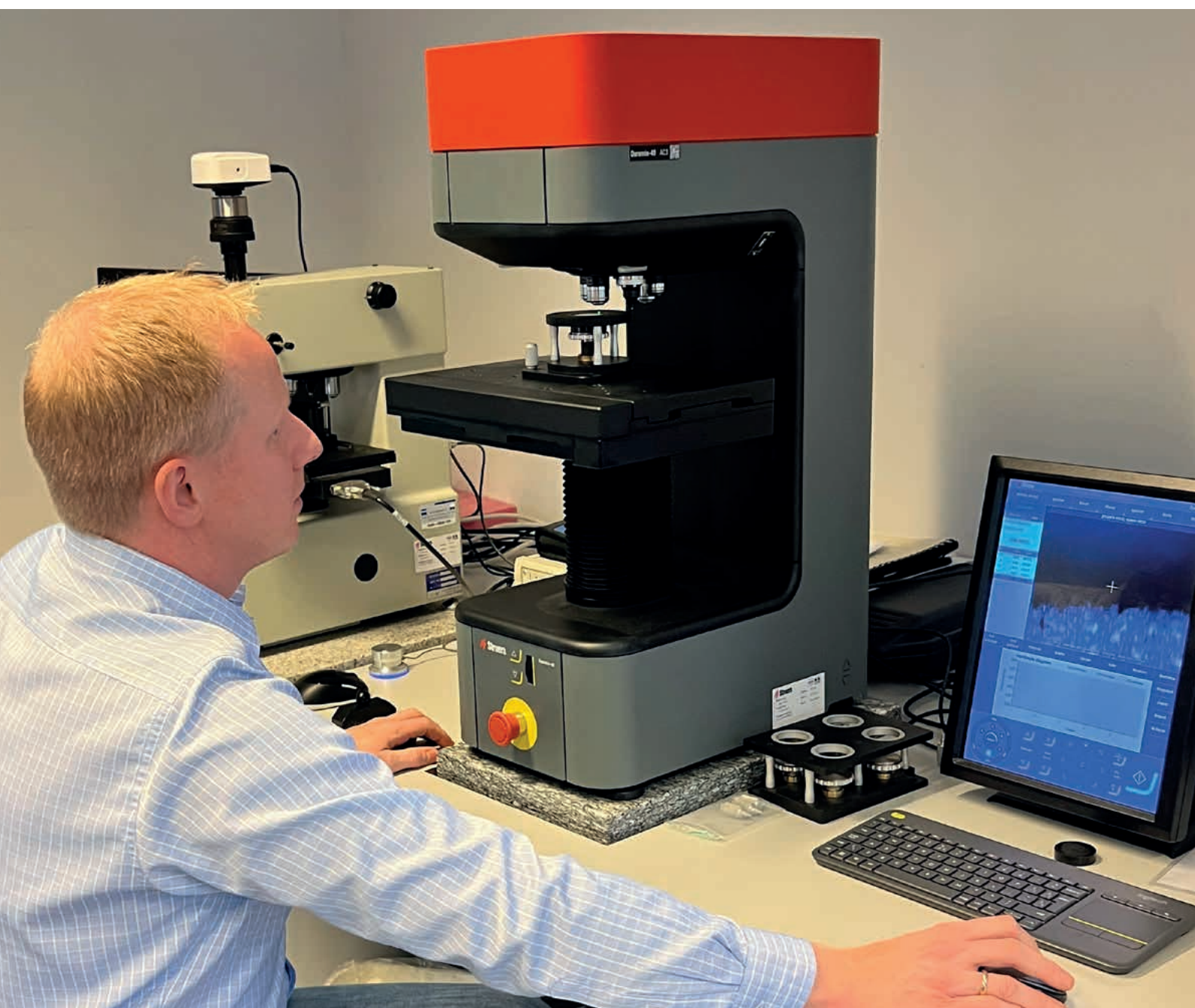
Advanced innovation reduces emissions in the shipping industry

At MAN Energy Solutions, innovation is not just about good business – it is key to developing a carbon-free shipping industry. MAN Energy Solutions produces advanced marine engines that utilize carbon-free and low-carbon fuels to drive the world's largest shipping vessels. They were the first marine engine supplier to introduce a methanol engine, back in 2016, and their team of engineers is constantly pushing the boundaries of marine engine design as they search for new ways to increase efficiency and reduce emissions.

Many of the components in Man Energy Solutions' engines have a special coating to improve certain aspects of performance. These is a thermal spray coating for piston

rings, which improves wear, friction, and corrosion resistance. This enables the cast iron base material to withstand higher impacts, pressure, and temperatures – also making them more durable when used in new engines, operating on low-carbon fuels. As a result, the thermal spray coating is essential for MAN Energy Solutions' drive to lower CO₂ emissions in the marine industry.

One challenge for MAN Energy Solutions was that quality testing these components during development and production was extremely time-consuming, especially hardness testing.



A highly efficient hardness testing process with Duramin-40

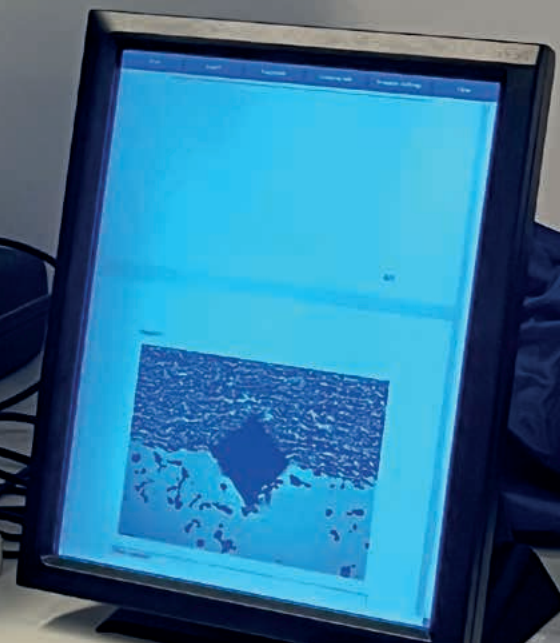
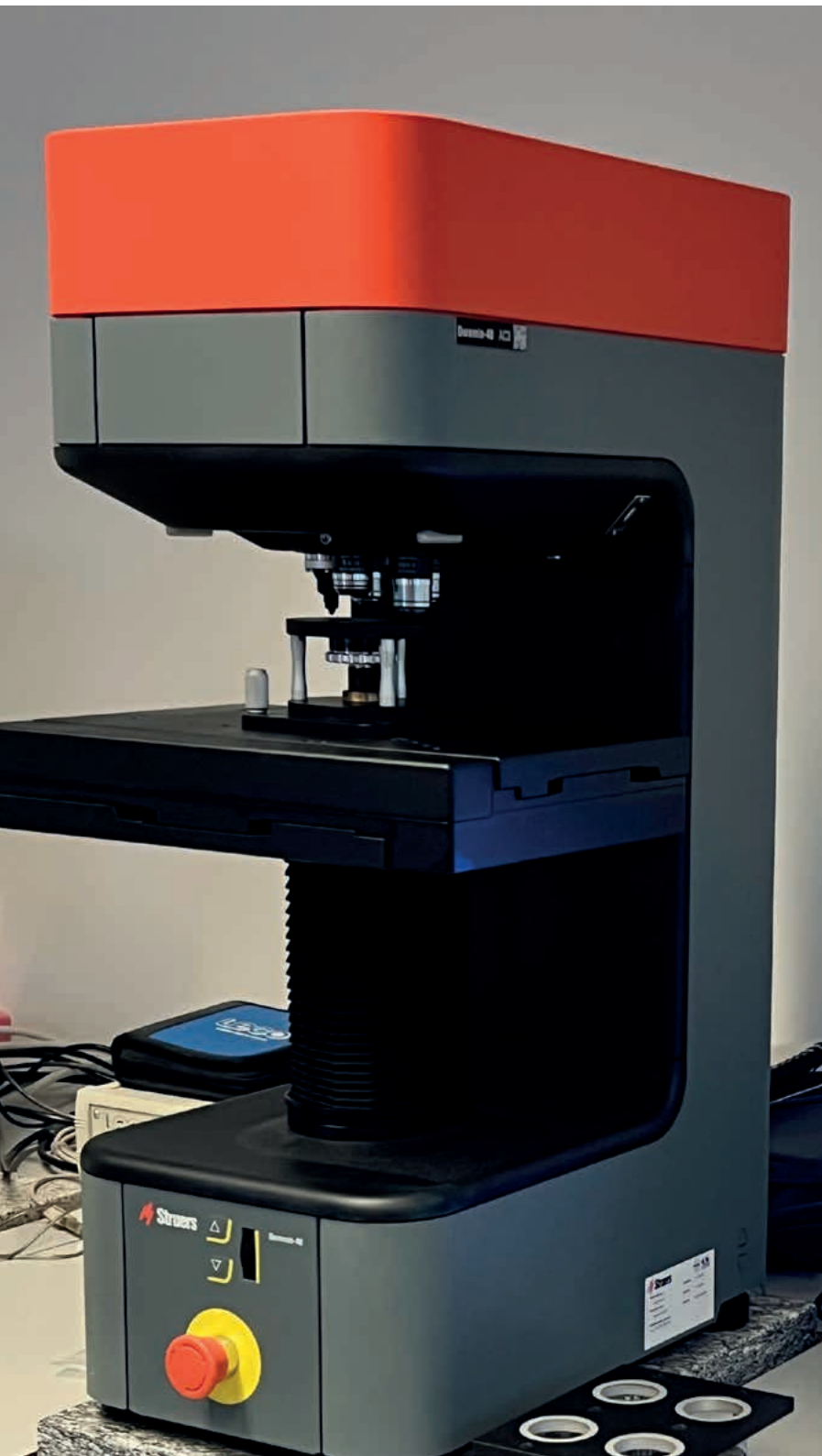
To properly verify the quality of the thermal spray coating, MAN Energy Solutions' technicians needed to perform Vickers micro- and macro hardness measurements within the coating and an interfacial bond strength test to ensure that the coating will not peel off during operation. To perform these tests, two machines were required – a micro-hardness tester and macro-hardness tester. After hardness testing, the specimen was moved to a microscope to measure the cracks formed at the Vickers macro indentations within the coating and at the interface.

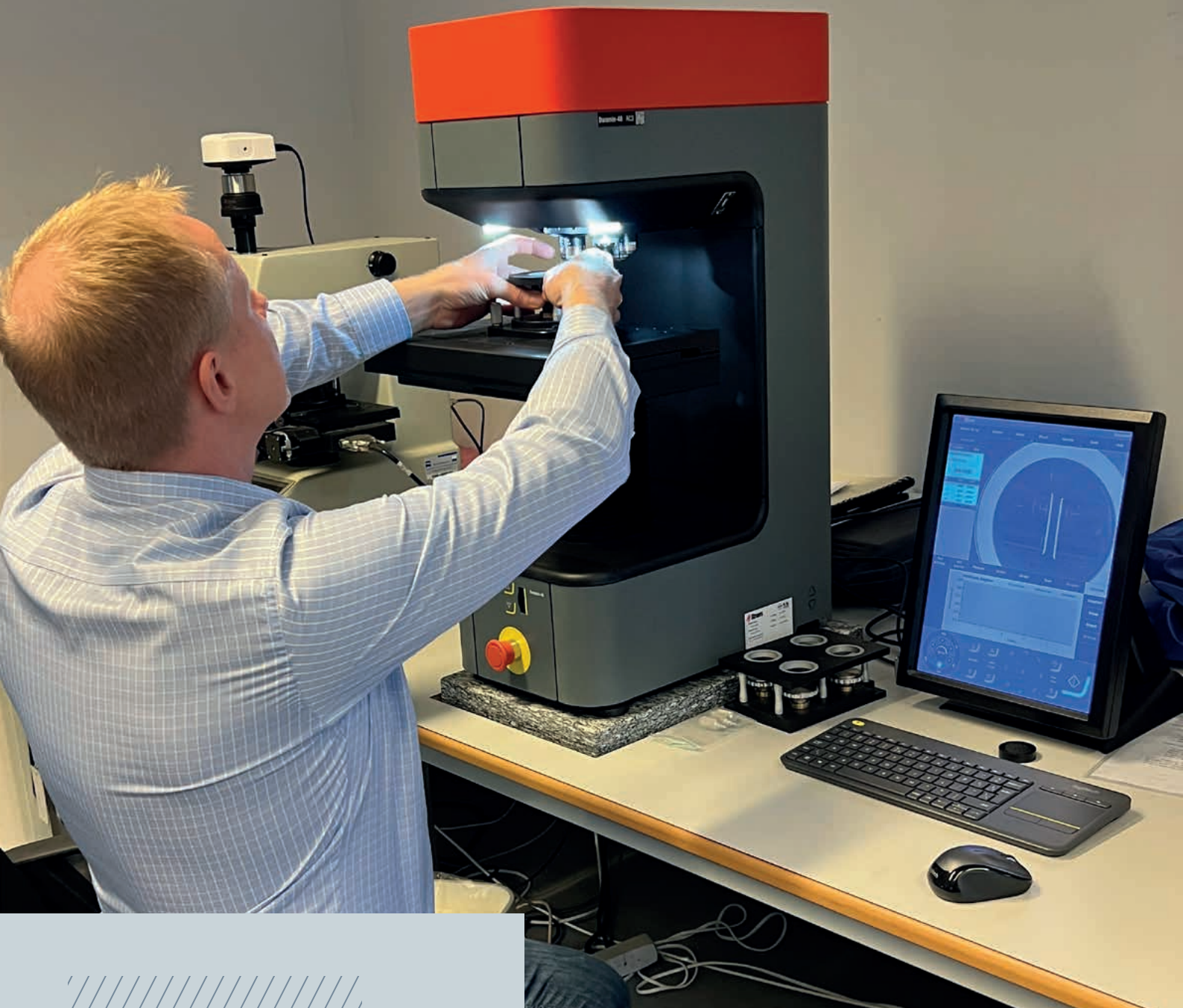
This procedure entailed that a lab technician had to unpack and reload the specimen between each step – using valuable time that the lab technician could use for other tasks. The team at MAN Energy Solutions is constantly working to improve efficiency – and they were looking to streamline the procedure. The solution was the Duramin-40 hardness tester, a fully automatic machine that can perform all three steps of the process.

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Jesper Vejlø Carstensen,
Senior Research Engineer, M.Sc., Ph.D.,
MAN Energy Solutions





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“With the Duramin-40, we can take before and after pictures easily, so we can see potential cracks before we start the tests – and analyze them more efficiently afterwards.”

Jesper Vejlø Carstensen,
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MAN Energy Solutions

A 3-step process on one machine

Duramin-40 can be used for Vickers, Knoop and Brinell hardness testing. It has a load range from 1.0 gf to 62.5 kg with an automatic XY-stage and inbuilt camera. With the optional dual monitor, you are able to view the measurement data and macro images side by side. This overview imaging results in precise measurement, making finding relevant test spots on the sample much easier. The MAN Energy Solutions team is now using the Duramin-40 for different applications that previously required three machines. This is saving time and improving efficiency, as Jesper Vejlø Carstensen, Principal Research Engineer at MAN Energy Solutions, explains.



“We went from three different machines to one. Before we used a micro and macro hardness tester, followed by a microscope. Now, in most cases, we only need to use the Duramin-40. This has significantly reduced time and increased efficiency in our testing process. Additionally, with the Duramin-40, we can take before and after pictures easily, so we can see potential cracks before we start the tests.

Spot potential cracks

This last point is extremely important. Through the use of before and after images, the team at MAN Energy Solutions can see potential cracks before they start the tests – so they are aware of any cracks in advance. After the test, they can then compare the before and after images, increasing the precision and efficiency of their analysis.

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“We have collaborated with Struers for many years. Struers service and support is an important factor in why we choose Struers again and again. All help and support are accessible when needed.”

Jesper Vejlø Carstensen,
Senior Research Engineer, M.Sc., Ph.D.,
MAN Energy Solutions