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Turbine Specs-At-A-Glance

The MONO CBA:
Howden releases new steam turbine

Howden launches new MONO CBA steam turbine

Latest turbomachinery features augmented reality enhancements, external bearings. By **DJ Slater**

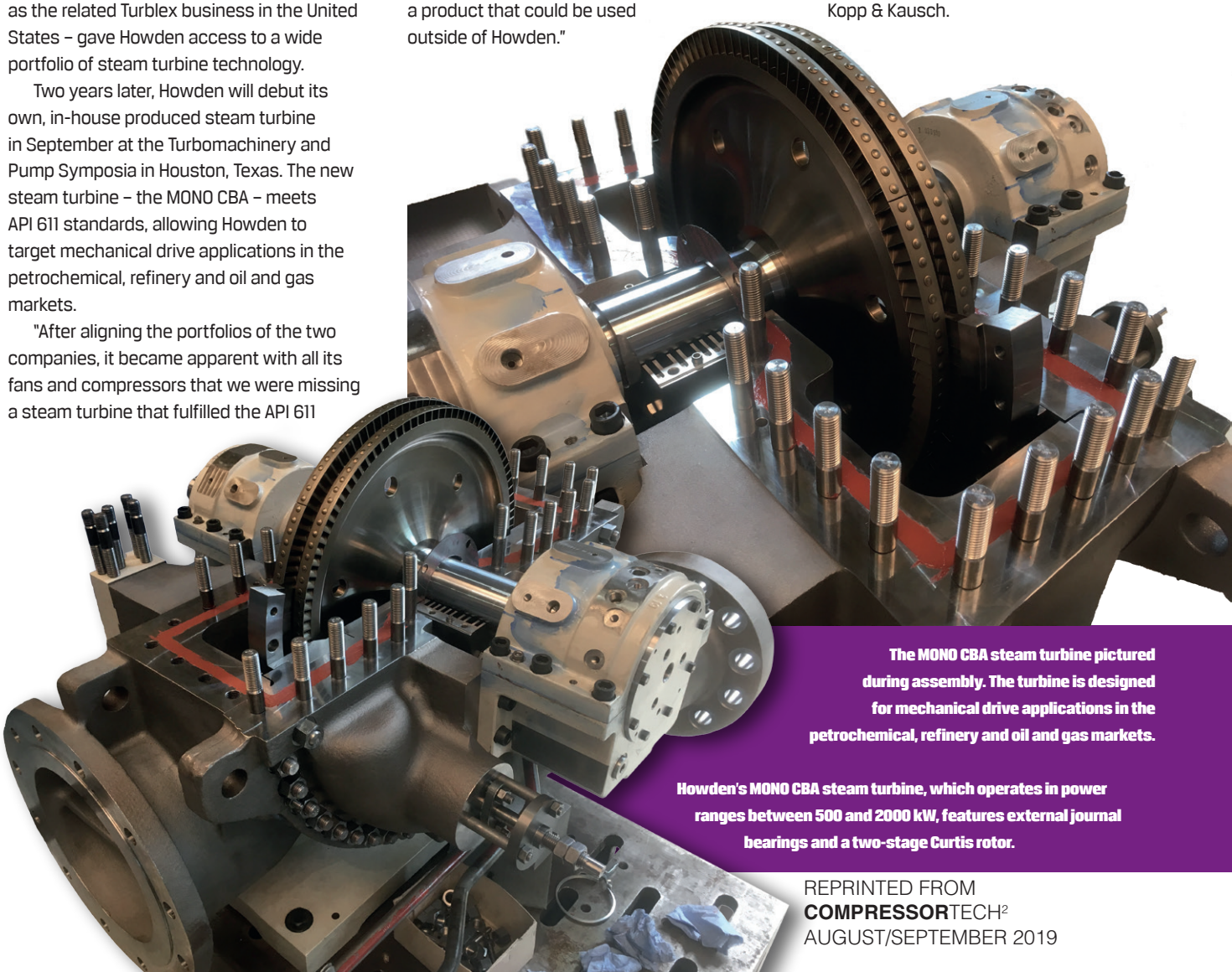
Howden got more than it expected when it acquired Siemens Turbomachinery Equipment business on Oct. 3, 2017. The move – which included the former Kühnle, Kopp & Kausch and HV-Turbo business in Europe and China, as well as the related Turblex business in the United States – gave Howden access to a wide portfolio of steam turbine technology.

Two years later, Howden will debut its own, in-house produced steam turbine in September at the Turbomachinery and Pump Symposia in Houston, Texas. The new steam turbine – the MONO CBA – meets API 611 standards, allowing Howden to target mechanical drive applications in the petrochemical, refinery and oil and gas markets.

"After aligning the portfolios of the two companies, it became apparent with all its fans and compressors that we were missing a steam turbine that fulfilled the API 611 requirement," said Volker Brakel, Howden's director of the steam turbines business. "We started to design the turbine with the idea to fulfill API 611 and to provide a drive solution to Howden compressors and fans. While developing it, it became apparent it was a product that could be used outside of Howden."

Adding to the product line

Before the acquisition, Howden's product range included compressors, fans, blowers and heaters, along with turbomachinery technology through its Roots, Donkin and ExVel brands. The company, however, did not have steam turbines in its repertoire. That changed post-acquisition, which gave Howden several turbomachinery brands, including Turblex, HV-Turbo and Kühnle, Kopp & Kausch.



The MONO CBA steam turbine pictured during assembly. The turbine is designed for mechanical drive applications in the petrochemical, refinery and oil and gas markets.

Howden's MONO CBA steam turbine, which operates in power ranges between 500 and 2000 kW, features external journal bearings and a two-stage Curtis rotor.

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Rotor blades milled from one solid piece.

The acquisition also gave Howden business sites in Springfield, Missouri; Frankenthal, Germany; Helsingoer, Denmark; Mornago, Italy; and Beijing, China. The Springfield location, along with the Turblex brand, came from Siemens Energy, said Matthias Schleer, director of research and development and technology, Howden Turbo.

A detail view on the two-stage Curtis rotor showing the inter-stage return vanes.

Keeping the steam turbine technology in house didn't last long for Howden. While the company planned to use the MONO CBA for its own compressors and fans, other manufacturers took notice and wanted the new steam turbine for their own mechanical drive applications, Brakel said.

"Our target now is to spread our product across the mechanical drive industry as well as related industries," he said.

A closer look

The MONO CBA (Curtis impeller between Bearings Axial flow) steam turbine features a two-stage Curtis rotor, which is a one-piece bladed design that fits securely on the shaft. The rotor has interstage guide vanes, a second blade row and titanium-shrouded blade tips.

These features allow the steam turbine to outperform single-stage technologies while operating at speeds up to 6000 rpm; the MONO CBA can reach speeds as high as 9000 rpm, Schleer said.

The new steam turbine, which operates in power ranges between 500 and 2000 kW, has a live steam pressure of 769 psia (53 bara), an exhaust steam pressure range of 14.5 to 145 psia (1 to 10 bara) and a live steam temperature of 824°F (440°C). Its also has up to 2682 hp (2000 kW) of coupling power.

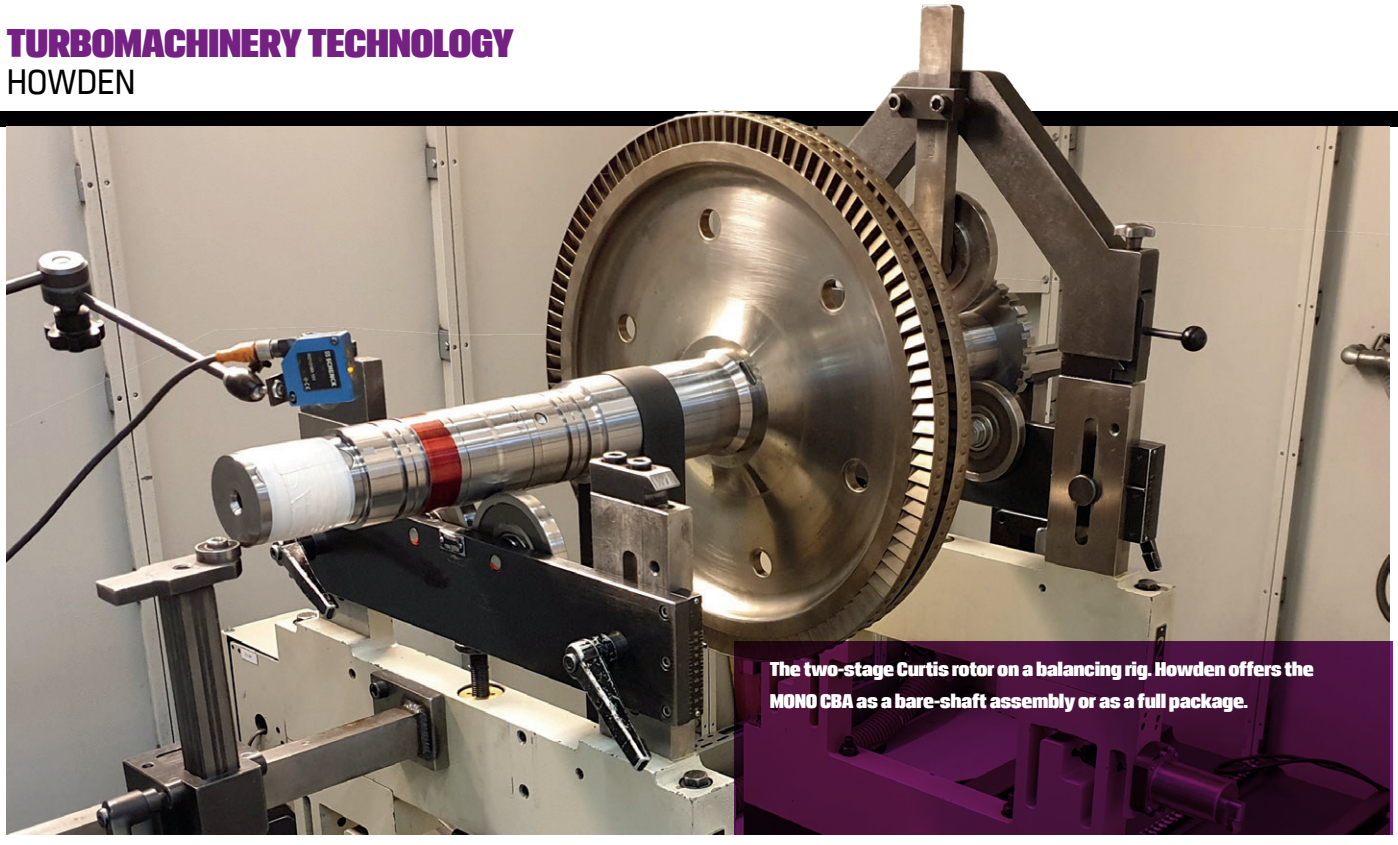
Another noteworthy attribute of the MONO CBA is its journal bearings, which are installed externally on the turbine.

"The outstanding feature is the bearings are on either side of the turbine," Schleer said. "The bearings can be arranged with a protection system with several configurations."

While the hardware of the MONO CBA consists of performance enhancements, another aspect gives end users more control and insight over the steam turbine. Earlier this year, Microsoft introduced HoloLens2 at MWC Barcelona. HoloLens2 is a wearable headset that projects holographic visuals for the user to interact with. Users can use it to pull up 3D instructions while working on a piece of equipment or cast an interactive holographic image that can be manipulated in their workspace.

Data streams

Howden has worked with Microsoft to incorporate this technology into its data-driven advantage (DDA) strategy. The turbine has internal sensors that send



The two-stage Curtis rotor on a balancing rig. Howden offers the MONO CBA as a bare-shaft assembly or as a full package.

out data, which can be accessed through the MONO CBA's control system (as part of Howden's full-package option) or any device that has access to Microsoft's cloud-based service, Schleer said.

"This provides a new kind of service for the customers," Schleer said. "They can see the operating data and interact with it in real time."

Using HoloLens 2 and PTC's Vuforia software, users can superimpose instruction manuals on the steam turbine during maintenance or pull up a 3D segment of the turbine to use as a guide when making adjustments. The technology also allows users to grab, rotate and resize the holograms to see all the finer details clearly in real time.

Howden offers the MONO CBA as a bare-shaft assembly (turbine rotor, casing, bearings) or as a full package, which includes the turbine outfitted with gear and oil lubrication system – meeting API677 and API614 standards – trip and control valves; a turbine control panel; and surveillance systems. Optional additions of the full-package variation include bearing temperature sensors, shaft vibration and position probes. End users can request 2oo3 configuration as well as a test run at Howden's Frankenthal steam test center in Germany.

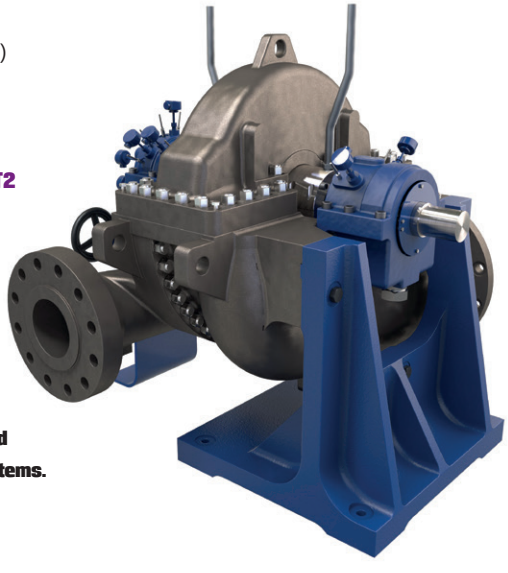
"Big brother" on the horizon

While Howden owns a variety of steam turbines, the MONO CBA stands in its own category as a smaller-scale steam turbine. Including the MONO CBA, Howden has seven steam turbines in its portfolio that have a power range up to 24 MW. The MONO CBA, however, will not be alone for too long.

The company plans to extend this steam turbine model range by adding a "big brother" in 2020, Brakel said. That turbine will have a power range up to 3.5 to 4 MW, meet the API 611 standard and be designated for mechanical drive applications.

"This is all part of our strategy," Schleer said. "We wanted to have a more diverse product range and play in different markets. Our existing turbines (prior to the MONO CBA) have been mainly used in power plants, but not in petrochemical applications. We'll soon have two that can work in those industries." **CT2**

Howden's MONO CBA steam turbine meets API 611 standards.



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