TAKING THE NEXT STEP IN COMPRESSION WITH THE STC-SVM

BY MICHAEL SCHULZ

When Siemens Energy was formally established in 2020, it brought together two of the most successful turbocompressor lines under one entity: the DATUM line (of Dresser-Rand, which was acquired by Siemens in 2015) and the STC single-shaft platform. Both designs have a long and successful history in the oil and gas industry, with thousands of project references across the upstream, midstream, and downstream sectors.

In 2021, Siemens Energy merged these two technologies to form a state-of-the-art compressor platform called the STC-SVm. The STC-SVm brings together the best attributes of the DATUM and STC compressor products and represents the next generation of industrial inline compressors. It is applicable to all major industrial markets, including those with case ratings up to 5076 psig (350 barg) and temperature levels down to −58°F (−50°C).

STC-SVM DESIGN OVERVIEW

A key design attribute of the STC-SVm is its fully modular cartridge, which can easily be swapped out with a spare cartridge if the existing unit must be taken out of service. The cartridge includes the rotor, stationaries, heads, housings, bearings, and seals. Operators requiring full assurance of availability can choose to have a fully tested modular cartridge installed in a purged container and stored on-site for instant backup through cartridge exchange.

Proven in the DATUM line, the modular cartridge concept provides for minimal downtime. The process for removing the existing cartridge, installing the new cartridge, and connecting all remaining auxiliaries typically can be performed in a matter of hours. An advanced roller and cradle design ensures smooth insertion and centering of the cartridge into the outer casing.

Other key features of the STC-SVm include optimized impeller designs, which contribute to higher efficiency and lower power consumption. Each impeller can be removed for fast service and reduced downtime. Additionally, the arrangement of stationary seals, based on the STC line, ensures optimized leakage control. Duct resonator arrays provide noise attenuation. Rotordynamics are further enhanced with damper seals and swirl brakes.

Last but not least, to comply with future regulations and general emissions targets, the STC-SVm features Siemens Energy's dry gas seal (DGS) system, which minimizes leakage.

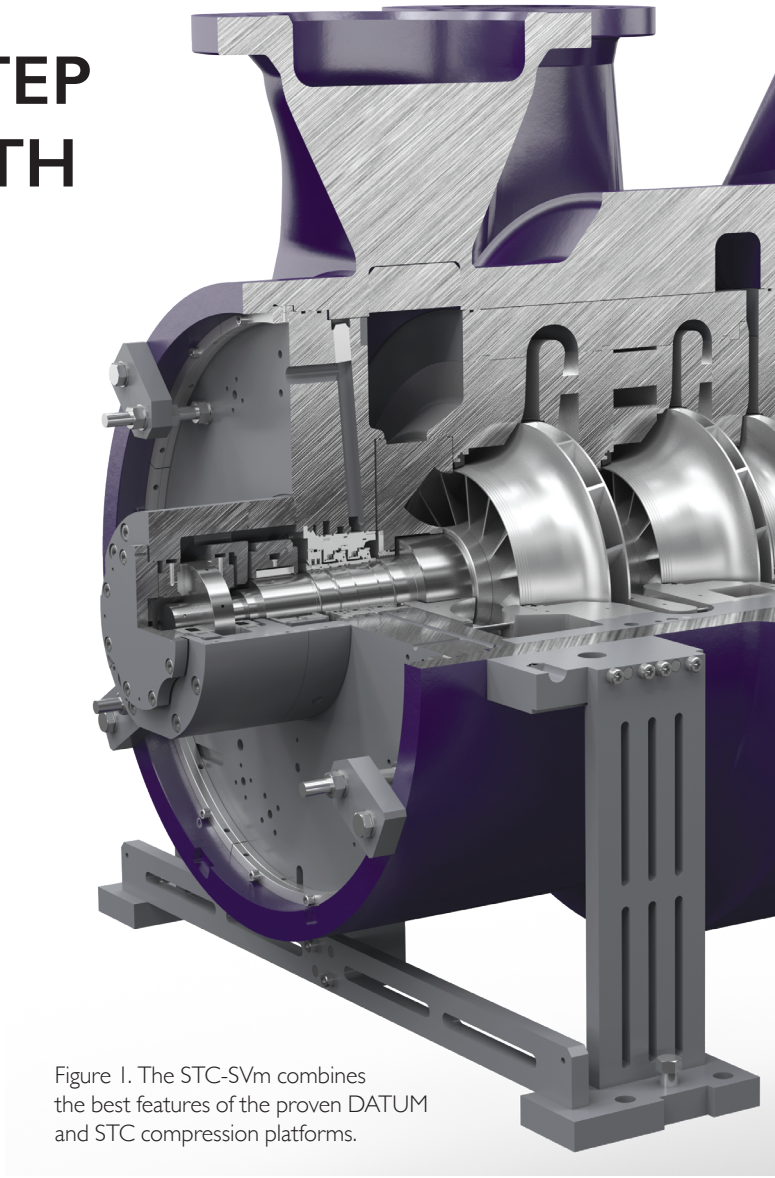


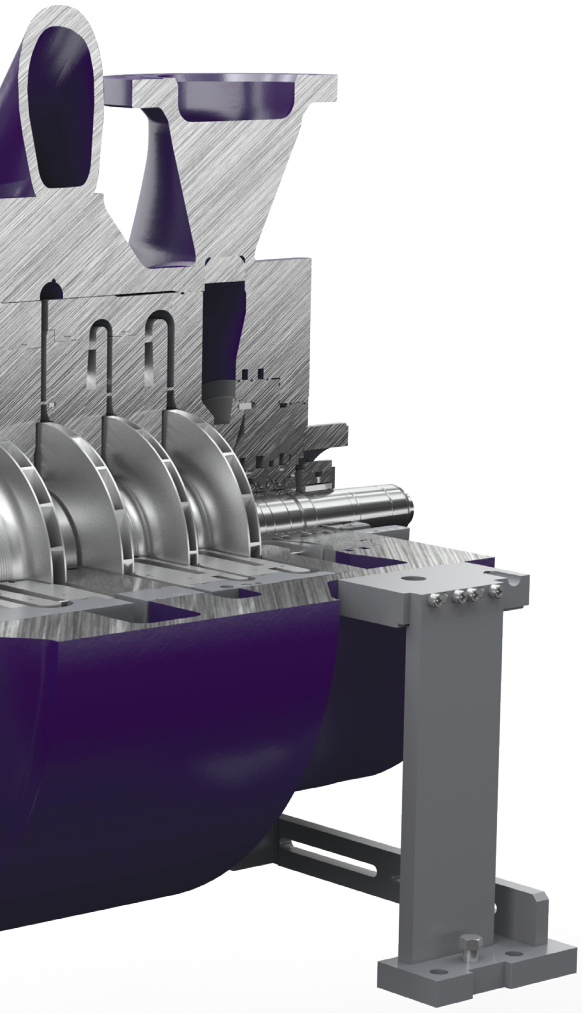
Figure 1. The STC-SVm combines the best features of the proven DATUM and STC compression platforms.

BORN DIGITAL

Digitalization is leveraged in the earliest phases of the STC-SVm compressor design to support product optimization and avoid the risk of nonconformity. In addition, every compressor can be equipped with built-in digital capabilities, giving customers the opportunity to leverage remote diagnostic services and digitally enabled field services.

Remote diagnostic services enable real-time monitoring of the compressor's performance and condition, including vibration levels, temperature, pressure, flow, etc. With the help of data analytics, any anomalies and/or signs of impending failures can be detected and addressed promptly, facilitating predictive maintenance.

Digitally enabled field services can further reduce downtime. Field service engineers can access real-time data and diagnostic information remotely, providing expert guidance and support to on-site technicians. This digital collaboration ensures that maintenance and repair activities are executed efficiently, with access to up-to-date technical documentation, troubleshooting guides, and remote assistance.



HYDROGEN-READY

Finally, the STC-SVm platform has been designed to match future technology development, which, among other applications, explicitly applies to the emerging market of hydrogen compression.

For hydrogen compression, reciprocating compressors apply for small inlet flows at high-pressure ratios. However, as inlet flow increases, the footprint needed for the reciprocating compressor package(s) grows accordingly, which negatively impacts economics.

Turbocompressors represent a more efficient option in medium- and high-flow compression applications. They work by increasing the kinetic energy of the gas, which is then converted to pressure through the stationary diffuser. But, because of the physics of hydrogen and its low molecular weight, a high amount of specific work is required to achieve meaningful pressure ratios per compression stage. One way to accomplish this is to increase circumferential speed at the impeller discharge, as described by the Euler equation of turbocompressors. In such cases, the mechanical strength limits of the impeller materials can become a constraint and need to be considered during design.

With the STC-SVm platform, impeller tip speed limits have been increased by approximately 50% relative to products of similar compression capability, without compromising material limits as specified in API 617. This allows for a compact design with fewer stages and casings than typically would be required for equivalent hydrogen compression duties. Proven bearing and DGS technology enables the related increase in train speed.

DEMAND FOR THE STC-SVM

Recently, Siemens Energy has received several orders for the STC-SVm in North America and the Middle East, including for sales, feed gas, and propane compression in liquefied natural gas (LNG), and midstream and upstream onshore markets. Operators see the benefits of the design improvements, and, anticipating growth of the hydrogen economy, have made a commitment to the latest improvements in compression turbomachinery.

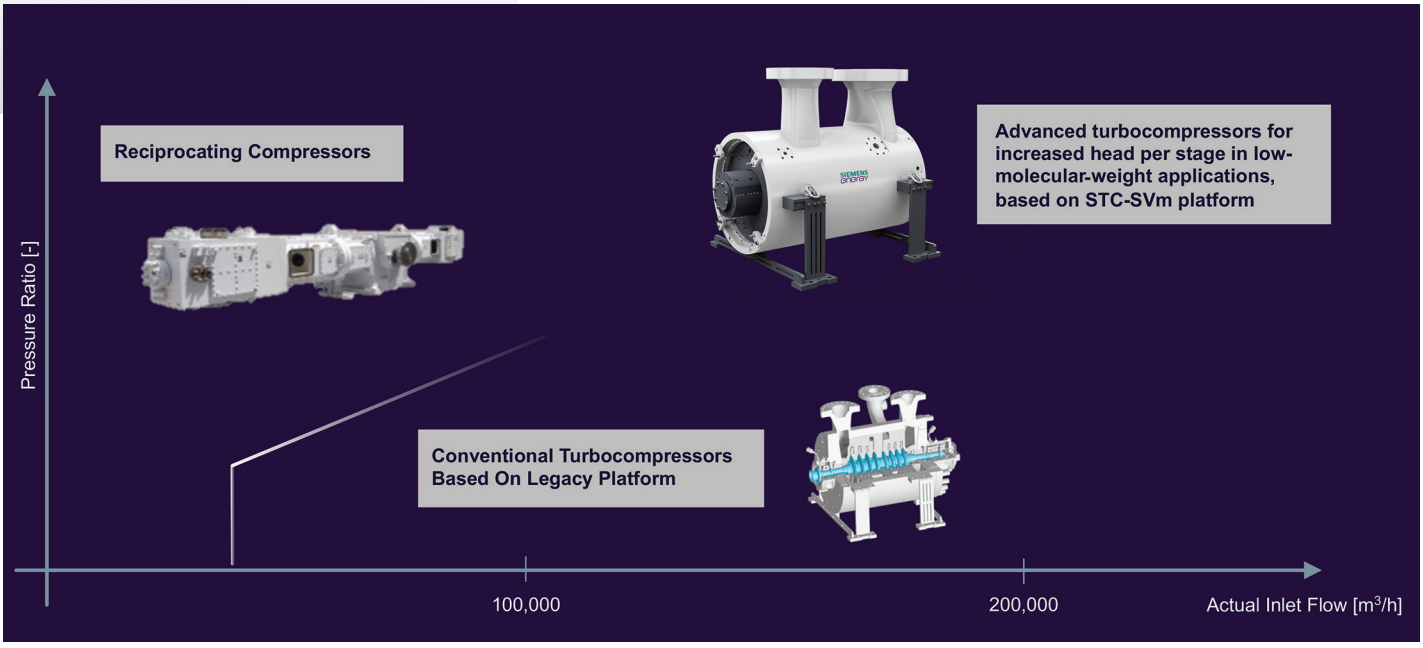


Figure 2. With high rotational speeds, the STC-SVm is optimized for hydrogen operation.

ABOUT THE AUTHOR

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