Greene Tweed Achieves Hydrogen Compression Breakthrough with Record-Speed Composite Impeller

Advanced design reduces costs, boosts efficiency, and sets an industry benchmark for hydrogen pipelines

LANSDALE, PA, UNITED STATES, December 11, 2025 /EINPresswire.com/ -- Greene Tweed, a global leader in advanced materials and high-performance solutions, has achieved a significant advancement in hydrogen compression technology. The company's newly engineered composite closed impeller set a record-breaking tip speed of 688 m/s in testing – nearly double that of traditional metallic impellers. The innovation highlights the potential of advanced composite materials to enhance performance, reduce costs, and improve efficiency in critical hydrogen pipeline infrastructure, specifically the transportation, storage and utilization market segments.

Transporting hydrogen through pipelines requires large centrifugal compressors to maintain pressure. Conventional metallic impellers typically operate at speeds of up to 360 m/s for closed designs and 500 m/s for open designs before burst, limiting the achievable compression ratio for lighter gases and thus requiring more compressor stages, increasing the system size, cost, and maintenance requirements. With Europe planning tens of thousands of kilometers of hydrogen pipelines by 2040, the demand for faster, more durable, and cost-effective compressor technology is surging.

"Greene Tweed began developing its composite closed impeller in 2020, leveraging the high specific strength and temperature resistance of carbon fiber reinforced PEEK (C/PEEK). Our goal was to create a design that could exceed 600 m/s tip speed for compressing light gases like hydrogen," said Samuel Stutz, Technology Manager at Greene Tweed. "After three rigorous development and testing cycles, the impeller achieved a tip speed of 688 m/s, far exceeding the project's original target and setting a new industry benchmark."

Greene Tweed's composite closed impeller design offers several key advantages. It is remarkably lightweight – up to five times lighter than conventional metallic impellers – while offering three times the strength-to-weight ratio. This design also boosts efficiency, as higher operational speeds improve hydrogen compression, supporting global clean energy goals.

"We aim to revolutionize hydrogen infrastructure by breaking past the limitations of metals," said Magen Buterbaugh, Greene Tweed President and CEO. "By delivering solutions that cut costs,

simplify operations, and drive scalability, Greene Tweed is setting a new standard for the industry. We are now collaborating with centrifugal compressor OEMs to bring this technology to real-world applications."

As hydrogen infrastructure rapidly grows to meet global energy demands, Greene Tweed's composite impeller positions the company at the forefront of clean energy innovation.

About Greene Tweed

Greene Tweed is a leading global manufacturer of high-performance thermoplastics, composites, seals, and engineered components. For 160 years, we have served clients in semiconductor, oil and gas, aerospace, defense, chemical and pharmaceutical processing, and other industries where failure is not an option. Greene Tweed products are sold and distributed worldwide. For additional information, call +1.215.256.9521, or visit our website at https://www.gtweed.com/.

Sofia Doss
Greene Tweed
sdoss@gtweed.com
