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Distributing and refueling hydrogen more economically

Manuela Kessler | 01.06.2022 | Lohr am Main | PI 020/22

Maximator Hydrogen and Bosch Rexroth are promoting the use of hydrogen by developing a cost-effective compressor

- High-efficiency H2 compression could potentially halve total costs for operators
- More economical distribution cuts prices at the filling station
- Easier maintenance due to automatic seal change



The container-based H2-compressor MAX Compression 2.0 with digitalized hydraulics from Bosch Rexroth reduces distribution costs for passenger cars, as well as commercial and rail vehicles. (Image source: Bosch Rexroth AG)

Maximator Hydrogen, Maximator Advanced Technologies and Bosch Rexroth have jointly developed a solution for efficient compression of hydrogen for filling stations, storage facilities and pipelines. Both companies are thus making an important contribution toward economic use of green hydrogen in passenger cars, as well as commercial and rail vehicles. Maximator Hydrogen's new MAX Compression 2.0 compressor could potentially halve the total costs to date for operators. Bosch Rexroth is delivering a scalable, low-maintenance system solution for the energy-efficient drive of the compressor and the automatic seal change. Maximator Hydrogen is planning 4,000 new H2 filling stations worldwide by 2030. The market launch is planned for the first half of 2023.

The new, jointly developed solution allows hydrogen to be filled directly from the storage tank for use in fuel cells or combustion engines, i.e., without intermediate storage at high pressure. This increases cost-efficiency of H2 filling stations and reduces the required investment costs. Furthermore, MAX Compression 2.0 can also expand, if necessary. Scalable drive units from 75 to 250 KW provide an economical option for operators to enter the sector, allowing them to expand compressor capacity at a later date.

The public transport provider Wiener Linien will be a pilot customer. The Austrian metropolis aims at being climate-neutral by 2040. City buses are to run exclusively on green hydrogen by

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2030. The associated CO₂ savings potential amounts to around 290 tons per year for around 1,000 vehicles each travelling a distance of 400 km per day.

Bosch Rexroth is a close development partner and system supplier for the energy-efficient MAX Compression 2.0 compressor drive. The main components of the complete solution: an electrohydraulic drive solution for demand-based power control, two customized drive cylinder units, as well as the power electronics and digital control technology including software.

Thanks to the vertical arrangement of the pistons and precise digital monitoring, the new solution not only operates more quietly, but also at significantly higher frequencies. The highly accurate process control system ensures that the piston movement uses the maximum compression space, resulting in higher efficiency. Compared to its predecessor, the MAX Compression 2.0 achieves up to five times the output in the same space.

Maximator Hydrogen also succeeded in reducing the operating and maintenance costs within the development partnership. One of the main factors here is the Automatic Seal Exchange System (ASX), which was optimized together with Bosch Rexroth. The mechanism, which is hydraulically driven as a secondary function, enables automatic replacement of the piston seals, which must be replaced at regular intervals because they are subject to increased wear due to contact with hydrogen. The ASX eliminates this frequent and cost-intensive process with the help of an easy-to-change seal magazine, thus allowing almost uninterrupted operation.

“The development partnership with Bosch Rexroth enabled us to raise the efficiency of our novel seal solution to a whole new level,” noted Mathias Kurras, Managing Director of Maximator Hydrogen GmbH. “With delivery from a single source, we benefit from efficient production with fewer interfaces. The multi-technological approach, the high quality of the components, and the modern digital process control system contribute significantly to the future success of the solution.

“We are pleased to be able to contribute to this forward-looking project with our complete package and to further advance hydrogen technology together,” said Guido Hettwer, Senior Vice President Business Unit Industrial Hydraulics, Bosch Rexroth AG.

Maximator Hydrogen ranks among the global technology leaders for hydrogen compression and offers complete H₂ filling stations including storage, compressor and fuel pump. In addition to mineral oil companies and consortia from various sectors, the customer base also includes municipalities and large logistics companies, as well as food chains and municipal utilities.

Basic Information Bosch Rexroth

As one of the world’s leading suppliers of drive and control technologies, Bosch Rexroth ensures efficient, powerful and safe movement in machines and systems of any size. The company bundles global application experience in the market segments of Mobile Applications, Machinery Applications and Engineering, and Factory Automation. With its intelligent components, customized system solutions and services, Bosch Rexroth is creating the necessary environment for fully connected applications. Bosch Rexroth offers its customers hydraulics, electric drive and control technology, gear technology and linear motion and assembly technology, including

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software and interfaces to the Internet of Things. With locations in over 80 countries, more than 31,000 associates generated sales revenue of around 6.2 billion euros in 2021.

Basic Information Bosch

The Bosch Group is a leading global supplier of technology and services. It employs roughly 402,600 associates worldwide (as of December 31, 2021). The company generated sales of 78.7 billion euros in 2021. Its operations are divided into four business sectors: Mobility Solutions, Industrial Technology, Consumer Goods, and Energy and Building Technology. As a leading IoT provider, Bosch offers innovative solutions for smart homes, Industry 4.0, and connected mobility. Bosch is pursuing a vision of mobility that is sustainable, safe, and exciting. It uses its expertise in sensor technology, software, and services, as well as its own IoT cloud, to offer its customers connected, cross-domain solutions from a single source. The Bosch Group's strategic objective is to facilitate connected living with products and solutions that either contain artificial intelligence (AI) or have been developed or manufactured with its help. Bosch improves quality of life worldwide with products and services that are innovative and spark enthusiasm. In short, Bosch creates technology that is "Invented for life." The Bosch Group comprises Robert Bosch GmbH and its roughly 440 subsidiary and regional companies in some 60 countries. Including sales and service partners, Bosch's global manufacturing, engineering, and sales network covers nearly every country in the world. With its more than 400 locations worldwide, the Bosch Group has been carbon neutral since the first quarter of 2020. The basis for the company's future growth is its innovative strength. At 128 locations across the globe, Bosch employs some 76,100 associates in research and development, of which more than 38,000 are software engineers.

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