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Press Release

Ready for the mass market: Schaeffler presents formed strain wave gearboxes for humanoid robots

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- Schaeffler's strain wave gearboxes meet the highest demands for precision, stiffness, and compactness in humanoid robot joints and make humanoids ready for the mass market
- Innovative forming technology lowers the cost of manufacturing strain wave gearboxes by more than 25 percent and reduces material consumption by more than 75 percent
- Rollout of mass manufacturing of formed strain wave gearboxes to numerous humanoid manufacturers around the world is slated for 2027

Motion Technology Company Schaeffler is expanding its humanoid robotics product portfolio and bringing formed strain wave gearboxes to market. Strain wave gearboxes are key components in actuators which make up around half of the total costs of manufacturing a humanoid. Strain wave gearboxes can transmit movements precisely and with a high torque capacity and a high gear reduction ratio in extremely compact spaces and offer high accuracy and stiffness. They thus satisfy the central requirements of humanoid robot joints. The manufacturing method currently established in the market for strain wave gearboxes is precision machining. However, it is time-consuming and capital-intensive and could turn into a major bottleneck in the scaling of humanoid robots in coming years. Using an innovative forming technology, Schaeffler now offers a manufacturing method for the strain wave gearbox with a whole new level of efficiency: with manufacturing steps for key components that can be completed in seconds instead of minutes, it paves the way for the scaling of humanoid robot component manufacturing to high volumes. At the same time, it cuts manufacturing costs by more than 25 percent and material consumption by more than 75 percent.

Schaeffler has successfully concluded the extensive validation testing of the formed strain wave gearboxes and thereby laid the foundations for the start of mass manufacturing in 2027. Production will start in Germany and successively be rolled out to other regions. Schaeffler has been accumulating know-how in the manufacturing of strain wave gearboxes for the automotive sector using forming for many years. The company has already supplied more than 2 million formed strain wave gearboxes to all major markets in the world in this sector in the last ten years. Now Schaeffler has successfully transferred this manufacturing expertise to the global growth field of humanoid robotics.

David Kehr, President of Humanoid Robotics at Schaeffler, says: “Schaeffler will take a leading role in the market for humanoid robots. We deploy humanoids along our entire global value chain and therefore have first-hand knowledge of the requirements of this technology and can develop key components based on our know-how. Using this knowledge in combination with our decades of manufacturing experience and our automotive DNA, we can create solutions geared toward quality, economy, and scalability. The formed strain wave gearbox is another example of how we are readying key robot components for industrial high-volume mass manufacturing.”

Innovative forming technology for strain wave gearboxes

Schaeffler has developed a novel forming process for humanoid robot strain wave gearboxes based on its innovative manufacturing technologies. Unlike conventional machining, in which high-precision gear geometries are created through material removal, this forming process gets the component into the desired geometrical shape in seconds through the use of high pressing forces. The formed strain wave gearboxes achieve comparable torques and efficiencies to those achieved by conventionally manufactured components. The method offers a high dimensional accuracy, reduces material consumption, and at the same time improves process stability. With this, Schaeffler has created a manufacturing approach that unites precision, efficiency, and industrial scalability and forms the technological basis for the provision of these key components with a high quality level and considerably improved manufacturing efficiency.

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Schaeffler Group – We pioneer motion: The Schaeffler Group has been driving forward groundbreaking inventions and developments in the field of motion technology for 80 years. With innovative technologies, products, and services for electric mobility, chassis solutions, and renewable energies, the company is a reliable partner for making motion more efficient, intelligent, and sustainable – over the entire life cycle. Schaeffler describes its comprehensive range of products and services by means of eight product families: from bearing solutions and all types of linear guidance systems through to repair and monitoring services. With around 110,000 employees and more than 250 locations in 55 countries, Schaeffler is one of the world’s largest family-owned companies and ranks among Germany’s most innovative organizations.

The formed strain wave gearboxes from Schaeffler were developed especially for humanoid robots and transmit movements precisely and with a high torque capacity and a high gear reduction ratio in an extremely compact space. (Image: Schaeffler)

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Schaeffler develops and supplies key components for the scaling of humanoid robots. (Image: Schaeffler)

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