

Harmonic Drive Precision Gearboxes: -- Markets Reach \$3.5 Billion By 2024

LEXINGTON, Massachusetts (December 7, 2017) – WinterGreen Research announces that it has published a new study Harmonic Drive Precision Strain Wave Reducer Gearboxes and RV and RD Reducers: Market Shares, Strategy, and Forecasts, Worldwide, 2018 to 2024. The 2018 study has 230 pages, 141 tables and figures. The leading vendors in the harmonic drive industry have invested in high-quality technology and processes to develop leading edge reducer strain relief gearbox capability.

Harmonic drive market driving forces relate primarily to the implementation of speed reduction capability for robots and wind turbines initially, providing industrial controls that are compelling.

The harmonic drive is used in situations where smooth, efficient gear operation is needed. Initial applications are in robotics, aerospace and solar tracking, the materials used in these applications can wear and break if the gearing in a motor is rough. Harmonic gear vendors offer a unique gear tooth profile that optimizes the tooth engagement.

Revenue for harmonic drives was \$838 million in 2017, and products are expected to generate revenue of \$3.517 billion by 2024. Strong growth is the result of increasing use in industrial robots as they become integrated and able to perform multiple functions sequentially in an automated manner. Harmonic drive reduction gearboxes are presented many new market opportunities from multiple types of applications. The VNTOL aircraft uses the drive reduction to enable vertical takeoff. This lifts off like a helicopter and flies like an airplane.

Demanding applications for the gear box include surgical robots. By application category, there was a substantial year-on-year increase in sales for industrial robots used on production lines for smartphones, tablet devices, household appliances, automobiles, and other products.



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Sales for semiconductor manufacturing equipment increased due to rising capital investment against a backdrop of increasing demand for industrial equipment, automotive devices, and devices for data centers, among other factors. Sales for flat panel display manufacturing equipment increased due to high levels of investment to expand production capacity for LCD and organic EL panels.

Semiconductor liquid crystal production equipment, photovoltaic equipment, optical instruments, precision machine tools and other cutting-edge areas provide target applications.

Japan manufactures reliable performance precision gears. Reliable performance of precision gear reducer manufacturing is not yet occurring at scale elsewhere, particularly in China. China with its huge investments in industrial robots would really like to be able to scale manufacture of harmonic drive precision strain wave reducer gearboxes. They cannot yet.

The market has just begun. Early adopters are the robot manufacturers. Suppliers of the precision gears are Japanese companies. They address markets for industrial robots. While the Chinese would like to be the primary suppliers of Harmonic Drive Precision Strain Wave Reducer Gearboxes, it has not happened yet.

Harmonic gear reducers are used in aviation, aerospace, energy, navigation, shipbuilding, bionic machinery, commonly used ordnance, machine tools, instruments, electronic equipment, mining and metallurgy, transportation, lifting machinery, petrochemical machinery, textile machinery, agricultural machinery and medical Instruments.

Japan's a precision reducer is used in industrial robots and airplane engines, wind turbines and for solar trackers.

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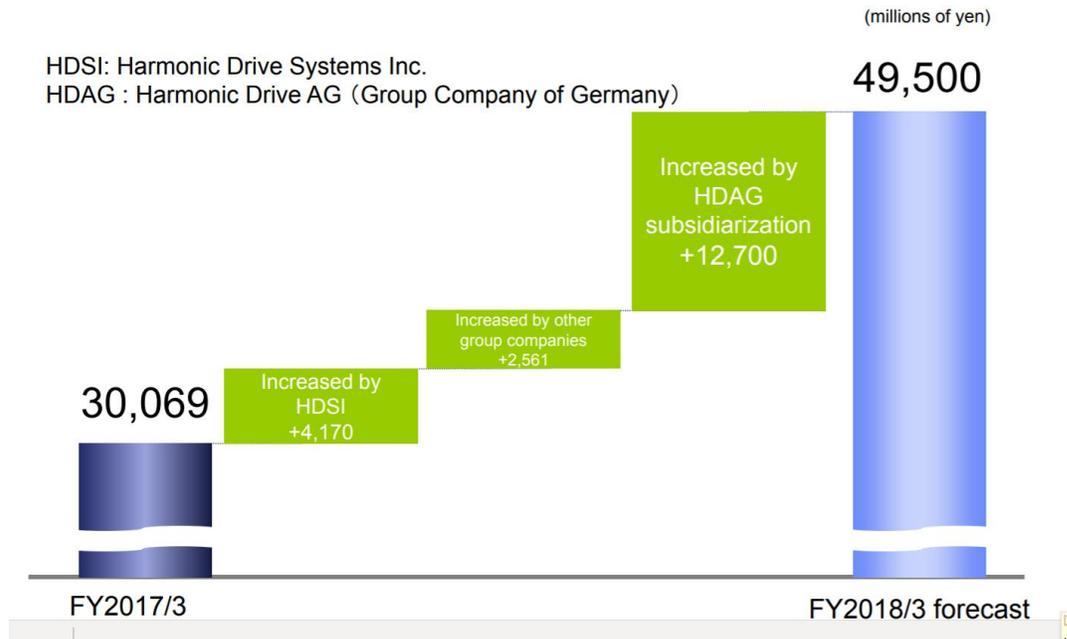
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Harmonic Drive Revenue Forecast



Source: Harmonic Drive.

These numbers look realistic, and even stronger growth thereafter is forecast by WinterGreen Research. Growth has been lackluster thus far; the situation is expected to shift favorably for the company.

According to Susan Eustis, leader of the team that prepared the research, “Harmonic drive precision gearing is known for zero backlash, high torque, compact size, and excellent positional accuracy. Harmonic drive reduction gears are mechanical, they are used as speed changing devices. Harmonic drive gearboxes have of a thin ring that provides elastically as it rolls on the inside of a slightly larger rigid circular ring.



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“Harmonic gear boxes consist of a circular spline, flex spline, and wave generator. The flex spline component produces a repeated vibration, stimulated by the wave generator. A harmonic gear is a strain wave gear. It is characterized by the ability to transmit motion through sealed walls. Operation of harmonic gears is based on the thin-walled flexible cup with external splines on its lip, placed inside a circular thick walled rigid ring machined with internal splines.

“High gear ratios, light weight, reconfigurable ratios within a standard housing, good resolution, and repeatability are features of the devices. Devices work when repositioning internal loads, they have high torque capability, coaxial input, and coaxial output.”

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