

Press Release

1 MAR 2021 – for immediate release

MHI Machine Tool Develops Gear Shaping Machine for High-Precision Small-Module Gears Used in Robots

-- Simultaneously Developed Dedicated Cutting Tool Enables One-Stop Support in Gear Cutting Machines and Cutting Tools --

- New addition to the “FR Series” introduced last August is even more advanced, raising gear cutting precision through adoption of direct-drive motors
- Machine launch from March 2021, together with dedicated tool for small-module gear cutting



High Precision Gear Shaping Machine SE25 FR Plus

Tokyo, March 1, 2021 – Mitsubishi Heavy Industries Machine Tool Co., Ltd., a Shiga-based part of Mitsubishi Heavy Industries, Ltd. (MHI) Group, has newly developed the "SE25FR Plus," a gear shaping machine dedicated to making high-precision small-module (Note 1) gears used in robots. The company has simultaneously developed a small-module cutting tool specifically for the new gear shaping machine. Full-fledged marketing of both new items will commence in

March. By providing this dual support in high-precision gear cutting machines and cutting tools from a single source, MHI Machine Tool looks to respond to the need for reduction gears of increasingly higher precision in the expanding global robot market.

MHI Machine Tool launched its "FR Series" (Note 2) of high-precision gear cutting machines in August 2020. The new SE25FR Plus is a high-end model developed especially for shaping strain wave gears (Note 3), which require high precision. Outstanding rotation precision has been achieved through the adoption of ultra-high-precision bearings and direct-drive motors (Note 4) in the two core components: the work table and the cutter head. This provides gear cutting precision of ISO class 3, enabling cutting precision higher than the model SE25FR, which is of ISO class 6.

The small-module cutting tool to be launched together with the SE25FR Plus features a newly developed dedicated tool material and a special coating, "MightyShield μ " for micromachining. The tool material incorporates carbide particles offering improved toughness and wear resistance, while the new coating produces a uniform thin film below 2 micrometers (μm) thick that has no impact on tool shape error. The result is outstanding shaping even with difficult-to-cut materials, and the ability to achieve gear shapes down to the submicron level. Furthermore, MHI Machine Tool provides one-stop support in gear cutting machines and cutting tools, from the prototype development stage through mass production.

MHI Machine Tool is Japan's only manufacturer producing both gear cutting machines and cutting tools. Moreover, the company possesses comprehensive proposal capability – encompassing not only its high-precision gear cutting machines but also all aspects relating to gear cutting, including cutting know-how and automated systems. Going forward, as a leading producer of gear cutting machines to support not only the manufacturing industry but also the market for robots, which are increasingly adopted in the healthcare and service industries, MHI Machine Tool will continue to lead the way in "monozukuri": the traditional Japanese concept of craftsmanship (Note 5).

Notes:

1. Module (m) is a unit representing the size of a gear tooth. It is derived by dividing the diameter (mm) of the pitch circle by the number of teeth.
2. The name "FR Series" derives from "Fine Pitch used Reducer for Robot." Its development was undertaken in response to market expansion for industrial and life-support robots in recent years, which led to a sharp rise in demand for the high-precision small-module gears inside the precision reduction gears used in robot joints.
3. Strain wave gears are mechanical devices that utilize the variance between elliptical and circular movements to reduce and output dynamic rotation speed.
4. Direct-drive motors drive their target utilizing torque from the motor directly, without passing through a gear box or other intermediary mechanism; this enables suppression of wear on parts and driving loss due to friction, etc.
5. Business in machine tools currently performed by MHI Group, including MHI Machine Tool, is scheduled to be transferred to Nidec Corporation and Nidec Group in May of this year.

Specifications of the New SE25FR Plus Gear Shaping Machine

	SE25FR Plus
Max. workpiece diameter	250 mm
Max. cutting module	1.25 mm
Max. gear width	60 mm
Spindle stroke speed	180 to 1,800 str/min



High Precision, small module Shaper Cutter

About MHI Group

Mitsubishi Heavy Industries (MHI) Group is one of the world's leading industrial groups, spanning energy, logistics & infrastructure, industrial machinery, aerospace and defense. MHI Group combines cutting-edge technology with deep experience to deliver innovative, integrated solutions that help to realize a carbon neutral world, improve the quality of life and ensure a safer world. For more information, please visit www.mhi.com or follow our insights and stories on www.spectra.mhi.com.