

Press Release

September 18, 2014

Debut of 2nd Generation NHX 4000 and NHX 5000 High-precision, High-speed Horizontal Machining Centers

DMG MORI SEIKI CO., LTD. (hereinafter called DMG MORI SEIKI) begins taking orders for the second generation models of the NHX 4000 and NHX 5000 high-precision, high-speed horizontal machining centers on September 18, 2014. Both models have evolved as the new NHX series machines with improved performance, the new DMG MORI design and the innovative operating system CELOS. DMG MORI SEIKI will showcase the newest models at JIMTOF 2014 to be held October 30 - November 4 at Tokyo Big Sight.

The second generation NHX 4000 and NHX 5000 have enhanced their basic capabilities by employing a new spindle with greater reliability and a thick robust bed for higher rigidity to achieve the speed and precision demanded of horizontal machining centers at the highest level. The machines come with CELOS that revolutionizes machine tools in use today through touch panel operation. The new exterior design featuring rounded corners overturns the conventional image of factory equipment and enables you to recognize at a glance the integration between DMG MORI SEIKI and our German collaboration partner DMG MORI SEIKI AKTIENGESELLSCHAFT. These two models will be produced at both the Iga Campus in Japan and the North American factory. Manufacturing machine tools at optimal locations around the world enables us not only to reduce delivery times and logistics costs, but also to hedge foreign exchange risk.

We would like to highlight the main features of the second generation NHX 4000 and NHX 5000 from the perspectives of: (1) High productivity, (2) High rigidity, (3) Super high precision, (4) Spindle technology, (5) CELOS, (6) Automation, (7) Energy saving, and (8) Safety.

1. High Productivity

The new NHX 4000 and NHX 5000 have improved functions and capabilities to offer dramatically increased productivity. The machines achieve a maximum acceleration of 1G and a 60% greater rapid traverse rate of 96 m/min (option) on all axes, both of which are the highest in their classes. The standard ring-type tool magazine offers high-speed indexing and can hold up to 40 tools. Moreover, to allow for flexible tool layout, the maximum storable tool length was extended by approximately 13% from 400 mm to 450 mm for the NHX 4000 and by 10% from 500 mm to 550 mm for the NHX 5000, and the tool diameter was expanded from $\phi 140$ mm to $\phi 170$ mm for both models. In addition to the standard ring-type magazine, chain-type and rack-type magazines are also available as options. The NHX 4000 has shortened cut-to-cut time from 2.8 to 2.2 seconds and the NHX 5000 from 3.1 to 2.7 seconds, making shorter cycle time possible. The optional DDM (Direct Drive Motor) on the B-axis allows high-speed, high-accuracy pallet indexing. Providing the high speed and high precision demanded of horizontal machining centers, the new NHX 4000 and NHX 5000 will serve as replacements for dedicated machines that have been used in the automotive and other industries.

2. High Rigidity

The X- and Z-axis linear guides are located at higher positions to enable the machines to employ a thick robust bed that ensures stable machining. The highly rigid bed also allows for stable machine installation with three-point support. The three-point support installation is less susceptible to ground conditions or secular change and enables easier level adjustment and much faster installation work. Additionally, the minimum distance from the spindle nose to the pallet center has been shortened by 30 mm compared with the conventional machines, allowing shorter tool overhang and more rigid, stable machining.

3. Super High Precision

The machines are equipped with the Magnescale direct scale feedback system on all axes as standard to provide high-precision positioning using absolute magnetic linear scales. The magnetic linear scale has better vibration- and impact-resistance characteristics than those of an optical scale and is far less affected by condensation or oil which is inseparable from machining operations. It offers high-accuracy measurement with a resolution of 0.01 μm even in a severe environment. What's more, the magnetic linear scale has the same linear expansion coefficient as cast iron used for machine tool components, so it exhibits the same behavior as the machine body on which it is mounted, thereby providing highly stable machining accuracy even in a temperature-fluctuating environment. Equipped with the high-precision scales and structural components built with carefully-selected castings and sophisticated assembly techniques, the new NHX machines surpass all others in their classes in positioning accuracy and roundness.

4. Spindle Technology

The new NHX 4000 and NHX 5000 feature a new spindle with enhanced machining capability. The maximum spindle speed has been increased to 15,000 min^{-1} from 12,000 min^{-1} of the previous models, and the maximum torque has been enhanced to 250 Nm to deliver powerful, high-speed machining. The high-efficiency DDS (Direct Drive Spindle) motor enables them to maximize their cutting capabilities in a wide range of machining, from high-speed to heavy-duty cutting of various materials including steel, aluminum and other non-metallic materials. In view of the increased use of high-pressure coolant, the spindle labyrinth structure has been enhanced to prevent coolant entry and improve spindle durability. What's more, an oil jacket is arranged around the stator coil of the spindle motor to allow for forced circulation of cooling fluid which prevents heat dispersion. The extended disc spring life allows the spindle to maintain tool clamping force for a long period of time, minimizing vibration during spindle rotation and making high-precision machining possible.

5. CELOS

With a futuristic design and the industry's first touch panel operation, CELOS accelerates the processes from an idea to a finished product. CELOS apps enable the operators to see production instruction, process and machine data on the screen, making the shop floor more efficient and productive. CELOS can also connect the shop floor with the administrative division over a network, creating a paperless manufacturing environment. CELOS is compatible with PPS (Production Planning and Scheduling) and ERP (Enterprise Resource Planning) systems and can be linked to CAD/CAM systems. The use of SMARTkey[®] that comes with a user authentication function and internal USB memory enables the users to individually set access privileges to the NC unit and the machine.

6. Automation

A variety of automation solutions are offered to meet each customer's production challenges. The RPP (Round Pallet Pool) system features both space saving and ease of setup and boasts the largest number of pallets per unit area. The CPP (Carrier Pallet Pool) system is designed for easy installation with a simple construction and eight predefined packages, from which customers can choose the ideal specification for their production needs. The LPP (Linear Pallet Pool) system is equipped with multi-level pallet racks to provide a high level of automation. The easily-customizable LPP system helps the users maximize productivity and operating efficiency.

7. Energy Saving

Energy-efficient components such as LED lighting are used to reduce environmental burden and running costs. DMG MORI SEIKI has also focused on machine design to improve operating efficiency. Significant energy saving has been achieved through optimization of M modes and the use of newly developed functions for shorter canned cycles and faster ATC (Automatic Tool Change) operation. A function to adjust coolant supply volume according to the machining load is also employed to save power during automatic operation. These energy-saving functions, coupled with the improved machine design for faster mechanisms, enabled CELOS-equipped models to successfully reduce cycle times and power consumption. For example, when compared with a machine which has been used for 15 years or longer and is about to reach its replacement time, a CELOS-equipped model can cut down the annual energy consumption by approximately 45%.^{*1}

The visualized energy-saving effects can be checked on CELOS.

*1 Comparison between the latest DMG MORI lathe "NLX2500MC" and the "SL-250BMC" manufactured in 1997.

- The figures mentioned above may not be obtained due to differences in machines, cutting conditions or environmental conditions during measurement.

8. Safety

The second generation NHX 4000 and NHX 5000 comply with global safety standards, including ISO standards, IEC standards, UL standards and JIS standards.

DMG MORI SEIKI will continue to provide products that are reliable, highly functional and worthy of investment to meet each and every customer's needs.

Type	High-precision, high-speed horizontal machining center
Model name	NHX 4000 / NHX 5000
Market	Automotive, industrial machinery and aerospace industries
Order starts	September 18, 2014
Production	NHX 4000: 25 units/month NHX 5000: 12 units/month

■ Main specifications

Item		NHX 4000	NHX 5000
Axis travel (X/Y/Z)	(mm)	560 / 560 / 660	730 / 730 / 880
Pallet working surface	(mm)	400 × 400	500 × 500
Max. workpiece swing diameter	(mm)	φ 630	φ 800
Max. workpiece height	(mm)	Tapped pallet: 900 [T-slot pallet: 880]	1,000
Rapid traverse rate (X/Y/Z)	(m/min)	60 / 60 / 60 [96 / 96 / 96]	
Max. spindle speed	(min ⁻¹)	15,000 [15,000 (high-output spec.)] [20,000 (high-speed spec.)]	
Spindle taper hole		No.40	
Tool storage capacity	(tools)	Ring type: 40 [60] Chain type: [120], Rack type: [180] [240]	
Floor space (W×D)	(mm)	2,680 × 4,181	3,078 × 4,785

[] option



Photo 1. Exterior (NHX 4000)



Photo 2. Spindle



Photo 3. Ring-type Magazine