

TOYODA

GEAR SKIVING CENTER

GS200H
GS300H
GS700H

JTEKT



<https://www.jtekt.co.jp>

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Type of Machinery: Gear Skiving Center
Model Number: GS200H, GS300H, GS700H

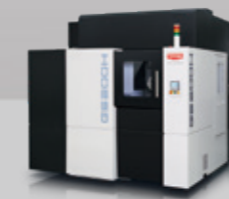
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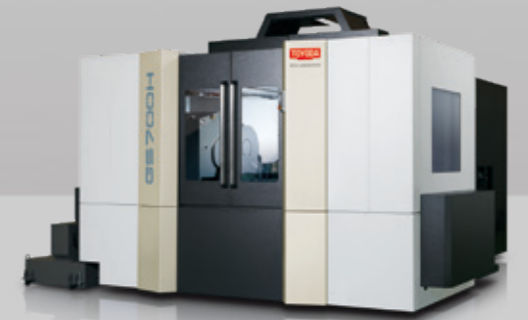
JTEKT's lineup of gear skiving centers responding to needs in a wide variety of industries



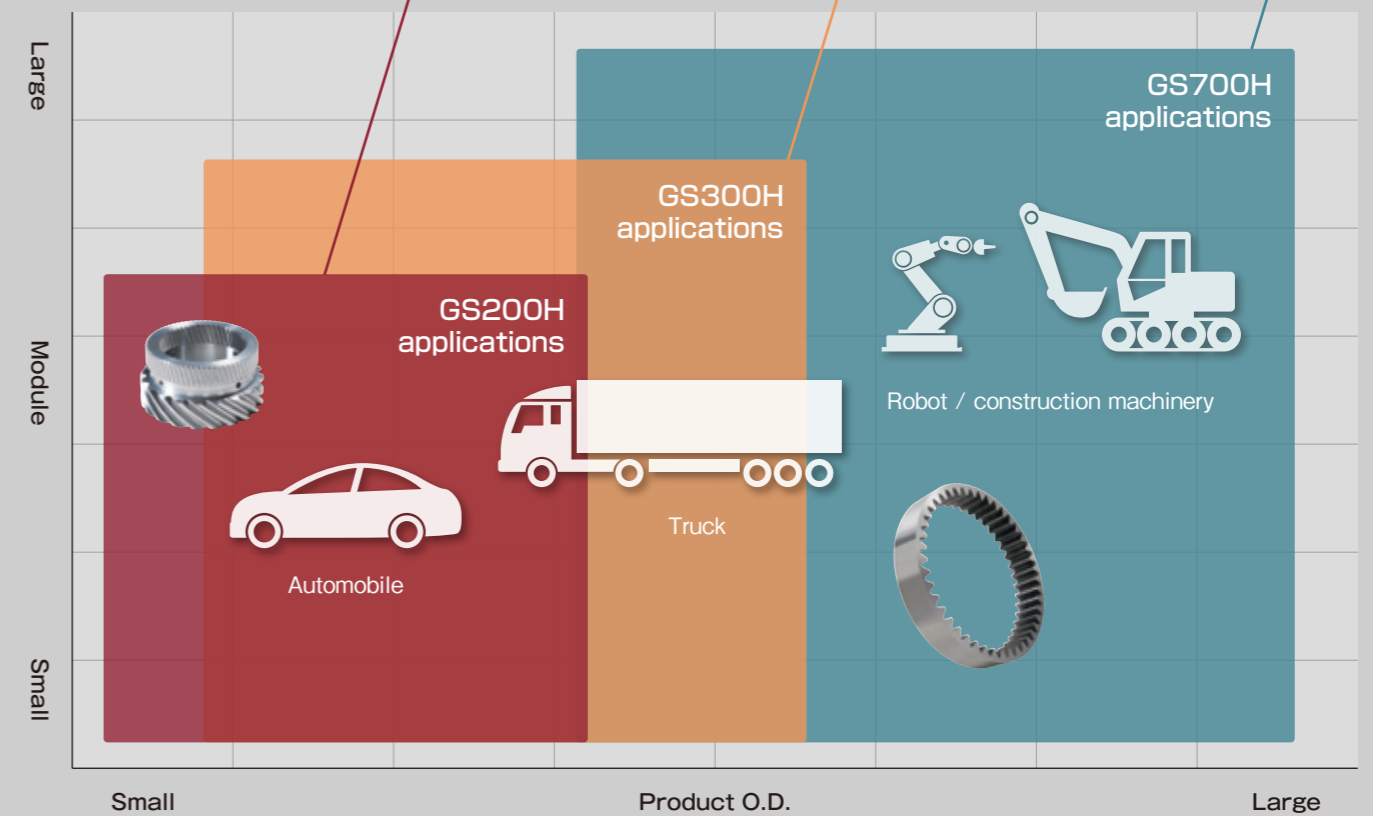
New Product
GS200H

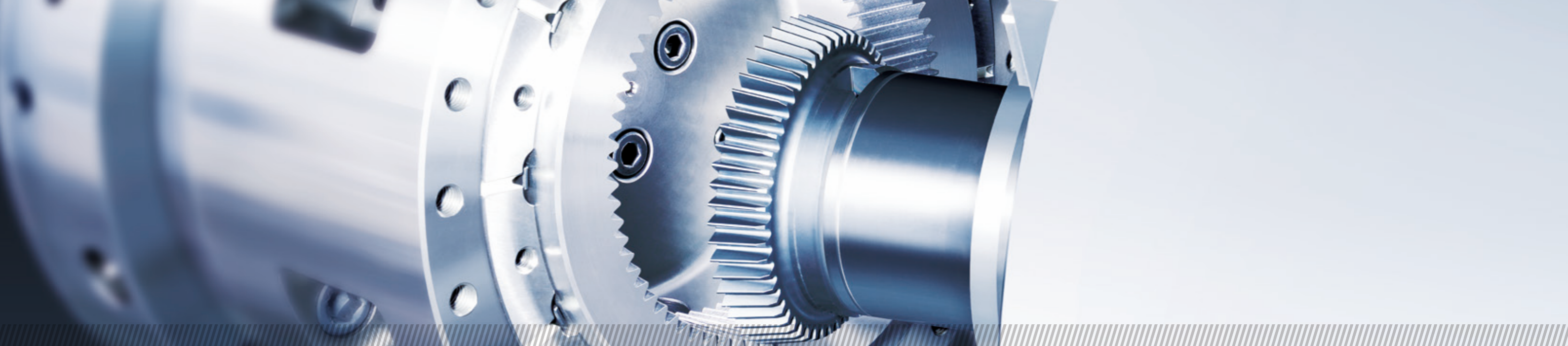


GS300H



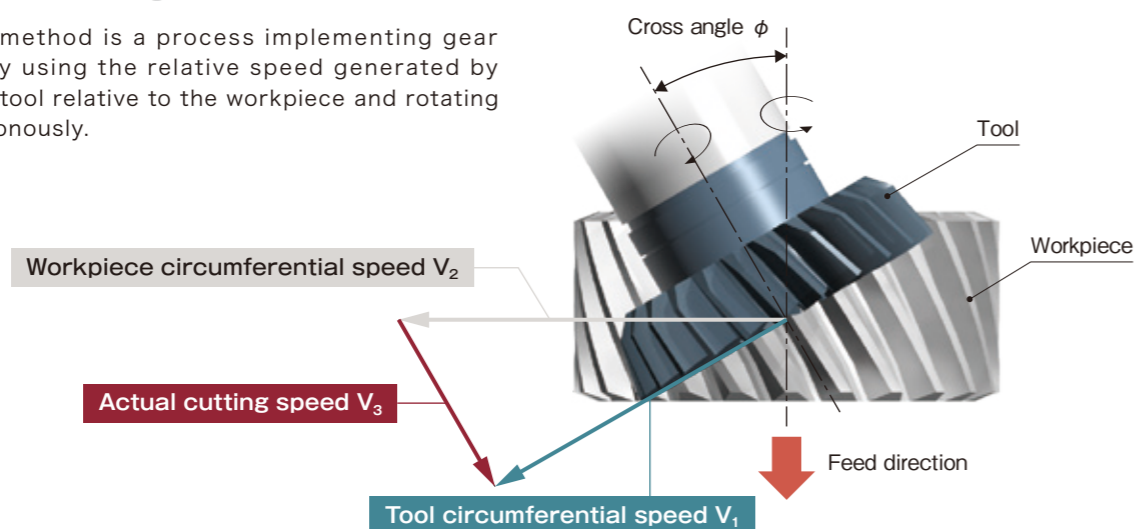
GS700H





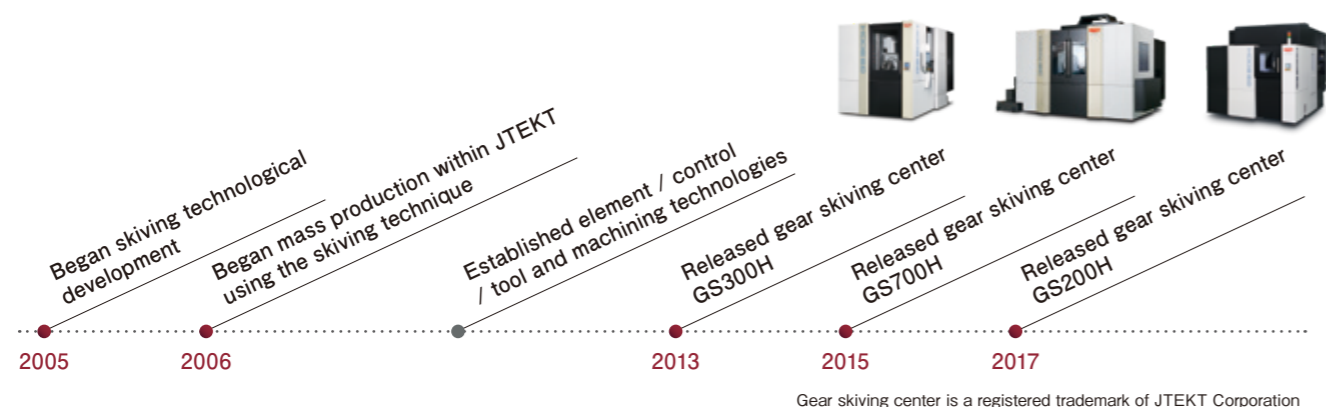
What is the skiving method?

The skiving method is a process implementing gear machining by using the relative speed generated by inclining the tool relative to the workpiece and rotating them synchronously.



JTEKT's initiatives

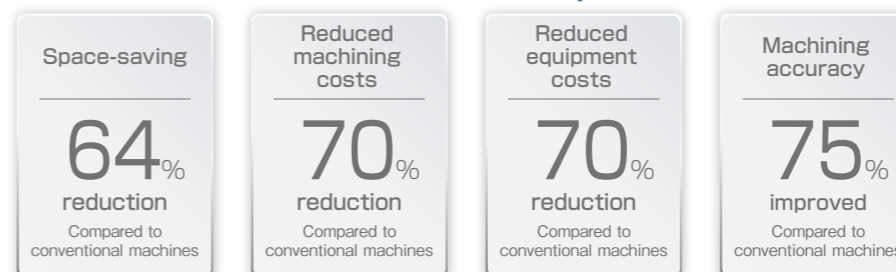
JTEKT began technological development of the skiving method in 2005. Leveraging our strength of operating an auto parts business, we introduced skiving to our gear components mass production line in 2006. Through completing performance evaluations on mass production lines, we were able to establish the technologies required for skiving of "element," "control," "tools," and "machining." In 2013, we developed a gear skiving center, then produced a machine series for large gear machining and compact gear machining. Building up our track record on internal mass production lines and creating even better machines is the strength that JTEKT's gear skiving centers offer.



All gear machining processes rolled into one

JTEKT's gear skiving centers reduce set-up changeover time through not only integrating gear cutting, but also all processes from turning to drilling on one machine. This machine increases productivity at the same time as improving machining accuracy by completing all processes in a single chuck grasp.

Conventional					
Machining equipment	Lathe	Hobbing machine	Shaper	Chamfering machine	Machining center
Machining process	Turning	Hobbing	Shaper	Chamfering	Drilling
New technology					
Machining equipment	Gear skiving center				
Machining process	Turning + Skiving (External gear, internal gear) + Chamfering + Drilling				
Performs <i>five</i> separate machining operations in a <i>single</i> machine.					
Enhances production efficiency, allowing effective "yosedome" (consolidation of production lines)					



* According to JTEKT's investigation method.

Comparison with gear machining techniques

There are four major types of gear machining - hobbing, shaping, broaching and skiving. Hobbing, shaping and broaching each have their pros and cons but skiving is characterized by its high-speed and good accuracy.

		Hobbing	Shaper	Broaching	Skiving
Machining method					
	Principle	The workpiece is rotated so as to engage the hob, the tool feeds and gears are generated	Gears are generated by making the shaper cutter travel back and forth	Gears are formed by having a serrated cutting edge then extracting the tool	The tool and workpiece are tilted, synchronously rotated at high speed, and gears are generated
Shape	External gear	○	○	×	○
	Internal gear	×	○	○	○
Machining capability		○	△	◎	○

Note ◎ (Very good) ○ (Good) △ (Fair) × (Not applicable)

Contributing to the reformation of gear component machining

JTEKT's gear skiving centers make it possible for machining of gears that were previously difficult to process, thus contributing to customer's product reformation.

	Compact and light	High rigidity	Integration
Conventional machining method	<p>Skiving reduces the incomplete gear portion, which results in more compact and lighter products.</p> <p>Hobbing Large run-out</p> <p>Example of reduced overall length Double helical gear</p>	<p>A relief portion is no longer necessary, making it possible to avoid stress concentration and increase product strength.</p> <p>Shaper Relief groove required</p>	<p>Products which were previously comprised of two parts assembled together are now able to be machined as one. This means cost can be reduced through reduction of machining and assembly processes, thus making the product even more compact.</p> <p>Broaching Welding</p> <p>Example of integration Internal gear Weld or bolt together with other part after broaching</p>
	Skiving	<p>Skiving Small run-out</p> <p>Example of reduced overall length Double helical gear</p>	<p>Skiving Relief groove not required</p>

Proprietary technology supporting skiving

Element technology	Control technology	Tool technology	Machining technology
<p>High speed/high rigidity workpiece axis</p> <ul style="list-style-type: none"> • N=3,000 min⁻¹ spec. • Compaction by built-in motor • Compatible with automatic hydraulic fixture 	<p>High speed/high accuracy gear cutting control TOYOPUC-GC70</p> <ul style="list-style-type: none"> • High accuracy skiving control by high speed synchronization • Simple programming function 	<p>Low resistance tool design</p> <ul style="list-style-type: none"> • Tool design based on JTEKT original gear creation theory 	<p>Optimum machining conditions</p> <ul style="list-style-type: none"> • Selects the optimum machining conditions according to the customer's product

Control technology

Programming is simple with JTEKT's own control technology

NC programs are expressed in flow charts using NCSFC*. "Visualization" of motions for processes that were previously hard to understand using G code.

* NCSFC...NC Sequential Function Chart

Simple programming only requiring screen input of gear specifications data and tool data cutting conditions

Tool technology

JTEKT offers not only machines but also tools. We design and produce optimal tools for each machine to provide the best performance.

Tool design

Machining simulation: Workpiece, Cutter, Workpiece, Tool path. Machining accuracy Cutting force is calculated.

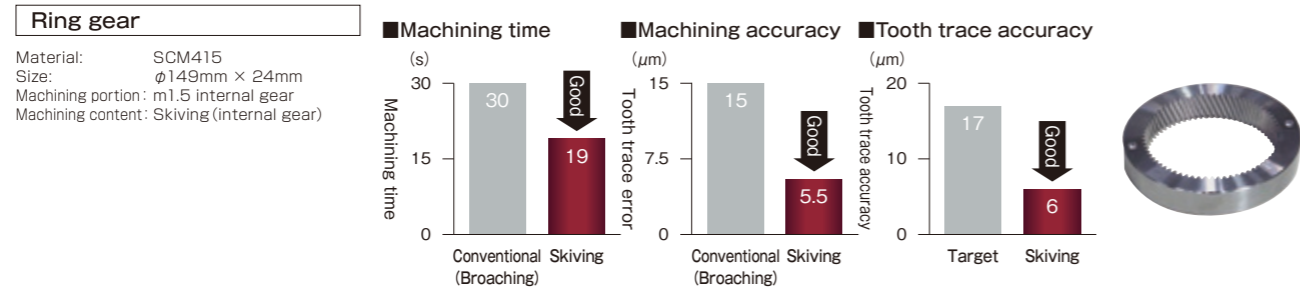
Optimization

Tool fabrication

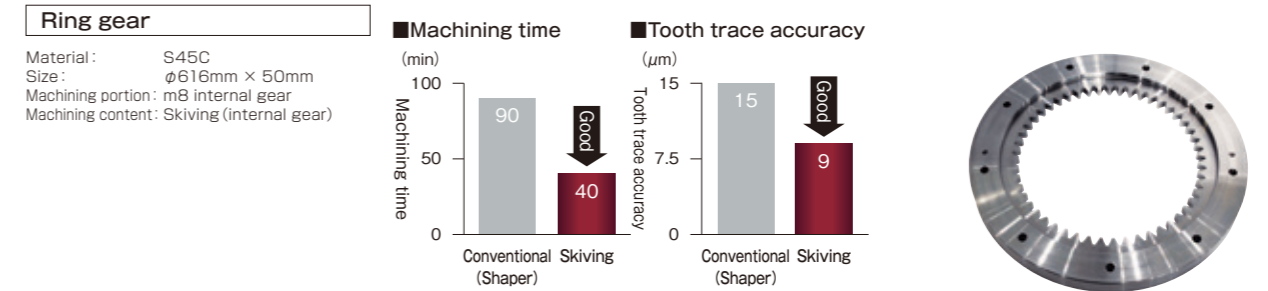
Tool blade shape, Skiving tool, JTEKT developed its own skiving tool in-house

Machining example

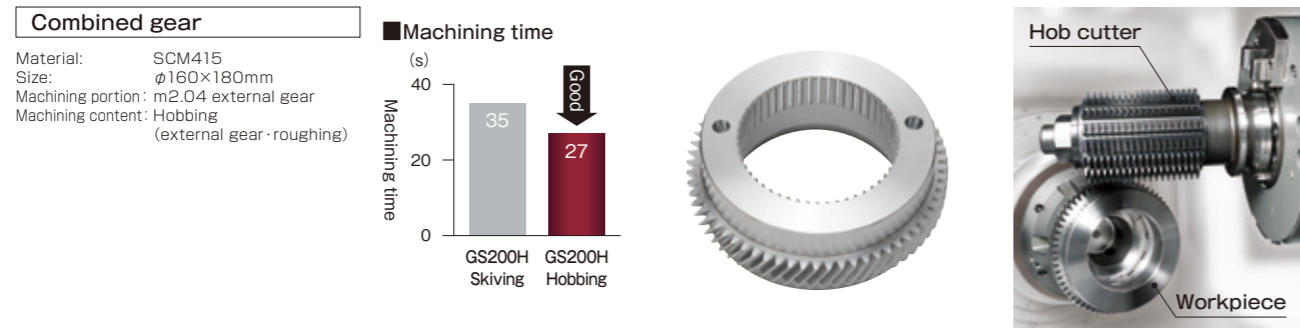
Simultaneously achieving high-speed, high-capability, and high-accuracy



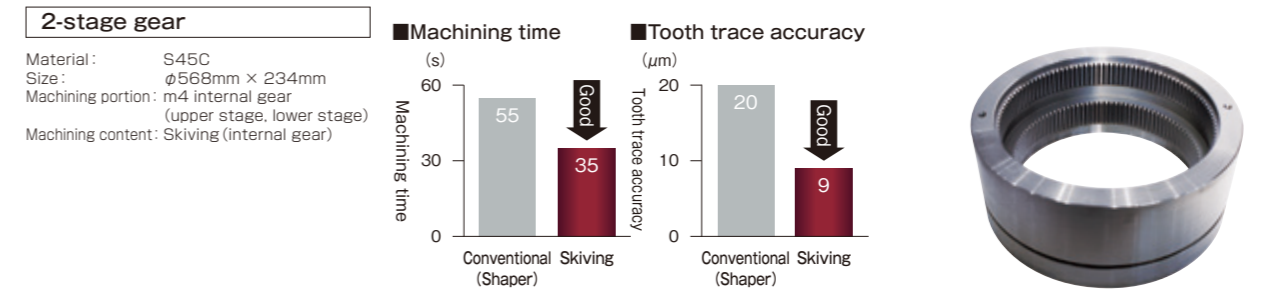
Skiving of large-size, 8-module gears



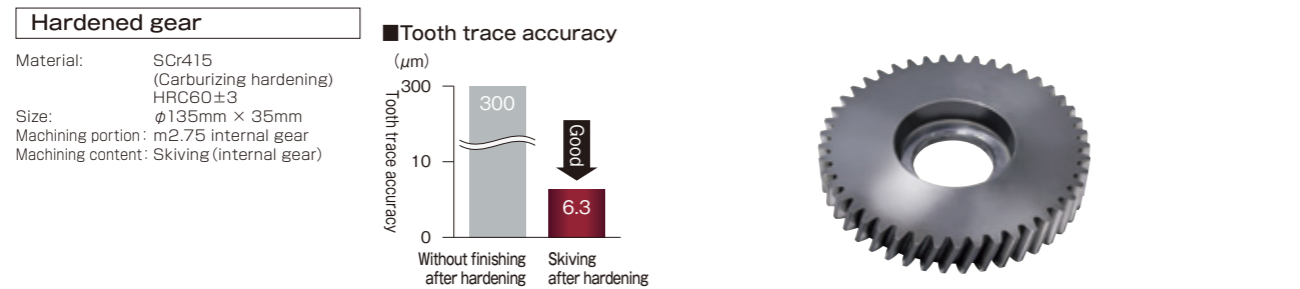
High-speed, high-efficiency, gear rough machining using a hob cutter



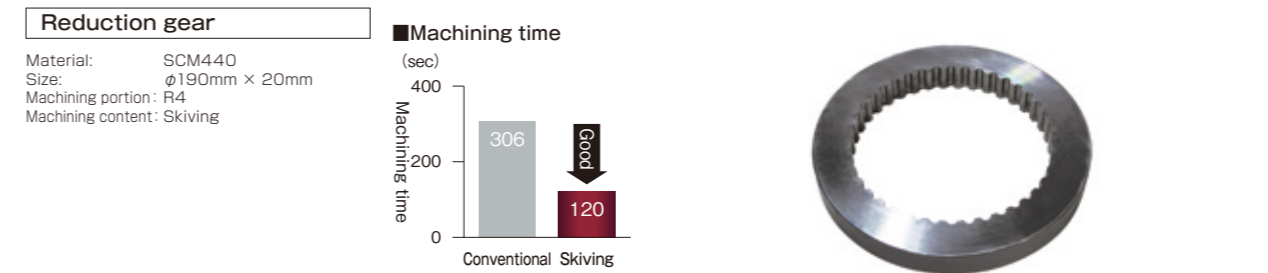
Machining of 2-stage gears in a single chuck grasp



Machining of hardened gears

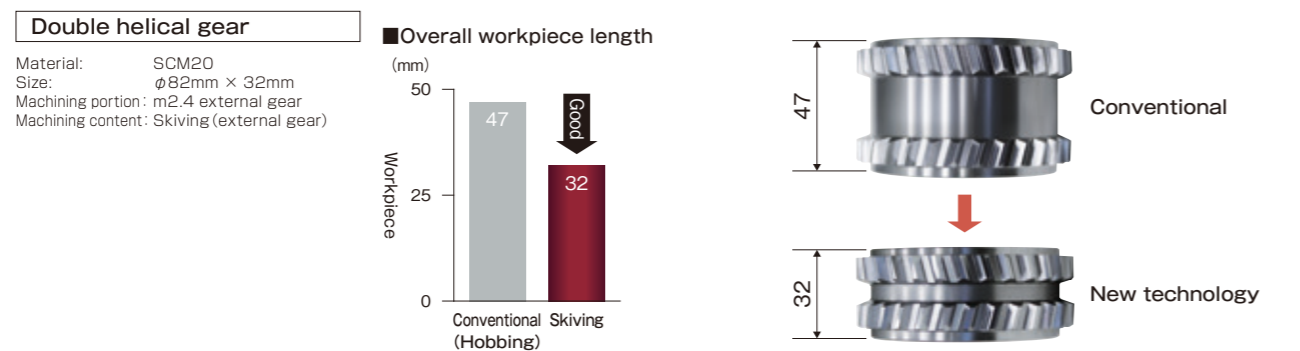


Machining of non-involute gears



Case example of contribution to product design

Compact and light product shape



Product integration

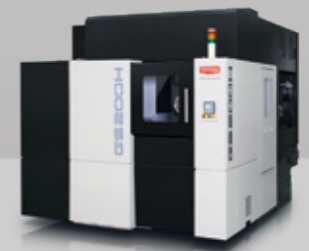


* According to JTEKT's investigation method.



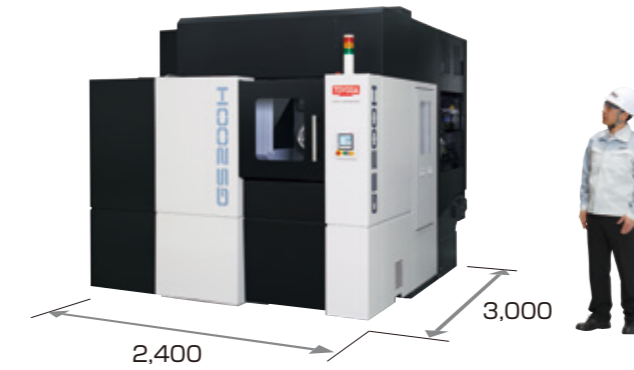
GS200H

High productivity and quality achieved
by a suitable machine size for mass-production lines



A compact machine size suitable for production lines

A machine size suitable for production lines makes a shift to in-line possible, thus using significantly less floor space compared to conventional machining methods.



Floor space **64%** smaller
Compared to conventional machines (Shaper)

Offering high productivity and stable accuracy

A high-load resistant machine / unit configuration necessary for high-efficiency gear skiving has been adopted. By increasing the rigidity of individual units and axes, stable machining is achieved and the number of cuts have been reduced, thus improving productivity.

High rigidity spindle

Adopting a large diameter double-row cylindrical roller bearing achieving both high damping performance and high rigidity

High-rigidity, low-heat displacement platform

With effective use of analysis technology, the bed and column were optimally designed to resist force and heat and manufactured with our advanced casting technology

High-rigidity workpiece axis

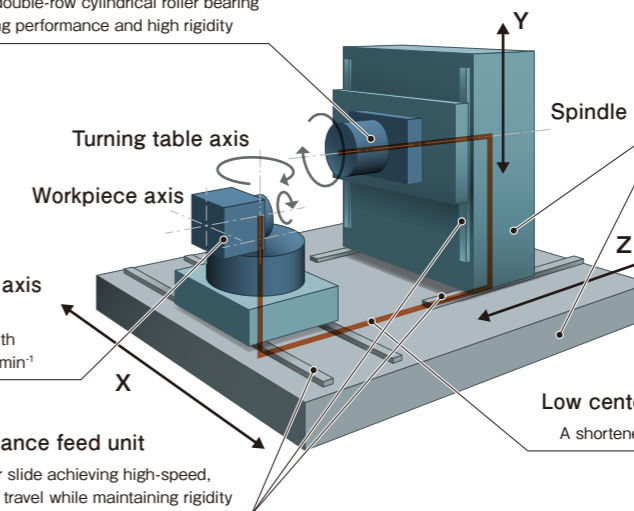
A high-rigidity unit able to withstand continuous cutting with a high-speed rotation of 3,000 min⁻¹

High-performance feed unit

A cylindrical roller slide achieving high-speed, high-acceleration travel while maintaining rigidity

Low center-of-gravity / compact design

A shortened stress path improving machine rigidity

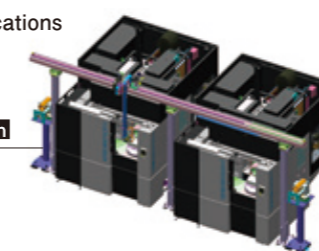


Supports automation

Doors have been installed on the machine's front and side to best suit our customers' production shop layout.

Example of loader specifications

Specs with machines arranged horizontally **Option**



Specs with machines arranged vertically **Option**



*Illustrations are for example only

JTEKT Gear Skiving Center -
Integrating gear machining processes into one machine

GS300H

Best-selling machine well received since the release in 2013

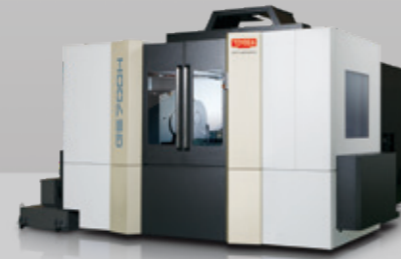


Optimal for production of many models in small quantities

GS300H can hold up to 40 tools, thus allowing various machining in a single chuck grasp. Its B-axis swiveling angle of 270° provides wide-range, 5-face machining including a workpiece side face. This is a suitable machine for production of many models in small quantities.

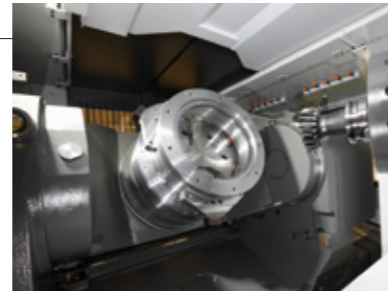
GS700H

Machining of gears with a large diameter or module integrated into one machine



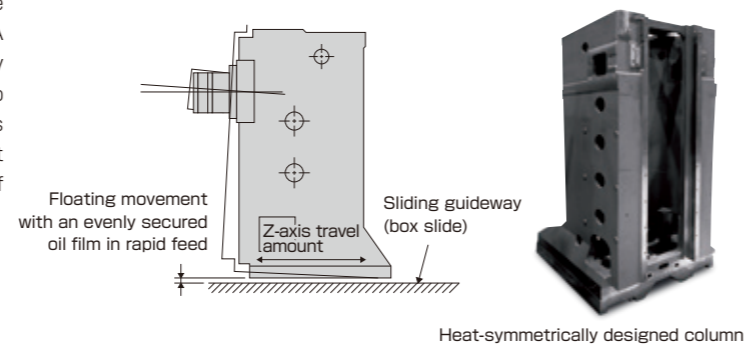
High cutting capability enabling machining of large-size gears

GS700H is equipped with a JTEKT original high-rigidity trunnion type table and #50 high-power spindle with a rotation speed of 6,000 min⁻¹. Its high cutting capability realized skiving of large-size gears.



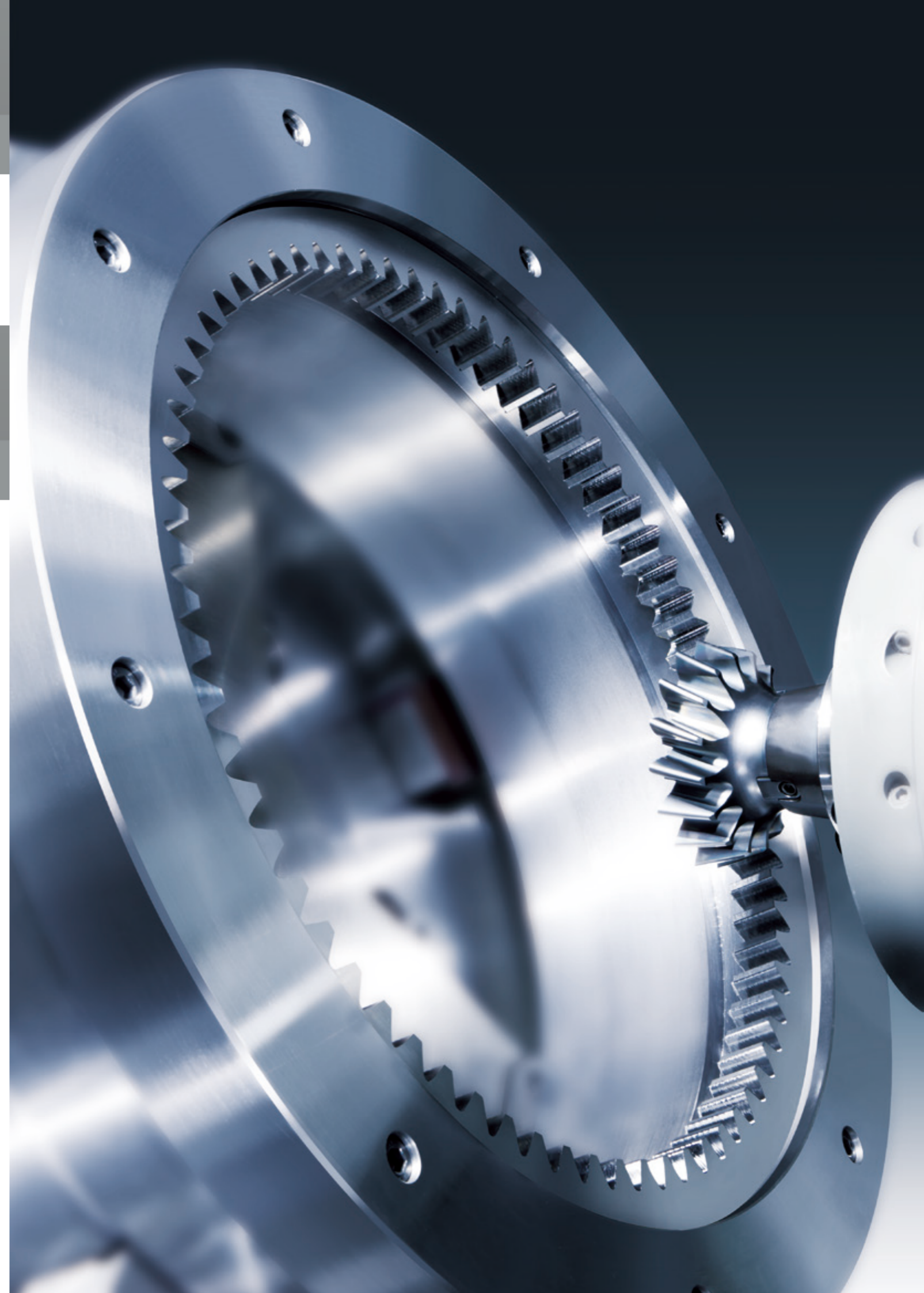
Box slide enabling high accuracy gear machining

The JTEKT original box slide (G II slide) minimizes the slide floating amount at the instant rise in rapid feed. A heat-symmetrical box structure (horizontally and vertically symmetrical) is employed for the column in order to minimize the amount of heat displacement that affects machining. The high-rigidity, low-heat displacement machine structure enables high accuracy machining of large-size gears.



Superior safety and workability

In order to facilitate the setting and removal of workpieces, we carefully designed a trunnion table that has a wide opening on the ceiling and capable of vertical attachment of a workpiece, thus enabling safe and easy use.



Basic specifications

Item		Unit	GS200H	GS300H	GS700H
Feed unit	Travel amount (X, Y, Z)	mm	470, 360, 620	730, 650, 850	900, 850, 900
	Swiveling angle of swiveling table (B-axis)	°	220 (0 ~ -220), 0.001°	270 (0 ~ -270), 0.001°	—
	Swiveling angle of tilt axis (A-axis)		—	—	100 (+5 ~ -95)
	Rapid feed rate	m/min	48	60	20 (X), 36 (Y, Z)
	Rotation speed (A / B-axis)	min ⁻¹	32	40	6
Spindle	Spindle nose shape	—	BBT No.50 [OP: HSK-A100]	BBT No.50 [OP: HSK-A100]	BBT No.50 [OP: HSK-A100]
	Spindle speed	min ⁻¹	6,000	6,000	6,000
	Spindle motor, short-time / continuous	kW	30 / 25	30 / 25	30 / 22
Workpiece axis	Rotating speed	min ⁻¹	3,000 *1	3,000 *1	1,000
	Rated output	kW	32 / 19.5 [OP: 33.5 / 28.3]	33.5 / 28.3	50 / 17.5
	Max. workpiece swing	mm	φ528	φ800	φ1,346
	Max. jig/workpiece mass	kg	70	70	550
	Workpiece clamp		No. of distributor ports Standard: 4 ports (2 hydraulic ports, 2 pneumatic ports) OP: 8 ports (6 hydraulic ports, 2 pneumatic ports) Note) No. of ports able to be used upon rotation: 1 (hydraulic)	Manual type [OP: hydraulic type, Max. No. of ports: 8]	Manual type [OP: hydraulic type, Max. No. of ports: 8]
A T C	Tool holding capacity	tools	8 [OP: 20]	40	40 [OP: 60, 120]
	Tool change time	sec	2.4 (~7kg) (tool to tool)	3.6 (chip to chip)	—
	Max. tool dia. × Max. tool height	mm	φ160 × 300	φ285 × 560	φ120 × 600
	Tool mass	kg	27	27	27
Control	CNC	—	TOYOPUC-GC70	TOYOPUC-GC70	TOYOPUC-GC70
Floor space (Width × depth)	Machine dimension	mm	2,400 × 3,000	2,845 × 5,710	5,200 × 6,200

*1 If the option of 8 distributor ports is used, the workpiece RPM will be 1,500 min⁻¹.

Machining gear specifications

	GS200H		GS300H		GS700H	
	External gear	Internal gear	External gear	Internal gear	External gear	Internal gear
Type of gears	Spur gear, helical gear, spline		Spur gear, helical gear, spline		Spur gear, helical gear, spline	
Workpiece size	φ30 ~ φ220mm	φ50 ~ φ200mm	φ30 ~ φ220mm	φ50 ~ φ200mm	φ250 ~ φ700mm	
	Total length 100 mm or less		Total length 100 mm or less		Total length 500 mm or less	
Max. module	3.5		3.5		6	
Workpiece material	Iron type material (before hardening)		Iron type material (before hardening)		Iron type material (before hardening)	
Machining accuracy (reference)	JIS N7 class or equivalent		JIS N7 class or equivalent		JIS N7 class or equivalent	

Please contact our sales staff for more information.

GS200H accessories

Standard accessories

- NC indexing table (with encoder) ■ Scale feedback (X-, Y-, Z-axis)
- Spindle cooling unit ■ A axis cooling unit
- Centralized lubricant unit (slide portion, spindle bearing portion, A axis bearing portion)
- Supports hydraulic jigs (2 hydraulic ports, 2 pneumatic ports) ■ Splash guard (enclosure type)
- Internal lighting (LED) ■ Front door (manual opening/closing type)
- Side door - removable maintenance window ■ Front door interlock (electromagnetic lock)
- Magazine door interlock (electromagnetic lock)
- Machine internal coil conveyor (1 horizontally extended type)
- Coolant supply unit (take-up chip conveyor type)
- Pump for sending coolant through spindle (pump for mid-pressure coolant, 1 Mpa equivalent)
- Manual pulse generator ■ TOYOPUC-GC70 (JTEKT made)
- Operation display screen 4.1 inch, installed on machine front ■ Basic parts ■ Instruction manual (1 copy)

Special accessories

- Automatic front door ■ Manual side door ■ Area sensor
- Operator door interlock (electromagnetic lock) ■ 3-level signal tower
- Auto touch sensor function ■ Auto tool length measurement function
- Magazine internal broken tool detection ■ Oil skimmer ■ Chip box ■ Splash gun ■ Mist collector
- Supports hydraulic jigs (6 hydraulic ports, 2 pneumatic ports) Instruction manual (1 copy)

GS300H accessories

Standard accessories

- NC indexing table (with encoder) ■ Scale feedback (X-, Y-, Z-axis)
- Spindle cooling unit ■ A axis cooling unit
- Centralized lubricant unit (slide portion, spindle bearing portion, A axis bearing portion)
- Supports hydraulic jigs (2 hydraulic ports, 2 pneumatic ports) ■ Splash guard (enclosure type)
- Internal lighting (LED) ■ Front door (manual opening/closing type)
- Front door interlock (electromagnetic lock) ■ Magazine door interlock (electromagnetic lock)
- Operator door interlock (electromagnetic lock)
- Coolant supply unit (take-up chip conveyor type)
- Pump for sending coolant through spindle (pump for mid-pressure coolant, 1 Mpa equivalent)
- Manual pulse generator ■ TOYOPUC-GC70 (JTEKT made)
- Operation display screen 4.1 inch, installed on machine front ■ Basic parts
- Instruction manual (1 copy)

Special accessories

- Automatic front door ■ Area sensor ■ 3-level signal tower
- Auto touch sensor function ■ Auto tool length measurement function
- Magazine internal broken tool detection ■ Oil skimmer ■ Splash gun ■ Mist collector
- Supports hydraulic jigs (6 hydraulic ports, 2 pneumatic ports) Instruction manual (1 copy)

GS700H accessories

Standard accessories

- NC indexing table (with encoder) ■ Scale feedback (X-, Y-, Z-axis)
- Spindle cooling unit ■ Table cooling device
- Intensive lubricating device (slide part, spindle bearing part, table bearing part)
- Splash guard (enclosure type) ■ Internal lighting (LED)
- Front door (manual opening/closing type)
- Front door interlock (electromagnetic lock) ■ Magazine door interlock (electromagnetic lock)
- Operator door interlock (electromagnetic lock)
- Machine internal coil conveyor (2 horizontally extended type)
- Coolant supply unit (take-up chip conveyor type)
- Pump for sending coolant through spindle (pump for mid-pressure coolant, 1 Mpa equivalent)
- Manual pulse generator ■ TOYOPUC-GC70 (JTEKT made) ■ Basic parts
- Instruction manual (1 copy)

Special accessories

- 3-level signal tower ■ Auto touch sensor function
- Magazine internal broken tool detection ■ Oil skimmer ■ Supports hydraulic jigs
- Splash gun ■ Mist collector ■ Supports hydraulic jigs Instruction manual (1 copy)

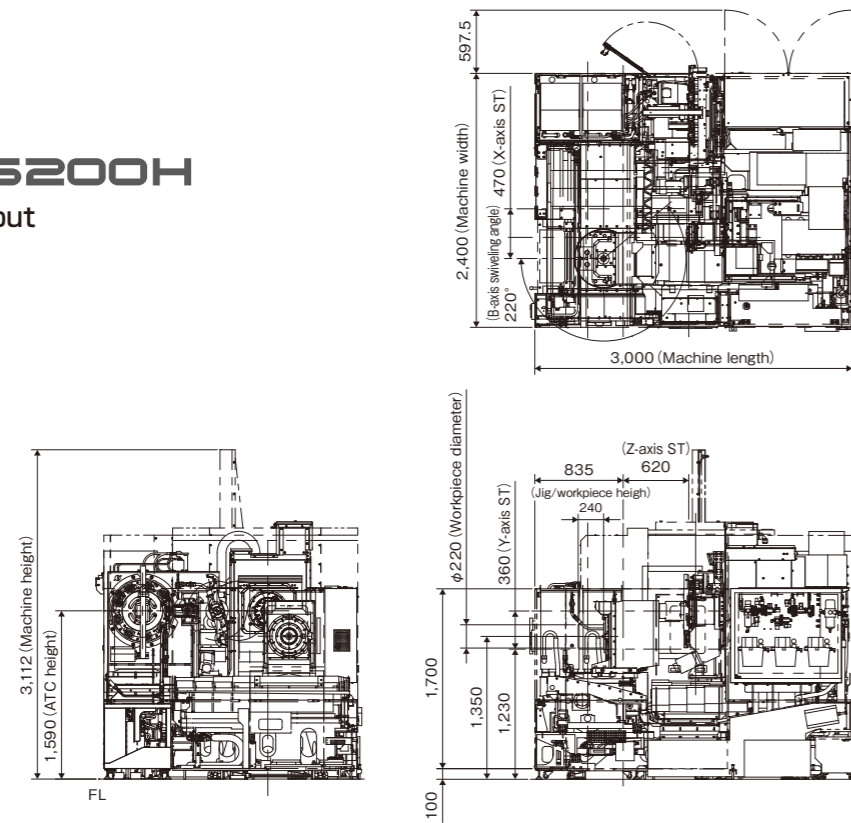
CNC unit TOYOPUC-GC70

●: Standard / □: Optional

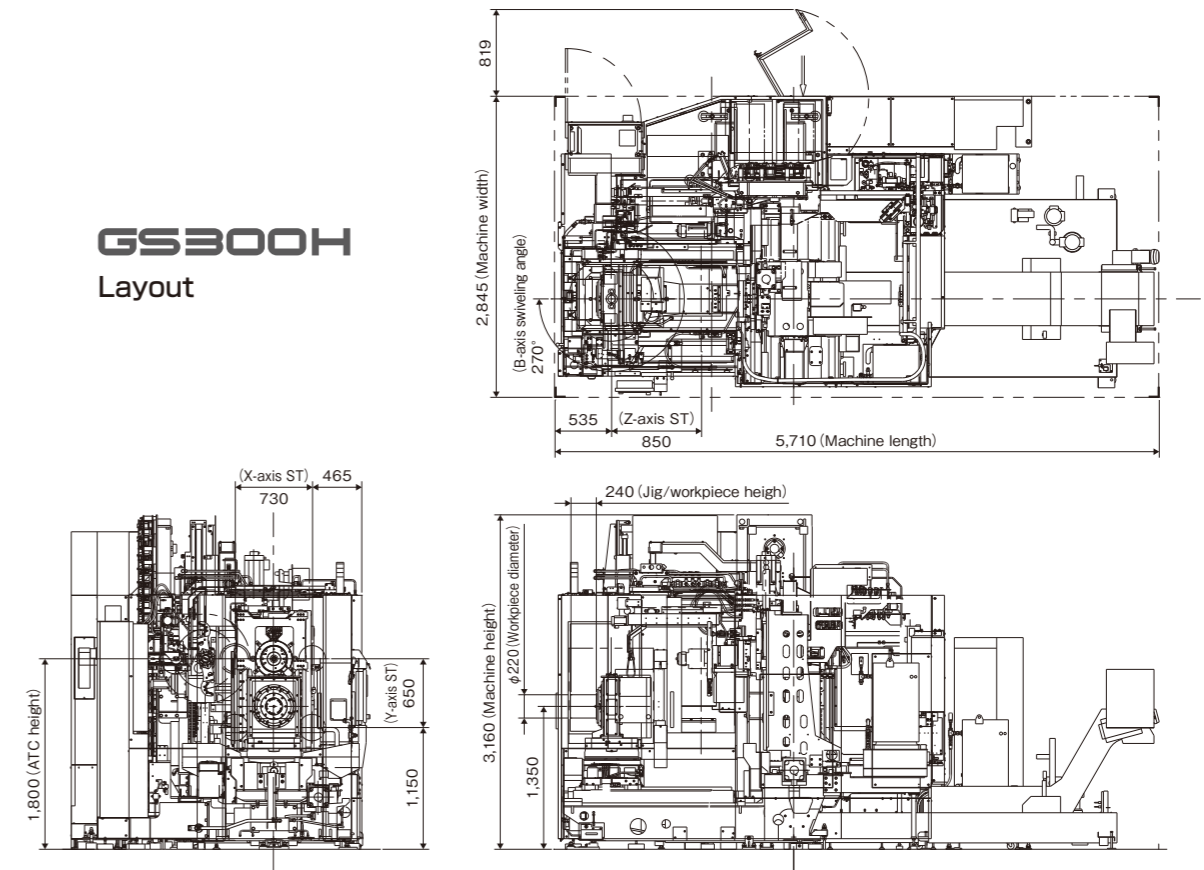
Division	Name	Accessories	
Axis control	Min. input increment (0.001mm)	●	
	Absolute position detection	●	
	Inch/metric switch	□	
Operation	Single block	●	
	Manual handle feed 1 unit	●	
	Machine lock	□	
	Dry run	□	
Interpolation function	Manual handle interrupt	□	
	Positioning (G00)	●	
	Tapping mode (G63)	●	
	Cutting mode (G64)	●	
	Exact stop (G09)	●	
	Linear interpolation (G01)	●	
	Arc interpolation (G02,G03)	●	
	Dwell (G04)	●	
	Reference point return (G28)	●	
	Second reference point return (G30)	●	
	Third and fourth reference point return (G30)	●	
	Program entry	Machine coordinate system (G53)	●
		Workpiece coordinate system (G54 ~ G59)	●
Custom macro		●	
Fixed drilling cycle (G74,G84,G98)		●	
Optional stop		●	
Optional block skip (9 pieces)		□	
Spindle function		Rigid tap	●
Tool function	Tool corrections (40)	●	
Tool correction function	Tool diameter compensation	●	
	Tool length compensation (G43,G44,G49)	●	
Editing operation	Program storage capacity (1,024Kbyte)	●	
	Number of registered programs (1,000)	●	
	Background editing	●	
Data entry / display	Touch panel control	●	
Communication function	Ethernet function	●	

MACHINE LAYOUT

GS200H
Layout



GS300H
Layout



JTEKT JTEKT CORPORATION

NAGOYA HEAD OFFICE

No. 7-1, Meieki 4-chome, Nakamura-ku, Nagoya, Aichi Pref., 450-8515, JAPAN TEL: (81)52-527-1900 FAX: (81)52-527-1911

OSAKA HEAD OFFICE

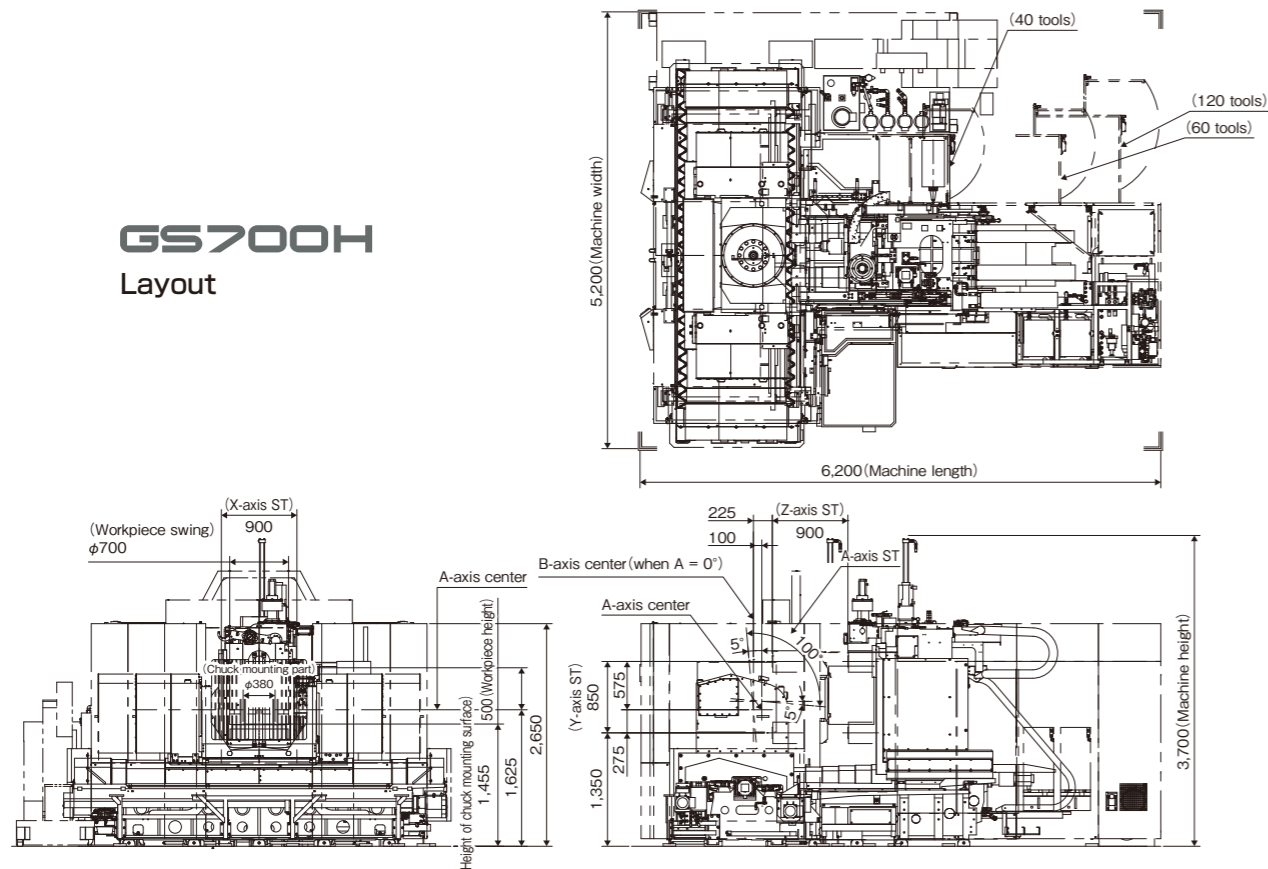
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SALES & MARKETING HEADQUARTERS

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MACHINE LAYOUT

GS700H Layout



— GLOBAL NETWORK —

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MACHINE TOOLS & MECHATRONICS OVERSEAS SALES DEPT.

1, Asahimachi 1-chome, Kariya, Aichi Pref., 448-8652, JAPAN
TEL: (81)566-25-5171 FAX: (81)566-25-5467

OVERSEAS AFFILIATED COMPANIES

JTEKT TOYODA AMERICAS CORP.
HEADQUARTERS
316 W. University Drive,
Arlington Heights, IL 60004,
USA
TEL: (1)847-253-0340
FAX: (1)847-253-0540

TOYODA MACHINERY (DALIAN) CO., LTD.
BEIJING BRANCH
Room 1017, Fortune Building, No.5 Dong San
Huan North Road, Chaoyang, Beijing, 100004
CHINA
TEL: (86)-10-6590-9356/7/8
FAX: (86)-10-6590-9359

TPA ENGINEERING CORP.
84BL-19Lot,
Namdong Industrial Complex,
675-18, Gojan-Dong, Namdong-ku, Incheon,
KOREA
TEL: (82)-032-822-0305
FAX: (82)-032-822-0306

JTEKT TOYODA AMERICAS CORP.
REBUILD PRODUCT DIVISION
51300 West Pontiac Trail
Wixom, MI 48393-1003,
USA
TEL: (1)248-624-5755
FAX: (1)248-624-8597

TOYODA MACHINERY (DALIAN) CO., LTD.
SHANGHAI BRANCH
Room 25B3, V-Capital Building, 333 Xianxia
Road, Changning District, Shanghai, 200336
CHINA
TEL: (86)-21-5175-7812
FAX: (86)-21-5178-1099

TOYODA MACHINERY S.E. ASIA CO., LTD.
313, Bangna-Trad Road, KM.1
Kwang Bangna, Khet Bangna, Bangkok, 10260
THAILAND
TEL: (66-2)361-8250/1
FAX: (66-2)361-8252

TOYODA MACHINERY AND ENGINEERING
EUROPE SAS
2 Grande Allee P.A des Petits Carreaux
94380 Bonneuil sur Marne, FRANCE
TEL: (33)1-49.56.85.80
FAX: (33)1-43.77.47.50

TOYODA MACHINERY (DALIAN) CO., LTD.
FOSHAN BRANCH
Rm.714, Agile City Shopping Park Yannian Rd,
Daliang District, Foshan, 528300
CHINA
TEL: (86)-757-2232-6651
FAX: (86)-757-2232-6650

PT.JTEKT INDONESIA SALES
Jl.Celebration Boulevard Blok AA3/006 Grand Wisata,
Desa Lambang Jaya, Kec. Tambun Selatan
Kab. Bekasi 17510-Jawa Barat INDONESIA
TEL: (62)21-8261 5471
FAX: (62)21-2211 4991

TOYODA MACHINERY EUROPE GmbH
HEADQUARTERS
Bischofstr. 118 47809 Krefeld GERMANY
TEL: (49)2151-5188-300
FAX: (49)2151-5188-333

TOYODA MACHINERY (DALIAN) CO., LTD.
CHONGQING BRANCH
3-14-2, No.68 Jinkai Avenue, Xie Xin Center,
New District, North, Chongqing, 401120
CHINA
TEL: (86)-23-6305-6070
FAX: (86)-23-6305-6077

TOYODA KOKI DO BRASIL INDUSTRIA
E COMERCIO DE MAQUINAS, LTDA.
Alameda Ulderico Ferrari, 100,
Itaim Guacu, Itu, SP 13312-655, BRASIL
TEL: (55)4023-1730

TOYODA MACHINERY (DALIAN) CO., LTD.
HEAD OFFICE (PLANT)
No. 2, Fu'an Street, Dalian Economic and
Technological Development Zone, 116600
CHINA
TEL: (86)-411-8733-4601
FAX: (86)-411-8733-4602

TOYODA MICROMATIC MACHINERY INDIA
PRIVATE LIMITED
506-507, 5th Floor, Suncity Business Tower,
Golf Course Road, Sector-54
Gurgaon-122002, Haryana, INDIA
TEL: (91)-124-4264602
FAX: (91)-124-4288355