

Higher accuracy  
produces  
greater profitability

YASDA PRECISION CENTER

Model **TT** & **TH**

**YBM 10T-100TT**  
**YBM 10T-TH**

*Saxis*

Thermal Distortion Stabilizing System  
High-performance Spindle with Preload Self-adjusting System



**YASDA**

# THE DREAM MILLING MACHINE

## Integration of traditional technology and smart advanced technology

**YBM10T-100TT** and **YBM10T-TH** were developed by fully putting YASDA's advanced concepts and the technology to manufacture traditional high-precision machining centers into them.

The subject is "high-precision and high-quality profiling of difficult-to-cut materials."

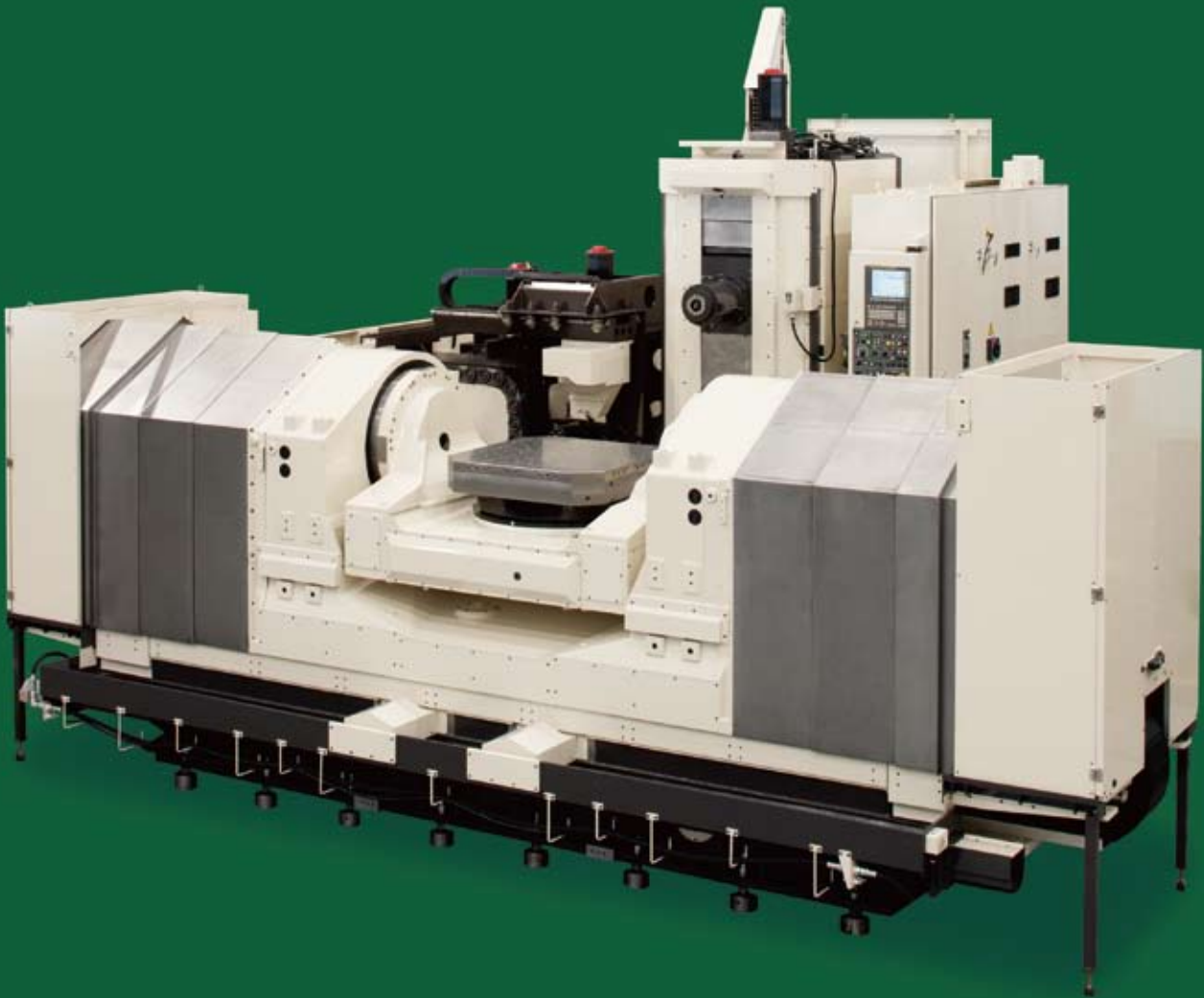
This large five-axis machine realizes the above subject with excellent efficiency.

It is a superior machine which achieves a higher degree of confidence and unlimited possibility serving as an engine of the times and industry.

### Main features

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- Preload self-adjusting spindle mounted. Both heavy duty cutting at low spindle speed and highly accurate rotation with low-heat generation at high spindle speed are achieved.  
A two-motor torque tandem control spindle (option) mounted for YBM10T-100TT.
  - Thermal distortion stabilized system equipped. This enables stable high-precision processing for an extended period of time by minimizing the machine-body thermal distortion caused by the factory environment.
  - YASDA's unique advanced function "HAS-3" equipped. This enables extremely high-precision processing at high speed by accurately reflecting NC data.
  - High-precision five-axis processing support function "i-CAL" equipped. This enables high-precision and high-grade five-axis processing by accurately searching for the central coordinates of the important "rotation axis" and "spindle" which exert influence on processing accuracy and automatically sets them.
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## PRECISION CENTER **YBM 10T-100TT**

“YBM10T-100TT” is a newly developed simultaneous 5-axis machining center, which is equipped with a 1,000-square-mm tilting table for YBM10T. It is new to the lineup of YBM10T and a high-end model machining center developed for performing stable high-precision processing with a high degree of efficiency as a theme. This processing ranges from difficult-to-cut materials to complicated profiling, in addition to aircraft parts which have recently been in high demand.

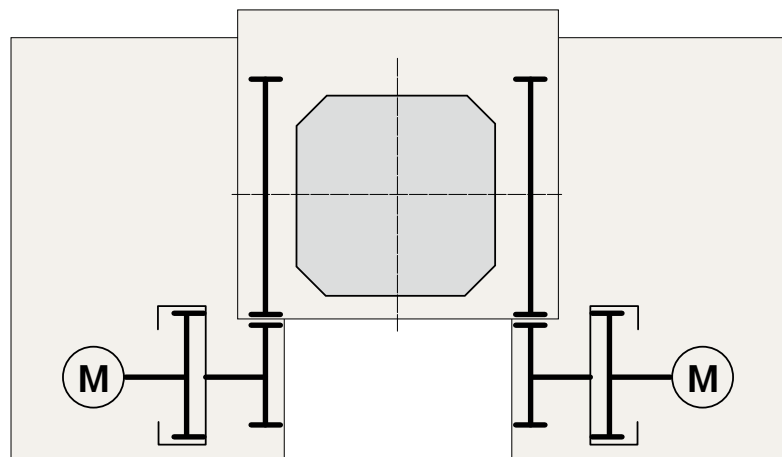
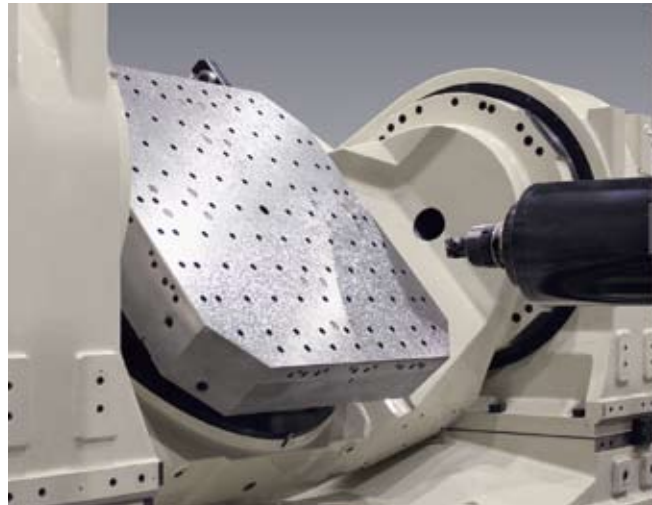
# Main components and their mechanisms

YBM IOT-100TT

## I Table

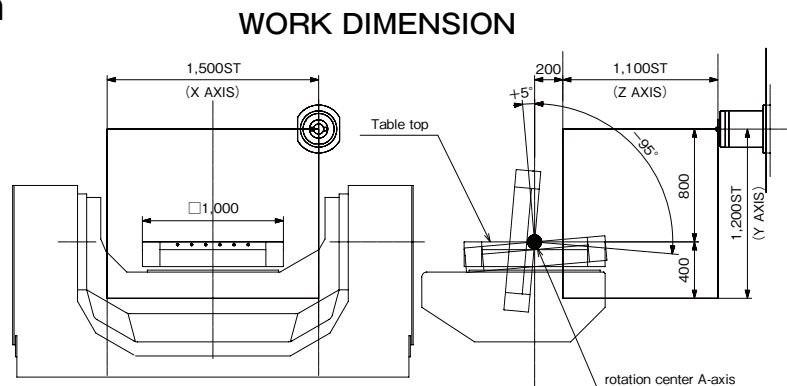
Trunnion table of complete symmetrical structure mounted - High-grade processing capability has been improved

A large 1,000-square-mm table is driven with trunnions of complete symmetrical structure supported coaxially. The driving force of the A-axis (tilt axis) transfers the rotation of the servo motor through the speed reducer to pinion gears to drive the segment gear mounted on the base (cradle) of the B-axis (rotation axis). The rotary encoder mounted on both sides of the twin-drive cradle drive shaft also performs position tandem control to achieve non-backlash positioning with high accuracy. For the angle of the tilt axis, the processing-point dividing accuracy is secured by measuring each angle at both ends of the cradle. Heat generation can also be controlled by enhancing the efficiency of a conventional drive mechanism.



## High rigidity, high precision drive and guide system

The guide mechanism of the B-axis (rotation axis) employs a “three-roller bearing” which achieves both high rigidity and rotational accuracy. It also has a “high-resolution rotary encoder” as standard for the detection of a dividing angle. This allows a wide range of high-precision processing of heavyweight work from difficult-to-cut materials to profiling.



	Standard	Option
X-axis	1,500mm	—
Y-axis	1,200mm	1,400mm
Z-axis	1,100mm	1,400mm
B-axis	360°	—
A-axis	-95°~5°	—

## II Spindle

### Self-adjusting spindle equipped with innovative functions

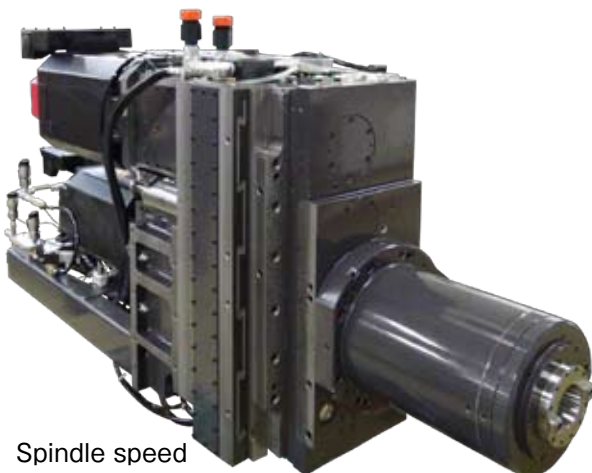
The preload self-adjusting spindle (Model: SA type) developed by YASDA is equipped with functions completely different from conventional concepts. This spindle, which has appealed to many users since the beginning of development, differs from the conventional fixed type preload system. It has a mechanism of providing a large preload at low spindle speed and reducing the preload according to the bearing heat generated at high spindle speed. This mechanism helps to achieve both heavy duty cutting at low spindle speed and highly accurate rotation with low-heat generation at high spindle speed.

The spindle and the spindle motor are connected coaxially by a diaphragm coupling. This enables highly accurate rotation of the spindle at the full range of its rotation speed, in a variety of processing, such as heavy duty processing, high speed cutting on hardened steel, and thrust-reversing helical end milling.

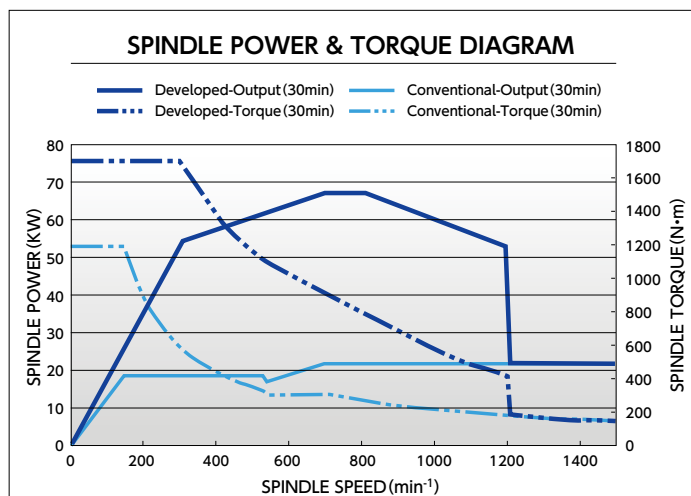


### Torque tandem control spindle

In this system, two low-speed and high-speed motors operate the spindle. The system has a mechanism for compensating to obtain a larger torque by the output of the high-speed motor where a required torque cannot be obtained only by the low-speed motor in heavy duty processing, etc. This allows the spindle to deliver high performance and provide stable work with high reliability for heavyweight work processing.



Spindle speed  
Max. 8,000min<sup>-1</sup>



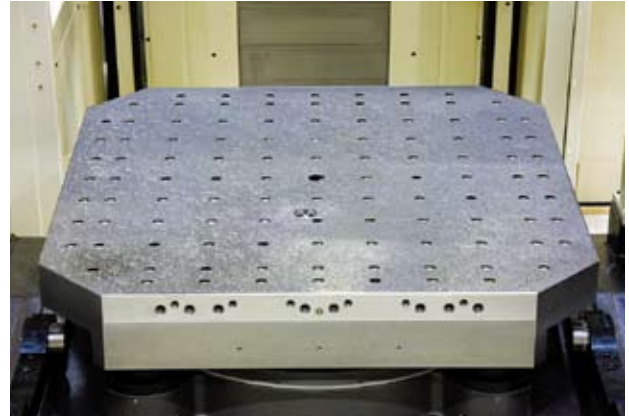
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### III Pallet and chucking mechanism to support high-precision, high-grade processing

#### High-precision pallet with high rigidity

A highly rigid pallet with a thickness of 175 mm provides high precision with the top surface accurately scraped and maintains its precision for an extended period of time.

With the flat bottom surface, these pallets are compatible with various transfer systems, automatic warehouses, and flexible manufacturing systems (FMS).

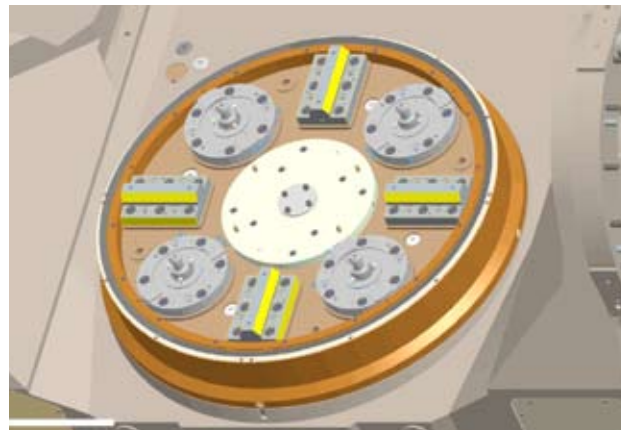


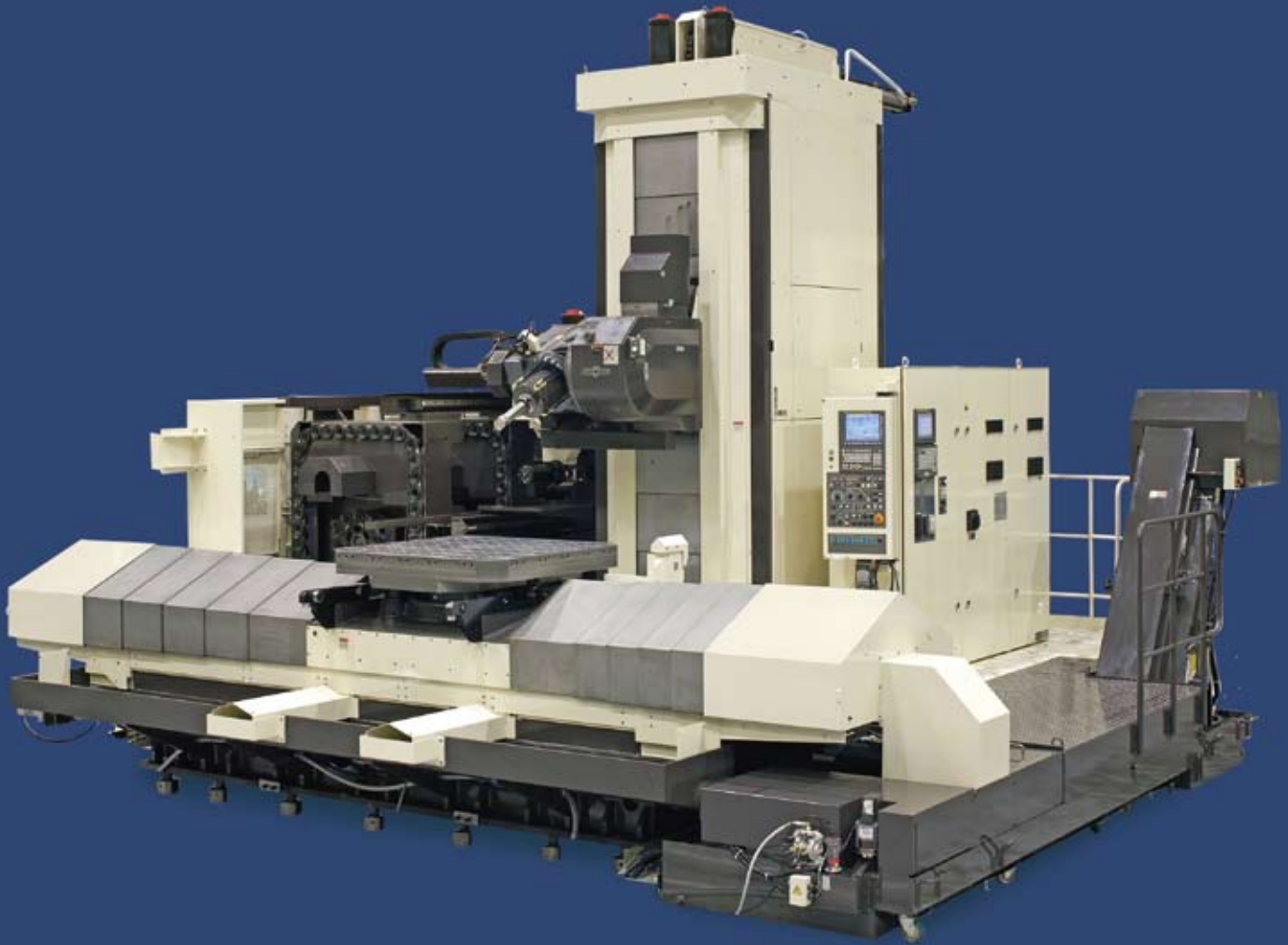
#### Powerful clamping force, high positioning accuracy - Unique pallet chucking mechanism

To realize high efficiency and high-grade processing by loading heavyweight work, the pallet chucking mechanism is an extremely important mechanism that must have high rigidity and stable repeatability of positioning accuracy.

YBM10T-100TT, a newly developed pallet chucking mechanism, performs positioning with V-shaped and flat-shaped blocks. In this mechanism, pull rods placed at four points powerfully draws a pallet.

With the above, this pallet chucking mechanism can sufficiently withstand the moment load associated with the rotation of the tilt axis and maintains stable, high-precision repeatability of high positioning accuracy.





## PRECISION CENTER

# YBM 10T-TH

YBM10T is a heavy-duty machine which provides high-speed and high-precision processing for the world's heaviest work (5 tons). To adapt to industrial trends and changes in requests for parts processing and enable a wider variety of processing with a higher degree of efficiency, this YBM10T includes a newly-developed, compact, and powerful built-in spindle.

It is configured with a large simultaneous five-axis controller of the tilting head type, as YASDA's new product lineup.

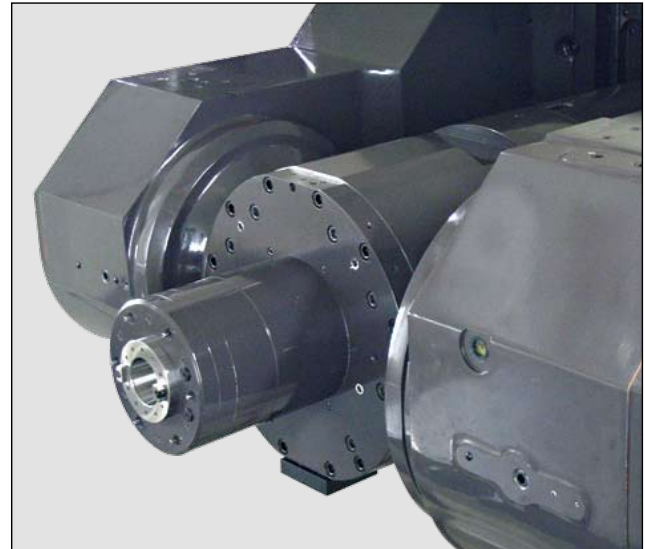
# Key components and their mechanisms

YBM IOT-TH

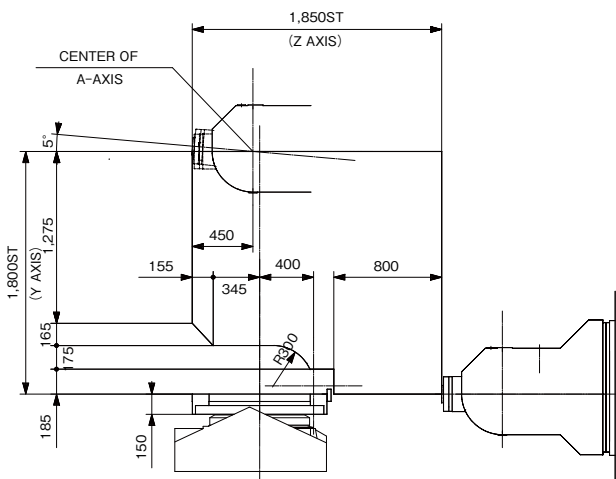
## I Spindle

### Dedicated spindle equipped with a preload self-adjusting spindle

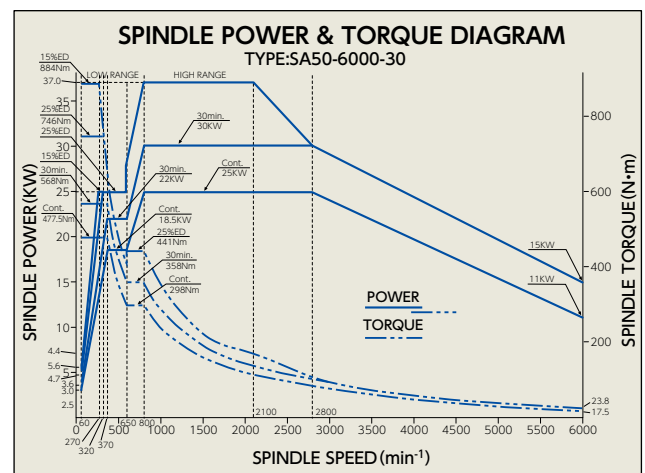
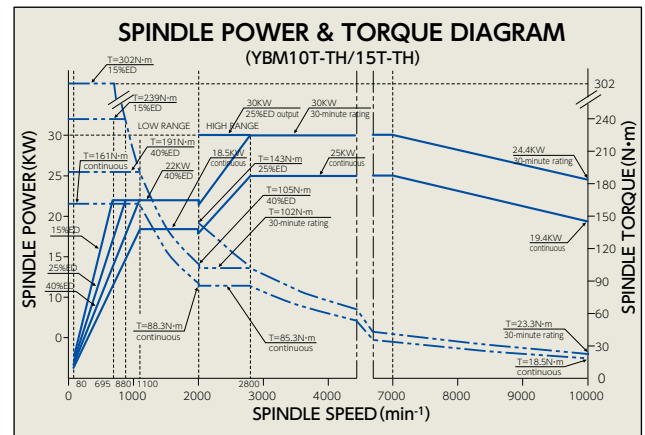
As a newly-developed built-in spindle dedicated to a tilting head, the “preload self-adjusting spindle” in which many users have full confidence is configured. The greatest strengths of highly accurate rotation of the spindle and high-precision processing at the full range of rotation speed are exerted by achieving both heavy duty cutting at low spindle speed and highly accurate rotation with low-heat generation at high spindle speed. Its superior capability is compatible with all types of processing including difficult-to-cut materials of castings and heat-resistant alloys. This spindle provides two types: high-speed rotation type and high-torque type.



WORK DIMENSION



	10T-TH
X-axis	1,500/2,100mm
Y-axis	1,800/2,100mm
Z-axis	1,850mm
B-axis	360°
A-axis	-95°~+5°





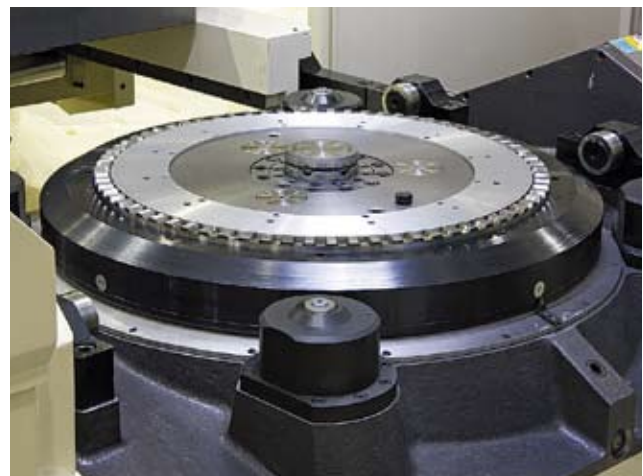
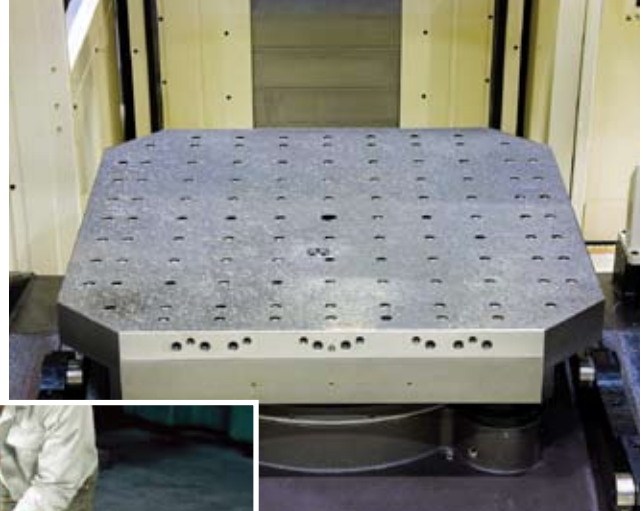
## II Pallet and pallet chucking mechanism

### Pallet chucking mechanism

The pallet chucking mechanism consists of highly rigid pallets with a thickness of 150mm and YASDA's traditional large-diameter curvic couplings. It maintains high precision for an extended period of time.

- (1) Pallets of high-grade cast iron, with the top surface accurately scraped, maintains high precision.
- (2) The pallet bottom surface is flat, which is compatible with various transfer systems, automatic warehouses, and flexible manufacturing systems.

In the pallet chucking mechanism, 72 teeth with an engagement angle of  $300^\circ$  placed on the circumference are engaged with no backlash using large-diameter curvic couplings. With automatic aligning, this mechanism delivers high repeatability of positioning accuracy and chucking rigidity.



### Curvic coupling cleaning nozzle

Air cleaning nozzles are provided on each tooth-bottom side face of the curvic coupling. Air jetted from these nozzles constantly removes minute deposits from curvic coupling tooth surfaces to maintain high chucking precision.



# Highly rigid basic structure comprising YBM10T-100TT/10T-TH

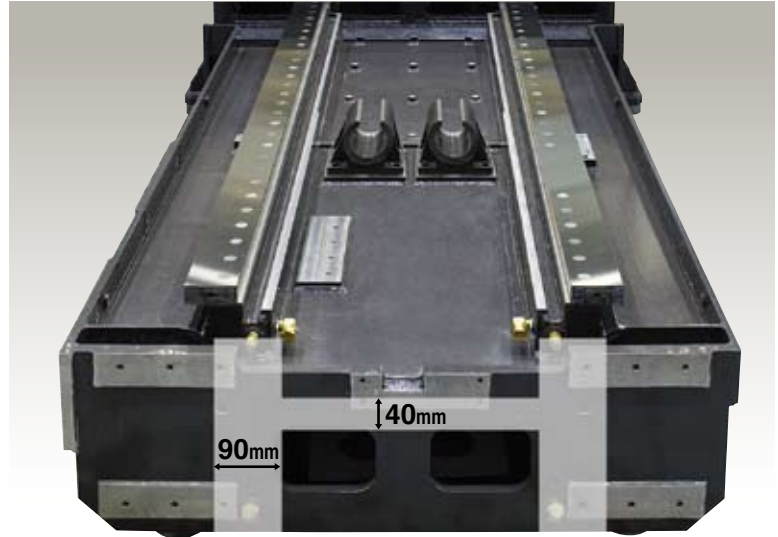
To operate large machinery with high precision and stability for an extended period of time, the basic structure of the rigid, highly-durable machine body is indispensable.

Key components of YBM10T-100TT/10T-TH have high-precision and high-rigidity construction which is a characteristic of YASDA.

## Bed

The bed consists of vertical frames with a thickness of 90mm and top horizontal frames with a thickness of 40mm. The most simple “H-shaped” bed is provided with high rigidity.

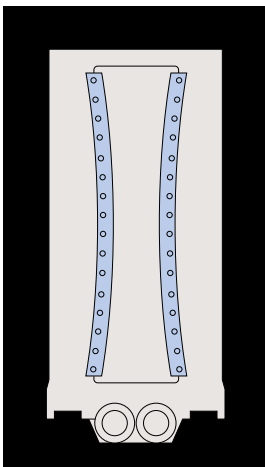
Frames employ solid steel plates. With uniform heat capacity throughout the frames, they maintain stable high precision with no distortion created due to changes in room temperature.



## Column

A large column of double housing structure has the double-walled box shape. It is provided with superior heat stability. This is due to the highly rigid and bilaterally symmetrical structure with ribs placed inside the both side walls. With the above, stable and high-precision processing is made possible.

### Column (Y-axis) guideway (for 100TT only)



Column (Y-axis) guideways, with both sides not completely parallel, are slightly hourglass-shaped mounted. This is to make the preload of roller way bearings on both sides of the spindle constant regardless of the spindle head position. This realizes extremely high positioning accuracy with fewer positional changes of the spindle head.

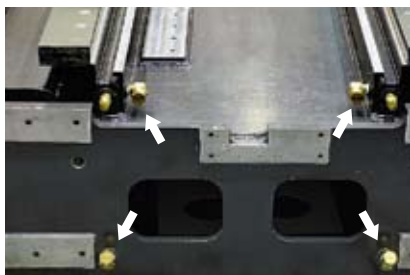
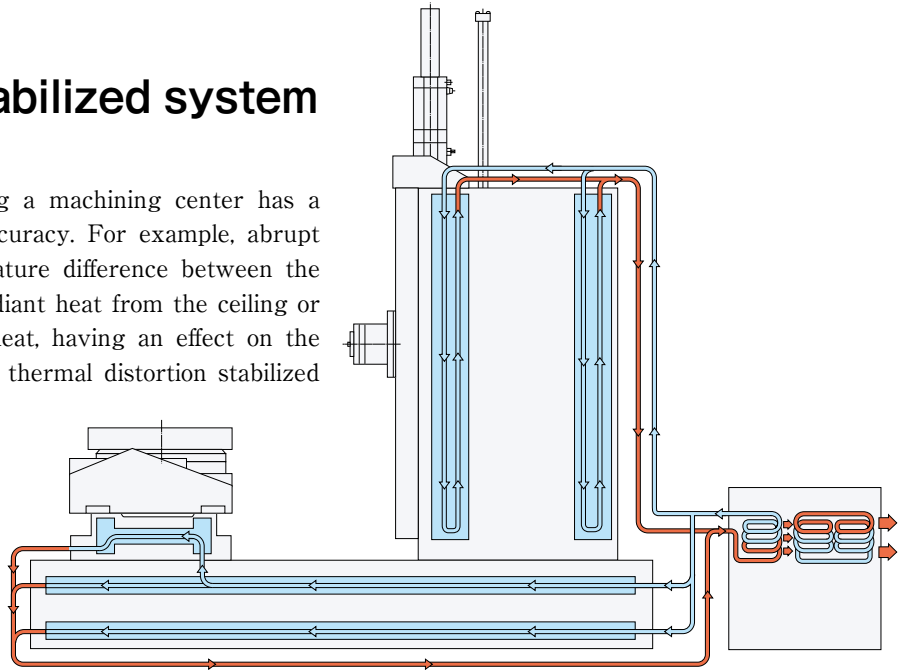


# YASDA's unique accuracy retention system

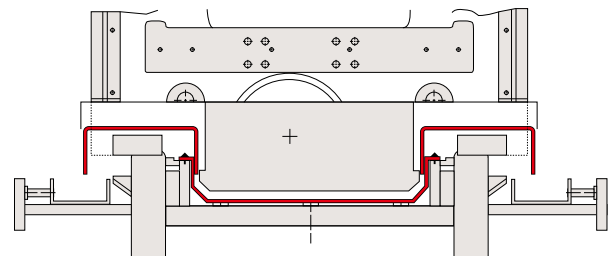
YASDA constructs its unique machine-body accuracy retention system to prevent processing precision from deteriorating due to machine-body heat deformation as a result of heat propagation and transmission of various heat such as heat generated from the working part of the machine body or heat caused by the factory environment.

## Thermal distortion stabilized system (Special specification)

The factory environment for establishing a machining center has a profound effect on the machine body accuracy. For example, abrupt changes in room temperature, a temperature difference between the upper and lower parts in a room, and radiant heat from the ceiling or wall always distorts machinery due to heat, having an effect on the accuracy of the machine body. YASDA's thermal distortion stabilized system minimizes the effect the factory environment has on the machine body. It realizes always-stable high-precision processing by circulating the liquid coolant controlled at room temperature  $\pm 0.2^{\circ}\text{C}$  in the main component to prevent abrupt thermal distortion of the machine body.



Thermal distortion stabilizing oil to the bed



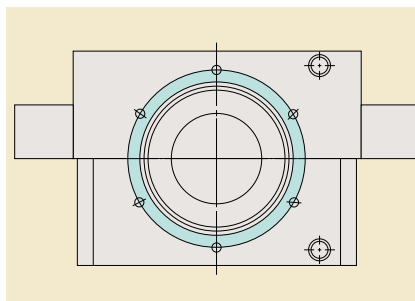
## Structure to prevent heat transfer to the bed

If the liquid coolant or chips taking on heat drop onto the bed, the bed will be thermally distorted. YASDA maintains high accuracy of the machine body by placing covers over the slide way and bed to prevent this thermal distortion.



## Cooling of ball screw bracket

The machine body distortion caused by heat transfer becomes a major impediment to positioning accuracy. YASDA prevents the thermal distortion of the machine body caused by bearing heat generated by providing an oil jacket for a ball screw bracket and circulating cooling oil.



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## Improvement in chip discharge capacity/Doubling the capacity of sliding surface oiling device

To enable productivity improvement in and unattended processing for an extended period of time, new functions and mechanisms are provided in many places as follows:

- (1) The improvement in chip discharge capacity is realized by additionally establishing a screw conveyor in the Z-axis direction of the machine to adapt to a large quantity of chips.
- (2) The capacity of the sliding surface oiling device doubles the conventional one to enable unattended operation for an extended period of time.
- (3) Sliding surface oil recovery devices are located at one point to improve the ease of maintenance.
- (4) Water-oil separation and recovery is performed for a water-soluble coolant to reduce the quantity of waste oil.



## Consideration of workability and safety

To ensure excellent workability and safety is an indispensable factor to stably perform high-efficiency production. YASDA is committed not only to high precision but also to the development of user-friendly safe machining centers, making innovations and improvements in each machine body location.

The following is one example of the above:

### Manual tool changer

In the case where tools are manually removed from the stocker of a large machine where a wide variety of tools are stored, especially handling of heavy tools not only imposes a substantial burden upon personnel but also involves danger.

YASDA, considering workability and safety in such conditions, provides a “manual tool changer” to be selected as a special specification.



### Ensuring high visibility

High visibility, which further surpasses that of conventional machines, is realized to ensure safer work for personnel working inside and outside of the machine. Workability inside the machine is also significantly improved. The “slide steps inside the machine” which can safely expand the work area are provided as an option.



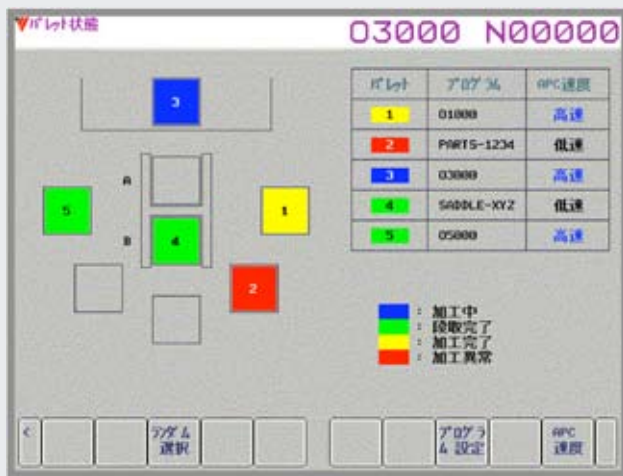
Man-to-machine interface that connects man to machine

# OpeNe | Operator + Machine



## Standard version

A creative operating system, "YASDA OpeNe" is a unique system that simplifies the operating system of the machine, enabling user-specific settings.



### Work management function

The well-developed work management function enables detailed settings such as the program and registration destinations per pallet, and the processing order in the case of multifaceted pallets.



### Comprehensive auxiliary screen

The machine status can be grasped instantaneously to enable stable high productivity to be maintained.



### Battery change notification function

The battery change time is notified with a message to prevent troubles due to battery exhaustion and reduces maintenance burdens.



### Free setting/change screen

The operation screen that enables user-specific settings and changes is provided.

Man-to-machine interface that connects man to machine

# OpeNe | Operator + Machine



## Extended version

In addition, "YASDA OpeNe" is equipped with various functions that assist automation, such as the tool life management function, production control function, and stored tooling content confirmation function, to achieve high productivity and automation. In addition, wide-ranging needs such as machined product accuracy management can be met.

▼工具情報管理 01000 N00000

管理番号	工具番号	セット番号	グループ	工具寿命管理方法	寿命初々	最大寿命	予告寿命	寿命状態
101	1001	101	1	時間	3:45:19	5:00:00	0:30:00	有
102	1002	102	1	時間	0:55:00	3:00:00	0:30:00	有
103	1003	103	1	時間	7:26:00	10:00:00	1:00:00	有
104	1004	104	1	回数	2:00:00	2:00:00	0:30:00	有
105	1005	105	1	回数	70	200	10	有
106	1006	106	2	時間	0:00:00	1:00:00	0:00:00	有
107	1007	107	2	時間	4:00:00	4:00:00	0:00:00	有
108	1008	108	2	時間	0:00:00	7:00:00	0:00:00	有
109	1009	109	2	時間	1:50:00	2:00:00	0:15:00	有
110	1010	110	2	時間	0:00:00	4:00:00	0:30:00	有
111	1011	111	1	時間	0:00:00	5:00:00	0:00:00	有
112	1012	112	1	時間	4:47:00	3:00:00	0:30:00	有
113	1013	113	1	時間	0:00:00	1:00:00	0:00:00	有
114	1014	114	1	回数	25	100	10	有
115	1015	115	5	時間	0:00:00	3:00:00	0:30:00	有

編集 検索 グループ一覧 個別 入換工具

▼加工時間実績 01000 N00000 2012-08-23 14:35:31

プログラム番号/名称	バレット番号	加工開始日付	開始時刻	終了日付	終了時刻	自動運転時間	加工結果
01000	1	2012/08/22	07:00	08/22	08:45	1:45:50	正常
02000	2	2012/08/22	08:50	08/22	10:53	2:03:11	正常
03000	3	2012/08/22	10:55	08/22	11:34	0:39:47	正常
04000	4	2012/08/22	12:50	08/22	14:08	1:18:25	正常
05000	5	2012/08/22	14:15	08/22	14:41	0:26:58	中断
01000	1	2012/08/22	14:50	08/22	16:35	1:45:50	正常
02000	2	2012/08/22	16:45	08/22	18:11	1:26:33	異常
03000	3	2012/08/22	18:15	08/22	18:54	0:39:47	正常
04000	4	2012/08/22	19:30	08/22	20:48	1:18:25	正常
05000	5	2012/08/23	08:40	08/23	09:06	0:26:58	正常
01000	1	2012/08/23	09:18	08/23	10:55	1:45:50	正常
02000	2	2012/08/23	11:00	08/23	11:14	0:14:09	中断
03000	3	2012/08/23	11:30	08/23	12:09	0:39:47	正常
04000	4	2012/08/23	12:10	08/23	13:28	1:18:25	正常
05000	5	2012/08/23	13:30	08/23	13:56	0:26:58	正常
01000	1	2012/08/23	14:00			0:35:20	加工中

検索 稼働アツ 異常一覧 補助稼働一覧 出力 F出力 USB出力 時間表示替

### Tool management function

Well-developed management functions such as tool life management and spare tool management

### Production control function

The operating conditions of the machine are summarized and displayed. Data of the processing program, and operating rate and operating hours on a daily basis are tabulated and displayed as graphs.

▼収納工具確認(工具一覧) 01000 N00000

プログラム	工具番号	セット番号	工具長形状	工具長摩耗	工具径形状	工具径摩耗	寿命状態
1	1001	101	367.2132	0.0372	0.0000	0.0000	有
2	1002	102	418.2950	0.0000	0.0000	0.0000	有
3	1003	103	363.6780	0.0000	0.0000	0.0000	有
4	1004	104	344.6514	0.0000	0.0000	0.0000	有
5	1005	105	308.0170	0.0245	17.0000	17.0000	有
6	1006	106	365.4500	0.0000	0.0000	0.0000	有
7	1007	107	422.1653	0.0000	0.0000	0.0000	有
8	2000						未登録
9	3000	120	325.0462	0.0000	-20.0000	-20.0000	有

編集 補正/寿命

### Stored tooling content confirmation system

This is a new function created by enhancing the "tool check function before processing" of MiPS, which is highly valued as YASDA's unique control system.

Conditions of all the tools used are set before processing to judge the approval or prohibition of the use and support high precision and high-grade processing.

In the case of multifaceted pallets, the order of priority is assigned to the pallet with the work that can be processed with the target tool.

This realizes flexible processing with high productivity.

# SPECIFICATIONS

**YBM 10T-100TT**

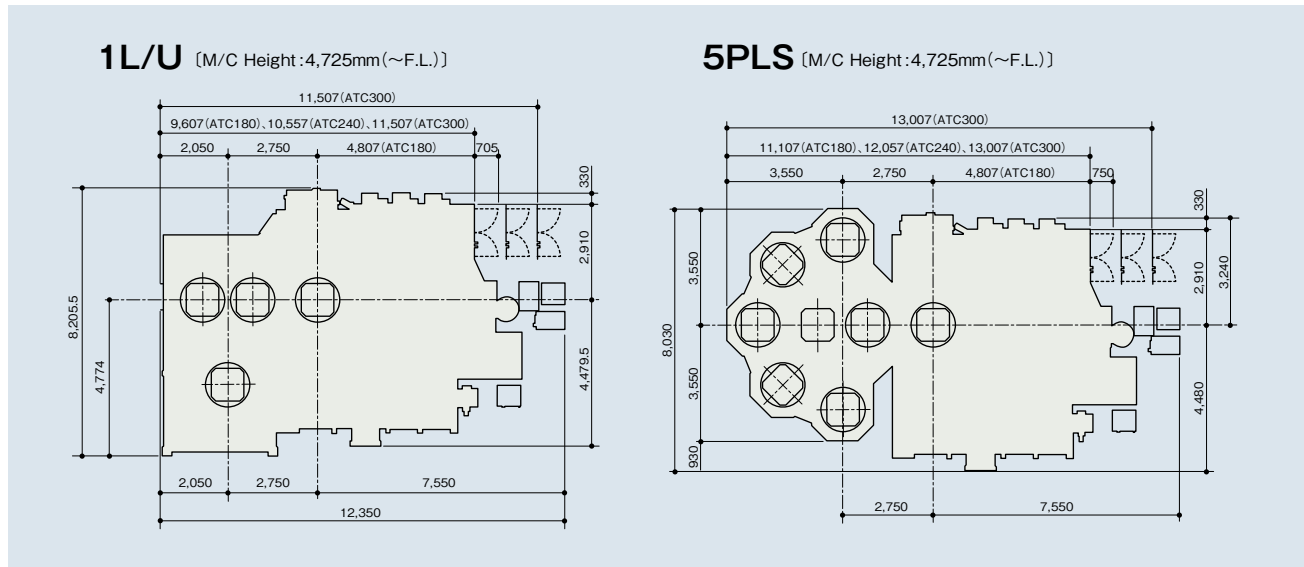
Machine body specifications	
<b>Amount of travel</b>	
X-axis travel (Longitudinal movement of table)	1,500mm
Y-axis travel (Vertical movement of spindle)	1,200mm
Z-axis travel (Cross movement of column)	1,100mm
Distance from table top surface to spindle center (A-axis horizontal)	-400~800mm
Distance from table centerline to spindle nose (A-axis horizontal)	200~1,300mm
Min. distance from table top surface to spindle nose (A-axis vertical)	200mm
<b>Rotary table A- and B-axes</b>	
Size of table working surface	1,000×1,000mm
Table maximum loading capacity/moment	(Horizontal)2,000kg/(Vertical)500kg·m
Table top surface configuration	109-M16tap
Max. turning diameter of work	φ1,350mm
Max. work height	595mm(Conditional: 900 mm)
<b>Spindle</b>	
Spindle type	SA50-10000-22(Preload self-adjusting type spindle)
Spindle speed	Standard 50~10,000min <sup>-1</sup> Option 50~8,000min <sup>-1</sup> (High-torque spec.)
Spindle motor	AC18.5/22kW(Continuous/30-minute rating)
Tapered bore of spindle	7/24 NT No.50
<b>Feed rate</b>	
Rapid feed rate	(X-axis, Y-axis, Z-axis)16,000mm/min (B-axis)2,160deg/min, (A-axis)720deg/min
Cutting feed rate	(X-axis, Y-axis, Z-axis)Max.5,000mm/min(Standard) (B-axis)2,160deg/min, (A-axis)720deg/min
Min. setting unit	0.0001mm (deg)
Automatic tool changer	60 pcs.
Max. tool diameter/length/mass	φ300mm / 440mm / 20kg
Automatic pallet changer	Rotary shuttle system, Number of pallets:2 pallets
Pallet chucking system	w/pallet setting check function
Mass of machine body	Approx. 36,000kg
Power source capacity	150kVA
NC equipment	FANUC31i-B5

**YBM 10T-TH**

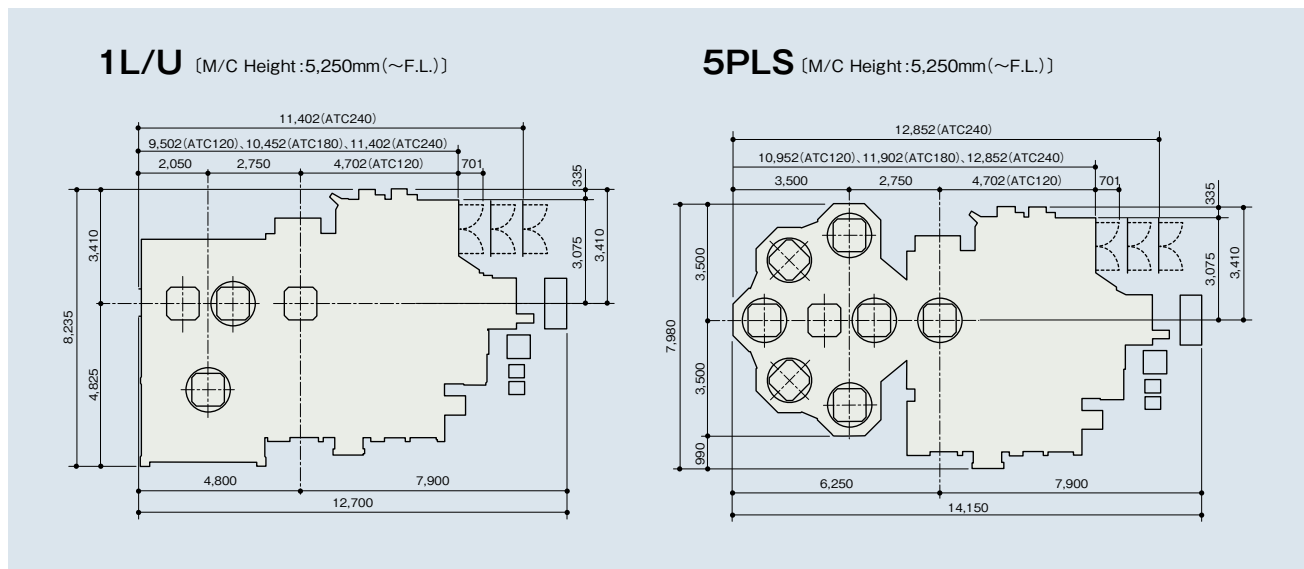
Machine body specifications	
<b>Amount of travel</b>	
X-axis travel (Longitudinal movement of table)	1,500mm
Y-axis travel (Vertical movement of spindle)	1,500mm
Z-axis travel (Cross movement of column)	1,800mm
Distance from table top surface to A-axis rotation center	0~1,500mm
Distance from B-axis rotation center to A-axis rotation center	0~1,800mm
Distance from A-axis rotation center to spindle end face	450mm
Min. distance from A-axis rotation center to pallet top surface	0mm
Min. distance from B-axis rotation center to A-axis rotation center	0mm
Distance from A-axis rotation center to column front face	835mm
<b>Rotary table B-axis</b>	
Size of table working surface	1,000×1,000mm
Table maximum loading capacity/moment	5,000kg
Table top surface configuration	109-M16 tap
Max. turning diameter of work	φ1,350mm
Max. work height	1,500mm
<b>Spindle</b>	
Spindle type	SA50-6000-30(Preload self-adjusting type spindle)
Spindle speed	Standard 50~6,000min <sup>-1</sup> Option 50~10,000min <sup>-1</sup>
Spindle motor	AC26/30kW(Continuous/30-minute rating)
Tapered bore of spindle	7/24 NT No.50
<b>Feed rate</b>	
Rapid feed rate	(X-axis)45,000mm/min (Y-axis,Z-axis)16,000mm/min (B-axis)3,600deg/min, (A-axis)1,800deg/min
Cutting feed rate	(X-axis, Y-axis, Z-axis)Max.5,000mm/min(Standard) (B-axis)1,440deg/min, (A-axis)1,080deg/min
Min. setting unit	0.0001mm (deg)
Automatic tool changer	60 pcs.
Max. tool diameter/length/mass	φ300mm / 440mm / 20kg
Automatic pallet changer	Rotary shuttle system, Number of pallets:2 pallets
Pallet chucking system	w/pallet setting check function
Mass of machine body	Approx. 47,500kg

# OUT LINE

## YBM 10T-100TT



## YBM 10T-TH



# YASDA

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