

## PBM series

### Precision boring machining center

- Hartrol plus controller
- 5-year warranty on guideways
- Maximum cutting torque: 6520N-m
- W-axis supported by two linear guideways
- B-axis repetitive positioning accuracy:  $\pm 8''$



Website



FaceBook



Hartford has sold more than 46,000 machines to all over the world, accumulated more than 37,000 customers, who absolutely affirm Hartford's manufacturing experience and ingenious machine manufacture technology. We insist on providing customers with the best quality machining centers. We will devote more carefully, in order to continuously enhance the technical level of manufacture and applications.

**Hartford**  
*innovation*

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# Optimized Cutting Efficiency

The optimized cutting efficiency and capability of Hartford Precision Boring is your best partner.



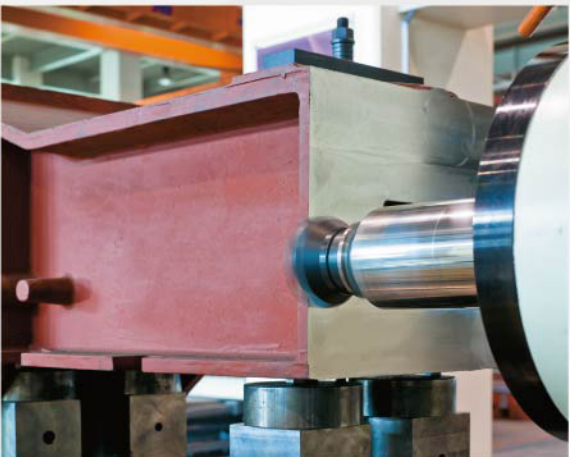
1. Component of wind power generation



2. Vertical machine head

# Actual Cutting Test

Model: Machine: PBM-135  
Spindle: Spindle: 2,500 rpm Gear type 26kW  
Cutting material: S45C



**Face milling**  
Tool diameter :  $\phi$  160 mm  
Feedrate: 2,550 mm/min  
Cutting depth: 2.5 mm  
Cutting width: 65 mm  
Cutting volume: 765 cc/min  
Spindle speed: 500 rpm/min



**Tapping**  
Tool diameter : M42xP4.5  
Feedrate: 315 mm/min  
Spindle speed: 70 rpm/min



**Drilling**  
Tool diameter :  $\phi$  76 mm  
Feedrate: 120 mm/min  
Spindle speed: 300 rpm/min

All the test results featured in this catalogue were produced under strict testing condition in a special zed testing environment. Under different testing conditions and in less than ideal testing environments, that the test results may vary from those shown in this catalogue.



## Tough, rugged and durable for MVP

With the extra rigid structure design, the Hartford PBM series precision boring milling machine features greater durability, stability and accuracy.

The picture shows PBM-135A/B



### Full range of box guideway five-year warranty

Warranty coverage will not apply under the following conditions,

- 1.Improper operation (collision)
- 2.Lack of regular cleaning of accumulated debris causing damaged to the linear rails & carriages.

### Oversized column design (PBM-135)

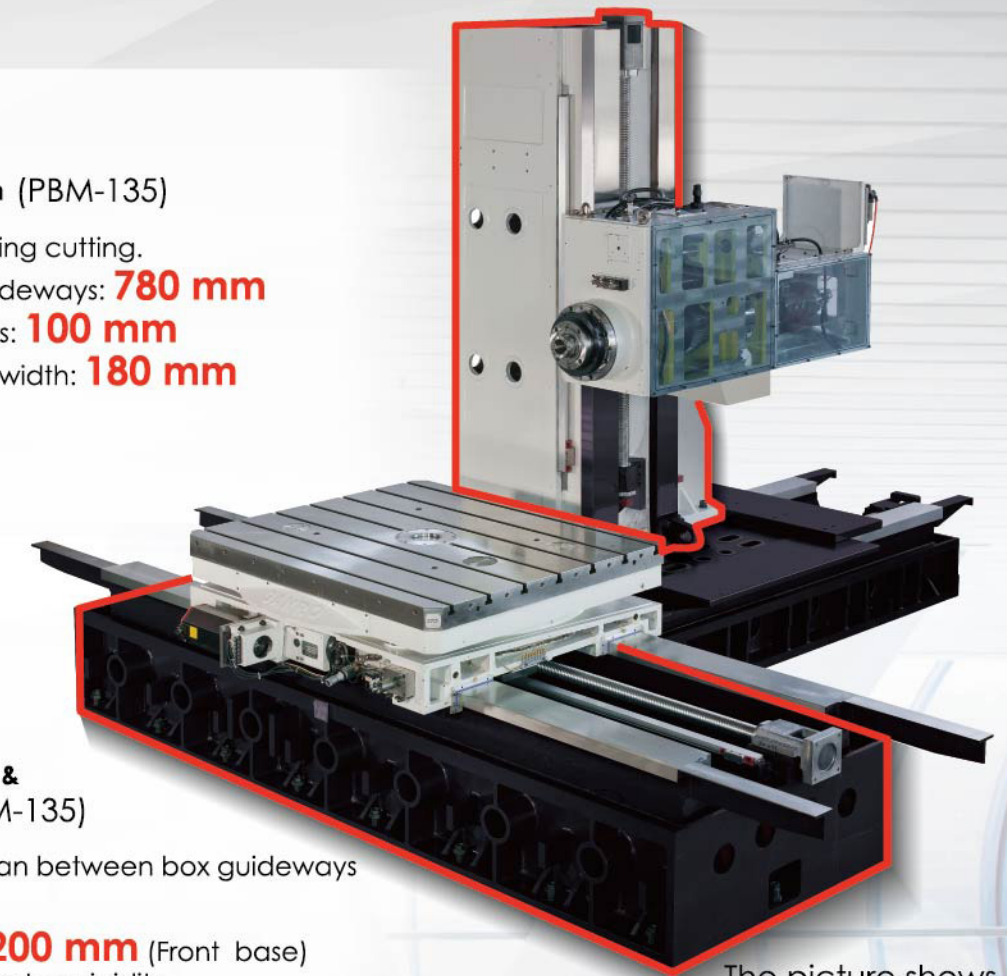
- For greater stability during cutting.
- Span between box guideways: **780 mm**
- Box guideway thickness: **100 mm**
- Box guideway surface width: **180 mm**

### Specially design on front & rear base structure (PBM-135)

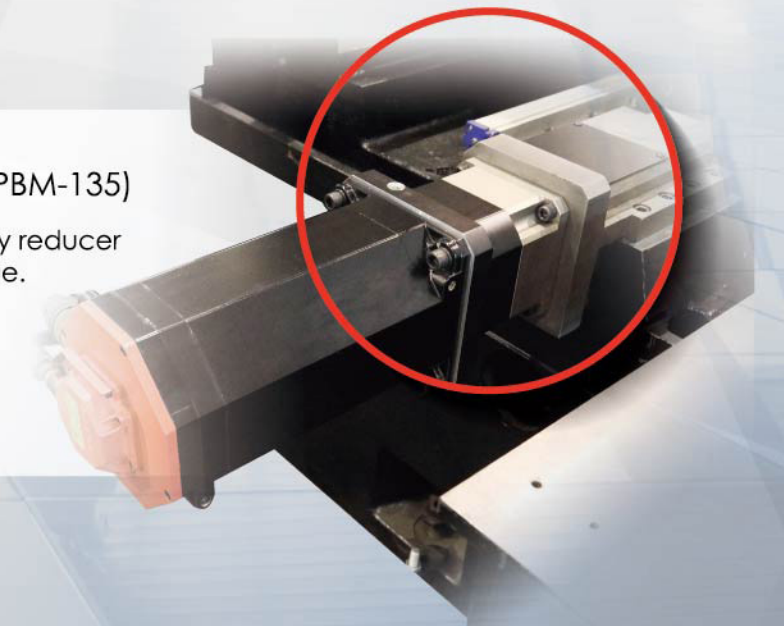
- Widen base design, span between box guideways **1080 mm**,  
box guideway width: **200 mm** (Front base)
- Increased machine structure rigidity.
- Span between box guideway: **1140 mm**,  
box guideway width: **250 mm** (Rear base)

### X/Y/Z direct-connected drive system (PBM-135)

- X & Z axis are designed with planetary reducer enhance the overall axial drive torque.
- Y axis is direct-connect drive delivers high speed and less noise.
- Available with PBM-135



The picture shows PBM-115A/B





## High Rigidity & High Accuracy Spindle

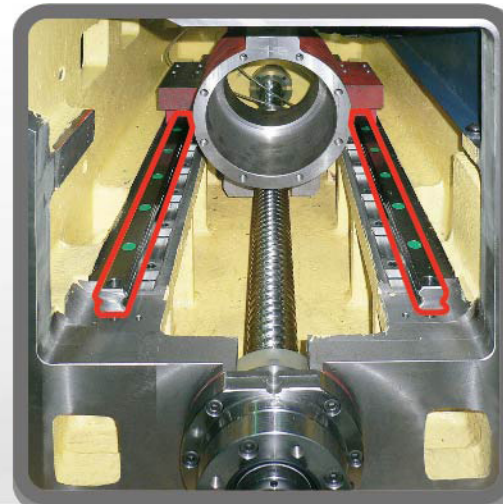
### Heavy duty precision spindle

- The spindle supported by D4 class bearings guarantee superior dynamic running accuracy.
- Bearings & gear box are designed with cooling lubrication system so that spindle thermal problem can be reduced and prolong lifespan of parts.
- PBM-115 Spindle diameter:  $\phi$  110mm
- PBM-135 Spindle diameter:  $\phi$  130 mm
- PBM-115 W-axis travel: 500 mm
- PBM-135 W-axis travel: 700 mm



### W-axis supported by two linear guideways

- Increases the supported rigidity of W-axis.
- Increase the accuracy of W-axis.
- Delivers greater supporting capacity.

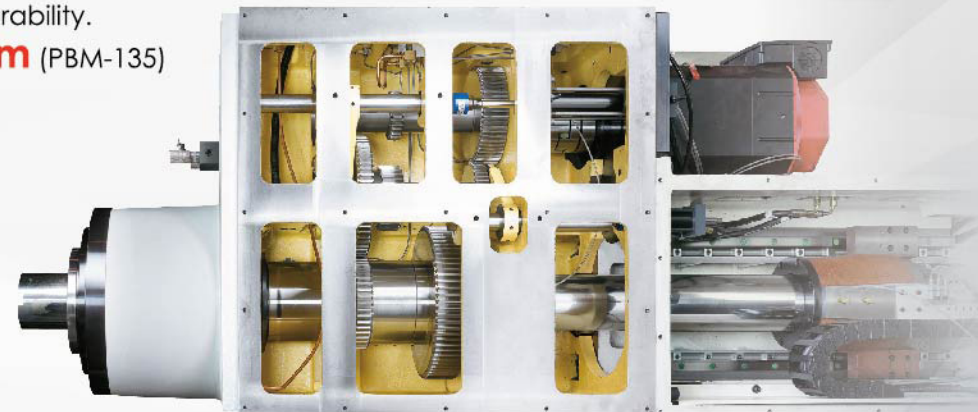


### Gear-driven spindle

- The spindle is driven by gear box.
- Allowing for 4-step speed change delivers higher torque output and durability.
- Spindle torque is **6527 N-m** (PBM-135)

### High rigidity spindle stock

- The spindle stock is a high rigid box type construction.
- Ensures maximum stability during boring cutting.



## A Variety of Accessories

### Universal head

- Spindle taper: #50
- Max. tool diameter:  $\phi$  200
- Tool clamping: Manual
- Max. power: 55 kW
- Max. speed: 1000 rpm
- Indexing method: Manual



### 90 degree head

- Spindle taper: #50
- Max. tool diameter:  $\phi$  200
- Tool clamping: Manual
- Max. power: 55 kW
- Max. speed: 1000 rpm
- Indexing method: Manual



### 90 degree extension

- Spindle taper: #50
- Max. tool diameter:  $\phi$  150
- Tool clamping: Manual
- Max. power: 38 kW
- Max. speed: 1000 rpm
- Indexing method: Manual



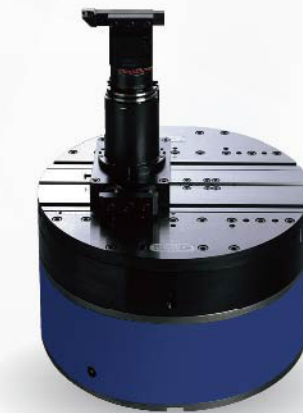
### Quill support

- Spec.:  
300L (PBM-115)  
310L (PBM-135)  
510L (PBM-135)
- Max. speed: 1500 rpm



### U-axis head(UT-360S)

- Travel: 120 mm
- Feedrate: 400 mm
- Max. speed: 500 rpm
- Torque: 400 N-m
- Weight: 130 kg



### Angle plate

- With standard fixtures provide customer a requirement fixtures on machining.





# Intelligent Controller- Hartrol Plus

## What is Hartrol plus?

- 19" multi-touch screen
- IPC is equipped with the Windows operating system
- The world's fastest CNC
- Automatic feed system control function

By the use of open architecture, we begin to enter a new era of intelligent processing.  
In addition to basic functions, we have joined hardware and software exclusively developed by Hartford. Software can be added to and updated at any time with each new features.



## An Intelligent Controller

With three major solutions, Hartrol plus takes your machining to the next level.  
Highly optimized and intelligent controls bring even more capabilities and productivity to your metal cutting processes.  
With ease of use, advanced automation, and smart data collection, Hartrol plus is essential tool for enhancing performance on your production floor.

The difference between Hartrol plus and others

Function	Hartrol plus 1 	Others
Screen Size	19" Multi-touch Panel	10.4"(OPT:15")
Hard Drive	32GB SSD	NO
Smoothing Interpolation	SSS-4G	Option
Look Ahead Block	2700	400(1000 Max.)

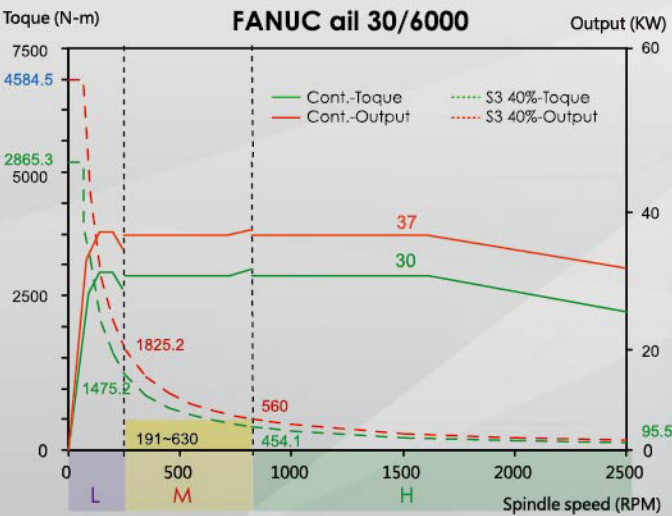
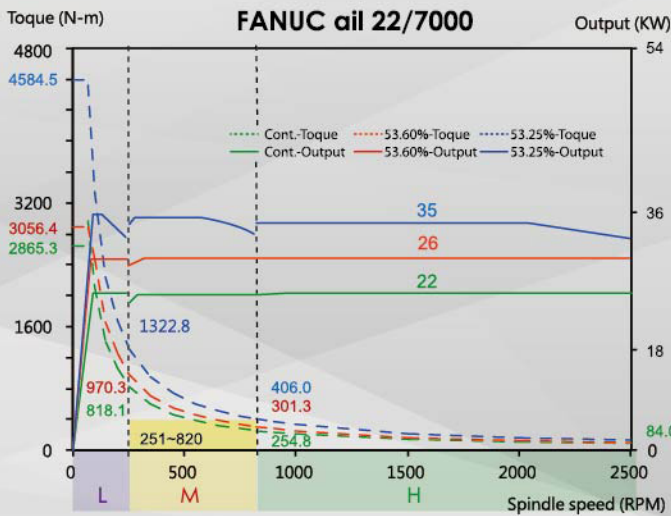
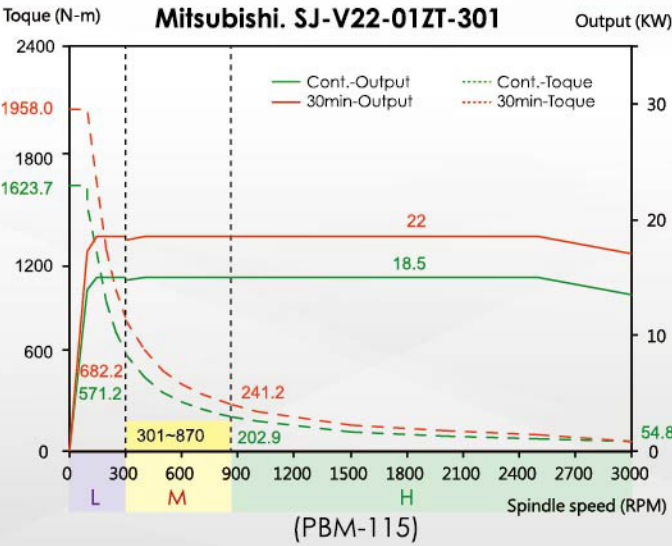
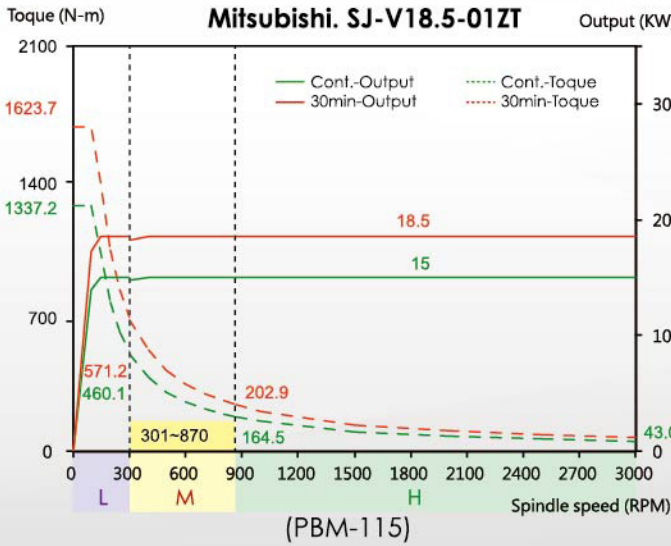
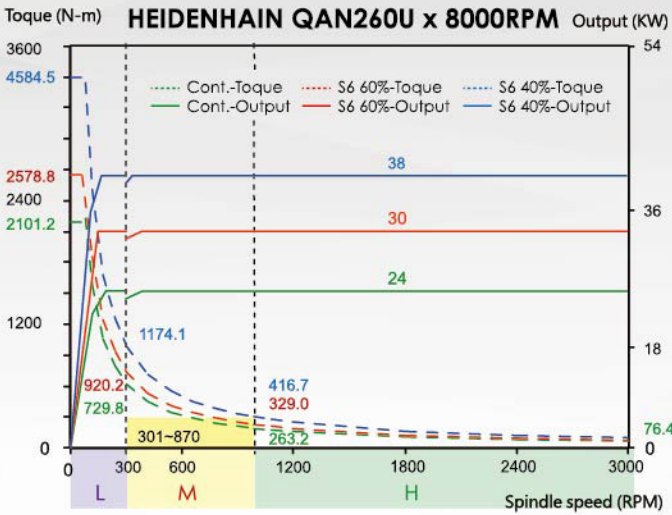




Spindle Torques

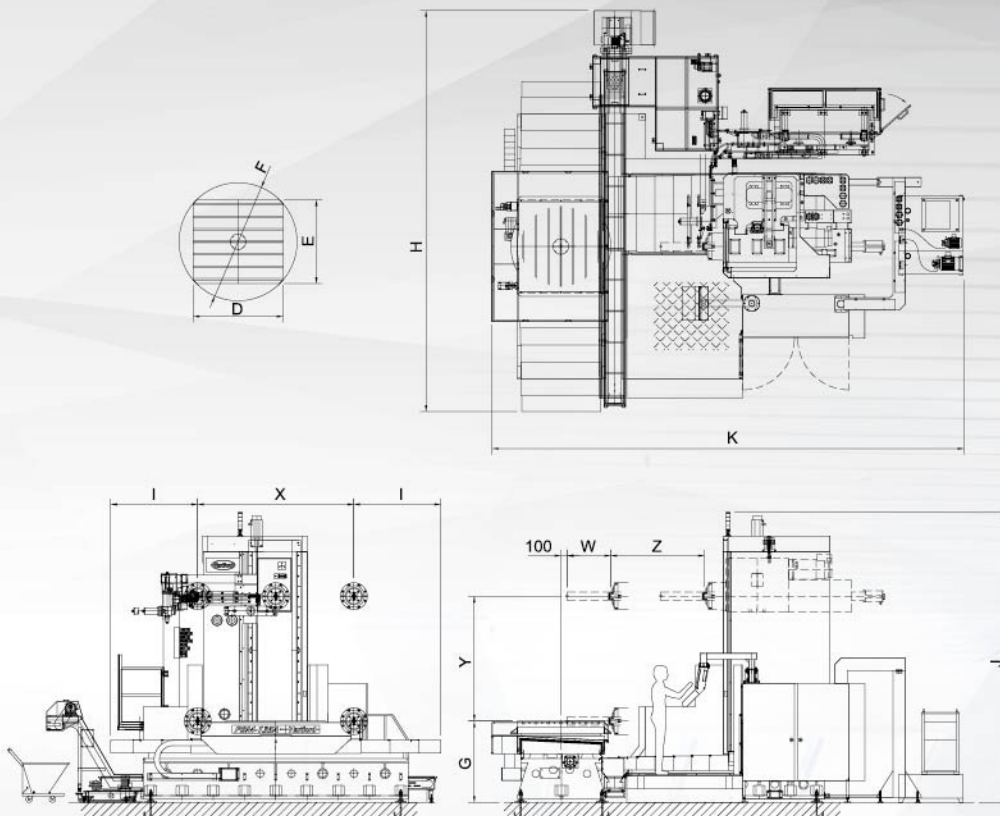
BBT option

- Dual contact between the contact and the flanges.
- Improves the rigidity, accuracy, speed and performance.
- Radial deflection, vibration and deviation are significantly reduced.



-----低Cont.-Torque -----低 S3 60%-Torque -----低 S3 25%-Torque  
-----中Cont.-Torque -----中 S3 60%-Torque -----中 S3 25%-Torque  
-----高Cont.-Torque -----高 S3 60%-Torque -----高 S3 25%-Torque  
-----低Cont.-Output -----低 S3 60%-Output -----低 S3 25%-Output  
-----中Cont.-Output -----中 S3 60%-Output -----中 S3 25%-Output  
-----高Cont.-Output -----高 S3 60%-Output -----高 S3 25%-Output

Machine Dimension



(Picture shown without guring)

Unit:mm

Model	X X-axis travel	Y Y-axis travel	Z Z-axis travel	W W-axis travel	D Length of table	E Length of table
PBM-115A	2000	1600	1500	500	1600	1400
PBM-115B	2000	1600	1500	500	1800	1600
PBM-135A, X=2.5M	2500	2000	1500	700	1600	1400
PBM-135B, X=2.5M	2500	2000	1500	700	1800	1600
PBM-135A, X=3M	3000	2000	1500	700	1600	1400
PBM-135B, X=3M	3000	2000	1500	700	1800	1600
PBM-135C, X=3M	3000	2000	1500	700	2000	1800
PBM-135A, X=4M	4000	2000	1500	700	1600	1400
PBM-135B, X=4M	4000	2000	1500	700	1800	1600
PBM-135C, X=4M	4000	2000	1500	700	2000	1800
PBM-135P2	2000	2000	1500	700	2000	1500
PBM-135P3	3000	2000	1500	700	3000	1500

Unit:mm

Model	F Max.table size	G Distance from floor to table	H Width of machine (including frame)	I Distance from spindle to frame	J Height of machine	K Height of machine
PBM-115A	Ø2400 x 1600H	1300	5463	1493	4088	7256
PBM-115B	Ø2400 x 1600H	1300	5463	1493	4088	7256
PBM-135A, X=2.5M	Ø2400 x 2000H	1400	6417	1493	4744	7635
PBM-135B, X=2.5M	Ø2400 x 2000H	1400	6417	1493	4744	7635
PBM-135A, X=3M	Ø3000 x 2000H	1400	7417	1770	4744	7635
PBM-135B, X=3M	Ø3000 x 2000H	1400	7417	1770	4744	7635
PBM-135C, X=3M	Ø3000 x 2000H	1400	7417	1770	4744	7635
PBM-135A, X=4M	Ø3500 x 2000H	1400	8417	1846	4744	7635
PBM-135B, X=4M	Ø3500 x 2000H	1400	8417	1846	4744	7635
PBM-135C, X=4M	Ø3500 x 2000H	1400	8417	1846	4744	7885
PBM-135P2	2000L x 1500W	1150	6417	1743	4644	7615
PBM-135P3	3000L x 1500W	1150	8510	2343	4644	7615



## Inspection Results

### Straightness of table (X-axis) moves in R&L direction

Inspection item	Hartford PBM
R&L direction (vertical surface)	0.03 / 1000 mm
Forward & backward direction (vertical surface)	0.03 / 1000 mm

### Spindle hole runout

Inspection item	HartfordPBM
Fixed side(20mm)	0.015 / 20 mm
At 300mm of testbar	0.025 / 300mm

### Positioning & repetitive accuracy of linear movement (PBM-135A)

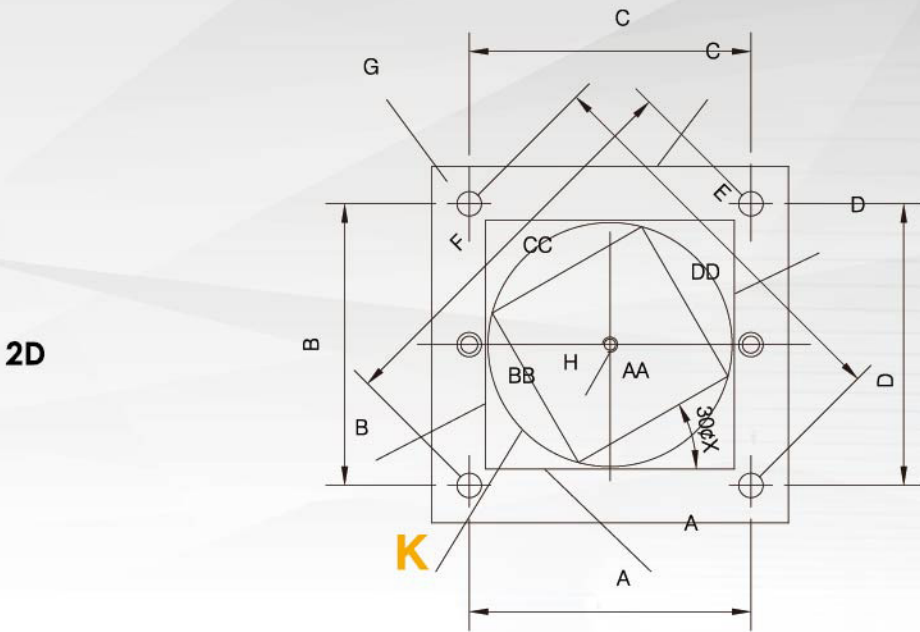
Inspection item	Positioning accuracy	Repetitive accuracy
X / Y / Z -axis	±0.010/ Full travel	±0.006/ Full travel
W -axis	±0.010/ Full travel	±0.005/ Full travel

### Positioning & repetitive accuracy of linear movement with linear scale (PBM-135A)

Inspection item	Positioning accuracy	Repetitive accuracy
X / Y / Z -axis	±0.007/ Full travel	±0.003/ Full travel
W -axis	±0.010/ Full travel	±0.005/ Full travel

### Boring accuracy report: 0 °-180 ° boring (PBM-135A)

Inspection item	JIS standard	Measured value
X -axis deviation	0.06 / 1000 mm	0.03
Z -axis deviation	0.06 / 1000mm	0.03



	Inspection item	Tolerance	Test result	Remarks
Boring positioning accuracy	Positioning accuracy A (300mm)	0.025	0.0078	(⊕)
	Positioning accuracy B (300mm)	0.025	0.0062	(⊕)
	Positioning accuracy C (300mm)	0.025	0.0076	(⊕)
	Positioning accuracy D (300mm)	0.025	0.0056	(⊕)
	Positioning accuracy E (300mm)	0.035	0.0057	(⊕)
	Positioning accuracy F	0.035	0.0134	(⊕)
Circular cutting	Roundness K	0.04	0.0096	(○)
Side milling accuracy	Straightness A	0.015	0.0047	(—)
	Straightness B	0.015	0.0052	(—)
	Straightness C	0.015	0.0055	(—)
	Straightness D	0.015	0.0046	(—)
	Squareness A&B	0.03	0.0140	(⊥)
	Squareness B&C	0.03	0.0146	(⊥)
	Squareness C&D	0.03	0.0148	(⊥)
	Squareness D&A	0.03	0.0141	(⊥)
	Parallelism A&C	0.03	0.0122	(//)
	Parallelism B&D	0.03	0.0112	(//)
Linear interpolation end milling accuracy	Straightness AA	0.02	0.0020	(—)
	Straightness BB	0.02	0.0044	(—)
	Straightness CC	0.02	0.0027	(—)
	Straightness DD	0.02	0.0021	(—)
	Squareness AA & BB	0.04	0.0028	(⊥)
	Squareness BB & CC	0.04	0.0048	(⊥)
	Squareness CC & DD	0.04	0.0056	(⊥)
	Squareness DD & AA	0.04	0.0058	(⊥)
	Parallelism AA & CC	0.04	0.0050	(//)
	Parallelism BB & DD	0.004	0.0060	(//)

Inspection accuracy on each machine may vary with accessories and cutting conditions



Machine Specifications

Model	Unit	PBM-115 A/B	PBM-135 A/B	PBM-135 A/B/C
<b>Table</b>				
Working surface	mm	1400x1600(A) / 1600x1800(B)	(X=2.5M)Standard 1400x1600 (A) / 1600x1800 (B)	(X=3M) 1400x1600 (A) / 1600x1800 (B) / 1800x2000(C)
T-slot(Size×Number×Pitch)	mm	22x7x220(A) / 22x7x225(B)	22x7x200 (A) / 22x7x225 (B)	22x7x200 (A) / 22x7x225 (B/C)
Max. table load	Kg	8000(A) / 12000(B)	8000(A) / 12000(B)	8000 (A) / 12000 (B) / 15000 (C)
Min. indexing degree	deg.	0.001	0.001	0.001
Max. rpm	rpm	2	2	2
Max. rotating range	mm	2400	2400	3000
<b>Travel</b>				
Longitudinal travel (X-axis)	mm	2000	2500	3000
Cross travel (Y-axis)	mm	1600	2000 (2500 opt.)	2000 (2500 opt.)
Vertical travel (Z-axis)	mm	1500	1500	1500
W-axis travel	mm	500	700	700
<b>Spindle</b>				
Spindle diameter	mm	110	130	130
Spindle sleeve	mm	225	245	245
Spindle nose taper		#50	#50	#50
Spindle speed (Gear type)	rpm	3000	2500	2500
<b>Feed</b>				
Cutting feed rate (X・Y・Z axis)	m/min	6/6/6	5/5/5	5/5/5
Rapid traverse (X・Y・Z axis)	m/min	15/12/15	10/10/10	10/10/10
Rapid traverse (W-axis)	m/min	6	6	6
<b>Motor</b>				
Spindle motor(Fanuc)	kw	18.5/25	26/35	26/35
<b>ATC</b>				
Tool storage capacity	Pcs	40 (60 opt.)	40 (60 opt.)	40 (60 opt.)
Max. tool weight	Kg	25	25	25
Max. tool size (diameter×length)	mm	125x400	125x400	125x400
Max. adjacent tool size(dia.x length)	mm	250x400	250x400	250x400
<b>Positioning Accuracy</b>				
3 axes laser positioning accuracy (JIS B6330)				
Positioning accuracy/Full travel	mm	±0.008	±0.008	±0.010
Repetitive positioning accuracy	mm	±0.003	±0.003	±0.003
3 axes laser positioning accuracy (VDI 3441)/Repeated 5 times				
Positioning accuracy	mm	0.015	0.015	0.015
Repetitive positioning accuracy	mm	0.012	0.012	0.013
VDI3441 accuracy available upon order request				
<b>Other</b>				
Coolant Capacity (L)	L	310	310	310
Required Air Pressure	kg/cm2	6.5	6.5	6.5
Electric power consumption	KVA	65	65	65
Machine dimension	mm	6800x8250(CTS:7000x10000)	7370x8650(CTS:8082x10435)	8370x8650
Machine Weight	kg	25000/27000	30000/32000	32000/34000/35000

Standard & Optional Electrical Functions

Standard-Mechanical

- B-axis 0.001°
- Fluorescent lamp x1 (full-enclosed)
- RS-232 interface
- Spindle oil cooler
- Tool ARM Type Tool Magazine\_40 pcs
- Automatic Power OFF
- 2500 rpm gear type spindle (PBM-135)
- Work finish lamp
- Air blast through spindle
- MPG
- Lubrication system
- Convection Heat Exchanger In Control Box

- X, Y, Z-axis linear scale system(FAGOR)
- B-axis linear scale system (Heidenhain)
- Mist coolant system
- Table side air blast

Optional-Mechanical

- Full-enclosed splash guard (For CTS)
- Coolant through system
- Full-enclosed splash guard
- Universal milling head
- 90 degree milling head

PBM-135 A/B/C	PBM-135P2	PBM-135P3
(X=4M) 1400x1600 (A) / 1600x1800 (B) / 1800x2000(C) 22x7x200 (A) / 22x7x225 (B/C) 8000 (A) / 12000 (B) / 15000 (C) 0.001 2 3000	Plane table type 1500x2000 22x200x7 10000 - - -	Plane table type 1500x3000 22x200x7 12000 - - -
3000 2000 (2500 opt.) 1500 700	2000 2000 1500 700	3000 2000 1500 700
130 245 #50 2500	130 245 #50 2500	130 245 #50 2500
5/5/5 10/10/10 6	5/5/5 10/10/10 6	5/5/5 10/10/10 6
26/35	26/35	26/35
40 (60 opt.) 25 125x400 250x400	40 (60 opt.) 25 125x400 250x400	40 (60 opt.) 25 125x400 250x400
±0.010 ±0.003 0.015 0.013	±0.008 ±0.003 0.015 0.013	±0.010 ±0.003 0.015 0.013
310 6.5 65 9470x8650 34000/36000/37000	310 6.5 65 7370x8650 30000	310 6.5 65 9470x8650 34000

Optional-Mechanical

- 90 degree extension head
- Coolant system
- Shaft Support Block
- Portable chip bucket
- Link type chip conveyor
- Auto. tool probe
- Foot Switch for spindle Clamp/Unclamp
- Air gun
- Wash down hose
- Oil skimmer
- X, Y, Z-axis linear scale system(Heidenhain)

Electrical

Hartol (Standard)

- Workpiece calibration by MPG directly
- Parameter package
- Tool magazine display(0i&31i only)
- Tool status display
- Utilization rate of machining
- Machining time countdown
- B-axis workpiece calibration (manually)

Hartnet (Optional)

- Management system of utilization
- Machining time countdown
- Convenient file transfer

Electrical (Optional)

- Lifting function against gravity
- Retraction for rigid tapping
- Intelligent MPG