



# PALLETECH SYSTEM



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High-productivity unmanned system

# PALLETECH SYSTEM

Manufacturing innovation to meet your requirements today as well as tomorrow

The PALLETECH SYSTEM is designed with the flexibility required for shorter product life cycles, reduced in-process inventory, just-in-time production and other demands of today's manufacturing environment. We offer the PALLETECH MANUFACTURING CELL (1 level) and PALLETECH HIGH RISE SYSTEM (2, 3 levels) according to your volume of production and budget. Furthermore, the PALLETECH SYSTEM is designed for convenient system expansion after the initial installation to easily respond to increased production requirements in the future.



PALLETECH HIGH RISE SYSTEM - 3 levels stocker with 18 pallets, 1 loading station, 1 machining center



Enhanced  
Productivity

# Investment Comparison

## POINT 1

By using a PALLETECH SYSTEM to its full capacity, the start-up costs can be minimized without suffering any loss in production. In addition, the payback period is minimized.

System comparison between HORIZONTAL CENTER NEXUS 6800-II with 2PC, HORIZONTAL CENTER NEXUS 6800-II with 6PC, and PALLETECH HIGH RISE SYSTEM with HORIZONTAL CENTER NEXUS 6800-II.

Assume 55 workpieces are machined daily each with a one-hour cycle.

	HORIZONTAL CENTER NEXUS 6800-II with 2PC	HORIZONTAL CENTER NEXUS 6800-II with 6PC	PALLETECH HIGH RISE SYSTEM with HORIZONTAL CENTER NEXUS 6800-II
Required net machine hours/daily	55 parts x 1 hr. = 55 hrs.	55 parts x 1 hr. = 55 hrs.	55 parts x 1 hr. = 55 hrs.
Effective machine hours <small>(Manned operation + unmanned operation) x utilization rate = hours of production</small>	$(10 + 2) \times 70\%$ <b>=8.4 hours</b> <small>*10 hrs. includes 2 hrs of overtime</small>	$(8 + 6) \times 81\%$ <b>=11.3 hours</b>	$(8 + 15) \times 85\%$ <b>=19.6 hours</b>
	Required number of machines $55 \text{ hrs.} \div 8.4 \text{ hrs.} =$ <b>7</b> machines	$55 \text{ hrs.} \div 11.3 \text{ hrs.} =$ <b>5</b> machines	$55 \text{ hrs.} \div 19.6 \text{ hrs.} =$ <b>3</b> machines
			

## Investment Requirements Comparison:

System comparison (constant production output)

	Number of required machines	Investment Ratio	Production rate (Parts/Day)	Unmanned operation (Hrs/Day)	Number of operators/Manned time	Main specifications
Machining center with 2PC	7	1.29	55	2.0	4	60-tool magazine, Monitoring system B, Scale feedback system, Chip conveyor
Machining center with 6PC	5	1.3	55	6.0	2	120-tool magazine, Monitoring system B, Scale feedback system, Chip conveyor
PALLETECH HIGH RISE SYSTEM	3	1	55	15.0	1	160-tool magazine, Monitoring system B, Scale feedback system, Chip conveyor

Assume the initial investment cost for the PALLETECH HIGH RISE SYSTEM is 1, the cost for both the 2-pallet changer and 6-pallet changer machines are about 30% higher. Accordingly, the PALLETECH SYSTEM has the lowest initial investment.

## POINT 2

Considerable reduction of required number of operators:

	Number of required operators	Labor expense
7 machining centers with 2PC	<b>4</b> 	<b>100%</b>
5 machining centers with 6PC	<b>2</b> 	<b>50%</b>
<b>PALLETECH HIGH RISE SYSTEM with 3 machining centers</b>	<b>1</b> 	<b>25%</b>

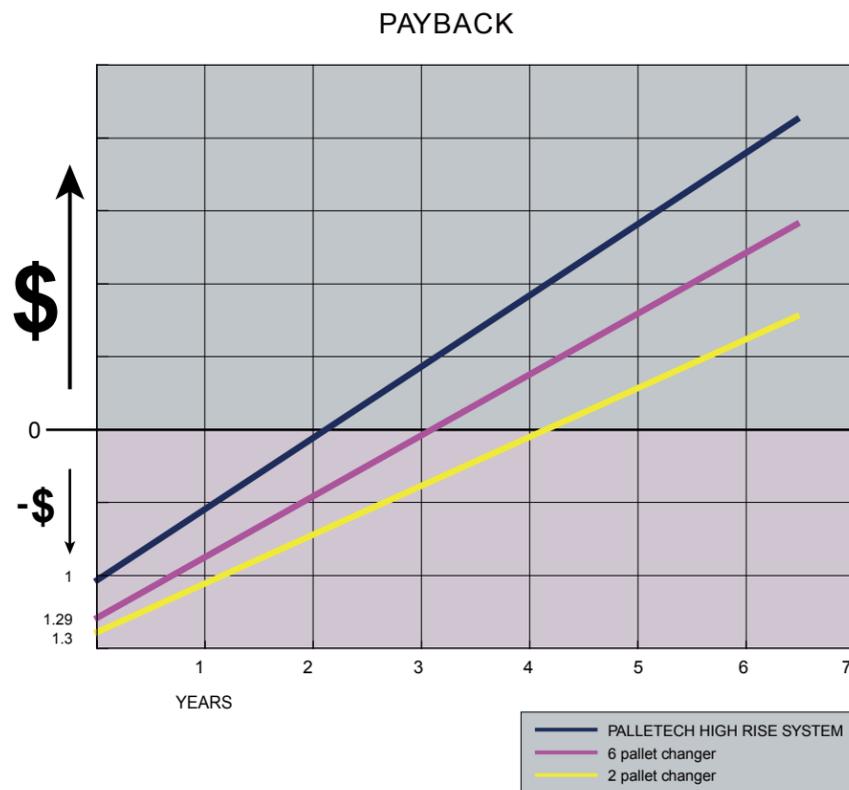
# Investment Comparison

## POINT 3 An analysis of PALLETECH SYSTEM operation

The graph below shows the basic payback period for the 3 different systems used to produce the same production requirements. Payback is defined as the time to recover the investment amount from positive cash flow (contribution to profit or gross margin plus depreciation). Operation data for all systems are shown in the table to the right – the PALLETECH SYSTEM performs unmanned operation 15 hours every day, the machines with the 6 pallet changer system perform unmanned operation 6 hours a day and the machines with the 2 pallet changers 2 hours a day. The direct labor charge per hour is the labor expense for each operator and includes all benefits and necessary taxes borne by the employer. The indirect labor is charged for every hour of operation – both manned and unmanned. Depreciation is for a seven year period and is calculated by the straight line method.

Input Data of Production Comparison

Machining cycle	60 min./part		
Required number of workpieces	55/day		
Load/unload time (average)	5 min./part		
Annual workdays	5 days/week 50 weeks/year		
Manned shifts (PALLETECH / 6PC / 2 PC)	8 hrs./day	8 hrs./day	10 hrs./day
Unmanned ( PALLETECH / 6PC / 2 PC )	15 hrs./day	6 hrs./day	2 hrs./day
Operation rate (PALLETECH / 6PC / 2 PC)	85%	81%	70%
Sales price of a part	\$110		
Material cost	\$10		
Labor (8 hrs. shift/operator)	\$55/hour		
Overhead	\$50/hour		
Depreciation period	7 years straight line depreciation		



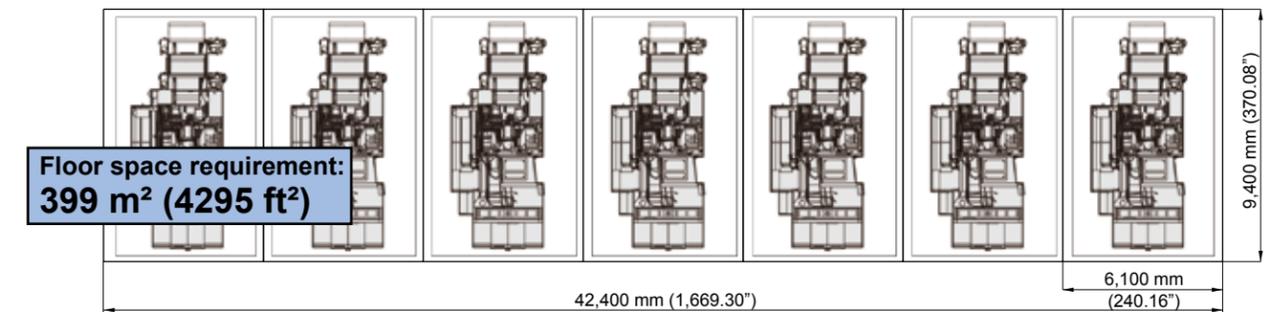
The PALLETECH SYSTEM has the fastest payback period of just over two years. The machines with the 6 pallet changer have a payback period of almost three years and the standard machines with 2 pallet changers have a period of four and one half years. This simplified payback calculation clearly shows the most significant benefit of a PALLETECH SYSTEM when compared to other production systems to produce the same quantity of workpieces. The PALLETECH SYSTEM has the lowest required investment along with the lowest operation expenses which results in the fastest payback period.

## POINT 4 Floor Space Requirements Comparison

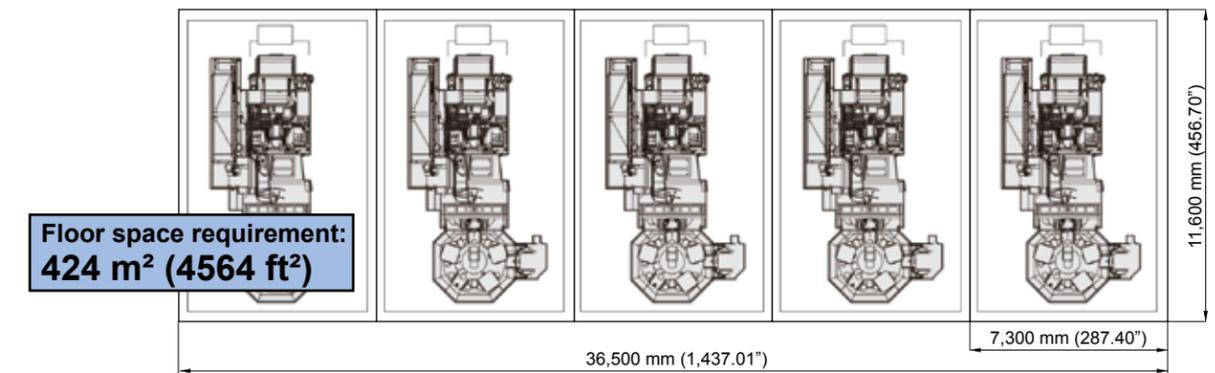
To efficiently use limited factory floor space, the PALLETECH SYSTEM provides the best solution.

A PALLETECH HIGH RISE SYSTEM when compared with the 2PC and 6PC HORIZONTAL CENTER NEXUS 6800-II is shown below:

### HORIZONTAL CENTER NEXUS 6800-II (60-tool magazine, 2PC) x 7 machines



### HORIZONTAL CENTER NEXUS 6800-II (120-tool magazine, 6PC) x 5 machines



### HORIZONTAL CENTER NEXUS 6800-II [(160-tool magazine, 2PC) x 3 machines] + PALLETECH HIGH RISE SYSTEM (1 loading station, 36 pallets)

Diagram showing 3 machines in a row with a high-rise system. Dimensions: 24,800mm (976.38") width and 12,000mm (472.44") height. A callout box indicates: Floor space requirement: 298 m<sup>2</sup> (3208 ft<sup>2</sup>).

	Floor Space Requirement Ratio
HORIZONTAL CENTER NEXUS 6800-II (60-tool magazine, 2PC) x 7 machines	100%
HORIZONTAL CENTER NEXUS 6800-II (120-tool magazine, 6PC) x 5 machines	106%
HORIZONTAL CENTER NEXUS 6800-II [(160-tool magazine, 2PC) x 3 machines] + PALLETECH HIGH RISE SYSTEM (1 loading station, 36 pallets)	75%

# Module

## PALLETECH SYSTEM Modules



### Pallet Loader

Pallets are automatically transferred from the pallet stocker to the loading station and then to a machining center by the pallet loader. The system controller commands the pallet loader according to the registered production schedule. The pallet loader features high speed acceleration and positioning to eliminate non-productive pallet waiting time. Additionally, the loader utilizes 2 different pallet transferring speeds – one when a workpiece is on a pallet and the other when no workpiece is on a pallet.



### Pallet Stocker

The rail for the loader and the chip pan are integrated with the pallet stocker in order to provide convenient system expansion. The PALLETECH HIGH RISE SYSTEM features a 2-level pallet stocker for increased storage capacity with a minimum floor space requirement. Either the PALLETECH MANUFACTURING CELL or PALLETECH HIGH RISE SYSTEM can be selected according to current production requirements and budget. Either system can be easily expanded after the initial installation in response to increased production requirements.

### Loading Station

When a pallet is at the loading station, the pallet can be indexed to 4 positions at every 90-degrees for convenient workpiece loading and unloading. Additionally, the loading station is equipped with a safety door as standard equipment to maintain a safe working environment for the operator. The PALLETECH SYSTEM can be equipped with up to a maximum of 8 loading stations.



### e-BOT CELL 720

The e-BOT CELL 720 is designed to realize up to 720 hours of unmanned operation per month in the machining of a wide variety of workpieces. Even for changes in production lot sizes, labor requirements are minimal.

### PALLETECH SYSTEM specifications

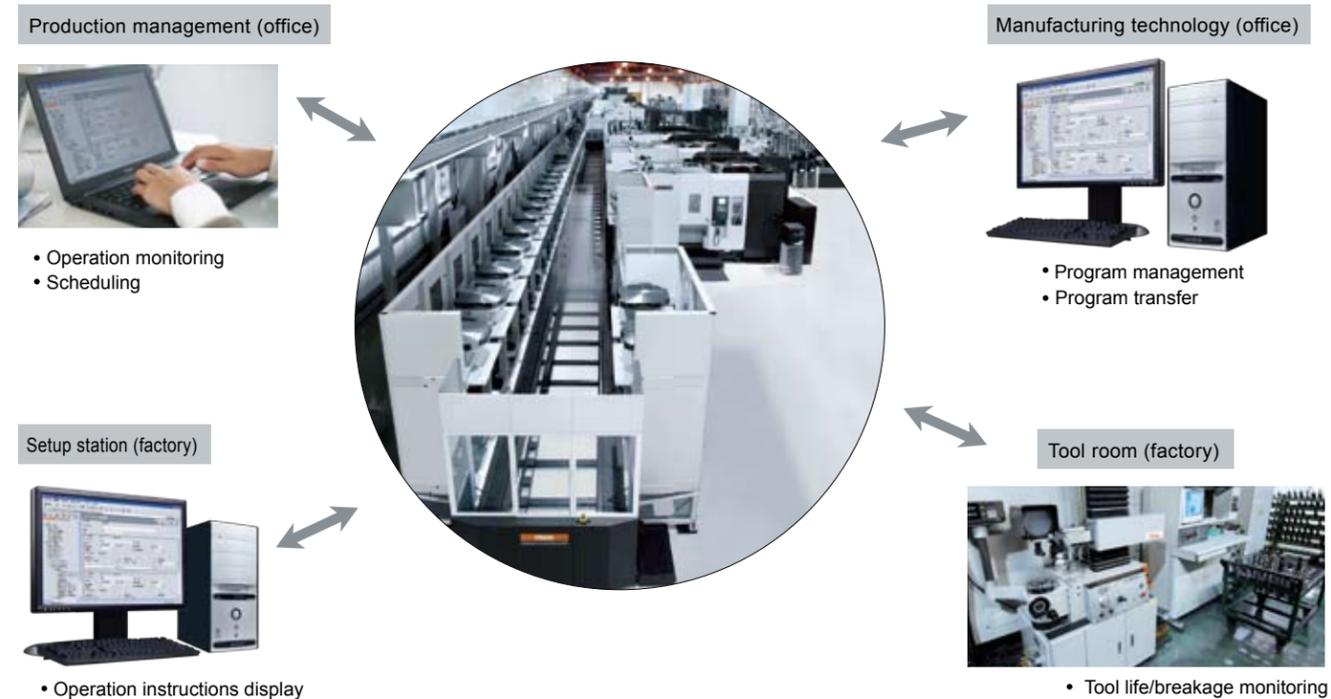
○ : Available  
 — : Not available

	□ 400	□ 500	□ 630	□ 800	□ 1000	□ 1250
PALLETECH MANUFACTURING CELL	○	○	○	○	○	○
PALLETECH HIGH RISE SYSTEM (2 levels)	○	○	○	○	—	—
PALLETECH HIGH RISE SYSTEM (3 levels)	○	○	○	—	—	—
HORIZONTAL CENTER NEXUS series	4000-III	5000-III 6000-II	6800-II	8800-II	10800-II	12800-II
VARIAXIS series	i-500 i-600	i-700 i-800				
INTEGREX series			e-1060V/6II	e-1060V/8II e-1250V/8II	e-1550V/10II e-RAMTEC V/10	e-1850V/12II
VORTEX series		i-500V/5	i-630V/6	e-RAMTEC V/8 e-1060V/8		

# Ease of Operation

## PALLETECH MANUFACTURING CELL Web

All functions are available over networked PCs without any special software thanks to the browser-based operation system. The system can be managed by pallets number or parts number.



Different security level settings are available

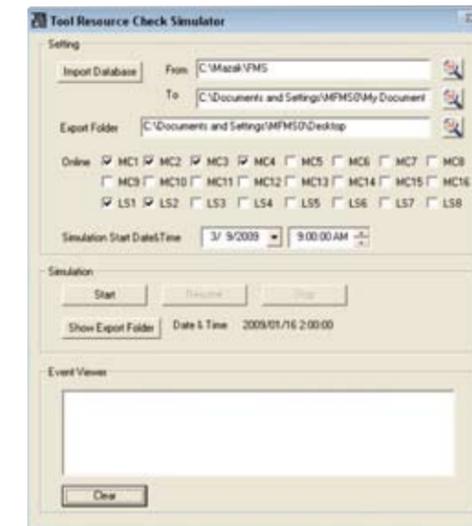
Display of PALLETECH MANUFACTURING CELL WEB

## Convenient functions for efficient operation

### ■ Tool resource check simulation (Standard equipment)

With this software, by using data in the PMC-Web server, tool resource check is simulated, and “Missing-tool list” and “Unused-tool list” are output in a CSV format file every 4 hours (Up to a week in the future)

#### Simulation display



#### Output list

##### Missing-tool list

	A	B	C	D	E	F	G
1	MC No.	Tool Name	Part	Nominal Dia	Suffix	Group No.	Necessary Time(sec)
2	3	BOR BAR		43.0	S	313	2400
3	3	DRILL		14.0	C	311	2400
4	3	END MILL		10.0	A	312	2400
5							

##### Unused-tool list

	A	B	C	D	E	F	G
1	MC No.	Pkt No.	Tool Name	Part	Nominal Dia	Suffix	Group No.
2	1	1	TAP M		M5	C	1003
3	1	5	END MILL		10.0	A	0
4	1	6	BOR BAR		42.0	S	0
5	1	7	BOR BAR		12.4		0
6	1	8	BOR BAR		95.5	H	0
7	1	9	BOR BAR		43.7	A	0
8	1	14	REAMER		25.0	M	0
9	1	15	END MILL		10.0	A	0
10	1	16	DRILL		18.0		0

### ■ Raw material and finished workpieces stored in stocker (Option)

Containers with workpiece raw material can be stored in the stocker. Pallets with fixtures are automatically brought to the system loading station for the loading of workpieces according to the production schedule. By linking pallets with the workpiece container, when the pallet is brought to a loading station the container with the required workpiece material is automatically brought to the other loading station. As a result, material management is conveniently realized and minimizes the accumulation of parts in the loading station area.

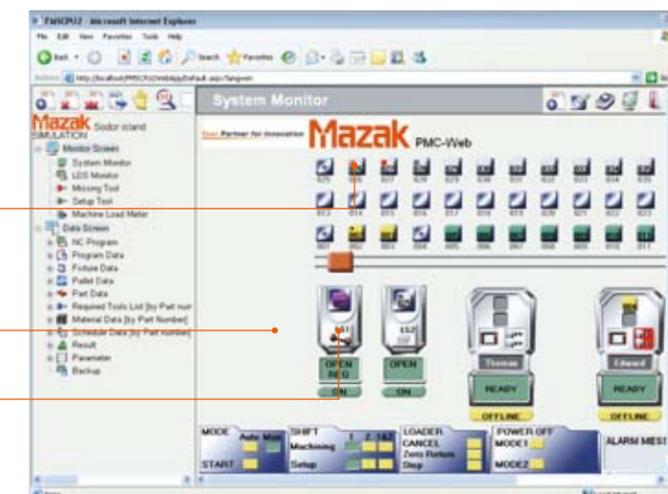
#### System monitor screen

#### Raw material / finished workpiece management

#### Workpiece pallet

#### Loading station

#### Workpiece station



# PALLETECH MANUFACTURING CELL Web

## PALLETECH MANUFACTURING CELL Web (PMC-Web) Functions

Operation environment	Windows browser screen display, Security
System	Pallet number schedule, 3-level priority setting, Part number schedule (process monitoring function), Automatic pallet allocation, Delivery time/priority number schedule, 2-shift schedule selection, Workpiece preparation schedule, Pre-process priority, Post process priority, Automatic allocation of loading stations, Automatic allocation of machine in operation, Function to assign same machine, First machining stop, Continuous machining function (machine-to-machine), Pallet call function, Pallet hold/urgent designation, Selection of Pallet transport priority
Machine control	Unit skip function, Simultaneous workpiece set/machining of multiple kinds of workpieces, Automatic machining program transfer, Machining start (Workpiece No. search), Machining program transfer over Ethernet, Automatic transfer of machining sub-program to hard disk operation area, External program automatic transfer, Program directory management, Temporary management of program, Workpiece offset automatic transfer, Automatic power OFF
Job instructions	Machining face or machining process designation, Job instruction at loading station, Link to detailed job instruction, Re-machining designation, Urgent designation, Hold designation, Cancel designation
Tool management	Display of tool life / damaged tool / tool life notice, Automatic process function when tool breakage is detected, Listing of used tools, Tool resource check
Simulation	Pallet transport simulation
Measurement management	Measurement result data entry at loading station, Selectable for machine workpiece measurement result out of tolerance – pallet remain in machine or transferred to loading station
Utilization	Machine operation utilization, Loader robot utilization, Loading station utilization, Pallet utilization, Machining results, Operation log output
Monitoring	System, Machine, Loader robot, Loading station, Pallet status, Alarm

## PALLETECH MANUFACTURING CELL Web Specifications

Specification		Notes		
System	Max. number of machines	16 Maximum 15 machines when a MAZATROL controller for pallet loader robot is installed		
	CNC system	MAZATROL MATRIX 2	○ (see Note 1)	
		MAZATROL MATRIX 2 NEXUS	○ (see Note 1)	
		MAZATROL 640M	○ (see Note 1)	
		MAZATROL 640M Pro	○ (see Note 1)	
Max. number of loading stations	8			
No. of pallet loader robot	1			
Max. pallet storage capacity	240			
Data	Program data	9999 Registered main programs		
	Pallet number schedule	Pallet data	240	
		Schedule data	Number of pages	10
			Number of data per page	300 Maximum 100 data per each priority: "Urgent," "Normal" or "Hold"
	Parts number schedule	Fixture data	9999	
		Pallet data	9999	
		Parts data	9999	
Schedule data		9999		

Note1: Limited compatibility between MAZATROL versions as shown below

CNC (Machine) type	Machining Program	MATRIX 2 (WPC method)	MATRIX 2 (Workpiece method)	MATRIX (Z offset method)	640MPro	640M
		MATRIX 2 NEXUS (Machining center)	○	—	—	△
MATRIX 2 (INTEGREX e-V)	○	○	—	△	△	
MATRIX (INTEGREX)	—	—	○	—	—	
640M Pro	—	—	—	○	△	
640M	—	—	—	—	○	

○: Machining programs can be transferred from PMC-Web to CNC  
 △: Requires program modification by using Input/Output function of MAZATROL.  
 If MATRIX, M640M Pro and M640M CNCs are in a system, program modification is required for each CNC type.  
 Modified programs must have a different program number.  
 —: Not available

# Loader Robot

## PALLETECH MANUFACTURING CELL Loader Robot Specifications

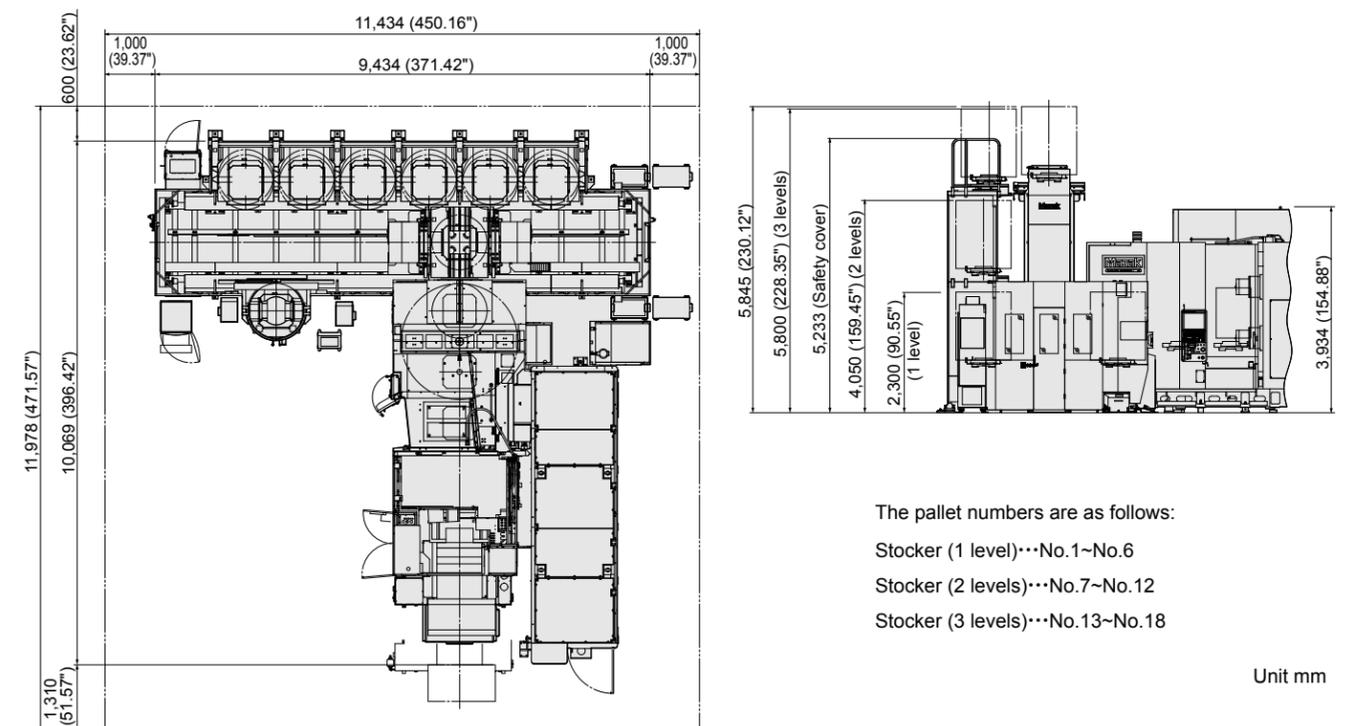
	HORIZONTAL CENTER NEXUS 4000-III	HORIZONTAL CENTER NEXUS 5000-III	HORIZONTAL CENTER NEXUS 6000-II	HORIZONTAL CENTER NEXUS 6800-II	HORIZONTAL CENTER NEXUS 8800-II	HORIZONTAL CENTER NEXUS 10800-II	HORIZONTAL CENTER NEXUS 12800-II	VARIAXIS i-500 i-600	VARIAXIS i-700 i-800	INTEGREX i-500V/5	INTEGREX e-1060V/6 II e-630V/6	INTEGREX e-1060V/8 II e-1250V/8 II	INTEGREX e-1550V/10 II	INTEGREX e-1850V/12 II
Max. workpiece weight [kg (lbs)]	500 (1102)	850 (1874)	1150 (2535)	1730 (3814)	2700 (5952)	4000 (8818)	7500 (16534)	400 (882)	650 (1433)	850 (1874)	1800 (3968)	2700 (5952)	5000 (11023)	7500 (16534)
A-axis [m/min (IPM)]	120 (4724)	120 (4724)	80 (3150)	80 (3150)	60 (2362)	60 (2362)	40 (1575)	100 (3937)	100 (3937)	80 (3150)	80 (3150)	60 (2362)	60 (2362)	40 (1575)
B-axis [m/min (IPM)]	80 (3150)	80 (3150)	50 (1969)	40 (1575)	35 (1378)	40 (1575)	50 (1969)	57 (2244)	57 (2244)	50 (1969)	40 (1575)	35 (1378)	40 (1575)	50 (1969)
C-axis [m/min (IPM)]	2.5 (98)	2.5 (98)	2.8 (110)	2.8 (110)	8 (315)	1.3 (51)	-	3 (118)	3 (118)	2.8 (110)	2.8 (110)	2 (79)	1.3 (51)	-

## PALLETECH HIGH RISE SYSTEM Loader Robot Specifications

	2 levels										3 levels			
	HORIZONTAL CENTER NEXUS 4000-III	HORIZONTAL CENTER NEXUS 5000-III	HORIZONTAL CENTER NEXUS 6000-II	HORIZONTAL CENTER NEXUS 6800-II	HORIZONTAL CENTER NEXUS 8800-II	VARIAXIS i-500 i-600	VARIAXIS i-700 i-800	INTEGREX i-500V/5	INTEGREX e-1060V/6 II e-630V/6	INTEGREX e-1060V/8 II e-1250V/8 II	HORIZONTAL CENTER NEXUS 4000-III	HORIZONTAL CENTER NEXUS 5000-III	HORIZONTAL CENTER NEXUS 6000-II	HORIZONTAL CENTER NEXUS 6800-II
Max. workpiece weight [kg (lbs)]	500 (1102)	850 (1874)	1150 (2535)	1730 (3814)	2700 (5952)	400 (882)	650 (1433)	850 (1874)	1800 (3968)	2700 (5952)	500 (1102)	850 (1874)	1150 (2535)	1730 (3814)
A-axis [m/min (IPM)]	100 (3937)	100 (3937)	80 (3150)	80 (3150)	60 (2362)	100 (3937)	100 (3937)	80 (3150)	80 (3150)	60 (2362)	100 (3937)	100 (3937)	80 (3150)	80 (3150)
B-axis [m/min (IPM)]	60 (2362)	80 (3150)	50 (1969)	40 (1575)	35 (1378)	57 (2244)	57 (2244)	50 (1969)	40 (1575)	35 (1378)	60 (2362)	80 (3150)	50 (1969)	40 (1575)
C-axis [m/min (IPM)]	10 (394)	8 (315)	8 (315)	8 (315)	2 (79)	10 (394)	10 (394)	8 (315)	8 (315)	8 (315)	10 (394)	14 (551)	8 (315)	8 (315)

# Machine dimensions

3 levels pallet stoker: 18 pallets, 1 Loading station  
 HORIZONTAL CENTER NEXUS 6800-II with TOOL HIVE (280 tools)



The pallet numbers are as follows:  
 Stoker (1 level)···No.1~No.6  
 Stoker (2 levels)···No.7~No.12  
 Stoker (3 levels)···No.13~No.18

Unit mm

# Global Customer Support Network

Mazak provides total before and after sales and support

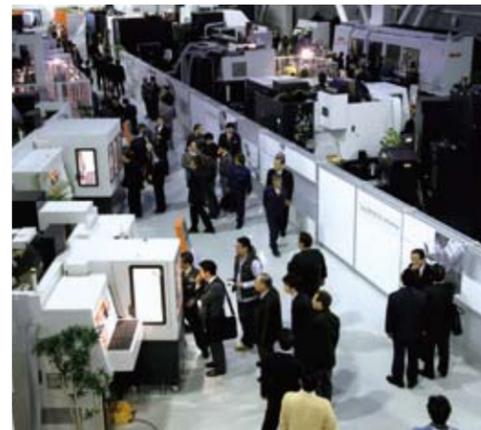
## Fast Spare Parts Delivery

To consistently achieve high machine up-time for the maximum performance, it is imperative that spare parts are available as quickly as possible when they are needed. The World Parts Center is designed to supply spare parts worldwide 24 hours a day, 365 days per year. The World Parts Center works closely with our regional parts centers all over the world to ensure that they are properly stocked to support the installed base of machines in each region.



## Technology and Technical Centers

Yamazaki Mazak has established more than 30 Technology Centers and 40 Technical Centers in more than 20 countries. In addition to providing machine demonstrations and introductions to advanced technology and concepts, our Technology and Technical Centers have been established to provide opportunities for our customers to learn how to improve productivity with their machine tools after they have been purchased and installed. The Technology and Technical Centers are the local bases for our team of highly skilled service engineers that provide service support to customers wherever their manufacturing facilities are located.



## Worldwide R&D Centers

Yamazaki Mazak has established strong R&D Centers in all manufacturing plants so that product development can consistently reflect local customer requirements. Our concept is – “Products should be developed and manufactured to meet local requirements as quickly as possible.”



## Mazak Global Support Network

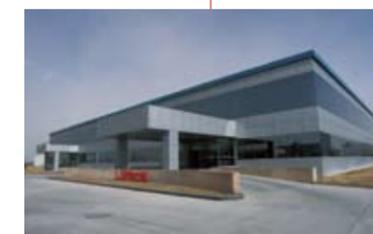
The worldwide production base and the worldwide network of more than 70 Technology Centers and Technical Centers provides technical support for higher productivity and timely service.



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