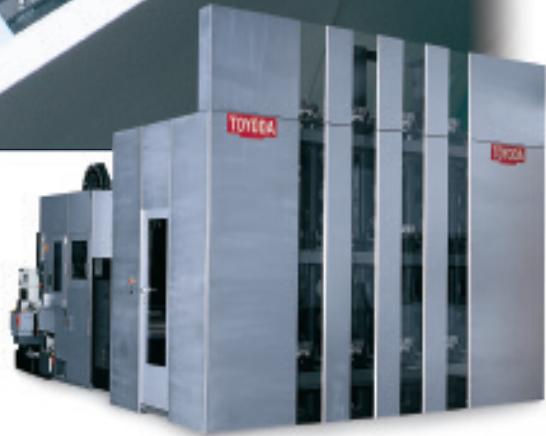


FMS/FFPA

TOYODA

MACHINERY USA



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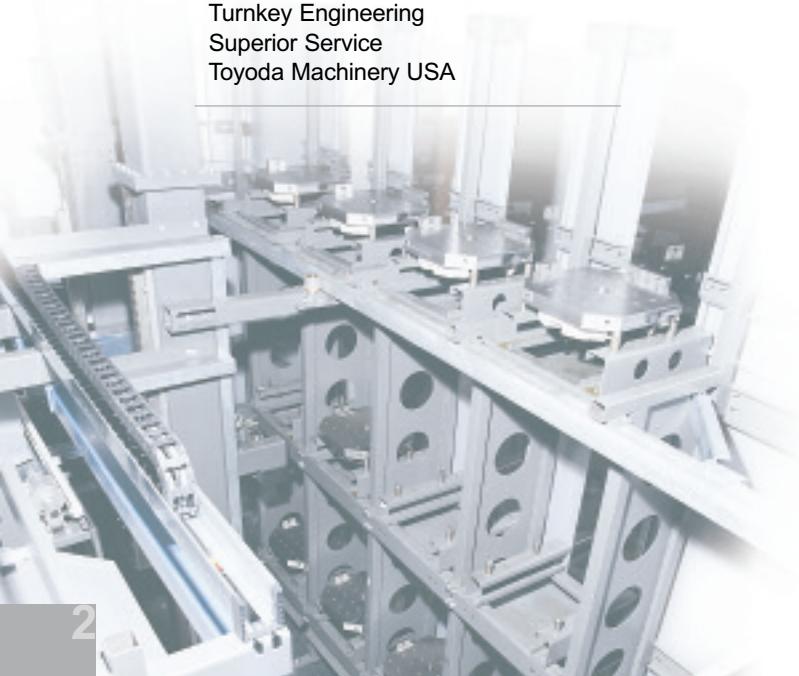
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Toyoda flexible metalcutting cells for lean manufacturing



Toyoda metalcutting cells expand as your business grows

Automating the metalcutting process can bring production to a whole new level of efficiency and profitability. Run multiple machines from a central PC to automate production scheduling, slash set-up times, reduce labor costs and improve throughput. Depending on your production requirements, numerous combinations of loading stations, machining centers and pallet storage styles are possible. Toyoda software and hardware can easily be upgraded or expanded at any time.



Single-level Flexible Metalcutting System (FMS)

The expandable, single-level FMS allows integration of machines, pallets and stations on either side of a central track. Parts are delivered to the machine by a high-speed rail-guided vehicle (RGV). The cell controller tracks pallet locations within the system. Pallet identification is verified by a read/write chip located on each pallet. A reader head mounted on the RGV guarantees the correct pallet is loaded every time.



Multi-level Flexible Pallet Automation (FPA)

This modular design has the same features as FMS (above) with either two or three levels to add more pallet storage in the same floor space. A two-level FPA can even be expanded to three levels should future production volumes require it. The welded construction, linear guideways and high-speed RGV support high rates of acceleration.



Pallet Pool

Vertical pallet pools are an economical option for expanding storage and automating production on one machining center. The basic model has 6 buffer stations and one loading station. The two- or three-level VPP accommodates 11 to 15 buffer stations without consuming any more floor space.

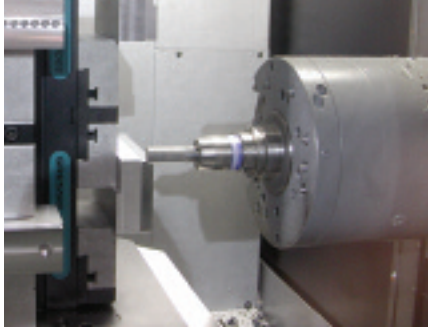
Horizontal pallet pools (HPP) are one level, but can have one or two HMCs, and one or two loading stations. There are 6 to 10 buffer stations on one level for pallet storage. Unlike the FMS or FPA, the number of stored pallets cannot be increased after installation.



Robot Loading

Robot loading systems are custom-designed for high-volume production environments. They allow machines of various sizes to be fully automated in one cell. Parts are delivered to the machine and then loaded into a dedicated fixture by the robot. Finished parts are automatically unloaded to the outboard pallet changer position.





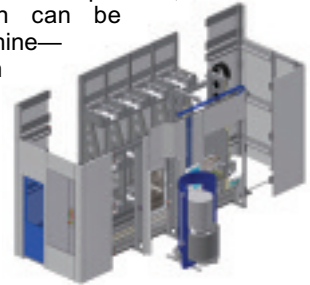
Highest Spindle Utilization

Metalcutting cells dramatically enhance the production capabilities of horizontal machining centers. By automating redundant tasks (like machine loading and unloading) and storing loaded pallets ready for machining, the system maintains spindle utilization well over 90% while reducing operator involvement.



Modular, Expandable, Upgradeable

Using pre-engineered, modular components, an initial cell installation can be modest—even a single machine—so you can profit from increased production right away. As production grows, so can the system with more machines and greater handling capacity.



Unmatched Productivity

A single operator controls all the machining centers, pallets and work stations in the cell. The cell software supports unmanned operation, so production can continue “lights out” on nights and weekends. Mach-III even powers down the machines when the work is complete.



Powerful, Flexible Software

The basic Mach-III Cell Controller software makes it easy to schedule and manage work in progress. The optional Dynamic Scheduler creates an ideal production schedule based on available resources. These might include work days and hours, manpower, fixture components, tool availability, current machine load, and work order completion date. Mach-III can be linked to factory MRP systems to support true lean manufacturing. The power and flexibility of Toyoda’s software is unmatched in the industry.

Factory Support at the Click of a Button

Remote access software allows direct control of the cell from any networked PC, over the internet or by modem. This makes diagnostics fast and easy should technical support ever be needed. Internally, it allows managers to adjust the production schedule or check the status of a project without leaving their desks.



Reduced Set-up & Tear Down

There's no need to repeatedly set-up and tear down fixtures with up to 120 pallet buffer stations in one cell. An additional 300 pallets can be stored off line and put back into production quickly when needed. Part change-over is reduced to minutes by selecting the part number, lot size and job priority on a central shop floor PC.



Expanded Tool Storage

The Matrix-style magazine is an alternative to the standard 40 or 60 (opt 120) chain-type magazine. The modular unit stores up to 500 tools, delivered to the work area by a high-speed servo-driven transfer mechanism. The operator can load and unload tools in a five-position set up rack without interrupting magazine operation.



Reliable Machines

Toyoda HMCs are the foundation of our metalcutting cells. Their construction is extremely robust to maximize accuracy and minimize downtime. In thousands of installations, they have been proven to run under incredible loads day after day, year-in and year-out. Such dependable performance makes them ideal for unmanned production environments.





Powerful Cell Management

The basic function of a cell controller is to select and execute the part program, then return the pallet and finished workpiece back to the operator's loading station or storage rack.

Toyoda's Mach-III Cell Controller goes beyond these basics to make the system both user-friendly and extremely powerful. Mach-III has DNC capabilities, tool management, production monitoring, production scheduling, performance diagnostics, maintenance support, and more.



User-Friendly PC Interface

Toyoda's Mach-III is easy to use because it's based on the Windows® XP operating system (or Windows2000®). Full color graphics capability and familiar Windows® icons enable any desktop-PC user to quickly become a proficient cell operator.

Simply click on any machine icon on the main screen to check the status of a machine or pallet, or to manage the production schedule. Take control of any machine's CNC with a click of the mouse. All information shown on the HMC's Fanuc control is available, and can be modified, without walking to the machine.

Assigned work is added to the schedule by "drag-and-drop" from anywhere on the company's integrated network. Operator support for set-up, maintenance and troubleshooting are built in. Work Wizards help the new user to benefit from the full power of the system from day one.

Mach-III Material Handling Functions:

- Specify order in which work is performed, or add/delete work from the schedule
- Predict completion of work in queue
- Route pallets to multiple machines, or engage multiple CNC programs for a single pallet
- Route high-priority jobs to next available machine
- Abort a part program, unload a pallet from machine, clear tool from spindle, reset control
- Flag a pallet that generates a broken tool error
- Flag pallets as "First Piece" to automatically generate an operator call for program prove-out
- Control power to all machines and the RGV at a single location
- Group machines with like resources to send a pallet to the next available machine with appropriate tooling (Level 2 & 3)

Monitoring functions:

- Real time monitoring of machine and rail-guided vehicle
- Display work in queue, flagged pallets, completed pallets and empty pallets
- Display machine status (cycle, alarm, waiting, etc.)

Data logging functions:

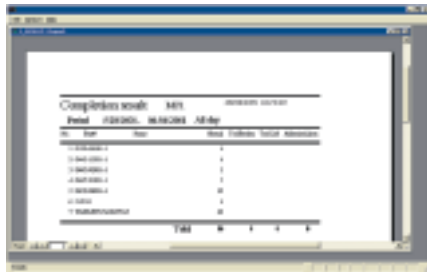
- Number of pieces produced
- Alarm history
- Process history
- Communications history

Note: Some advanced software features may be available only with Mach-III Level 2 or Level 3 software. Ask your Toyoda representative for details on standard and optional specifications.

Automatic, Detailed Reports

Whether you want daily production reports or long-term capacity utilization, the reporting options of Mach-III are invaluable. Detailed production data, operation and alarm logs are stored in a Microsoft Access database. It is easy for the user to generate custom reports or to upload data to a corporate database.

Click on any loading station icon when a pallet is present to view customer-defined work instructions, reports, offsets, tool magazine configuration, and program management. Tool management, monitoring, scheduling and maintenance diagnosis are also provided.



Machining Report

Shows machining status by part number and by machine. Provides both real time monitoring of work in process, and production status displayed in tables or charts.



Alarm Report

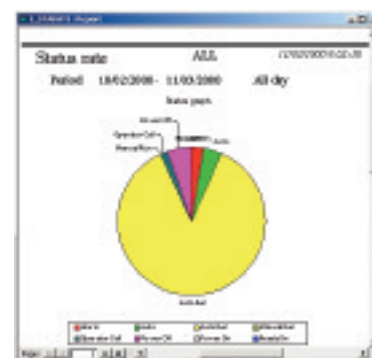
Flags errors, diagnoses problems, and records those events for maintenance analysis and corrective action. Track the number of incidents and downtime per alarm. Alarm recovery is fully automatic, with motors relying on absolute encoders.

RGV Automatic Alarm Recovery takes just a click of the mouse after the cause of the alarm is addressed. This capability is enhanced by the use of absolute encoders on all axes of the vehicle. Online instructions help the operator identify alarm messages.



Production Report

Provides tables and charts for part/process comparisons, batch tracking and scheduling. Reports are exported to Microsoft Access. Review production history for any time period, and break it out by customer, category, part, cycle time per pallet, quantity, etc.



Operation Report

Provides machine status and utilization histograms for each (or all) machines in the cell. Track true machine utilization without any paperwork. See how much time each machine was powered up, machining, waiting for parts, etc.



Level 1 Transfer Control

Mach-III Level 1: Transfer Control

The cell controller maintains constant, real-time communication to all machines in the cell, and coordinates the transfer of pallets between buffer stations, loading stations and machines as specified by the operator.



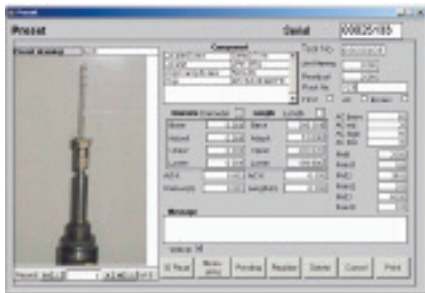
Level 2 Production Report

Mach-III Level 2: DNC & Reporting Functions

Level 2 has all the functions of Level 1, plus expanded reporting capabilities. Optimize shop floor operations with production reports, machine utilization reports, operator logs, alarm logs and more. Data is stored in a Microsoft® Access database so it is easy to generate custom reports or to upload data to a corporate database.

Access part programs located anywhere on the factory's network with a standard Windows browser. Move jobs from the programming department simply by dragging and dropping the file icon. Program storage is limited only by the size of your hard disk or back up media.

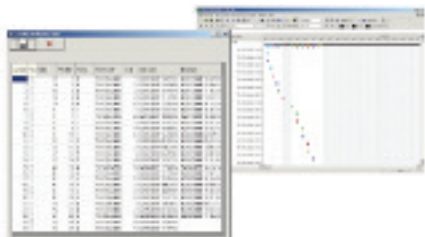
Tool requirement checking determines if a machine has the tools loaded and available before sending a pallet to a machine.



Level 3 Tool Management Preset

Level 3: Tool Management

Toyoda's advanced suite of tool management functions is especially valuable for long runs of complex parts. Tool pocket number translation permits a CNC program to be written without knowing the location of each tool. Additional functions include tool pre-setter integration, RF ID tags, automatic loading of tool offsets, and tool life uploading and downloading.



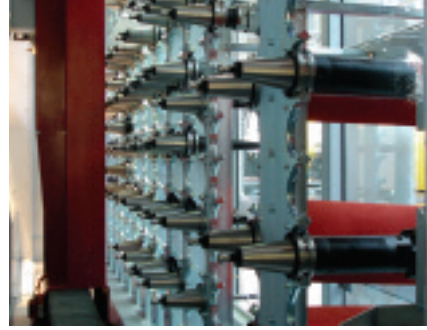
Dynamic Scheduling

Dynamic Scheduling

This feature determines the most efficient production schedule based on your preferences. It analyzes job priority, lead time, machining time, availability of tools, fixture and machine, and the cell's manned/unmanned status to determine the ideal production sequence.

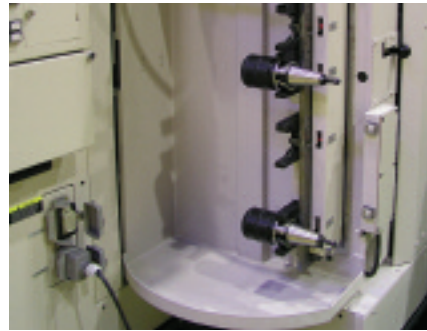
Matrix Tool Magazine

Toyota's Matrix Tool Magazine is a large capacity, stationary tool storage rack that accommodates up to 500 tools. No more time-consuming trips to the tool room. The machine can be tooled for more part numbers and back up tools are ready and waiting.



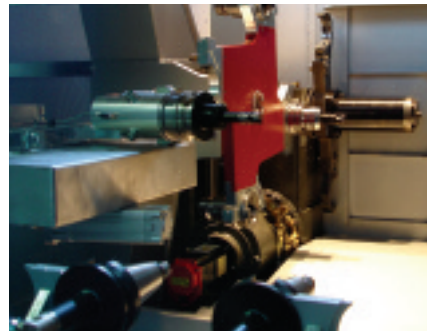
Compact & Efficient

The compact design houses a huge array of tools in a relatively small footprint, and is about the same height as the machine itself. The operator accesses a fully secure carousel-style rack to load tools without interrupting machine or magazine operation. A special feature of the magazine is a four position revolving disk that keeps the next tool ready and waiting for the machine's tool changer arm. So there's no delay while the next tool is delivered, even after a short machining cycle.



Continuous Tool Monitoring

The magazine controller reads the part program to pre-select and display the needed tools. Continuous monitoring of the magazine, loading station and revolver keeps track of every tool. Touchless tool identification and tool length monitoring are optionally available.



Software Functions

- Monitors all tool positions continuously
- Lists tools stored in the magazine
- Shows details of each tool
- Lists tools needed for part program
- Displays of spare tools
- Shows OP Supporter data from CNC
- Allows data editing

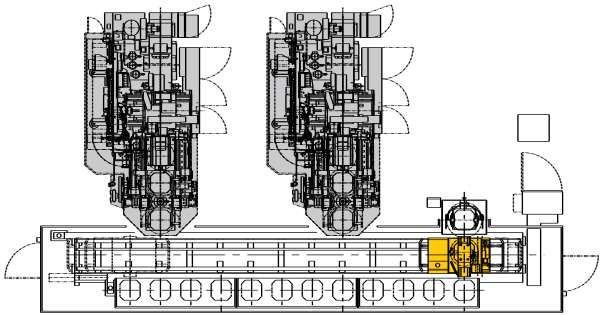


Specifications

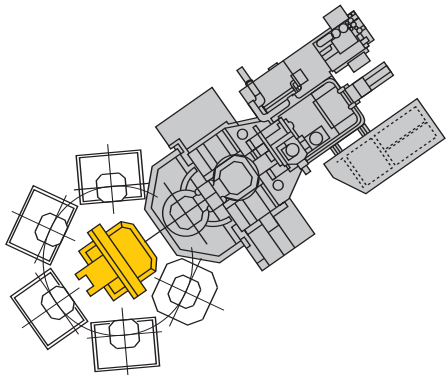
Single-Level & Multi-Level FMS	
Machines	Max 20
Misc Equipment	Max 3
Loading Stations	Max 10
Buffer Stands	8 - 120
Pallets	Max 300
Tools	40 - 500 per machine
Part Programs	Unlimited
Transfer Device	Rail-Guided Vehicle
CNC Unit	Fanuc 16i, 18i, 30i, 31i
Operating System	Windows XP
DNC Connection	Ethernet, RS422
Database	Microsoft SQL Server
Reports	
Machining	4
Operations	4
Production	3
System Alarm	3
Pallet Configurations	8
Work Offsets per Pallet	400

Pallet Pool		
	VPP	HPP
Machines	1	Max 2
Misc Equipment	NA	NA
Loading Stations	1	Max 2
Buffer Stands	Max 15	Max 10
Pallets	Max 300	
Tools	40 - 500 per machine	
Part Programs	Unlimited	
Transfer Device	Transfer table	
CNC Unit	Fanuc 16i, 18i, 30i, 31i	
Software	Windows XP	
DNC Connection	Ethernet, RS422	
Database	Microsoft SQL Server	
Reports		
Machining	4	
Operations	4	
Production	3	
System Alarm	3	
Pallet Configurations	8	
Pallet Offsets	400	

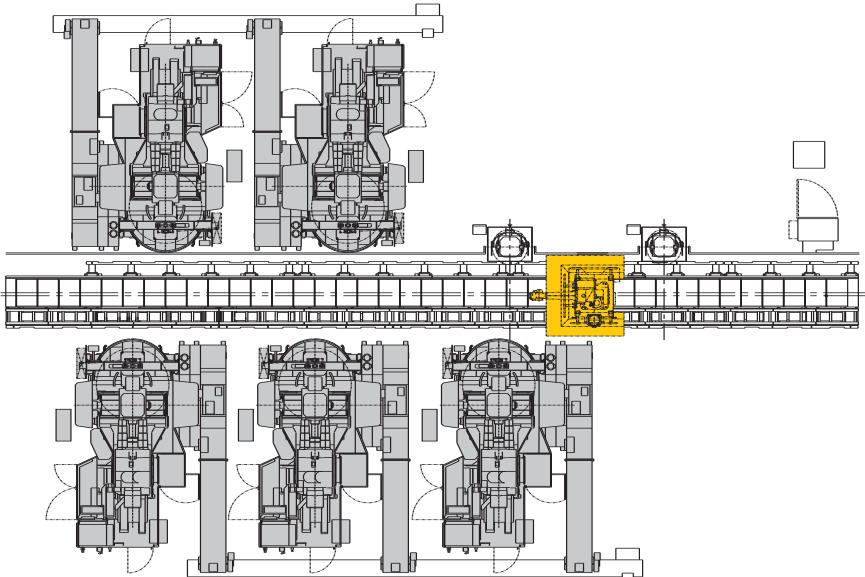
Some specifications may require Level 2 or Level 3 software.



Expandable Single or Multi-Level Configuration



Single or Multi-Level Pallet Pool



Expandable Single or Multi-Level Configuration

Reliable Machines

Toyoda machines can run under incredible loads 24 hours a day, year-in and year-out, and hold the same exacting precision for far longer than other machines. Such dependable performance makes them an ideal choice for unmanned production environments.

Turnkey Engineering

As much as our customers rely on Toyoda machines, they also look to our people. And we're lucky to have some of the best engineers in the business. They are experts averaging more than a decade of experience in automotive, aerospace and general manufacturing industries. From turnkey engineering to complete systems integration, they'll find a way to make technology work for you.

Superior Service

Responsive factory-trained service personnel are stationed strategically across the US and Canada. Coupled with one of the largest parts inventories in the industry, Toyoda machines (the least likely to encounter problems) can, if necessary, be brought up and running in no time flat. More than 12,000 different components are available from our Chicago and Detroit facilities – virtually all of which can be shipped within 24 hours.

Toyoda Machinery USA

The 100,000 square foot plant in Arlington Heights, Illinois, (just northwest of Chicago) is the Toyoda Machinery USA headquarters. It is also home to the company's Standard Products Division, providing a range of horizontal machining centers, factory automation systems, and the widest array of production cylindrical grinders in the industry. Toyoda's Automotive & Special Machines Division, located just outside of Detroit, specializes in serving the needs of automotive OEMs and other high-volume parts suppliers.



The information provided herein should not be construed as a contract. Product designs are subject to change without prior notice. Available machines or machines shown may vary depending on optional equipment or design variations.

Some product features may be photographed with guarding removed for purposes of illustration only. Machinery should never be operated without all proper safety devices in place and functioning.

www.toyoda.com

FMS/FPF



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