

## High Speed Horizontal Flexible Manufacturing Cells

Toyoda FA450-II Horizontal CNC FMS Machining Centers (2 FMS cells – 23 machines 5 of are stand alone)

- 40 Taper, 5 axis system with 30 pallet shuttle changer controlled by a rail guided vehicle
- Fanuc 15MB Control
- 15,000 RPM Spindle
- 1890 IPM Rapid Rates
- 2000 tool capacity
- High Speed Machining Package with Adaptive Software controls
- High Pressure Through the Spindle Coolant
- Automated Touch Probe System.



Entire System is managed through a series of computers (cell management system), which manages and handles Tools, Pallets, Scheduling, MRP Needs and Projected Completion Dates.

*Installed July 1998*  
Envelope Size (24" x 24" x 23")

## Horizontal Machining Centers

Toyoda FA1050 Horizontal Machining Center (2 EA)

- Full 4 Axis
- Cat 50 Taper Spindle
- 1000 IPM Rapid Feed Rate
- 40 HP (30 kW) Spindle Drive Motor
- **120 Tool Storage** Magazine
- **14,000 rpm** Spindle
- GE Fanuc 16i Control
- 1000 PSI High Pressure Coolant through tool
- $\pm 0.00012/FS$  ( $\pm 0.003$ ) Linear Position Accuracy
- Envelope Size (63" X 55" X 45")



Toshiba - Horizontal CNC Machining Cell (2 EA)

- Full 4<sup>th</sup> axis
- Machining centers
- Cat50 Taper spindle
- High pressure coolant through the tool
- 120 tool Automatic Tool changer
- Touch Probes
- Tool Management System
- Toshiba Controls 16 pallets
- FMS automatic pallet changing system
- Envelope Size (63" X 44" X 40").



These machines handle "the big stuff" Parts up to 2500 pounds.

## ⊕ Horizontal Machining Centers

- 24 EA Matsuura MC-600H
- Horizontal CNC Machining Centers
  - Fanuc Controls
  - Tool and Pallet Management System in place
  - Full 4th & 5th axis (a over b) with pallet shuttle changer with 50 & 100 tool automatic changer.
  - High pressure coolant through the tool horizontal machining centers
  - **Envelope Size (23.6 X 22.0 X 22.0)**



- 2 EA Matsuura MC-700H
- Horizontal CNC Machining Centers
  - Fanuc Controls
  - 50 taper with 50-tool automatic tool changer
  - High pressure coolant through the tool horizontal machining centers
  - Full 4th axis and pallet shuttle changer



- 6 EA Kitamura H400
- Full 4th axis with pallet shuttle changer
  - 100 tools
  - Fanuc 15m control
  - High-speed machining functions
  - High-pressure coolant through the tool horizontal machining centers.
  - **Envelope Size (24" X 24" X 23")**

## ⊕ Vertical Machining Centers

- 3 EA Haas VFOE
- 3 Axis 4th capable
  - 32 tool
  - Vertical machining center 30 X 16 X 20 inch Travels
  - (Fanuc compatible control)



- 3 EA Haas VF2
- 3 Axis 4th capable
  - 32 tool
  - Vertical machining center 30 X 16 X 20 inch Travels
  - (Fanuc compatible control)

- 4 EA Haas VF4
- 3 Axis
  - 4th capable
  - 32 tool
  - Vertical machining center 50 X 20 X 25 inch Travels
  - (Fanuc compatible control)



- 4 EA Haas VF6
- 3 Axis
  - 4th capable
  - 32 tool
  - Vertical machining center 64 X 34 X 30 inch Travels
  - (Fanuc compatible control)

## ⊕ CNC Turning Centers

- 10 EA** Hyundai HIT 18S CNC Lathes
- 840 Graphic Control w/conversational programming
  - 12 station turrets
  - Programmable tailstock
  - 10 " chuck (Cut Size 10" diameter X 17" long)
- 6 EA** Hyundai HIT 30S CNC Lathes
- 840 Graphic Control w/conversational programming
  - 16 station turrets
  - Programmable tailstock
  - 12" chuck. (Cut Size 12.5" diameter X 39" long)
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- 1 EA** Hyundai HIT 160S CNC Lathes
- 840 Graphic Control w/conversational programming
  - 12 station turrets
  - Programmable tailstock
  - 6" chuck. (Cut Size 12.5" diameter X 39" long)
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- 1 EA** Mori – Seiki
- CNC Lathe
  - TL-5B
  - (Cut Size 22" diameter X 40" long)



## ⊕ Manual Milling Machines/Equipment

- 8 EA** Bridgeport 1 1/2 H.P.
- Fully tooled, with digital read out.
  - New 1986
- 2 EA** Bridgeport 1 1/2 H.P.
- Fully tooled, with digital read out.
  - New 1994
- 2 EA** Lagun 1 1/2 H.P.
- Fully tooled, with digital read out.
  - New 1996
- 7 EA** Sharp 3 HP
- Fully tooled in DRO. New 1999.
- 3 EA** SK-SIP Jig Bores
- Completely tooled, includes all boring heads and tilting rotary table.



## ⊕ Manual Lathes

- 2 EA** Leblond
- 15" engine lathes.
- 1 EA** Hardinge HLV-H
- Second operation lathe fully tooled.
- 1 EA** Mori Seiki
- Turret lathe, 2.00" bar capacity.
- 2 EA** Model HCT Hardinge
- chucker lathes.
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## ⊕ Grinding Equipment

2 EA	Walters <ul style="list-style-type: none"><li>▪ 5 axis</li><li>▪ Fully Programmable CNC Tool &amp; Cutter grinder.</li></ul>
2 EA	42" Blanchard grinders.
1 EA	14" X 32" O.D. & I.D. grinder.
1 EA	6" X 10" O.D. grinder.
2 EA	#2 Tool & Cutter grinder.
1 EA	Boyer Shultz surface grinder.
1 EA	Brown & Sharp surface grinder.
1 EA	H. Tschudin O.D. grinder.
6 EA	Monoset tool & cutter grinders.
1 EA	Winslow drill grinder.
1 EA	#2 Cincinnati centerless grinder.

## ⊕ EDM

1 EA	Mitsubishi M55K CNC Electrical Discharge Machine <ul style="list-style-type: none"><li>▪ C4G70 Controller</li><li>▪ 32 tool automatic changer. New 1989.</li></ul>
1 EA	Elenix EDM Drill ST300 EM "Hole Popper"

## ⊕ Assembly Equipment

2 EA	Blue™ ovens Capable of bonding, stress relieving of components.
1 EA	Bond line, for etching and cleaning of components for bonding.
1 EA	Acetyl Helium leak detector, with sniffer and vacuum pump.
1 EA	Pressure test stand and tank for gross bubble leak tests.
6 EA	Hager press, 6-Ton hydraulic press & arbor presses.
2 EA	Custom built airflow stands.
20 EA	Various Automated Helicoil, Keensert installation tools.
1 EA	- 40° F freezer (storage of adhesives and epoxy's).
1 EA	Vacuum chamber (bell jar) and vacuum pump for enclosed testing.

## ⊕ Miscellaneous Equipment

8 EA	Horizontal Sunnen hones.
3 EA	Vertical Sunnen hone. (Automatic stroker).
1 EA	40" Horizontal lapmaster, Lapping Machine.
1 EA	Burgmaster drill, Model 2D.
1 EA	Do-All Band saw.
2 EA	Amada HA250 W Horizontal Power Saw.
2 EA	4 Spindle 20" Walker Turner drill presses
1 EA	Walker Turner drill press with power feed.
1 EA	Walker Turner radial drill press.
2 EA	6 Spindle Burgmaster drilling and tapping machines, 1/2" capacity.
1 EA	Electro-Machano precision sensitive drill press.
1 EA	Millman automatic tapping machine.
1 EA	Sterling pedestal drill grinder.

- 15 EA Various off hand grinders for tool sharpening, two are diamond.
- 4 EA Belt sanders.
- 2 EA Wheelabrator Hutson tumble deburrers.
- 1 EA Electro Ark 2DB Metal Disintegrator.

## ⊕ Inspection Equipment

- 1 EA Brown & Sharp Global Image 15-22-10 DCC/CMM
  - Equipped with PC-DMIS Version 3.5 Software
  - Renishaw TP200 Probe System with Auto Tip Changer
  - Measuring range: X = 59" Y = 86" Z = 39"
  - Accuracy stated per ANSI/ASME B.89.1.12M – 1985.
- 4 EA Brown & Sharp Global Fx 9-15-8 DCC/CMM
  - Equipped with PC-DMIS Version 3.5 Software
  - Renishaw TP200 Probe System with Auto Tip Changer
  - Measuring range: X = 35" Y = 59" Z = 31"
  - Accuracy stated per ANSI/ASME B.89.1.12M – 1985.
- 2 EA Mitutoyo Coordinate Measuring Machine Model B251
  - Equipped with QC 5000 Metronics.
  - Measuring range: X=27", Y=60", Z=18".
- 2 EA Mitutoyo Coordinate Measuring Machine
  - Equipped with QC 5000 Metronics.
  - Measuring range: X=27", Y=60", Z=18".
- 4 EA Mitutoyo Coordinate Measuring Machine Model B231
  - Equipped with QC 5000 Metronics.
  - Measuring range: X=28", Y=24", Z=18".
- 3 EA Mitutoyo Coordinate Measuring Machine Model AE122
  - Equipped with QC 5000 Metronics.
  - Measuring range: X=20", Y=16", Z=12".
- 4 EA 48" X 96" Granite surface plate, Grade A.
- 7 EA 36" X 64" Granite surface plate, Grade A.
- 34 EA 24" X 36" Granite surface plates, Grade B.
- 16 EA Mitutoyo 12" height masters.
- 2EA Mitutoyo 18" height masters.
- 7 EA Deltronic DH14 14" optical comparator with MPC-5 digital readout computer.
- 7 EA Mitutoyo 81 piece gage block set. (Master Set)
- 108 EA Sunnen Holtest bore gage set. Measuring range: 0.2570 - 6.0000
- 100 EA Diatest bore gage sets. Measuring range: 0.0625 - 1.5000.
- 15 EA Western Gage series AEC-12 air gage comparators.
- 1 EA Wilson hardness testing machine.
- 2 EA Reichert Model FB-250A bore scope.
  - 0.085 diameter X 6" working length.
- 1 EA Instrument Technology, Inc. bore scope Model 131030
  - 7/16 diameter X 18" working length.
- 1 EA Magnaflux model FM-140 digital conductivity meter.
- 4 EA Olympus flexible borescope with Sony color TV camera and monitor.
- 2 EA Pratt and Whitney Super Micrometer.
  - 0.00002 resolution.

