



Ultra Precise Machines

Precision Slicing Equipment

CNC 4 Axis State of the Art Slicing Machinery

MTI NSS-612 4 Axis Nano Slicing System w/MTI Video System

- Effective work table travel:
 - X axis 305 mm (12 in)
 - Y axis 152 mm (6 in)
 - Z axis 76 mm (3 in)
- Resolution:
 - X (feed) 0.100 μ m (4.0 μ in)
 - Y (index) 0.100 μ m (4.0 μ in)
 - Z (vertical) 0.100 μ m (4.0 μ in)
- 4th Axis Indexing Accuracy: Y (axis) \pm 0.250 μ m (\pm 10.0 μ in)
- Straightness of Feed: X (axis) 0.05 μ m/25 mm (2.0 μ in/in)
- Spindle Cartridge Accuracies:
 - True centerline run-out of taper .05 μ m (20 μ in)
 - True axial run-out of taper 0.5 μ m (20 μ in)

MTI NSS-816 Axis Nano Slicing System w/MTI Video System

- Effective work table travel:
 - X axis 400 mm (16 in)
 - Y axis 200 mm (8 in)
 - Z axis 150 mm (6 in)
- Resolution:
 - X (feed) 0.100 μ m (4.0 μ in)
 - Y (index) 0.100 μ m (4.0 μ in)
 - Z (vertical) 0.100 μ m (4.0 μ in)
- 4th Axis Indexing Accuracy: Y (axis) \pm 0.250 μ m (\pm 10.0 μ in)
- Straightness of Feed: X (axis) 0.05 μ m/25 mm (2.0 μ in/in)
- Spindle Cartridge Accuracies:
 - True centerline run-out of taper .05 μ m (20 μ in)
 - True axial run-out of taper 0.5 μ m (20 μ in)



High Speed CNC Milling & Drilling Centers

Fanuc Robodrill T14iBL

- Effective work table travel:
 - X axis 700mm
 - Y axis 400 mm
 - Z axis 330mm
- Spindle:
 - 120 - 20,000 RPM
- Feedrate: 1 – 15,000mm/min
- Rapid Travel:
 - 1890 IPM
 - 1.2G Acceleration
- Turret:
 - Tool change system – spindle independent from turret
 - Type of tooling: BT30
 - Tool storage capacity: 14 tools
 - Tool changing time: 1.8 sec. chip to chip
- Accuracy:
 - Single direction positioning accuracy: 0.006/300mm
 - Positioning repeatability: +/- 0.002mm



Precision Polishing Equipment

High Precision Flat Polishing Machines

Strasbaugh Two Spindle Polishing Machine Model 6DA-DC-2

- Capacity: 12" \varnothing x 8" length
- Capability: .003 μ in Ra

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Ultra Precise Machines

Precision Centerless Grinding Equipment

High Precision Centerless Grinding Machines
Grinding Capability – Plunge grind; concentric grind; through feed grind

Agathon 150-SL CNC

- Workpiece length up to 250 mm
- Workpiece diameter from .1 to 10 mm
- Smallest adjustment .0001 mm
- Repeatability .0005

Agathon 150-SL CNC fitted with Custom AGT CNC Crush

- Dressing Accuracies of $\pm .001$ mm per feature

General E226 Truing Machine with Vision Scope for Dressing Bonded Diamond Wheels



State of the Art Cleaning Facility

Branson Model No. 427081 Custom Ultrasonic Aqueous Cleaning System

- Ultrasonic Cleaning Tanks 12"x16"x12" Dp
- Tank 80 KHz or 40 KHz
- Tank 80 KHz
- Tank 40 KHz
- Rinse Tanks, Double DI Counter Flow 12"x16"x12" Dp
- Hot Air Drying Tank
- TDR Robotic Part Delivery System
- Oil Coalescing System
- 12 Mega Ohm DI Water Generator

Yamato Vacuum Oven

- Capacity: 16"x16"x16" Dp
- Capability: .1 milapascals

Metroline M4L Plasma Cleaner

- Capacity: 11" x 9" x 14" Dp
- Argon Oxygen Plasma Generation
- Nitrogen/Argon Plasma Generation

Miscellaneous Equipment

- Bench Top Ultrasonic Cleaners
- Dry Nitrogen Boxes



Ultra Precision Surface Grinding

Okamoto VG101MKIIL

- Wafer Size: 4", 5", 6", 8"
- Continuous downfeed grinding method
- Work table and spindle:
 - Air bearing
 - Spindle speed: 1 – 3600 rpm
 - Infeed rate: 1 – 999 μ m/min
 - Vacuum chuck speed: 1 - 999 rpm
- Automatic sizing device:
 - 2 point in-process gauge system
 - Minimum resolution: 1 μ m
 - Maximum range: 999 μ m (1999 μ m by offset base)
- Grinding Accuracy:
 - Thickness Variation (WTW) – without tape
 - 4": Less than 0.5 μ m
 - 6": Less than 0.5 μ m
 - 8": Less than 1.0 μ m
 - Total Thickness Variation (TTV) – without tape
 - 4": Less than 0.5 μ m
 - 6": Less than 0.7 μ m
 - 8": Less than 1.0 μ m
 - Surface Finish
 - Less than 0.2 μ m Rmax.

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State of the Art Inspection Equipment

Z-Mike 1210 Series Laser Bench Micrometers

- Measurement Range: 0.005 to 1.0 in. (.1 to 25.4 mm)
- Repeatability: ± 0.000012 in ($\pm 0.3 \mu\text{m}$)
- Linearity: ± 0.000036 in. ($0.9 \mu\text{m}$)



OGP SmartScope Zip 250

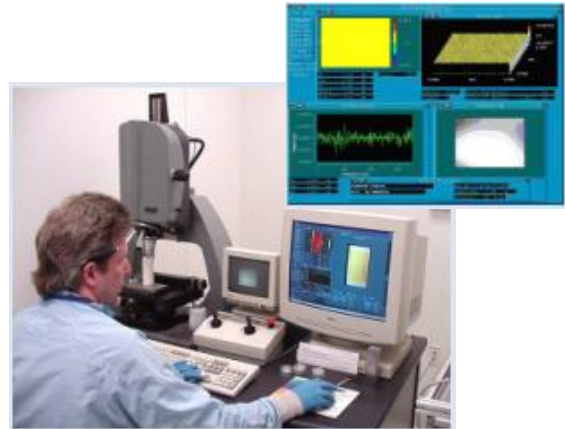
- Accuracy:
 - XY = .002 mm
 - Z = .0025 mm
- Measuring Range: 250 x 150 x 150 mm (10 x 6 x 6")
- Resolution: 0.00025 mm (0.0001")
- Software:
 - MeasureMind Plus metrology
 - MeasureFit contour analysis
 - MeasureMind 3D metrology
 - QC-Calc SPC
 - SmartReport
 - SmartCAD

OGP Optical Comparitor QL-30

- Measuring Range: 15 x 9 x 3" (380 x 225 x 75 mm)
- Resolutions: 0.00004" (0.001 mm)
- Software:
 - Projectron auto edge detection
 - CAD interface software
 - QC-Calc SPC software
 - SmartFit contour analysis

Zygo NewView 5000 – Model 5032

- Measurement Technique: Non-contact, three dimensional, scanning white light and optical phase-shifting interferometry
- Image Zoom:
 - Continuous variable zoom with six indexed positions
 - repeatable to 0.2%
- Vertical Scan Range: 150 μm (5906 μin)
- Vertical Resolution: Up to 0.1 nm (0.004 μin)
- Lateral Resolution: 0.45 to 11.8 μm



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