

## NEW PRODUCT: PISTON TURNING

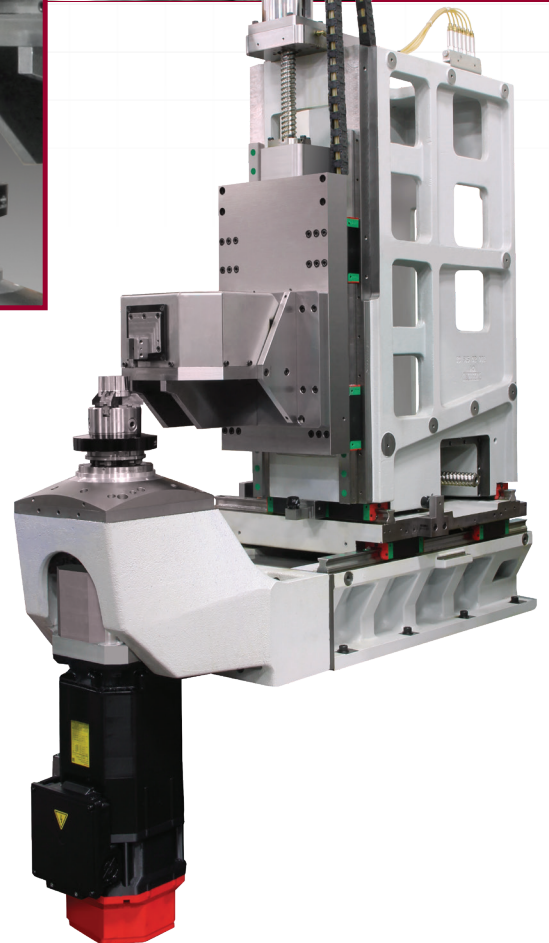
### Elliptical & Barrel Turning Module Overview

The ICON Elliptical & Barrel Turning Module is a 5-Axis configuration for machining Aluminum Pistons. We have developed a high-speed single axis Oscillating Head and integrated it to our standard ICON 4-Axis Machining Module. The standard module provides the primary X, Y and Z movement including the B-axis for part rotation. The Oscillating Head provides the X-2 Axis generating movement.



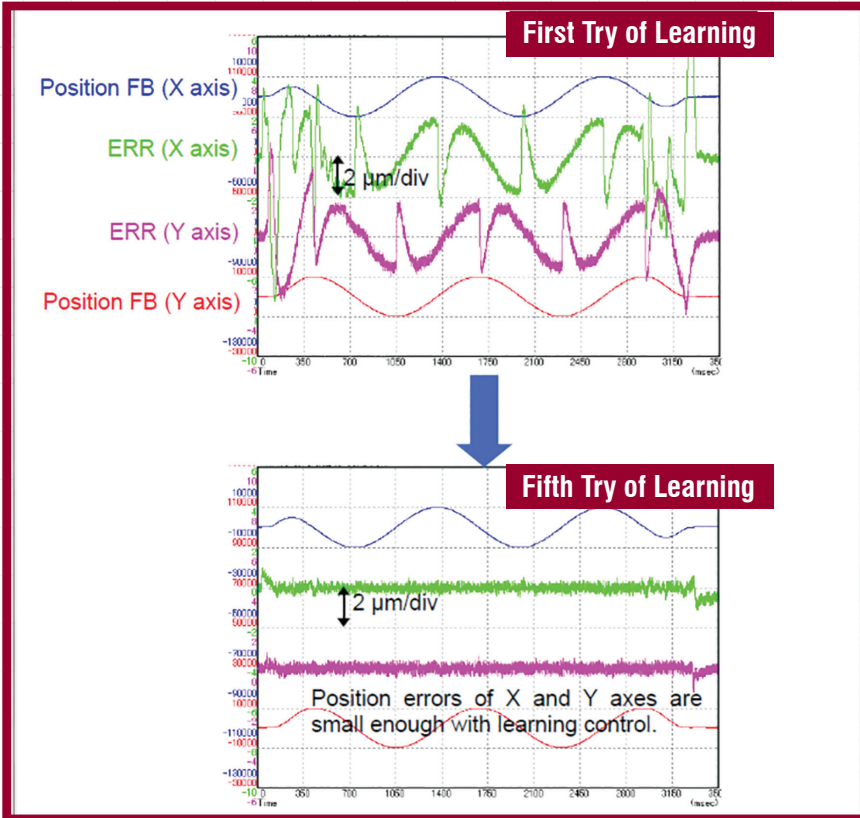
### General Specifications and Features

- 90 mm x 77 mm Oscillating Head Dimensions
- FANUC Control
- Embedded Linear Encoder Measuring System with 50 nanometers resolution to measure tool displacement in X-2 Axis
- 24 meters per second<sup>2</sup> maximum acceleration
- Maximum X-2 Axis travel of 400 microns at 4500 RPM and 350 microns at 5000 RPM
- Any shape can be achieved within the stroke limitation of the Oscillating Head
- Infinite variety of shapes are possible with every revolution





**MECHATRONICS**



**Control A**

The latest, most powerful, FANUC learning control is used.

**Basic Control Operation**

The Learning Control A Function is designed to allow high-speed and precision cutting by recovering previously saved cutting data from memory and utilizing that data during production. The X-2 Axis in the programmed machining operation must be “taught” the desired path movements and related cutting information before production. This data is stored in memory and recovered as a template during production, as well used to increase the speed and machining accuracy.

High-Speed Cycle Cutting is a function that accepts as input machining profiling data consisting of command data for each axis based on selected time interval, then distributes that data immediately to the motors controlling the designated axis. A macro compiler and executor prepares the cycle data and operated by the High-Precision Learning Control A Function.

**Mounting**

Two 600 Neuton Motors are mounted opposed to cancel the magnetic forces. With this set-up, there is equal pull 90 degrees from the line of actuation.

**Magnets**

The magnets are mounted on the moving device for easy cable management and overall reliability. The latest magnets are lighter weight and enable higher velocity and acceleration.

**Cooling**

The motors are liquid cooled for thermal stability, reliability and performance.

**Actuator**

Advancements in material design and lubrication allow for extremely high velocities. Constant recirculating lubrication will be provided to all moving parts. The guide bushings are accessible and will be custom fit for precise fit. Total estimated weight of the Linear Motor moving parts is approximately 2.53 kilograms.

**Linear Encoder**

An encoder with 50 nanometer increments measure the position of the actuator. That is 1.968504e-006 inch!

**Enclosure**

The device will be enclosed and air purged to prevent contamination.

**Support**

24/7/365 Technical / Service Support for this system will be provided out of our Hydromat - ICON Technologies St. Louis, MO manufacturing facility.