



## Greater accuracy and productivity through powerful new technology

### BUILDING ON A TRADITION OF EXCELLENCE

**With many recent advances in software and hardware, jig grinding continues to play a critical role in a wide range of small and large scale production applications**, where consistency and the highest levels of accuracy and surface finish are required. From mold making to complex part manufacturing, today's jig grinders deliver the highest degree of accuracy and repeatability required to successfully compete in today's marketplace.

When effectively integrated into other machining operations including EDM and high-speed hard milling – utilizing manual or automated part palletizing system solutions – the enhanced capabilities of today's jig grinders can create new opportunities with existing customers and open doors to completely new markets.

Taking advantage of these developments, Moore Tool, a leader in building ultra-precision jig grinding equipment, is continuously enhancing the productivity of its jig grinder product line -- making it more user friendly and relevant in today's tool room and higher-volume production environments. While building one of the world's most accurate grinding machines has been and continues to be the foundation of Moore's long-term success, a cornerstone of their strategy is to help define customer-specific processes and to help customers fully utilize all the advances in technology in order to create better parts -- faster and at a lower cost. Through collaboration with Moore's experienced Applications Department, customer's are finding more and more innovative ways to, cost-effectively, utilize jig grinding in their most critical operations.

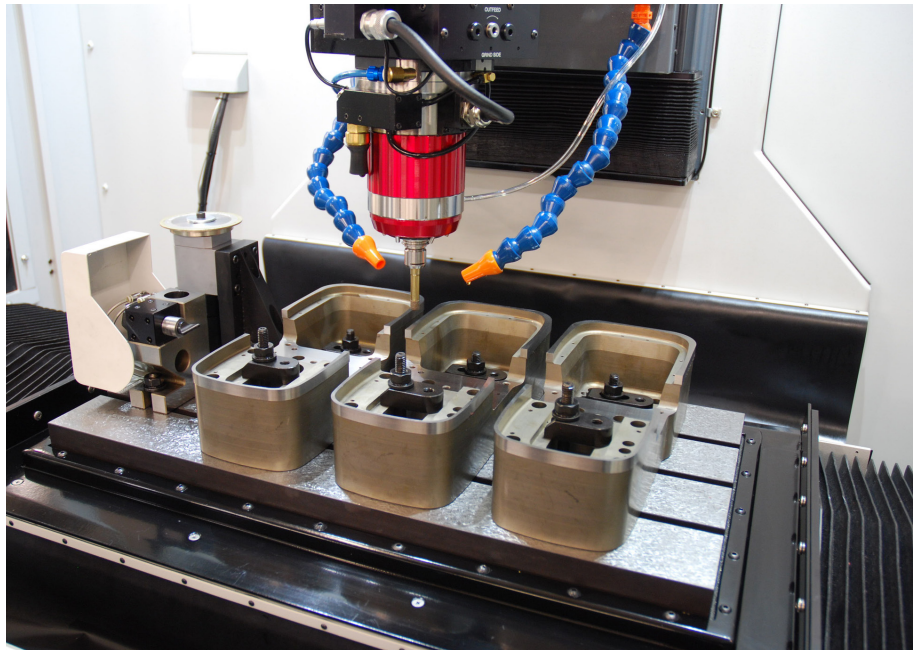
With over 85 years of leadership in machine tool design and manufacture, Moore Tool continues to evolve its line of four- and five-axis, CNC-controlled jig grinders. Integrating new enhancements with proven continuous path contouring capabilities, Moore Jig Grinders enable customers to more effectively grind complex two- and three-dimensional surfaces.

#### 500 Series

- 500 mm (19.6 in.) in X-axis travel
- 300 mm (11.8 in.) in Y-axis travel
- Improved base assembly provides expanded travels and increased stability
- Featuring Moore ProGrind® for applications requiring wet grinding
- Fanuc 31i-a control and new, state-of-the-art sensor technology

#### 1280 Series

- 1220 mm (48.0 in.) in X-axis travel
- 820 mm (32.3 in.) in Y-axis travel
- Larger travels for large work or multiple part setups
- Featuring Moore ProGrind® for applications requiring wet grinding
- Fanuc 31i-a control and new, state-of-the-art sensor technology



### Moore ProGrind® Electric Grinding Spindle

With today's electric grinding spindle technology, constant torque is maintained throughout the speed range of 10,000 to 60,000 rpm. Superior spindle taper and high accuracy radial run-out, and repeatability tool to tool, helps ensure accuracy when using the 20 tool ATC. The hybrid ceramic ball bearings provide long life and less downtime.

## Introducing Moore ProGrind®

**In today's competitive markets, manufactures must achieve greater and greater levels of productivity to remain cost effective in today's global market place.**

In response to our customer's requests, Moore has introduced a number of grinding enhancements, including the Moore ProGrind® platform, to support their precision applications – from both small- and large-scale production runs. These new features help empower manufacturers to realize even greater efficiencies, while still achieving sub-micron positioning and surface finishes.

With Moore ProGrind®, users reap the time and tool-cost saving benefits that the latest grinding wheel advancements and wet grinding provide. Moore ProGrind® features a powerful electric grinding spindle and coolant system for dramatically improved stock removal rates, better surface finishes and longer tool life. Along with the proven grinding spindle and coolant system, companies are grinding with greater confidence, both attended and unattended. These machines are completely CE-compliant, use state-of-the-art sensor technology including remote listening and monitoring capability. Companies are also benefitting from other time saving enhancements such as the 20 position automatic tool changer for unattended operations.



### New 500 with CE-Compliant Enclosure

- Large windows allow more ambient light
- Features latest in LED lighting
- Better work piece access
- Precision guided doors
- Removable side doors for easy maintenance
- Durable powder coating finish

## Updated sensor technology and renishaw probe integration

**As part of the Moore ProGrind® platform, the company has updated its sensor system by integrating the very latest in acoustic emission sensor technology.**

This technology is fully integrated with Moore AutoSize® and enables the dynamic measurement of effective wheel diameter and automatic compensation of wheel edge to part edge for precise size finishing of holes and contours. This important technology allows unattended cycles and, in an ideal environment, repeatability to within 3-5 microns.

In addition, the sensor technology is fully integrated with Moore AutoGrind an adaptive response system for automatically adjusting feed rates based upon stock encountered in tool path. The system minimizes time spent “grinding air” on work pieces with varied initial stock condition.

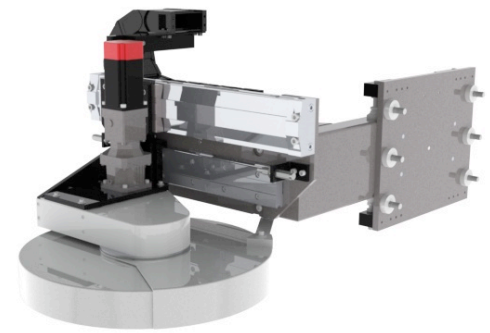
Moore has also worked with Renishaw to implement the latest advances in Renishaw’s measuring system. Utilizing their latest technology — the new OMP400 – together with Moore custom macros, measurement uncertainty approaching extremely high levels can be integrated into the grinding cycle.

## Fanuc’s 31i-a featuring the latest in PC front end controls

**In addition to significant advances in grinding technology, Moore and Fanuc have evolved the Fanuc 31i-a control into the highest performing CNC available for jig grinders today.**

With improved reliability and ease of use, operators are seeing significant advances in program set-up and work monitoring, with key benefits including:

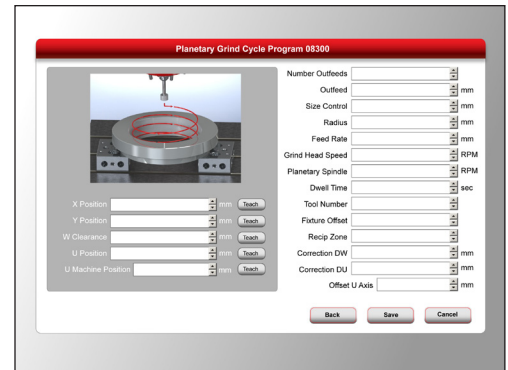
- 0.0001 mm (0.1  $\mu$ m) Least Command Increment
- 0.00001 mm (10 nm) Detect Unit
- 16X greater velocity feedback (16 million lines versus 1 million)
- Following error optimized to improve contouring accuracy



**20-Position Automatic Tool Changer**

In addition to the Fanuc 31i-a, users will benefit from a PC front end, featuring:

- 19" Touch Screen Display
- Ultra-compact, fan-less, fully-sealed, embedded computer
- Celeron M 1 GHz
- 1 GB SDRAM
- 2 GB compact flash for the Operating System and a 2 GB compact flash primarily for customer storage
- Windows XP Professional embedded
- 100 base ethernet for system communications with the Fanuc CNC
- Exterior USB ports
- Industrial sealed keyboard



### New User Interface

Example of data entry screen for a grinding cycle

## A more user friendly interface

**In order to benefit from all the latest advances, Moore is launching next generation software that will further minimize operator's input in calculating complex measurements and manual data entry.**

**The first release** will focus on running the following operations directly from the HMI or to call them from a macro program, one at a time, or in combination:

- Tool Changer
- Reciprocation
- Wheel Dresser
- Renishaw Probe
- Pocket, Planetary, and Chop grinding macros

**The second phase** of development will focus on updating user interface screens to incorporate shoulder grinding and wheel dressing of various forms, including internal and external radii and various angles. This second release will include the ability to use Moore Autogrind to monitor the dressing process as well as the ability to run a customer program created from a post processor.

**The third phase** will add the ability to monitor the grinding head for bearing failure and detect collisions through several different processes and tool monitoring limits. Additionally, an operator will be able to use load values from the drives and/or with force sensors to maximize efficiency during rough machining. There will also be an option to load CMM data or data from the Renishaw probe to update the HMI.

## In summary

**As a manufacturer, staying ahead of the competition with the latest advances in equipment, software and processes is essential.** In keeping up with these challenges, machine tool makers must continuously innovate to provide their manufacturing customers more accurate and more productive equipment. Today, Moore Tool jig grinders come standard with features that make the machine extremely productive and easy to operate. With these advances, the modern jig grinder continues to play an essential role in the most complex operations requiring superior accuracy, productivity and surface finish.

## About Moore tool

Today, the Moore Tool Company offers a complete line of jig grinders and accessories. In addition, the company operates an ultra-precision manufacturing business certified to ISO 9000 and AS 9100 standards, including 5-axis milling and ultra-precision jig grinding. Moore Tool also designs and manufactures tooling for the food packaging, metal stamping and plastics forming industries. The company operates out of a 10,000 SM (80,000 SF) facility in Bridgeport, CT, U.S.A. and through Moore Special Tool AG in Zurich Switzerland.

**The Moore Tool Company has a long history of providing precision machine tools and measuring machines to the world's most demanding customers who need to machine and measure parts to the tightest tolerances achievable.**

Founded in 1924 in Bridgeport, Connecticut by Richard F. Moore, the Company has remained true to his standards of mechanical excellence. In 1974, the American Machinist magazine awarded Richard Moore their prestigious AM Award and described him as the man who “gave the world’s industry an additional decimal place of accuracy!”

The Moore Tool Company started out as a tool & die company, but soon, Richard Moore realized that the machinery he needed to work to close tolerances was not available. Early in the 1930's, Moore developed a jig borer for his own work and that of fellow die makers; these machines were the first to utilize the famous Moore lead screw and double-vee construction. As tool and die making progressed in the 1940's, the Company added the jig grinder to grind hardened steel components. Before long, measuring machines were added to the product line to inspect the higher accuracy parts manufactured on Moore jig borers and jig grinders.



**Moore Tool**  
800 Union Avenue  
Bridgeport, CT



Richard Moore understood the underlying engineering principles necessary to build high precision equipment. He collaborated with a wide range of university researchers, as well as government and private laboratory scientists around the world to refine these mechanical design principles. Perhaps most importantly, he was able to train others to use these principles and apply the craft skills necessary to generate the geometry that was so uniquely “Moore quality.”

Over the years, many different machine applications were developed that took advantage of the superior Moore geometry and stability. Ruling engines and diamond turning machines were two prominent examples of Moore geometry. Moore Tool has also designed and manufactured a wide range of accessory items for its machine tools as well as metrology products. Over 6,000 jig borers and 8,000 jig grinders have been manufactured, most of which are still in use today. In addition, several hundred ultra-precision special machines have been designed and built by the Moore Tool Company to serve a wide range of industries including optics, aerospace, and defense.

In 1994, the Moore Tool Company and its European subsidiary, Moore Special Tool AG were acquired and became part of the PMT Group. The PMT Group is the parent of three operating companies – Moore Tool Company, Inc., Moore Nanotechnology Systems, LLC, and the Producto Corporation.

**Moore Nanotechnology Systems, LLC (“Nanotech”)** was established as a stand alone subsidiary of the Moore Tool Company in October 1997. Nanotech is dedicated to the continual development of state-of-the-art ultra-precision manufacturing systems and processes for the production of advanced optics — primarily for the consumer electronics, defense, aerospace, lighting, medical, and automotive sectors. These ultra-precision machine systems support single point diamond turning, deterministic micro-grinding, precision micro-milling, and glass press molding for the production of advanced optics including diamond turning sphere, asphere, freeform, conformal, lens array, and plano surfaces.

**The PMT Group**, through its three operating companies, remains dedicated to maintaining world leadership in precision engineering and applying measurement science to develop machinery, system and precision tooling components that exceed customer’s expectations.