Machining Solutions for the
VR / AR / MR Markets

We provide the world’s most accurate & reliable machining systems enabling AR / VR / MR Engineers to create alternate realities.
Virtual Reality ♦ Augmented / Merged Reality

Nanotech’s Ultra Precision Machines provide the resource necessary to overcome many of the manufacturing challenges for a rapidly expanding optical headset industry. Whether for entertainment, medical, aerospace or educational applications, our reality is in providing the world’s highest quality machines and value added post sales technical support for successful implementation.

Life Changing Advancements

Education

Surgical Training

Business Conferencing

Defense Simulations

Applications for Freeform Optical Molds in AR

From diamond turning plastic directly for R&D prototypes to gearing up for full production with precision aspheric injection mold core pins & mirrors, our family of 2 - 5 axis nanometer systems provide the performance and reliability your entire project demands from beginning to end.
Suite of Ultra Precision Lathes

We offer 3 different lathe style systems with industry tailored solutions most suited for the VR, AR, MR market. From rotationally symmetric fresnel micro structures to freeform profiles, we work with you to define the best solution for achieving the highest level of optical performance.

250UPL² Compact Lathe
- 2 - 4 axes symmetric or freeform
- 310mm Diameter Swing Capacity
- Slow Slide Servo Machining
- Tool Normal turning
- Fast Tool Servo

650FG² 5-Axis Freeform Generator
- 3 - 5 axes symmetric or freeform
- 650mm Dia. Swing Capacity
- Slow Slide Servo Machining
- Tool Normal turning
- Fast Tool Servo
- Rastering
- Micro-milling / Grinding

450UPL² Mid-Size Lathe
- 2 - 4 axes symmetric or freeform
- 450mm Diameter Swing Capacity
- Slow Slide Servo Machining
- Tool Normal turning
- Fast Tool Servo
- Grinding

Aspheric Grinding with In-Situ Wheel Dressing

Aspheric Mold Pins

Aspheric Micro-Milling

Heads Up Display (HUD) Turning

Concave Toric Face Shield Molds

CX Toric Face Shield Molds
Optically Correct Freeform / Toroidal Inserts

Prior to the use of diamond turning technology, face shield molds were often polished from Stavax 420 Stainless Steel. Although surface finish was acceptable, maintaining the profile to the mathematical equation was out of reach.

Using Nanotech’s Ultra Precision systems, you get the best of both worlds. Contours are CNC programmed precisely to the optical designers’ equations or 3D models and the optical surface finish requirements are achieved directly off the machine. From wrap around aspheric toroidal safety glasses to headset shields, diamond turning enables mathematically correct lenses.

Sub-nanometer Finish, Sub-micron Form Directly off our Machines

Freeform HUD Surface Finish: 0.460nm Ra!
Freeform HUD Surface Form Accuracy: 0.286µm PV!
A Broad Range of Applications

In addition to freeform visor molds, our systems offer unprecedented accuracy and reliability for aspheric, fresnel or diffractive lenses as well as precision aspheric metal mirrors for reflective systems. Regardless of the market, the same machine is often used. Beyond the system itself, Nanotech’s unique team of respected employees includes decades of real industry experience to assist you with fixture design concepts, custom machine configuration layouts and advanced programming strategies. It’s about more than simply designing and building the world’s most precise systems. We judge ourselves on their successful utilization by our customers.

Aspheric Form: 0.029µm
Surface Finish: 0.279nm Ra!

Part Configuration:
Material: Electroless Ni (ElNi)
Diameter: 4.654mm
Profile: Aspheric

Enabling prototyping of complex geometries directly in polymers . . .

. . . Followed by Hi-Production via ElNi Aspheric Mold Inserts
Innovative Machine Enhancements

NEW! Y-Axis CNC Tool Holder
Programmable height adjustment for up to 3 diamond tools. This precision stage has a bidirectional repeatability of 0.1µm and a linear resolution of 1.2nm. It also includes side mounting for optional measurement probes. This CNC tool holder increases productivity by enabling faster, easier diamond tool setups.

NEW! Solid State Air Shower
The intricate features of many optical profile designs can require machining cycle times measured in hours, not minutes. As a result, precise thermal management of the entire process is critical in achieving the desired results.

Our newest Air Shower Temperature Control System can provide a 20:1 improvement in temperature variation for the machine’s upper enclosure. This design also features Solid State Thermo Electric Control technology (TEC) thereby eliminating any need for a refrigerant coolant! Capable of heating or cooling the plumnum air, the system input interface accepts multiple additional caged air, surface mount, or immersible probes for use with our exclusive NanoTEMP Precision Air Temperature Monitoring Software, which is included. Available on 250UPL, 450UPL or 650FG systems.

NFTS-6000 Fast Tool Servo on top of Oil Hydrostatic Rotary B-axis
Advancements Nanotech has made over many years in optical micro-milling have largely eliminated the need for Fast Tool Servo devices for many customers. Our micro-milling process surpasses FTS performance with better resulting form accuracies and steeper slopes that are simply not possible with any FTS device on the market. As a result, FTS devices today are mainly used in the contact lens industry. When the need does arrive, customers utilize our closed loop NFTS-6000 Fast Tool Servo option.

60K RPM Micro-Milling Spindle
The PI 2.25 Air Bearing Spindle is one of our most popular accessory options for the optics industry. When integrated to the 5-axis 650FG, the addition of this highly precise auxiliary air spindle allows the use of micro ball nose diamond mills to produce the most demanding & complex optical features. For very small micro end mills, it is necessary to reach 50K RPM speeds for tool life. Of equal importance are the specifications for the spindle runout errors to ensure smooth steady motion. The PI 2.25 has guaranteed radial and axial runout accuracies of less than 25nm throughout its entire speed range.

Ultra-Sonic Machining of Steel Molds
From among the choices of diamond turning machines available, Son-X purchased the Nanotech 250UPL for the best demonstrations of their device. Only our robust box style slide designs maintain constant horizontal stiffness regardless of vertical load, taking the machine out of the equation leaving behind true absolute accessory performance.

Main application of the Son-X device is for optical molds. Often it can be advantageous to create molds for optics directly into hardened steel alloys. Son-X states that Ultra Sonic machining of steel averages < 3nm Ra Surface Finish & < 200µm PV Form Accuracies directly after machining. Son-X demonstrated live at SPIE Photonics West 2016 in Nanotech’s exhibition booth.

Sequential Dynamic Part Indexing (DPI)
This intriguing patented technology, offers a 2-axis ultra precision machining option for aspheric and diffractive lens arrays. Wielandts upmt, located in Belgium, purchased the Nanotech 450UPL system on which to operate their innovation. Markets served include Automotive, Defense, Ophthalmology, and Instrumentation. The device was demonstrated live at SPIE Optifab 2015 in Nanotech’s exhibition booth.
Defined by our Customers’ Success

As a Nanotech customer, you will benefit from our professional pre / post sales technical expertise - for life. At all levels of our organization, we have unmatched hands-on industry experience for critical value added process development and application support. Here’s what just a few of our customers have to say:

- “As always, we are very pleased with the recent addition / install of our new 250UPL. Everything went very smoothly with zero issues, questions or concerns. Your Service Engineers performed a superb job, upholding the high level of quality, service, and accuracy we have come to know and expect from Moore Nanotech. We look forward to a future of growth and expanding our business with Moore Nanotech products.”

- “As I’ve mentioned in the past, our Nanotech machines have performed flawlessly. We have not experienced any lost production time with a Nanotech machine period, regardless of age, date of installation, or type of work we are running on the machine.”

- “The most remarkable and excellent service & support I have ever seen”.

- “I’ve been in this business for a long time, and response time like this is unheard of.”

- “FANTASTIC support we received from your team as we worked through a difficult problem solving process. Top notch all the way.”

- “I’ve said it before and I’ll say it again. I believe you guys are building the best diamond turning machines in the world. The quality and performance is truly amazing.”

April 2015 - Celebrating customer acceptance of our 100th 350FG / 650FG Y-axis Freeform Generator!