OPTOFORM® 40

The world's most competitively priced Ultra Precision Lathe
specifically designed for manufacturing both
INTRA-OCULAR LENSES and CONTACT LENSES.

ENGINEERING SPECIFICATIONS

Description

Through the use of AC Linear motors, in conjunction with precision linear scales (laser scales), the machine operates at a resolution of less than 10 nanometers. Linear motors (non-contacting magnetic technology) provide smooth, cog-free operation while also eliminating all maintenance associated with conventional drive systems.

The slides are mounted on a solid, natural granite base. This gives the machine excellent thermal stability and a high degree of vibration damping. Granite is also very stable over long periods of time, ensuring accuracies remain unchanged over the life of the lathe.

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The base is supported and isolated from the fabricated steel frame with a 3-point vibration isolation system. Incorporated into this frame are the electrical and pneumatic controls, as well as the computer and spindle drive.

The spindle is of an air-bearing design, capable of running up to 10,000 RPM. It uses an air-operated precision collet. These are available in various configurations and depths for both 'standard' or 'fixed stop' (dead length) use.

Ergonomic Features

All lathe functions are accessed from a touch-screen, which can be positioned to suit the operator's comfort. A small JOG control panel and EMERGENCY STOP panel are provided for convenience and safety.

All controls are provided through the touch-screen. No keyboard is necessary, but one is provided. It can be plugged into the keyboard port if required. The operator is prompted to enter data using a graphical keyboard on the touch-screen.

Tool-setting is accomplished by a specially designed, spindle-mounted LVDT holder, in conjunction with an automated process accessed from the machine control screen. The lathe can accommodate up to 6 tools. It takes fewer tools when using any of the optional fast tool servo systems such as VariForm™, VariMax™, or the FTS-1000™. The Fast Tool Servo devices replace one of the three dual tool holders.

All items needing service or routine maintenance,are accessible from the front or rear of the lathe (air filters for example). Service records are maintained on the machine in the Maintenance software section.

Performance

Using an advanced linear motor drive system, the following results were consistently obtained using a PMMA lens blank, 12.7mm diameter and a cutting speed of 25mm/min.

Surface Finish: 12nm (.012µm) RMS or less
Form Accuracy: 0.3µm or less
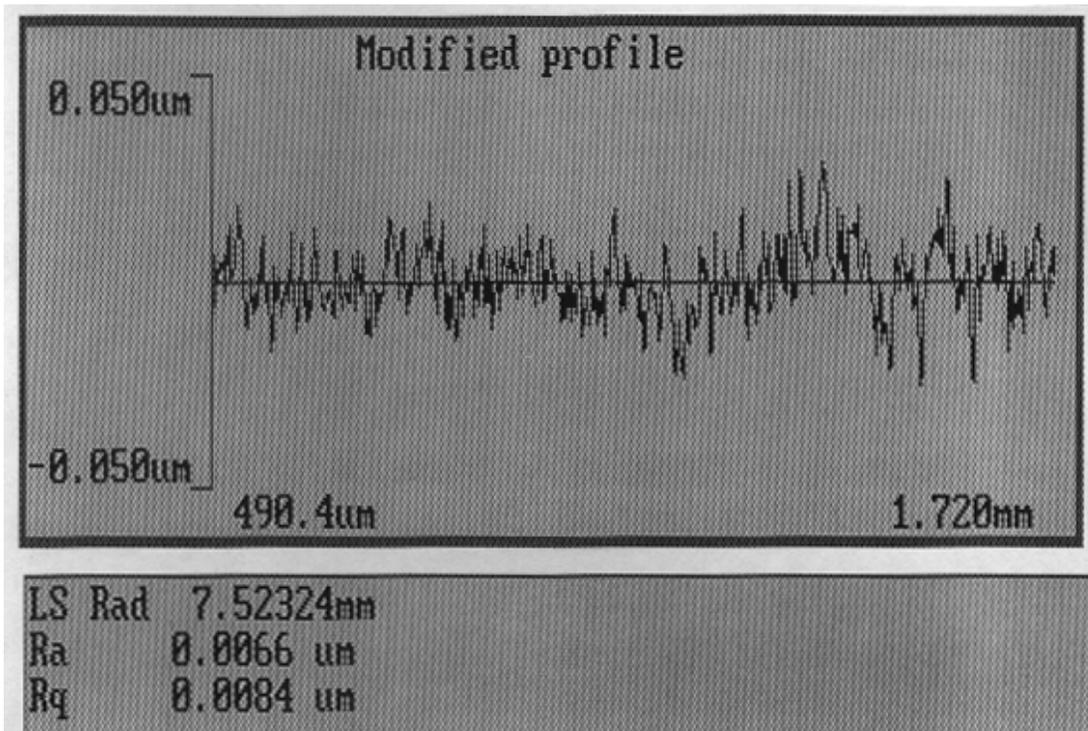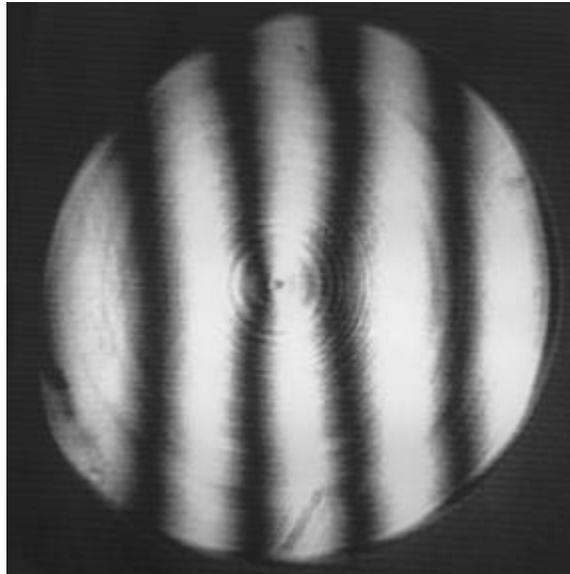
Specifications

Machine configuration: Two-Axis, offset "T" design

Base: Natural Granite

Vibration isolation: Passive Vibrations Isolators

Slide design: Preloaded air bearing

Slide travel (X): 7.5" (190mm)

Slide travel (Z): 4.0" (101mm)

Slide speed: to 60"/min (1500mm/min)

Spindle design: pneumatic air bearing

Spindle speed range: to 10,000 RPM

Dimensions (HxWxD): 48" x 36" x 30"

Overall weight: 1500 lbs. (680kg)

Electrical requirements: 110/220 vac, 50/60 hz, single phase 1.0 kva

Pneumatic requirements: 90 PSI, 6 SCFM, pre-filtered to 5 microns and dry to 50°F dew point

LENS DESIGN SOFTWARE PACKAGES (see SOFTWARE section for details.)

A wide range of lens design software packages is available for the OPTOFORM 40 machines. (These packages run on all OPTOFORM machines.)

The package supplied with the machine is suited to the end-user's applications.

These software design packages create either job files (.JFL files which describe data points in 2 or 3 dimensions) or MiniFiles, which use arcs and lines to describe the geometry of the surfaces being lathed.

Examples of these packages include:

Lens Design Software (version 3) "LDS-3" for contact lens design. All aspherics, spheres, multi-curves and edge designs.

MCG (Multi Curve Generator) programming software creates part programs from user specified coordinate points or geometrical data. Commonly used for mold tool design and IOL designs.

OPTO-CAD converts AutoCad generated designs (.DXF files) into MiniFiles, which the Optoform machines can process. Used mainly by IOL and mold tool producers.

TURBO-LENS – for spherical, multi-spherical, bifocal contact lenses in both RGP and Soft materials.

MiniFile Path Editor (MPE) software for programming non-rotationally symmetrical surfaces.

GP Power Suite covers all spherical, aspheric designs, toric designs, slab-off and edges.

SOFT Power Suite is a very powerful software tool for the design of soft contact lenses of all kinds, including non-rotationally symmetrical designs.

MiniGen compatible. MinGen software directly connects the laboratory's Order-Entry system to the Optoform machines on the laboratory production floor

Focal Points modules for IOL, soft and GP contact lens design.

IOL Generic: an Excel sheet based generic program suitable for many IOL designs.

OPTIONS AND ACCESSORIES FOR OPTOFORM 40

Tooling Package (included as standard)
The lathe comes standard with two separate dual tool holders. (If the Optoform 40 is used without a Fast Tool Servo attachment, the lathe will accept up to three separate dual tool holders, each accommodating two tools.)

Front Surface Probe (included as standard)
The probe is mounted in a fixture on the X-axis table. This probe is used automatically to establish the relative Z-axis position of the lens prior to machining, thereby assuring precise and repeatable center thickness from piece to piece.

- LVDT Tool Set Station (highly recommended: details below)
- Calibration Artifacts (mounted to X-slide for tool setting references: details below)
- VariForm™ or VariMax or FTS-1000 or FTS-500 (Fast Tool Servo Systems) for the production of freeform designs (including all torics)
- Milling Attachment for on-machine precision milling (for production of IOL haptics, engraving, marking, fenestrations, other milling applications)
- Marking Attachment for on-machine marking of axis alignment lines for both manufacturing and doctor's use
- Freezing Attachment for cryogenic lathing
- Compatible with MiniGEN which links laboratory's Order-Entry system with Optoform design software and the Optoform lathes
- Diamond Tooling (special tooling available)

- Height gage (Mechanical Height Indicator (recommended for tool setting). Mounts into dual tool holder and is readily transferred to other tool holders on the gang tooling system)
- Foot switch operated collet release
- Water-cooled spindle and chiller option
- Auto-loader (load and unload)
- Safety enclosures
- CNC Controlled Spray Misting Attachment (prolongs diamond life, improves surface finish)
- Air dryer and tank and compressor for air supply
- Recommended spare parts package
- Annually renewable Maintenance Contract (preventative maintenance and complete inspection)
- Advanced Maintenance Training program and documentation (see Training section)

Tool Set Station: the LVDT Tool Set Station is <u>not</u> included as "standard" since one Tool Set Station can be used on multiple OPTOFORMS. (This item is therefore usually purchased with the first Optoform machine system acquired by the laboratory.)

A spindle mounted L.V.D.T. Tool Set Station is available as an option. It kinematically mounts to the face of the spindle and is completely interchangeable from machine to machine. Therefore, only one Tool Set Station is needed to service any number of machines.

Calibration Artifacts are available as an option, and can be used quickly and easily to qualify the Tool Set Station each time it is placed on the machine. This insures consistent repeatability from one set-up to the next. (These artifacts are installed on the gang tooling system beyond the 3 dual tool holders.)

Tool setting is accomplished through the use of two air-bearing LVDT probes (linear variable differential transducers) located on the Tool Set Station. A vertical probe is used to establish the height of the tool relative to the spindle centerline; and a horizontal probe is used to automatically establish the X (lateral) centerline position of the tool, and calculate the tool radius.