DLL Series IV/2-Axis Compact Lens Lathe

Features

- Linear Motor XY Axes
- Sub-Micron Resolution
- Linear Scale Feedback CNC Servo System
- Full Aspheric Software
- Multi-Tool System
- Air-Bearing Spindle
- Edge Radiusing
- DAC Script Language
- Air-Bearing Linear Slides
- Lens Design Graphics
- Statistical Process Control
- Windows or DOS Operating Software
- Stable Granite Base

Description

This DAC lathe is a computer numerically controlled two-axis, multi-tool, high-precision, diamond-turning lathe for the generation of contact and intraocular lenses, as well as the precision machining of small non-ferrous metal parts.

The machine base is a granite surface plate for accuracy and stability. The surface plate is mounted with vibration isolators on a welded frame. The complete machine and electronics are housed in a single cabinet.

The X axis is mounted directly to the granite and carries the 3 precision diamond tool posts. The Y slide, also mounted on the granite, is precisely positioned at 90 degrees to the X slide and carries the air-bearing spindle.

This machine geometry assures that the machining loads are well centered within the travel of the slides and that the spindle mounting is stiff and stable.

All axes are linear motor driven with position feedback provided by optical linear encoders.

The lathe "work-head" is a carefully balanced air-bearing, high-frequency spindle with programmable speeds of 6,000 to 18,000 RPM. Either an automatic mechanical collet or a vacuum chuck may be specified to hold the work piece.

Operation

It is highly recommended that all parts be blocked. Provision can be made for a collet to hold the part directly. Vacuum colleting may also be used for either side of the lens with special tooling. The diamond roughing tool is used to remove the bulk of the material. As the finishing controlled waviness diamond tool removes only minimal amount of material, its edge (and life) are preserved. The 3rd tool is used to turn a complete edge radius. The use of 3 tools ensures long periods between diamond changes.

As all cuts are made by X or Y motion, or by X-Y interpolation, junction problems are eliminated. Any number of spheric and aspheric surfaces (front or back) can be generated by the system. Because of the sub-micron resolution of the slides the surface requires little if any polishing.

Edge radiusing is accomplished by utilizing a "dog leg" diamond tool and interpolating the X and Y axes to produce the desired contour. Typical contact lens base curves can be produced in 30 to 60 seconds.

Operator Interaction

"Menu" type queries, on the color monitor screen, guide the user quickly through machine set-up, calibration, alignment and tool replacement. DAC Script Language (DSL), which employs a subset of RS274D machine language, is a high level programming language that is easily understood by the user and is included in each lathe.

If all lens design parameters are known, the user simply enters the appropriate numbers by use of the keyboard. The machine will calculate variables, such as junction thickness, after the entry of the basic design factors. A display of a lens cross-section aids the user in the design process by graphically presenting the actual design. The machine's computer automatically converts the lens design specifications into the machine language program necessary to machine the desired part.

Programs may be stored on the hard disk system, transferred via USB port or downloaded from a host computer via a network system.

New lens specifications may be entered during the time that the machine is turning a previously entered part.

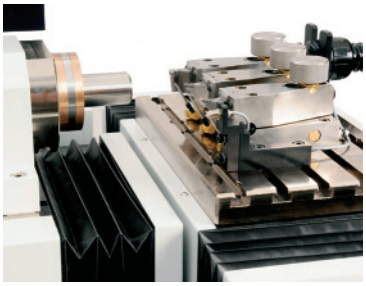
Control System

The DAC DSP Motion Control System is at the "heart" of all DAC Lathes and Mills. It is housed in the PC-based computer, mounted with the servo amplifiers, in the base of the machine behind doors for easy access. A RW/CD is part of the computer along with a USB Flash drive for system backup.

Each axis is driven by a linear motor with linear encoder feedback and is controlled by the Digital Motion Control System These linear scales more than double the rapid traverse speeds making the DLL Series IV/2-Axis Compact Lathe the industry's fastest lathe.

Auxiliary functions such as actuating lights, vacuums, air, etc. can be added by the user by utilizing the several available "M" functions.

Tooling



The 3 tool posts are designed with an integrated tool shank that accepts 35° diamond inserts. Each 2-Axis Compact Lathe is supplied with a left-hand tool post for the roughing cycle and straight tool post for the controlled waviness finish diamond. If the lathe is to be used for Contact Lens production, a "dog leg" tool holder is supplied to do complete edge radiusing. If the lathe is to be used for IOL production, the 3rd tool will be a very small radius diamond for doing "square edge" production.

Specifications

Slides: Linear slides are DC servo motor/zero backlash, ball screw driven with rotary encoder feedback.

	X	Y
Type:	Air-bearing	Air-bearing
Travel:	6" (152 mm)	4" (102 mm)
Resolution Linear Encoders:	Sub-micron	Sub-micron
Traverse Rate:	200 IPM (5 m/min)	200 IPM (5 m/min)

Accuracy (incremental):

Center Thickness	±0.0002" (5 microns)
Diameter	±0.0004" (10 microns)
Radius of Curvature	±0.0002" (5 microns)

Traverse Rates: 200 IPM (5 meters/min)

Spindle: 6,000 to 18,000 RPM air-bearing, high-frequency synchronous motor. May be equipped with automatic collet or vacuum chuck.

A ½" x ½" dead length collet is standard.

Installation Data:

Power:	208, 220, 230, 240 VAC, ø, 50/60 Hz, 20 Amps
Air:	5 CFM @ 80 PSIG (8.5 m^3/Hr. @ 5.6 Kg./cm^2)
Temperature:	68° to 74° Fahrenheit (20° to 23.3° C)
Vacuum:	User furnished 1.25" (3.2 cm) Dia Manifold
Spindle Cooling:	Air supplied by user
Floor Space:	30" x 44" x 60" high (762 mm x 1118 mm x 1524 mm)
Weight:	*Floor* 1600# (726 kg) *Shipping* 2000# (908 kg)

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