O&O mdc
Ophthalmic & Orthopaedic
medical devices consultant

"Nothing generates more value than innovation..."

ROTLEX
A Vision of Quality

From Raanan Bavli

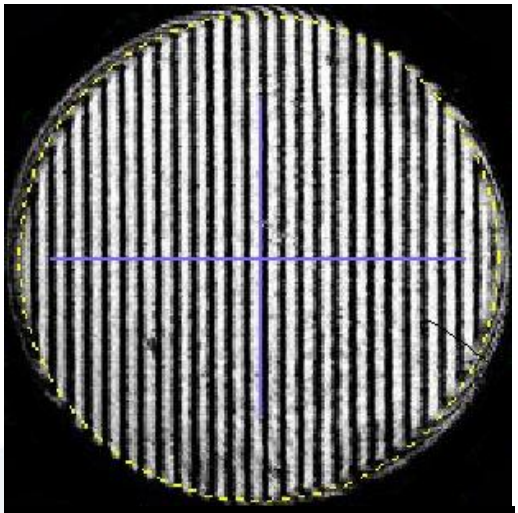
ROTLEX is thankful for the opportunity to contribute to "O&O mdc" Web Site
We believe that establishing such a meeting place for lens manufacturers and their suppliers, works for the benefits of all, and eventually for the cataract patients.

Although most people involved in the IOL industry are acquainted with ROTLEX, I would like to say a few words about us. The company was established in 1986, for commercializing the applications of its first patent - Moire deflectometry. We have implemented this technology in QA systems for all three segments of the ophthalmic lens industry: intraocular, contact, and spectacle lenses. Through the years, ROTLEX has introduced several pioneering initiatives to the market. These include power mapping of progressive lenses, contact lens testing while immersed in saline, and simultaneous power and MTF measurements of IOLs. ROTLEX instruments, utilizing original as well as other newly developed state-of-the-art technologies, have been serving the industry of many years, often working three shifts.

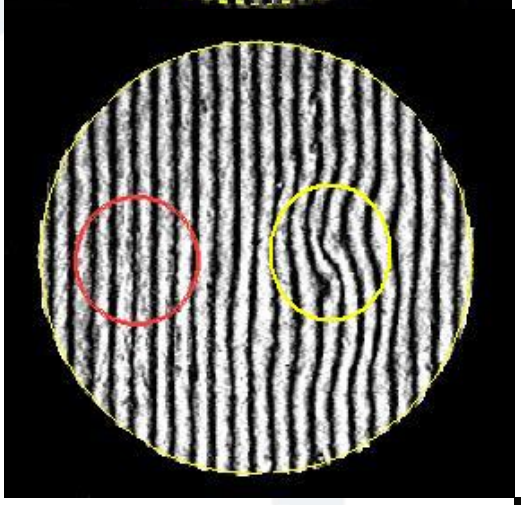
ROTLEX has been cooperating with O&O in several projects where Patrick and his team assisted manufacturers establishing new production lines, and improving existing ones. His profound understanding of the needs of the industry helped us improve and upgrade features of our instruments. A good example for such improvement is the ROTLEX BRASSIOLA. This is an instrument, which measures and inspects optical surfaces, providing curvature, cylinder, asphericity, and optical quality. Traditionally, samples (mainly semi-finished lenses) were inserted into the measurement chamber from the top. Following discussions with O&O, we have modified the design of the instrument as well as its software, so that it can inspect lenses from

above, while moving out of the lathing position. As reported from first customers, this turned to be a major contribution to the throughput.

Following are few examples of fringe patterns and their interpretation related to process control:

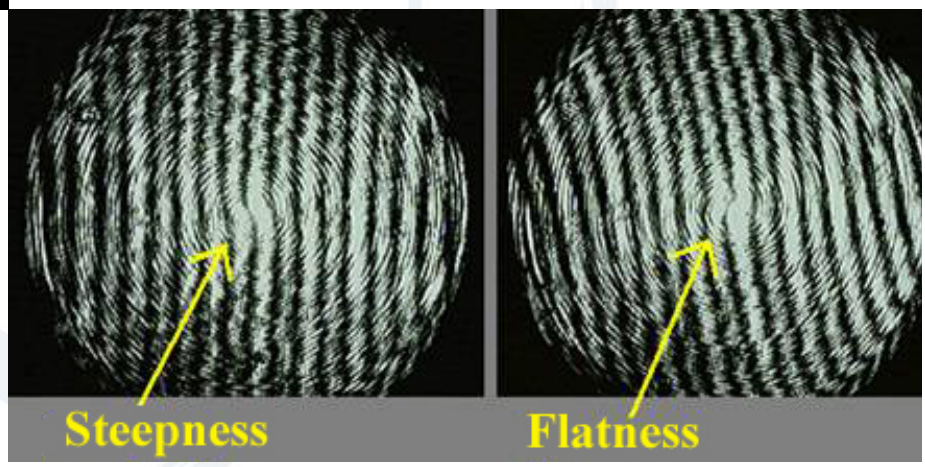


Straight vertical fringes indicating good quality surface.

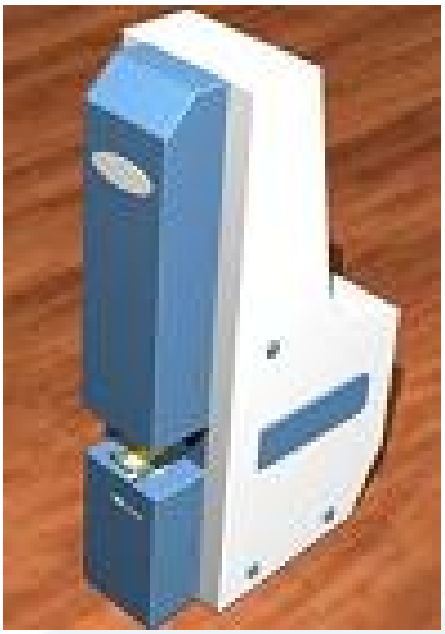


Local distortions (yellow circle) vs. good area (red circle). This distortion is probably related to an after-lathing process (deblocking).

Axial lathe alignment. Note also the fine lathing marks...



Other visible features include polishing level, lathe speed, and more. All these make the BRASSIOLA, to be a multifunction means of process control.



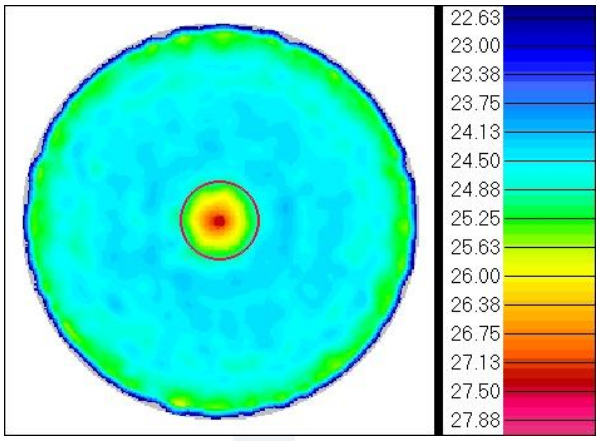
Another new innovation is our ***IOLA Plus*** Wavefront Analyser. Following the developments in the IOL market, an increasing number of manufacturers started producing multifocal IOLs and nominally single-vision lenses, having special radial power profiles.

Measuring such lenses was a challenge quickly answered by ROTLEX. We developed a powerful wavefront mapping technology, which enabled us to analyse the most complicated lenses. This technology was then implemented in an instrument with unmatched capabilities.

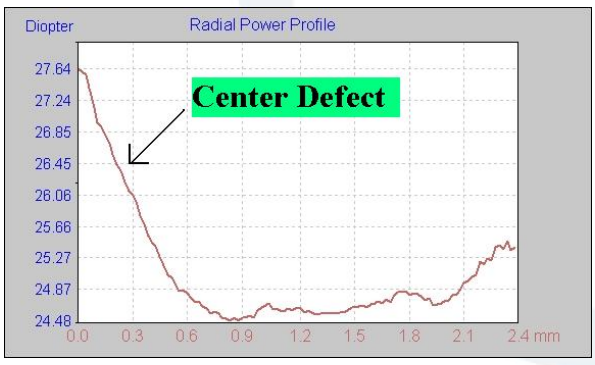
The ***IOLA Plus*** provides high-resolution power and astigmatism maps for all types of refractive lenses, in both dry and wet states, from -125D to +160D.

Perhaps more striking is the fact that all this was achieved without the use of moving parts! This resulted in a compact, simple-to-use, and affordable instrument.

Flatness and Steepness, issues shown in the BRASSIOLA fringe pattern above, are also observed in the final power maps of the IOLA Plus. Such an example is demonstrated in the following map.

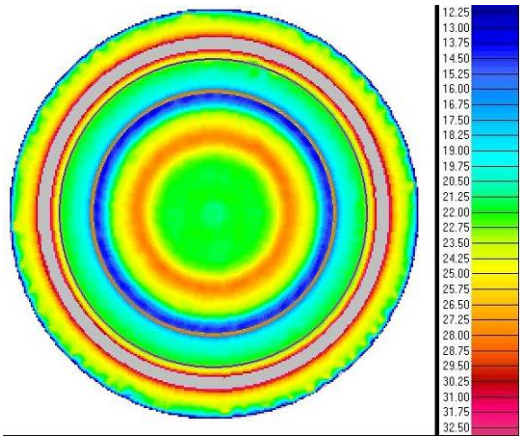


Power map – note the high power in the centre. This phenomenon is usually related to "steepness" lathe alignment error, and is one of the most common problems in IOL production.



A radial presentation of the "steepness" defect. IOLA Plus' ability to quantify this effect provides an invaluable way of controlling and eliminating this phenomenon.

Needless to say, producing multifocal or aspherical optimized lenses requires more of everything used in the process: Lathe alignment and programming, control over lathing speed, raw material quality, etc. Here too, the IOLA Plus' mapping capabilities makes things easier for controlling such production processes.

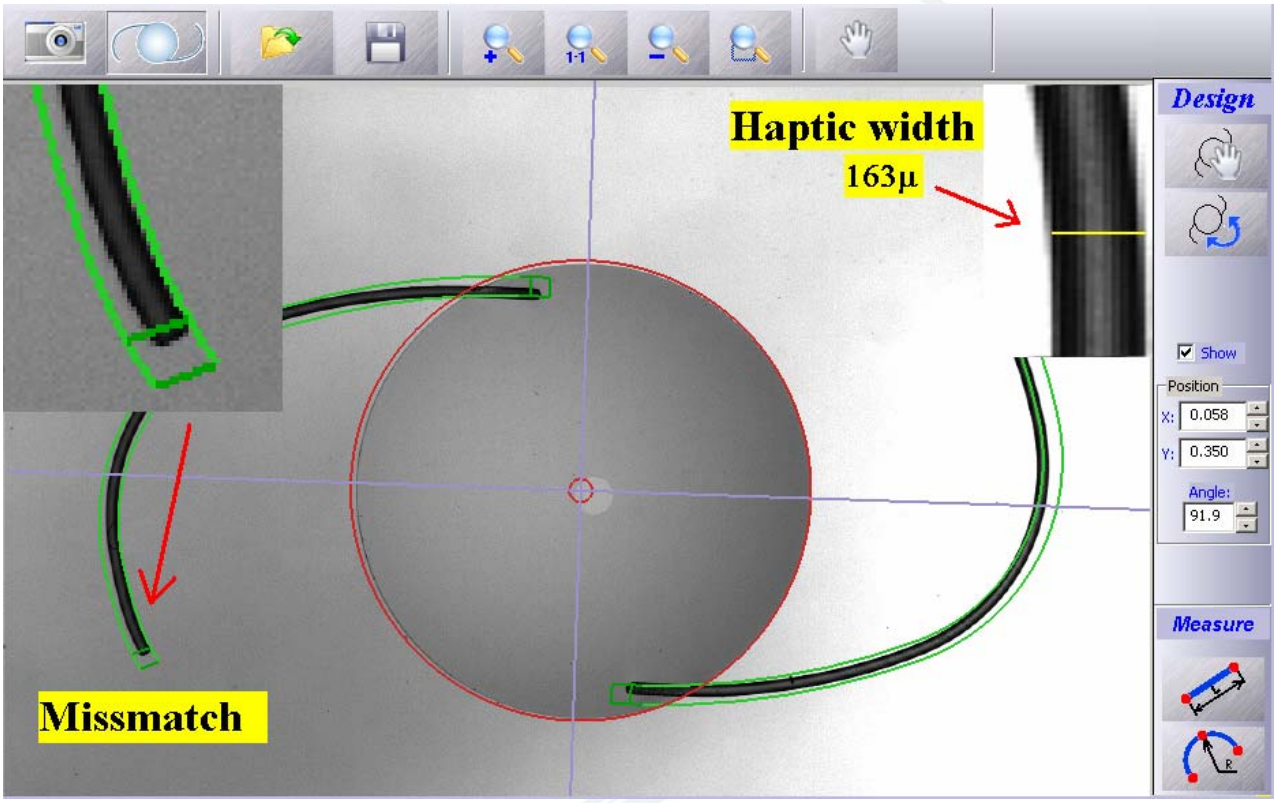


Power map of a multifocal IOL.
Sizes of power zone rings, as well as their values are easily obtained. Any deviation from symmetry will be seen even to the naked eye

Once more another instrument, which resulted from our interaction with O&O, is the Vis-IOLA (Visual IOL Analyser). Although many machine vision systems are available in the market, the vast majority of them are unfit for the IOL industry due to several reasons:

- Large footprint
- Price
- Complexity of operation

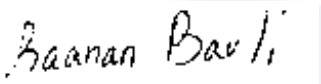
These force many manufacturers to work with manual projectors, despite their disadvantages.



We decided to use our acquaintance with the market, for developing an inspection system, which, other than fine optics, will also include software customised for the specific needs of

this industry. The measurable items are haptic thickness, optics and overall diameter, distance between holes, and any other property defined by the user. In addition to measurements, we added a *fit-to-design* function, which eliminates the need to use transparencies. This function enables loading the lens design from a CAD file and overlaying it on the lens image. The "A" defect detection mode completes this comprehensive analysis, by revealing fine lathing marks, scratches, and other imperfections.

To conclude, we all believe at ROTLEX that the industry's fast development and increasing competition creates an emerging demand for advanced inspection systems.
ROTLEX already offers five systems for the IOL industry covering the production stages from tools, semi finished lenses, lathe alignment control, to optical, dimensional, and cosmetic inspection of final products. ROTLEX, as a leader in ophthalmic lens metrology, is willing to be involved and achieve all current and future challenges for our customers for patients benefit.



Raanan Bavli, Ph.D.
Head of R&D
ROTLEX Optics