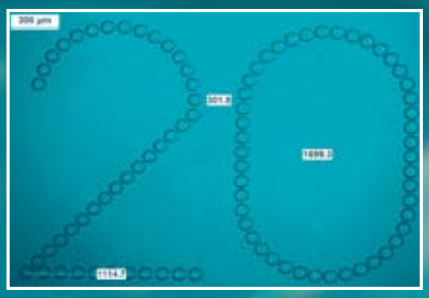
LASER 2000

The Future of Photonics

Ophthalmic Systems for Engraving and Printing



Cost effective CO_2 Engraving Systems

Premium quality Excimer Engraving Systems

State of the art Ink-Jet Printing Systems

Quality & Inspection Solutions

LASER 2000

Your European Source for Optical Technologies
25 Years
PHOTONICS
LASER 2000

Laser 2000 GmbH

High Technology Specialization in Photonics

Armin Luft,
President and CEO
of Laser 2000 GmbH

Laser 2000 GmbH is a supplier of high technology in the field of lasers, micromachining equipment, optics, and fiber optic equipment. Our products are designed to meet the challenges of both research and industrial production – as well as your actual or future requirements of your applications. Laser 2000 is headquartered in Munich, Germany and operates local offices in all major business areas of the European market. In order to support your application we deliver top-level service and products and meet the highest standard of quality. With an installed base of thousands of applications around the world, Laser 2000 has shown the ability to provide timely onsite-support.

Milestone Laser 2000

- 1986: Laser 2000 GmbH, Germany, established in Munich
- 1991: Laser 2000 S.A.S., France, established in Paris
- 1992: Laser 2000 U.K. Ltd., GB, estab. in Northhampton
- 1992: Berlin office is opened
- 1996: Dresden office is opened
- 1998: Laser 2000 S.A., BeNeLux, established in Brussels
- 1999: Laser 2000 C.V., BeNeLux, established in Amsterdam
- 2001: Mönchengladbach office is opened
- 2003: Laser 2000 AB, Sweden, established in Norrköping
- 2005: Cooperation with 3D-Micromac, Chemnitz
- 2005: Chemnitz office is opened
- 2006: Spain office in Zaragossa is opened
- 2008: Bamberg, Germany office is opened
- 2009: Vienna, Austria office is opened
- 2010: Sweden office removal to Stockholm
- 2010: further European offices in preparation

3D-Micromac AG

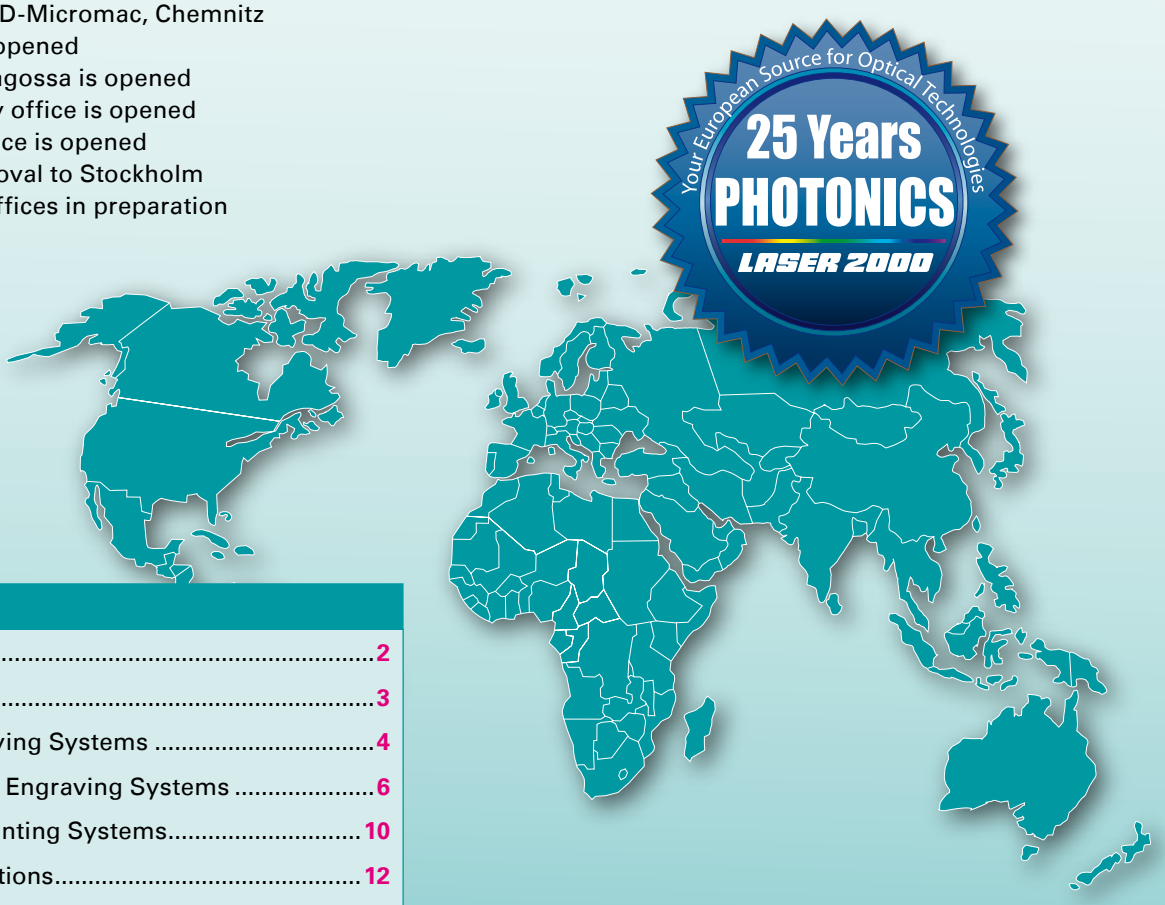
High Technology in Micromachining

Tino Petsch,
President and CEO
of 3D-Micromac AG

3D-Micromac AG, a leading supplier of customized laser micro machining systems, has gained an established position in the international market over the past several years.

Like all laser micromachining systems of 3D-Micromac the ophthalmic workstations offer high precision in the marking process of several materials in the RX-workflow. With our machines you have the possibility to engrave all kinds of mineral and plastic lenses as well as molds. The engraving can be done either at surface or inside of the lens. Another task in the RX process is the flexible InkJet printing of coated and uncoated lenses.

We offer our engraving and printing systems separately but they can also be built as one single unit. As an option we provide additional measurement systems for surveying of lenses, and for quality management. Depending on machine type it's possible to integrate the measurement system. All these before mentioned options are available to ensure highest flexibility and best machining results for the customer. More: ***www.3d-micromac.com***



Content

Laser 2000 GmbH and 3D-Micromac AG

Experts in Engraving, Marking and Quality Control

The cooperation between Laser 2000 GmbH and 3D-Micromac AG is providing several advantages to the European photonics market: high-level consulting, assistance for feasibility studies, sampling, and realization of customized micromachining equipment as well as standard systems.

Awards and Patents

3D-Micromac AG Awards

- 2010: Winner of the „Chemnitzer Meilenstein“
- 2007: Winner of the Innovation Price Saxony
- 2007: Laureate of the “Economic Growth Price” of the economic region Chemnitz-Zwickau
- 2007: Winner of the Innovation Price 2007 Industry in the category “Microtechnology” of the “Initiative Mittelstand”
- 2003: 1st Price in foundation contest of the city of Chemnitz
- 2003: 2nd Price in foundation contest “FutureSAX” of the state of Saxony, Germany

Common Patents

- Patent for the optimizing of the positioning accuracy, repeatability, long-time stability, and compensation of optical failures in galvanometer scanner technology
- Patent for high-efficiency optical mask projection path for Excimer laser
- Patent for method and arrangement for producing a laser engraving in a surface of a substrate (Ophthalmic)
- Patent pending for a new technology for semi permeable marking
- Patent pending for Inkjet (MC-Jet) glass printing (Ophthalmic)
- Patent pending for UV optical systems

History

The Laser 2000 Ophthalmic started in the year 2000. Meanwhile MC-Flexc is a widely industry-proven laser system. Our laser engraving and printing systems are operated successfully by more than 50 companies worldwide. Other than ophthalmic, Laser 2000 also has reference customers in automotive and semiconductor industries as well as in numerous research institutes and facilities.

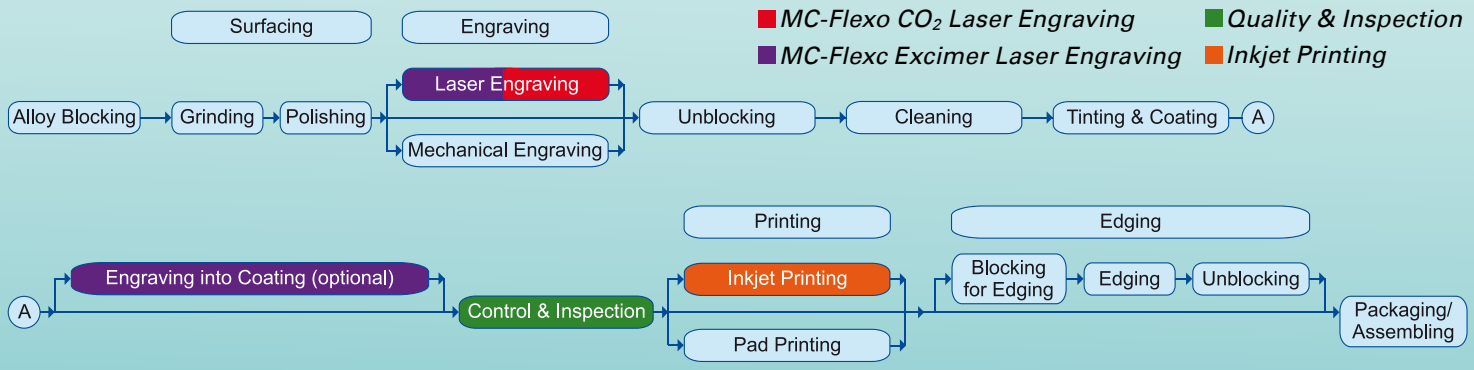
Laser 2000 looks back on some 20 years of laser experience in the field of material processing. There are more than 100 employees in production, sales, and service. In 2007, the turnaround surpassed 35 million in Europe. We have an open structure. Customers are welcome to see the entire company and meet with our R&D, CAD, service, and production departments. Laser 2000 is committed to providing service for our customers for a long time to come.

Service

For any industrial application it is imperative to operate highly reliable equipment and to secure timely service. For this purpose, Laser 2000 continues to enhance machine quality standards and to add service engineers as the number of customers and machines sold grow. Today, there are service partners located close to our customers in Europe, America and Asia.

Laser 2000 Systems in the RX workflow

In 1999 Laser 2000 developed the first Galvanometer controlled Excimer Engraving Systems for the Ophthalmic industry. In the course of the years, the product mix has been extended by CO_2 Engraving Systems, Inkjet Printing machines and equipment for quality test and logistics. The Laser 2000 product range for RX labs and lens mass production is emphasized and coloured in the adjoining marginal drawing.



Cost effective CO_2 Engraving Systems

MC-Flexo CO_2 Engraving Systems

Two different Ophthalmic engraving CO_2 systems (MC-Flexo C3.0 and C4.0) are determinated for manual or automatic loading as well as for engraving of blocked and unblocked free form lenses. The systems are based on experience in CO_2 laser systems and various patents for fast and accurate laser positioning and low heat insertion into the material. This is essential for marking ophthalmic plastic lenses in high quality.

The laser systems contain all components, materials, hard- and software for “dotted engraving code” and “vector engraving”. It is important to mention that the control software already has the “One Click Import” functionality for vector and pixel graphics.

MC-Flexo C3.0 System Configurations

- Desktop Ophthalmic CO_2 Marking System
- Manual Loading
- Pneumatic chuck for blocked lenses
- Barcode Reader for Host data transfer
- Automatic z position correction
- Engraving style ‘Vector-’ and ‘Dotted Code’

MC-Flexo C4.0 System Configurations

- Ophthalmic CO_2 Marking System
- Automatic Loading
- Pneumatic chuck for blocked und unblocked lenses
- Barcode Reader for Host data transfer
- Automatic z position correction
- Engraving style ‘Vector-’ and ‘Dotted Code’

Materials to be engraved
Organic RX lenses
High precision chucks for all available blocked- and unblocked lenses

Software
MC serious operating system
WINDOWS XP multilingual
Intuitive graphical interface with preview
Extended configurable log filing for long tern process control and tracing C-Flexc operating system
Full remote access to MC-Flexc and log files at a shared directory via TCP/IP
Project designer software on MC-Flexc or external PC
Project File Designer
Compilation of characters and signs to a complete project (e.g. all characters and signs for one specific lens/mould)
Full automatic project file generation
‘one click import’ functionality for drawings, logos and fonts (dxf, jpg)
Online and offline generation of project files
RX environment
Communication with host computer based on shared folder or OMA/VCA protocol
Assignment of job records from OMA/VCA server to individual signs and characters
Interface to barcode readers and RFID tags

Features
CO_2 System for economic plastic lens engraving
Individual engraving field sizes and lens diameters
Dot- and line engravings from 60 µm to any bigger size
Long life CO_2 laser source and optic system
More than two year maintenance-free operation
Close to stand-bye operation for very long lifetime

Highlights	
Sealed 25 W CO_2 laser	Stability on a higher level, +/- 5 % stability
Separate working chambers	Long term reliability, dust free operation
Separate laser process room with exhaust	Cleanness & healthy System fulfils the CE and UVV rules
Integrated industrial PC	Plug and play unit, easy to install intuitive user dialogue
Unique VCA/OMA interface	Connectivity to international RX lab standards
Import function for pictures, vectors, fonts	Very easy customised logo import
24 month CO_2 laser source warranty	Transparent long term costs
Vector code as well as state of the art dotted code engraving	Minimum heat effected zone around the laser engraving on high index materials

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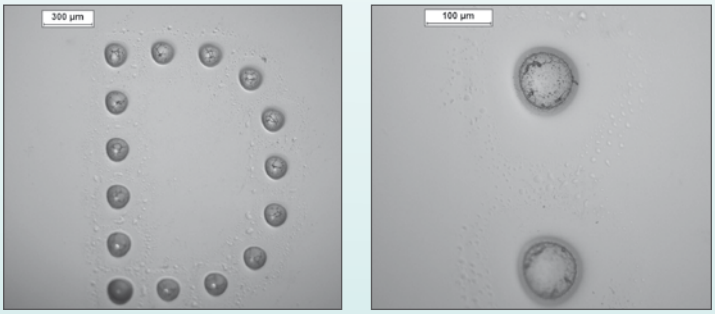
MC-Flexo C3.0 for manual loading

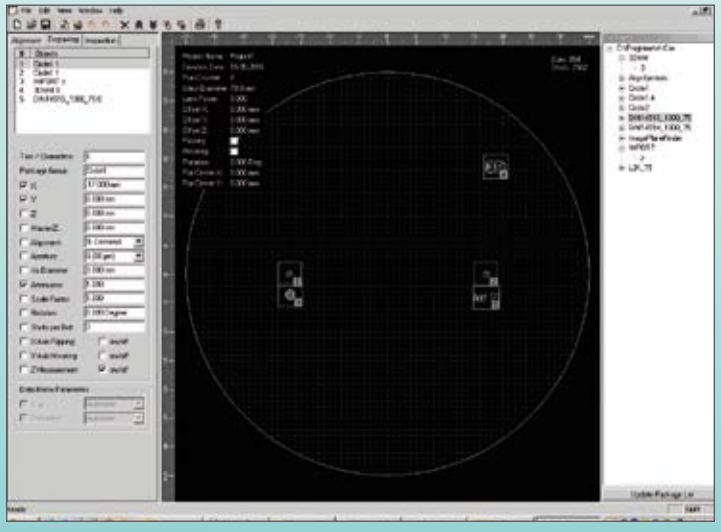
MC-Flexo C4.0 with automatic handling

High Resolution Engraving Samples

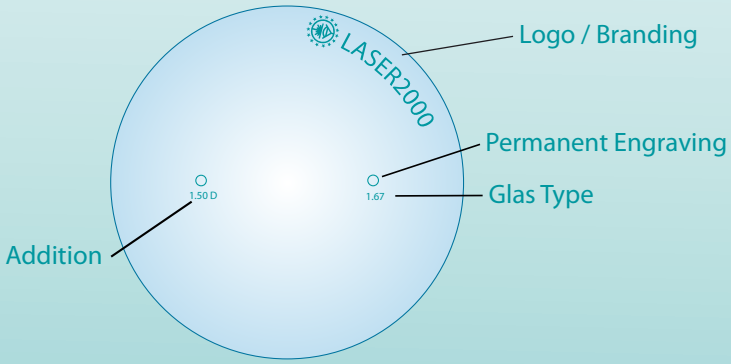


C3.0 engraving results on CR39

Sample engraving file with Permanent Marks, Addition, Glass Type and Logo



MC-Flexo CO_2 Engraving of Permanent Marks, Addition, Glass Type and Logo / Branding



Premium quality Excimer Engraving Systems

MC-Flexc V2.4

Laser 2000 has developed the MC-Flexc Laser Engraving System combining precise mask projection with a high-speed galvanometer laser beam scanning system. This permits the engraving of an unlimited mix of characters, patterns or codes without changing the lens aperture. This is achieved by replacing the usual lens with a specially designed image objective.

The method is very fast – allowing the use of full pulse speed of an Excimer laser – and far more economical since a greater part of the laser energy can be applied. Conventional methods are less flexible because there each character change also requires an aperture change. The systems also need more powerful and thus more expensive laser systems.

With the MC-Flexc High-End Laser Engraving Systems of Laser 2000, the characters to be engraved are simply generated as a chain of x-y coordinates in a text file such that every user can easily create and apply his own character set.

By appropriate selection of laser parameters dot diameter can be miniaturized to approx. 10 µm. The contrast and appearance of the engraving remains freely selectable. Meanwhile, the patented MC-Flexc system became international standard in the ophthalmic industry. It can be used in all situations where conventional laser products fail to operate due to micro cracks or unclean marking results.

Materials to be engraved
Mineral and organic RX lenses
Glass and ceramic molds Coding (Data-Matrix, digital, cryptic)
Inserts for injection molding
High precision chucks for all available blocked- and unblocked lenses and molds

Software
MC serious operating system
WINDOWS XP multilingual
Intuitive graphical interface with preview
Extended configurable log filing for long tern process control and tracing
Full remote access to MC-Flexc and log files at a shared directory via TCP/IP
Project designer software on MC-Flexc or external PC
Project File Designer
Compilation of characters and signs to a complete project (e.g. all characters and signs for one specific lens/mould)
Full automatic project file generation
'one click import' functionality for drawings, logos and fonts (dxf, jpg)
Online and offline generation of project files
RX environment
Communication with host computer based on shared folder or OMA/VCA protocol
Assignment of job records from OMA/VCA server to individual signs and characters
Interface to barcode readers and RFID tags

Features
Deep-UV Excimer System for high quality engraving and ablation
Individual engraving field sizes and lens diameters
Dot engravings from 30 µm to 200 µm size
Long life Excimer laser source and optic system
Close to stand-bye operation for very long lifetime
Laser gas filling with low turbulences for highest optic cleanness
Sealed Nitrogen beam-path with internal Nitrogen Generator
High-Safety ArF- and Laser security Standard
MC-Flexc integrated and sealed laser gas cabinet
Double equipped ArF gas absorber (F2 –Scrubber)
Integrated gas detection and protection devices
Gas cabinet exhaust device
Automatic Gas warning

Applications
Engraving (visible via semi-visible to nearly invisible)
Coding (Data-Matrix, digital, cryptic)

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MC-Flexc modular concept for RX lab and mass production

Special features of the MC-Flexc

The MC-Flexc is designed to engrave free form references, ophthalmic symbols, serial numbers and individual graphical elements on all kinds of lenses, glass molds and other substrates as:

- uncoated and coated by engraving into the coating layer(s)
- concave and convex
- blocked and unblocked
- round, elliptical and cutted
- single vision, progressive / free form
- semi-finished and finished

Image Recognition

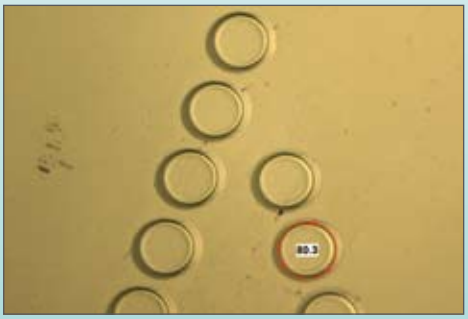
MC-Flexc can be equipped with an image recognition system for visualisation of the permanent marks. A camera and illumination systems indicates the permanent engravings for further engraving process steps. The lens alignment can be done manually or full automatically.

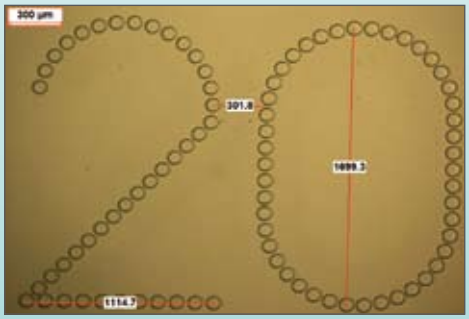
Automatic Handling

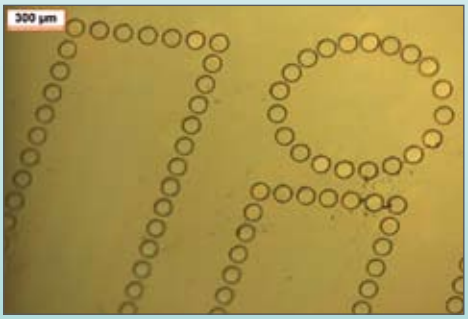
The MC-Flexc handling option allows full automatic operation of blocked and unblocked lenses. The throughput is up to 180 lenses per hour on the standard system and higher on request. The handling system includes a handling arm with vacuum grippers, stoppers and sensors for the conveyor and the conveying belt. The conveyer location (left or right) is selectable according to the individual needs:

- Adaptable on the most common lab conveying systems
- Conveyer belt length free selectable
- Throughput up to 180 lenses/hour

High Resolution Engraving Samples







Premium quality Excimer Engraving Systems

MC-Flexc-ROB

The MC-Flexc-ROB is a robot controlled semi-automatic system for contact lens engraving. The system can handle calottes with RGP lenses and soft lenses as well as aluminium calottes. Besides the high-quality Excimer engraving, the system also features a function for sorting the lenses after the engraving process.

Laser 2000 has developed the MC-Flexc Laser Engraving System which combines precise mask projection with a high-speed galvanometer laser beam scanning system. This means an unlimited combination of characters, patterns or codes can be engraved. The system provided full pulse speed but is far more economical than the conventional Excimer laser demagnification principle.

The method is very fast since the full pulse speed of an Excimer laser can be leveraged fully and is far more economical since most of the laser energy can be applied. Conventional methods are less flexible because every time the character is changed, the aperture has to be changed. The systems also requires more powerful and therefore more expensive laser systems.

By selecting appropriate laser parameters, text heights can be reduced to approximately 20 µm. As far as the graving is concerned, customers can choose whatever contrast and appearance they wish. In the meantime, the patented MC-Flexc system has become the international standard in the ophthalmic industry. It can be used in all situations where conventional laser products fail to operate properly due to micro-cracks or unclean marking results.

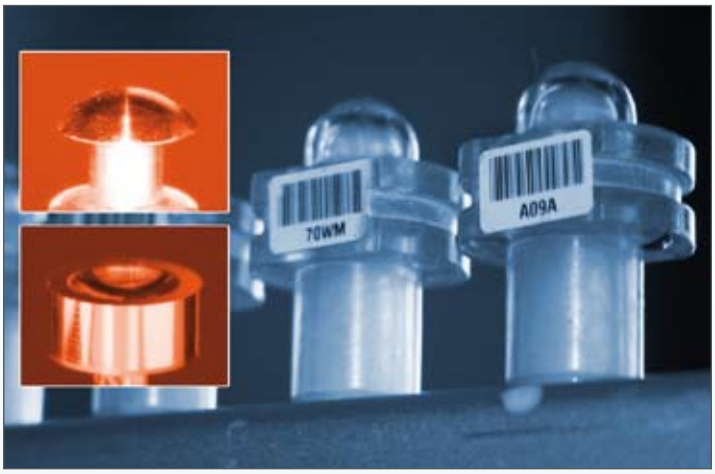
Highlights
The calottes are used during the engraving process and other production steps to carry RGP lenses, contact lenses and other special types of lens. The interaction of a mechanical 5-axis robot and a free-form calotte is a unique combination which allows individual, very fine and highly accurate engraving results to be applied at any lens position.

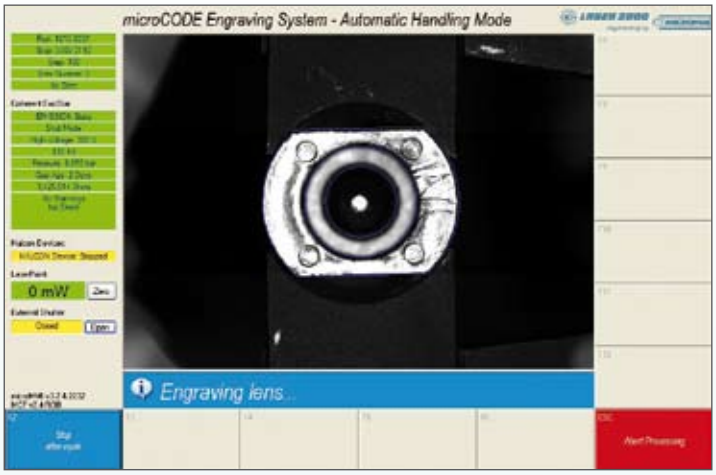
Technical data
Electricity 230 VAC; 50/60 Hz, 16 A
Height 1,70 m (w/o lamp); depth 1,27 m; width 2,54 m)
Weight 1.600 kg
Air pressure 6 to 16 bar; consumption 75 ltr. / min

Features
Productivity depending on the type and amount of engraving required – up to 150 lenses / hour
Unlimited number of engravings
Optimum “cold ablation” Excimer engraving quality
Cost-effective system with regular one-year-service cycle

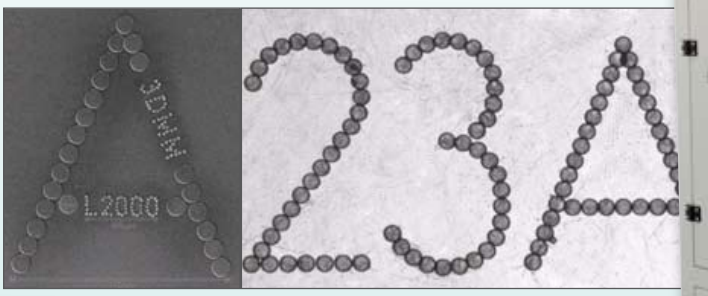
Operation steps
Calottes loading into the loading rail or tablet
Job number reading by barcode
Receiving project file e.g. from HOST
Lens engraving
Lens unloading and sorting

Please call us: +49 8153 405-0





High Resolution Engraving Samples



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State of the art Ink-Jet Printing Systems

MC-Jet Inkjet Printing Systems

In the ophthalmic industry, the market of progressive lenses for near and far sight is the market of growth. Usually, these lenses are pad-printed to identify work-in-process lenses as well as final products. This is done to ease the work of opticians finding semi- or quasi invisible laser engravings, which indicate the properties of the lens.

Until recently however, lens manufacturers had to live with the pad printing machines' major flaw of inflexibility. Now, the new Inkjet Printing systems provides great flexibility and gives the lens manufacturer great market advantage. The MC-Jet replaces limited pad changers. Different images on the lenses are now simply placed by software. Consequently, yearly running costs are greatly reduced. With the special MC-Jet different lens geometries may follow in a mixed sequence. The convex or concave lens geometry can either be determined by the MC-Jet or a fully automated version – be retrieved from barcode and host computer. As an additional feature, the MC-Jet also gives the opportunity to freely import any graphical data. This way, lenses and molds can also be printed with individual company names and logos.

The MC-Jet will become the flexible alternative to pad printing processes mostly because it is more flexible and no pads are needed. Finished lenses or molds can be marked with individual information for personalized products.

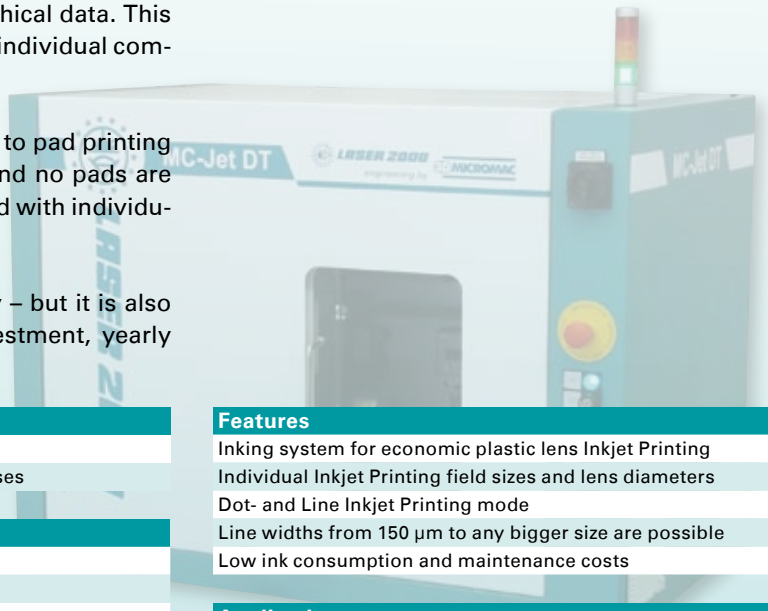
The MC-Jet lets you enjoy the higher flexibility – but it is also far more economic regarding the cost of investment, yearly costs, and cost per lens.

MC-Jet DT (DeskTop) System Configurations

- Inkjet Printing System
- Automatic Loading and Unloading
- Pneumatic chuck for unblocked lenses
- Barcode Reader for Host data transfer
- Printing in 'Vector-' and 'Matrix' Style
- Customized solutions for 60 to 90 lenses per hour

MC-Jet V2.2 System Configurations

- Inkjet Printing System
- Automatic Loading and Unloading
- Pneumatic chuck for unblocked lenses
- Barcode Reader for Host data transfer
- Printing in 'Vector-' and 'Matrix' Style
- Index table equipped for up to 400 lenses hour



Materials to be Inkjetted
Mineral and organic RX lenses
High precision chucks for round and cutted unblocked lenses

Software
MC serious operating system
WINDOWS XP multilingual
Intuitive graphical interface with preview
Extended configurable log filing for long tern process control and tracing
Full remote access to MC-Flexc and log files at a shared directory via TCP/IP
Project designer software on MC-Flexc or external PC
Project File Designer
Compilation of characters and signs to a complete project (e.g. all characters and signs for one specific lens/mould)
Full automatic project file generation
Import functionality for drawings, logos and fonts (dxf, jpg)
RX environment
Communication with host computer based on shared folder or OMA/VCA protocol
Assignment of job records from OMA/VCA server to individual signs and characters
Interface to barcode readers and RFID tags

Features
Inking system for economic plastic lens Inkjet Printing
Individual Inkjet Printing field sizes and lens diameters
Dot- and Line Inkjet Printing mode
Line widths from 150 µm to any bigger size are possible
Low ink consumption and maintenance costs

Applications
Inkjet Printing on all kind of coatings (hydrophop)
Coding (Data-Matrix, digital, cryptic)

MC-Jet V2.2 with indexing table for full automatic operation

MC-Jet-DT V2.0 for manual operation

Samples and Application Results

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Quality & Inspection Solutions

Mapping device for full lens inspection

Our quality and inspection systems are following the need of checking lenses and glasses before they are going to the optician or retailer.

The MQ series is the flexible adaptation to the fast-moving market developments. The seamless integration of additional functions including optical power mapping of lenses, increases the system's throughput and overall productivity.

The classic methods for optical measurement in RX processes are systems for dioptre measurement for single vision or free form lenses. In most cases these systems are supplemented by pad printing solutions for adding the information necessary for the optician. Nevertheless the downsides of the well known pad printing technology are its limited flexibility, high costs for clichés and high maintenance. Currently, optical measurements of lenses using this equipment are limited to discrete positions on the lens, so there is no possibility to make a complete evaluation of a free form lens.

New generation of control system

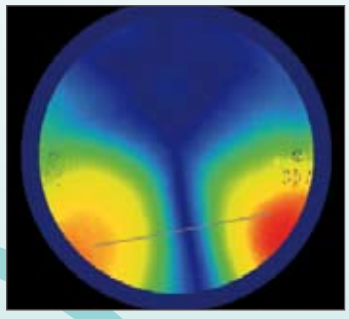
The MQ series represents a new generation of measurement and control system combining Inkjet Printing with automatic lens mapping over the entire surface. This totally non-contact approach captures and records vital data such as optical power, cylinder and prism values, instantaneously. The intuitive software allows the user to interrogate the power measurements at every point of the surface, using the XY coordinates and the diameter around these coordinates. Furthermore, the customer can define near and far field size of the measuring area, and the nuvmber of measuring areas for every lens.

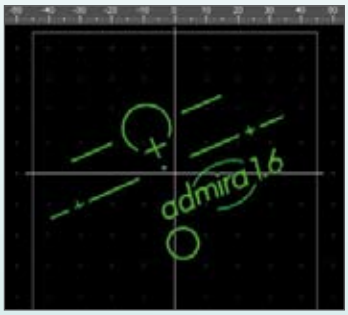
Complete quality assessment

The MQ series accepts all lens types from single vision lenses with a central measurement point to progressive lenses with near and far field. Even special lenses with more than two fields of view (e.g. special glasses for pilots) can accommodated. In addition, the actual measurement values can be compared with the model data of the lens.

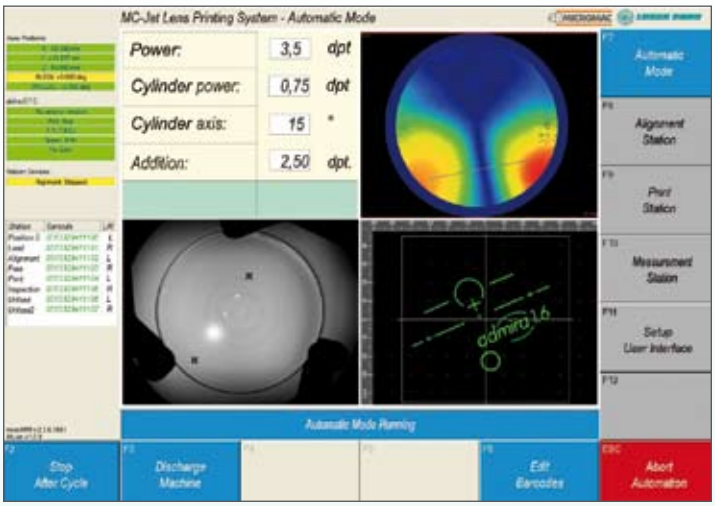
Tolerance limits and levels can be set such that deviations from the optimal values of the lens will be shown in different colours e.g. green, red, yellow, for a quick visual comparison.

After mapping, the optical parameters of a free form lens can be detected. Only with these steps it is possible to make a complete quality assessment with the decision whether the lens fulfils the high quality standards of the manufacturer or not. The exchange of data accomplished via OMA interface. Customer-specific solutions are available that include a connection to an SQL data base to ensure statistical process control.

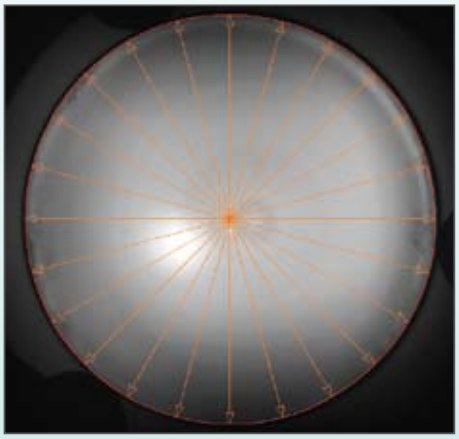




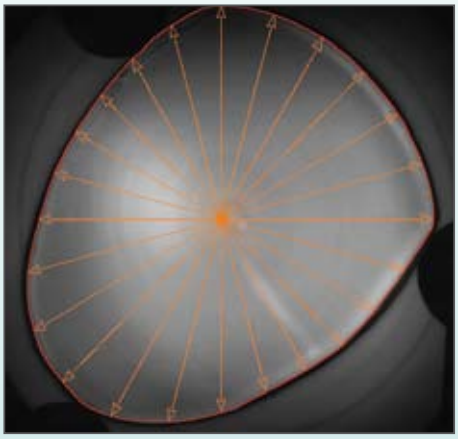
Screenshot of a typical free form lens analysis



Measurement of lens outer diameter

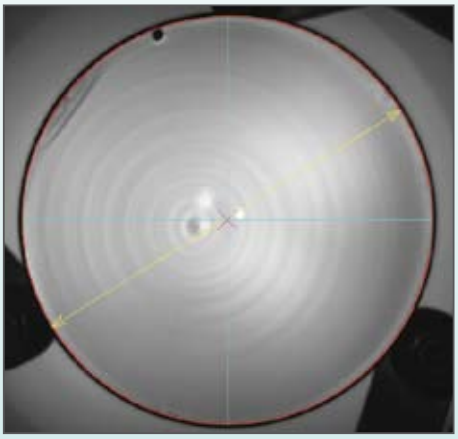


Measurement of circular lenses
- Value of roundness
- Diameter in mm, ± 0.1 mm



Measurement of cutted lenses
- R @ α in mm ± 0.1 mm
- Number of α is variable

Measurement of torus



Suitable for circular lenses
- Touchless measurement
- Very fast measurement (<1 sec)
- α, (dpt 0,25-4)

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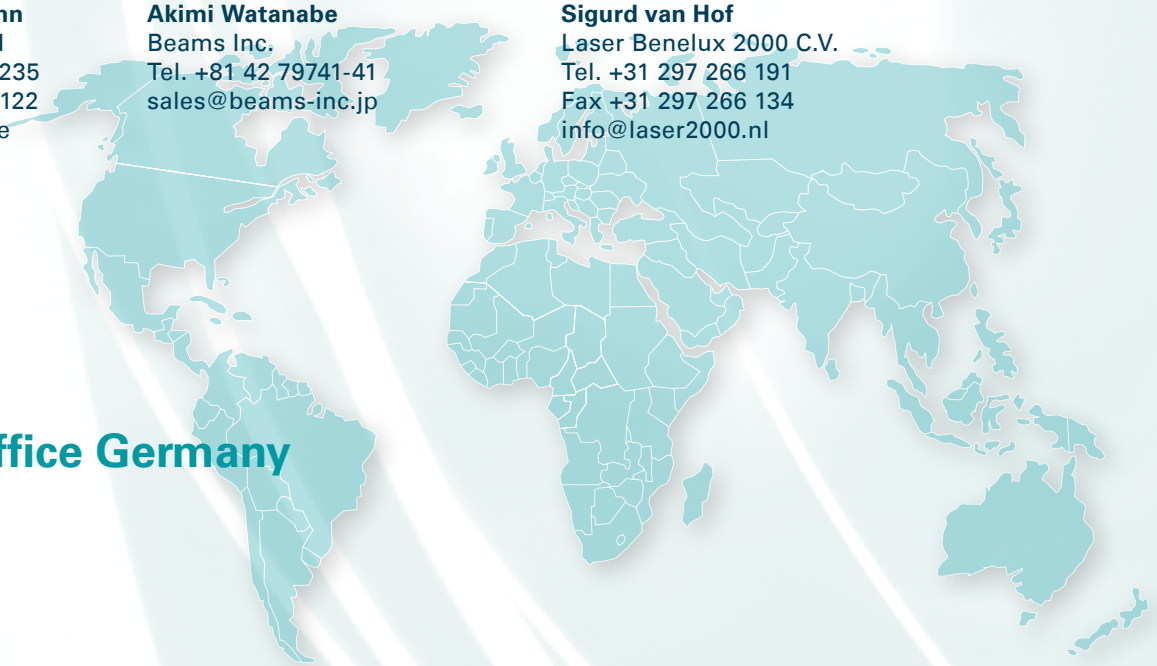

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