

# OPTICAL PROCESSING

CUSTOMIZED SOLUTIONS FOR THE OPTIC INDUSTRY

SLICING | FINE GRINDING | LAPPING | POLISHING | PITCH POLISHING



The background of the page is a high-quality photograph of various optical components. In the foreground, there are several circular lenses and mirrors with concentric rings, reflecting light in a way that creates a sense of depth and precision. The colors are predominantly blue and white, giving it a clean, technological feel. A white, angular shape on the right side of the page serves as a backdrop for the main title.

## LATEST TECHNOLOGY SOLUTIONS FOR THE GLOBAL OPTICS INDUSTRY



## DEFINING THE LEADING-EDGE

The optic industry can be varied and challenging. Minor changes in acids, process chemicals, and random batch variability can compromise surface quality, leading to defective products.

Lapmaster Wolters works closely with its customers to find the best solution for every requirement and achieve predictable process results and quality.

With its brands Lapmaster and Peter Wolters, broad knowledge and deep experience exist to help improve products and strengthen the competitiveness of the customers.

### OPTICS APPLICATIONS:

- LCD displays
- Flat panel displays
- Fused quartz
- Zerodur components
- Avionics gyros
- Telescope lenses
- Sapphire read lenses
- Photo copier lenses
- Precision camera lenses
- Photo masks
- Plasma display panels
- BK7 glasses
- Optical flats
- Optical mirrors
- Copy machine mirrors
- Fiber optic connectors
- Sapphire watch crystals
- Optical filters

# COMPREHENSIVE SOLUTIONS FOR EVERY CHALLENGE

STATE-OF-THE-ART MACHINE TOOLS AND TAILORED SERVICES

## COMPREHENSIVE MACHINING SOLUTIONS



SLICING  
(Page 6)

### SINGLE-SIDE PROCESSING



LAPPING/POLISHING  
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PITCH POLISHING  
(PAGE 14)

### DOUBLE-SIDE PROCESSING



GRINDING/LAPPING  
(PAGE 12)



POLISHING  
(PAGE 13)

Surface Quality

Process Stability

Removal Rates

Throughput

## SUPPORTIVE SERVICES



PROCESS DEVELOPMENT  
(Page 19)



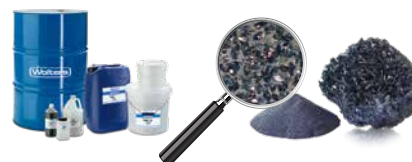
SERVICE SOLUTIONS  
(Page 16)



SUBCONTRACTING  
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CONSUMABLES  
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# PROCESSES FOR EXCELLENT RESULTS

## MAXIMUM PRECISION FOR ALL MATERIALS AND INDUSTRIES

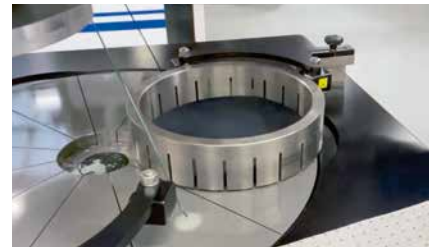
### SLICING

With automated wire slicing solutions on Peter Wolters machines, diamond-coated wire is stretched over two wire guide rollers to form a wire web that slices material into wafers with minimal kerf loss. The workpiece moves towards the wire web, which is guided over the wire guide rollers and commutes back and forth accordingly. The thickness of the wafer is determined by the grooving of the wire guide rolls, which allows a wide thickness range to be covered.



### SINGLE-SIDE LAPPING

One or more workpieces are machined at the same time in a batch process. The abrasive is usually mixed with a liquid vehicle, either oil or water-based. The pieces being lapped are captured in retaining rings. Workholders also called "carriers" may be used to keep the parts separated to prevent damage to their edges. The workpieces are dragged across the lap plate surface on which the abrasive is fed.



### SINGLE-SIDE POLISHING

A polishing pad and water-based slurry are utilized to achieve a reflective or clear surface. To meet this requirement, caustic polishing slurries are often employed, necessitating the use of stainless-steel components in polishing systems. At the end of the process, thorough water rinsing is carried out to prevent staining caused by residual polishing media.



### SINGLE-SIDE PITCH POLISHING

Single-side pitch polishing is a precision surface finishing method using a pitch plate and fine polishing media. Optical components are placed on the pitch surface, and grooves are cut to allow slurry flow. The pitch plate, rotated against the components, achieves high surface quality, tight tolerances, and low roughness.



### DOUBLE-SIDE GRINDING / LAPPING

Double-side grinding or lapping is a precise machining process where a workpiece is sandwiched between two rotating abrasive surfaces. An abrasive slurry is applied to both sides. Carriers hold the workpiece for parallelism. The surfaces grind or lap simultaneously, ensuring flatness, parallelism, and precise thickness.



### DOUBLE-SIDE POLISHING

Double-side polishing is a process in which both sides of a workpiece are polished simultaneously. It uses a special machine with two rotating polishing plates. The workpiece is placed between the plates and polishing agents are applied. During the polishing process, unevenness is removed by the abrasive action of the polishing agents. The simultaneous polishing of both sides ensures an even surface.





## SUSTAINABILITY AND LATEST TECHNOLOGY

### INNER DIAMETER SAWS COVER A WIDE RANGE OF WORKPIECE SIZES

Balancing economical and technologically advanced production with today's requirement for sustainability can be challenging. The factory overhauled Inner Diameter or Outer Diameter saws represent a part of the solution and the step in the right direction in terms of sustainable business models. This involves disassembling machines that are 30 years old or more down to their basic components, bringing all mechanical and electrical parts up to today's standards, implement a user friendly high automatic HMI and combine all to a high precision state of the art equipment.

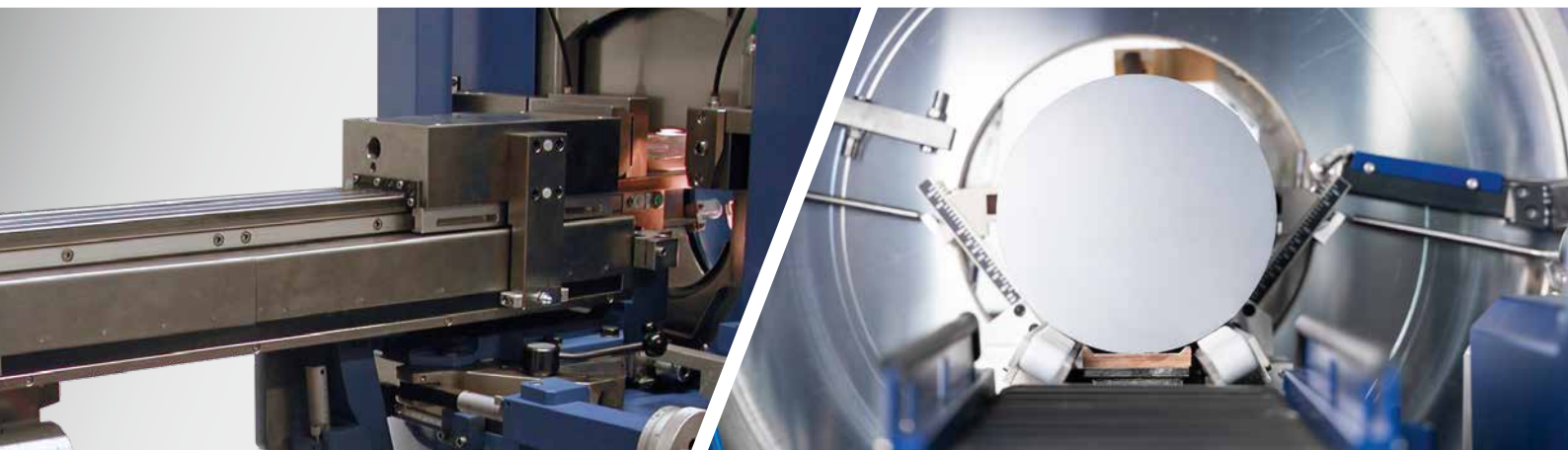


TS23



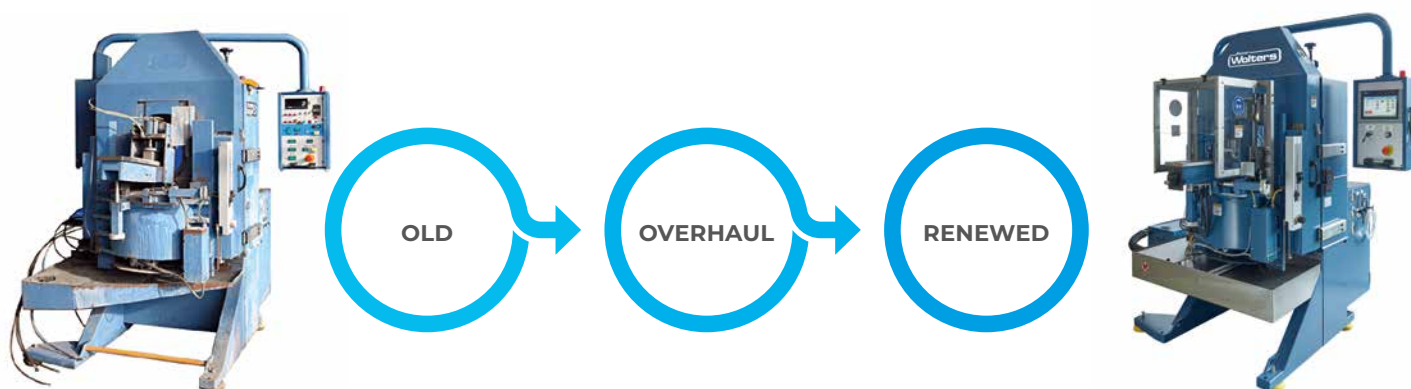
TS207

The models TS23, TS207 as well as the TS121 show high flexibility, allowing a wide range of workpiece sizes and various dimensions to be sliced. Despite the given flexibility, the highest degree of accuracy and stability is still ensured. Accordingly, these products are not only used in the optical sector, but also for slicing semiconductor materials, magnets, ceramics, sapphire and in various other industries.



# FACTORY OVERHAULED INNER-DIAMETER SAWS

MAXIMUM FLEXIBILITY AT MAINTAINED PERFORMANCE



All electrical components of the machine are replaced and a new control system is implemented. The operation takes place via touchscreen with a new HMI platform.

Mechanically, the machine is completely disassembled, repainted and all parts are reassembled in a revised state.

## YOUR BENEFITS

- Extended life time of a proven production equipment
- State-of-the-art control and electrical components
- Guaranteed availability of spare parts
- New ID-blade monitoring system linked to the HMI
- New drip pan and sludge collector
- Quality check according to test record
- 1 year warranty as on new machine

## ADDITIONAL OPTIONS

- Electrical feed
- Rotary system
- Automatic wafer removal system
- Variable blade rotation speed
- Additional equipment
- Spare part package
- Maintenance and service contract



# MULTI WIRE SAWS FOR SLICING HIGH VOLUMES

## SLICING TECHNOLOGIES FOR SPECIAL MATERIALS

Lapmaster Wolters has set the technological standard for the slicing of hard and brittle materials with the biggest possible material and cost savings. In semiconductor, photovoltaic, optical, and other industries, a substantial growing list of applications use environmentally friendly diamond wire technology. Higher slicing speed, a longer wire web and ultra-thin diamond wires enable increasing numbers of wafers to be sliced faster at top quality and with outstanding precision. Diamond wire is the principal cost factor in wafer manufacturing and these market-leading diamond wire slicing systems offer



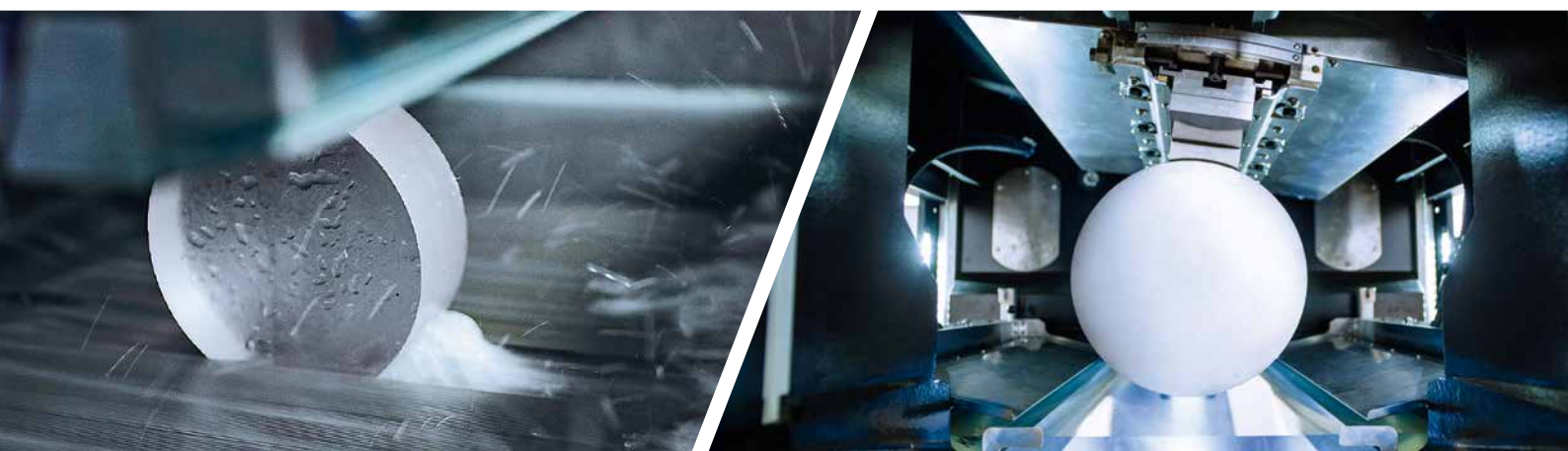
DW292



DW288

customers innovative solutions and processes that reduce their overall operating costs. The DW288 as well as the DW292 platform allow broad flexibility in terms of different workpiece dimensions – equipped with a workpiece rocking unit and other additional features to ensure customers benefits:

- Low temperature dependency
- Stabilized slicing conditions
- Higher material yield
- Lower downstream process efforts





# FACTORY OVERHAULED PARTS

## BEARING OVERHAUL, WIRE GUIDE GROOVING AND COATING



### YOUR BENEFITS

- Improved consistency of slicing quality
- Increased yield
- Reduced production downtime
- Comprehensive approval testing ensures safe and trouble-free operation of the overhauled parts

### SCOPE OF WORK

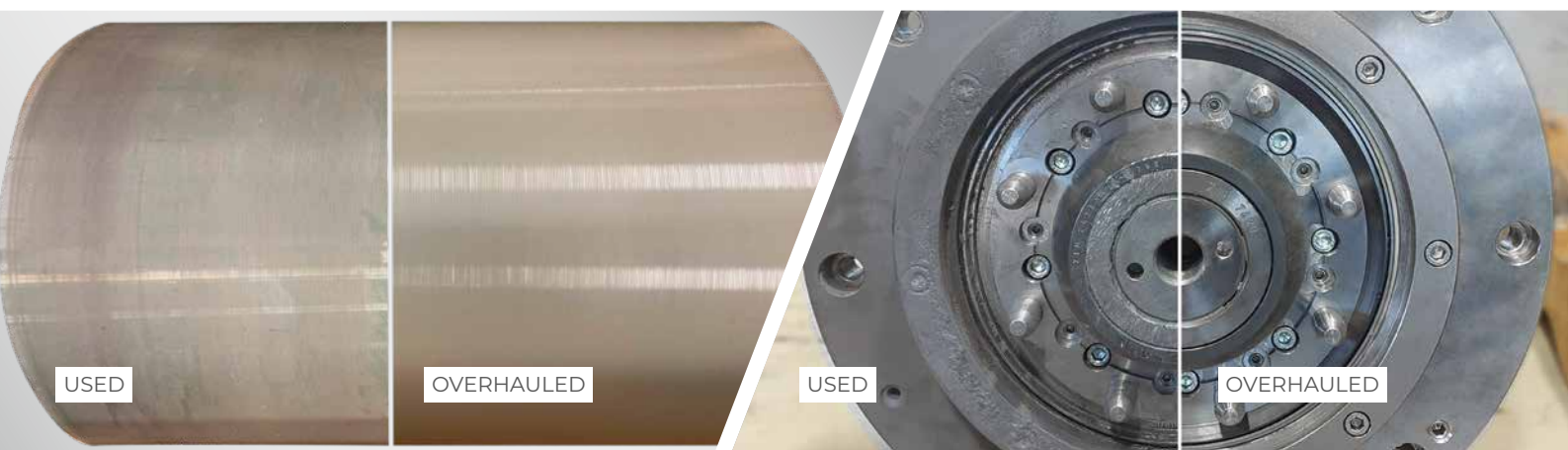
- Quality inspection
- Surface condition inspection
- Cleaning
- Replacement of wear parts
- Re-coating/re-grooving (wire guide roller)
- Overhauling and testing (bearing)

### OVERHAULING OF WIRE GUIDE ROLLS (WGR)

- Essential to ensure good performance as a core part of a wire saw
- Direct influence on slicing quality
- Over time of use, WGR are wearing out, reducing performance and wafer quality
- New coating, new grooves and replacement of worn mechanical components, ensure smooth rotation of the WGR and wire web
- Any type of WGR and grooving possible, flexible in customer specific requirements

### OVERHAULING OF BEARINGS

- Essential to ensure a constant production quality
- Direct influence on slicing quality
- Over time of use, parts are wearing out, reducing the stability of the bearing and wafer quality
- Overhauled bearings ensure smooth rotation of the WGR and wire web
- Bearing overhaul service can be provided for almost all wire saw and bearing types in our portfolio



# THE POWER OF SINGLE-SIDE MACHINING

## DISCOVER PRECISION AND VERSATILITY

Single-side lapping, or polishing is a precision machining process to achieve flat and uniform work-piece surfaces. The precision and uniformity offered by single-side lapping and polishing machines make them indispensable for manufacturing optical components such as lenses, mirrors, prisms, and filters.

The key advantage of single-side machining is its ability to produce surfaces that are so flat they can be measured in light bands. This level of flatness enables leak-proof mating without the need for gasketing, making it ideal for applications where precision sealing is crucial.



## OVERVIEW OF SINGLE-SIDE MACHINE PORTFOLIO

Machine	Lapping	Polishing	Plate O.D. [in/mm]	Ring I.D. [in/mm]
Model 15	✓	✓	15/381	5.5/140
Model 20	✓	✓	20/508	7.5/191
Model 24	✓	✓	24/610	9.7/248
Model 36	✓	✓	36/914	14.4/368
Model 48	✓	✓	48/1219	19.8/505
Model 56	✓	✓	56/1422	22.7/578
Model 72	✓	✓	72/1828.8	27.25/692.15
Model 96	✓	✓	96/2438.4	37.25/946
Model 120	✓	✓	120/3048	44/1117

Single-side lapping and polishing machines offered by Lapmaster Wolters are engineered to provide the right balance between stock removal rate, finishing, and flatness. Their versatility sets Lapmaster's single-side lapping and polishing machines apart. Each machine is designed specifically for the customer's application, without any predisposed tendency to promote one abrasive technology. This approach ensures the development of an optimal process tailored to the customer's specific needs.





# DOUBLE-SIDE MACHINING FOR HIGHEST PRECISION

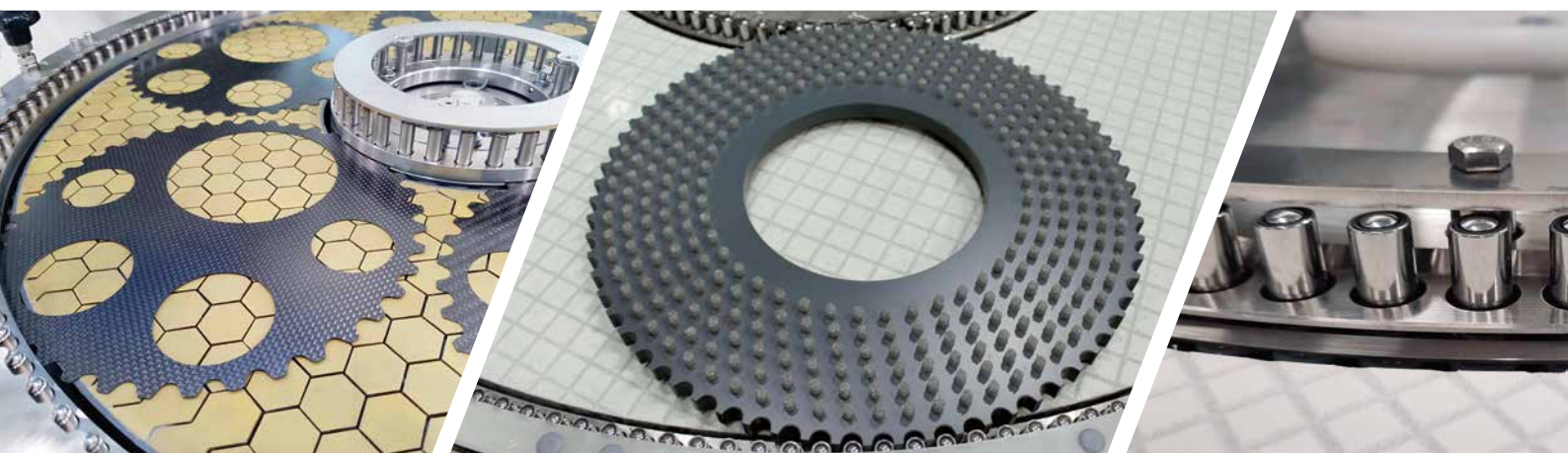
## IDEAL FOR FLATNESS AND TOTAL THICKNESS VARIATION

The high-precision machines of the Peter Wolters brand are based on continuous further development through decades of experience. Our R&D center works permanently on the optimization of existing processes and deals intensively with new technologies. The result are state-of-the-art machine tools, which can be optionally supplemented with various customer-specific requirements.



### MACHINE HIGHLIGHTS

- Optimal access to the process area due to swiveling machine head
- Gap formation and alignment system of the upper working wheel
- High-precision pneumatic controlled force system
- Working wheel cooling for homogeneous process temperature
- Direct process temperature measurement
- Integrated measurement control
- Powerful, sustainable regenerative drive technology
- Cost- and maintenance-optimized wear components in the work area
- Carriers (workpiece carrier) for machining fragile and very thin workpieces
- Innovative, intuitive menu navigation and visualization via touchscreen
- Individual, flexible media-feeding technology
- Process Data Analysis Tool = DataCare®





In addition to highly efficient machines with corresponding consumables, Lapmaster Wolters also supplies the complete process chain. Complex, customized customer-specific solutions are developed in our technology center. Moreover, several machines for different processes are often purchased for individual applications. The process steps are:

### SINGLE APPLICATION OR COMPLETE PROCESS CHAIN



### OVERVIEW OF DOUBLE-SIDE MACHINE PORTFOLIO

Machine	Lapping	Fine Grinding	Polishing	Plate O.D. [in/mm]
AC 400	✓	✓	✓	17-19/425-475
AC 535	✓	✓	✓	21-22/534-562
AC 700	✓	✓	✓	28-30/720-760
AC 880		✓		35/900
AC 1000		✓		41/1050
AC 1200	✓		✓	46-48/1180-1220
AC 1250		✓		49/1250
AC 1500	✓	✓	✓	59-61/1500-1538
AC 2000			✓	71-76/1800-1935



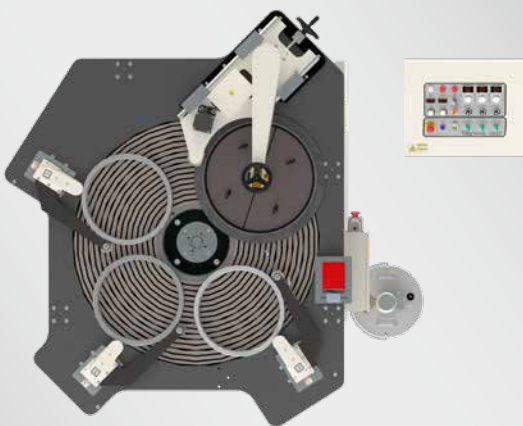
# PITCH POLISHING AT THE HIGHEST LEVEL

## ENHANCING HIGH PRECISION IN OPTICS

Pitch Polishing is a highly precise and efficient method of manufacturing optical components. It employs a pitch plate and fine polishing media to achieve exceptional surface quality. The pitch plate, with its semi-fluid consistency, features grooves that facilitate the flow of polishing slurry beneath the components, ensuring remarkable surface roughness and flatness. This process surpasses conven-

tional polishing techniques, providing tighter tolerances and superior optical performance.

Lapmaster Wolters' skilled optical technicians, backed by extensive knowledge and experience, consistently deliver high-quality components. A wide range of pitch polishing machines is available to meet a variety of production needs, from high-volume industrial applications to low-volume job shop applications.





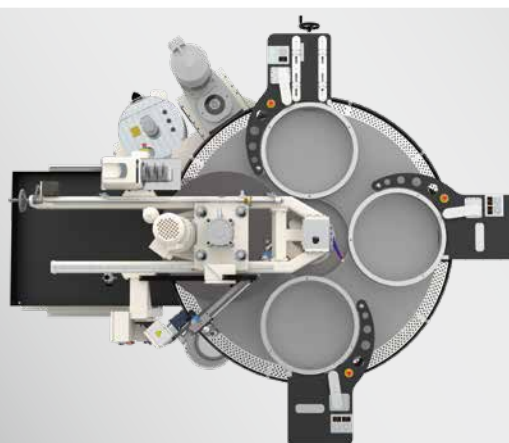
# PITCH POLISHING MACHINES

## ADVANCING OPTICAL MANUFACTURING



Lapmaster pitch polishing machines and systems offer numerous benefits for precision polishing. The Pitch Polishing machine is designed to use a rotating polishing plate that is coated with pitch. The pitch then forms a conformal layer between the workpiece and the polishing plate, which helps to reduce the surface roughness of the workpiece and produce extreme flatness. Significant skill is required for pitch polishing, achieving tighter tolerances for surface flat-

ness, roughness, parallelism, and cosmetics than you would achieve using the conventional lapping process with coarser abrasives. Ideal for optical lenses, mirrors, and semiconductor substrates, pitch polishing involves careful cleaning, application of abrasive solutions, and continuous surface quality monitoring. Lapmaster Wolters' machines ensure consistent and reliable results, meeting the demanding requirements of the optical industry.

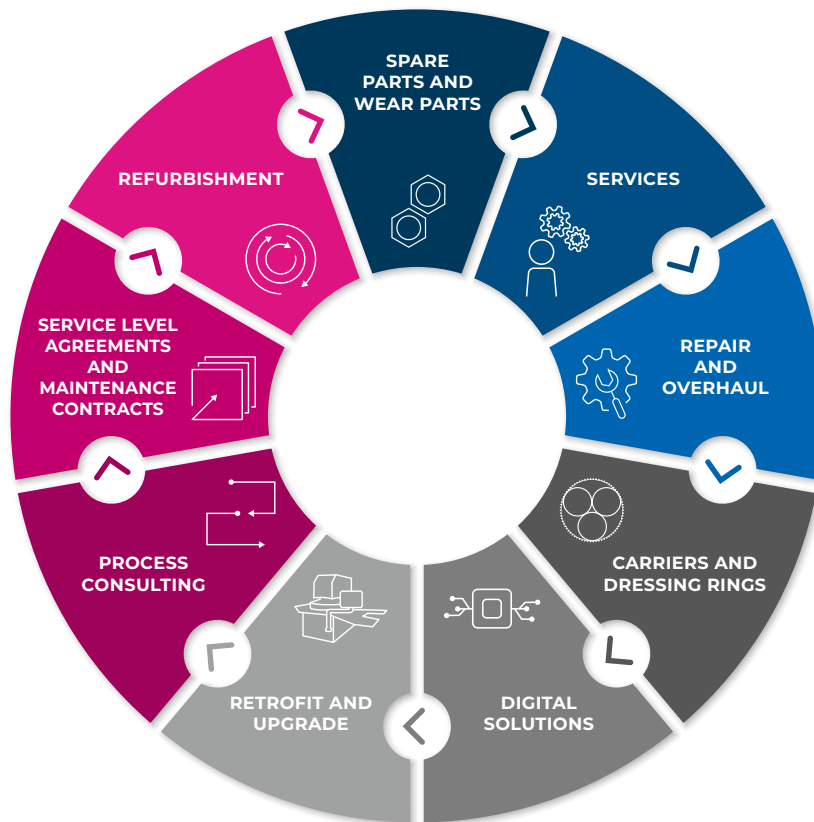


## OUR RANGE OF SERVICES

### A CUSTOMIZED SOLUTION FOR EVERY PROBLEM

We care – two words that are easy to say. But sophisticated solutions that require a high level of technological expertise and an in-depth understanding of the customer – that's precisely our thing. Regardless

of whether you want a complete or partial service package, we have our excellently trained crew of technicians. On-site, on the phone and via our digital platforms – worldwide.



For in-depth information on our comprehensive range of services please scan the QR-code.



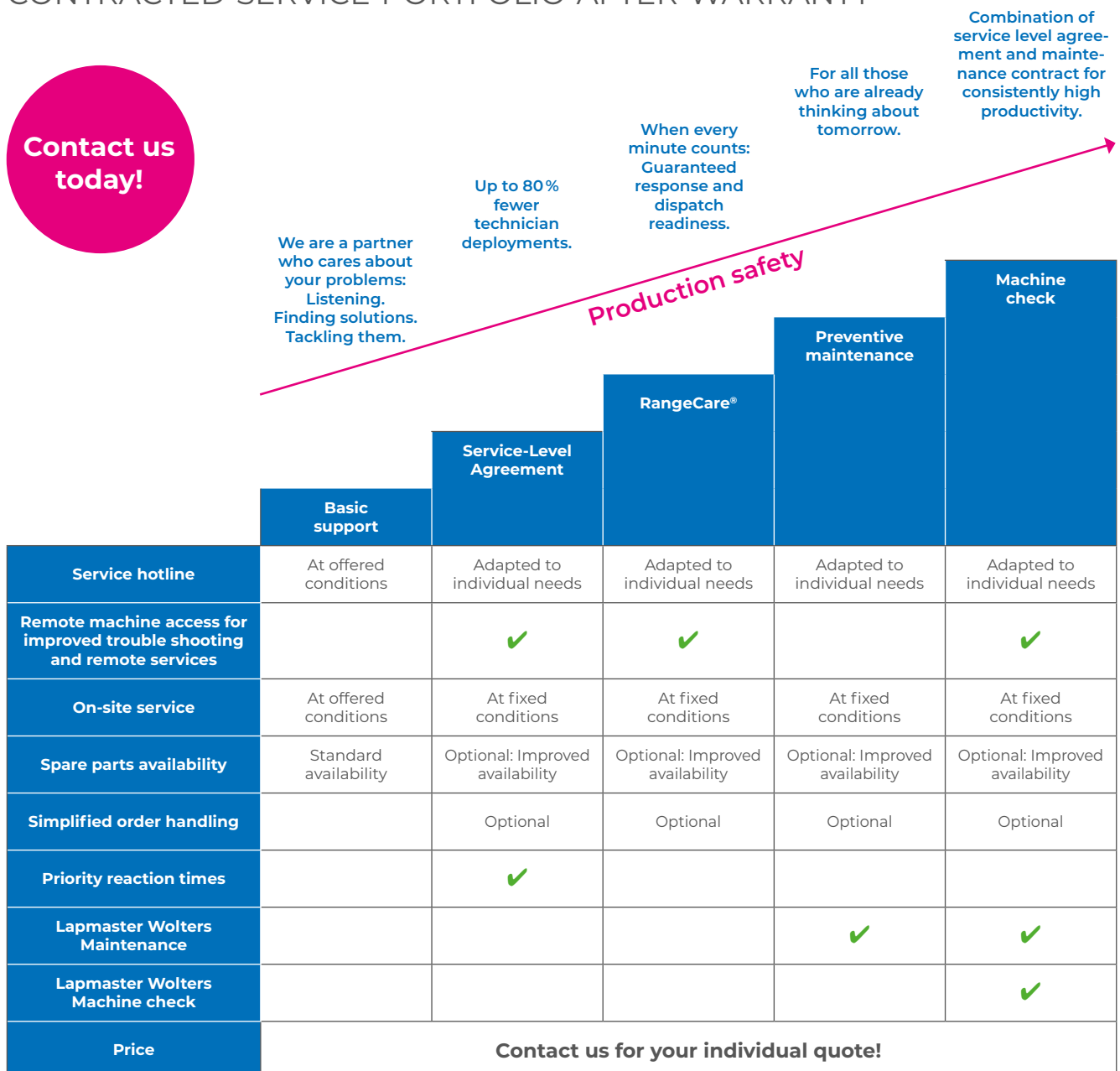
# SLA AND MAINTENANCE CONTRACTS

## INDIVIDUAL SERVICE AGREEMENTS

Whether inspection, maintenance, repair, training or advice – all the services in our service portfolio can be called up individually – or with more security as part of a service contract. We offer you a variety of standardized and individual service level agreements and maintenance contracts. These are put together by us on the basis of many years of experience to make

your day-to-day work easier. Your expenditure can be planned and you save on operating costs thanks to optimally adjusted machine components. Benefit now from various solutions and attractive price advantages. Talk to our service department about your applications. Together we will find the best service and maintenance package tailored to your needs.

## CONTRACTED SERVICE PORTFOLIO AFTER WARRANTY





# WORLD CLASS CONSUMABLES

## THE TEAM TO SUCCESS

Beside the industry leading equipment, the material to be processed and the perfect recipe, the consumables being used have a major impact on the quality of semiconductor wafers. Decades of close relationships with best-in-class and international operating manufacturers facilitate your path to success. Lapmaster Wolters supports you with our R&D testing environment and our experience to improve your overall production yield.

Contact us – we support you with:



### CONSUMABLES FOR WIRE SAWS

- Deflection pulleys
- Diamond wire
- Structured and straight steel wire
- Cutting fluid additive
- SiC slurry
- Diamond slurry
- Beams
- Glue

### CONSUMABLES FOR LAPPING, POLISHING AND FINE GRINDING

- Carriers
- Dressing Rings
- Abrasive Powders
- Lapping Vehicles
- Pre-Mixed Abrasive Slurries
- Lapping Compounds
- Polishing Pads



**AT HOME IN DEMANDING INDUSTRIES**

Ever-shorter development cycles, increasingly complex production processes and massive competitive pressure: Only those companies that achieve high quality standards and precision, maximum productivity, low production costs and short processing times are successful.

Designed for maximum precision, a high level of reliability and cost-reducing efficiency, our machines are the decisive key to your competitive advantage.

**WE GET YOUR PROCESSES UP TO SPEED****FROM CONSULTATION TO A TURNKEY SYSTEM SOLUTION****COMPREHENSIVE SOLUTIONS FROM ONE PROVIDER**

Our customers in high-tech industries have one thing above all else: complex requirements and specific needs. We provide the right solution, no matter for which task or industry, which material or market.

From the first idea to the production support, as your competent partner we provide you with comprehensive system solutions that adapt to your specific production requirements. As standardized as possible, as customized as necessary, and everything from a single source.

**MACHINE**

The machine portfolio ranges from small compact machines to large fully automated machines. Several options are available to meet individual needs for the respective application.

**PROCESS**

In addition to the machines, we offer comprehensive and in depth process development. Our application specialists work continuously to optimize the respective technologies and processes. Customer-specific test setups make it possible to demonstrate the performance capability of our machines.

**ANCILLARY UNITS**

Ancillary units are an important factor for a successful process. For example, we deliver optimal filtration and cooling systems for the customer process. The complete solution from a single source.

**SERVICE**

Our global service not only offers spare parts, repairs and maintenance contracts for your systems. The offer reaches well beyond training, machine upgrades and complete overhauls of entire systems.

## LAPMASTER WOLTERS – THINKING GLOBALLY, ACTING LOCALLY

Are you interested in one of our products, need a consultation or would like to have a quote? To contact one of our sales and services offices directly, please visit our locations overview online:

