OPTICS MATERIAL PROCESSING



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Logitech is a world leader in materials processing, shaping and surface finishing technologies. From a business developed out of a project in 1965, to research advanced semiconductors at the University of Glasgow, one of the world's oldest and widely respected academic institutions, Logitech has grown a wealth of knowledge and problem-solving skills in materials processing in a wide range of optics based applications such as fibre cable polishing, IR and polymer waveguide production, LED wafer substrate preparation and more.

We specialise in the design and manufacture of lapping and polishing equipment. Also in cutting, bonding, testing and measurement equipment, allowing us to offer turnkey system solutions for a quick and effective route to complete success in any optical polishing process.

Our technical team work in confidence with customer's identifying the most relevant system for optimum results on their particular applications processing issues. Initial discussions provide a detailed understanding of production quantity, surface finish and geometric tolerance requirements.

Typical applications where our systems are used:

- → Fibre Optics
- → Opto-Electronics
- → Laser Material
- → LED substrate preparation



All of our systems are designed for optimum flexibility, productivity and quality, the benefits customers see from this are:

- → Flexibility: Allowing for low initial investment during the projects development stages with the ability to increase capacity with demand.
- → **Productivity:** Logitech systems increase sample yield due to fast processing times, automated processes and easy conversion between processes meaning less down-time.
- → Quality: As individual machines can be dedicated to specific stages of the process, ensuring quality and yield are optimised.





Logitech prides itself on offering a truly bespoke system that adapts to your applications needs and requirements. Specifically in optical applications, this becomes an essential need as samples such as fibre optic cables or laser rods do not meet the standard size or dimensions for basic sample retention tools such as precision jigs.

Logitech work with you to understand your process needs and can develop bespoke fixtures and templates that are exact to your process requirements. Whether it be fixtures for edge polishing, fibre array polishing or specific templates for LED susbtrate preparation.

All of our bespoke fixtures are designed in-house by our engineering team, specifications are then agreed upon and approved by the customer before the fitting is manufactured – complete control

from the customer ensures fixtures are exact to the application requirements. These fixtures are designed to work completely in unison with your Logitech system. The streamlined system allows operators to achieve the highest specification surface finishes in the minimal amount of time – therefore boosting productivity.







APPLICATIONS

Advances in communication technology have led to the development of a wide variety of optoelectronics and integrated optics devices for applications such as; dense wavelength division multiplexing (DWDM), optical isolators, signal processors and optical switching.

Logitech has a large selection of adaptable systems for the preparation of optoelectronic materials such as; silicon, lithium niobate, lithium tantalate, bismuith silicon oxide, barium titanate and similar materials.

Our systems, accessories and consumables provide defect free face and edge polishing on optoelectronic substrate and scratch free surfaces with exacting and repeatable dimensional tolerances.

The importance of optical polishing and the processing of optical components has never been greater with the ongoing development of the telecommunications market. Whether for Infra Red and polymer waveguide production or fibre optic cable polishing.

The precision design and manufacture of our equipment enable you to obtain maximum results from the cutting, lapping and polishing of these optical materials.





Fibre Optics:

Individual optical fibres sandwiches between two layers of an approritate optical/semiconductor material for example silicon or optically coated glass are called "fibre arrays" and are used within the currently expanding DWDM (Dense Wavelenght Division Multiplexing) market. They are essentail in the successful day to day running of worldwide information and transfer networks. These arrays enable high volumes of data to be transmitted throughout the optical network.

Approritately sized v-grooves are cut into the optical material being used to sandwich the fibres, allowing each fibre to nestle comfortably in its own channel. The resulting edge, where the fibre ends appear through their own channel, must be polished to a particularly high degree in order to allow data to be successfully transmitted along each fibre and through the optical material into/out of the network.

Logitech has designed equipment and developed the necessary technology to allow the highly precise levels of polish to be achieved in repeatable processes allowing for the stringent sample specifications required to be easily achieved.

Fibre arrays are held in a bespoke designed sub-fixture located at the base of a precision polishing jig. The sub-fixture is custom designed and made to accommodate the required number, sizes and angle of the fibre arrays being processed. Dependent on the throughput levels required, the polishing jig with the specially designed sub-fixture is then mounted on to a Logitech PM6 or LP70 Precision Lapping & Polishing System for both the lapping and polishing of the fibre arrays.

LED Substrate Prep:

Logitech offer system solutions for the preparation of Sapphire, Silicon Carbide and Gallium Nitride for LED applications. LEDs are typically manufactures on Sapphire substrates, around 90% of the blue LEDs currently in production, the remaining 10% are made from SiC substrates. Demanding industry requirements mean wafer polishing is essential to reduce the final thickness of the substrate to the required target value, with a TTV of better than +/- 2 microns and an improved surface roughness of less than 2nm.

This can be achieved by first, safely bonding the wafer to a rigid glass substrate using a Logitech Wafer Substrate Bonding Unit (WSBU). Once bonded, the wafers require to be lapped in order to remove excess material prior to being polished. This lapping process can be undertaken on a number of Logitech precision lapping systems including a PM6, LP70 or DL system - utilising a Logitech precision lapping and polishing jig.

After lapping, the wafers are manually cleaned using the in-situ integrated DI water and Nitrogen guns found in our precision lapping systems. They are then transferred to specially designed wafer template holders for our DP Driven Head Precision Polishing System. The DP allows wafers to be polished in a wide variety of quantities, ranging from low to high throughput requirements, to repeatable levels of optical grade polish.

Laser Rods:

Titanium:Sapphire (Ti:Sapphire) can be configured to lases over the range 660-1050nm. With pumping wavelength of 490nm Ti:Sapphire is very well suited to diode-pumping and have excellent thermal, physical and optical properties.

Logitech has many years experience in the design and manufacture of high precision equipment in sophisticated materials processing solutions. Our optics focussed systems provide a quick and effective route to complete success in sample requirements that are accurate and repeatable. Our adaptable cutting, lapping and polishing systems are extremely effective, on the most fragile of materials through to the hardest materials used in optics processes.

Titanium Sapphire laser rods samples are secured with bespoke sub-fixtures to our Precision Polishing Jigs. These sub-fixtures secure the sample so that it can be lapped and polished at the correct polarization angle (Brewster angle) which allows light with a particular polarization to be perfectly transmitted through a transparent dielectrics surface with no reflection. Once the sub-fixture with the sample is fitted to an appropriate jig it can be mounted on to our PM6 Precision Lapping & Polishing system to achieve excellent results.

Some typical results that can be achieved using the PM6 includes:

- → Flatness: Lambda/10
- → Ra 10/5 stratch dig
- \rightarrow Brewster faces shall be parallel to within 30 arc seconds
- → Brewster angle: 60.4 degrees +/- 0.25 degrees

EQUIPMENT GLOSSARY



PM6

The PM6 precision lapping and polishing machine will reproduce processing results typically found on production-scale equipment. Highly flexible in use, the PM6 allows users to work with both hard and fragile semiconductor materials

Key features

- → Single station machine with a wafer process capacity up to 100mm/4"
- → Plate speeds up to 100 rpm facilitating faster lapping rates
- → Bluetooth enabled features
- → Automatic plate flatness control

LP70

The LP70 multi-station precision lapping and polishing system is a bench-top machine designed to run concurrent automated processes, allowing operators to achieve repeatable results to stringent samples specifications. With four work stations as standard, this system is the optimal solution for both production and research laboratories.

Key features

- → Four station machine with a wafer process capacity up to four 100mm/4" or two 150mm/6"
- → Plate speeds up to 100 rpm facilitating faster lapping rates
- → Bluetooth enabled features
- → Automatic plate flatness control

Logitech equipment can support your wafer fabrication processes. Our wide range of precision thinning from bonding, to lapping bulk material removal to chemically polishing for the attainment in device production and test and measurement To see our full product range please visit our website: logitech.uk.com



Akribis-air

This intelligent sample preparation system delivers the ultimate in processing innovations and is a highly automated stand-alone machine. Offering dynamic load control of Logitech's intelligent air jigs, with reliable and highly accurate results across a wide range of applications.

Key features

- → Four station machine with a wafer process capacity up to four 100mm/4" or two 150mm/6"
- → Plate speeds up to 100 rpm facilitating faster lapping rates
- → Bluetooth enabled features
- → Automatic wafer thickness control
- → Intelligent air-driven jigs
- → Dynamic load control

Wafer substrate bonding unit

The Logitech wafer substrate bonding unit (WSBU) are premium bonders for the processing of a wide range of materials including fragile semiconductor wafers such as silicon and gallium arsenide. The bonding units utilise vacuum bonding and diaphragm pressure to minimise breakages with these expensive materials, whilst retaining the highest quality of sample yield.

Key features

- → Available as single station or triple station bonding units
- → 100 mm/4", 150 mm/6" or 300mm/12" wafer capacity
- → Save and re-call recipes via the graphical user interface for easy process repeatability
- → Excellent wafer support disc parallelism

Logitech's precision lapping and polishing systems are available for a variety of wafer sizes and throughput requirements — including single station units and multiple station units for multi-wafer processing.



DL driven-head system

DP driven-head system

The DL high speed lapping systems process materials with high geometric precision. The capacity range of the DL systems make these ideal for small research laboratories through to production environments.

Key features

- → Process up to 200mm/8" samples
- → Single or four station unit
- \rightarrow Ideal for the lapping of hard and soft materials

The DP high speed polishing systems have been designed for the semi-automated final stage polishing of hard materials. The systems are capable of applying up to 200 kg download on the DP1 and 50 kg download per carrier head on the DP4, resulting in the highest sample throughput of any Logitech polishing system.

Key features

- → Process up to four 200mm/8" wafers or forty-eight 50mm/2" simultaneously
- → Single or four station unit
- → Designed for chemo-mechanical based polishing processes
- → Ideal for polishing silicon carbide, gallium nitride and sapphire

The Logitech CMP Orbis is a precision engineered floor standing CMP tool ideally suited for R&D environments. Typically used in applications which conduct pilot production tests with optimum analytical capabilities and enhanced processing performance.

Key features

CMP Orbis

- → High capacity workspace for samples up to two 200 mm/8"
- → Laboratory scale footprint
- → Ideal for use in R&D environments and pilot process testing
- → Downloadable data for analysis of process parameters

CMP Tribo

CMP

device fabrication processes.

Key features

- 100 mm/4"
 - substrates
- → Customisable carrier heads/ templates: polish standard wafer diameters, unique diameters or





CP3000/CP4000

The Logitech CMP Tribo is a benchtop chemical mechanical polishing system ideal for tribological and CMP applications. This system can achieve nanometer level material removal on a wide variety of wafers/ substrate materials used in today's

→ Wafer process capacity of up to

→ Ra to subnanometer levels on

→ Ideal for tribological and chemical mechanical polishing applications

shapes as well as small wafer dies

The Logitech CP Chemical polishing systems have been developed to be resistant to the chemicals used in polishing processes, for example: bromine methanol, hydrogen peroxide, ammonia, standard acid or alkaline, standard acid and alkaline etches.

The CP3000 is a compact system designed to fit inside your exisiting fume extraction cabinet, with a wafer process capacity up to 100 mm/4".

The CP4000 integrated fume hood allows for connection to a standard laboratory extract system with a wafer process capacity of up to 200 mm/8", or multiple smaller wafers.







Logitech's Technology Transfer programme is an integral part of our materials processing systems. Our training courses offer over 50 years of processing expertise and have proven to be the best method of providing information and guidance on the use and maintenance of our systems

Our training courses are held at our purpose built laboratories at Logitech in Scotland. With over 50 years of combined experience, training will be given by our process development engineers, demonstrating the most up-to-date and advanced process techniques available. Trainees benefit from our continuous research and development, which means that process methods are improved and updated constantly.







Emphasis is placed on trainees producing their own work, allowing them to create the highest standard of specimen possible, adhering to strict application specifications, using process methods introduced and coached by our engineers. Each course is limited to just two or three individuals, usually with similar training needs, allowing for close, often individual, tuition.

As the course is tailored to your exact requirements, all of your specific needs and problems receive full attention. Our dedicated process team are always on hand, on-site, or reachable by email, to offer further advice and problem solving knowledge.

CONSUMABLES

Logitech offers an extensive range of certified consumable products, carefully developed to work in unisonwith our range of sample processing systems and machinery. Our own research and analysis provides us with the expertise to achieve the best results from Logitech equipment using diverse material processing applications. Utilising Logitech's consumable range with your Logitech system will enable you to achieve optimal performance and maximise the lifespan of your Logitech equipment.

Visit our online store:

store.logitech.uk.com



















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