

Application Process

Sapphire is regularly used as an optical substrate due to its extreme toughness and strength. This highly durable material also offers high thermal conductivity and good transmission between UV, Visible and IR regions. However Sapphire is one of the most difficult materials to process.

Logitech has developed a technology package which fully meets the requirements of this demanding application.

Expected results from a Logitech System are:

- **Diameter:** 2"
- **Material Removal Rate (MRR):** 6 microns per hour
- **Final Ra Value:** <1nm
- **Flatness:** +/-2 microns
- **Bow:** <25 microns

(process results will vary slightly according to the quality of sample being used)

Complete Systems for the preparation of

Optical Materials

Technology Transfer

Training and process technology trials at Logitech cover equipment and sample handling, cleaning, bonding, gauging and process adjustments, with which the operator needs to be familiar. Logitech are dedicated to complete success and through training at our purpose built laboratories or at client premises, the team ensures that personal training is provided at a level relevant to the clients process requirements.

Years of experience has identified that instruction manuals alone do not provide operators with the levels of knowledge and success that are achievable through personal training and practical experience. Logitech are so committed to this programme of technology transfer that it provides a full three day training course, with all material processing systems purchased. Courses cover all aspects of system operation, maintenance and customer focussed process trials. This unique approach ensures successful installation, optimum use and maintenance of Logitech systems.

Client Support

Support is provided directly by Logitech and via an extensive global network of, Logitech trained, dealers. This enables us to provide a consistently high level of localised support and services from our technical base in Scotland.

A 12 month warranty is provided for all Logitech machines purchased. The client support policy at Logitech aims to resolve any client issues, be it mechanical, electrical or technological, in a fast and effective manner. The "no quibble" policy for replacement of faulty components ensures that any response to client difficulty is immediate.



Logitech Limited

Head Office

Erskine Ferry Road,
Old Kilpatrick, Glasgow
G60 5EU Scotland

T: +44 (0) 1389 875444
F: +44 (0) 1389 890956
E: enquiries@logitech.uk.com
W: www.logitech.uk.com

USA Contact Information:

T: +1 800 490 1749

**Adaptable Cutting, Lapping & Polishing systems
for the accurate processing of optical materials.**



Precision Materials Processing

Introduction

With the continued expansion and development of the telecommunications market the requirement for accurate processing of optical materials has never been more important.

Logitech has many years experience in the design and manufacture of high precision equipment and in sophisticated materials processing. Our optics focussed systems provide a quick and effective route to complete success in areas such as, IR and polymer waveguide production or fibre cable polishing.

Application Analysis

Our technical team work, in confidence, with customers to identify the most relevant system for optimum results on their particular material processing problems. Initial discussions provide a detailed understanding of production quantity, surface finish and geometric tolerance requirements.

Typical process technologies where our systems are used are;

- Fibre optics
- Opto-electronics
- Laser materials
- Fabry perot etalons
- Micro lenses and micro optics

DP4 polishing system provides high quality surface finishes quickly and easily due to its driven head technology.



Logitech's unique consultative approach ensures that customers achieve the best possible results from our advanced machine systems and application processes.

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

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

Whilst this brochure details a number of typical applications, we are able to provide system packages tailored to your precise needs. This may include the design and manufacture of custom holding fixtures or modifying integral parts of the system.

Products & Services

Precision Cutting

A variety of cutting technologies are available from Logitech, including annular, peripheral, abrasive wire and diamond wire saws.

Annular & Peripheral Saws: When working with a material of good integrity, such as glass, a Logitech APD saw will produce slices as thin as 300µm with minimal material loss and surface damage.



AWS1
Horizontal, abrasive wire saw.

Abrasive & Diamond Wire Saws: The AWS1 horizontal, abrasive saw is capable of cutting fragile and delicate optical materials with very little kerf loss, minimal crystal damage and surface quality. When working with sample materials of limited integrity, the angled cross slide allows cuts to be made at varying angles, making the AWS1 ideal when working with awkwardly shaped materials. See www.logitech.uk.com for further details.

Sample Retention

Some delicate materials require support during the lapping and polishing phase of the process. Our Wafer Substrate Bonding Units (WSBU) and spring-loaded jigs enable samples to be bonded onto a support plate with uniformity of bond thickness.

The WSBU has both vacuum and pressure bonding facilities with an automated process cycle, maintaining a higher yield with minimal breakage. We also provide a range of precision lapping and polishing jigs to accurately and easily control the samples on the lapping or polishing plate. To minimise supervision, a Programmable Sample Monitor (PSM) can be fitted for automatic thickness control of within 1µm.

Lapping & Polishing

Lapping: Where samples need smoothed prior to polishing, a Logitech PM or LP multi-disciplined system is ideal. These are available as a single or three workstation solution for low to mid volume sample throughputs. Using a combination of advanced controls, plates, abrasives and fluids a wide range of materials or devices can be lapped to achieve required shape and surface quality. Each system offers unique features, including a process timer, automatic abrasive feed system and continuously variable plate speed control. The added option of automatic plate flatness enables the plate shape to be set and controlled by the system, to within 1µm.



LP50 precision polishing and lapping system

Polishing: Precise polishing operations are also achievable with a PM or LP system, as a combination of unique product features ensure highly accurate results. Key features of these systems are easy operation and sample repeatability.

For applications of optical materials such as sapphire or silicon carbide, the production level DP4 and research level DP1 offer highly accurate polishing of these hard materials in a much reduced process time. Further information on all Logitech lapping and polishing systems can be found at www.logitech.uk.com

A comprehensive range of accessories, components and consumables are available to support these systems, enabling optimum results and longevity of the machines. For information on these products please see www.logitech.uk.com

Test & Measurement

Thickness Measurement: Logitech gauges such as the CG10 contact gauge provides accurate measurement of the sample thickness to within 0.001mm. The excellent repeatability and linearity make the CG10 an ideal measurement gauge for fragile materials such as lithium niobate.

Flatness Measurement: Rapid and accurate "in progress" measurements can be taken with a Logitech GI20 (for lapped up to an array of 300nm and polished surfaces) or a LI10, for more accurate flatness measurement of polished surfaces.

Angular Measurement and Setting: A LG2 Autocollimator can be used in applications such as Laser Rod polishing as the unit allows the sample faces to be accurately aligned with the polishing plane to achieve end face parallelism better than 2 arc seconds. The Autocollimator also enables the polishing surface to be set at a precise, predetermined angle, thus greatly improving the precision with which wedge angles can be produced.



CG10 Contact Gauge for accurate thickness measurement

Optical Material Systems Range				
	Positional Accuracy	Speed	Capability (Max)	
Wafer Slicing & Dicing				
	Positional Accuracy	Speed	Dicing	Slicing
APD1	y-axis 7.5µm/x-axis 5µm	600 - 5000 rpm	102mm	55mm
APD2	y-axis 7.5µm/x-axis 5µm	600 - 3000 rpm	152mm	78mm
AWS1	-	0 - 400 rpm	-	102mm
Sample Retention				
	Average Process Time	Max Head Temperature	Sample Diameter (Max)	
WSB (1 or 3 station unit)	45 mins	180 °C	102mm (4") or 152mm (6")	
WSB300	60 mins	180 °C	300mm (12")	
Lapping Systems				
	No Workstations	Removal rates	Flatness	Sample Process (Max)
PM5	1	5-10µm/min	<2µm: 2" & 4" <4 to 6: 6" & 8"	Up to 100mm (4")
LP50	3	5-10µm/min	<2µm: 2" & 4" <4 to 6: 6" & 8"	150mm (6") or smaller multiples
DL1	1	5-10µm/min	<2µm: 2" & 4" <4 to 6: 6" & 8"	Up to 200mm (8")
DL4	4	5-10µm/min	<2µm: 2" & 4" <4 to 6: 6" & 8"	4 of 200mm (8") or smaller multiple
Polishing Systems				
	No Workstations	Av. Surface Roughness	Wafer Process (Max)	
PM5	1	<3nm	Up to 100mm (4")	
LP50	3	<3nm	150mm (6") or smaller multiples	
DP1	1	<3nm	300mm (12") or smaller multiples	
DP4	4	<3nm	250mm (10") or smaller multiples	
Measurement & Inspection				
CG-10	Linear measuring range: 10mm	Accuracy over range: 1µm	Up to 300mm (12")	
NCG-2	Measurement range: ±1.25mm	Accuracy: ±1µm	Up to 150mm (6")	
LI10 Fizeau Interferometer	Surface Roughness: <20nm	Fringe Spacing: 0.335µm	100mm (4")	
GI20	Surface roughness: 1nm to 300nm Ra	Fringe spacing: 2µm	150mm (6")	
LG2 Autocollimator	Typical setting accuracy: <2 arc secs	Adjustment Range: ±3 mins of arc	Aperture: 25mm (1")	