Application Process

Thin sections of concrete are prepared for a number of different tests, such as porosity determination, inclusion analysis and mineral composition. Preparing thin section such as these can present a significant challenge to the most experienced petrographer. The combination of soft cement matrix and hard aggregate is difficult to work with.

Logitech has a technology package which fully meets the requirements of this demanding application. This package provides you with the ability to produce thin concrete sections down to 20µm.

Logitech System includes:

- **LP50 Lapping & Polishing Machine**
- **IU30 Impregnation Unit**
- **PLJ2 or PLJ7 Lapping Jig**
- **GTS1 Saw**
-

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

Technology Transfer

Training and process technology trials at Logitech cover equipment use, sample handling, cutting, bonding, gauging, cleaning 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

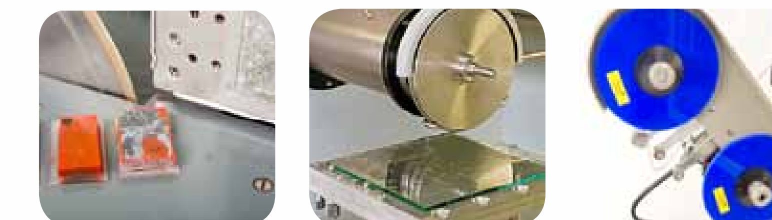
T: +44 (0) 1389 875444
F: +44 (0) 1389 890956
E: enquiries@logitech.uk.com
W: www.logitech.uk.com

USA Contact Information:
T: **+1 800 490 1749**

LOGITECH
Materials Technologists & Engineers

Precision Materials Sawing

A complete range of saws for the precise cutting, slicing and trimming of a wide range of materials.



Precision Materials Processing

Introduction

Drawing on over 45 years of experience, Logitech has developed a series of precision saws to meet a wide range of requirements within an extremely diverse range of materials processing applications.

The main application areas include:

- Geology
- Semiconductors
- Opto-electronics
- Optics and many more

This brochure provides an analysis of the materials and application areas for a Logitech Precision Saw and illustrates the range of equipment available.

Application Analysis

Geology: Thin Rock Section Production requires that a slide-mounted rock slice be thinned to 30µm from a starting thickness of between 2mm (0.08") and 6mm (0.24"). Although lapping must be employed in the final stages of thinning, an initial rapid process is required to remove most of the excess material prior to lapping. Logitech provides a range of saws that can quickly and automatically saw off excess material from several sections simultaneously down to 300-500µm thick. These saws also have the capability for manual trimming and slabbing operations.

Semiconductors: The production of thin or ultra-thin device wafers of semiconductor materials, such as gallium arsenide, requires that wafers be cut from a boule prior to lapping, polishing and fabrication. Again Logitech provides a range of precision saws that can easily and effectively cut these expensive and often brittle and friable materials to give a highly accurate cut with minimum surface and sub-surface damage and with minimum kerf loss. These saws will complement a system package provided by Logitech for complete success in materials processing for any device fabrication process.

Opto-electronics: The preparation of opto-electronic devices from lithium niobate and similar materials to precise tolerances and with scratch free surface finishes initially requires the slicing of the wafer from the crystal boule. After lapping both wafer faces and polishing to a defect free quality, the wafer requires to be cut into substrates prior to fabrication. Logitech saws fully meet these cutting requirements and are vital components of a Logitech system package for the processing of these delicate materials.

Optics: Laser rods of ruby, sapphire, Nd:YIG, Nd:YAG, GGG, GSGG and materials such as zinc selenide, germanium, chalcogenide glasses, TGS, lithium fluoride used in the production of IR windows, require to be cut or sliced prior to polishing using a customised Logitech polishing package.

Others: Various other materials can be routinely sliced using Logitech's range of precision saws:

- Thin sections of calcified tissue such as teeth or bone can be sliced prior to lapping for use in dental/medical research
- Producing flat or thin layers of delicate and difficult ceramic materials such as PZT and lead oxides needs very careful slicing into wafers prior to polishing and device manufacture.
- Thin sections of polymers to 30µm thick or less are produced by initial trimming before final lapping and polishing for structural defect and stress cracking analysis.

Products & Services

Thin Section Cut-off & Trim Saws

The GTS1 is a compact bench top unit that allows automatic operation during the cutting of bulk rocks and the thinning of mounted sections, down to as little as 200µm thick.

GTS1 Saw

When cutting bulk material, the rock is either mounted on the sample table or fed through the blade by hand. For subsequent thinning operations, the vacuum chuckface is easily attached to the sample table. This vacuum chuck slide holder accepts a variety of slide sizes and configurations.
The maximum standard slide size is 102x76mm (4x3"), of which two may be cut at one time, but twelve 28x48mm (1.10x1.89") slides, for example, can be fitted with equal ease.
Special chuckfaces, for slides such as 150x100mm (6x4"), can be supplied.

The chuckface linear drive system feeds the samples through the saw blade at a rate controlled from the saw's user friendly control panel. Using the feed rate monitor, the operator can set the optimum rate for the material being cut.

The CS30 Trim Saw, a standard component of the Compact 50 Thin Section Preparation System, has the same cutting applications as the GTS1 but on a smaller scale.

CS30 saw is ideal for initial trimming of bulk specimens for first face lapping, the saw includes a convenient sliding clamp fixture and a ceramic vacuum chuck holds two slides 28x48mm (1.1x1.9") or one 26x76mm (1.3") slide for section slicing down to 500µm thick.

CS30 Trim Saw

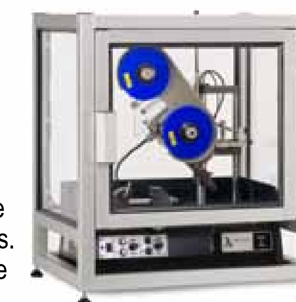
Model 15 Diamond Wire & Disc Wire

The Model 15 is a compact, rigidly constructed instrument and has the facility to change from wire to disc configuration quickly and easily, ensuring that the saw is used to its full capacity.

A calibrated cross-slide with vice attached allows incremental cuts to be made on samples up to 105mm (4.13") long in increments of 0.1mm (0.004"), useful for lithium niobate wafer dicing.
The vice can accommodate specimens up to 51mm (2") Ø.

The cross-slide is also detachable, which is invaluable for cutting specimens at precise angles.
The complete assembly can be taken off the machine and aligned on a microscope.

Options, such a tilt or rotary table, accommodate special orientation requirements. The LD2 Linear Drive Unit has been designed to aid the operator in the dicing of the $LiNbO_3$ and other opto-electronic materials. It provides the facility for feeding the workpiece through the saw with 100mm (3.94") travel and a variable cut time from 1 to 20 minutes.


Model 15 Saw

Annular & Peripheral Saws

APD1 Combined Annular & Peripheral Saw: The APD1 is ideal for both production and research environments as it offers a wide variety of cutting solutions for many different materials. As a combined bench top precision annular and peripheral cutting saw, the APD1 is truly unique and perfectly suited to both slicing wafers from a crystal boule and cutting wafers into individual substrates.

In annular configuration, the APD1 has 55mm depth of cut using a standard saw blade of 100µm thick. Slices of 0.1mm (0.004") thickness can be made and the variable saw blade speed of 3,000rpm, combined with a fully adjustable feed rate, grants a wide scope for cutting various materials.

The peripheral configuration provides a cutting envelope of 100x100mm, ideal for wafer up to 4" Ø. In addition, an optional rotary table with variable height adjustment is available for cutting crystals of varying thickness up to a maximum of 30mm. Indexing facilities are available to allow cuts to be made at a known and precise angle to each other. Both configurations can be used in either single or multiple cut modes, as the APD1 provides microprocessor controlled programmability, ensuring maximum efficiency and versatility.

APD1 Saw

APD2 Annular or Peripheral Saw: Available in either annular or peripheral configuration, the APD2 is a floor standing unit designed to provide industrial and research establishments with an invaluable tool for material wafering or dicing.

The APD2 Annular Saw can slice materials to within 300µm with minimal surface damage or kerf loss and will cut crystal boules of up to 78mm (3.1") Ø. With an APD2 Peripheral Saw, chips as small as 1x2mm can be reproduced on a unit which accepts samples of up to 152x152mm (6x6") Ø. It may also be used for slotting to precise depths on glass or similar materials. Both units offer a combination of high positional accuracy (10µm in the x-axis and 10µm in the y-axis) and minimal material wastage.

The cut depth, thickness and number of cuts to be made can be precisely set from the main menu screen, situated on the control panel, allowing unattended operation throughout.

An optional rotary table for the peripheral unit allows cuts to be made at any angle, particularly useful for establishments needing to cut along a crystal axis or "brewster's angle". This rotary table has additional manual height variation in the z-axis to within 10µm. Cutting accuracy and width of cut can both be closely monitored using the optional APD2 camera and monitor, with measurement indexing and magnified viewing.

Abrasive Wire Saws

The AWS1 Abrasive Wire Saw allows fragile and difficult materials to be cut or wafered without fear of damaging delicate optical and semiconductor crystal boules.

AWS1 Saw

The saw uses fine lapping and cutting technology to perform cuts with minimal material loss and minimal sample damage. Samples up to a maximum of 102mm (4") x 102mm (4") can be wafered with ease.

A unique sample feed system allows the cutting load to be varied from 0-100gms, using a sensitive servo mechanism which constantly measures the cutting load being applied.
This allows the optimal cut to be achieved and assures sample safety.

Abrasive is fed onto the cutting wire using an integral autofeed system based upon proven Logitech technology and sample manoeuvrability features highly with an angled cross slide and digital readout showing sample position to a resolution of 10µm.

Material & Application

Application / Material	GTS1	CS30	Model 15	APD1	APD2	AWS1
Geological bulk trimming or slabbing	•	•				
Bulk thinning of geological specimens	•	•	•	•	•	
Cutting up to 40mm (1.64") Ø wafers*				•	•	•
Cutting up to 55mm (2.17") Ø wafers*				•	•	•
Cutting up to 78mm (3.1") Ø wafers*					•	•
Dicing of $LiNbO_3$ planks from a polished wafer			•	•	•	
Cutting of Laser Rods: ruby, sapphire, Nd:YIG, Nd:YAG			•	•	•	•
Cutting of Polymers and carbon based materials			•	•	•	
Cutting of calcified tissues, such as teeth or bone			•	•	•	•
Slotting to depth			•	•	•	
Fine serial sectioning of a wide range of materials			•	•	•	•
Slicing particularly fragile or brittle crystals						•