

# Application Note

## Thin Section Preparation



### 1. Introduction

Logitech has been manufacturing precision machine systems for the production of geological thin sections for almost 50 years. Logitech systems are recognised as the worldwide standard for Thin Section Preparation of geological materials such as rock, coal, concrete and soils.

Machine systems are based on a number of standard precision lapping, polishing and cutting machines which, combined with the appropriate accessories deliver optimum thin section results.

### 2. Application requirements

In many areas of geological study, such as mineralogy, petrography or sedimentology, there is a need for samples to be examined microscopically. This is normally carried out using transmitted polarised light which creates a need for thin sections of known and exact thickness. Reflected light microscopy is also widely used for certain applications and this technique requires the surface of the sample to be flat and highly polished for the best results to be achieved. The increasing use of electron microscopes is also contributing to the need for top quality sections and thin sections of a wide range of materials.

### 3. System Specification

Dependent upon the level of production required by the operator, Logitech have produced a number of different systems based upon the LP50 and PM5 precision lapping and polishing machines for the successful lapping and polishing of geological thin sections.

Available in each of these machines, Logitech's unique automatic lapping plate flatness control system helps increase the level of precision achieved with each of these processing systems. By removing the need to spend valuable time on process plate maintenance, the automatic lapping plate flatness control system ensures that the plate maintains its preset shape throughout the lapping / polishing process. The operator simply sets the desired shape using a simple LCD display and keypad, thereafter, the system prevents the plate from straying outwith a 0.5 micron resolution without need for further operator intervention.

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#### A. LP50 System

With three workstations and optional automatic plate flatness control, the LP50 precision lapping and polishing system is capable of producing more than 100 standard thin sections per week with the capacity to increase thin section output to approximately 220 thin sections per week if required. By making use of PLJ2 precision lapping jigs, the LP50 ensures repeatability and uniformity of thickness across each individual section. Through this method, a standard thin section may be produced to a final desired thickness as thin as 15 microns.



Logitech LP50 Lapping & Polishing System

#### B. PM5 System

The PM5 system allows operators to produce around 100 standard thin sections per week. Using a single station, with optional auto-lap, the PM5 again makes use of PLJ2 precision lapping jigs to produce sections of repeatable and uniform thickness.

#### C. WG2 Polishing System

Based on the PM5 machine, the WG2 is a versatile, high precision polishing system ideally suited to polishing geological samples. It can be used to polish sections, ultra-thin sections and ore mounts of any sample material and will routinely produce highly uniform thickness relief free samples. Abrasive feed, sample loading, speed of rotation and direction of rotation are just a few of the parameters which can be finely controlled on the WG2; this allows the operator to truly maximise the process conditions for each material being polished and ensures the highest quality of result.



Logitech WG2 Lapping & Polishing System

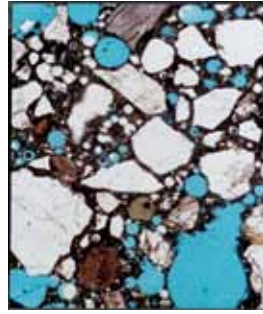
#### D. IU30 vacuum impregnation unit

The IU30 is ideal for impregnating large samples and multiple small samples where the material types are too soft or friable for processing from the raw state, and for laboratories with a high volume requirement for impregnated material.



Logitech IU30 Impregnation Unit

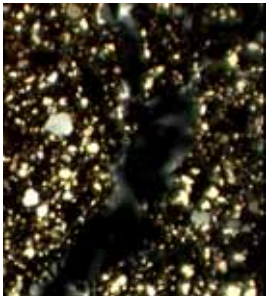
It is a self-contained unit designed to meet the needs of researchers to encapsulate and impregnate specimens with synthetic resins. The IU30 allows both sample and resin to be evacuated separately and enables resin to be delivered to the sample while both remain under vacuum. Admission of air to the sample chamber then causes the specimen to be impregnated with resin under atmospheric pressure.



#### C. Concrete thin sections

Thin sections of concretes are prepared for a number of different tests, such as porosity determination, inclusion analysis, or mineral composition. The Logitech thin section preparation system supplied for such an application includes the required IU30 Impregnation Unit as well as the other essential accessories for concrete thin section production.

## 4. Processing



#### A. Soil thin sections

The delicate nature of soil demands careful sample preparation to avoid sample damage and disintegration. Logitech provides machine systems incorporating vacuum impregnation, cutting, lapping and polishing equipment to ensure optimum results.

To complement the range of geological thin section preparation equipment, we supply a variety of consumable products to aid you in the production of top quality samples.

Products are chosen on the basis of the quality of results produced and on their suitability for the many precision materials processing applications our systems are used. Each product has been tested and approved by our experts.

Further details on the full range of Logitech Consumable products and Geological Thin Section Preparation Systems are available at [www.logitech.uk.com](http://www.logitech.uk.com).



#### B. Coal thin sections

Coals are particularly difficult materials to process - being generally friable, prone to distortion under heat stresses and opaque. They thus require a section less than 10 microns thick to define the structure under the microscope. Logitech has developed an effective technique which, when employed with the appropriate machine-technology package will allow the operator to successfully produce high quality coal thin sections.

#### Logitech Limited

Erskine Ferry Road, Old Kilpatrick, Glasgow G60 5EU, Scotland, U.K.

Tel: +44 (0) 1389 875444  
Fax: +44 (0) 1389 890956

e-mail: [info@logitech.uk.com](mailto:info@logitech.uk.com)  
[www.logitech.uk.com](http://www.logitech.uk.com)

