

# Application Note

## Polishing Fibre Arrays



Optical fibre inserted into v-groove

### 1. Introduction

Fibre arrays are used within the currently expanding DWDM (Dense Wavelength Division Multiplexing) market and are an essential element in the successful day to day running of today's world wide, information transfer networks.

Consisting of individual optical fibres sandwiched between two layers of an appropriate optical / semiconductor material, e.g. silicon or optically coated glass, these arrays enable high volumes of data to be transmitted throughout the optical network.

Appropriately 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 these highly precise levels of polish to be achieved in a repeatable, efficient manner that will lead to increased levels of productivity.

### 2. Application requirements

Fibre arrays are held in a sub-fixture located at the base of a precision polishing jig. The sub-fixture is custom designed and made to accommodate the required number, size(s) and angle(s) of fibre arrays being processed. Excess fibre can be threaded through slots in the jig base or held in place at the top of the jig by a specially designed metal plate.



The required fibre and optical substrate geometry is achieved during the lapping stage, thereby allowing the preparation of high quality 'optical' surfaces during

polishing. Highly accurate results are achieved via this process with a defect and damage free surface at x500 magnification. PSM's optional automatic cut-out switches the lapping machine off when the preset thickness has been reached.

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### 3. System Spec

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 fibre arrays.

Available in each of these machines, Logitech's unique, patented automatic lapping plate flatness control system helps increase the level of precision achieved with each of these processing systems.

By removing the requirement 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.

Each system is specifically designed to suit the individual needs of the customer and will enable the operator to attain the optimal level of efficiency for their process procedure.

#### A. LP50 Precision Lapping & Polishing System

The LP50 system offers the highest production capacity available from Logitech. With three workstations capable of taking a maximum of three PP5, PP6 or one PP8 precision lapping and polishing jigs, the LP50 allows materials up to a diameter of 6" (152mm) to be processed at plate speeds of up to 70rpm.



Making the LP50, with optional automatic plate flatness control, ideal unit for the small batch production environment.

## B. PM5 Precision Lapping & Polishing



jig, the PM5 will allow materials up to 4" in diameter to be processed.

## C. Materials Retention

The fibre arrays are held securely within specially designed and manufactured fixtures. These are in turn secured onto appropriately sized Logitech precision lapping and polishing jigs.



This fully comprehensive range of materials processing jigs allows the operator to achieve automatic parallelism and, with a completely variable piston based loading weight system, the PP5, 6 and 8 jigs are the ideal way to produce the desired angle of polish on each particular product.

Further control over the lapping and polishing processes is afforded by Logitech's unique Programmable Sample Monitor (PSM), shown above.

By reprogramming the PSM it is possible to automatically process fibre arrays to a determined level of lap without having to supervise the whole process. An alarm will sound prior to the product reaching the preset process level, while an optional infra-red automatic cut-out switches the machine off.



LP50 training at Logitech's purpose built laboratories

## 4. Operator training

The purchase of each machine system from Logitech entitles the purchaser to receive free operator training at our purpose built laboratory facilities in the United Kingdom.

Each training and process technology trial at Logitech covers equipment and sample handling, cleaning, bonding, gauging, process adjustments, etc. with which the operator must become thoroughly familiar in order to achieve optimal processing results.

Over the years, experience has shown that instruction manuals alone do not provide the operator with the necessary subtle details. Only an intensive programme of personal training and experience provides a solid basis for the continued efficient and successful use of Logitech systems.

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