

FOX AND OFFORD

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COMPUTERISED MACHINES AND SYSTEMS

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POLYLAB

*Universal Moulding Machine
Mark III Motorized Manual Operated*

Teachers' Guide

Machine Ref. No.

A MEMBER OF THE  GROUP

Compression Moulding

Compression moulding involves the raw polymer powder being compressed between two heated moulds (male and female). It is generally used for thermosetting plastics but can also be used for thermoplastics (generally reserved for more complex designs). Using thermosets requires a curing time for the crosslinks to form within the polymer. It is these crosslinks which give thermoplastics their characteristic rigidity.

Advantages

- ♦ The polymer flows over short distances reducing the number of stresses that are frozen into the moulding.
- ♦ There is little product loss.
- ♦ The polymer is not forced through narrow constrictions which often lead to mechanical properties suffering
- ♦ The moulds are generally low in initial and maintenance cost due to the lack of runners.
- ♦ Simpler mould design due to no complications from flow patterns from runner layout.

Disadvantages

- ♦ Mould temperature must be relatively low so that the polymer does not cure too quickly at the surface, before the centre gets a chance to liquefy. This leads to long cure times and thus a low production rate.

Set-Up

Fitting The Platens

- ♦ Turn the machine off at the main isolator (rear right hand side), allow to cool.
- ♦ Remove any tools left in the machine.
- ♦ Remove the retainers and screws from the platens
- ♦ Locate the top platen to the hydraulic cylinder ram and secure using the connecting pin clip.
- ♦ Fit the lower platen in position between the pillars making sure the spigot locates.
- ♦ Remove the screw and retaining plates from the mould area, remove the heating elements, and then insert one into each platen.
- ♦ Insert the thermocouples into the platens and connect to the control box.
- ♦ Secure the heater and thermocouple by replacing the retainers and screws to both platens.
- ♦ Check that all connections are made.

Universal Polylab

Teachers' Guide

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Introduction

Plastics are now among the most important materials in use today, look around and you will see plastics in use, in every conceivable situations. The range available is growing at a tremendous rate with new applications been found constantly. Plastics are rapidly replacing wood and metals in new environments, in which ten years ago designers saw no alternative to the traditional materials.

Plastic technology should be playing an equally important role in the classroom, but it is hard to give the opportunity to young people to experience the wide scope of manufacturing techniques that plastics lend themselves to. The plastic moulding machines of today are often only to be seen in industrial applications.

The Polylab, by Fox & Offord, is an ideal way to introduce the scope of plastic technology to the student. It provides an opportunity for the major moulding techniques to be experienced in the classroom, and problems involved in moulding to be encountered first hand. In addition to its moulding capabilities the Polylab also includes materials testing facilities which will allow tensile, cross-break and shear tests to be conducted on test pieces that can actually be produced on the machine.

The Polylab is an ideal tool to demonstrate the basic principals of moulding, showing how the temperature, pressure and speed of the moulding process can effect the quality of the product. The material testing modules allow the Polylab to be used to show how different materials will break and deform, under varying conditions, allowing a quantitative comparison to be made between them.

The most important feature of the Polylab is fact that it will allow students to gain experience of plastics in a production environment. The scope for use is tremendous, be it producing a part for a larger project from the 'raw' plastic or going through the design process with a view to manufacture a moulding tool for use with the machine. The Polylab is a true universal plastic moulding machine.

The Polylab provides a new medium for students to design and manufacture with whilst in the classroom. Ensuring valuable experience, for tomorrow's workforce, in the ever growing role of plastics in today's technology.

Setting Up

The Polylab has been rigorously tested before delivery and should be in perfect working order. If anything seems amiss refer to the fault finding guide at the rear of this booklet.

Positioning Of The Hydraulic Cylinder Ram

For ease of use it is recommended that the hole in the ram should face the operator to allow easy fitting of tools. If this is not the case then the ram can be corrected by locating a rod or similar item into the hole and rotating. This will allow the locating clip to be inserted and remove more easily.

Connecting The Electrical Supply (110 Volts)

First connect the plug from the back of the machine to the transformer. Then connect the plug from the transformer to the mains (240V 50Hz) supply and switch on the mains. The machine isolator is located at the far right hand side of the machine.

Operating The Main Hydraulic Cylinder

Switch on the mains supply and switch on the motor pump at the far left hand side of the machine. To move the cylinder, ensure the guard is closed (the cylinder will not move whilst it is open), and then simultaneously press both the up or down buttons on either side of the machine.

Cylinder Pressure

The main cylinder pressure is adjusted by the control knob on the top of the back panel.

Cylinder Flow

The cylinder flow which effects the speed of movement of the cylinder (up and down) is controlled by the two knobs in the centre of the top back panel.

Heaters

The Polylab has two heating elements one fixed and one removable to give a wide range of heating configurations.

Thermocouples

There are two thermocouples, the upper thermocouple controls the main heating element, with the lower controlling the mould platen. The mould platen is only operational when a tool is in position to activate the micro switch.

Heat Control

Make sure that all connections are made to the control box before setting temperatures. Pushing in the left knob on the controller will tell you the temperature that is set. To adjust this set temperature turn the right knob (clockwise to increase the value and anticlockwise to decrease) until the desired temperature is displayed. Once set the temperature will be controlled automatically.

Moulding

Warning

**Make sure that the Polylab is
switched off before attempting to
change any tools.**

**Make sure that heat insulated gloves
are worn when moulding.**

Injection Moulding

Thermoplastics are heated above their melting temperature and then forced into a closed die to give a moulding. Pressure is applied to the molten polymer which then flows, via a channel, into the mould where it solidifies. This is a very popular moulding technique and is used to produce a wide range of plastic products.

Advantages

- ♦ The cycle time is low so the mouldings can be produced quickly.
- ♦ There is little product loss.

Disadvantages

- ♦ The machines and moulds are expensive
- ♦ Runners and gates must be included in the mould design.
- ♦ Mould design must take into consideration the flow of the polymer.

Set-Up

Fitting The Injection Moulding Cylinder

- ♦ Turn the machine off at the main isolator (rear right hand side), allow to cool.
- ♦ Remove any tools left in the machine.
- ♦ Place the injection moulding cylinder into the centre hole of the heat block with the locating lugs towards the pillars of the machine. Slide the cylinder down and then twist the cylinder 45° making sure the lugs secure the cylinder.
- ♦ Fit the upper thermocouple by sliding it down the cylinder slot provided.
- ♦ Fill the cylinder with the required material.
- ♦ Close the protective door.

Fitting The Plunger

- ♦ Locate the plunger to the hydraulic cylinder ram and secure using the connecting pin clip.

Moulding

- ♦ Switch the machine on.
- ♦ Set the cylinder temperature, pressure and flow controls.
- ♦ When the cylinder is at the correct temperature insert the mould until it reaches the stop plate. Lock the mould in place by tightening the clamp.
- ♦ Allow the mould to reach the correct temperature.
- ♦ Lower the cylinder to inject the material holding at the desired pressure for about 5 seconds.
- ♦ Raise the cylinder.
- ♦ Unclamp the mould and remove using heat insulated gloves, separate and remove the moulding.
- ♦ The mould can be replaced for further mouldings.

Transfer Moulding

A method for producing thermoset plastic parts. A measured charge of polymer is heated in a vessel and is forced into a heated mould. In the mould the polymer forms crosslinks whilst it cures. After the required curing time the mould can be opened and the part removed. The process of forcing the polymer through the entry gate results in the polymer chains becoming aligned in a given direction which can give added rigidity in one direction.

Advantages

- ♦ Useful directional strength.

Disadvantages

- ♦ Cure time slows down process.
- ♦ Moulds more complex due to having to account for flow patterns.
- ♦ The manufacture of moulds is expensive.
- ♦ Some wastage from excess cured material.

Set-Up

Fitting The Transfer Moulding Cylinder

- ♦ Turn the machine off at the main isolator (rear right hand side), allow to cool.
- ♦ Remove any tools left in the machine.
- ♦ Place the transfer moulding cylinder into the centre hole of the heat block with the locating lugs towards the pillars of the machine. Slide the cylinder down and then twist the cylinder 45° making sure the lugs secure the cylinder.
- ♦ Fit the upper thermocouple by sliding it down the cylinder slot provided.

Fitting The Plunger

- ♦ Locate the plunger to the hydraulic cylinder ram and secure using the connecting pin clip.

Moulding

- ♦ Insert the mould until it reaches the stop plate. Lock the mould in place by tightening the clamp.
- ♦ Switch the machine on
- ♦ Set the required temperatures using the control panel.
- ♦ Lower the plunger into the empty cylinder.
- ♦ Allow the cylinder and mould to reach the correct temperatures.
- ♦ Bring the plunger well out of the cylinder.
- ♦ Fill the empty cylinder with the required amount of desired material. This method requires 3 to 4 grams extra due to wastage.
- ♦ Close the protective door.

- ♦ Lower the cylinder and hold at the desired pressure. Pressures of about 0.35 Kg/mm^2 (200psi) can be applied. Remember that thermosets require a curing time (approx. 2 to 3 minutes) in the mould, during which the plunger should remain in the down position.
- ♦ Raise the plunger.
- ♦ Remove the waste material set into the dovetail by pushing it out using heat insulated gloves.
- ♦ Wearing gloves, remove the mould, separate and remove the moulding.
- ♦ Clean the mould.

Extrusion

Extrusion is the method used to form over 60% of the world's output of plastics. The process produces film, sheet, tubing, pipes and numerous other product which have one thing in common, which is a constant cross-section. Extrusion involves the raw plastic to be heated until it melts. It is then forced through a die of the desired cross section until solidified into the product.

Advantages

- ♦ Very fast way of producing high volumes of one particular moulding.
- ♦ Almost no waste.
- ♦ Good finish to the final product.

Disadvantages

- ♦ Can only be used to produce products with a constant cross section.
- ♦ Expensive machines

Set-Up

- ♦ Turn the machine off at the main isolator (rear right hand side), allow to cool.
- ♦ Remove any tools left in the machine.
- ♦ Place the extrusion moulding cylinder into the centre hole of the heat block with the locating lugs towards the pillars of the machine. Slide the cylinder down and then twist the cylinder 45° making sure the lugs secure the cylinder.
- ♦ Fit the upper thermocouple by sliding it down the cylinder slot provided.
- ♦ make sure the blow moulding die is removed as this obscures the view.

Fitting The Plunger

- ♦ Locate the plunger to the hydraulic cylinder ram and secure using the connecting pin clip.

Moulding

- ♦ Switch the Polylab on.
- ♦ Set the cylinder temperature.
- ♦ Add the thermoplastic material into the cylinder.
- ♦ Close the protective door.
- ♦ Wait for the cylinder to reach the required temperature.
- ♦ Lower the plunger holding for a few seconds at the desired pressure.
- ♦ Raise the plunger when sufficient tube has been extruded.
- ♦ Cut the extruded section clean from the nozzle.

Blow Moulding

This process is primarily used for the forming of plastic bottles. The most common technique for blow moulding is called extrusion blow moulding. This involves extruding a tube of plastic and then gripping the hot tube in a mould which seals one end. Air is then pumped into the tube to inflate it to the mould. The plastic solidifies on the cold mould forming the desired shape.

Advantages

- ♦ Very cheap to produce.
- ♦ Very quick cycle time.

Disadvantages

- ♦ Limited to reasonably simple shapes.
- ♦ Complex machine needed so set-up costs are high.

Set-Up

- ♦ Turn the machine off at the main isolator (rear right hand side), allow to cool.
- ♦ Remove any tools left in the machine.
- ♦ Open lower guard.
- ♦ Remove lower platen to reveal a hole for the cylinder and a bolt.
- ♦ Remove the bolt, allowing the column to be removed as well.
- ♦ Screw the core spigot into the hole in the centre of the base.
- ♦ Insert the blow mould with the neck of the bottle facing downwards.
- ♦ Replace the column so it passes through the hole in the die.
- ♦ Replace the bolt but only tighten lightly.
- ♦ Close the mould so that the edge at the neck of the bottle locates around the core spigot.
- ♦ Tighten the bolt fully.
- ♦ Place the extrusion moulding cylinder into the centre hole of the heat block with the locating lugs towards the pillars of the machine. Slide the cylinder down and then twist the cylinder 45° making sure the lugs secure the cylinder.
- ♦ Fit the upper thermocouple by sliding it down the cylinder slot provided.
- ♦ Fit an air supply to the core spigot (foot pump or compressed air).

Fitting The Plunger

- ♦ Locate the plunger to the hydraulic cylinder ram and secure using the connecting pin clip.

Moulding

- ♦ Open the blow mould die.
- ♦ Switch the Polylab on.
- ♦ Add the thermoplastic material into the cylinder.
- ♦ Close the protective door.
- ♦ Set the cylinder temperature.
- ♦ Wait for the cylinder to reach the required temperature.
- ♦ Lower the plunger until the tube is extruded over the spigot.
- ♦ Quickly close the mould and clamp it firmly.
- ♦ Pump in air (4 to 5 times on the foot pump or 3 to 4 seconds of compressed air, at approximately 27 p.s.i.)
- ♦ Cut the extruded section clean from the nozzle.
- ♦ Open the mould and remove the moulding.
- ♦ Trim the 'flash' from the moulding by hand.

Vacuum Forming

This is a very useful technique used to form simple products out of plastic sheet. The plastic is first inserted into the machine and heated until it is just softening. The plastic can then be blown up slightly to stretch it before moulding. Finally a vacuum is applied between the sheet and mould drawing the plastic onto the mould.

Advantages

- ♦ Very cheap to produce items
- ♦ Ideal for short run items or prototype products
- ♦ Used in industry for large formings
- ♦ Low cost to produce a mould tool.

Disadvantages

- ♦ Poor distribution of plastic, wall thicknesses can be variable and difficult to control
- ♦ The moulding needs additional work to remove the waste material.
- ♦ Quite large amounts of waste material.
- ♦ The polymer has to be heated twice, once in extrusion where it is formed into a sheet, and once more to be vacuum formed.
- ♦ Low pressure difference so high levels of detail are not possible.

Set-Up

- ♦ Turn the machine off at the main isolator (rear right hand side), allow to cool.
- ♦ Remove any tools left in the machine.
- ♦ Place the vacuum cylinder into the centre hole of the heat block with the locating lugs towards the pillars of the machine. Making sure the air connector passes through the hole at the top of the heat block, slide the cylinder down and then twist through 45° making sure the lugs secure the cylinder.
- ♦ Locate the plunger to the hydraulic cylinder ram and secure using the connecting pin clip.
- ♦ Stand the vacuum forming mould assembly on the insulated work surface at the front of the polylab.
- ♦ Connect the air connector to the spigot on the vacuum forming mould.
- ♦ Remove the screw and retaining plates from the mould area, remove the heating elements, and then connect the heating elements to the hot plate.
- ♦ Insert the thermocouple into the hot plate and connect to the control box.
- ♦ Check that all connections are made.

Moulding

- ♦ Close the protective door.
- ♦ Switch the power on.
- ♦ Bring the plunger down to its lowest position.
- ♦ Set the temperature for the platen to around 250 °C. Adjust depending on material been used.
- ♦ Remove the clamping plate.
- ♦ Insert the thermoplastic over the vacuum forming die.
- ♦ Fix the clamping plate on top, making sure the plastic is gripped all around.
- ♦ Using insulated gloves, place the preheated hot plate on top of the mould assembly locating it over the guide dowels.
- ♦ Watch the reaction of the plastic, when it sags raise the plunger to the top of its cycle.
- ♦ remove the hot plate using gloves and place it down onto the insulated surface
- ♦ Remove the clamping plate and remove the moulding.

Warning

Make sure that the Polylab is switched off before attempting to change any tools. Always ensure that the heating platen are switched off during testing.

Tensile

The tensile test is the measure of how hard it is to pull a material apart. It only involves a force in one direction with no turning action. The pressure that the Polylab reports is proportional to the force on the specimen. This allows comparative readings to be made. It is important to keep the up and down times the same for any set of tests as these can effect how the material fails.

Ductile Fracture

This is when the material will deform with plastic flow, so stretching out to create a 'neck' in the sample. eg polythene

Brittle Fracture

This is when the material will fracture suddenly, leaving a smooth surface with little sign of thinning in the rest of the sample. eg glass

Ductile-Brittle Transition

It is important not to assume that a material is always ductile or always brittle. In fact most materials change from ductile to brittle at a particular temperature. The ductile-brittle transition can also occur as a result as how the specimen is stretched. eg polypropylene:- at a fast strain rate it is brittle at a slow strain rate it is ductile.

Set-Up

- ♦ Turn the machine off at the main isolator (rear right hand side), allow to cool.
- ♦ Remove any tools left in the machine.
- ♦ Switch the heaters off by using the toggle switches at each side of the control panel.
- ♦ Clamp the specimen to be tested in the clamping units, making sure that the specimen is clamped tightly and evenly and the bars are parallel to grip the specimen tightly.
- ♦ Place the bottom clamp into the centre hole of the heat block with the locating lugs towards the pillars of the machine. Slide the clamp down and then twist the cylinder 45° making sure the lugs secure the clamp.
- ♦ Close the protective door.
- ♦ Switch machine on.
- ♦ Bring down the hydraulic ram until the top clamp can be located with it.
- ♦ Insert the retaining clip.
- ♦ Ensure that the pointer is in place in the top clamp.
- ♦ Attach a ruler with the magnet on the side of the Polylab.

Testing

- ♦ Slowly raise the ram until the specimen is just under load.
- ♦ Zero the ruler.
- ♦ Raise the ram, recording the variations in pressure and elongation as well as breaking point.
- ♦ Switch off mains supply before removing specimen and clamps.

Cross-Break

The cross-break test puts the specimen in a position where a number of different forces are acting on it at one time. The surface of the specimen is compressed while the bottom is under tension. This gives a good idea to how easily the material will bend under a three point load. The stiffness of the specimen is proportional to this measurement.

Set-Up

- ♦ Turn the machine off at the main isolator (rear right hand side), allow to cool.
- ♦ Remove any tools left in the machine.
- ♦ Switch the heaters off by using the toggle switches at each side of the control panel.
- ♦ Fit the anvil to the hydraulic ram using the locating clip.
- ♦ Place the cross-break tool into the polylab making sure it locates.
- ♦ Place the specimen centrally on the support nibs of the tool.
- ♦ Close the protective door.
- ♦ Switch power on.

Testing

- ♦ Bring ram down slowly until it touches the specimen.
- ♦ Continue bringing the ram down, recording the readings, until the specimen breaks or will bend no further.

Shear

A shear force, which produces sliding motion, acts in the direction of resulting motion. This test gives an idea to how the internal arrangement of the molecules are made up and the forces between the molecules.

The Polylab uses 25mm (1.0") diameter specimens.

Set-Up

- ♦ Turn the machine off at the main isolator (rear right hand side), allow to cool.
- ♦ Remove any tools left in the machine.
- ♦ Switch the heaters off by using the toggle switches at each side of the control panel.
- ♦ Remove the retainers and screws from the platens
- ♦ Locate the top platen to the hydraulic cylinder ram and secure using the connecting pin clip.
- ♦ Fit the lower platen in position between the pillars making sure the spigot locates.
- ♦ Do not fit the heating elements.
- ♦ Remove the screws from the shear test tool, split the tool and insert a testing disc into the hole.
- ♦ Replace the upper half of the tool and tighten the screws.
- ♦ Insert the punch into the recess in the tool.
- ♦ Place the tool in the centre of the bottom platen with the punch facing upwards.
- ♦ Close the door.

Testing

- ♦ Switch on the polylab.
- ♦ Lower the upper platen until it touches the shear punch.
- ♦ Continue lowering the platen recording the pressure readings until sheared.

Teaching Ideas

Moulding

By using Fox & Offord's blank moulds you can make up your own moulds, to suit your class project. This allows the class to make an actual moulding to use as part of a larger item. Examples:- Ideal for making a suitable container for a small electronics project, wheels for radio controlled cars, etc.

For the more able student who is working on a major project, the Polylab could be a valuable piece of equipment. Given a blank mould the student could produce an individual piece of work, which would involve producing the mould, making sure that the alignment was correct to fit in the Polylab. This would combine working in metal and plastics and also investigating flow problems during the moulding.

For a short project the class could work together experimenting with how moulding temperature and injection speed affects the quality of a moulding for a range of thermoplastic materials.

Using the shear disc tool, investigate the moulding properties of various plastics under compression moulding. Measuring the size of the disc in comparison to the mould size in order to calculate the shrinkage. Also, these can be used in the shear test to compare the shear properties of different materials.

Material Testing.

Using testing specimens of polypropylene, experiment with the speed of the tensile test to investigate the ductile-brittle transformation in this material.

Using a wide variety of samples in different materials, investigate how they break under the same set of test parameters.

The inclusion of a regular defect, notch or hole, will effect the materials properties of any sample. Investigate how a known imperfection in a moulding will behave under various tests compared to the original.

Transfer Moulding

Material	Cylinder Temperature °C	Mould Temperature °C	Comments
Phenol formaldehyde	110	150	Must find the optimum time to transfer.
Rubber	100-110	140-150	Transfers easily, but do not over cure.

Compression Moulding

Material	Mould Temperature °C	Comments
Phenol Formaldehyde	140-150	
Rubber	140-150	Be careful not to overcure.

Fault Finding:- Thermoplastics

Moulding To Short:- Has Not Filled The Mould

Most likely:- Injection pressure too low.
 Cylinder temperature too low.
 Insufficient material.

Less likely:- Mould gate too small.
 Venting required.

Rough Surface To The Moulding

Most likely:- Mould temperature too low.
 Injection pressure too low.
 Cylinder temperature too low.

Less likely:- Incorrect material.
 Bad mould design.

Poor Quality Moulding Having A Shiny Surface

Most likely:- Mould temperature too high

Less likely:- Cylinder temperature too high.

Burn Marks On Moulding

Most likely:- Injection pressure too high.
 Temperature too high.

Less likely:- Gate too small
 Venting required.

Weld And Flow Lines On The Moulding

Most likely:- Injection pressure too low.
 Cylinder temperature too low.

Less likely:- Mould temperature too low, unless large moulding.
 Insufficient material.

Bubbling In The Mould

Most likely:- Cylinder temperature too high.
Injection pressure too high.

Less likely:- Venting required.
Injection speed too quick.

Sink Marks

Most likely:- Injection pressure too low.
Insufficient hold on time.

Less likely:- Cylinder temperature too high.
Mould temperature too high.

Warping Or Buckling

Most likely:- Material gelling before mould is closed.
Insufficient hold on time.

Less likely:- Moisture content too high.
Injection pressure too high.
Cylinder temperature too high.
Poor mould design.
Incorrect material.

Flashing On Moulding

Most likely:- Injection pressure too high.
Insufficient mould lock.

Less likely:- Cylinder temperature too high.

Blow Moulding Faults***Bubbles In Moulding***

Most likely:- Cylinder temperature too high.
Moisture content too high.

Less likely:- Injection pressure too high.
Incorrect material.

Excessive Flash

Most likely:- Material gelling before mould is closed.
Insufficient mould lock.

Less likely:- Cylinder temperature too low.
Poor mould design.

Poorly Formed Moulding

Most likely:- Insufficient air pressure.
Cylinder temperature too high.

Less likely:- Cycle time too fast.
Incorrect material.
Poor mould design.

Sink Marks

Most likely:- Cylinder temperature too high.
Cycle time too fast.

Less likely:- Incorrect material.

Poor Surface Finish

Most likely:- Cylinder temperature too low.
Pressure too low.
Cycle time too fast.
Insufficient air pressure.

Less likely:- Moisture content too high
Poor mould design.
Incorrect material.

Fault Finding:- Thermosets

Compression Moulding

Rough Finish:- Having A 'Corky' Finish

Most likely:- Mould too cold
Insufficient material.

Less likely:- Insufficient pressure.

Small Blisters

Most likely:- Mould too hot.
Moisture content too high.

Less likely:- Insufficient cure time.
Trapped gases.

Large Blisters:- Which Can Burst

Most likely:- Mould too hot.
Trapped gases.

Less likely:- Moisture content too high.

Uncured Material

Most likely:- Insufficient cure time.
Mould too cold.

Less likely:- Old material been used.

Sticking In Mould

Most likely:- Insufficient cure time.
Mould too cold.

Less likely:- Dirty mould.
Poor mould design.

Moulding Short:- Not Complete

Most likely:- Not sufficient material.

Less likely:- Wrong material.

Transfer Moulding

Poor Finish:- Having A 'Corky' Finish

- | | |
|---------------|--|
| Most likely:- | Insufficient pressure.
Mould too cold.
Incorrect cylinder temperature.
transferred at wrong time. |
| Less likely:- | Insufficient material.
Old material.
Wrong material. |

Blistering On Moulding

- | | |
|---------------|---|
| Most likely:- | Insufficient cure time.
Moisture content too high. |
| Less likely:- | Poor mould design. |

Uncured Material

- | | |
|---------------|--|
| Most likely:- | Insufficient cure time.
Mould too cold. |
| Less likely:- | Old material been used. |

Short Moulding

- | | |
|---------------|---|
| Most likely:- | Insufficient pressure.
Incorrect cylinder temperature.
Transferred at wrong time. |
| Less likely:- | Insufficient material.
wrong material. |

Flash On Moulding

- | | |
|---------------|--------------------------|
| Most likely:- | Insufficient mould lock. |
|---------------|--------------------------|

Fault Finding:- Polylab

Polylab Does Not Respond When Switched On.

Is the mains power on?

Is the transformer connected?

Is the isolator switched on?

Check fuses.

Polylab Will Not Mould.

Are the guards closed?

Is the pump switched on?

Is there some polymer set in the cylinder?

Are the heaters connected?

Are the heaters switched on?

Are the settings correct for the material?

Temperatures Are Not Registered.

Are the thermocouples connected?

Are the thermocouples inserted into the mould?