

## GSA. PROTOTYPING WORKSHOP ORIENTATION

The induction process (ie. Instruction in the safe use of equipment and workshop procedures) is part of GSA.'s Health and Safety requirement related to the PREVENTION of accidents and damage, while allowing safe access to the workshops

The workshops within Glasgow School of Art are managed by the Technical Services Department (TSD.)

The technical staff are responsible for the access, safe operation and conduct of all students and non technical staff within the defined areas

### Laser Cutters x2 ...

Cut flat sheet material - Acrylic, Plywood and MDF., paper, cardboard, fabrics.

**IT DOES NOT CUT :** MDF. or plywood thicker than 9mm, metals, polycarbonate, acetate, styrene sheet, leather, etc. due to releasing toxic fumes (check with a technician if unsure as to material)

The Laser can either cut or etch. Use 2 colours in the file to designate what each of them is These can be any 2 colours from the palette, eg. red and black

Images can also be etched, altho the resolution needs to be at least 250dpi. for this to work well

It costs £5 per hour to run plus the cost of the material. Cutting thick materials or complicated shapes with lots of engraving can be **very** time consuming, and therefore expensive. Engraving images **larger than 200 x 200mm will run over an hour or most materials**

A basic selection of Materials can be purchased from the workshop for processing on the Laser via the **materials cutting list** form prior to use or can be student sourced, eg. 'Stockline Plastics'

The Laser's can be booked online at [tsdbookings.gsa.ac.uk](http://tsdbookings.gsa.ac.uk) for 1 hour or 45 minute slots

Maximum size bed is 900 x 700mm on the big lasers (400 x 300mm on the new small machines)

The files it takes are 'Illustrator 3' (with a 'hairline' or minimal line thickness setting) If you have never used Illustrator before then the school subscribes to [lynda.com](http://lynda.com) where there is a class on it and Kerry Aylin runs an evening class in the library every year.

### 3D. Printer (ABS.) / Rapid Prototyper ...

This RP. machine prints in white ABS. with a grey styrene support structure

It costs 50p / cm.<sup>3</sup> to use, plus 80p per square on the board of the bed, a staff member can run a simulation to enable checking of the file and to ascertain its cost/print time before printing

Maximum size of printing bed is 200 x 200 x 200mm

The files it takes are STL. format, on [lynda.com](http://lynda.com) there are tutorials for Rhino and Solidworks, both pieces of software are also installed on machines around the school

There is no booking process, please ask one of the workshop technicians about printing your file

### **3D. Printer (SLA.) / Rapid Prototyper...**

This 3D printer / rapid prototype machine will print in acrylic resins in very high resolution. It takes STL. or OBJ. files. The machine can print 125 x 125 x 160mm. parts

It costs 30p / cm.<sup>3</sup> to use, a staff member can run a simulation to enable checking of the file and to ascertain its cost/print time before printing

Maximum size of printing bed is 200 x 200 x 200mm

There is no booking process, please ask one of the workshop technicians about printing your file

### **3D. Scanner (fixed) ...**

will scan non reflective objects, the maximum size is 200mm. in diameter and 300mm. high  
It outputs STL. or OBJ. files for use in Rhino, Maya, Solidworks or similar for further processing

There is no booking process, come and see one of the technicians about scanning your object.

### **CNC. Mill (HAAS.) ...**

This machine cuts, in 3 and 4 axis in metals and engineering plastics/resins eg. Acetal or 'Cibatool'  
the maximum part size can be as big as 400mm x 300mm x 300mm but the part must be held somehow. This often limits the size that we can machine.

There is no cost for using the machine but materials must be paid for.

There is no booking process but the machining must be agreed with a technician as the process can be very time consuming depending on the geometry and complexity of the piece

The files required are STEP. files, that can be created in 'Rhino' or 'Solidworks', tutorials for which are available on [lynda.com](http://lynda.com)

### **NEW PROTOTYPING EQUIPMENT TO THE DEPARTMENT (awaiting staff training in use) :**

#### **CNC. Lathe ...**

This machine will turn components from engineering plastics or metal. It can turn compound curves, threaded components, shafts etc. up to a maximum length of 100mm. and a max. dia. of 60mm. It will take STEP. or DXF. files and can be programmed from dimensioned drawings

#### **3D Scanner (handheld) ...**

This will scan non reflective objects (ie. not chrome, mirror or glass ; these can be spray painted if required to make them 'visible' to the laser) but will allow the scanning of up to a 3m. cube if required. The object remains stationary and the scanner moves, meaning people, cars, pets etc. can be scanned

### **NEW PROTOTYPING EQUIPMENT AWAITING DELIVERY TO THE DEPARTMENT :**

#### **CNC. Router ...**

This machine will be able to cut wood or plastics. The bed size will be 1400 x 800mm and can cut materials up to 60mm. thick. It will cut 2D. shapes or do 3D. profiling

**It will not cut metals**

#### **CNC. Mill (small) ...**

This machine will also cut wood or plastics. The bed size is 300x300mm and will also cut in 2D. or do 3D. profiling. It also has a 4th axis for doing more complicated shapes. IT can also be used for making PCB.'s and engraving metal, wood and plastics

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## **PLASTICS PROCESSING WITHIN THE PROTOTYPING WORKSHOP :**

### **Vacuum Former (large) ...**

This machine will thermoform plastics and thin acrylic sheet within a fixed bed size of 570 x 470mm and up to 3mm. thick over a rigid mould plug form in a 'hard' material such as wood or plaster

A basic selection of thermoforming sheet materials can be purchased from the workshop for use the vacuum former or can be student sourced, eg. 'Stockline Plastics'

There is no booking process for use, come and see one of the workshop technicians to discuss your requirements

### **Vacuum Former (small) ...**

This machine will thermoform thin styrene sheet plastic within a fixed bed size of 270 x 200mm and up to 1mm. thick over a rigid mould plug form in a 'hard' material such as wood or plaster

A basic selection of thermoforming sheet materials can be purchased from the workshop for use the vacuum former or can be student sourced

### **Line Former ...**

This machine is for heating a strip in acrylic type materials to enable a fold to be created at any desired angle. The heater length is 900mm. long and materials up to this size can be accommodated

A basic selection of Materials can be purchased from the workshop for use the vacuum former or can be student sourced

### **'Media' Cabinet ... (awaiting delivery)**

This machine will be able to give a fine 'shot blasted' or opaque surface finish to metals or plastics by the use of a 'sandblasting' type technique

### **Plastics Solvents ... (STORED IN CHEMICAL CABINET ) ask a technician for access**

Plastic Solvents such as Tetrahydrofuran (THF.), MethylEthylKetone (MEK. / Butanone), and Dichloromethane (DCM.) are organic solvents used in the bonding of various thermoplastic polymer materials are available within GSA. workshops, a one-one induction will be given prior to student use

PLEASE NOTE THAT DCM. IS CONSIDERED POTENTIALLY HAZARDOUS BY THE EU.

**Under NO circumstances should any solvent based chemicals be removed from the workplace**

All chemicals in usage in student areas are classed AMBER CODE with safe working procedures in place including ; safe usage & PPE. Requirements (goggles / visor, well ventilated workspace and/or extraction cabinet)

### **Mouldmaking ...**

Mouldmaking as well as resin and plaster casting is available at the Casting Workshop in the GSA. Haldane Building, students requiring access should contact Helen Kalmijn

