



## OMAX Abrasive Jet Machining Protocol

### **Machine Capabilities:**

Maximum material dimensions: 24"x24" (609mm x 609mm)

Maximum thickness: 2" (70mm) (depending on the material)

Maximum dimension of the finished part or nest of parts: 22.75" x 22.75" (578mm x 578mm)

Material less than 24" x 24": Allow for .75" (19mm) per side larger than the part for fixturing/hold down

Minimum hole diameter: 0.06" (1.5mm)

Minimum inside radius: .04" (1mm)

General Part Tolerance: Tolerances on the water jet largely depend on material and thickness  
- For example, you might achieve  $\pm 0.005$  while machining a 0.5" thick piece of 6061-T6 aluminum, but only  $\pm 0.01$  when machining a 1.5" thick piece of the 6061-T6 aluminum

Required file format: .dxf file

### **How to Submit a Water Jet Job Request:**

1. Save part as a .dxf:
  - In Solidworks, while your part file is still open, go to "File"
  - Select "Make Drawing from Part"
  - De-select "Display Sheet Format" – Do not include title block or borders
    - If your part is larger than 8.5", select the "D" style page format
  - Drag the appropriate view of the part onto the sheet
  - Ensure the part is scaled 1:1
  - Do not include dimensions
  - Do not include extra lines, hole centerlines, or hidden lines (*Eg. Countersinks*)
  - Save as a .dxf file
2. Create a .pdf file drawing of the part that contains dimensions, the number of parts you'd like, the material type, size, and thickness.
3. Email your .dxf and .pdf files to [meshops-me@berkeley.edu](mailto:meshops-me@berkeley.edu)
4. Drop off your materials at the shop with your name and your project's name written on all pieces.

### **Current Charges:**

- \$2.00 per pound of abrasive

### **Equipment:**

The Omax Abrasive Jet Model 2626 uses high pressure water and a garnet abrasive to perform the cutting process. The working pressure of the water is at 50,000 PSI.

### **Materials:**

Abrasive jet machining is capable of cutting many different materials and thicknesses (in some cases up to 2" in thickness). Commonly machined materials are steel, aluminum, and polycarbonate. It is also capable of cutting harder materials like titanium, ceramics, and stainless steel.

We can cut acrylic, however it may chip or crater at the piercing point or edge of part. We recommend cutting acrylic on our laser cutter.

You may experience surface "hazing" on the bottom side of your part, this occurs from pressure back spray during the cutting process. There is no way to control or prevent this.

If the material is a composite, laminate, or affected by being submerged in water this may not be the best process to use. One way we have found to gain success with certain laminates is to pre-drill at the pierce points. That will require developing the tool path, dry run the part in the OMAX, mark out the pierce points, remove the material from the Omax, drill pierce points on a drill press or mill, reinstall the material into the Omax and run. This is a very time consuming task!

### **Material Size Capabilities:**

24"x24" is the maximum dimension of material; however, we need material on the edges to secure the material in the machine. **Maximum dimension of the finished part or nest of parts is 22.75" x 22.75"**. Any material less than 24"x24" please allow for 0.750" per side larger than part for clampdown.

### **Development of Tool Path:**

Depending on the complexity of the part or parts it may take several hours to develop and debug the tool path program. Parts that float or are small in size will need to be tabbed to the parent material sheet.

### **Parts Nesting:**

The Omax software nesting function will just stack the same part next to each other in the vertical and/or horizontal direction. Please do not nest parts in your CAD program to optimize the material. One part per file

### **Programmed Quality:**

The OMAX software has a scale of five qualities vs. speed settings, normal conditions a setting of three is appropriate. Five will give you a better finish however it will cost more in abrasive and cutting time.

### **File Format:**

Regardless of what CAD program you are using, the Omax software will only recognize a .dxf extension.

Save part as a .dxf:

- In Solidworks, while your part file is still open, go to “*File*”
- Select “*Make Drawing from Part*”
- De-select “*Display Sheet Format*” – Do not include title block or borders
  - If your part is larger than 8.5”, select the “*D*” style page format
- Drag the appropriate view of the part onto the sheet
- Ensure the part is scaled 1:1
- Do not include dimensions
- Do not include extra lines, hole centerlines, or hidden lines (*Eg. Countersinks*)
- Save as a .dxf file

Please also provide us with a .pdf drawing of your part with a couple of dimensions shown. Once your part is imported into the OMAX software, we need to verify the file was transferred accurately and was not scaled.

### **Taper:**

There is some taper associated with abrasive jet machining. The amount of taper to expect on a part is directly correlated to the material thickness and hardness; expect a larger taper on thicker or harder materials. If you need the finished edges to be square and parallel, you will need to design the part with additional material on the part and be prepared to perform a secondary machining process to accomplish.

### **Precision Hole Sizes:**

Minimum diameter hole size is @ 1.5mm (0.060”)

If you need tighter tolerances (*Eg. holes you intend to tap or ream after wat jet cutting*), dimension the holes 0.020” smaller than is required, and then finish with a secondary machining process.