Paths to Peace

Name Plate Design Exercise

FALL 2002. MIT

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Tile

During the course there will be a series of homework exercises that will help the students design and build a major inlaid tile. The elements of the tile are manufactured by the students on an OMAX abrasive water jet machine using CAD models that the students will create.

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Name Plate

- As an exercise to get to know the operation of the OMAX machine each student will have to design and fabricate a name plate

1. The first part of the exercise will be test the design using 17"x17" aluminum plates. Each student will be given two plates, one will be used to cut the design pattern and the other to cut the design components.

2. After finishing part 1, each student will be given a 12"x12" marble plate and 5"x5" aluminum plates to apply design with the new material.

3. Now the students will do a wood frame for the plate in the hobby shop.

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Name Plate

- This presentation with all its links is designed to help you finish the first exercise, that requires:

1. Designing the plate on Solid Works.
2. Loading the design on OMAX layout software and adding features.
3. Working on the OMAX machine.

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Part I _Solid Works

Designing the plate on Solid Works: After deciding on the text that you will place on the plate, make an assembly sketch of how the plate will look like at the end.
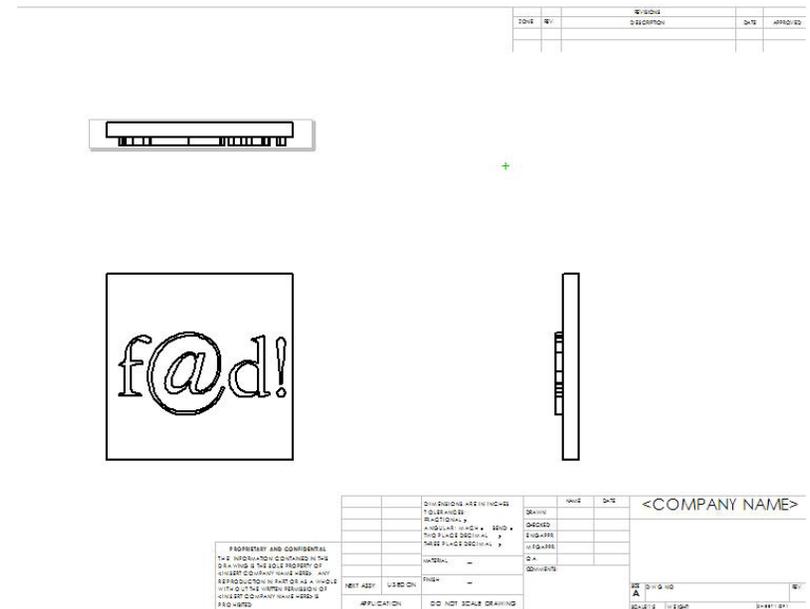
Solid Works assembly sketch
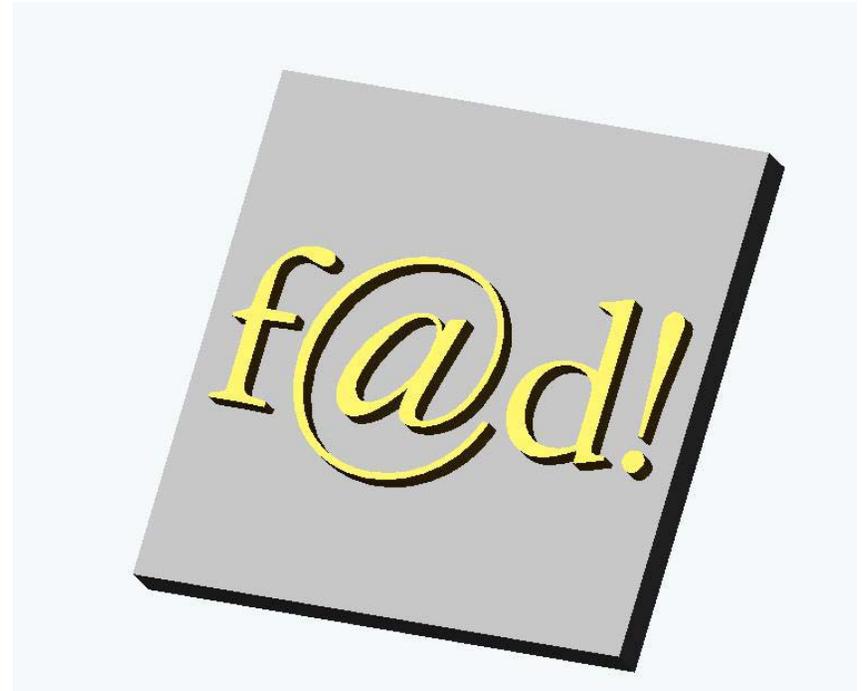
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Part I _ Solid Works

Do a drawing of your assembly and save it as a .dxf file

Solid Works assembly drawing

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Part I _ Solid Works

- Your final part should be something like this.

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Part II _ OMAX layout

OMAX Layout:

- You need to import the file:

File>Import from other CAD> .dxf file

- *Resize your design to the plate size:12"x12". Size>height = 12" >width = 12".*

- Erase everything except

for the name design. *Erase>*

You can right click on Erase and

choose many options.

- Select the parts. *Select>*
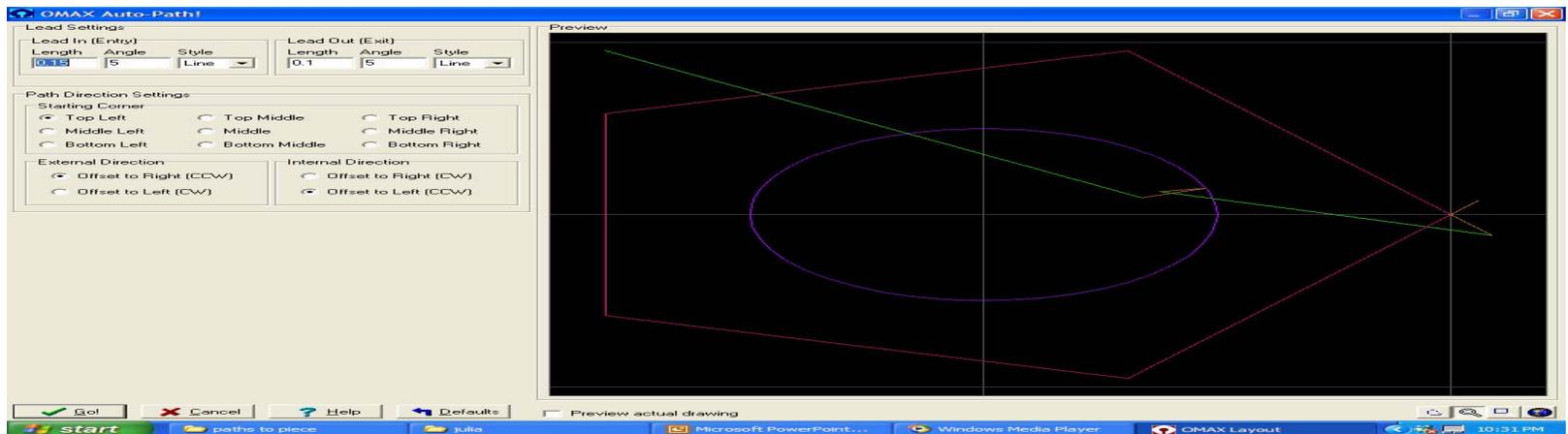- Move the name design into the grid. *Move>*
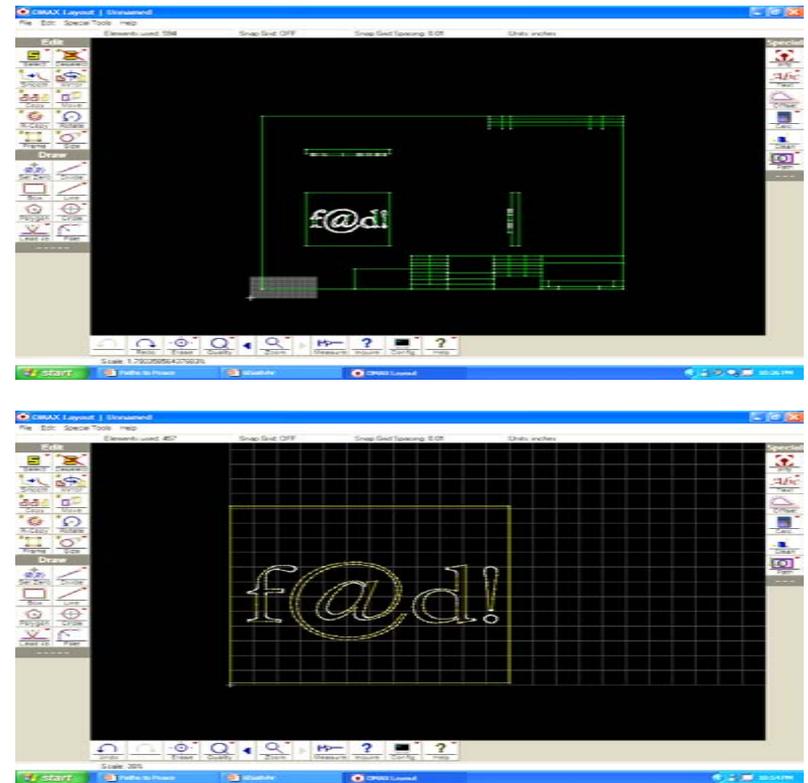
OMAX Layout drawings

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Part II _ OMAX layout

- Set the quality of your cut, the higher the better. Right click on *Quality > Set quality= > 3*

- The OMAX machine follows paths that you can draw or just set them automatically. Right click on *Lead i/o > AutoPath (Advanced)…>* the following window will open

OMAX Layout drawing

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Part II _ OMAX layout

The window that opens is very important for 2 reasons:

1. Notice how the path of the cutting nozzle changed directions inside the circle under the exclamation mark, and this means that while cutting the plate, the cut signs will show on the material cut from the plate, this is what we want while doing the plate and what we don't want while doing the letters.

➔ Therefore an easy way to design the plate is to leave a square around the design, and hence choosing *Lead i/o,* will place the cut signs inside the letters. Then for the letters erase the square and *Lead i/o* will place the cut signs outside the letters leaving them intact.

Examples will be shown in class to make the point clearer.

Part II _ OMAX layout

2. The *External Direction/ Internal Direction* selection in the window is very important for it will specify which side of the path the water jet will cut. Usually for the plate we choose the cutting to be from the outside and for the letters from the inside. This way there will be more offset in opposing directions so that the letters will fit into the plate.

After setting the options, select *GO>*

- If you are doing the plate *Erase* the box that we drawn to set the cutting signs outside the letters.
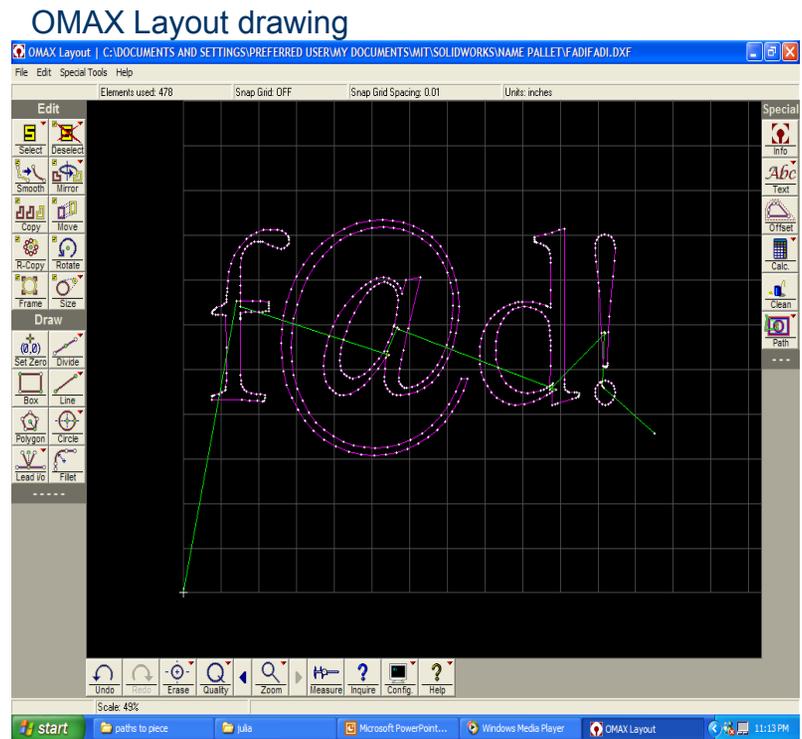
Part II _ OMAX layout

OMAX Layout drawing

- Notice that the starting and finishing leads are not in a nice location, for it is usually better to start on the origin at the bottom left corner. *Erase>* the starting and ending leads. Redraw the starting lead from the origin to the point where the first one ended, and the finishing lead from where the first one started to any where. *We don't care where the cutting handle goes after it finishes the job.*

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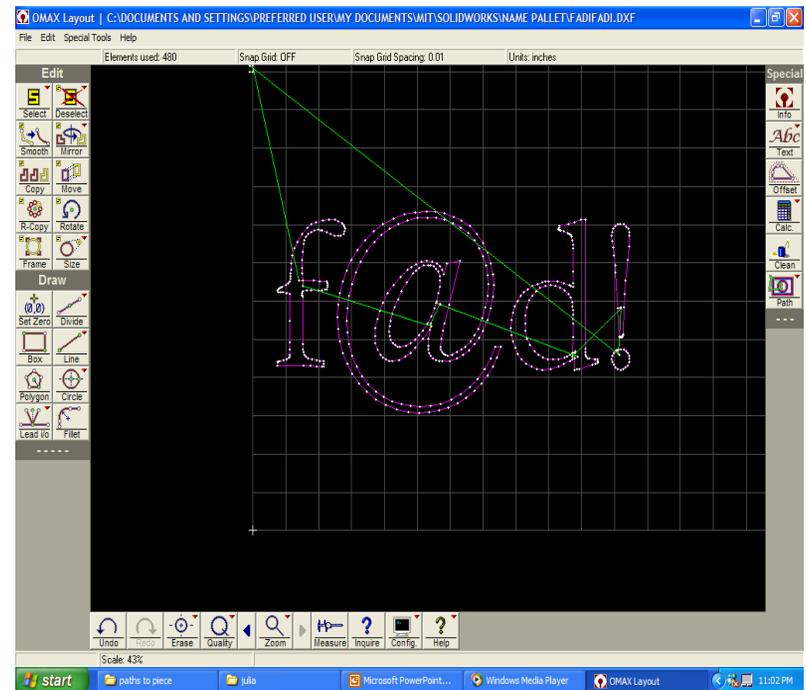
Part II _ OMAX layout

- Clean the drawing. *Clean > OK >*

- *Path > set the starting point to the origin (bottom left corner) > Save > OMAX creates a .ord version of your file.*

- Before pressing save in the Path window Zoom in to the part and notice the red region near the path. This is the side the machine will be cutting on.

OMAX Layout drawing

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Part II _ OMAX layout

- Advice tips:

1. When ever you have a small thing in your design, always use tabs in the design because small parts can fall into the machine and can't be recovered afterwards. To do tabs in OMAX layout software erase some small connections between the letters and the plate.

2. There are many keyboard shortcuts to use.

3. Place the tab in a thick place of the part So that the whole thing wont break.
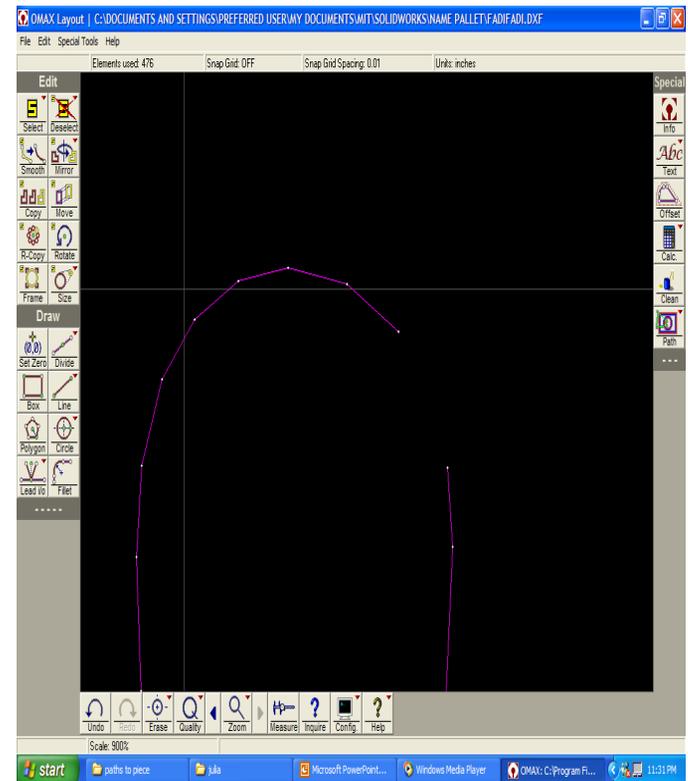
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Part III_ OMAX machine

- An OMAX Abrasive Water Jet Cutter found in the hobby Shop will be used.

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Part III_ OMAX machine

On the OMAX machine:

- Load the machine with file. *File Path > Open file .ord*
- *Input* the material code and the thickness of the plate
- *Place* the plate at the bottom left part of the machine's working area.
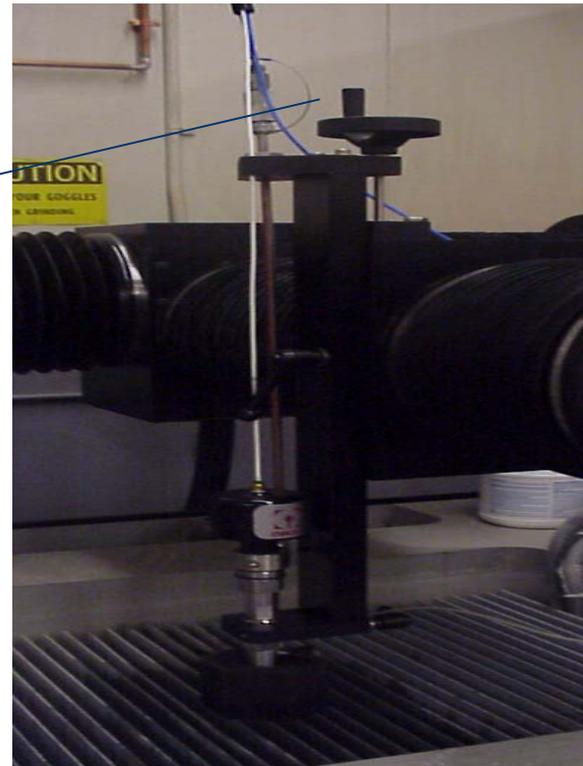- *Bring* the jet arm to the bottom left corner of the working area using the arrow keys on the key board.

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⇓

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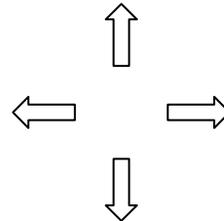
Part III_ OMAX machine

- Here are some images of the jet handle. With the important parts indicated.
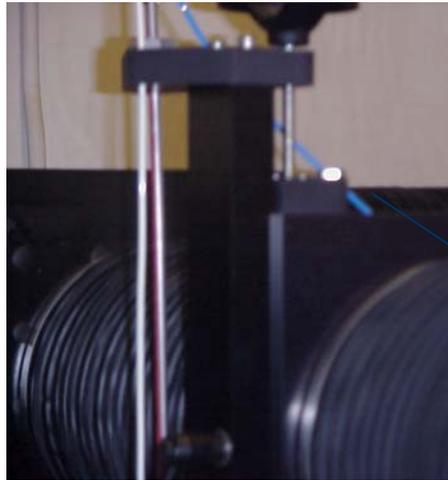
1. Position Arm.

2. Level Indicator.

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The drawing on the right is a simple representation of the jet handle.

- *Unlock* the jet handle by moving the lock arm downwards.
- *Lower* the jet handle by rotating the position arm until the level indicator just moves up. Rotate the position arm half a rotation for thick plates and ¾ of a rotation for thin ones.
- *Lock* the jet handle.

Lock Arm
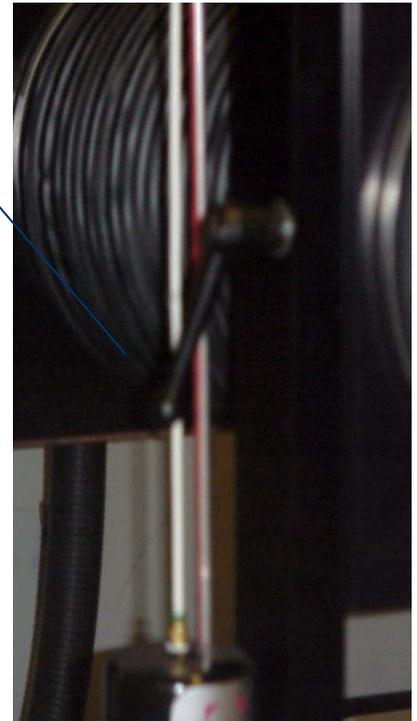
Part III_ OMAX machine

- *Put* on the plate some weights and clamps if necessary, to reduce vibration and fix the plate.

- *Elevate* the water level to about an inch above the plate.

1. Elevate water button.

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Part III_ OMAX machine

- *Wear* your safety goggles.
- Press *start*.
- The machine will ask if you want to set the current position to the abs zero one, Press *YES*.
- Be very careful and watch the machine so that it won't hit any obstacle, whenever there is something wrong press the *SPACE BAR,* this holds the machine's action on pause.

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Part III_ OMAX machine

After the machine finishes its job:

- *Move* the jet handle away from the plate.
- *Lower* the water level.
- *Remove* the weights and clamps.
- *Release* the lock.
- *Elevate* the jet handle.
- *Lock* the jet handle.
- Some machining might be required to remove the tabs and improve the surface finish of the part.

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Imp.

- Hope that you will enjoy this exercise and always remember.
1. The **space bar** stops the machine.
2. Save your files always, especially in OMAX layout.
3. Wear your safety goggles.

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Pathways to Peace

The aim of this course is to provide students with an artistic means of expressing their thoughts on peace and allow them to create lasting symbols thereof.

Art is the language of all people, the tile will be an everlasting message from you to the world.

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