Roland

Part 1
RIB

BASIC Training guide

~ How to make 3D object ~

by MODELA

Roland DG Corporation

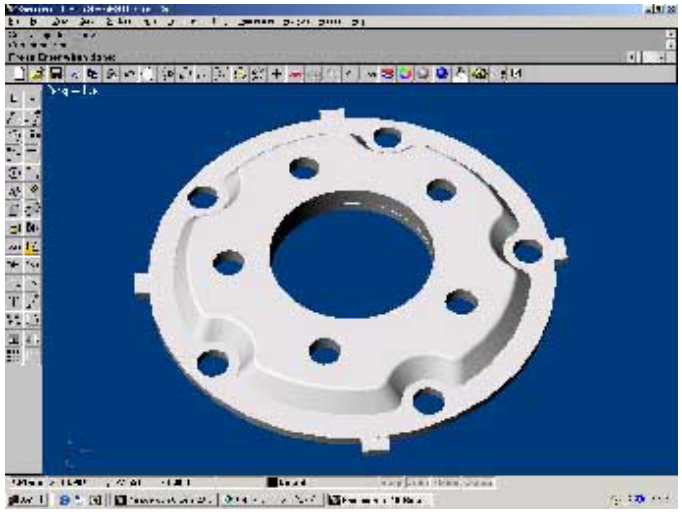
Prepare items

- Users manual (See P7, P11~14, P68)
- PC　(System requirements Pentium 200MHz HDD 1GB, Memory 64MB）
- OS Windows 95/98/ME/NT4.0/2000
- MDX-20 or MDX-15
- Accessories of MDX-20/15 (Spindle Unit, Cap screw for spindle unit x 2, Endmill, Set screw for endmill x 1, Double-sided tape, Positioning pins x 3, Hexagonal wrench for 3mm, 1.5mm)

- 3D-CAD or CG software
- Roland Software Package (RSP-009 ver.1.6 or over)
  - RSP-009 includes MODELA Player, Virtual MODELA, Windows Driver
- RS-232C serial cable, XY-RS-14 or XY-RS-34
- Material (SAN MODUR, Chemical wood, wax etc. SAN MODUR->See Appendix 1)
- Vacuum cleaner
- Slide calipers or ruler

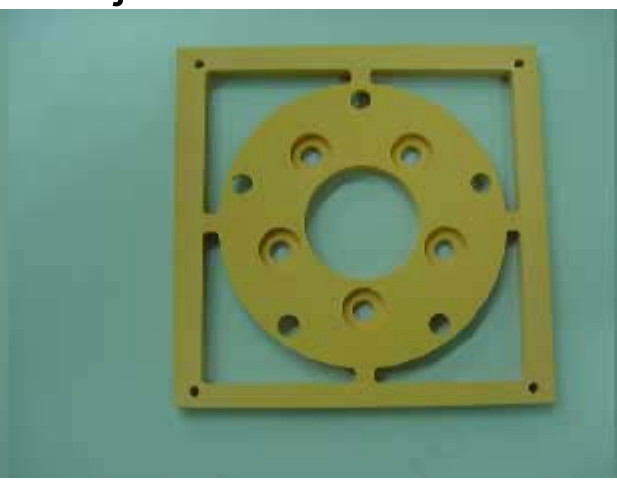
Sample for Training

3D-CAD Data

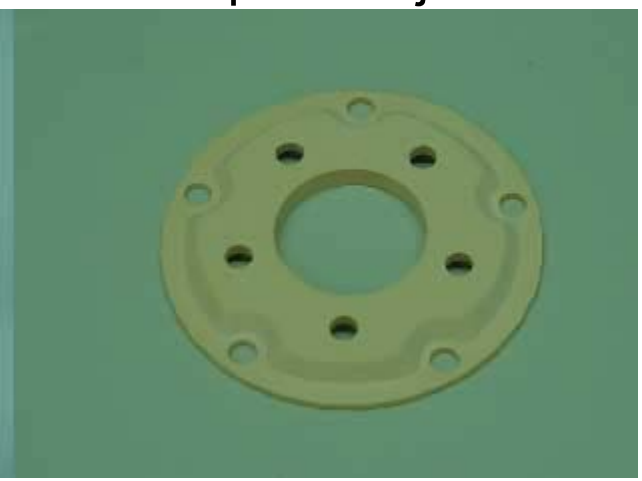


Object Front face

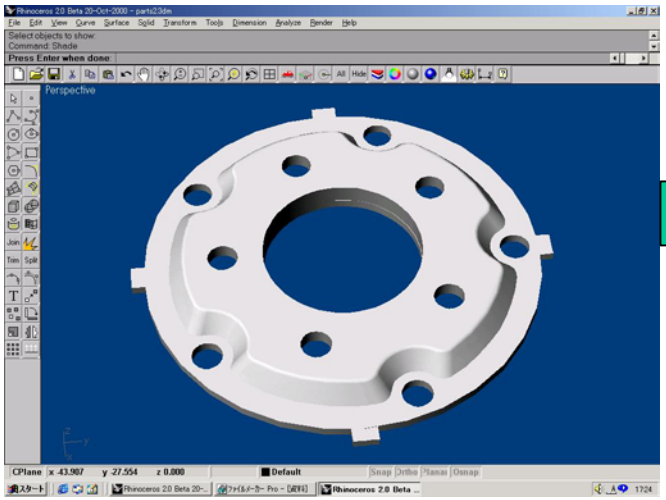
Object Reverse Side



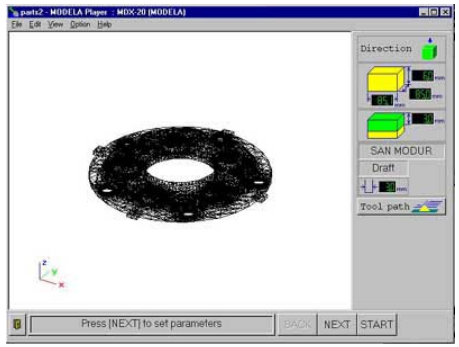
Complete object

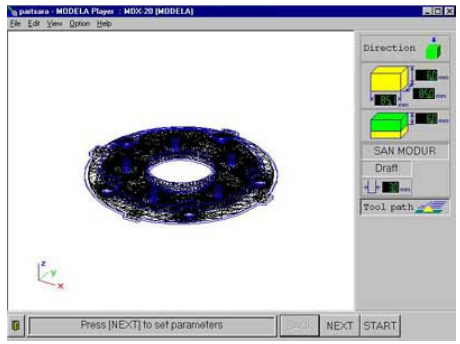


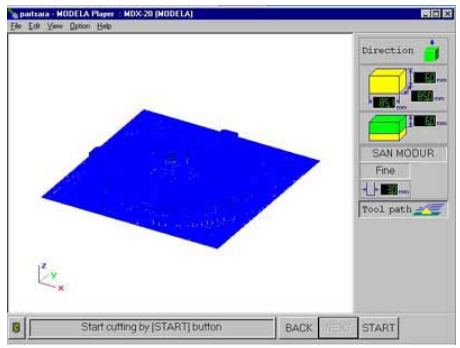
Workflow



Create 3d data



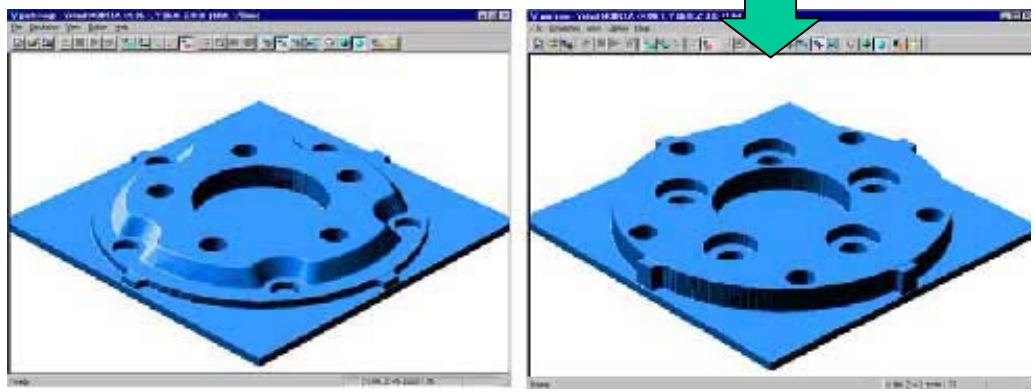




Create tool path by

MODELA Player

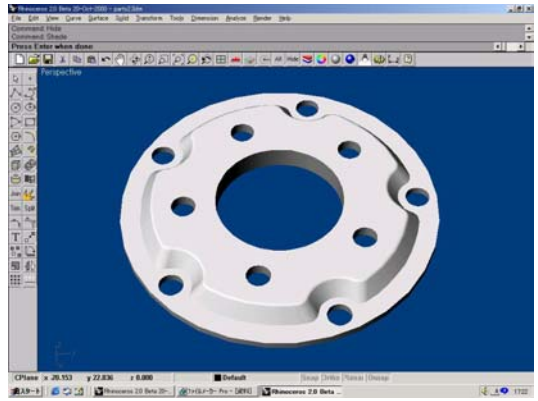
Cutting by MDX-20 or MDX-15



Simulation by VirtualMODELA

Training guide

(Please refer users manual)



1. Create cutting data

Use your 3D CAD or CG software and create 3D data.

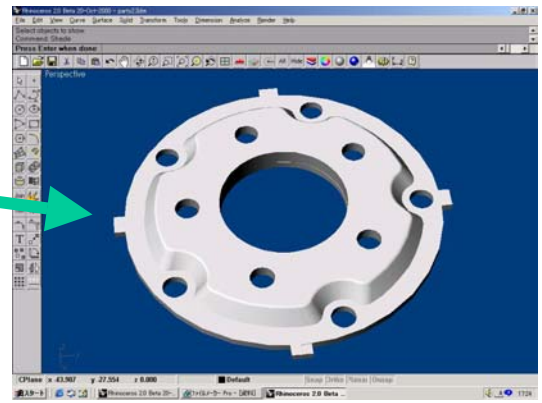
The software should be able to export data to DXF or STL format.

This sample object is created by Rhinoceros (3D CAD)

2. Add support ribs

Add ribs to 3D data for the cutting of reverse side.

Support rib



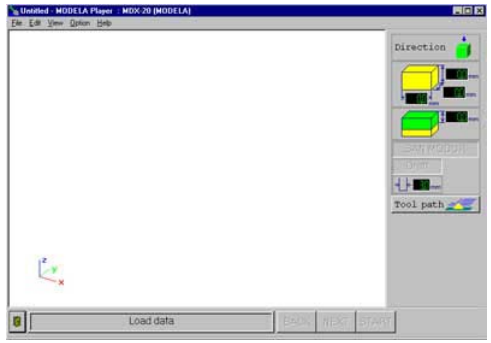
3. Export 3D data to STL or DXF format.

MODELA Player can import the file in DXF format or STL format.

4. Save your 3D CAD or CG software.

5. Start MODELA Player

Click [start] of Windows menu. Point to [MODELA App Group] and click [mdx3p]. MOELA Player will start

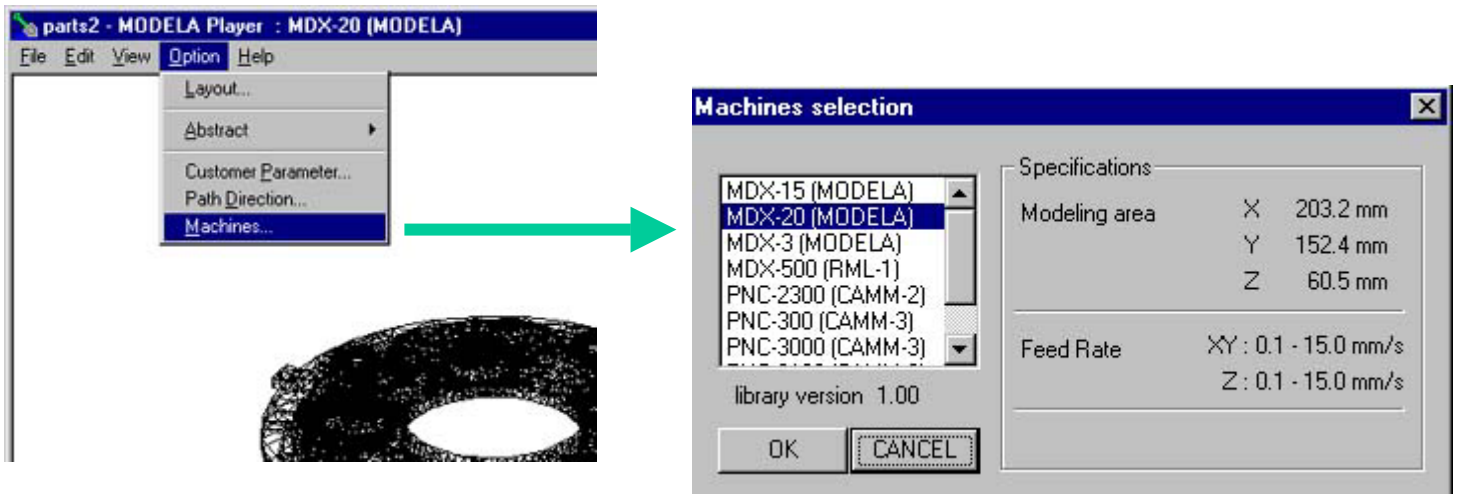


6. Import data in Modela Player (STL or DXF format)

(See Users manual P19)

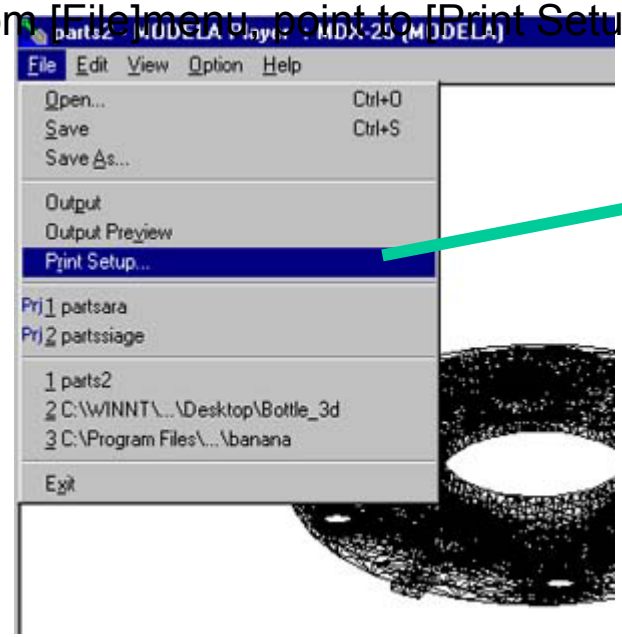
7. Choose Machine

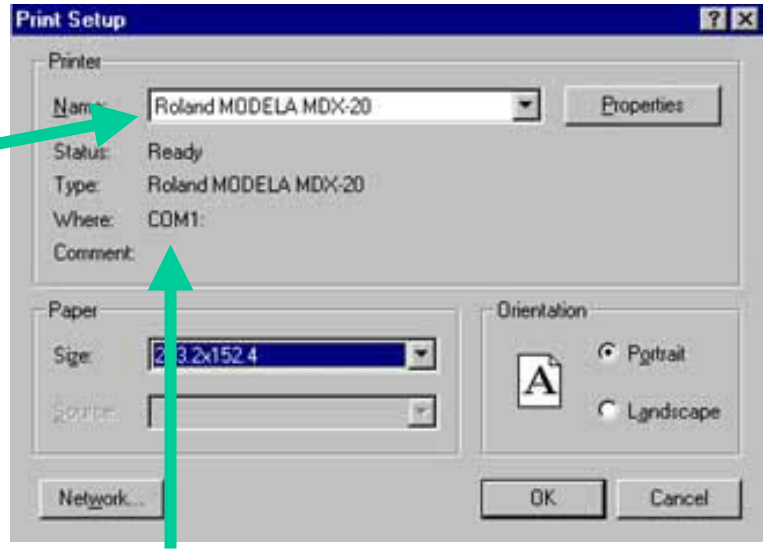
From [Option] menu, click [Machines…] Choose MDX-20 then click OK



8. Setting the printing device

From [File]menu, point to [Print Setup]. Choose MDX-20 then click OK





COM1 or COM2

9. Set the Cutting Parameters (See users manual P19~20)

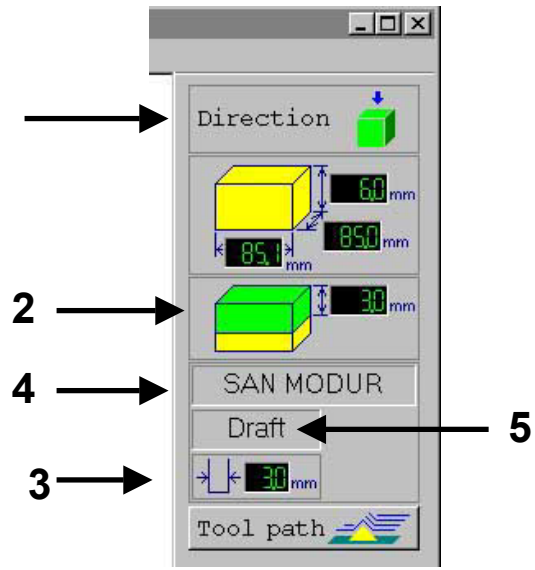
1) Set the cutting direction, choose [from TOP]

2) Set the cutting depth. Set the remain value[0]

3) Choose tool type. Choose straight endmill dia. 3mm

4) Choose Material.

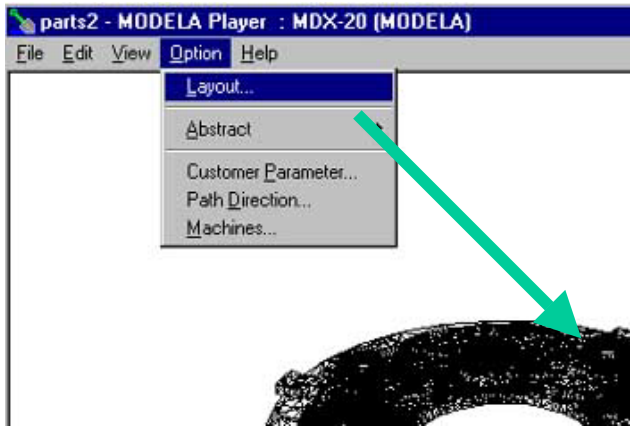
5) Change cutting performance. Choose [Draft]



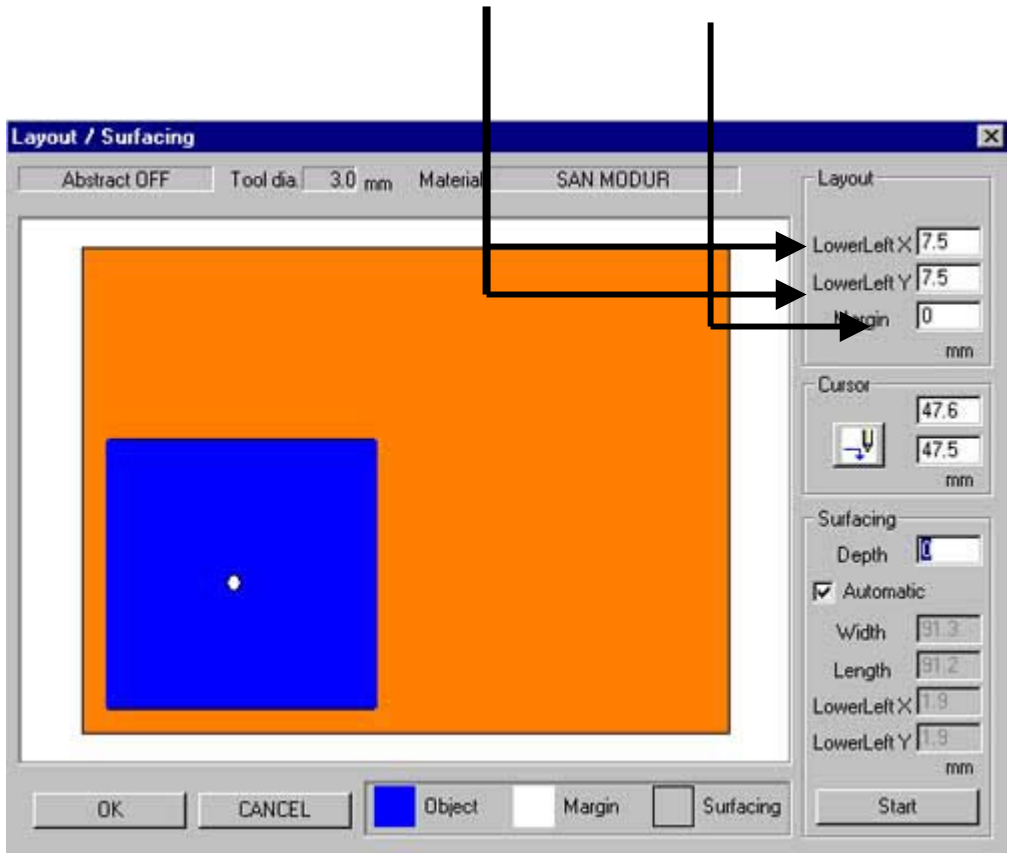
10. Position the object data

Position the object data at the center of material

1) From [Option] menu, point to [Layout. . .]



2) Set origin Lower left X, Lower left Y. Then set Margin [0]



How to decide the position

Sample object size

Material 100 x 100 x 15 (mm)

Object 85.1 x 85 x 6 (mm)

100 - 85 = 15 (mm)

15 / 2 = 7.5 (mm)

Lowe left X = 7.5.

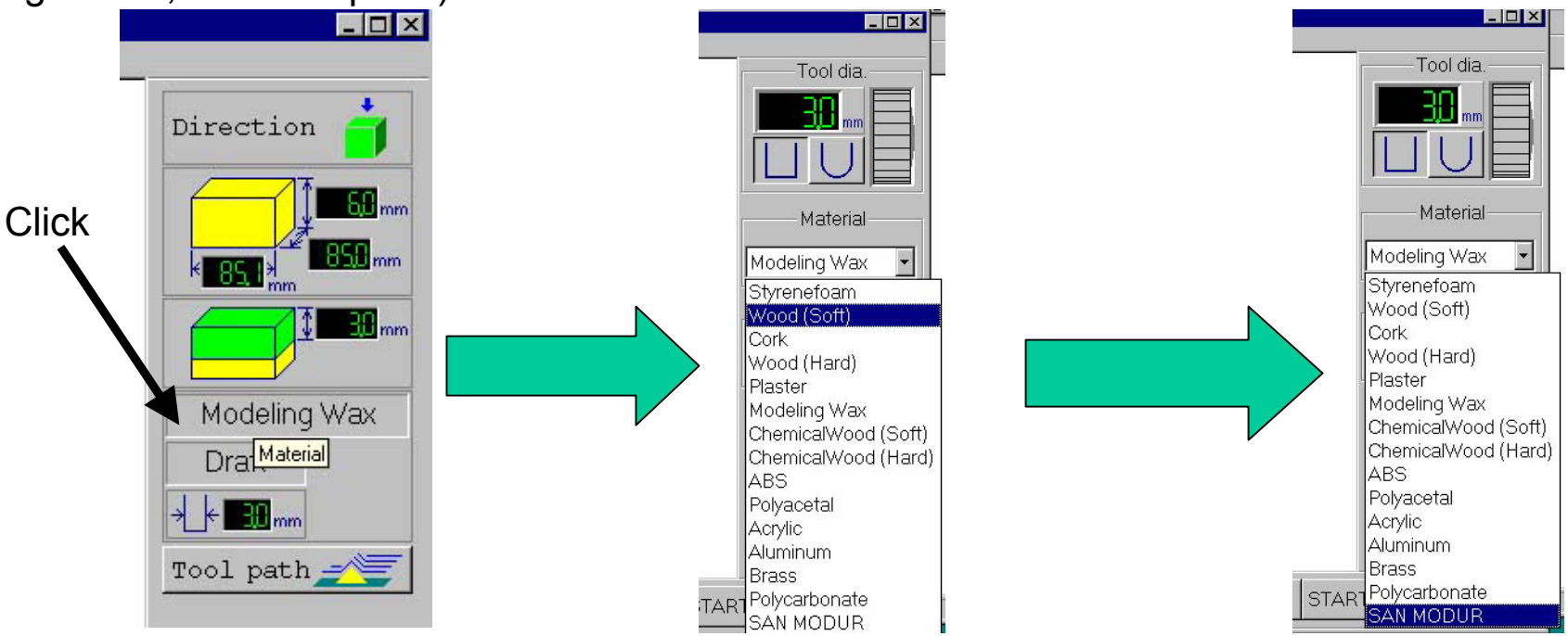
Lowe left Y = 7.5

11. Set the Abstract

From [Option] menu, point to [Abstract], then choose [OFF]

12. Choose material (See User's manual P20)

Choose material from material list.. (When SAN MODUR is not registered, see next pate.)

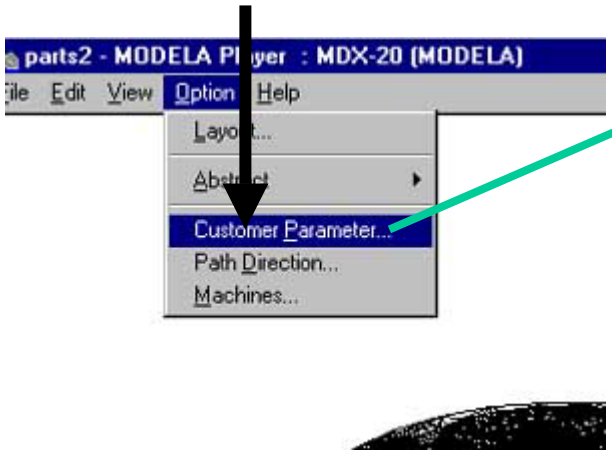


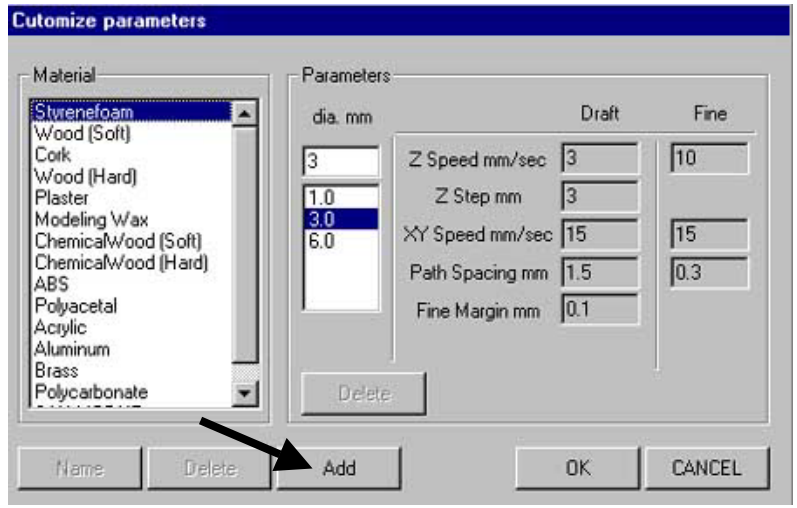
(12. Register new material)

You can register new material or customize the cutting parameter before you choose material.

See Appendix1 (P41) for the detail.

From [Option]menu, point to [Custom Parameter]. Click [ADD]



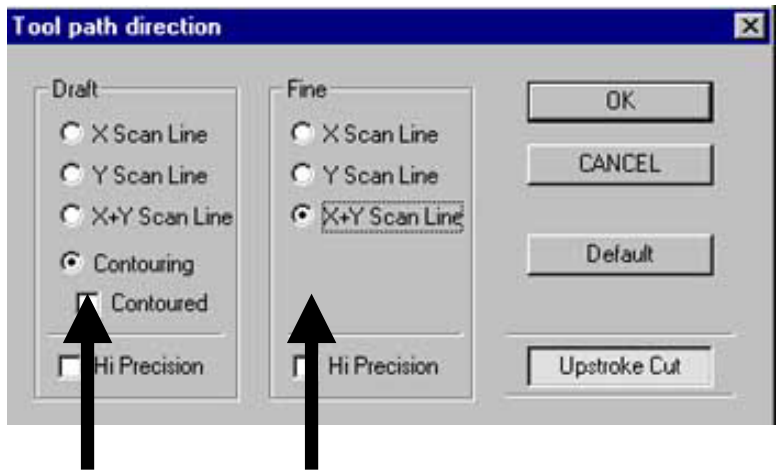


Continue… See Appendix1.

13. Choose Tool path direction

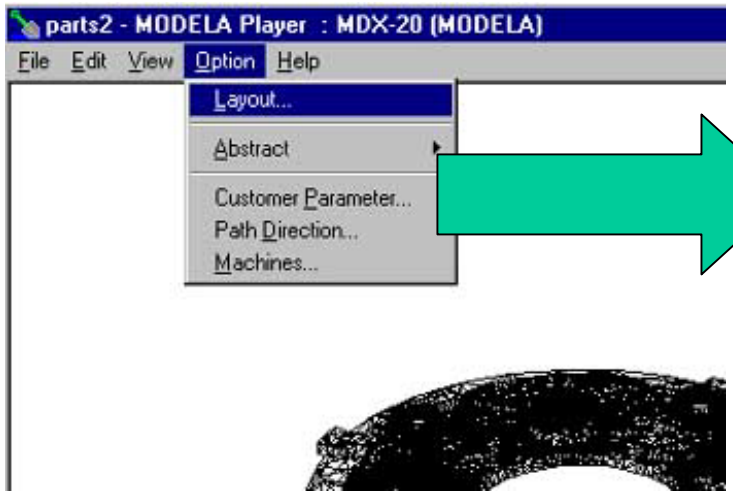
Choose Tool path direction for Draft (rough) and Fine (Finish). From [Option]menu, point to Tool path direction.

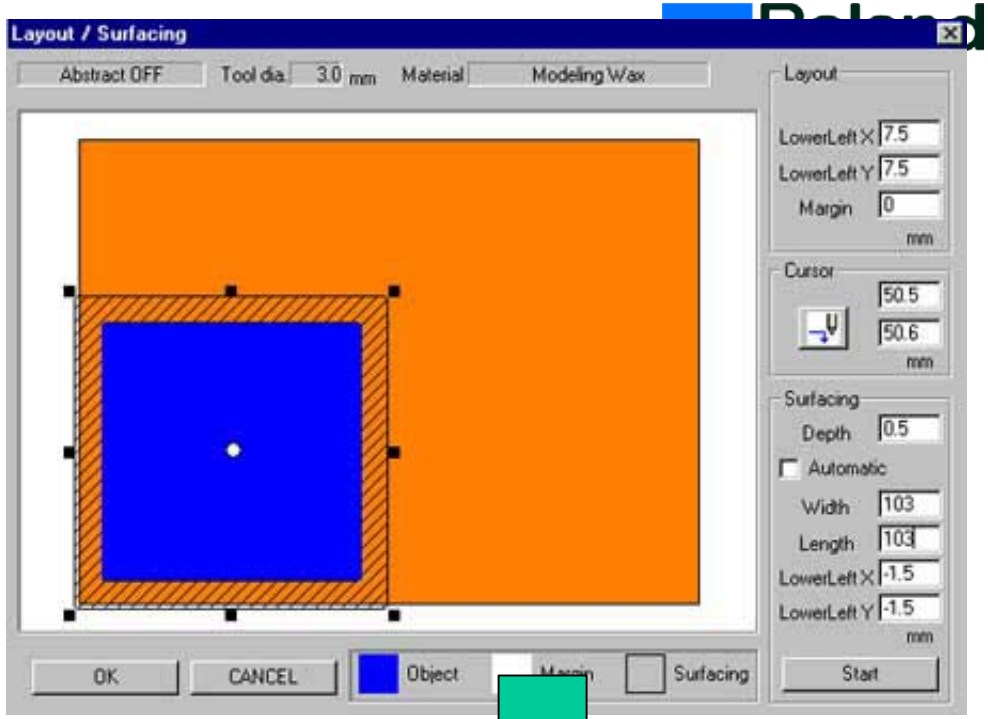
For quick finish : Draft X (or Y) Fine X(or Y)
For fine finish : Draft contour, Fine X + Y



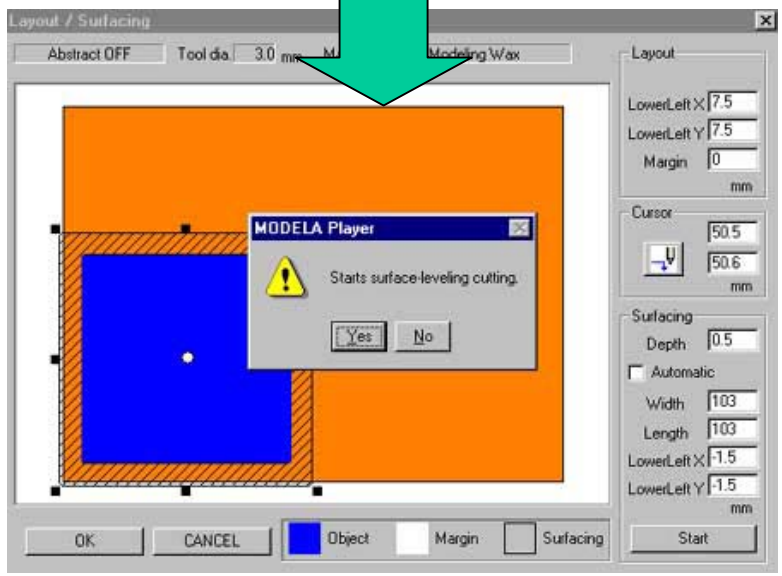
Training guide

14. Surfacing





1)From [Option]menu, choose [layout. . .]
2)Enter 0.5 for depth
3)Remove the check of [Automatic]
4)Enter width, length
5)Enter Lower Left X, Lower Left Y.
6)Click [Start] surfacing. Then [Yes]



Sample information

Width = Material width + Tool dia. (material 100 mm + Tool 3mm)

Length = Material length + Tool dia. (material 100 mm + Tool 3mm)

Lower left X, Y = -1.5 (Lower left coordinates should be tool radius minus to cut off the edge clear.

Continue...

Training guide

15. Surfacing

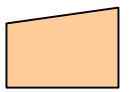
Surfacing time ---about 5 minutes

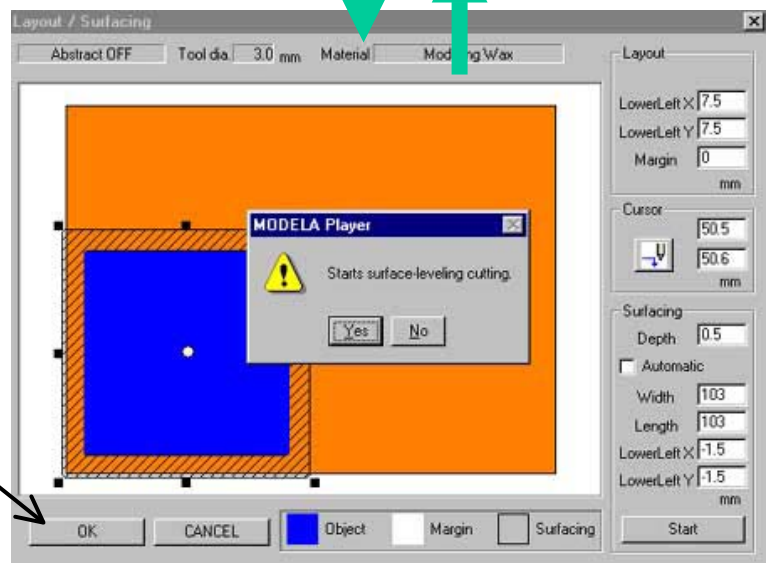
Check the surface of material if it is completely flat. Then click [OK] to return to main display.

If the surfacing is not flat yet, repeat the surfacing until you get the flat surface.

You do not need to change the setting. Just repeat.

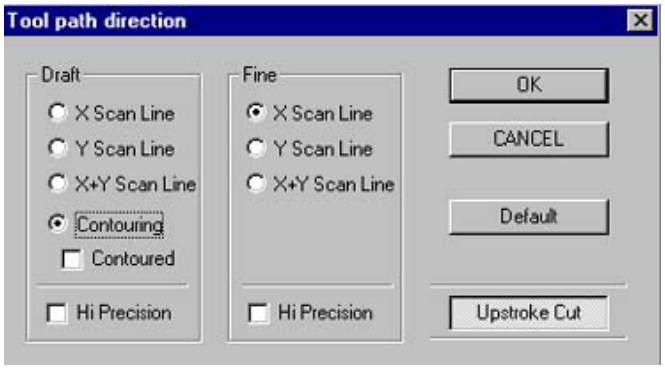
Note:

*If the slant of surface is big like () increase the surfacing depth value over 0.5.

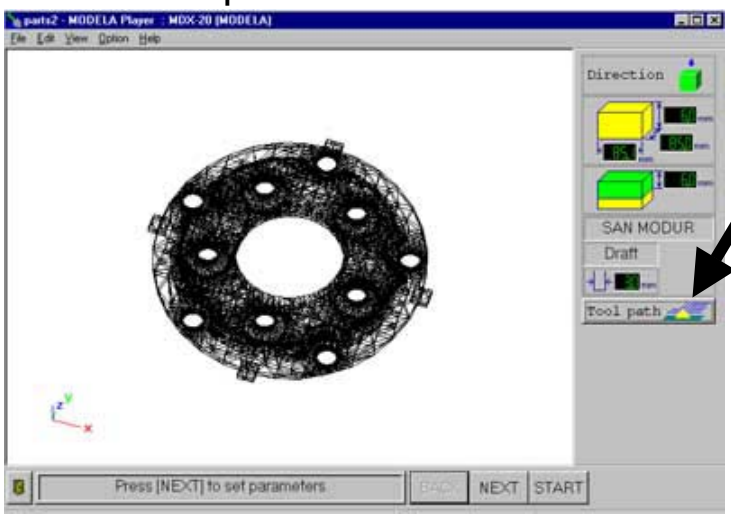


16 Create tool path for front face. (Draft)

From [Option]menu, choose Tool Path direction

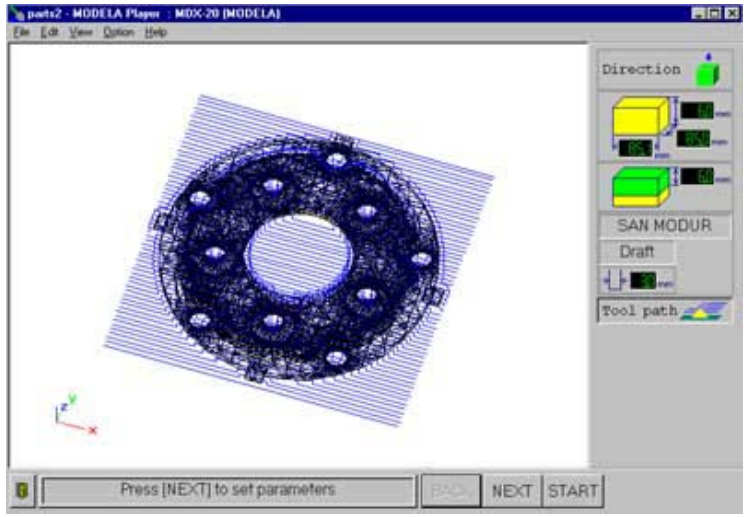


Click Tool path button

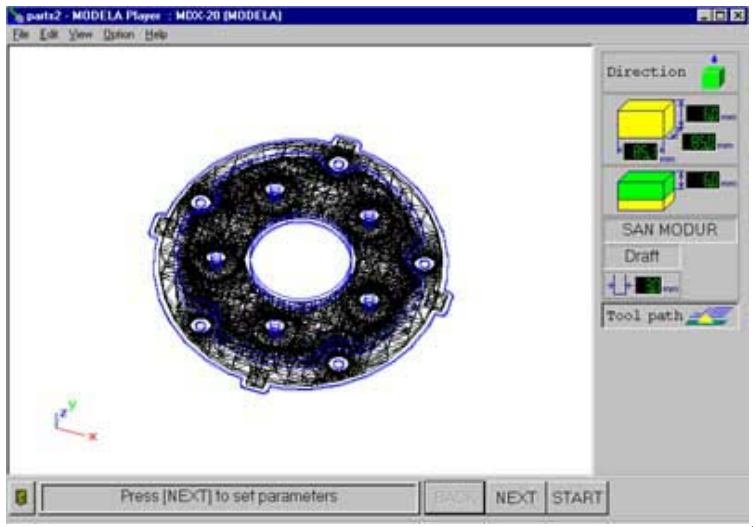


Create tool path

Draft X direction



Draft Contour direction



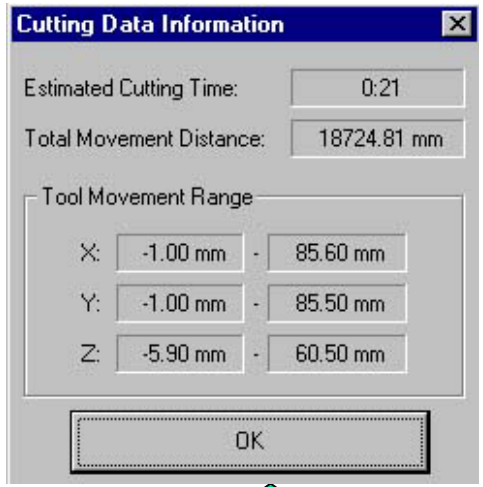
Training guide

17. Simulation on PC

Start Virtual MODELA and check the form and cutting information.

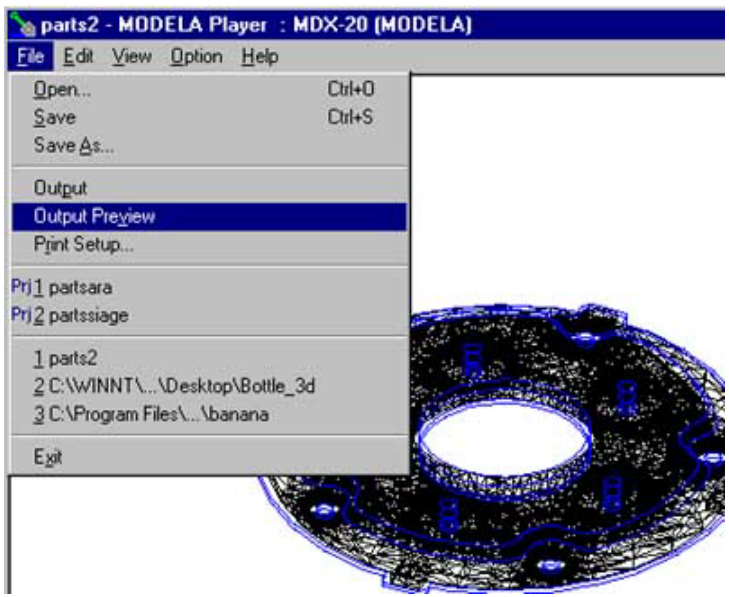
1)From [File] menu point to [Output Preview].
Virtual MODELA will start.

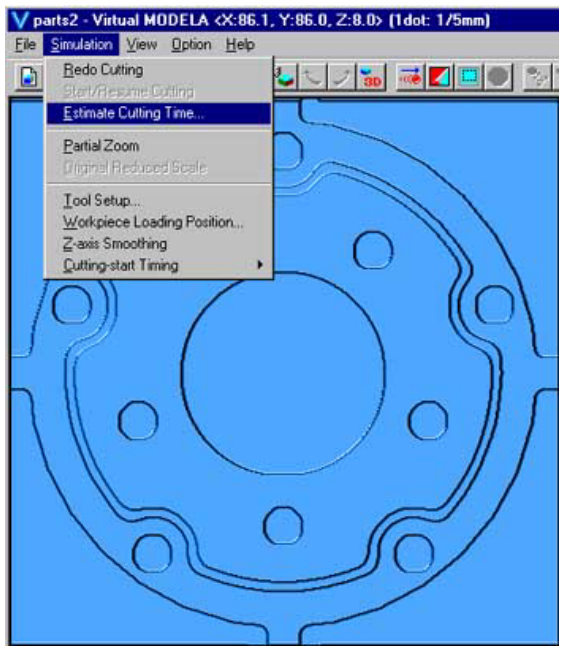
2)From Simulation menu point to [Estimation].
The [Cutting Data Information] will be shown.



<- Estimated Time

*Includes some tolerance.

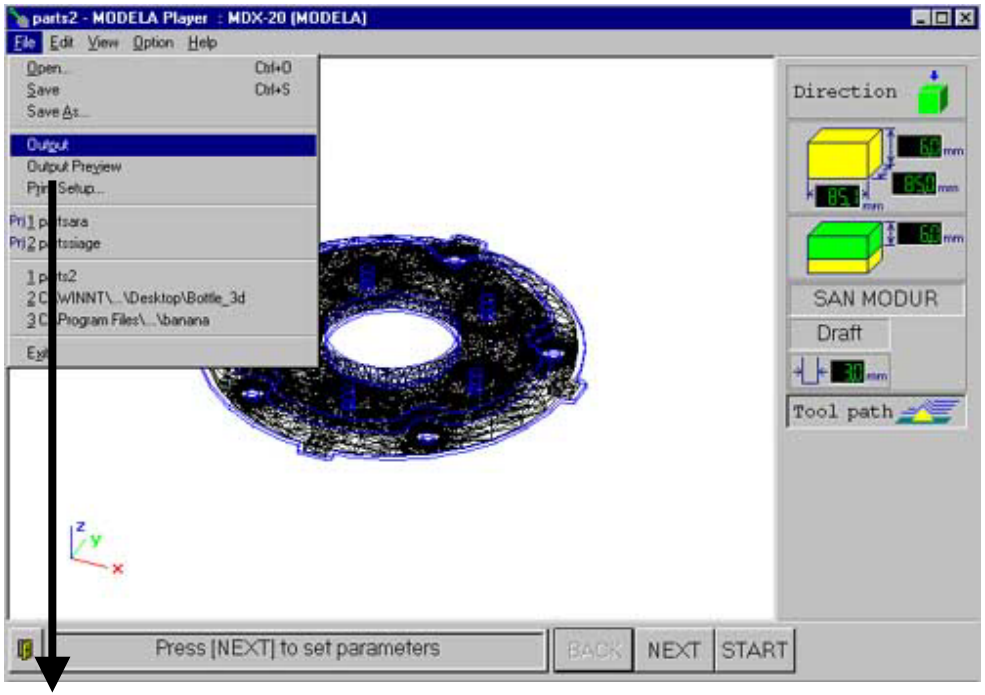


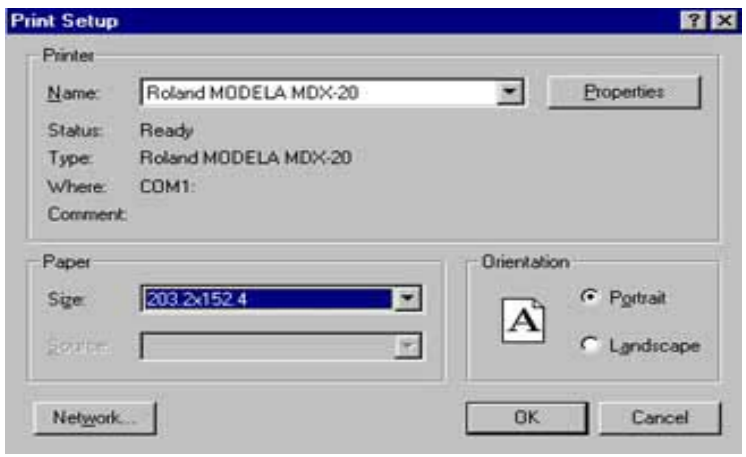


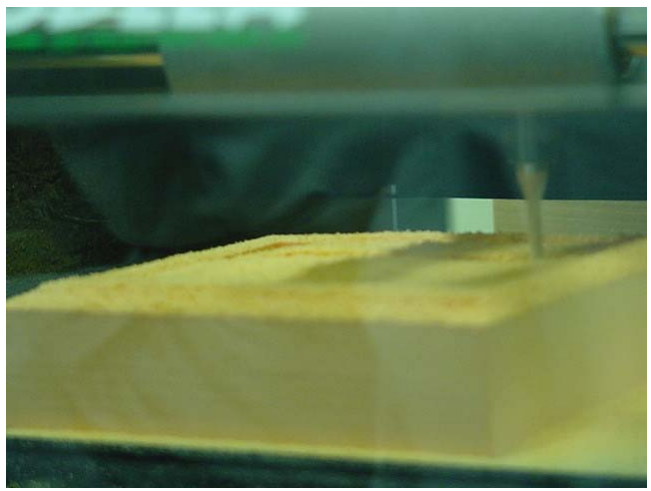
Simulation of Draft contouring cutting.

18. Output cutting data (Front face, rough (Draft) cutting)

From [File] menu, choose [Output]. MDX-20 will start cutting.

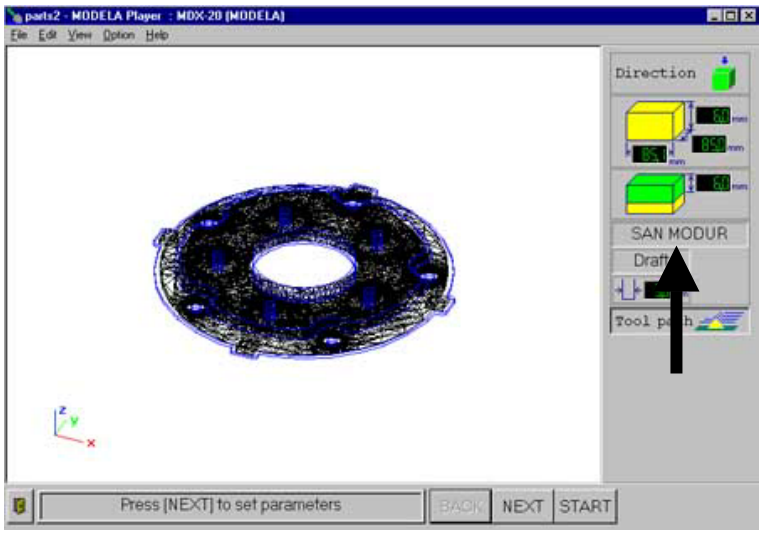






19 Change cutting performance (Front face, Fine cutting)

After finishing the Draft cutting, change the cutting performance to Fine.



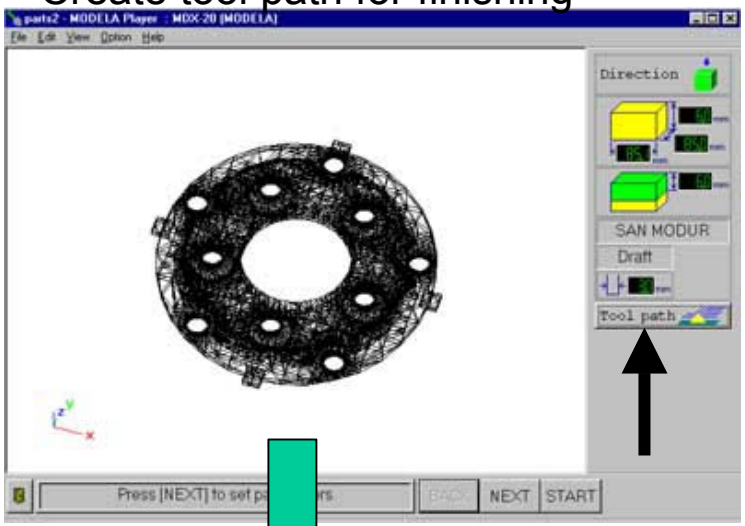
Click the Draft in the menu box

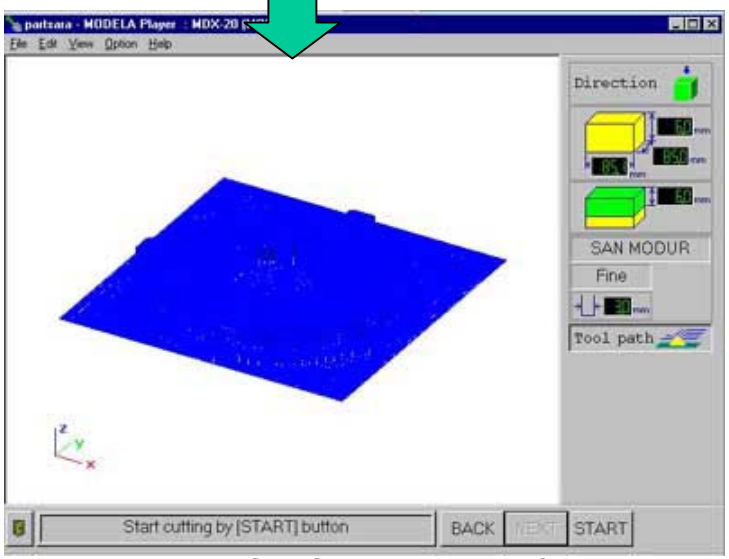
Click [DRAFT]button -> Change to [FINE]

Training guide

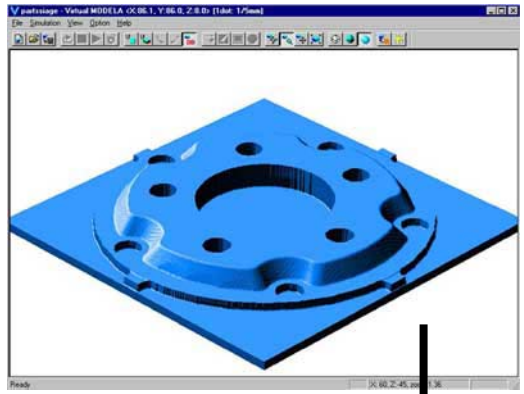
20 Create Tool Path and Simulate on PC for Fine cutting.

Create tool path for finishing

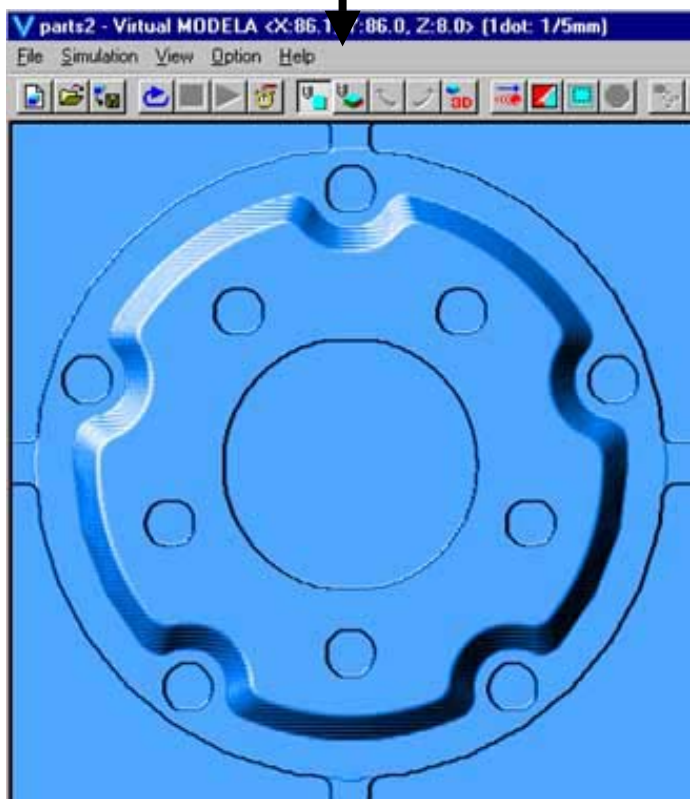




Tool path for finishing (X & Y)



Virtual MODELA 3Dsimulation

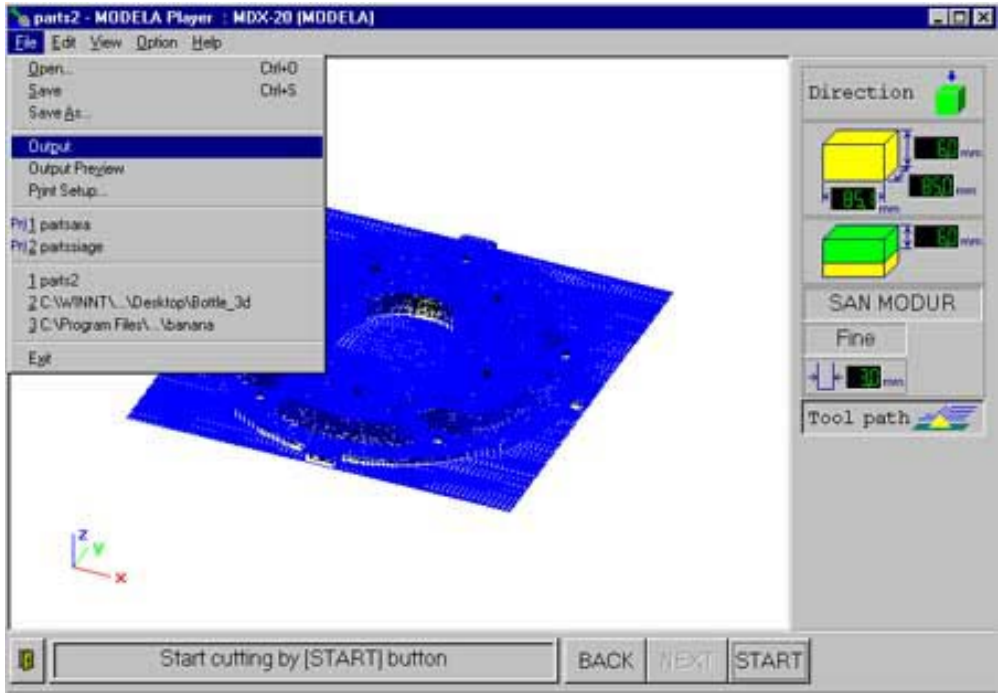


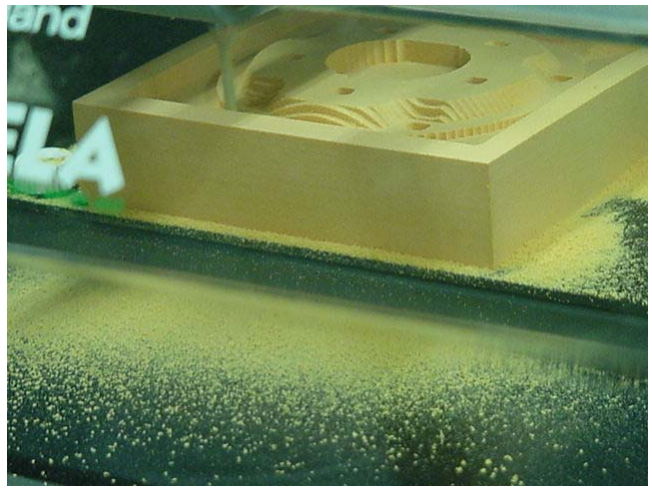
Virtual MODELA 2D simulation

Continue...

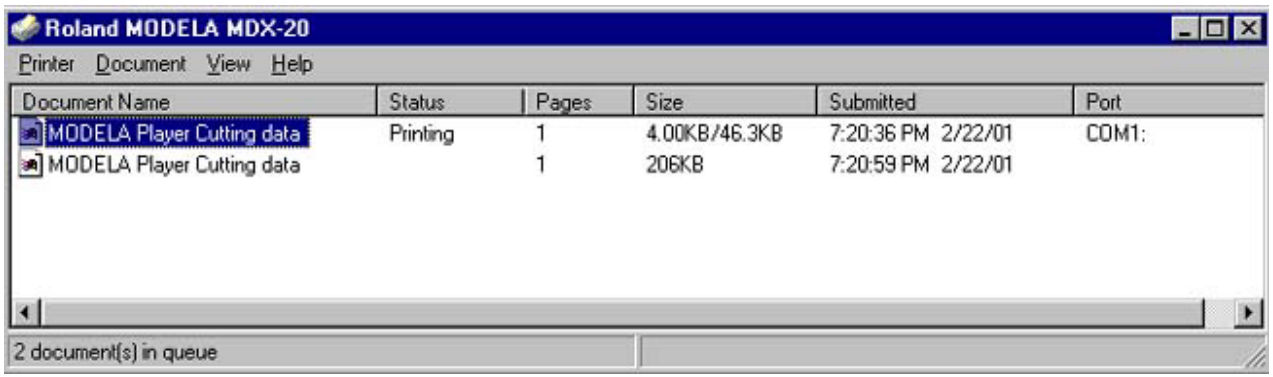
21 Output cutting data (Front face, Fine cutting)

From file menu, choose [Output]. The MDX will start cutting.





If you use only one tool for Draft cutting and Fine, you can output the data successively. In this case, keep the setting of MDX-20.

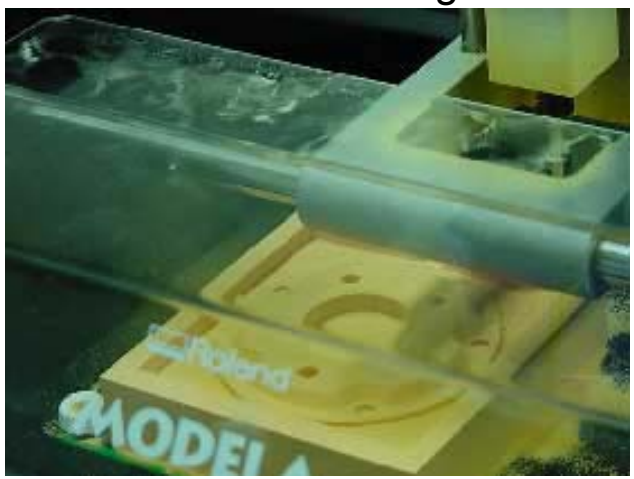


When you send Draft cutting data and Fine data successively, the dialog will be as left. The upper data is Draft and the under one is for Fine.

Training guide

22. Cleaning the fallen cuttings

Finish the cutting.



Remove the cover

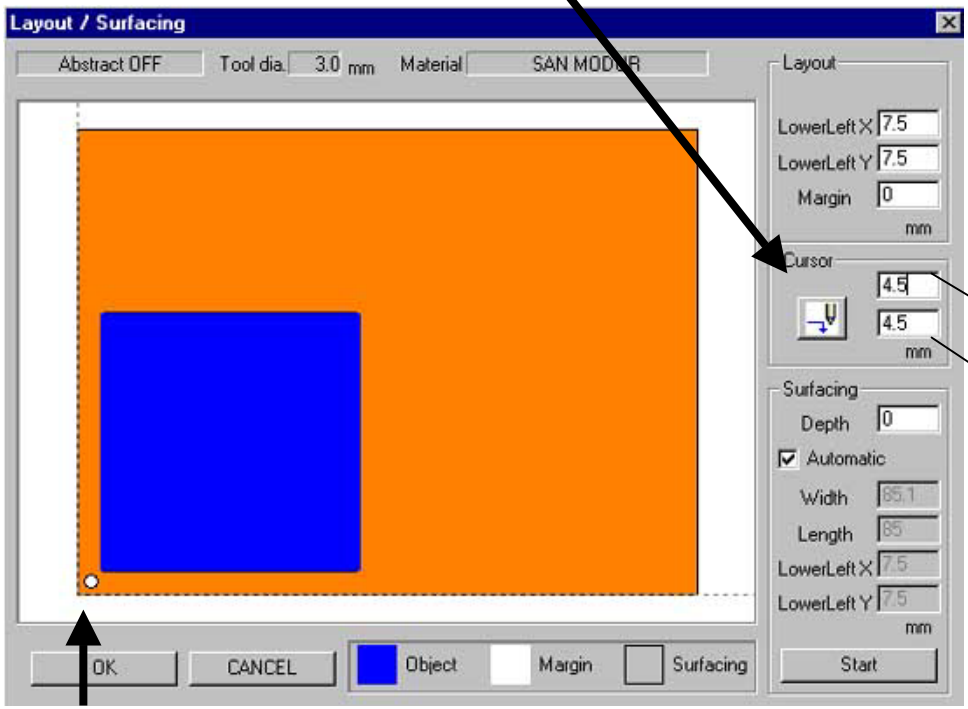
Press the VIEW key, and the table moves to front

Clean the cuttings by vacuum cleaner

Put the cover on and press the VIEW key

23 Make pin holes

Make pin holes by cursor functions of MODELA Player



Make 4 pin holes on frames around the material
4 points = Lower left, Upper left Lower right, Upper right

First, decide the position of lower left pin hole.

Layout lower left X - Tool dia. =X
7.5 - 3 = 4.5

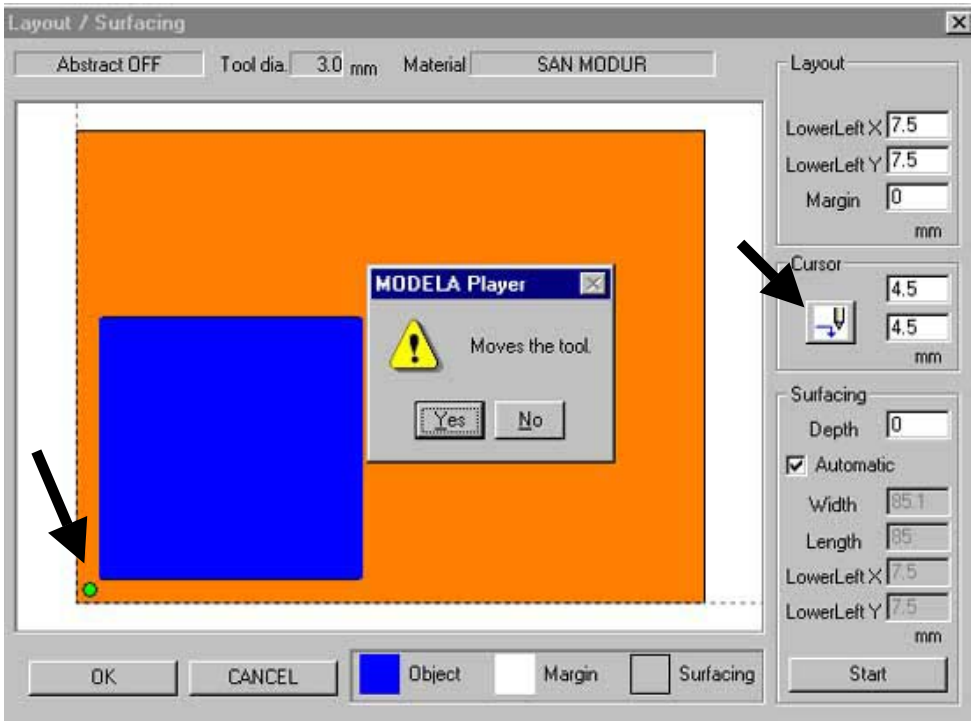
Layout lower left Y - Tool dia. = Y
7.5 - 3 = 4.5

Check the position by this circle.

Exmaple : Work (Material)size 100x100x15 Object size 85.1x 85x 6 (X x Y x Z)(Unit :mm)					
Upper Left	X=4.5	(Layout LowerLeft X - Tool dia.)	Upper Right	X=95.6	(Layout LowerLeft X + Object X + Tool dia.)
	Y=95.5	(Layout LowerLeft Y + Object Y + Tool dia.)		Y=95.5	(Layout LowerLeft Y + Object Y + Tool dia.)
Lower Left	X=4.5	(Layout LowerLeft X - Tool dia.)	Lower Right	X=95.6	(Layout LowerLeft X + Object X + Tool dia.)
	Y=4.5	(Layout LowerLeft Y - Tool dia.)		Y=4.5	(Layout LowerLeft Y - Tool dia.)

Continue...

24. Make pin holes



1) Enter the calculated X, Y, coordinate value

2) Click [CURSOR] key

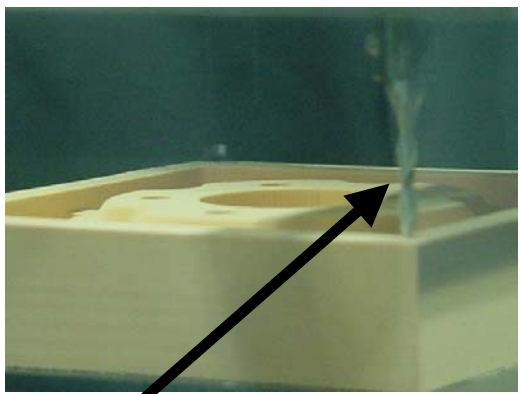
3) Click [Yes]

4) The tool moves to the position you specified at No.1). Then tool down the Z0 position.

5)Press the Tool DOWN key and make a pin hole about 10mm depth.

6)Repeat this process for other 3 positions and make 4 holes.

*Before you make a hole, mark on the tool by felt pen at 10mm. It makes you easy to find the depth.



Mark by felt pen

25. Cleaning the cuttings and Mark the direction

Remove the front cover

Press VIEW key, the table moves to the front

***IMPORTANT**

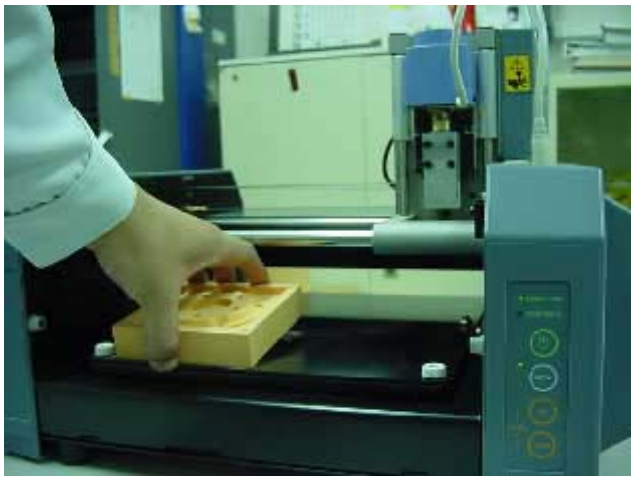
This mark is necessary to reverse the material to correct direction for reverse side cutting.

*Mark on the lower left corner with pen

Clean the cuttings by vacuum cleaner

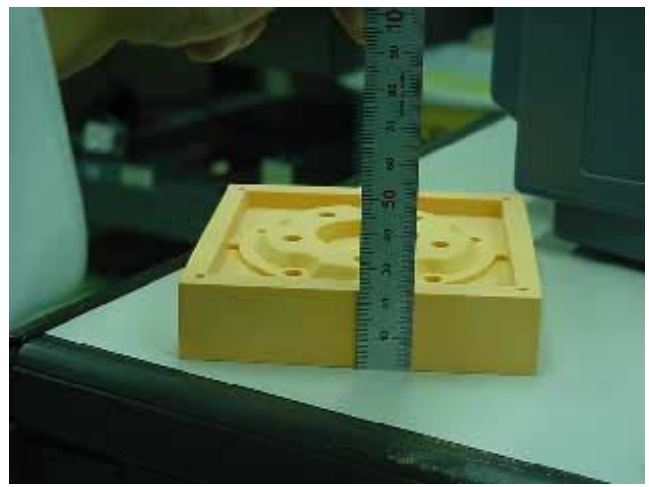
26. Remove the material

Remove the material from table



*If you cannot remove the material. . .
Use a screw driver, awl etc. or put some alcohol between material and table to remove double-sided tape.

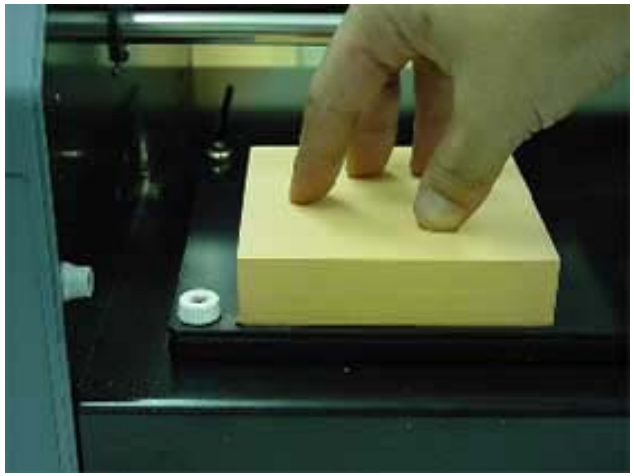
Measure the thickness by slide calipers or rulers



This measurement is to calculate the amount of surfacing for reverse side.
Measure by 0.1 unit for precise modeling

27. Put the base material

Put on material for base at the same position of object material



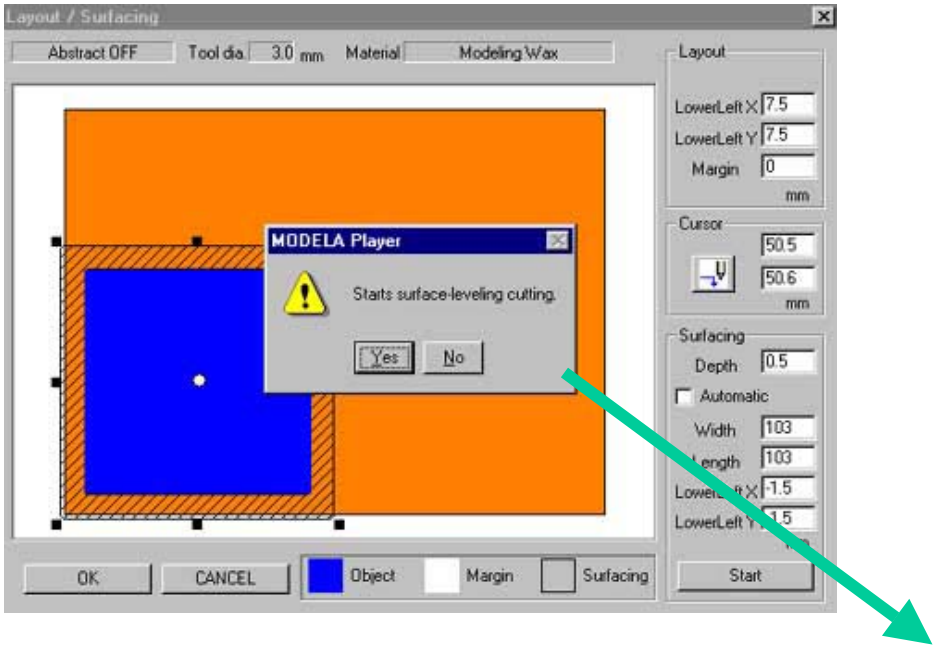
Put the front cover

Press VIEW key to release PAUSE

Press TOOL - DOWN key until the tip of tool reaches the surface

28. Surfacing the base material

Surface the base material by Surfacing function of MODELA Player. **See No. 14) Surfacing**.



*In case of this training, the object material and base material are same size.

Surfacing size for base material

Width = Material width + Tool dia. (material 100 mm + Tool 3mm)

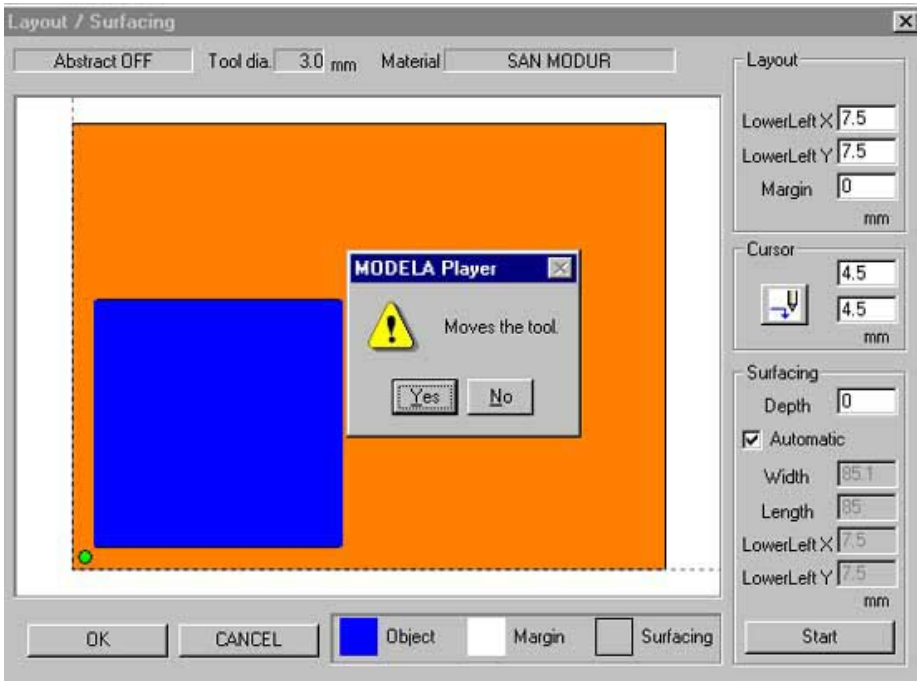
Length = Material length + Tool dia. (material 100 mm + Tool 3mm)

Lower left X, Y = -1.5 (Lower left coordinates should be tool radius minus to cut off the edge clear.

MDX starts surfacing

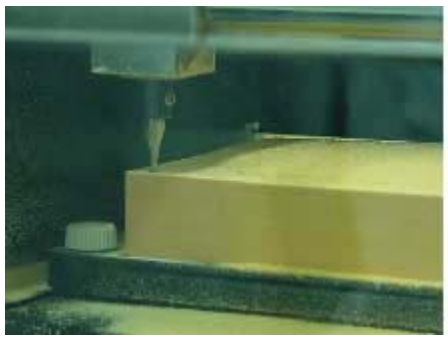
29.Make pin holes on base material

Make pin holes on base material by Cursor function of MODELA Player

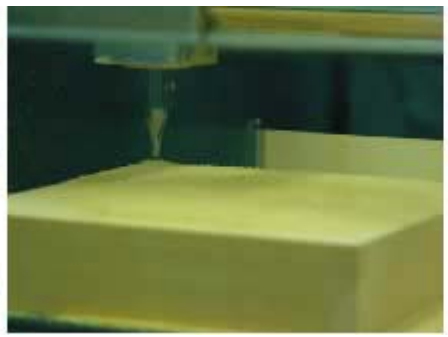


See **No. 24 Make pin holes.**
Make holes at the same place as the object material.
The depth of holes should be about 14~15 mm.
(Length of pin : 18mm)

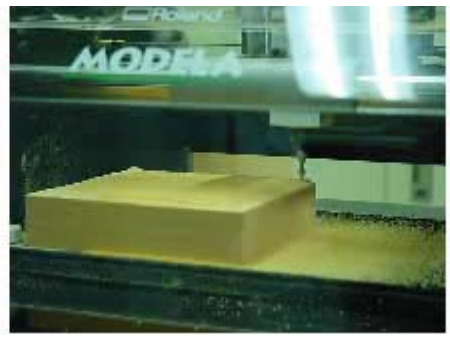
*Before you make a hole, mark the tool by felt pen at 14~15mm. It makes you easy to find the depth.



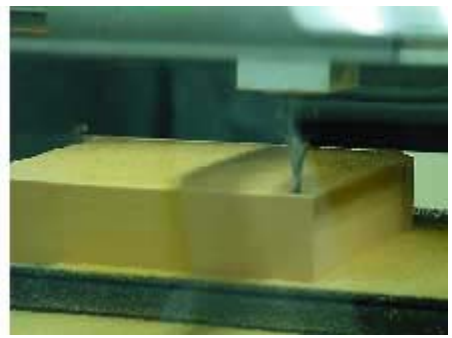
Lower left



Upper left



Upper right



Lower right

30. Clean the cuttings by vacuum cleaner

See. **No. 22 Cleaning the fallen cuttings**.

31. Insert positioning pins in holes

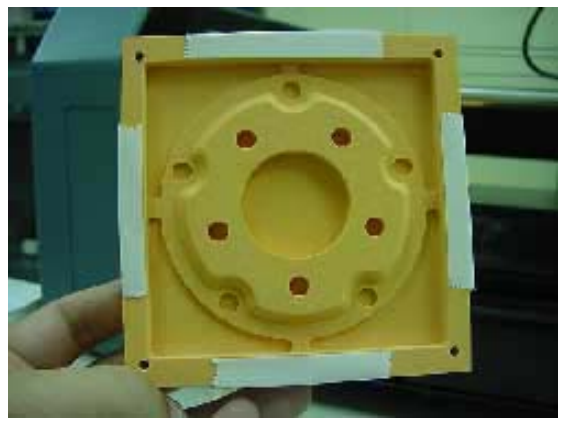
Insert 3 positioning pins in holes.

(*Positioning pins are included in the accessory)

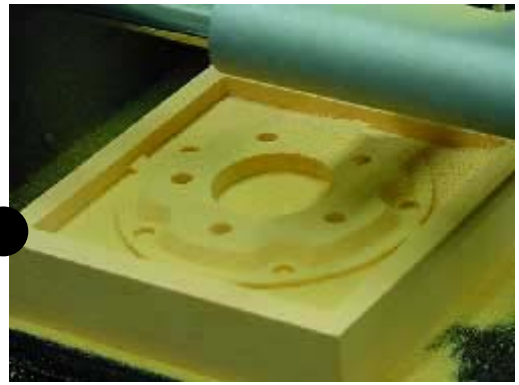
32. Put double-sided tape on the front face of the object material

*Remove the cuttings of the surface of material clearly before put the tape.

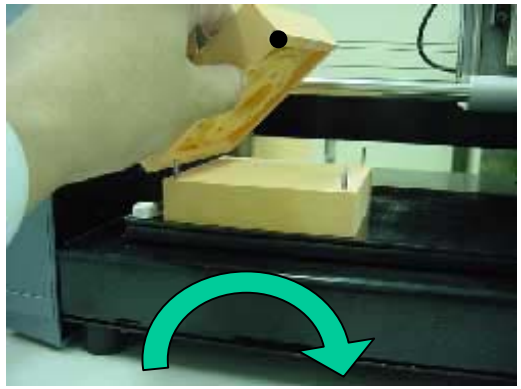
Put tape at 4 places and remove the back paper.



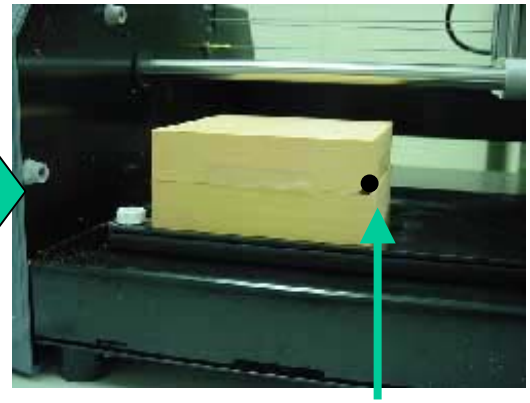
33. Fix the object material on the base material



Get the object material ready. The mark should be left lower corner first.



Turn the material left to right. (or right to left). Insert pins in the holes.



Stick it on the base material strongly. The mark should be at right corner now.

34. Set Z0

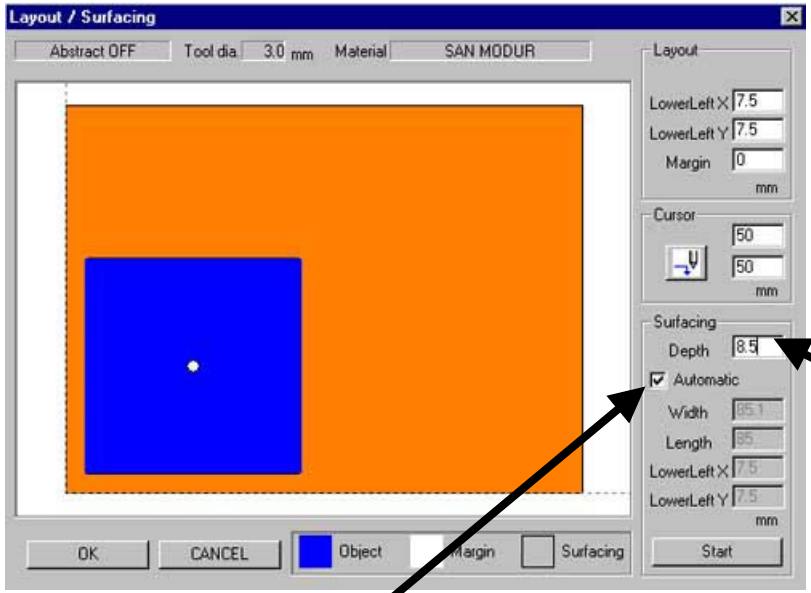
Put on front cover

Release VIEW key

Press TOOL-DOWN key until the tip of tool reaches the surface.

35. Surface the reverse side.

Surface the material by Surfacing function of MODELA Player

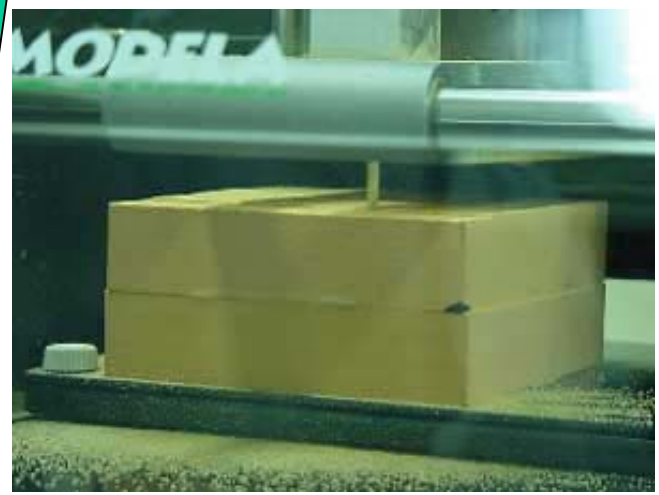


See.**No.14 Surfacing**

Enter the value for surfacing.
Refer No. 26 Remove the material.
Material thickness - Object height =Surfacing depth
(i.e. material thickness 14.5mm,
object height 6 mm
surfacing depth = 14.5 - 6 = 8.5 mm)

Check the [Automatic]
MODELA Player surfaces object size only if it is checked.

MDX starts surfacing.
Surfacing time varies depending on the depth.

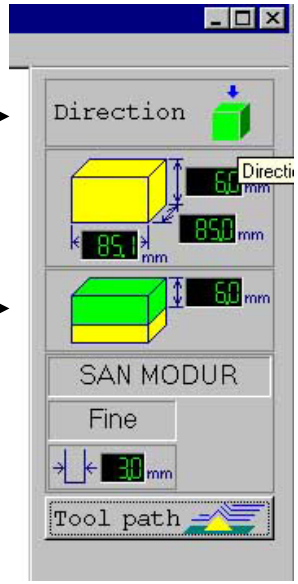


36. Setting the cutting parameter for reverse side

1) Cutting surface

2) Cutting Depth

3) ~ 5) Material, Cutting performance, Tool dia.



1) Cutting surface : Choose [bottom]

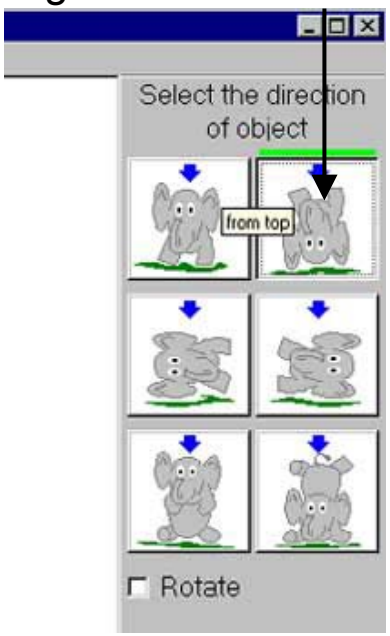
2) Cutting Depth : Set the remains [0]

3) Tool : Set [3 mm, straight]

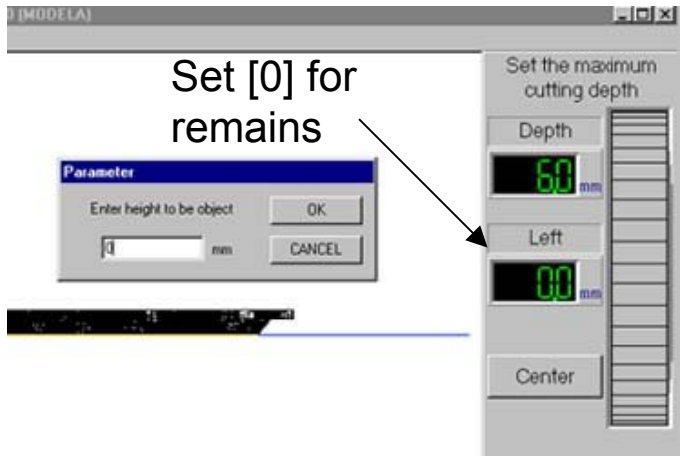
4) Material : Choose [SAN MODUR]

5) Cutting performance: Choose[DRAFT

1)Cutting Surface Click



2) Cutting depth



Set [0] for remains

3) ~ 5)

Tool dia.

Material

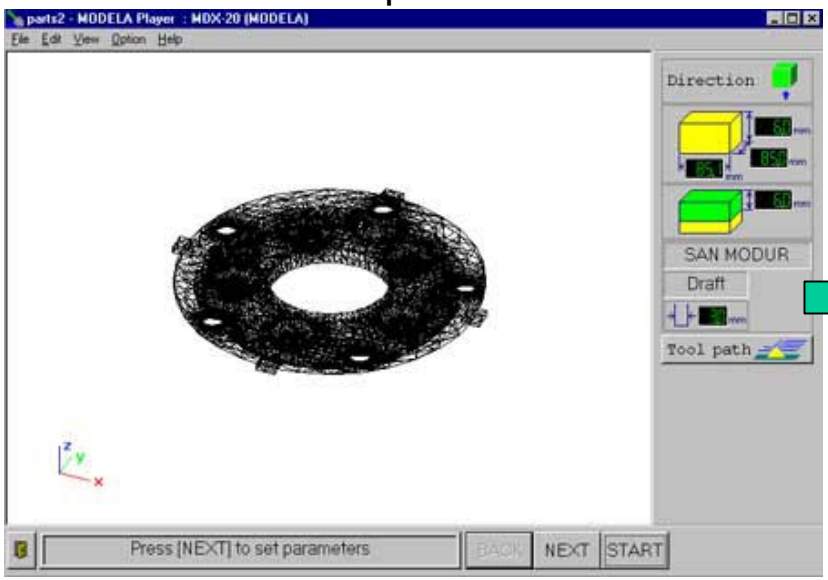
Cutting performance

37. Create tool path for Draft cutting （Rreverse side.）

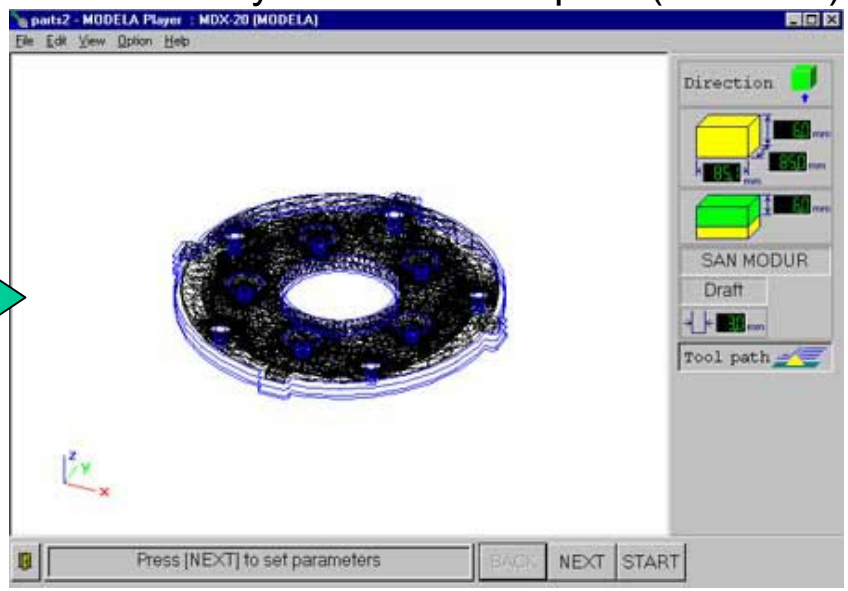
See. 16 ~ 21 Front face cutting DRAFT ~ FINE

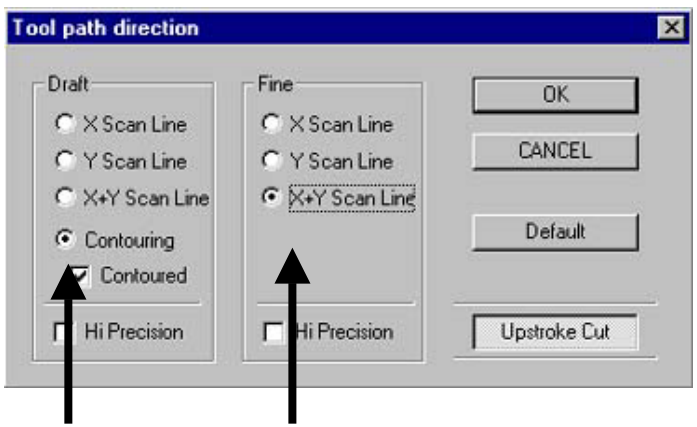
Cutting performance is same as front face cutting

Click tool path



MODELA Player creates tool path (Contour)





From [Option]menu, point to [Tool path direction].
Then choose direction for DRAFT and FINE

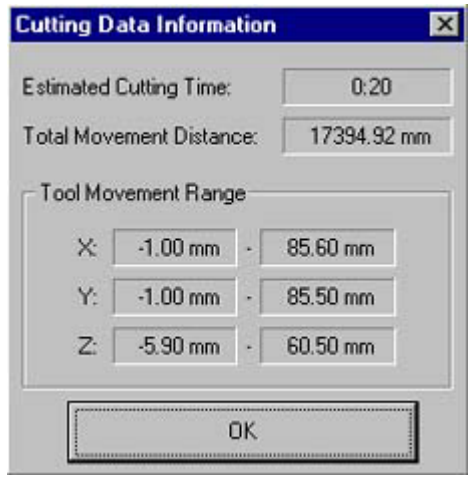
For quick finish : Draft X (or Y) Fine X(or Y)
For fine finish : Draft contour, Fine X + Y

38. Simulation on PC

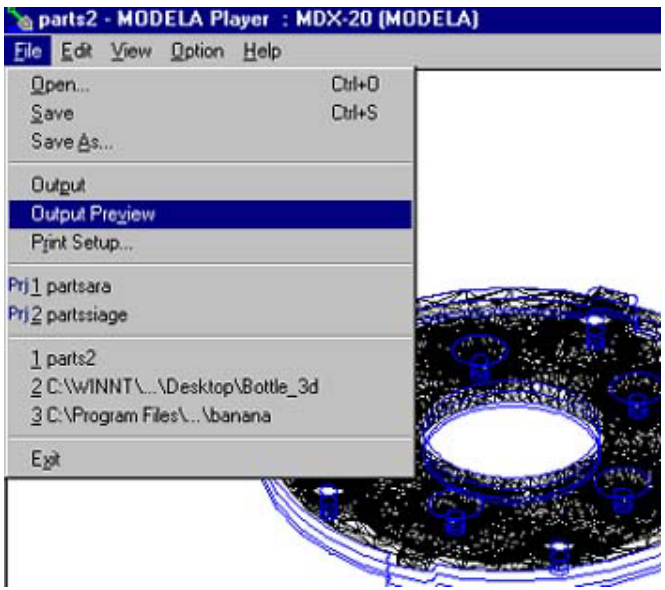
Start Virtual MODELA and check the form and cutting information.

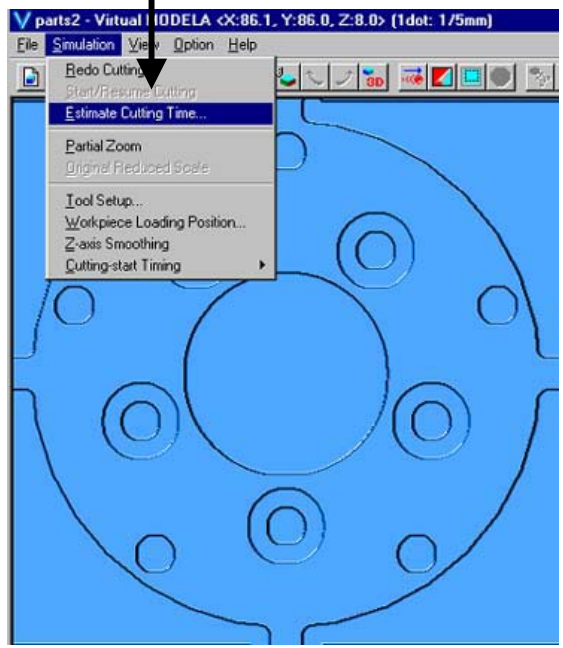
1)From file menu, point to Preview.
Virtual MODELA will start.

2)From Simulation menu point to [Estimation].
The Cutting Data Information dialog will be shown.



<- Estimated Time
*Includes some tolerance.

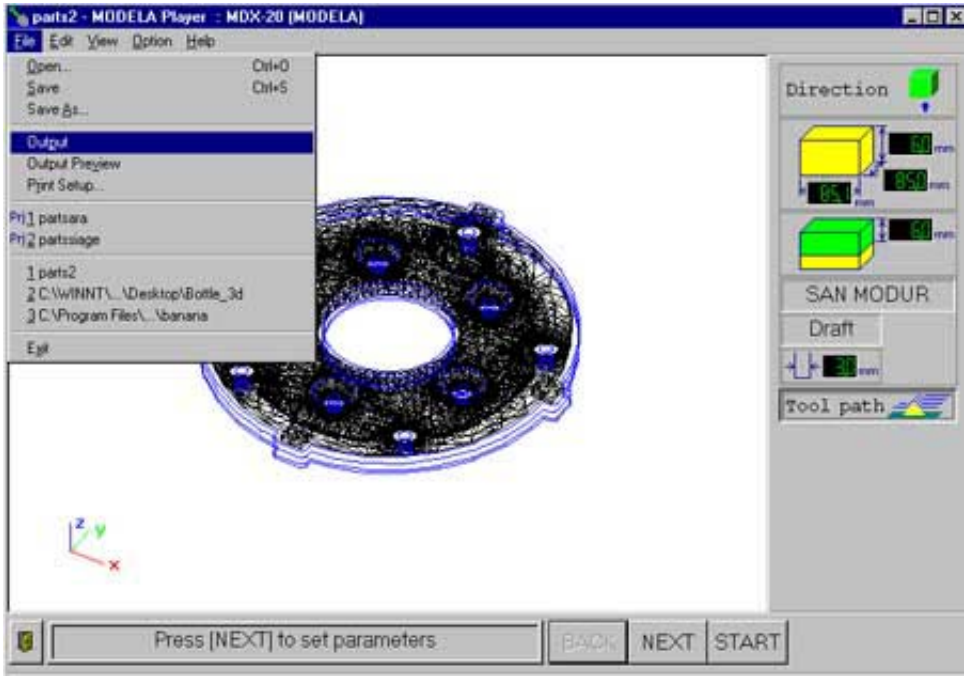


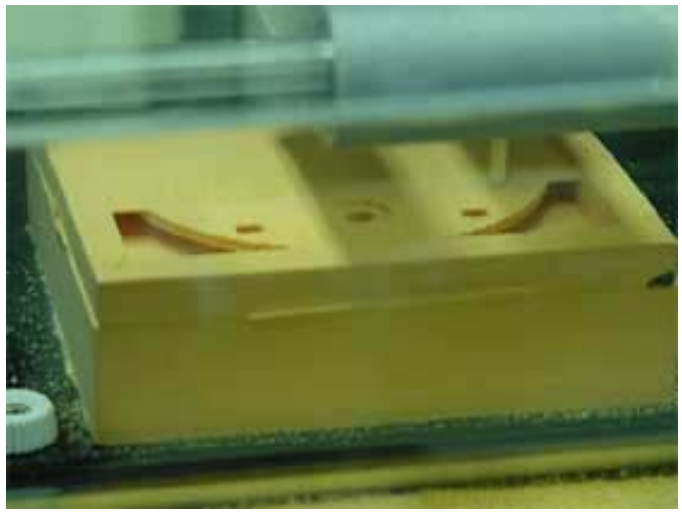


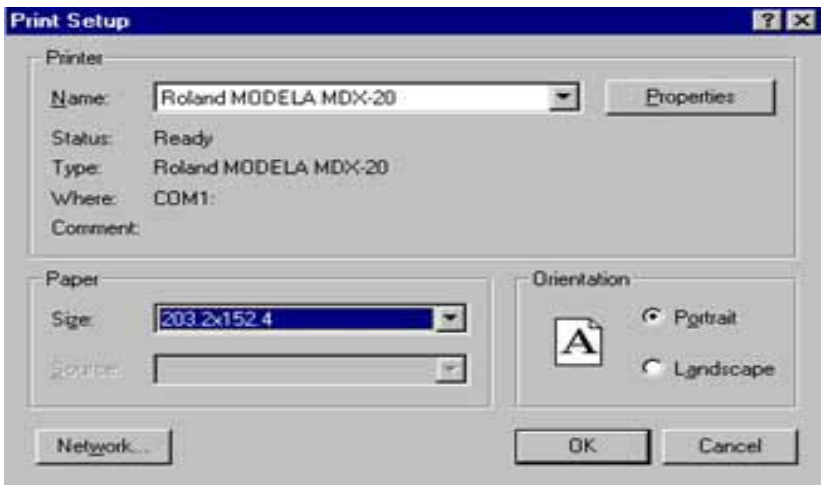
Simulation of Draft contouring cutting.

39. Output cutting data (Reverse side, rough (Draft) cutting)

From [File] menu, choose [Output]. MDX-20 will start cutting.

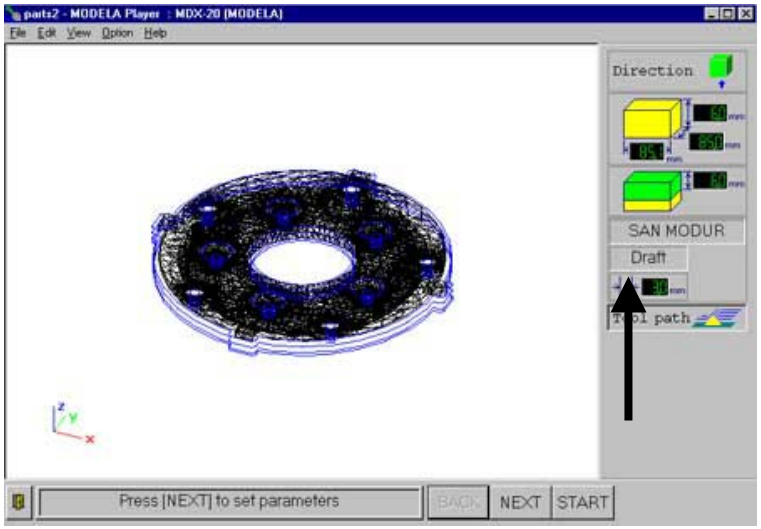






40. Change cutting performance (Reverse side, finish (FINE) cutting)

After finishing the Draft cutting, change the cutting performance to Fine.



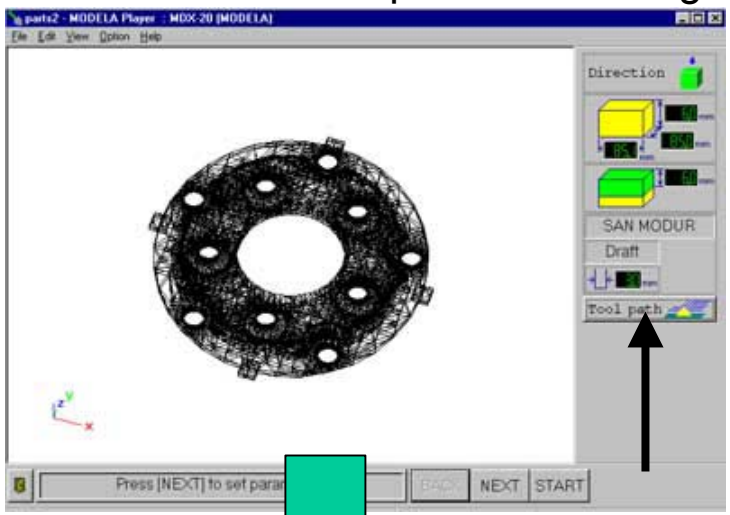
Click the Draft in the menu box

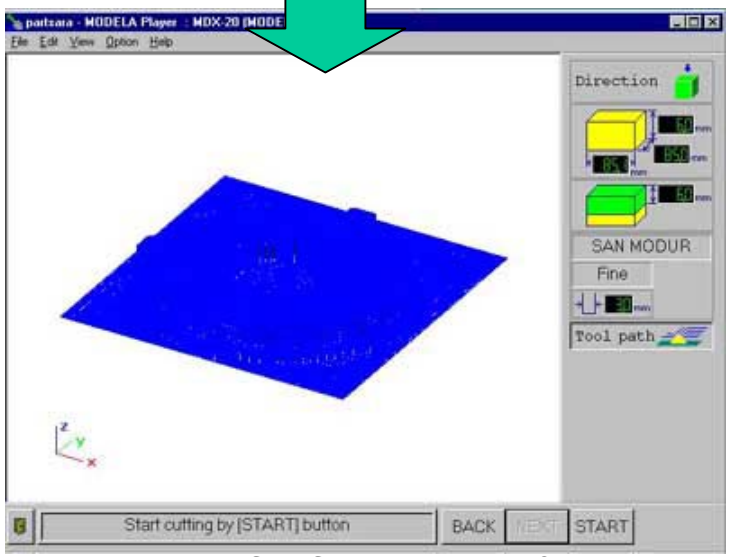
Click [DRAFT]button -> Change to [FINE]

Continue...

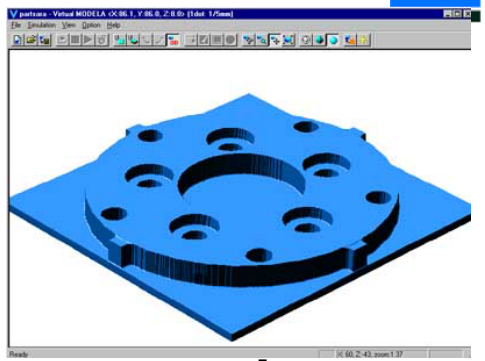
41 Create Tool Path and Simulate on PC for Fine cutting.

Create tool path for finishing

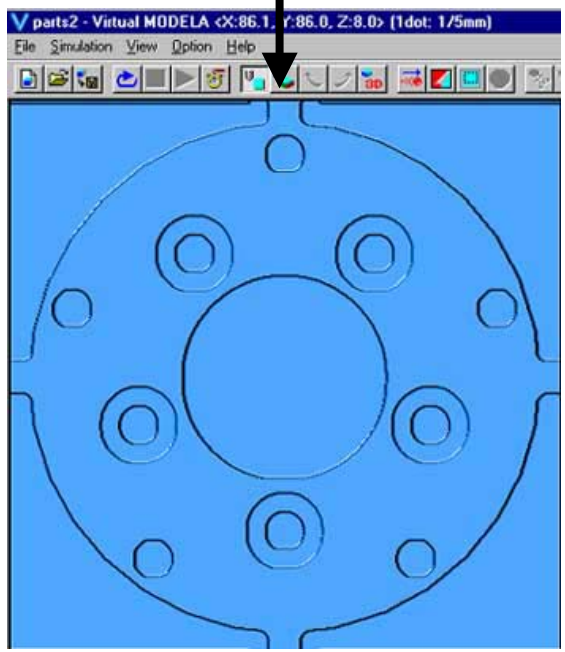




Tool path for finishing (X & Y)



Virtual MODELA 3D

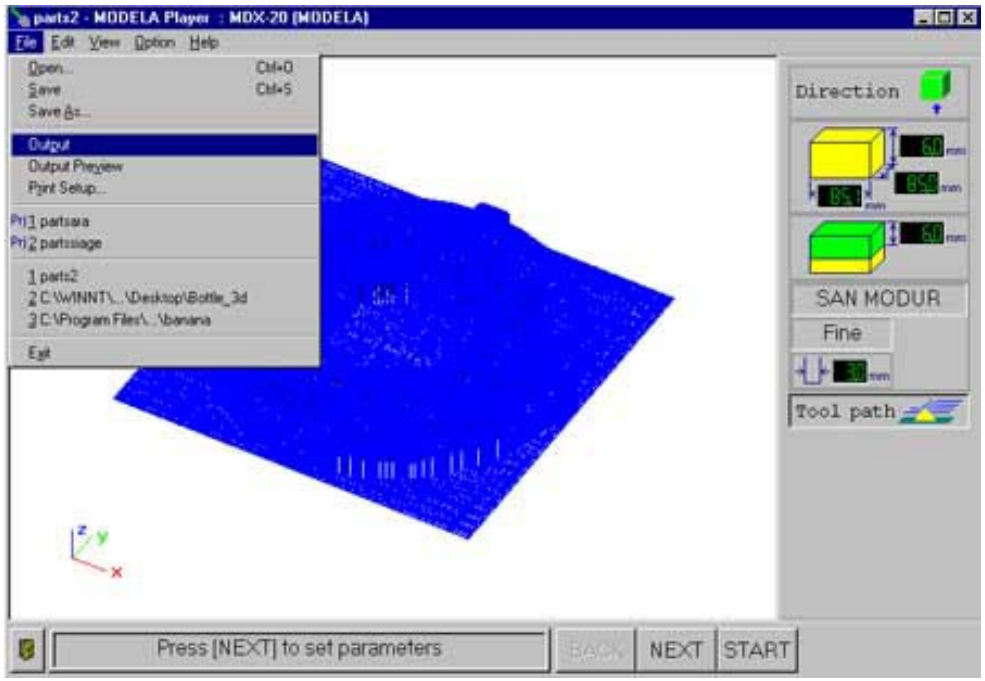


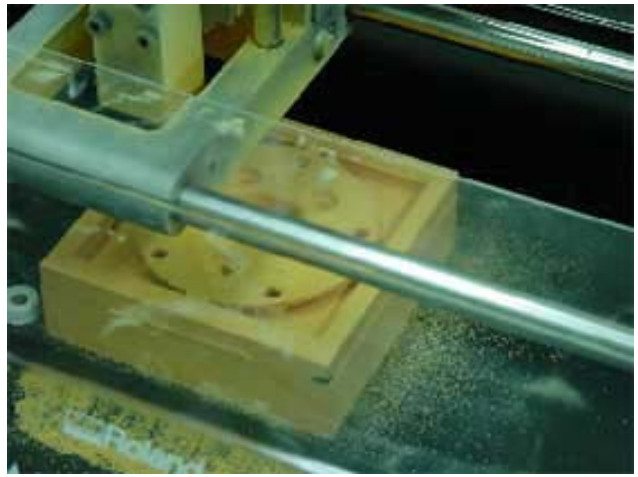
Virtual MODELA 2D simulation

Continue...

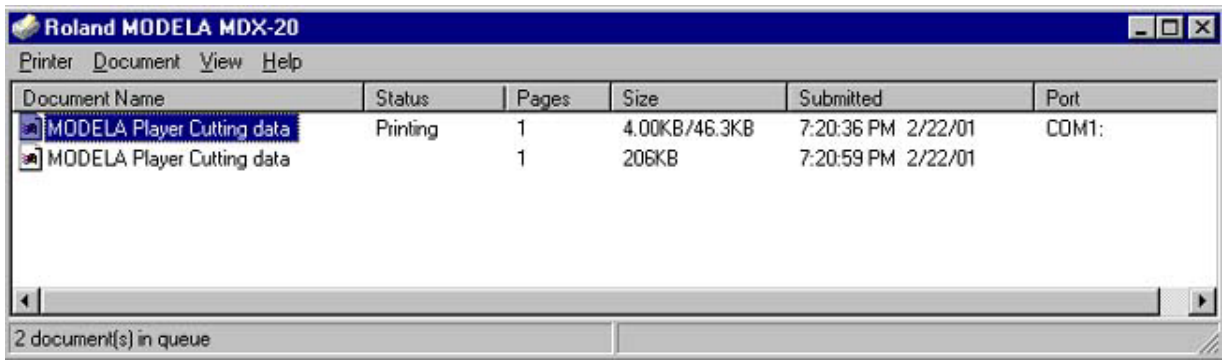
42 Output cutting data (Reverse side, Fine cutting)

From file menu, point to [Output]. The MDX will start cutting.





If you use one tool for rough cutting and finishing, you can output the data successively. In this case, keep the setting of MDX-20.

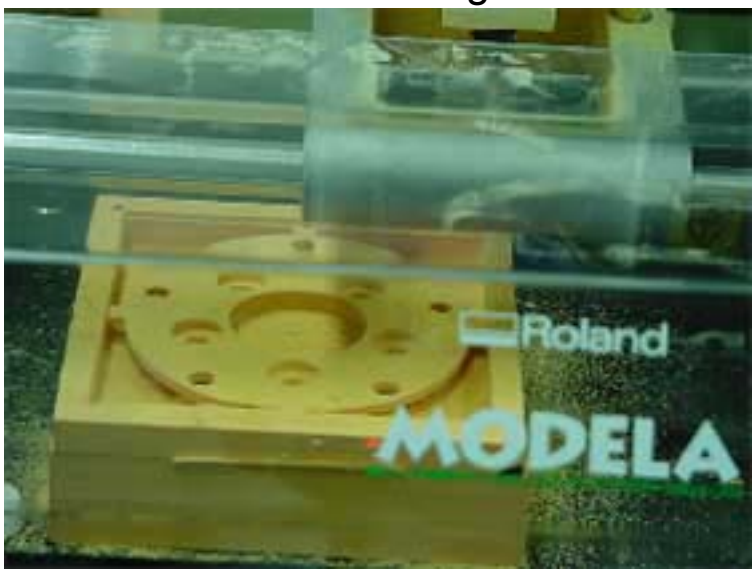


When you send rough cutting data and finishing data successively, the dialog will be shown as left. The upper data is rough cutting data and the under one is for finishing.

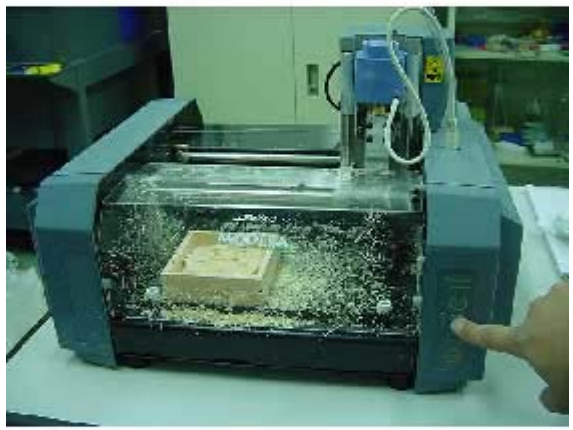
Training guide

43. Cleaning the fallen cuttings

Finish the cuttings.



Remove the cover



Press the VIEW key, and the table moves to front

Clean the cuttings by vacuum cleaner

Put the cover on and press the VIEW key

44. Remove the object material from base.

Prepare screw driver, awl etc.

Insert awl in lower left corner

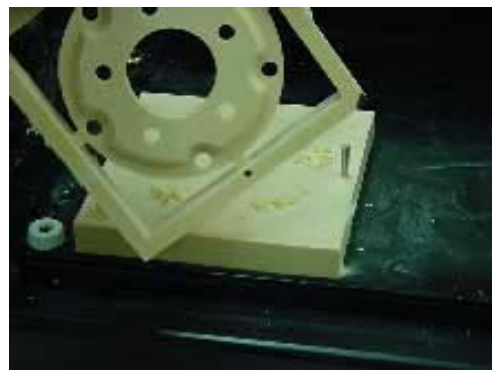
in lower right corner

in upper right corner

Pull out carefully

IMPORTANT!

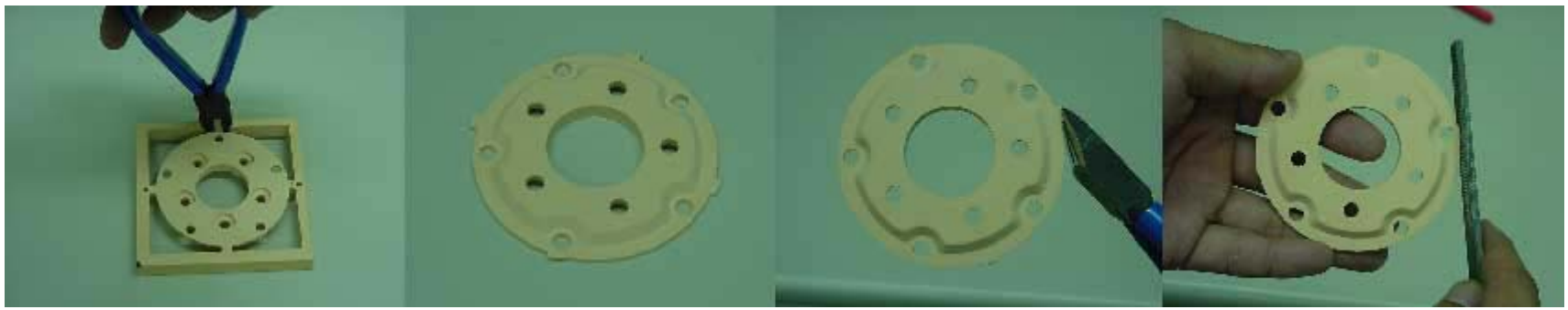
Insert awl or screw driver at each corner of object.
Then pull out object material **VERY carefully**.
Do **NOT** pull the object material quickly, or the object will be broken.



45. Remove the support lib.

Prepare Nippers, Scissors, Cutter Knife, Coping saw etc. to cut off the support lib, and also file, sandpaper to file.

Use nippers for this sample



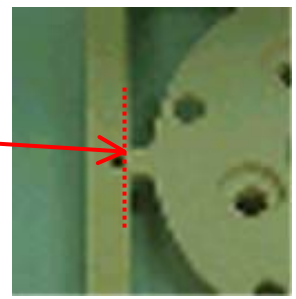
1)Cut the support lib. (See **IMPORTANT**)

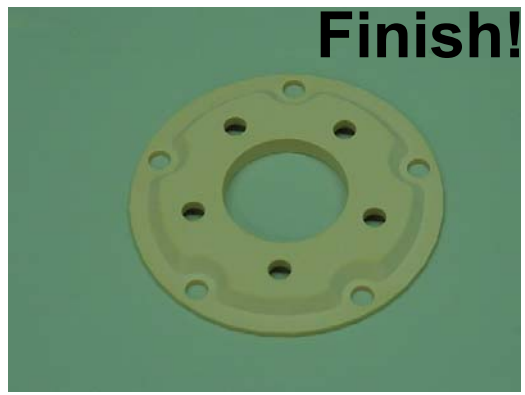
2)Remove object from frame

3)Cut off the remains of support lib

4)File the remains of support lib smooth.

IMPORTANT!
When you cut the support lib, cut the nearest part to frame first, then cut off remains. If you cut the nearest part of object first, the object might be cracked.





Appendix1

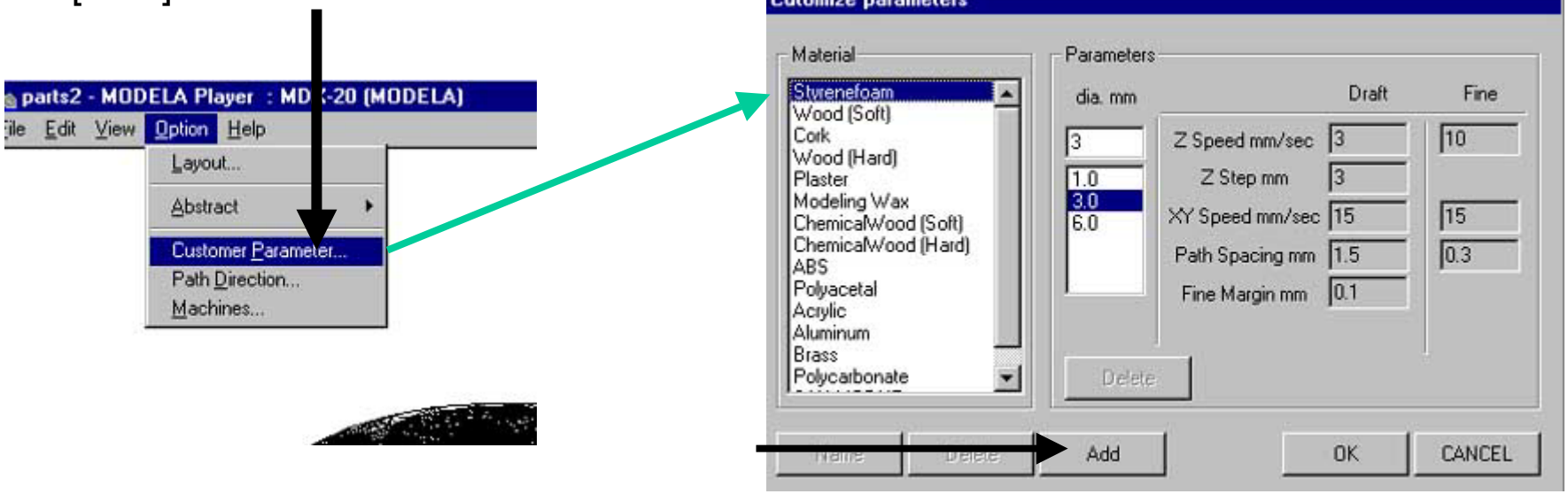
What is SAN MODUR?
Chemical wood resin made by SANYO Chemical Industries Ltd.
http://www.sanyo-chemical.co.jp/index_e.htm

Register new material

If your material is not listed, you can register it as new material or you can register your customize parameter as another material.

Register new material SAN MODUR

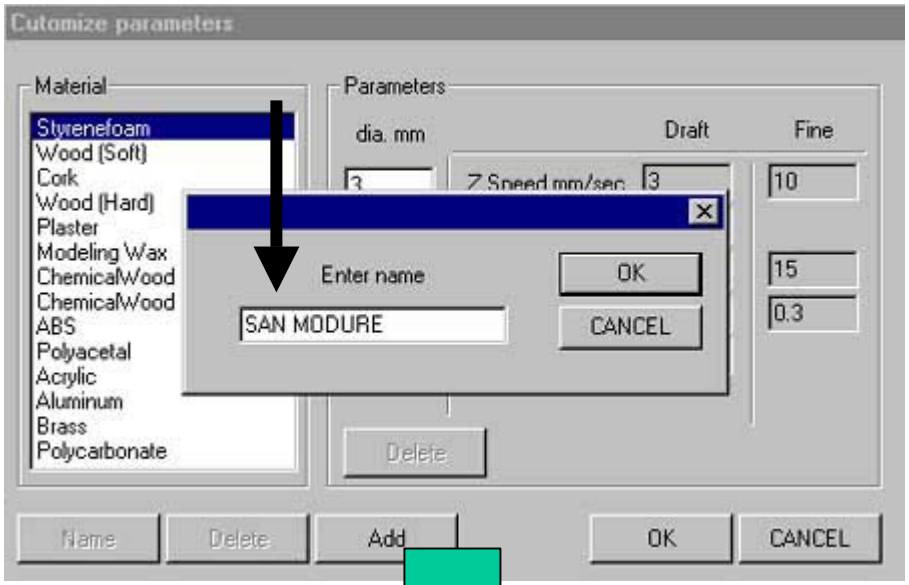
From [Option]menu, point to [Custom Parameter].
Click [ADD]

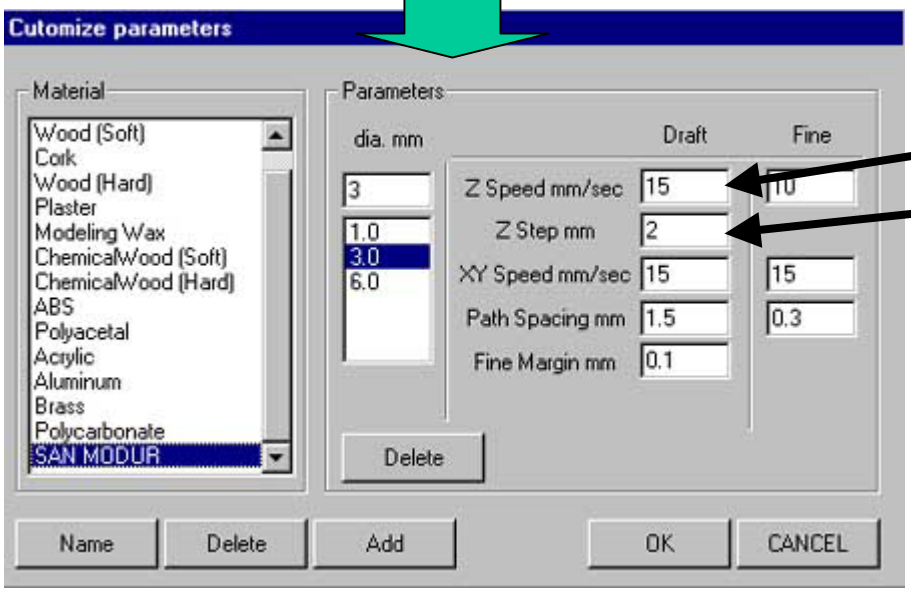


Continue...

Appendix1

Register new material SAN MODUR





1) Click Add

2) Enter material name [SAN MODUR]

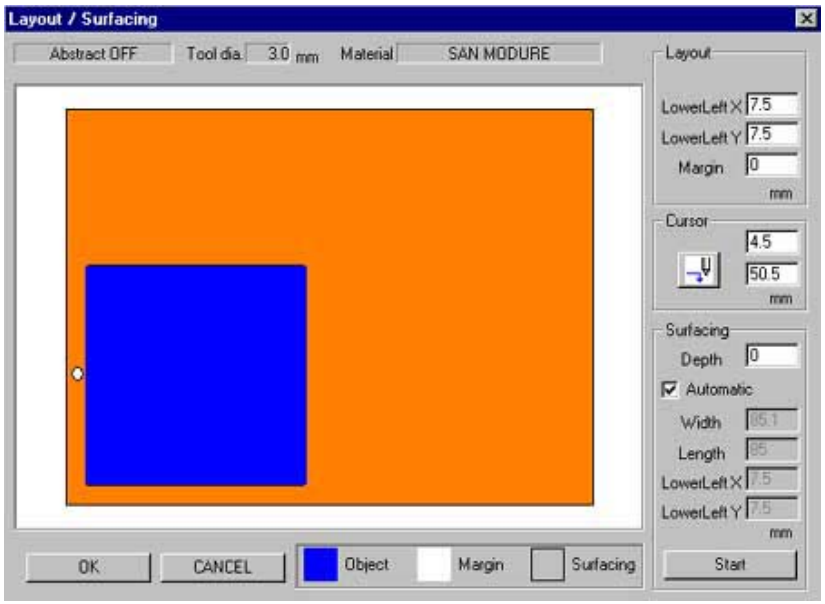
3) Click OK

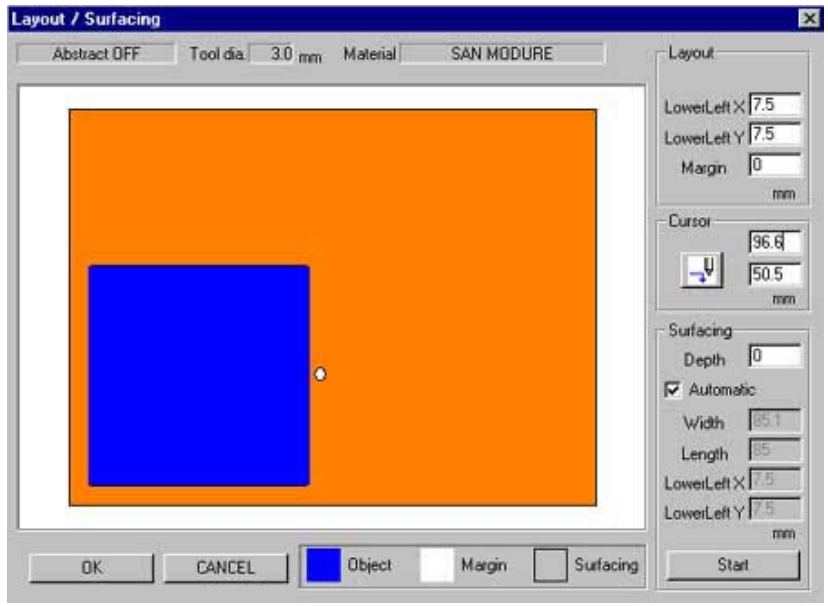
4)Change the parameter
*The parameter of this material
ZVS15mm/sec
Cutting in amount 2

Appendix2

Positioning the reverse side.

You can set position of reverse side by 2 pins only.





Make pin holes on Left & Right center of frame or Top & Bottom center. When you use only 2 pins, put double sided tape on the other frames and fix the material steadily.