

PN4000 Offer Total Automation



Complete Automation from DXF (or other formats) to machine NC-Code with little or no user interaction.

WiCAM have developed the possibility for any sheet metal fabricator to automate their programming processes. All achieved in minutes rather than hours or even days.

This is done automatically in a number of easy steps which any person can carry out (even those who have not been trained in the use of PN4000).

- 1. Automatically import and process for machining the DXF, Geo files etc. This can be achieved working with customer MRP or Excel file as shown below.**
- 2. Automatically import and process the information relating to each DXF file, material type, thickness, PN can also check for newer DXF files compared to those already stored in PN, saving even more processing time. Automatically include Kan-Ban, filler parts.**
- 3. Automatically import and process the production requirements, quantity required, delivery dates, customer, order numbers etc.**
- 4. Automatically generate all nested plates for all parts and orders, nests are created according to user pre-defined priorities, sequences, automatic allocation for part removal and part picking this means no restriction on part rotation etc.**
- 5. All additional processing of nest carried out by programmer such as splitting of plate remains can automatically be processed. Nesting for both common line cutting and standard nesting on same plate.**
- 6. Automatic generation of machine NC-Code in a logical numbering sequence and making those programs available for multiple machines.**
- 7. Automatic generation of data sheets reports on all nests including cover report, individual plate reports and parts reports.**

WiCAM have now also developed the possibility to produce automatically the NC-Code for several machines at one time. This means the same nest can be made available for any laser machine allowing complete versatility. See last images below. **PN can also create nests for a complete assembly of parts with just the assembly name and quantity.**

Below you can see more information on the automatic processes performed by PN4000 to make a complete automated solution.

Step 1.

PN4000 will automatically import from any where on your network the required DXF files, See Figure 1.

List of DXF files that PN4000 will automatically import and process.

Name	Size
3001.DXF	6 KB
3002.DXF	3 KB
3003.DXF	3 KB
3004.DXF	2 KB
3005.DXF	2 KB
3006.DXF	5 KB
3007.DXF	1 KB
3008.DXF	1 KB
3009.DXF	5 KB
3010.DXF	5 KB
3011.DXF	2 KB
3012.DXF	2 KB
3013.DXF	3 KB
3014.dxf	3 KB
3015.DXF	3 KB

PN4000 Part Order Entry Form

Part Details		Material Data	
Part Number	51kw6112	Material Type	ST1203
Order Number	9800	Material Name	N-2500-1250
Priority	1	Thickness	2.5
Quantity	23	Machine	Trupunch TC5000R FMC
Maximum Quantity	25	File Format	DXF
Machining Method		Type of Machining	
Common Cut OK	NO	Type of Machining	Punch STD(Tag)

Add New Entry Close

Figure 1

Step 2

The list of DXF files is added to the Excel file with details such as material type. Thickness etc. See Figure 2.

Part Filename	Material	Quantity	Max-QTY	Thickness	Machine	Com Cut Allowed	File Format	Cor
20340642-1B^5.GEO	ST1203	15		3	8000	1	TOPS	
20340642-2B^5.GEO	ST1203	15		3	8000	1	TOPS	
40926021^1.GEO	ST1203	35		1.5	8000	1	DWG	
46253232^1.GEO	ST1203	18		2	8000	1	DWG	
55427791-1B^1.GEO	ST1203	2		1.5	8000	1	DXF	
55427791-2B^1.GEO	ST1203	2		1.5	8000	1	DXF	
55427791-3^1.GEO	ST1203	2		1.5	8000	1	DXF	
55427791-4^1.GEO	ST1203	2		2	8000	1	TOPS	
55427792-1B^1.GEO	ST1203	1		1.5	8000	1	IGES	
55427792-2B^1.GEO	ST1203	1		1.5	8000	1	DXF	
55427792-3B^1.GEO	ST1203	1		1.5	8000	1	DXF	

Figure 2.

List of DXF/Geo files are added to the excel file so that PN4000 will automatically import and process.

Details such as quantity, thickness, material type are also added here.

PN can also generate complete manufacturing nests from just entering the name of the model or assembly required with the quantity of that assembly. PN can then automatically generate all parts and quantities for those assemblies form that information regardless of material type thickness etc. Parts such as KanBan parts can be grouped to be run at intervals.

The screenshot shows the PN software interface. At the top, there are five buttons: 'Add Assembly', 'Copy Data', 'Production', 'Nesting', and 'Copy - Prod - Nest'. Below these is a table with columns: Order Number, Position, Quantity, Model Assembly, Due Date, and Customer. The table contains four rows of order data. To the right, a 'PN4000 New Order Entry' dialog box is open, showing input fields for Order Number (8765), Position (1), Quantity (4), Assembly (Bucket), and Customer (WICAM). There are 'Add New Entry' and 'Close' buttons at the bottom of the dialog.

Order Number	Position	Quantity	Model Assembly	Due Date	Customer
Order1	1	3	Fabtech		No.1
1116	1	1	Assy102		WICAM
9829	1	2	Bucket		Bucket
2628	1	2	Assy103		MPL

Figure 2a

Figure 2a shows the Order Number, Assembly Name, Quantity and Customer name. This is all the information required to run all parts. By pressing the single button “Copy-Prod-Nest” everything will be done completely automatically. All programs will be available at the machine.

The information for the assemblies can be stored in the same excel file or imported as a .csv file etc.

11	Group Number	Amount	Lines															
12	Model 101																	
13	Assy101	5																
14	>EPL	1	2	3	>ST1203M3X1.5	>1.0	>8000	>1	>DXF	5	6	7						
15	>FRBOT	1	2	(*2)3	>ST1203M3X1.5	>1.0	>8000	>1	>DXF	5	6	7						
16	>CP	1	2	3	>ST1203M3X1.5	>1.0	>8000	>1	>DXF	5	6	7						
17	>EPR	1	2	3	>ST1203M3X1.5	>1.0	>8000	>1	>DXF	5	6	7						
18	>FRTOP	1	2	(*2)3	>ST1203M3X1.5	>1.0	>8000	>1	>DXF	5	6	7						
19	Model Bucket																	
20	Bucket	18																
21	>A4	1	2	(*4)3	>ST1203M3X1.5	>4.0	>8000	>0	>DXF	5	6	7						
22	>B4	1	2	(*4)3	>ST1203M3X1.5	>4.0	>8000	>0	>DXF	5	6	7						
23	>D4	1	2	(*4)3	>ST1203M3X1.5	>4.0	>8000	>0	>DXF	5	6	7						
24	>E4	1	2	(*4)3	>ST1203M3X1.5	>4.0	>8000	>0	>DXF	5	6	7						
25	>F6	1	2	(*6)3	>ST1203M3X1.5	>4.0	>8000	>0	>DXF	5	6	7						
26	>G8	1	2	(*8)3	>ST1203M3X1.5	>4.0	>8000	>0	>DXF	5	6	7						
27	>H2	1	2	(*2)3	>ST1203M3X1.5	>4.0	>8000	>0	>DXF	5	6	7						
28	>I4	1	2	(*4)3	>ST1203M3X1.5	>4.0	>8000	>0	>DXF	5	6	7						
29	>J2	1	2	(*2)3	>ST1203M3X1.5	>4.0	>8000	>0	>DXF	5	6	7						
30	>K1	1	2	(*1)3	>ST1203M3X1.5	>4.0	>8000	>0	>DXF	5	6	7						
31	>L14	1	2	(*14)3	>ST1203M3X1.5	>4.0	>8000	>0	>DXF	5	6	7						
32	>M4	1	2	(*4)3	>ST1203M3X1.5	>4.0	>8000	>0	>DXF	5	6	7						
33	>N6	1	2	(*6)3	>ST1203M3X1.5	>4.0	>8000	>0	>DXF	5	6	7						
34	>O6	1	2	(*6)3	>ST1203M3X1.5	>4.0	>8000	>0	>DXF	5	6	7						
35	>P4	1	2	(*4)3	>ST1203M3X1.5	>4.0	>8000	>0	>DXF	5	6	7						
36	>Q10	1	2	(*10)3	>ST1203M3X1.5	>4.0	>8000	>0	>DXF	5	6	7						
37	>R100	1	2	(*100)3	>ST1203M3X1.5	>4.0	>8000	>0	>DXF	5	6	7						
38	>S2	1	2	(*2)3	>ST1203M3X1.5	>4.0	>8000	>0	>DXF	5	6	7						
39	Model 103																	
40	Assy103	11																
41	>EXAMPLE1	1	2	(*6)3	>ALUM-M2.5X1.25	>1.5	>3300	>0	>DXF	5	6	7						
42	>EXAMPLE10	1	2	3	>ALUM-M2.5X1.25	>1.5	>3300	>0	>DXF	5	6	7						
43	>EXAMPLE11	1	2	3	>ALUM-M2.5X1.25	>1.5	>3300	>0	>DXF	5	6	7						
44	>EXAMPLE12	1	2	3	>ALUM-M2.5X1.25	>1.5	>3300	>0	>DXF	5	6	7						

Figure 2b shows a list of parts per assemble including various quantities of each part material type, thickness, preferred machine, cad format type etc etc.

The requirements for processing the DXF parts are also included in the excel file.
See Figure 3

READ_GEOMETRY	YES	
INPUT_GEO_PATH	C:\u\pn\txcongeo\dxf\asertc3030	Directory path for DXF file.
INPUT_GEO_FILE		
INPUT_GEO_FORMAT	DXF	
PREPARE_GEOMETRY	YES	
DELETE_COLOR		
KEEP_COLOR		
SET_COLOR	3	
GEO_MENU_01	10,2337X	
GEO_MENU_02	10,2338X	
GEO_MENU_03		
GEO_MENU_04	10,1101	
CHECK_GEOMETRY	YES	
CONTOUR_EXIST	YES	
OPEN_CONTOUR	YES	
MULTIPLE_PART	YES	
PART_IN_PART	YES	
CREATE_NEW_PART	YES	
MACHINE_NO	2106	
MATERIAL_NAME		
THICKNESS		
NESTING_ROTATION	4	
PREPARE_PART	YES	
PART_MENU_01		
PART_PROCEDURE_01	FPR201	This is a procedure that calls further commands in PN4000 that allow the user to process the parts the preferred way of the user.
WRITE_NC_MODEL	YES	
OUTPUT_NC_ARCHIV	4	
OUTPUT_NC_FILE	*	
CREATE_NEW_ORDER	YES	
ORDER_NC_FILE	*	
ORDER_NUMBER	123456	Parameters such as Order No. Customer, Machine etc can all be individualised to the part as in Figure 2.
ORDER_POSITION	1	
ORDER_REMARK		
ORDER_DATE	*Date+1	
ORDER_AMOUNT		
ORDER_MAX_AMOUNT		

Figure 3.

Step 3.

PN4000 is automatically opened and starts to process all the DXF files 1 by 1 until all have been processed. See Figure 4.

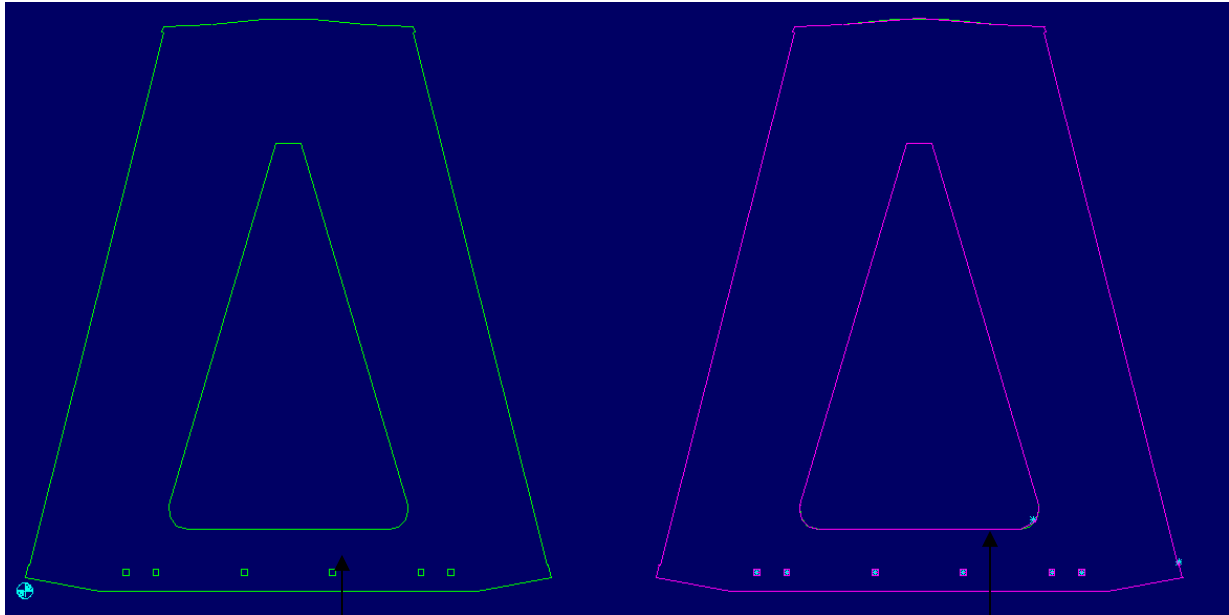


Figure 4.

Imported DXF file before processing.

DXF file after processing and then automatically saved.

PN4000 will automatically machine the parts according to user defined parameters relating to material type, thickness and any other user preferences. PN4000 will handle Punch machines the same way.

The total process time for all these DXF files is **less than 1 minute**. When the automatic processing of all DXF files is complete, PN4000 will be then automatically continue to create nest and prepare them for the machine and the following message displayed.

Step 4.

The next step is to automatically create the nests. With a simple batch file PN4000 will automatically open and generate the nests. All the information regarding material types, thickness, priority, customer scheduling etc will have been already extracted from the excel file. This means PN4000 has all the information necessary to generate the required parts on nests. See Figure 5.

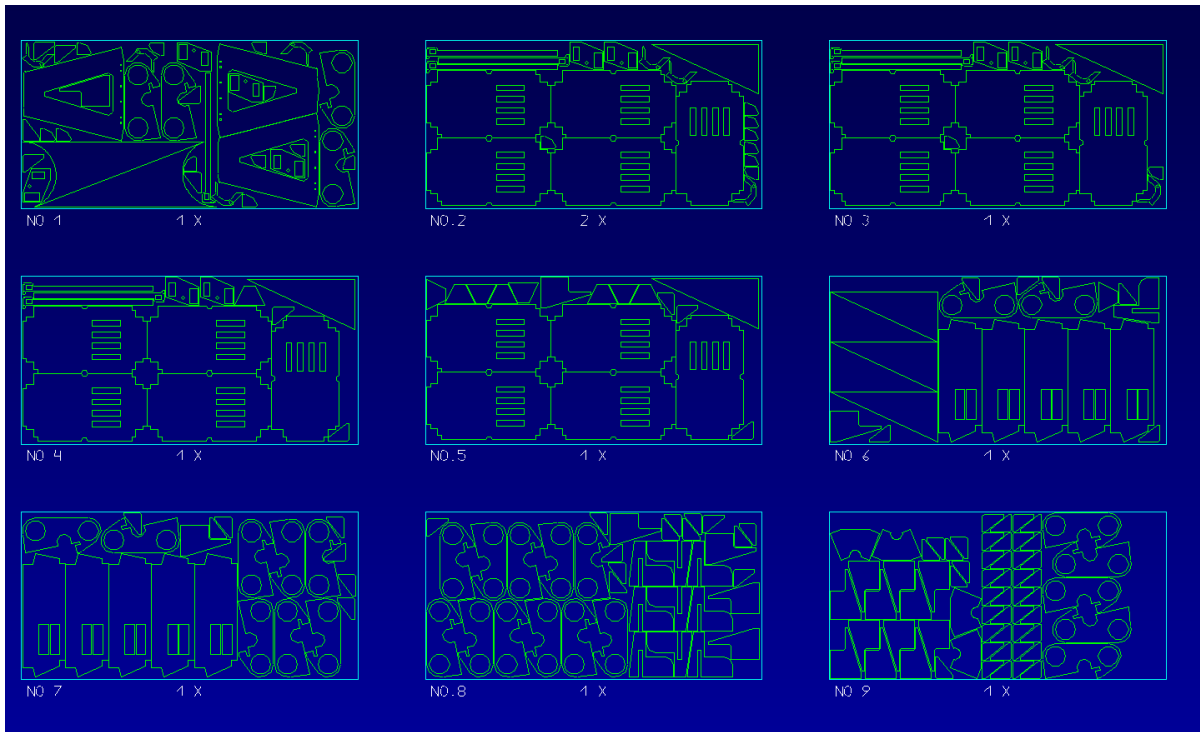


Figure 5.

Figure 5 shows the automatically generated nests from the DXF files and quantities. These nests were generated in about **1 minute**. When PN4000 has finished generating the nests it will automatically close down again.

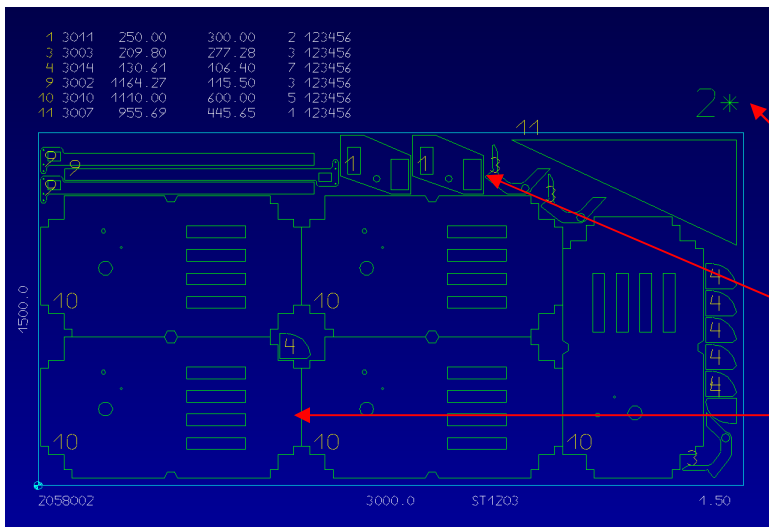


Figure 6a. Shows plate No.2. Note that plate No.2 needs to be ran 2 times.

2* indicates this program must be ran 2 times.

PN can nest both standard and common line cutting on the same plate automatically.

Figure 6.

PN4000 Automatically handles, generates NC M/C Code and Data Sheets.

Once again this can be executed with a click of a simple batch file. This batch file will start PN and call a user defined procedure that will process the each plate one at a time the same way the programmer would normally do manually. Figure 7 below the produced plates.

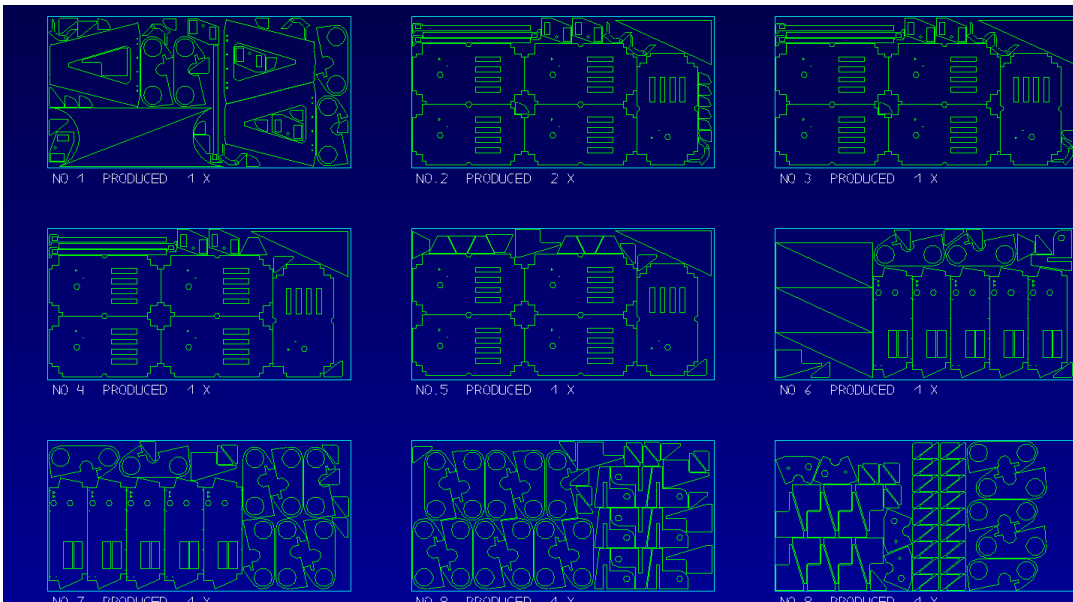


Figure 7.

We can look at an individual plate that has been processed. Plate No.2 for example shows red line where common line cutting is automatically created. And white line shows the continuous outside contour.

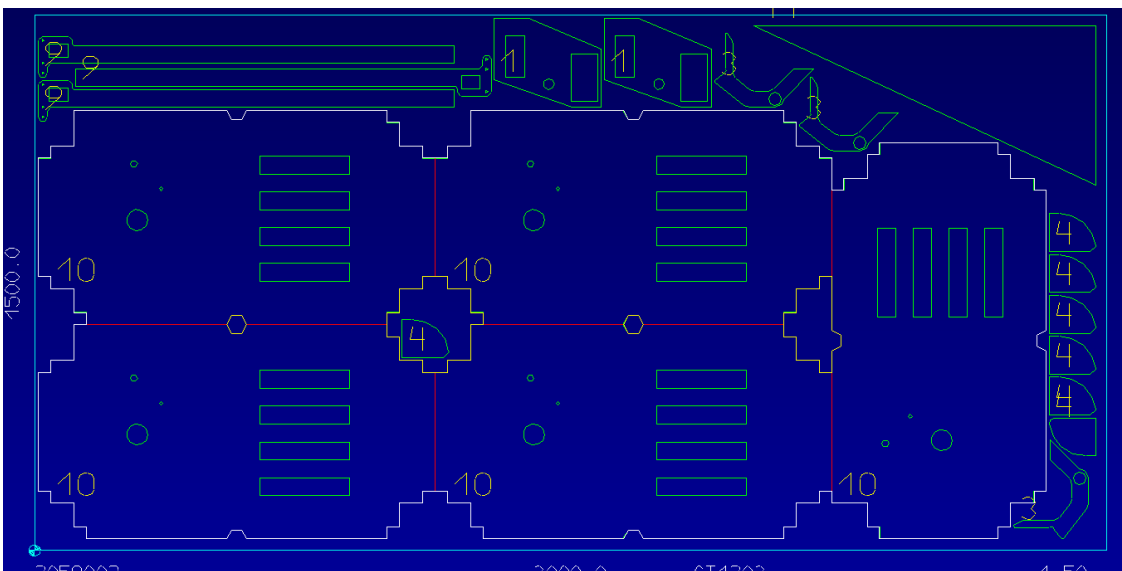
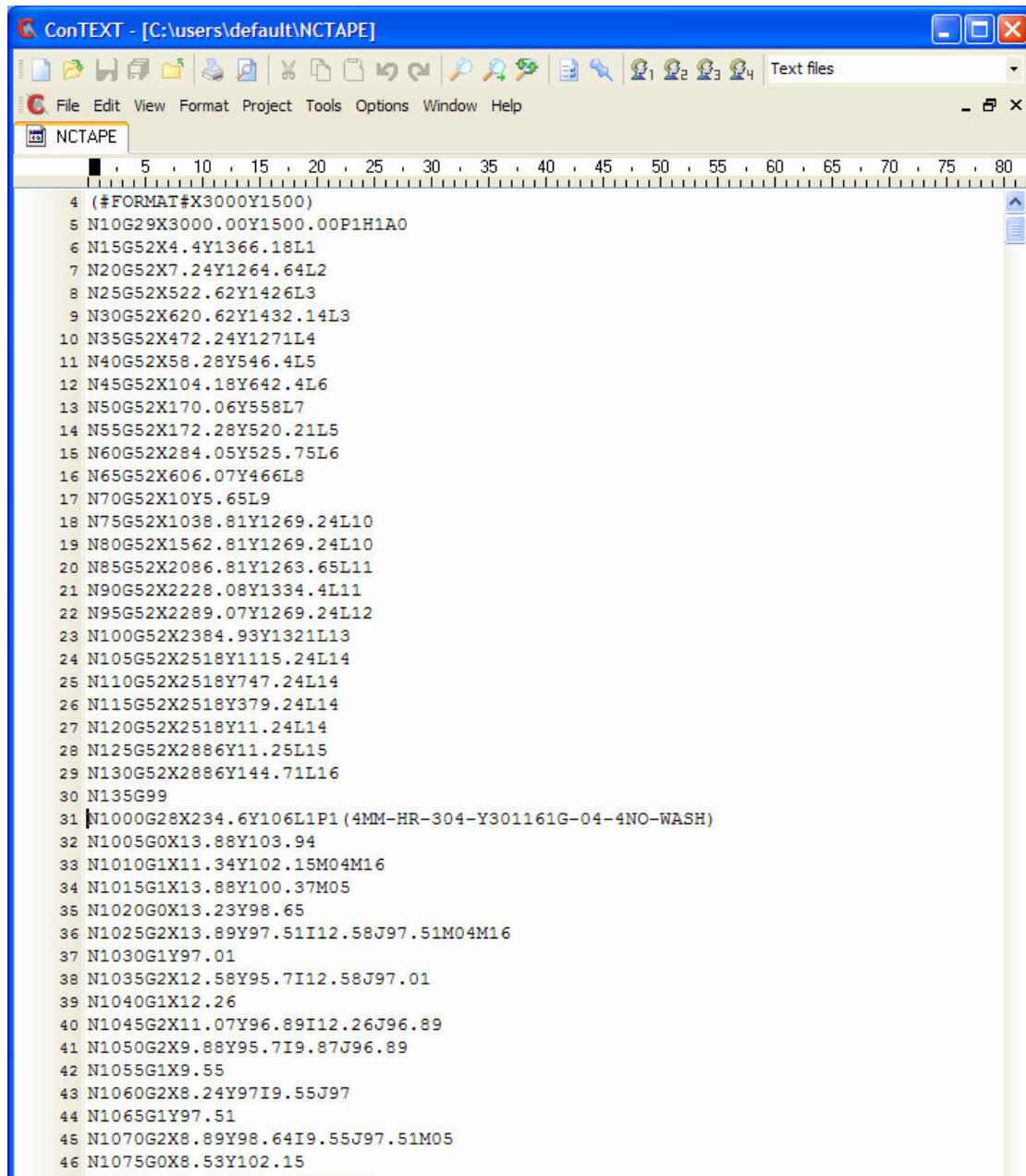


Figure 8

Figure 9 shows the NC Code automatically generated for the above program. This NC Code is for a Bystronic Laser. This code is automatically sent to the location from which the Bystronic Laser can read directly.



```
4 (#FORMAT#X3000Y1500)
5 N10G29X3000.00Y1500.00P1H1A0
6 N15G52X4.4Y1366.18L1
7 N20G52X7.24Y1264.64L2
8 N25G52X522.62Y1426L3
9 N30G52X620.62Y1432.14L3
10 N35G52X472.24Y1271L4
11 N40G52X58.28Y546.4L5
12 N45G52X104.18Y642.4L6
13 N50G52X170.06Y558L7
14 N55G52X172.28Y520.21L5
15 N60G52X284.05Y525.75L6
16 N65G52X606.07Y466L8
17 N70G52X10Y5.65L9
18 N75G52X1038.81Y1269.24L10
19 N80G52X1562.81Y1269.24L10
20 N85G52X2086.81Y1263.65L11
21 N90G52X2228.08Y1334.4L11
22 N95G52X2289.07Y1269.24L12
23 N100G52X2384.93Y1321L13
24 N105G52X2518Y1115.24L14
25 N110G52X2518Y747.24L14
26 N115G52X2518Y379.24L14
27 N120G52X2518Y11.24L14
28 N125G52X2886Y11.25L15
29 N130G52X2886Y144.71L16
30 N135G99
31 N1000G28X234.6Y106L1P1 (4MM-HR-304-Y301161G-04-4NO-WASH)
32 N1005G0X13.88Y103.94
33 N1010G1X11.34Y102.15M04M16
34 N1015G1X13.88Y100.37M05
35 N1020G0X13.23Y98.65
36 N1025G2X13.89Y97.51I12.58J97.51M04M16
37 N1030G1Y97.01
38 N1035G2X12.58Y95.7I12.58J97.01
39 N1040G1X12.26
40 N1045G2X11.07Y96.89I12.26J96.89
41 N1050G2X9.88Y95.7I9.87J96.89
42 N1055G1X9.55
43 N1060G2X8.24Y97I9.55J97
44 N1065G1Y97.51
45 N1070G2X8.89Y98.64I9.55J97.51M05
46 N1075G0X8.53Y102.15
```

Figure 9.

All parts and nested can be monitored to see which plates and parts are complete with the very easy to use Job Controller.

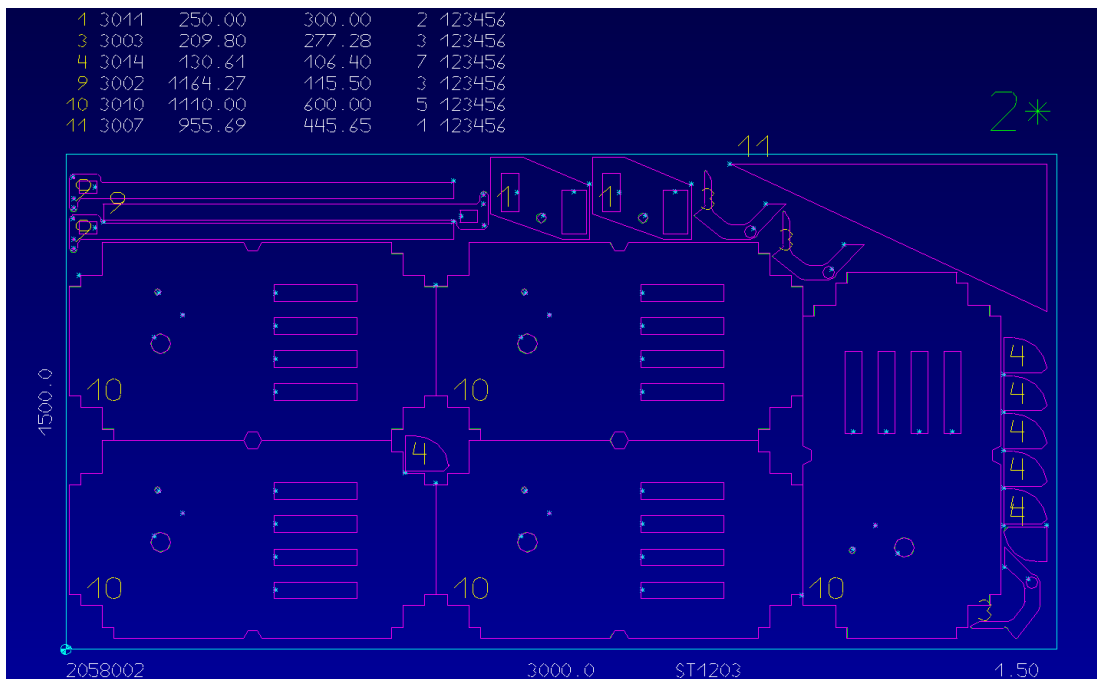
The Job-Controller shows completed nests, partially completed nests etc. As nests are complete they are automatically removed from PN4000 Production Planning System (PPS). Parts can also be rejected in the Job Controller, they are then prioritised in PN4000 so that they are manufactured first.

The screenshot displays the Job Controller interface with the following components:

- Job Selection:** A dropdown menu for 'Job' and input fields for 'Machine No', 'Material No', and 'Material'.
- Production Nests:** A grid of 12 nests, each containing a technical drawing of a plate with various cutouts and dimensions.
- Main Data Table:** A table with columns: Job, Job-Status, Machine, Material, Thic..., Plat..., Parts am..., Produce..., Product... It lists various jobs and their production progress.
- Plate Detail Table:** A table with columns: Plate, Program No., PLATE_NAME..., Plates am..., Produced, Storniert, Material..., Thickness, Di..., Total parts. It shows details for plate N-2500-1250.
- Part Detail Table:** A table with columns: Part, Archive No, Order No, Position No, Remark, Remark 1, Remark 2, Remark 3, Amount, Produced, Storno, Ar. It lists parts like 3020050...
- Control Buttons:** 'Delete', 'Delready', 'Refresh', 'Produced', 'Store', 'Reject', 'Cancel', and 'OK' buttons are located at the bottom of the interface.

Anybody with access to a networked PC can view the jodata to see how production is progressing.

PN can automatically create the same nest on different machines.



Trumpf Laser



Amada Laser



Bystronic Laser

PN can automatically generate the same nest across many machines and create the correct NC code for all machines. This gives total flexibility to move parts and nests across the machines without the need to re-program or re-nest saving hours of additional programming.