PROCARV

Operators Manual

Ver. 9-1

Disclaimer

All CNC machines (routing, engraving, and milling) are potentially dangerous and because SCANCAD SERVICES LIMITED has no control over how the software described in this manual might be used, SCANCAD SERVICES LIMITED or any associated Resellers cannot accept responsibility for any loss or damage to the work piece, machine or any individual, howsoever caused by misusing the software.

Extreme care should always be taken and the output from the software thoroughly checked before sending it to a CNC machine.

The information in this manual may be subject to change without any prior notice. The software described in this manual is supplied under the terms and conditions of the software license agreement and may only be used in accordance with the terms of this agreement.

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CLASS 2 & 3
LASER SCANNER

Warning
DO NOT LOOK AT
LASER LIGHT

About the PNC 1010

The PNC 1010 has been built with considerable thought in the choice of materials used in its design and construction.

The Drive system is powered by Panasonic Servo motors that are the best available, providing small format and power.

Machine alignment is a feature that checks the square of the machine, if out of square it corrects until square (automatically)

The Laser system is at the heart of producing first class quality products and should be used on all jobs to avoid disappointment &/or extra work.

GNC Operating system Ver. 3.xxxxx
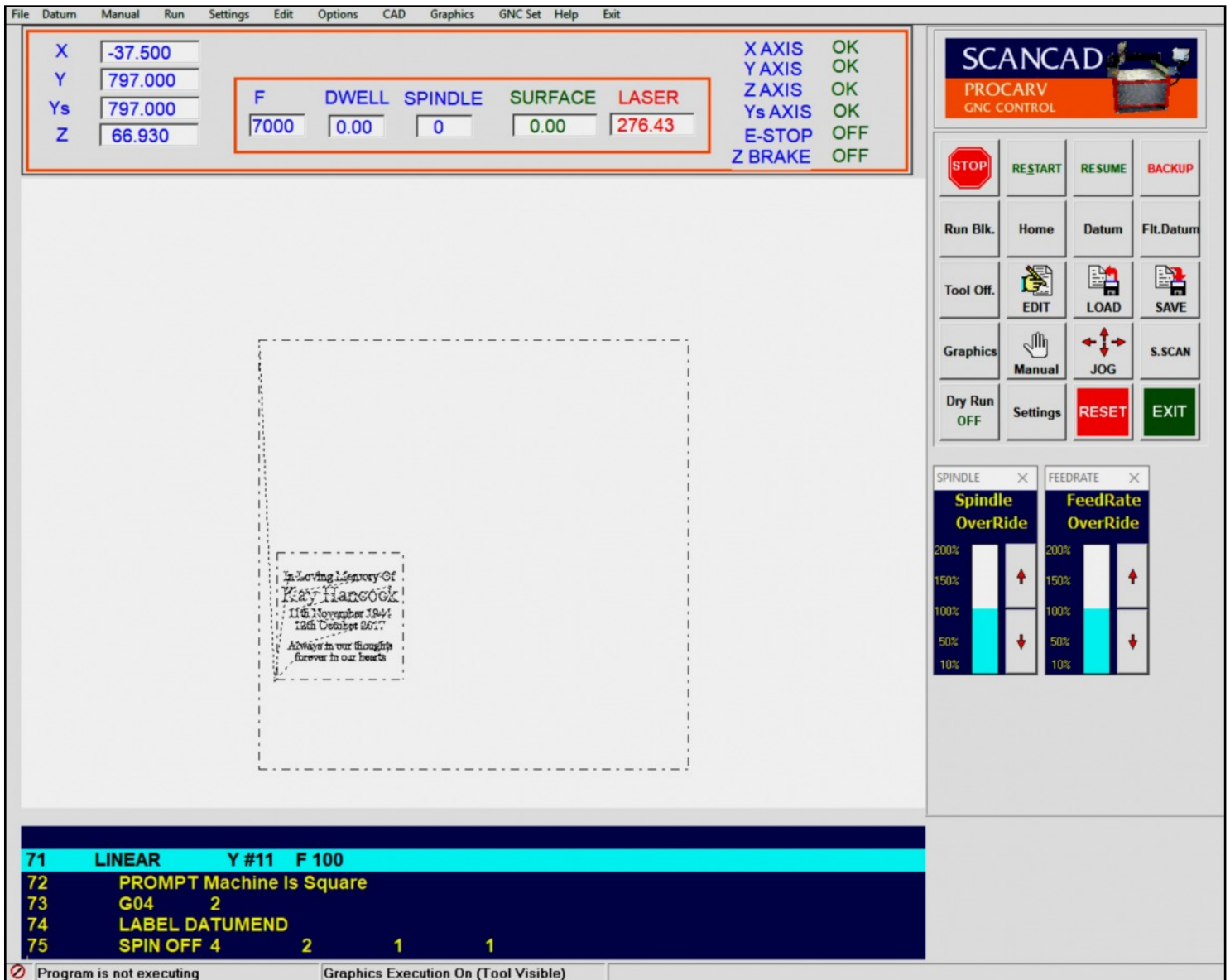
Display Top Left hand: X, Y, Ys, Z.   System Readouts

F, DWELL, S   SPINDLE   System Readouts

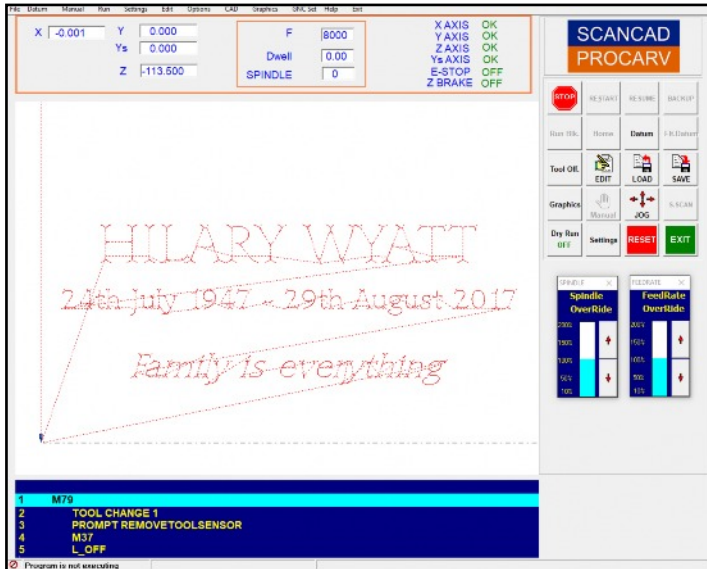SURFACE & LASER   OPERATOR / JOB SETUP

Readouts on the left are   System Status OK OFF = Normal | ERR = System Error

GNC Controller Logic

Start : Turn on at the Machine Isolator on the left hand side of machine.

When Windows has loaded click once on the GNC button on the Windows Start screen.

Select Datum - this sets the machine up and checks machine alignment.

Select LOAD and Load job

Set Floating Datum - move the cutter to the bottom left of the job - Press set Floating Datum on the remote.
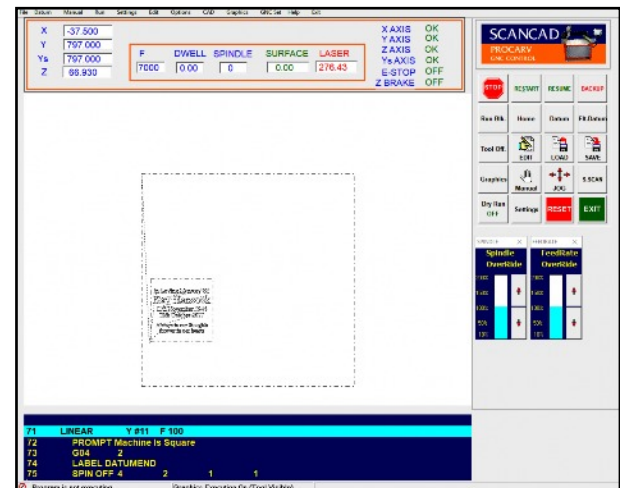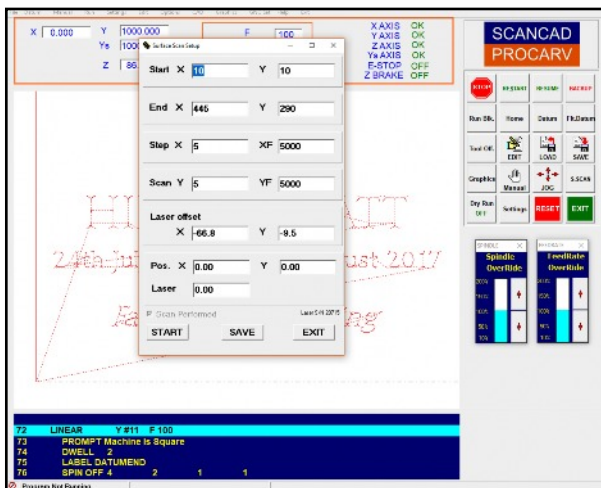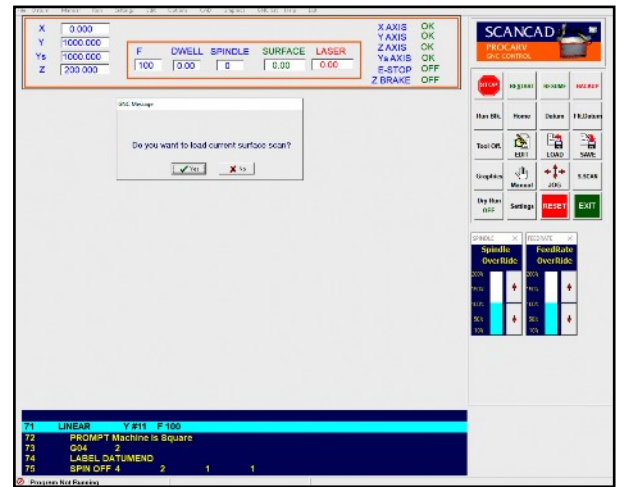

Load the correct cutter for the job.

Scan Surface - see note 012

Set Cutter to surface of job using the Setting plate.

Press START - there are prompts that help you check before machining.
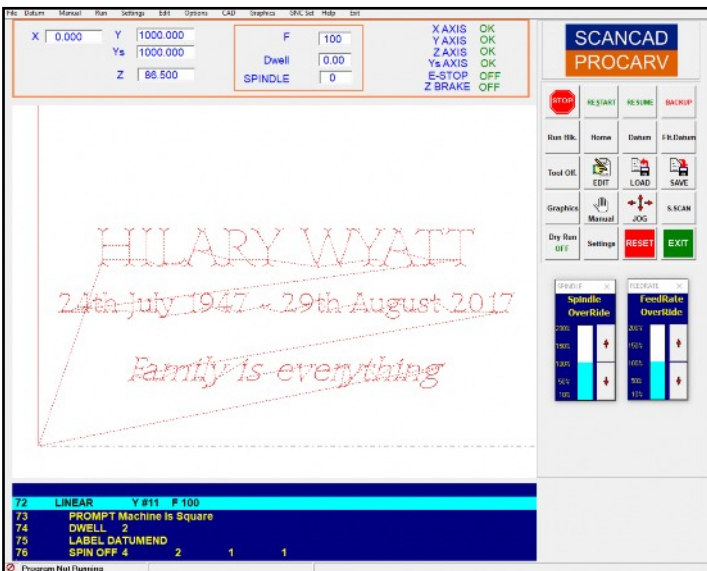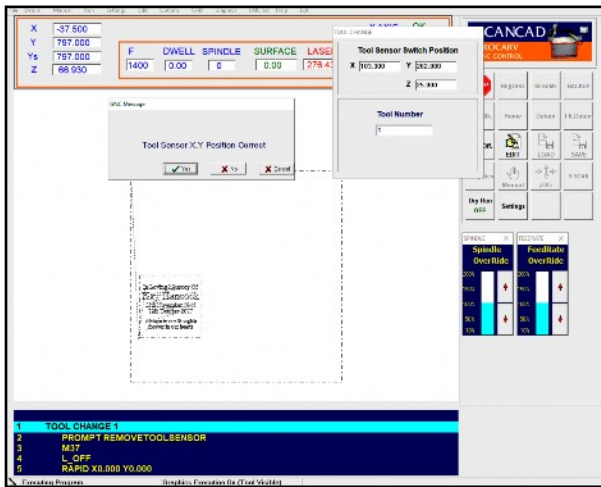
Auto Laser Setup

If you have drawn a scan area in your design Prompts in the scan procedure are:

LOAD Job
Select SCAN
Prompt 1 - Do want to use Previous Scan ?
If NO
Prompt 2 asks - Do you want to use setup from file ?
YES
The scan start and end are set Press SAVE the SCAN

012 | Surface Scanning
NEW Auto laser setup (10/2019)

1. Set up the machine and material.
   Set the Job Datum
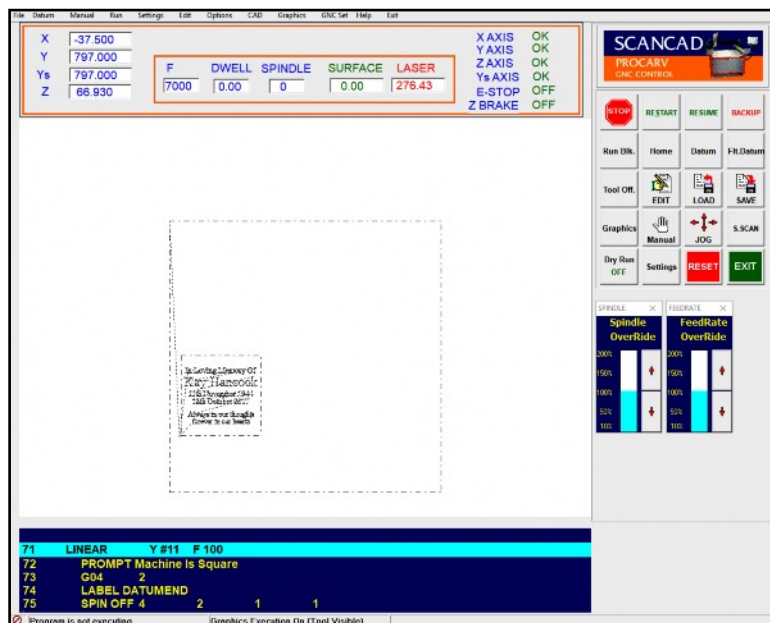   **Load Job from Aspire** - (pp SCAN ON ALS)

2. **Press Scan**

3. **The START & FINISH will have already been loaded**
   Enter the pitch you require and speed of scan 3000 (this depends the finer the pitch the slower speed are required. Ensure the Laser is in range 80mm - 250mm

4. **Press Save and then Press Scan**
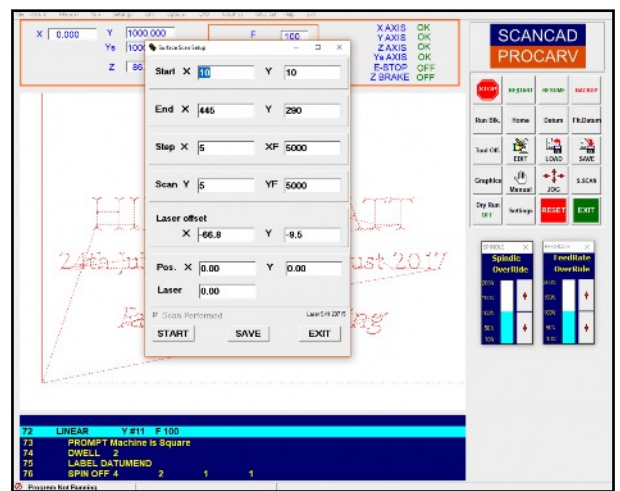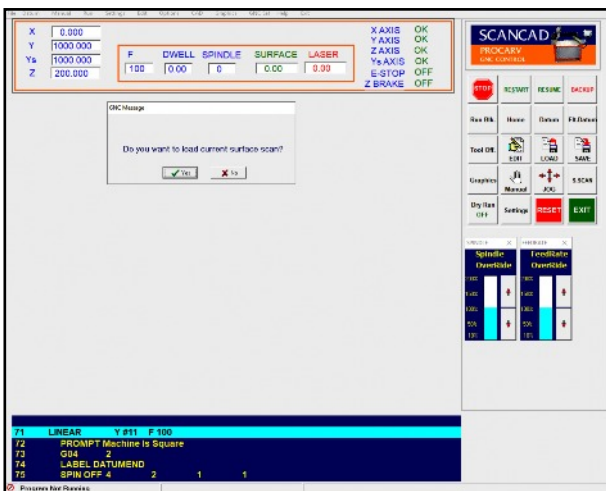
AUTO LASER SETUP IN ASPIRE

Laser Profile must be first in the list

Draw a box around the engraving area

Select the Profile tool from the menu on the right.

Select the Box and select the LASER tool from the tool database.

Click Calculate.

Select "**SCAN ON ALS ATC GNC**"

AND SAVE TO THE MACHINE

When you load the job into GNC the Scan area will be automatically setup the Scan area.

Set the scan pitch

Press SAVE then START

IMPORTANT NOTE:

When setting the tool length with the Surface Sensor Plate, It must be on the high point of the stone In the scan area.
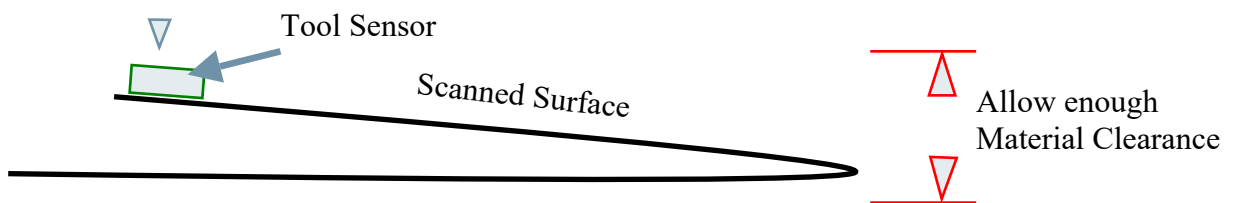
<u>Class 3B sensors</u>

The sensors make use of a c.w. 660 nm (or 405 nm or 450 nm) wavelength semiconductor laser.

Maximum output power is 50 mW.

The sensors belong to the 3B laser safety class.

The following warning label is placed on the laser body:

The following safety measures should be taken while operating the sensor:
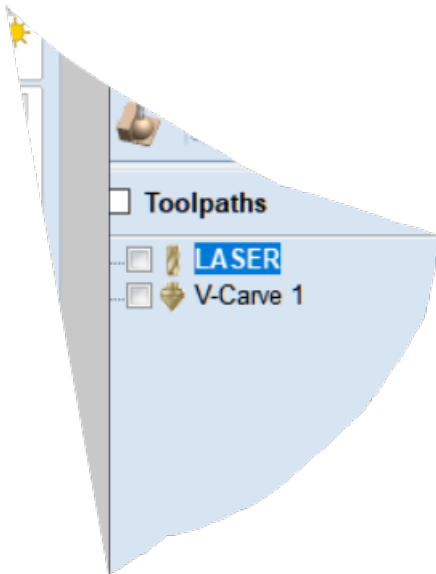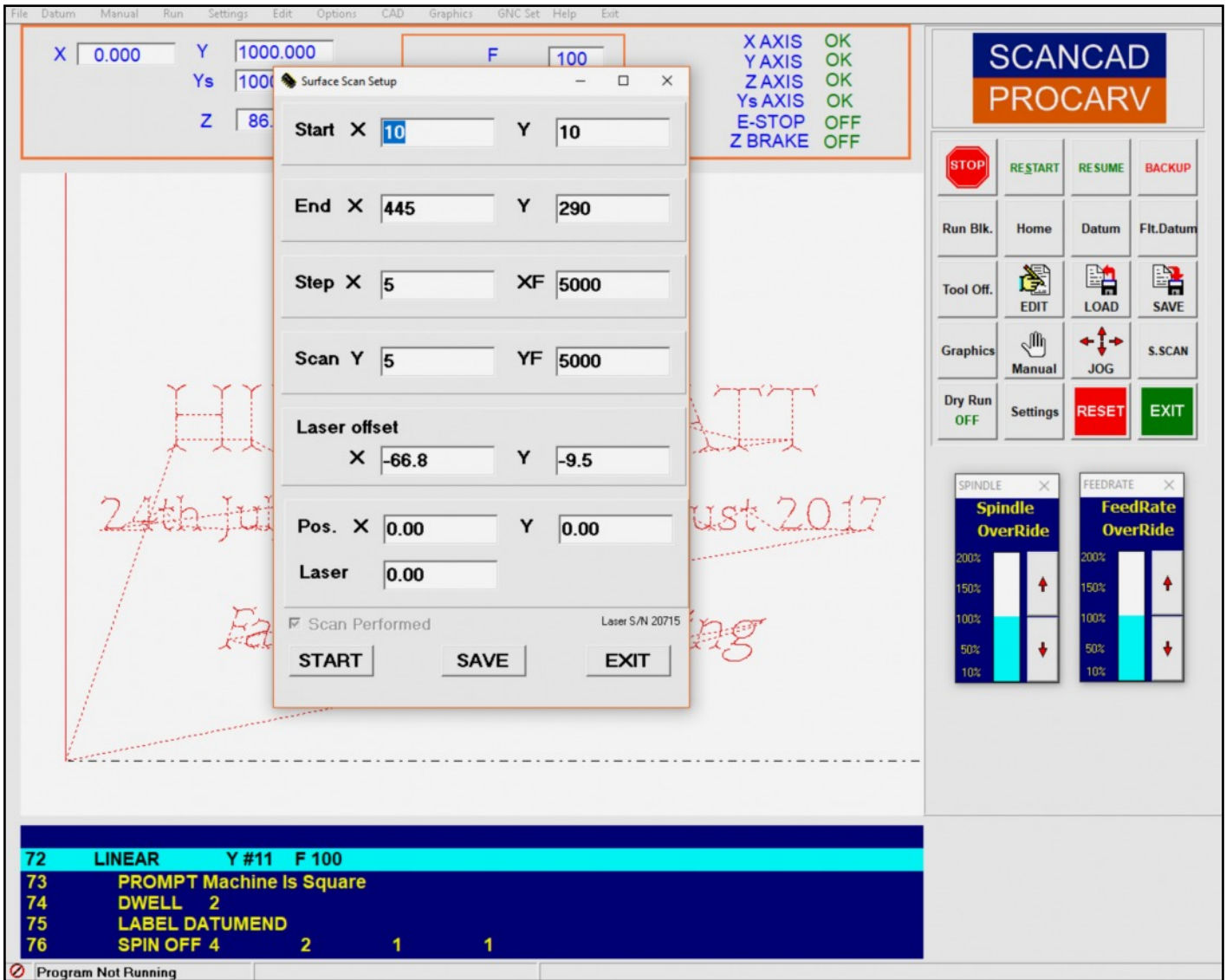
· Do not target laser beam to humans.

· Avoid staring into the laser beam through optical instruments.

· Mount the sensor so that the laser beam is positioned above or below the eyes level.

· Mount the sensor so that the laser beam does not fall onto a mirror surface.

· Use protective goggles while operating the sensor.

· Avoid staring at the laser beam going out of the sensor and the beam reflected from a mirror surface.

· Do not disassemble the sensor.

· Use the protective screen mounted on the sensor for the blocking of the outgoing beam.

· Use the laser deactivation function in emergency.

 <u>Note.</u> These sensors are supplied only as an OEM product.

 The consumer is solely responsible for compliance with the laser safety requirements.

Scanning to use Multi Cut or step V carving.

Real Time Surface scanning does not allow you to machine Multi Cuts.

In order to multi cut you import the scan file (*.XYZ) into Aspire via the Regular Grind Import gadget.

1.   Import *.xyz

2. Position it

3. Select it and apply machine path

4. Select the Text and Calculate ticking the Project tool path onto Surface

5. Then select the Text Tool Path and send to the machine using SCAN OFF Postprocessor.

This sounds a bit long winded but takes no time and produces best results.

3D Copy Scanning

The setup is the same as before but considerations to the amount of detail needed must be practices.

In this example we copied the Hand cut Rose design for reproduction on a new memorial.

SET UP THE LASER SCANNER

Place a D flat bit in spindle.

Jog machine to known position ie the bottom left corner of set gage plate.

In Float Datum select CLEAR

Click OK

Select Float Datum again

Click on HOME

This now is the Floating Datum Point

Select SCAN

Popup ask to Load previous scan Click NO

The Laser Menu Popup appears

In X & Y Start Position Enter 0

Click on SAVE

In X & Y Offset enter near numbers

Then click START

Adjust Offset until Laser beam matches gage plate corner.

You Laser is now correctly setup for accurate scanning

Tool Setup in GNC

Procedure

First Set the *Job Datum* (Floating Datum)

The operator would then be asked if the tool setting X & Y position is correct on the Tool Setting panel being displayed. If the operator selects YES then the X and Y axes would move at rapid speed to the X and Y axis tool sensor positions defined.

If the operator selects NO then the operator will be asked to jog the axis over to the tool setting selecting OK when at the correct position, this position will be saved for the next tool change operation.

If Cancel is selected the last tool setting will be used

The Z axis then moves towards the tool sensor slowly
Once the sensor has been detected the Z axis will stop then reverse off the switch at a slower speed then back onto the switch at a slower speed.

When the Z axis tool sensor position is detected a tool offset will be calculated for the selected tool and saved in the tool length offset setting.

Followed by a prompt to remove the sensor - Yes to continue.
The position is shown on screen SURFACE
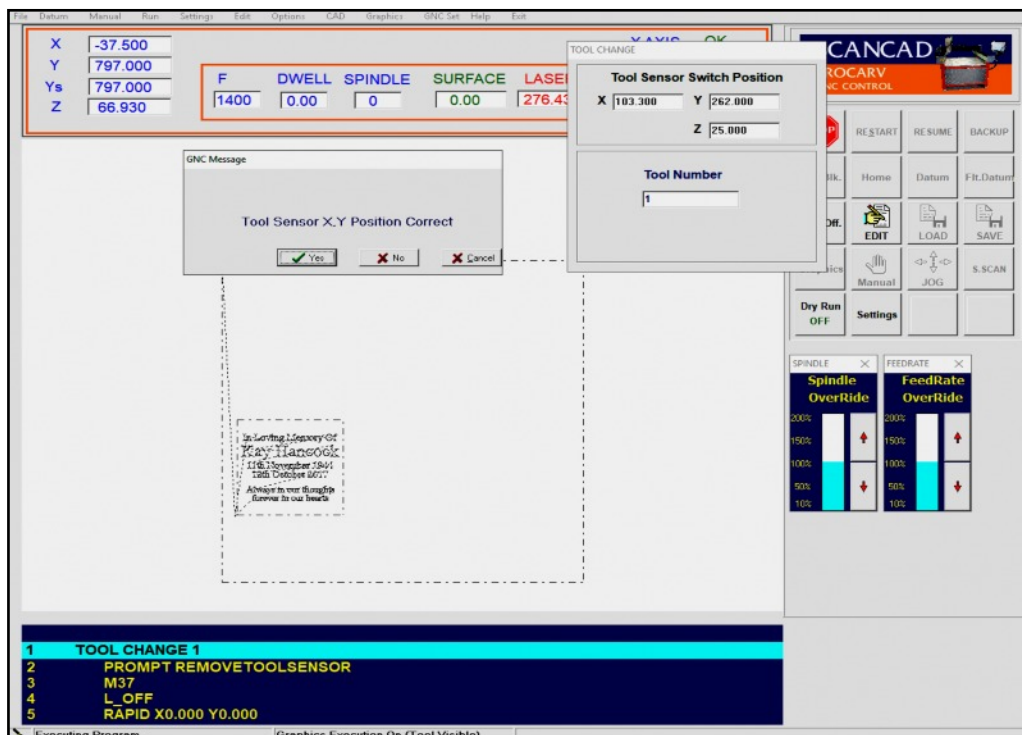
Machine Datum & Auto Alignment

When the Datum is pressed, the machine will search for the sensors and checks the machine alignment of the X axis (Bridge) and the Y axis and Y slave axis.

If the bridge is out of alignment you will be prompted to Press Datum until the alignment is achieved. In increments of 0.5 mm. The Datum Process may have to be repeated until the confirmation pop up appears.

How this Works

There is a position sensor on each of the Y axis. Each Servo motor unlocks and checks it own sensor the locks and checks any twist. This is repeated until square.

The software tolerance is 0.5mm over the 1 meter length of the X axis.
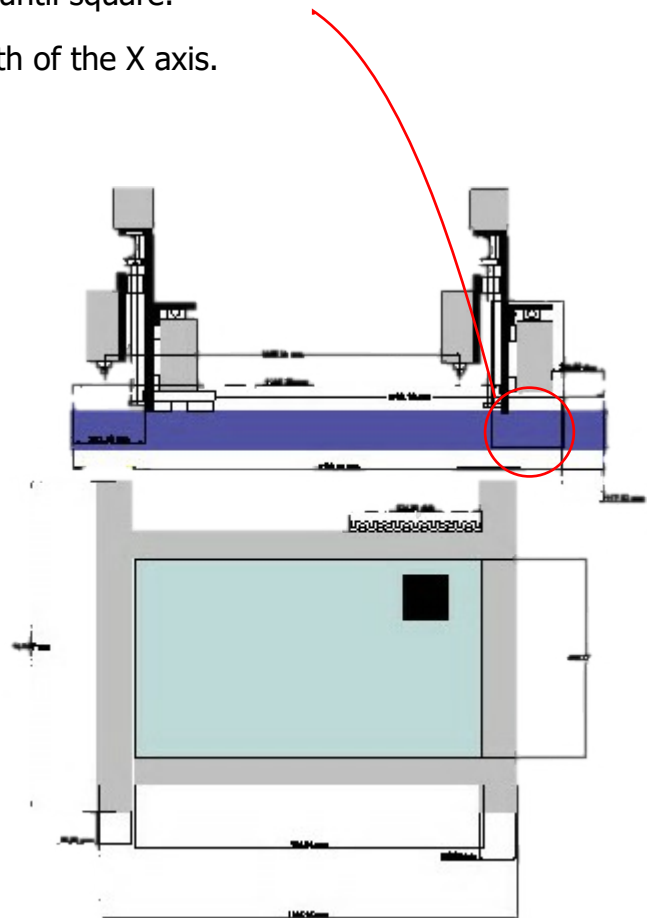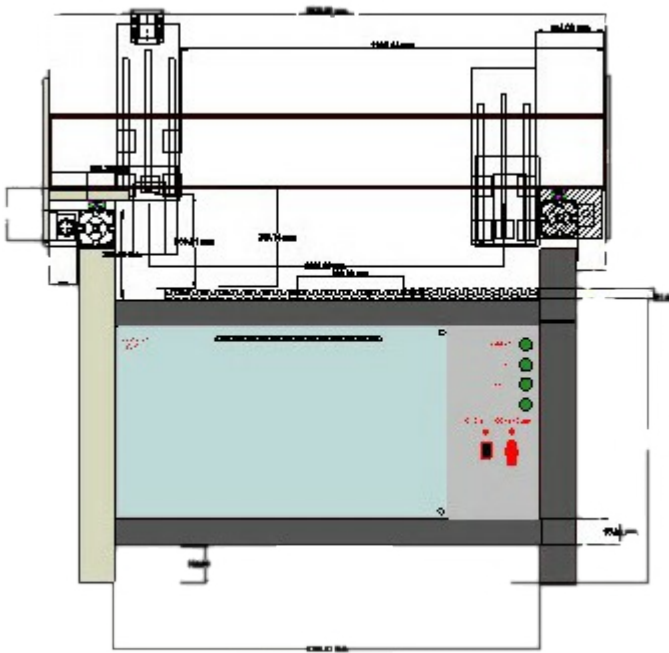
Maintenance

Lubrication

All bearings should be oiled once a week or daily if the machine is used a lot.

Each bearing only needs about 2ml of oil (do not use grease)

X AXIS	4 BEARINGS
Y AXIS	2 BEARINGS
Ys AXIS	2 BEARINGS
Z AXIS	4 BEARINGS

The ballscrews are more dificult to lubricate, the most practical way is to oil the shaft.

The Linear rails should be cleaned with a clean cloth and lightly oiled.

Keep the machine clean at all times

Your machine spindle has been Set

Insuring the best quality machining is possible.

If the spindle is moved this may have to be reset.

Spindle Set Gages are well worth having in you works.
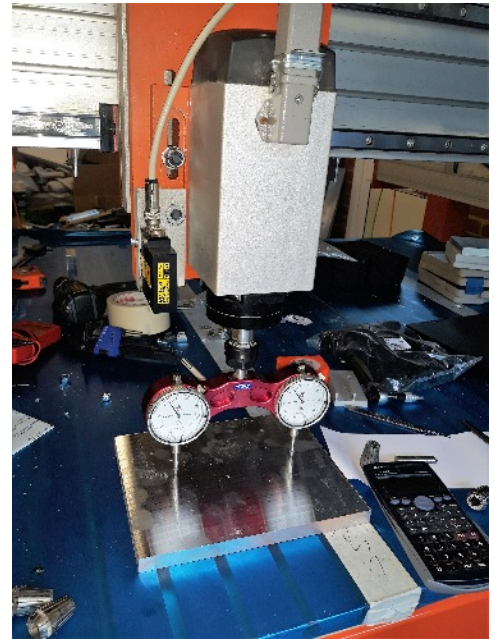
Motion Control Panel
Front panel access

PC Controller & UPS
Right Side Panel access
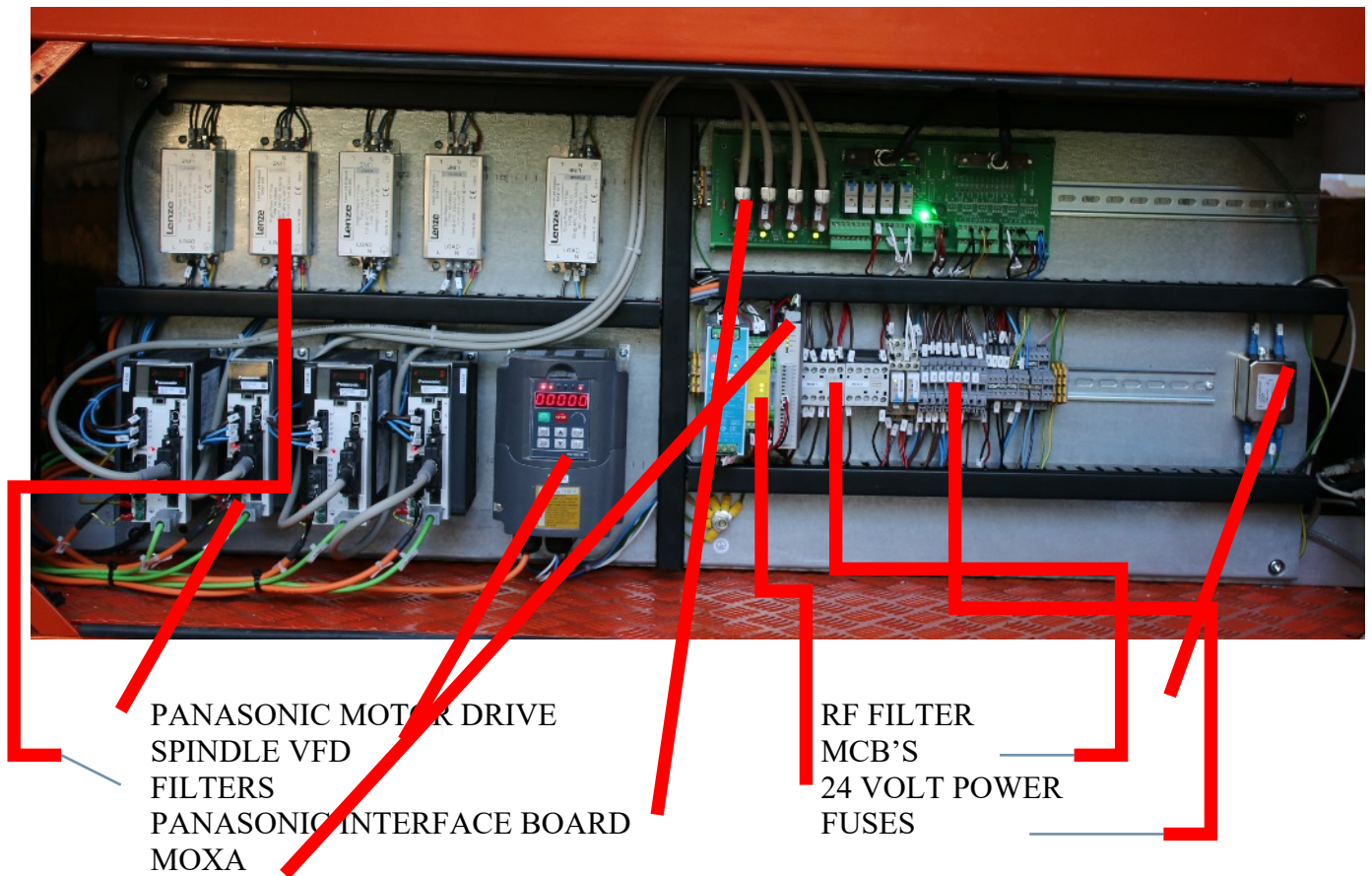
PANASONIC MOTOR DRIVE
SPINDLE VFD
FILTERS
PANASONIC INTERFACE BOARD
MOXA

RF FILTER
MCB'S
24 VOLT POWER
FUSES
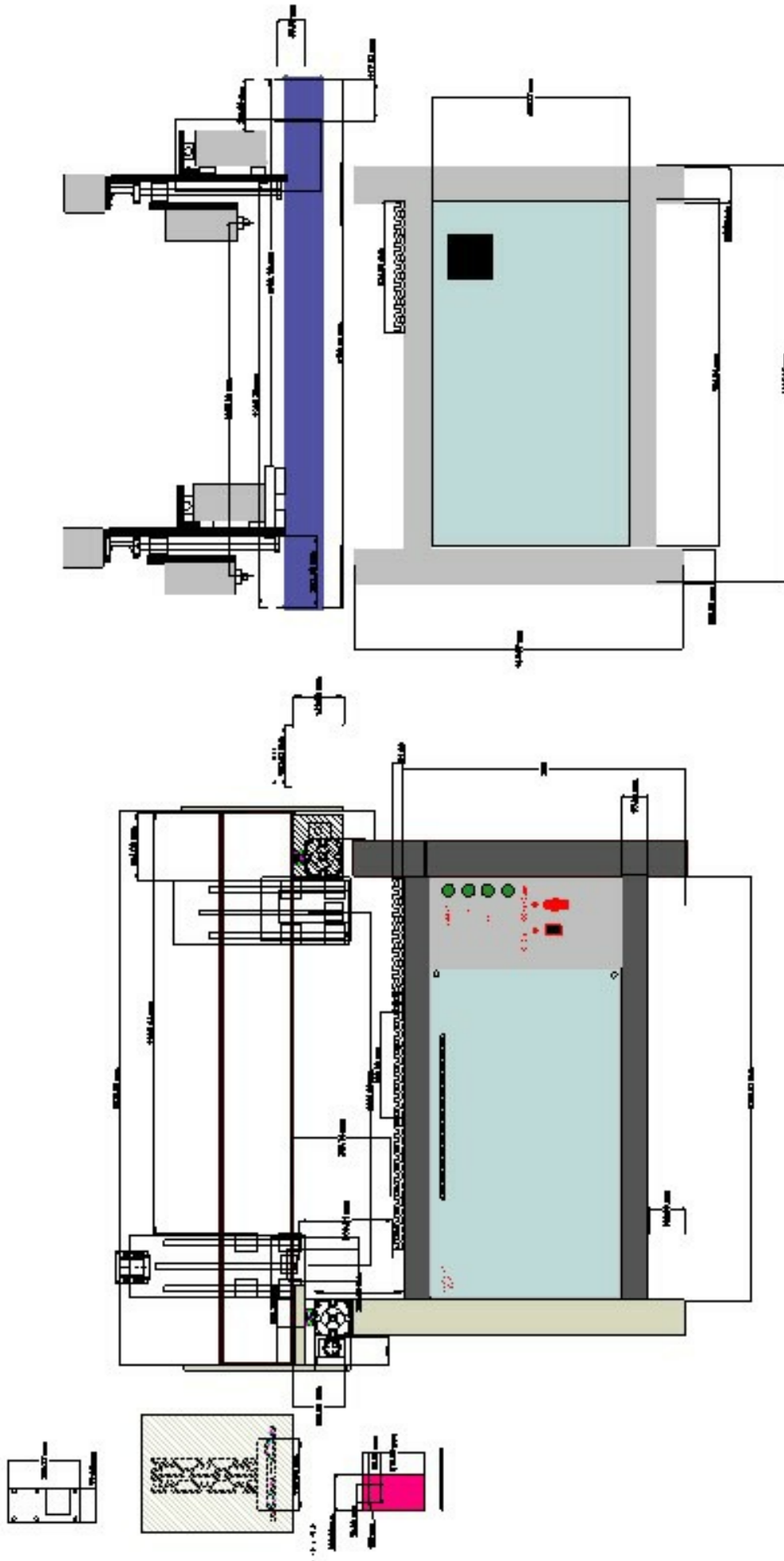
Machining Speeds & Feeds
End Mills

$N = Vc \ X \ 318 \ / \ D$

   100m/min X 318 / diameter = rpm

$Vf = Fz \ x \ Zn \ x \ N =$

0.06 x 2teeth x rpm = X Y feed

Example: 8mm dia Milled with 2 teeth

Spindle RPM = 100 x318 / 8 =3975 rpm

0.06 x 2 x 3975 = 477mm Min

Feedrates

Suggested Machine Speeds / Feed rates for V Cut lettering in Aspire for 10 - 40mm high letters

Stone type	… deg Cutter	X & Y Feed	Z Feed	Spindle Speed
Nabressina	70	1000 mm/min	600 mm / min	11,000 rpm
White Marble	70	1000 mm/min	600 mm / min	11,000 rpm
Purbeck	70	1000 mm/min	600 mm / min	11,000 rpm
York	70	1000 mm/min	600 mm / min	11,000 rpm +
Portland	70	1000 mm/min	600 mm / min	11,000 rpm +
Bath	70	1000 mm/min	600 mm / min	11,000 rpm +
Welsh Slate	70	1500 mm/min	1000 mm / min	11,000 rpm
Black Granite	90	400 mm/min	300 mm / min	9,000 rpm

Incimar MH users may need to use slower feed rates.

OnLine Support

Using TeamViewer we can assist in a wide range of issues .

Its fast and in real time.
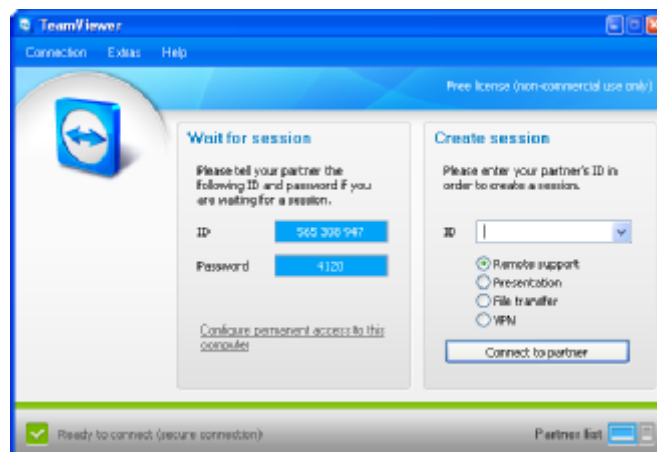
Milling Speeds & Feeds

Solid Carbide - Coated

MATERIAL GROUP	HARDNESS (Bhn)	SURFACE SPEED METRES/MIN	FEED (mm/Tooth) END MILL DIAMETER									
			3mm	4mm	5mm	6mm	8mm	10mm	12mm	16mm	20mm	25mm
Aluminium Low <8% Silicon	-	max avail.	0.02	0.03	0.04	0.06	0.07	0.10	0.15	0.15	0.20	0.20
Aluminium High >8% Silicon	-	200-600	0.02	0.02	0.03	0.05	0.06	0.10	0.10	0.10	0.15	0.15
Brass and Bronze	-	80-365	0.02	0.02	0.03	0.04	0.05	0.07	0.08	0.09	0.10	0.10
Copper and Copper Alloys	-	130-330	0.03	0.04	0.04	0.05	0.06	0.07	0.09	0.09	0.10	0.10
Cast Iron (Soft)	120-200	100-225	0.03	0.03	0.04	0.05	0.06	0.07	0.07	0.08	0.09	0.10
Cast Iron (Hard)	210-320	60-120	0.02	0.03	0.03	0.04	0.05	0.05	0.05	0.06	0.08	0.10
Low Carbon Steels	100-200	100-240	0.02	0.03	0.03	0.05	0.05	0.06	0.07	0.08	0.08	0.10
Medium Carbon Steels	175-425	60-100	0.01	0.02	0.04	0.04	0.04	0.05	0.05	0.06	0.10	0.10
Hardened Steels	45Rc-60Rc	30-60	0.01	0.01	0.02	0.02	0.03	0.03	0.04	0.04	0.05	0.06
Tool Steel	100-250	30-100	0.02	0.02	0.03	0.03	0.04	0.05	0.05	0.06	0.06	0.08
Stainless Steel Soft (300 series)	< 275	60-120	0.02	0.03	0.03	0.04	0.04	0.05	0.05	0.06	0.06	0.08
Stainless Steel Hard (400 series)	< 275	90-180	0.02	0.03	0.03	0.04	0.05	0.05	0.06	0.06	0.07	0.08
Stainless Steel (PH)	< 325	80-175	0.02	0.02	0.03	0.05	0.05	0.06	0.06	0.07	0.07	0.08
Titanium (Soft)	110-275	60-105	0.01	0.02	0.02	0.04	0.04	0.05	0.05	0.06	0.06	0.07
Titanium (Hard)	300-440	30-60	0.01	0.02	0.03	0.03	0.04	0.05	0.05	0.06	0.07	0.08
Monel/High Nickel Steels	-	60-80	0.01	0.03	0.03	0.04	0.04	0.05	0.05	0.06	0.08	0.10
Hi-Temperature Alloys	-	15-35	0.01	0.02	0.02	0.02	0.03	0.04	0.04	0.05	0.06	0.07

Solid Carbide - Uncoated

MATERIAL GROUP	HARDNESS (Bhn)	SURFACE SPEED METRES/MIN	FEED (mm/Tooth) END MILL DIAMETER									
			3mm	4mm	5mm	6mm	8mm	10mm	12mm	16mm	20mm	25mm
Aluminium Low <8% Silicon	-	max avail.	0.013	0.025	0.035	0.050	0.070	0.080	0.100	0.120	0.150	0.200
Aluminium High >8% Silicon	-	200-400	0.013	0.025	0.030	0.040	0.060	0.070	0.080	0.100	0.120	0.150
Brass and Bronze	-	70-120	0.025	0.030	0.040	0.050	0.060	0.070	0.075	0.090	0.100	0.150
Copper and Copper Alloys	-	120-250	0.025	0.030	0.040	0,050	0,060	0.070	0.075	0.090	0.100	0.150
Cast Iron (Soft)	120-200	70-180	0.025	0.030	0.040	0.050	0.060	0.070	0.075	0.120	0.150	0.200
Cast Iron (Hard)	120-200	30-90	0.010	0.014	0.017	0.020	0.030	0.040	0.050	0.060	0.075	0.100
Magnesium and Magnesium Alloys	-	300-460	0.025	0.030	0.040	0.050	0.070	0.080	0.100	0.130	0.150	0.250
Plastics-Glass Filled	-	100-185	0.038	0.045	0.055	0.076	0.090	0.095	0.100	0.130	0.150	0.300
Plastics	-	240-490	0.038	0.050	0.070	0.080	0.110	0.130	0.150	0.200	0.250	0.380
Low Carbon Steels	-	70-125	0.013	0.017	0.020	0.025	0.040	0.060	0.075	0.100	0.150	0.180
Medium Carbon Steels	275-425	35-90	0.015	0.020	0.030	0.040	0.043	0.047	0.050	0.075	0.100	0.150
Hardened Steels	48-52 Rc "C"	9-30	0.005	0.007	0.010	0.013	0.017	0.020	0.025	0.035	0.050	0.075
Stainless Steel Soft (300 series)	135-275	60-125	0.013	0.017	0.020	0.025	0.035	0.040	0.050	0.075	0.100	0.150
Stainless Steel Hard (400 series)	135-275	18-80	0.005	0.007	0.010	0.013	0.017	0.020	0.025	0.050	0.075	0.130
Titanium (Soft)	-	15-125	0.013	0.017	0.020	0.025	0.030	0.040	0.050	0.075	0.100	0.150
Titanium (Hard)	-	15-60	0.007	0.010	0.012	0.015	0.020	0.022	0.025	0.035	0.050	0.100
Monel/High Nickel Steels	-	45-75	0.013	0.017	0.020	0.025	0.031	0.040	0.050	0.060	0.076	0.100
Hi-Temperature Alloys	-	8-30	0.010	0.014	0.017	0.020	0.022	0.023	0.025	0.030	0.035	0.050

<u>Do's & Don'tS</u>

Always lubricate the bearings at regular intervals, once every 2 weeks

Do not use an air line to dust off machine

Always Vacuum and whip down

Always use a sharp cutter

Always go slower to start with

Always check the finished work before removing it from the machine

Always run tests in MDF especially 3D Bass-relief's

NEVER LOOK AT THE LASER LIGHT

Check out the Tutorial Videos http://www.scancad.co.uk/page44.html

Standard Equipment

- 3kw SPINDLE 3000rpm - 18000rpm
- E20 COLLECTS 10MM & 6MM
- SPINDLE SPANNERS
- LASER SCANNER
- 2 X 10mm DIA 90 DEGREE BITS

Optional Equipment

- VACUUM PAD SET - CLAMPING
- PNEUMATIC CLAMP
- COLD AIR CUTTER COOLING
- Vaxuun Pump DS8
- Dust Extractor

PNC 1010 Standard Specifications

Overall dimensions:	1450 x 1600
Machine base	Mild Steel
Machine Feet	Nylon Castor & Feet
Gantry	Raised
Machining Area	1000 x 1000mm
Z Axis	200mm
Standard Spindle	3kW | 18,000 rpm
Machine Table	T Slot
Drive Motors	Servo Drive (all axis)
Drive mechanics	Ball screw (all axis)
Rapid Speed	7 meter per minute
PC	Wndows 10 | SSD
Motion Control	AMTECH GNC
Data Transfer	2 USB & Ethernet
Remote	Wired
Machine Language	G-Code
Surface Sensor	Class 2 Laser
Point Cloud	XYX
Power	3ph 30amp
Warranty:	12 months
Service Contracts	Available
Support:	Online & Telephone
Training	2 days + Options

Features

- Touch Panel Control
- Auto machine alignment
- Laser Surface Acquisition

- Engraving:
- Solid Sunk & V Cut lettering
- 3D Carving
- Milling
- Routing

Applications

Sign making

Industrial Engraving

Control Panels

Component Parts

Dedication Plaques

Nameplates

Memorial Lettering & Carving

CE

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