

ISO Ns – Next Step

Machines Parameters Setting



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1 PREFACE

This documents describes how setting the IsoNs Parameters, Gcode functions, etc. for various machines tipology.

- *Carving machines 2D 2D¹/₂ 2 – 3 Axes*
- *Carving machines 3D – 3 Axes*
- *Engraving machines 2-3-4 Axes*
- *Cutting Plotter rotary blade 3-4 Axes*
- *Metal Work*
- *Laser*
- *Plasma*
- *Waterjet*
- *RTCP (Rotate Tool Center Point) Machines 5 Axes with continue interpolation*
- *Machines very slow speed with resolution 0.0001 mm*
- *Increase the Acceleration resolution*
- *ISONs Filters*
- *BackLash*

2 Carving machines 2D 2D½ 2 – 3 Axes

This machines tipology contains, all wood work machines, metal work machines, plastic etc. Generally the work is 2D or 2D½. The FEED depend by material to work. The working are in the plane X,Y

2.1 Working 2D 2D½ - Type 1

Setting for machines low speed machines – $F \leq 1,5 \text{ Mt/min}$

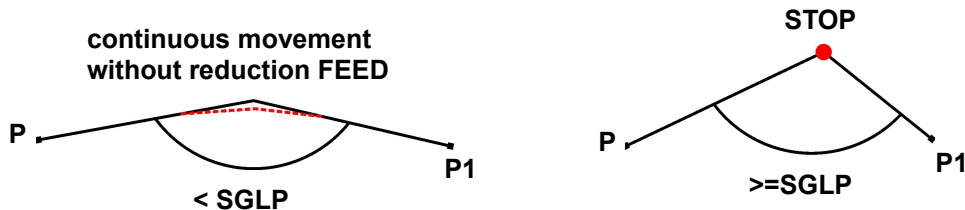
G to be set

G60	Set Always, otherwise set the parameter USE_G60=1
G17,G18,G19	Set the work plane used
G64	Work in 2D mode on the workplane (default is not necessary setting if not used G65, before) Uses SGLP as edge threshold

Machine Parameters to be set

SGLP	Threshold in tenth of degree (default 200 = 20 degree) to stop axis on edge when CN works in FAST INTERPOLATION. Threshold acts only on work plane axes. CN stopping automatically the axis when on work plane it recognizes an angle greater than SGLP (edge found). Values Recommended SGLP from 200 to 350
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Ex: **SGLP=200 (20 degrees) e SGLP_RED=0**



ACC_RAGGIO_MAX	It defines the centrifuge acceleration to auto-reducing speed on circular interpolation. It must be set after machine test. Value=0 – Disable Big values mean high speed (low reduction) Values Recommended ACC_RAGGIO_MAX from 1 to 5
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How calculate the parameter

Insert ACC_RAGGIO_MAX to 0
Open a PartProgram with G2 G3 Gcode
Set a F able to work the part program
Preview the Part Program

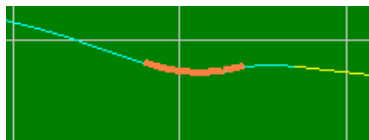


With the View Line function, move the mouse above the ARCH (where must reduce the axes feed) and view **AccR** value (see it in the pop up window). This a reference value for setting ACC_RAGGIO_MAX.

Try to set values less than by AccR in ACC_RAGGIO_MAX.

With Preview, you can see a reduced F.

Try up to the F corrected.



F: 8.34
AccR: 2
X: 125.378
Y: 195.076
ARC_TO: SGLP
LEN3D: 4.191
LEN2D: 4.191

2.2 Working 2D 2D½ - Type 2

Setting for machines low speed machines – $F \leq 5$ mt/min

G to be set

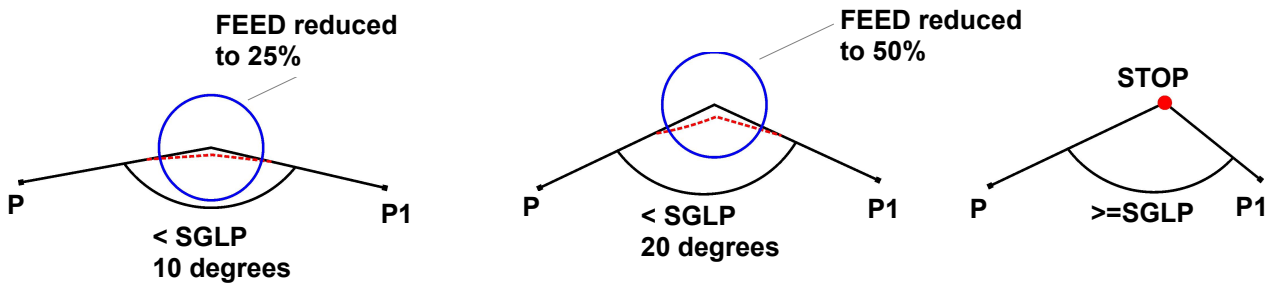
G60	Set Always, otherwise set the parameter USE_G60=1
G17,G18,G19	Set the work plane used
G64	Work in 2D mode on the workplane (default is not necessary setting if not used G65, before) Uses SGLP as edge threshold

Machine Parameters to be set

SGLP see Par. 2.1

SGLP_RED *Not Obligatory Set to ZERO for disable*
See IsoNs user guide
http://www.promax.it/file_download/IsoNs%20User%20Manual_eng.pdf
Values Recommended **SGLP from 450 to 600**
SGLP_RED from 5 to 20
MAX_RED from 80 to 90

Ex: SGLP=450 (45 degrees) , SGLP_RED=10 (10% by 45 degrees – 4,5 degrees starts to slow down)
MAX_RED=85



The Axis FEED will never be reduced over MAX_RED (85% Actual Feed)

ACC_RAGGIO_MAX see Par. 2.1

2.3 Working 2D 2D½ - Type 3

Setting for machines low speed machines – F>5 mt/min

G to be set

G60	Set Always, otherwise set the parameter USE_G60=1
G17,G18,G19	Set the work plane used
G64	Work in 2D mode on the workplane (default is not necessary setting if not used G65, before) Uses SGLP as edge threshold
G69	Depth look ahead Values Recommended G69 X200
G66	AFC Adaptive Feed Control See IsoNs user guide http://www.promax.it/file_download/IsoNs%20User%20Manual_eng.pdf Values Recommended G66 X1 Y1 (set SGLP and SGLAFC_)

Machine Parameters to be set

SGLP	see Par. 2.1 (setting high, ex: 350)
SGLP_RED	Set to ZERO (disable)
ACC_RAGGIO_MAX	see Par. 2.1
SGLAFC_	See IsoNs user guide http://www.promax.it/file_download/IsoNs User Manual_eng.pdf Values Recommended SGLAFC_ from 500 to 4000 (for each Axis)

3 Carving machines 3D - 3 Axes

This machines tipology contains, all wood work machines, metal work machines, plastic etc. Generally the work is 3D. The FEED depend by material to work. The working are in the 3D dimension X,Y,Z.

3.1 Working 3D - Type 1

Setting for machines low speed machines - F <=1,5 Mt/min

G to be set

- G60** Set Always, otherwise set the parameter USE_G60=1
G65 Work to out from the plane
Uses **SGL3D_** as edge threshold
G67 Set alternatively to G65. Is preferred for machines **2D,2D½ e 3D**
Combine G64 and G65
Uses **SGL3D_** when 3D movement axes
Ex:
G1 X10 Y20 Z40
Uses **SGLP** when 2D movement axes
Ex:
G1 X10 Y20

Machine Parameters to be set

- SGLP** see Par. 2.1 – only if G67 setted
SGL3D_ It defines the threshold to detection of **EDGE** in 3D interpolations. This is used by **G65 G67** or by **AFC** filter **G66**. The value is approximatively expressed in tenth of degree. The proper value must be found from dynamics of the machine. In **G65** or **G67** interpolation when an axis overcomes this threshold axis are stopped.

Reference value for SGL3D

THRESHOLD in DEGREES	VALUE OF SGL3D (min-max)
5	60-90
10	125-175
20	250-350
30	300-500
45	400-700

- ACC_RAGGIO_MAX** see Par. 2.1

3.2 Working 3D - Type 2

Setting for machines low speed machines - $F \leq 5$ mt/min

G to be set

G60 Set Always, otherwise set the parameter USE_G60=1
G65 see Par. 3.1
G67 see Par. 3.1

Machine Parameters to be set

SGLP see Par. 2.1 – only if G67 setted
SGL3D_ see Par. 3.1
SGLP_RED see Par. 2.2 – In this case SGLP_RED uses SGL3D_
ACC_RAGGIO_MAX see Par. 2.1

3.3 Working 3D - Type 3

Setting for machines low speed machines - F>5 mt/min

G to be set

G60	Set Always, otherwise set the parameter USE_G60=1
G65	see Par. 3.1
G67	see Par. 3.1
G69	see Par. 2.3
G66	see Par. 2.3 (sett SGLP, SGL3D_ and SGLAFC_)

Machine Parameters to be set

SGLP	see Par. 2.1 (setting high, ex: 350)
SGL3D_	see Par. 3.1 (setting high, ex: 6000)
SGLP_RED	Setting to 0 (disable)
ACC_RAGGIO_MAX	see Par. 2.1
SGLAFC_	see Par. 2.3

4 Engraving Machines 2-3-4 Axes

The engraving machines, may have 2 or 3 axes. Systems X, Y, Z. A fourth axis, can be a rotary axis for engraving on cylindrical objects. In this case, the rotary axis becomes the X or Y axis and then the processing is always on 3 axes, with Z axis generally only positioning. In some cases as machining **Vcarve** (sculpture with three-dimensional effect to V), the third axis is interpolated together with X, Y, then a 3D interpolation.

For parameters setting see the paragraph :

2 Carving machines 2D 2D½ 2 – 3 Axes

5 Cutting Plotter rotary blade 3-4 Axes

Machines for cutting blade, use a rotary axis to maintain the tangency of the blade on the path. The tangency is calculated or by a CAM, or by a special PlugIn "IsoNsCut" for IsoNs. A special interpolation rotary axis of the blade "interpolation axis Transported", makes it the fluid movements of the machine, because the blade axis is not interpolated in the normal way.

This, however, provides for particular settings of IsoNs.

G to be set

G60	Set Always, otherwise set the parameter USE_G60=1
G68	Enable Transported Axis See IsoNs user guide http://www.promax.it/file_download/IsoNs_User_Manual_eng.pdf Values Recommended G68 Xvel_max Axis A
G69	see Par. 2.3 Insert the Transported Axis name ex: G69 X200 A
G66	see Par. 2.3 (set SGLP and SGLAFC_)

Machine Parameters to be set

SGLP	see Par. 2.1 (setting high, ex: 350)
ACC_RAGGIO_MAX	see Par. 2.1
SGLAFC_	see Par. 2.3

6 METAL WORK

Generally, metal working machines have low speed but high accuracy.
In some cases the optical lines are also included to eliminate the errors of mechanics.
The calibrations answer those machines for 2D, 3D TYPE1 or TYPE2.
In some machines the SPEED far below the Mt / min and then you need to configure the CNC in:
0.0001 mm. Par 11 "Machines very slow speed with resolution 0.0001 mm"

7 LASER

This type of machine is different depending on the material that must cut.
Generally are machines that have a very large dynamic speed from medium to high speeds, then the settings of the CNC refer to that machine types.
What is very important to activate the laser power to control in the CNC.
This one makes to modulate the laser power according to the cutting speed (information at Promax for this option).

8 PLASMA

Machines to low speed and precision.
Use the same parameters to Par. 2.1 Working 2D 2D½ - Type 1 also if the Speed is greater to 1,5 Mt/min.

9 WATERJET

Use the same parameters to PLASMA MACHINES. Few machines, for cut soft materials, can used the parameters: Par. 2.2 Working 2D 2D½ - Type 2

10 RTCP (Rotate Tool Center Point) Machines 5 Axes with continue interpolation

Use the same parameters to Par. 3.3 Working 3D - Type 3

11 Machines very slow speed with resolution 0.0001 mm

Few machines, can working with speed less to 0,5 Mt/min.
In this case, is necessary configure the CNC with a greater resolution:
0.0001 mm.

Machine Parameters to configure for set the resolution in 0.0001 mm

DSOF_	Set x 10 respect to 0.001 mm value
FEEDRES	Set to 10000
RESQUOTE	Set to 10000
VMAX_	Set x 10 respect to 0.001 mm value
RZERO_OFFSET_	Set x 10 respect to 0.001 mm value
BACKLASH_	Set x 10 respect to 0.001 mm value
LIMITE_N_	Set x 10 respect to 0.001 mm value
LIMITE_P_	Set x 10 respect to 0.001 mm value

WARNING

ALL THE ACCELERATIONS ARE 10 TIMES MORE SLOW.
FOR TO BE SETTED TO VALUE IN 0.001 mm, THESE MUST BE MULTIPLIED x 10

12 Increase the Acceleration resolution

In the machines, where the CNC SAMPLE is \leq at 1 Millisecond, The Acceleration resolution is very low. See Par. 11 “Machines very slow speed with resolution 0.0001 mm”

Machine Parameters to configure for set the resolution in 0.0001 mm

DSOF_	see Par. 11
FEEDRES	see Par. 11
RESQUOTE	see Par. 11
VMAX_	see Par. 11
RZERO_OFFSET_	see Par. 11
BACKLASH_	see Par. 11
LIMITE_N_	see Par. 11
LIMITE_P_	see Par. 11

ALL THE ACCELERATIONS HAVE A RESOLUTION 10 TIMES GREATER

13 ISONS FILTERS

Some parts program imported from CAM, can be acquired by systems that generate a "NOISE" at the level of linearity of the shares. This can lead to difficulties in processing. The segments are not homogeneous (very short segments that the CNC can not work), and the path has constant changes of direction. To activate the filters must always enter **G69**

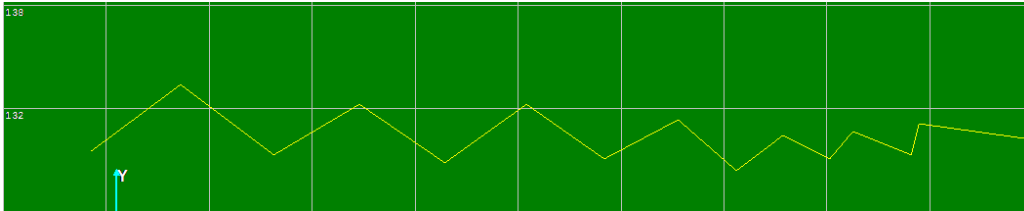
NOISE – G73

See *IsoNs user guide*

[http://www.promax.it/file_download/IsoNs User Manual_eng.pdf](http://www.promax.it/file_download/IsoNs%20User%20Manual_eng.pdf)

G73 eliminates the noise

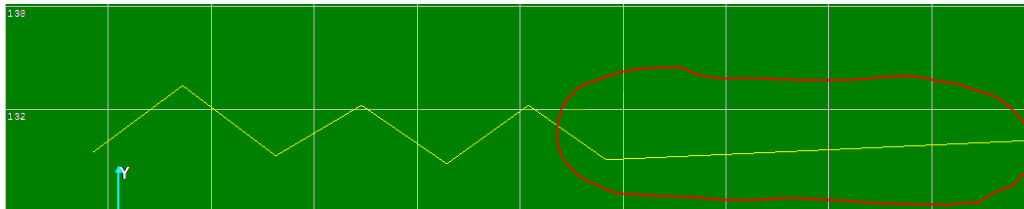
Normal without G73



With G73

G69X200 // ENABLE LOOK AHEAD

G73X1Y45Z5

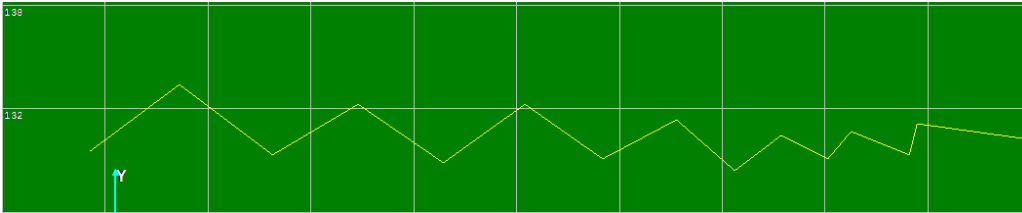


N.U.R.B.S. – G72 Smoothing

See *IsoNs user guide*

http://www.promax.it/file_download/IsoNs User Manual_eng.pdf

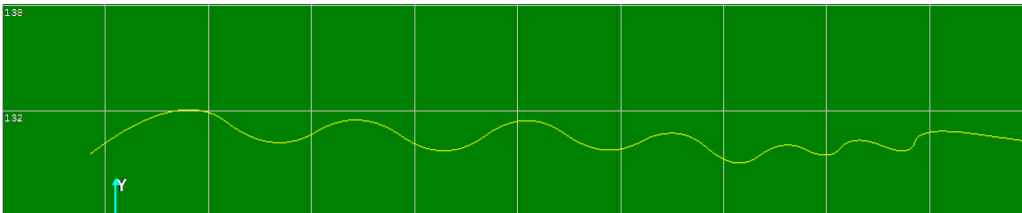
Normal Without G72



With G72 N.U.R.B.S.

G69X200 // ENABLE LOOK AHEAD

G72X1Y7 // ENABLE NURBS LEN 7 MM ORDER 3 SEGMENT 0.2



RLS. – G74 Removes the short segments

The G74 removes the short lines that are not workable.

The definition of the short lines, is given by the sampling of the CN and the FEED work.

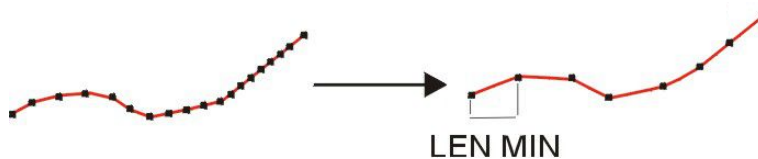
Traits that are normally range from 0.0001 mm to 0.2 mm (when the FEED are high > 30 Mt min)

Reference Values

CNC Sample Ms	FEED Mt/Min	Min Length to work (mm)
1	1	0.016
	5	0.08
	10	0.16
	20	0.32
2	1	0.032
	5	0.16
	10	0.32
	20	0.64
3	1	0.048
	5	0.24
	10	0.48
	20	0.96
4	1	0.064
	5	0.32
	10	0.64
	20	1.28
5	1	0.08
	5	0.4
	10	0.8
	20	1.6

Normal

G74



14 BACKLASH

Any machine, more or less have to a lack of precision mechanical (backlash).
IsoNs has the opportunity to take up the backlash, without having to using optical lines (very expensive)

Machine Parameters to configure for Backlash

BACKLASH_ [see manuale IsoNs](#)
TBK_ [see manuale IsoNs](#)

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