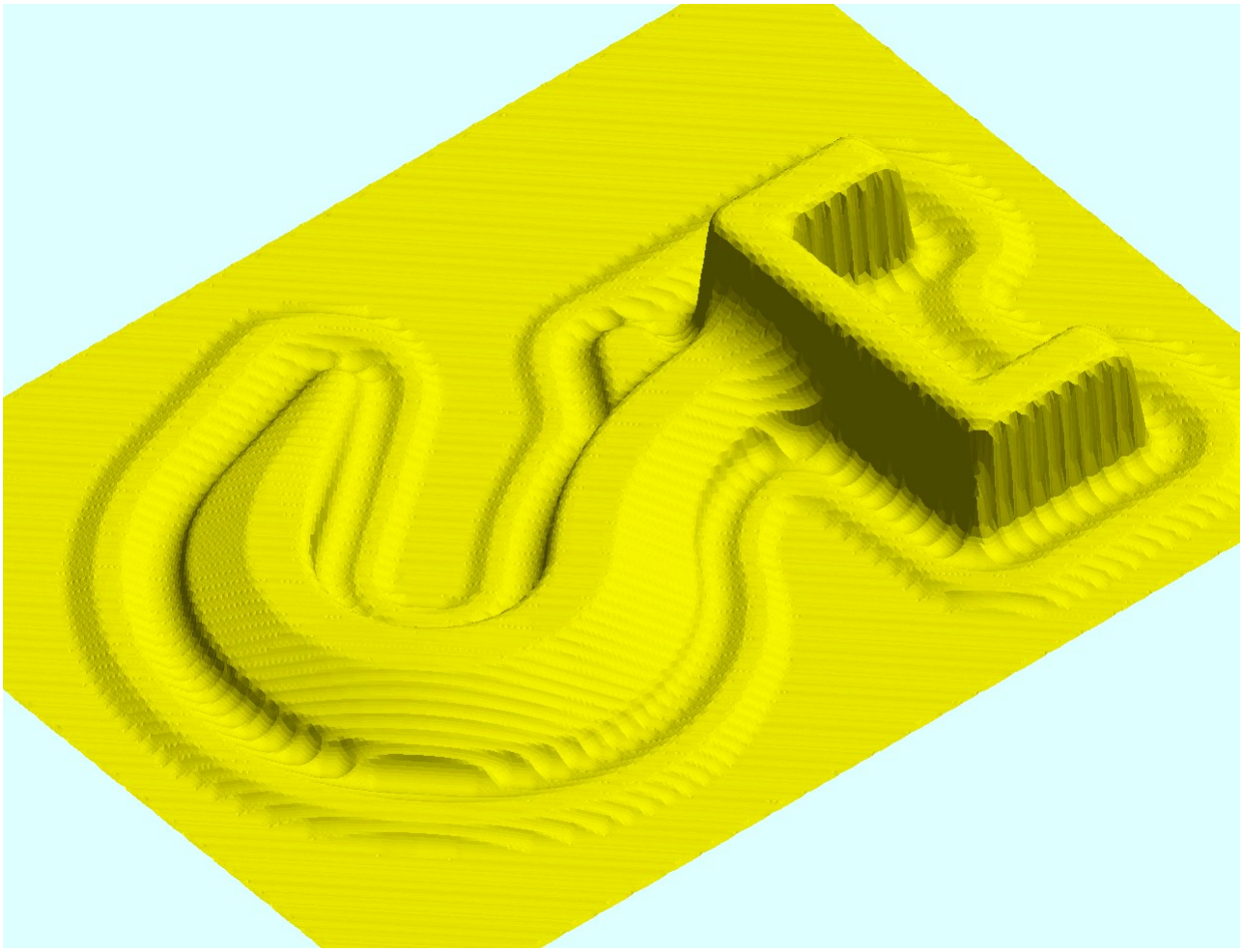
NCSIMU Version 4



English short description for the TechniSoft NC Simulation

What's NCSIMU?

NCSIMU (abbreviation of NC Simulation) is a software program that simulates on your computer screen how a workpiece will be machined on your NC machine. After every individual tool motion NCSIMU calculates the resting material and the relation to the resting workpiece geometry.

Input files may be 2, 2½ or 3D milling programs, written in APT format of (nearly) all CAD/CAM systems, or NC programs in ISO code of different origins. The only condition is: Machining from z axis.

If desired, the NC simulation plots the calculated rest material online, making the machining process visible.

Having finished its calculation NCSIMU stores the resulting workpiece in a file. You, your clients or other interested people may check this file on your screen with the help of the gratis freeware program *WpcView*[1] and control it from any viewpoint.

In addition to the WpcView format you may store the workpiece calculated by NCSIMU also in the popular VRML format and publish it on the Internet.

You may enter the calculated workpiece as input to a next machining step simulation. For example: the residual workpiece of the roughing program serves as input for the finishing program and finally with this result you go on to simulate the drilling program, etc.

[1] WpcView is available in www.technisoft.ch. To download this freeware program, click on Download and then on WpcView V3.x.

How to Install the NC Simulation

Insert the NCSIMU installation CD into the CD ROM drive of your computer.

Windows NT, 2000 and XP only: To install the software, you have to log in as Administrator.

1. Installation of the Hardlock Driver

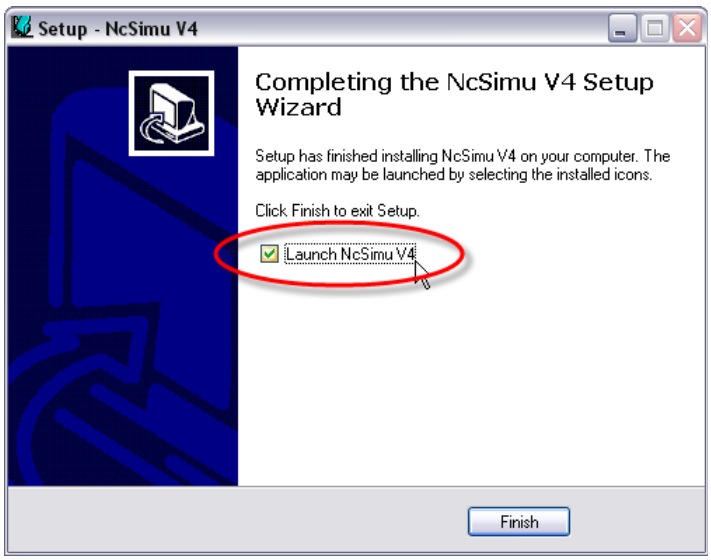
If this driver is already installed on your computer or if you are installing the NC Simulation Demo version, please continue with step 2.

Click on the **Start** button (in the Windows task bar). Select **Execute...**, then **Browse...**. You will find the installation program on the NCSIMU installation CD, in the **\Hardlock** directory with filename **HLDRV32.EXE**. Select this file, click on **Open** and then **OK**. Then just follow the dialogue on the screen.

2. Installation of the NC Simulation Software

Plug the hardlock device (copy protector connector) into the parallel or USB port of your computer.

Click on the **Start** button (in the Windows task bar). Select **Execute...**, then **Browse...**. You will find the installation program on the NCSIMU installation CD, in the **\NCSimu** directory with filename **NcSimuSetup*.exe**. Select this file, click on **Open** and then **OK**. Then just follow the dialogue on the screen.



If you activate the button „Run NcSimuV3.exe“ before you click **Close**, the NC Simulation demo program will be started directly..

The section „How to start NC Simulation“ lets you know in detail the possibilities the dialogue boxes offer.

How to start NC Simulation

Double click the Icon „TechniSoft NcSimuV3“ on your desktop (automatically created by the installation process) to start the NC Simulation.

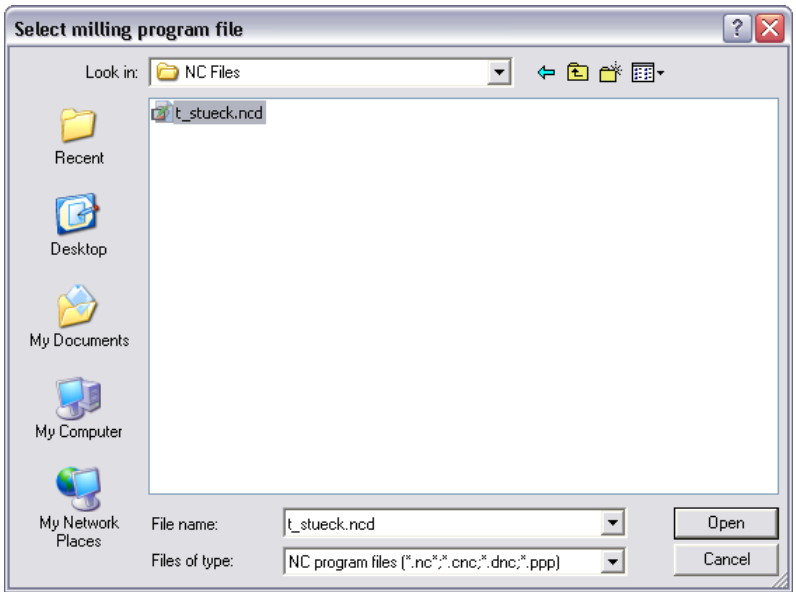
Or: Click on the **Start** button (in the Windows task bar). Select **Programs**, then **TechniSoft** followed by **NcSimuV3**. This will start the NC Simulation, too.

The NC Simulation will start up with the following window:

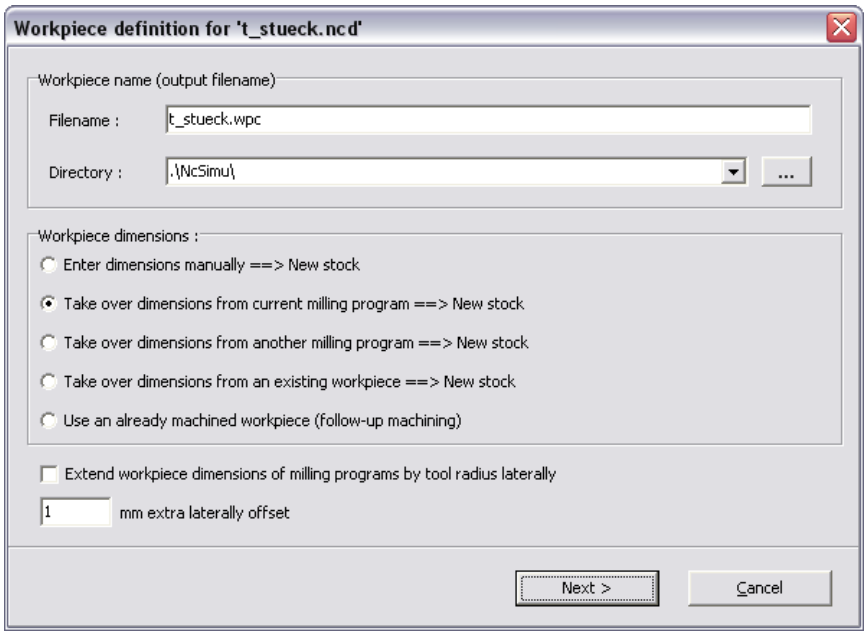
Click on this button, to start a simulation (you find it in the NCSIMU symbol bar).

A file selection dialogue box will pop up. Here you select the milling program file you want to process.

Select the desired milling program file and click on **Open**.



Now the NC Simulation needs information about blank and workpiece size. NCSIMU offers different possibilities to enter these data:

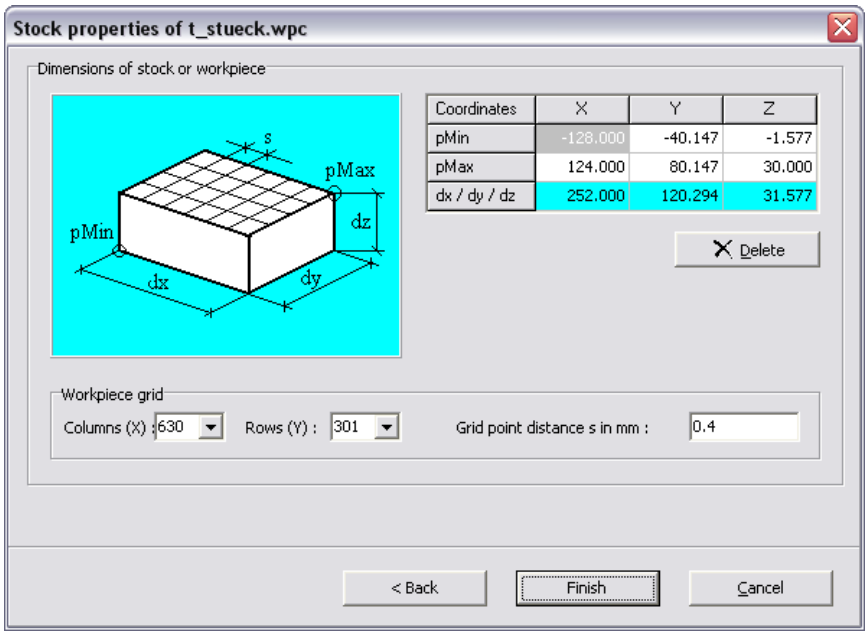


You may define a new blank or use the minimum/maximum values out of the milling program or use the result of a first simulation as input for a following simulation (see box "Workpiece dimensions", on the left side).

Please select the desired output directory and the output filename, then click on **Next >**.

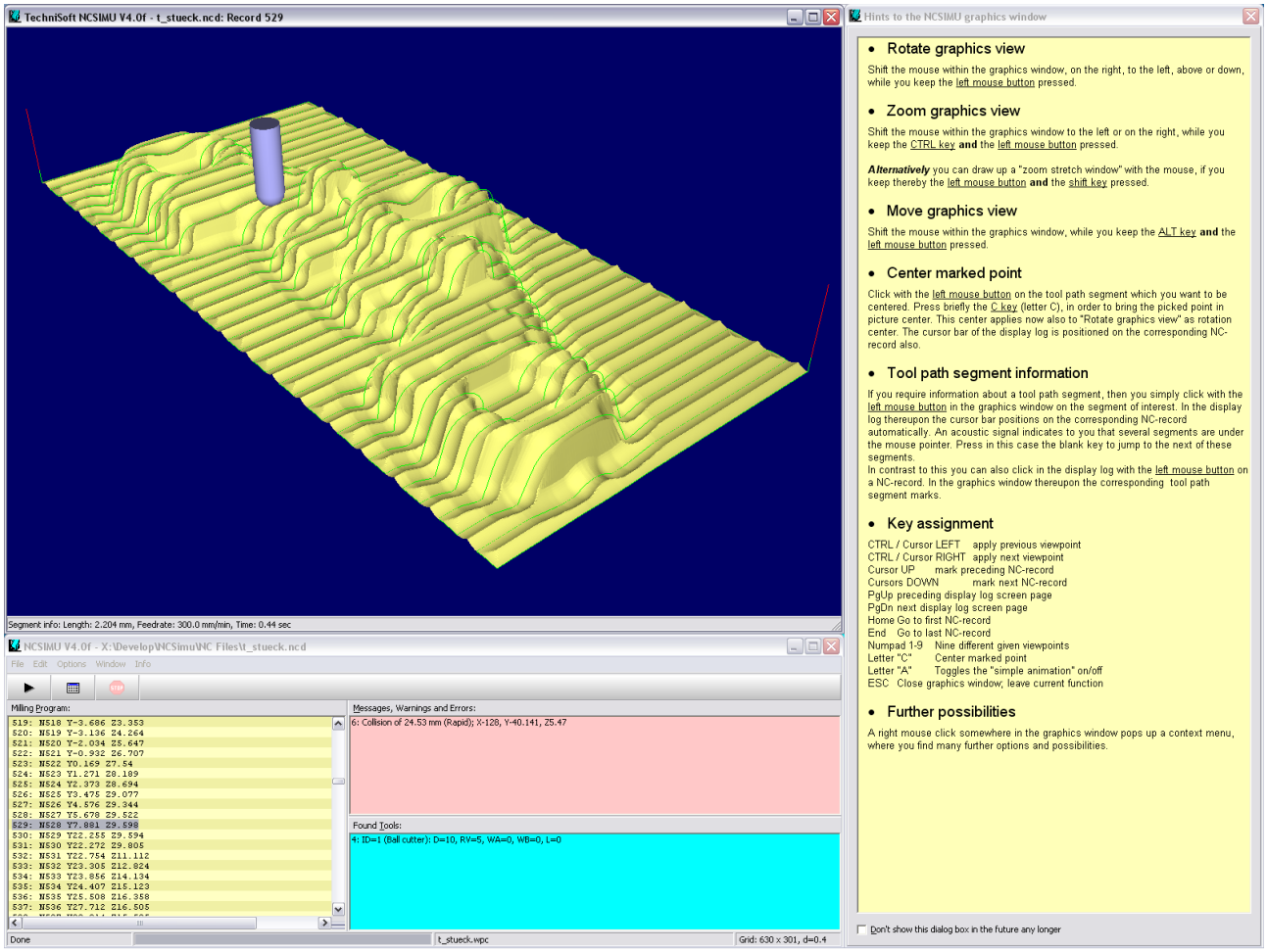
In the following dialogue box you may change the calculated values and define the tolerance for the calculation (grid size of the elevation grid)

The smaller you define the grid distance, the more detailed the resulting plots will be. But: the calculation effort will increase rapidly. This is also true for the plotting speed of NCSIMU and WpcView. So please consider what plot quality you really need. Practical numbers of gridlines are normally between 50 and 800. As a general rule, the multiplication of X gridlines by Y gridlines should result in 100'000, or thereabouts.



By clicking **Finish** you accept the values and start the calculation. Only if necessary, you will be prompted to accept the creation of a new directory or to overwrite an already existing output file.

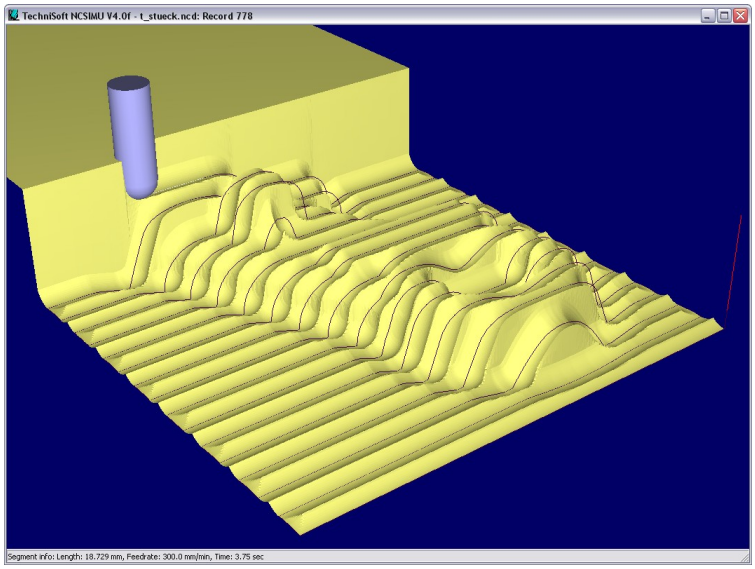
The calculation process may take a while, depending on your input file size and the selected grid size. Having finished the calculation, the resulting workpiece will be plotted in the graphic window. Example:



You may rotate this plot, move it or zoom in and out. On the right side, the window “Hints to the NCSIMU graphics window” gives you more hints in detail. A right mouse click on the graphic window will show you further plot properties.

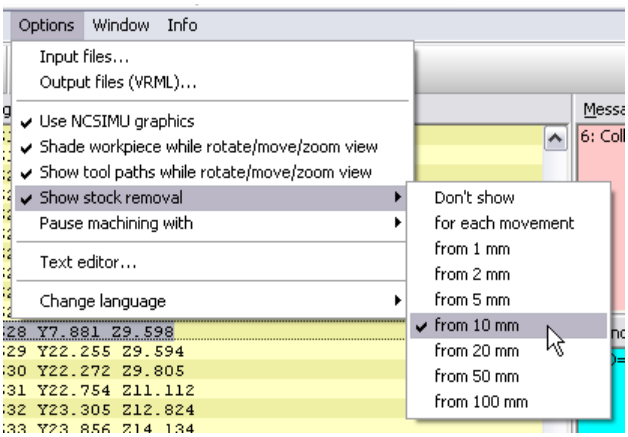
Machined Material

The NC-Simulation calculates the resting workpiece material of every programmed tool motion. You may check the machining result of every individual motion in the graphic window. This function is very time consuming, however, so you may opt to combine several tool motions and calculate these together before the remaining rest material is plotted.



To do so, in the NCSIMU main window click on **Options**, then **Show stock removal**.

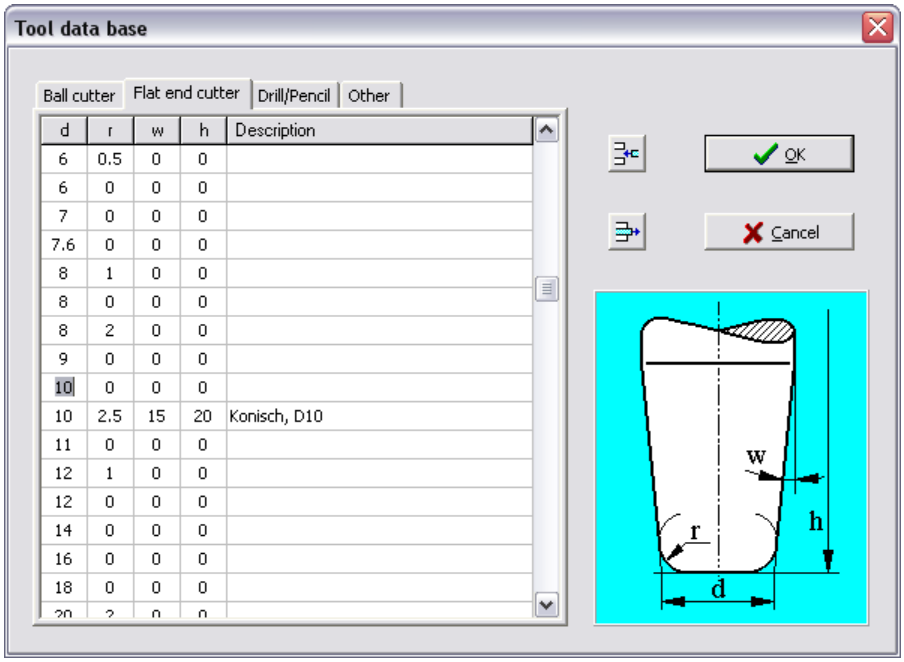
Here you define the useful milling path length. Sometimes you have to try out several values, to find out the best length for your purposes.



Tools defined in the NC Input File

At the beginning of an NC milling program, you normally define with the T command the tools to be loaded in the future. This command assigns the tool number (or the magazine location number) – but does not define its geometry.

But of course the NC Simulation needs the tool geometry to calculate the resting material. That's why each load tool command will prompt you to enter the tool geometry, if missing. The dialogue box looks like this:



Choose from Spherical cutter, Cylindrical Cutter, Drill/Pencil or other tools out of the predefined tools and accept the selection, or enter the new values of a new tool.

Already defined tools are automatically managed by the NC Simulation and stored in the file "ToolFile.dat" (in the installation directory).

If desired, you may define the tool geometry in your NC milling program. To do so, enter the following line before each new T command:

```
(#APT: CUTTER / d, r, e, f, a, b, h      $$ comment)
```

and replace the lower case letters by the correct values:

d Tool diameter
r Vertical rounding radius
e Horizontal distance between tool axis and center of the vertical rounding circle r.
f Vertical distance between the tool tip and center of the vertical rounding circle r.
a Angle between horizontal line and tool face.
b Angle between axis and conical line
h Tool length

Be sure to write the *six* characters **(#APT:** without any space. The characters $$ with the comment may be left out, but the closing parenthesis is necessary. Missing values will be calculated automatically by NCSIMU, if possible. The tool length, you should always specify.

Example spherical cutter:

```
(#APT: CUTTER / , 3,,,,, 18     $$ Ball cutter D6, cylindrical)
(#APT: CUTTER / , 3,,,, 7, 12   $$ Ball cutter D6, conical 7° each side)
```

Example Cylindrical cutter:

```
(#APT: CUTTER / 5,,,,,, 20      $$ Flat end cutter D5, angular, cylindrical)
(#APT: CUTTER / 5, 1,,,,, 25    $$ Flat end cutter D5, rounded R1, cylindrical)
(#APT: CUTTER / 4,,,,, 8, 20    $$ Flat end cutter D4, angular, conical)
(#APT: CUTTER / 5, 1,,,, 8, 30  $$ Flat end cutter D5, rounded R1, conical)
```

Example Drilling tool/Pencil:

```
(#APT: CUTTER / 5,,,, 30, 60    $$ Drilling tool D5, 120° drill point angle)
(#APT: CUTTER / 2,,,, 45, 12    $$ Pencil D2, 45° each side)
```

Example special tools:

```
(#APT: CUTTER / 8, 2, 2.3095, 3.2837, 25, 15, 10)
(#APT: CUTTER / 10, 2, 3.0984, 4.0982, 30, 5, 30)
```

NCSIMU – Technical Information

Operating system:	MS Windows XP or newer (32 or 64 Bit Version)
Method of calculation	Elevation Grid; grid size and distance as you like
NC machining:	2, 2½ and 3D milling in XY plane (G17), from Z axis
Input formats:	ISO (NC), APT as well as CLT (binary, created by Euklid)
Output formats:	STL and WPC (TechniSoft WorkPieceViewer)
Error recognition:	Error message, if collision occurs in rapid motion.
Tools:	Spherical cutter, Cylindrical cutter as well as Drilling tool and Pencil
Tool library:	Integrated, expandable