

Mul File Specification - Tools

Specification of the Tools.mul file

Contents

Specification

Sample

Comments



Specification



The tools file contains the setup information for the tools on the ring assembly. Different machines have different tooling setups, and this file allows the software to determine the correct angle for the ring with the shortest possible movement (if there is more than one tool of the same type on the ring).

The file consists of 2 parts, identified by a name in square brackets

1. [spindles] The spindle setup on the ring and the tool number associated with the position (Mounting angle on the ring, spindle frequency, etc)
2. [tools] The tool number specification (Diameter of tool, Cutting speeds, etc)

Field Format - Spindles

No	Name	Format	Notes
1	Spindle Number	1N	Spindle number on the ring
2	Tool Angle	5N	Physical angle of the tool on the ring. 0 is the datum position at 12 o'clock. The direction of the "clock face" is always anti-clockwise for all right to left feed machines. There is a difference in how "opposite-hand" or left to right feed machines are handled. Flowlines - The angle counts up in a clockwise ZX3/4/5 & Microlines - The angle counts up anticlockwise  ...The difference between flowlines and ZX machines is rooted in how an opposite hand machine is handled. Flowlines have a mirror image of the ring, ZXs use the same assembly for both hands
3	Output Definition - Spindle Power	8A	The output that switches power to the spindle Referenced to the IODef file
4	Output Definition - Spindle Plunge Output	8A	The output that operates the valve that plunges the spindle Referenced to the IODef file  ...On machines with an EtherCAT network to the ring, an IO box is supplied for each spindle head, allowing a separate output channel for the power relay and for the double and single plunge. This quantity of outputs was not available on previous control systems, so the same output drives the relay and spindle plunge valve

5	Output Definition - Spindle Double Plunge Output	8A	<p>The output that operates the valve that double plunges the spindle - a telescopic action that increases the plunge distance Referenced to the IODef file</p> <p> ...On machines with an EtherCAT network to the ring, an IO box is supplied for each spindle head, allowing a separate output channel for the double and single plunge. This quantity of outputs was not available on previous control systems, so the same output drives all double plunge cylinders on the ring</p> <p>Set to -1 if the spindle does not have a double plunge output</p>
6	Input Definition - Spindle Home	8A	<p>Input ref associated with home position for the spindle plunge cylinder Referenced to the IODef file Set to -1 if the input does not exist or to disable the input if it is faulty</p>
7	Input Definition - Spindle Out	8A	<p>Input ref associated with out position for the spindle plunge cylinder Referenced to the IODef file Set to -1 if the input does not exist or to disable the input if it is faulty</p>
8	Input Definition - Double Plunge Home	8A	<p>Input ref associated with home position for the spindle double plunge cylinder Referenced to the IODef file Set to -1 if the input does not exist or to disable the input if it is faulty</p>
9	Input Definition - Double Plunge Out	8A	<p>Input ref associated with out position for the spindle double plunge cylinder Referenced to the IODef file Set to -1 if the input does not exist or to disable the input if it is faulty</p>
10	Spindle Frequency	3N	<p>Frequency (Hz) of the spindle</p> <p> ...This field is very important, as supplying a 50Hz signal to a 300Hz motor will result in permanent damage</p>
11	Double plunge Compliment Spindle	2N	<p>Spindle numer to activate as the opposit double plunge - should compliment the other spindle data (eg if 7 points to 3 then 3 points to 7)</p>
12	Reserved	8N	
13	Reserved	1N	

Field Format - Tools

No	Name	Format	Notes																		
1	Tool Number	1N	<p>Used in the main programming files (mnd files) to define which tool to use These are standardised number used on every Stuga ring for 20+years</p> <p>Spindle Standards</p> <table border="1"> <thead> <tr> <th>Tool Number</th> <th>Tool Description</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>3 or 4mm Spot Drill</td> </tr> <tr> <td>2</td> <td>10mm Router</td> </tr> <tr> <td>3</td> <td>5mm Router</td> </tr> <tr> <td>4</td> <td>12.7mm Router</td> </tr> <tr> <td>5</td> <td>V notch Blade 45 deg</td> </tr> <tr> <td>6</td> <td>V Notch blade 135 deg</td> </tr> <tr> <td>7</td> <td>16mm Drill</td> </tr> <tr> <td>8</td> <td>Special Tool</td> </tr> </tbody> </table>	Tool Number	Tool Description	1	3 or 4mm Spot Drill	2	10mm Router	3	5mm Router	4	12.7mm Router	5	V notch Blade 45 deg	6	V Notch blade 135 deg	7	16mm Drill	8	Special Tool
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2	Tool Description	20A	Description of the tool																		
3	Plunging Speed	4N	Speed (in 10th of mm/s) used when plunging the tool into the profile using the axis control. Selected when using sp=PIERCE command in mnd files																		
4	Cutting Speed	4N	Speed (in 10th of mm/s) used when cutting / routing with the tool. Selected when using sp=CUT command in mnd files																		

5	Tool Diameter	4N	Tool diameter(in 10th of mm/s) used when cutting / routing with the tool. Selected as a variable in mnd files programming (cdia) to tie in slot length or width to the cutter diameter
6	Reserved	4N	

Sample

[spindles]

1,0.0,4,SPIN1,SPPL1,SPDP1,SPHM1,SPTO1,-1,DPTO1,300,5,0,100,0
2,45.0,1,SPIN2,SPPL2,-1,SPHM2,SPTO2,-1,-1,300,-1,0,61809,0
3,90.0,2,SPIN3,SPPL3,SPDP3,SPHM3,SPTO3,-1,DPTO3,300,7,0,125886,0
4,135.0,3,SPIN4,SPPL4,-1,SPHM4,SPTO4,-1,-1,300,-1,0,111133,0
5,180.0,4,SPIN5,SPPL5,SPDP5,SPHM5,SPTO5,-1,DPTO5,300,1,0,16949,0
6,225.0,7,SPIN6,SPPL6,-1,SPHM6,SPTO6,-1,-1,300,-1,0,119262,0
7,270.0,2,SPIN7,SPPL7,SPDP7,SPHM7,SPTO7,-1,DPTO7,300,3,0,111452,0
8,315.0,3,SPIN8,SPPL8,-1,SPHM8,SPTO8,-1,-1,300,-1,0,0,0

[tools]

1,3mm Drill ,900,500,30,0,0000
2,10mm Router ,400,300,100,0,0000
3,5mm Router ,1000,800,50,0,0000
4,12.7mm Router ,300,300,127,0,0000
7,16mm Drill ,300,200,160,0,0000