Preparation for CNC Programming and Set-Up the machine

(with the MTS simulator)
Preparation and CNC Programming Steps

1. Preparation for CNC Programming
   - Analyze the workpart drawing
   - Prepare the work plan

2. SET-UP (select the blank, clamping and tools)

3. Write the NC Program
Analyze the work part drawing
## Preparation of the work plan

<table>
<thead>
<tr>
<th>Machining step</th>
<th>Type of tool, position in turret cutting data</th>
<th>Machining step diagram</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Determine blank dimensions</td>
<td>Cylinder D: 80 mm L: 122 mm Material: A1Mg1 Chuck: KFD-HS 130 Chuck jaws: HM-110_130-02.001 Clamping depth: 18.0 mm</td>
<td><img src="image1" alt="Diagram" /></td>
</tr>
<tr>
<td>2 Clamp blank Determine origin of workpiece coordinates</td>
<td></td>
<td><img src="image2" alt="Diagram" /></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td><img src="image3" alt="Diagram" /></td>
</tr>
<tr>
<td>4 Facing</td>
<td>LEFT HANDED CORNER CUTTER CL-SCLCL-2020/L/1208 ISO30 T0101 G96 S260 M04 G95 F0.250 M08</td>
<td><img src="image4" alt="Diagram" /></td>
</tr>
<tr>
<td>5 Straight roughing external profile</td>
<td>LEFT HANDED CORNER CUTTER CL-SCLCL-2020/L/1208 ISO30 T0101 G96 S260 M04 G95 F0.350 M08</td>
<td><img src="image5" alt="Diagram" /></td>
</tr>
</tbody>
</table>
### Preparation of the work plan (continued)

<table>
<thead>
<tr>
<th>Machining step</th>
<th>Type of tool, position in turret cutting data</th>
<th>Machining step diagram</th>
</tr>
</thead>
</table>
| **6** Finishing internal profile | BORING TOOL (POSTAXIAL)  
BI-SCAAAL-1010/L/0604 ISO30  
T1010 G96 S300 M04  
G95 F0.100 M08 | ![Machining step diagram](image) |
| **7** Finishing external profile | LEFT HANDED CORNER CUTTER  
CL-SVJCL-2020/L/1604 ISO30  
T0202 G96 S360 M04  
G95 F0.100 M08 | ![Machining step diagram](image) |
| **8** External Threading | LEFT HANDED THREADING TOOL  
TL-LHTR-2020/R/60/1.50 ISO30  
T0303 G97 S1000 M03  
G95 F1.5 M08 | ![Machining step diagram](image) |
## Preparation of the work plan (continued)

<table>
<thead>
<tr>
<th></th>
<th>Activity</th>
<th>Tool Details</th>
<th>Code</th>
<th>Feedrate (mm/min)</th>
<th>Spindle (rpm)</th>
<th>故</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>Cutting three external grooves</td>
<td>EXTERNAL RECESSING TOOL7</td>
<td>RI-GHILL-1013/L/01.10 ISO30</td>
<td>T0404 G97 S1000 M04</td>
<td>G95 F0.150 M08</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Cutting internal groove</td>
<td>INSIDE RECESSING TOOL (POSTAXIAL)</td>
<td>RI-GHILL-1013/L/01.10 ISO30</td>
<td>T1212 G97 S01000 M04</td>
<td>G95 F000.150 M08</td>
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</tbody>
</table>
Set-up the machine

This involves the following steps:

- **Selecting a workpiece type and workpiece material:**

  ![Diagram of workpieces and materials]

- **Selecting workpiece clamping device and clamping method:**

  ![Diagram of clamping devices and methods]

- **Assigning tools to tool turret positions and creating new tool data:**

  ![Diagram of tool assignment and data creation]
Open the SETUP dialog window

To open the setup dialog, press key **F7** on the main menu:
Assign a program name

Enter a new name for the CNC program, e.g. "Exercise 01" and then open the program:
Selecting a workpiece

First select the blank geometry – a cylinder in our example:

Specify the workpart dimensions:
- Input length = 80 mm,
- Input width = 122 mm
Selecting workpiece material

select the material menu:

select the material from the table and press "✓" to confirm:
Workpiece clamping selection
Selecting the clamping device and clamping configuration

Select the clamping device type:

![Image of clamping device selection]

and select the lathe chuck menu:

![Image of lathe chuck selection]
Select the clamping device configuration KSF250-3AsB and press ✔️ to confirm:
Select the chuck jaws menu:

select the chuck jaws configuration and press ✓ to confirm:
Zero point selection

The standard selection – „right side – center of the workpart surface“. Additionally this point can be moved incrementally in Z ± direction from the selected point:
Assigning tools to tool turret positions

P = Tool holder reference point
B1 = Length compensation in X
A1 = Length compensation in Z
F1 = Cutting radius
E1 = Value for l
D1 = Value for K
Select the „Tool system“ tab and then press „Edit“ button:
Press „Exchange“ button:

Select Tool type „Corner Tool Left“ and press to confirm:

<table>
<thead>
<tr>
<th>Tool type</th>
<th>Tool type</th>
<th>Tool type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boring Bar Postaxial (97)</td>
<td>Front Grooving Tool (50)</td>
<td>Internal Thread Tool Preax (51)</td>
</tr>
<tr>
<td>Boring Bar Preaxial (90)</td>
<td>in_Center Drill (29)</td>
<td>Recessing Tool (58)</td>
</tr>
<tr>
<td>Broaching Tool (2)</td>
<td>in_Twist Drill (197)</td>
<td>Round Nose Tool (24)</td>
</tr>
<tr>
<td>Center Drill (16)</td>
<td>Indexable Insert Drill (44)</td>
<td>Spotting drill (36)</td>
</tr>
<tr>
<td>Copying Tool (12)</td>
<td>Inside Recess Tool Postax (36)</td>
<td>Tap (53)</td>
</tr>
<tr>
<td>Corner Tool Left (79)</td>
<td>Inside Recess Tool Preax (36)</td>
<td>Threading Tool Left (52)</td>
</tr>
<tr>
<td>Corner Tool Right (78)</td>
<td>Internal Thread Tool Postax (52)</td>
<td>Threading Tool Right (50)</td>
</tr>
</tbody>
</table>
Select insert type CNMM 120404_PCLNL 2020 H 12_B1-30 2022 and press ✅ to confirm:
Select „OK“ button to confirm full Set-up information:

```
<table>
<thead>
<tr>
<th>Norm</th>
<th>Type</th>
<th>Name</th>
<th>Overhang</th>
<th>Diameter</th>
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<tbody>
<tr>
<td>1</td>
<td>Corner Tool Left</td>
<td>CNMN 120404_PCLNL 2020 H 12_B1-30 2022</td>
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<td>2</td>
<td>Corner Tool Left</td>
<td>DCMT 11T304_SDJCL 2020 H 11_31-30 2022</td>
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<td>3</td>
<td>Threading Tool Left</td>
<td>M63E 1.00-1SL_E15 2020 KL_B5-30 2022</td>
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<td>4</td>
<td>Recessing Tool</td>
<td>SE-1.85-0700-01NR_EF5-1.85-2020-K08L_B5-30 2022</td>
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<tr>
<td>5</td>
<td>in_Twist Drill</td>
<td>DR_Cob 2332 7.5(9.5) R_E4-3CLE 32x73</td>
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<tr>
<td>6</td>
<td>Boring Bar Postaxial</td>
<td>DCMT 070204_A12K - SDUCIL 07_E2-30 12x60</td>
<td></td>
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<tr>
<td>7</td>
<td>Inside Recess Tool Postax</td>
<td>SE-1.10-0700-01NL IGS-1.10-10-M33_E2-30 10x60</td>
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</tbody>
</table>
```

Tool set: [Edit...]
Active tool: T 1
Tool change point: Z [ ] X [ ] mm

[OK] [Cancel]
View of Set-up sheet information

Select „NC-Editor“ button:

and then press „Edit program“ button:

```plaintext
Setup sheet
Machine: "MTS M-LC R3 T16 VDI30"
Control: "MTS2010-Turn"
General Information
Creation time: "11.04.2011 16:29"
Workpiece
Cylinder: L80 DA122
Material: "Aluminium AlMgSi0.5"
Workpiece clamping
Clamping device: "DIN5028 A0\lathe Chuck\KSP250-3AsB"
Clamping device attachment: "AsB50V1.5x60\Step jaw\HM2-B50xL49_24_12xH75_45_15"
Type of chuck: External chuck outside step jaw
Chucking depth: Z118
Tailstock
Tailstock center: "KM4\Tailstock Center\KMK4-60-30-25_44"
Tailstock position: ZR1100 M10
Tool system
Tool set: empty
Tool list
Tool: "VDI30A\Corner Tool Left\CNMM 120044 PCLNL 2020 H 12_B1-30 2022"
```