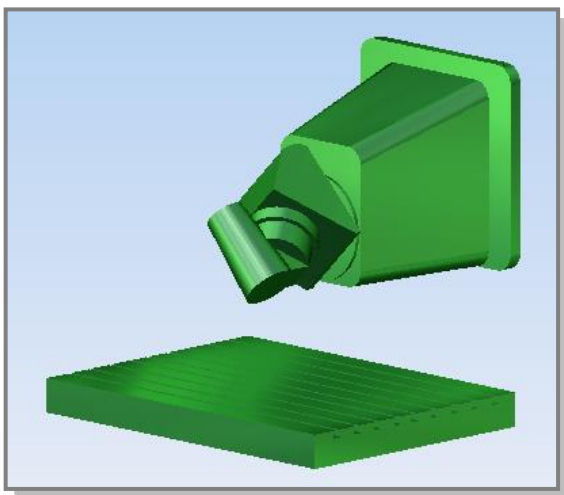
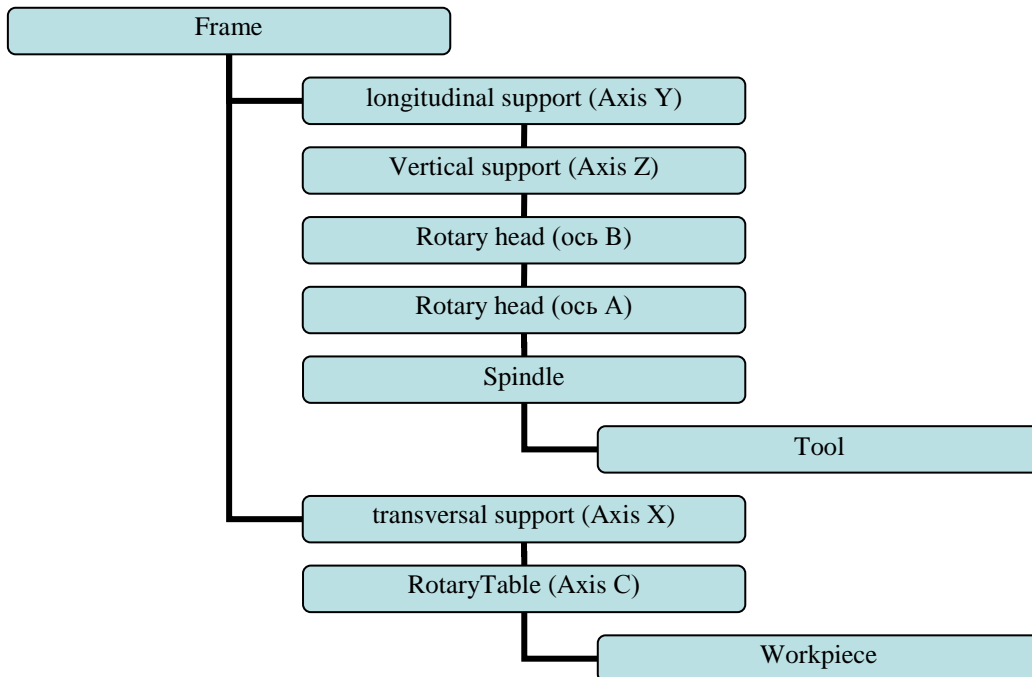


The addition of the machines to the SprutCAM

Introduction

SprutCAM supports a lot of machines. User can define own machine and can add it in the machine library. The machine kinematics, restrictions and other parameters are defined in the text XML file. So to create a new machine it is necessary to describe a new XML file and include it in the list. The machine schema is a tree of the nodes. Every machine node can move around parent node. Where are two types of the movements: linear and rotary. Usually the root of the schema tree is a machine frame and the end branches of schema tree are the tools and workpiece.



The creation of a new machine

1. Create a new folder in **C:\Documents and Settings\All Users\Application Data\Sprut Technology\SprutCAM\Version 7\Machines**
2. Create the machine file with XML extension using any text editor. Will be good if the editor supports the XML highlighting.
3. Copy the text below to the created file:

```

<?xml version="1.0" encoding="UTF-8" ?>
<SCCollection>
  <SCNameSpace ID="MachineRegistrar">
    <SCType ID="RegMachineName" Caption="Machine Name" type="TRegisterMachineRecord"
Enabled="True">
      <TypeName DefaultValue="MachineID"/>
    </SCType>
  </SCNameSpace>

  <SCType ID="MachineID" Caption="Machine Caption" type="AbstractMachine" Enabled="true">
    <GUID DefaultValue="{021E5610-31E1-478D-8C93-74891950DB27}"/>
    <Priority DefaultValue="161"/>
    <Name DefaultValue="Full Machine name"/>
    <Comment DefaultValue="Machine comment"/>
    <Image DefaultValue="Machine.bmp"/>
    <Icon DefaultValue="Mill_3Axis_ico.bmp"/>
    <ControlData>
    </ControlData>
    <MachineOperationsList>
    </MachineOperationsList>
    <MachineStateParameters>
    </MachineStateParameters>
    <Schema Caption="Frame">
    </Schema>
  </SCType>
</SCCollection>

```

4. Change the highlighted text in this file. The green text must be equal.
 - a. RegMachineName – just a unique name
 - b. Machine Name – will be out as a name of machine in the machine list
 - c. **MachineID** – internal machine ID
 - d. **GUID** – can be generated by GUIDGEN.exe and changed. You can find GUIDGEN.exe in internet. Change this parameter **necessarily**, The machines with the equal GUIDs are not impossible. If you do not have the GUIDGEN then change some digits in GIUD manually.
 - e. **Priority** – defines the order of machine in machine list
 - f. **Name** and **Comment** – output in machine description
 - g. **Image** – the name of the bmp file that contain the photo of machine. The file must be located in the same folder where machine is located
 - h. **Icon** - the name of the bmp file that contain the photo of machine. The file must be located in the same folder where machine is located
5. Add the reference to the new machine in the file “MachineList.xml”
6. Run SprutCAM and check the new machine in the machine list.
7. Shutdown SprutCAM

Basic sections of the machine descriptor

Basic machines described in the “C:\Program Files\Sprut Technology\SprutCAM 2007\Supplement\Machines\AbstractMachine.xml”. This file uses the types described in MachineTypes.xml. When a new machine is created it must be defined the ancestor machine (yellow below). Usually the ancestor machine is defined in AbstractMachine.xml.

Example:

```

<SCType ID="MachineID" Caption="Machine Caption" type="AbstractMachine" Enabled="true">

```

The **ControlData** section contains the parameters that define the specific of the toolpath:

- **DigitsTolerance** – the tolerance of the CL data for the current machine. (default 3 digits)
- **UseArc** – true if the CNC supports circle interpolation
- **MinArcLength** – minimal arc length. If shorter then arc is interpolated by cuts.
- **MaxArcRadius** – maximal arc radius. If more then arc is interpolated by cuts.
- **UseArcInXY, UseArcInYZ, UseArcInZX** –true if CNC supports the circle arcs in the corresponding planes.

The **MachineOperationsList** section defines the auxiliary operations specific for the current machine. Abstract machine has an “Abstract auxiliary operation”. This operation outputs in CLData any sequence of the commands. The next versions of SprutCAM will save the auxiliary operations as a prototype. At current moment new auxiliary operations are written manually in a text editor.

The **MachineStateParameters** section contains the list of the parameters that describes the state of machine. For example the position of the 5-axis milling machine can be described by the axes: X, Y, Z, A, C. These parameters appear in SprutCAM. The initial values of the parameters for any operation can be edited in SprutCAM and can be out in CLData with MultiGoto command. The parameter is defined by **TMachineStateParameter** type in MachineTypes.xml and has the next fields:

Address – these letters appears before the value in the MultiGoto command

Incr – the discrete for the discontinuous parameters. For the continuous axes Incr usually is equal 0.0001.

Min, Max – minimal and maximal values of the parameter. The range of the axis motion

InitialValue – start value of the parameter whet the machine is loaded.

Group – defines the section where the parameter appears in SprutCAM. Where are three sections: linear axes, rotary axes, and other parameters.

Priority – defines the output order in the dialog windows.

Enabled – set false if you want to hide this parameter

AxisControl – the control mode of the current axis. If the AxisControl is **continues** then parameter can be output by Multigoto command together with another continues parameters. If AxisControl is **indexed** or **manual** then parameter is output alone by Multigoto. Manual axes are not used for the automatically tool positioning. It can be set manually as initial value for the operation.

Order – defines the output order in MultiGoto command

ParameterType – (Geom, Tech) reserved

The **Schema** section describes the tree of the machine nodes. The type of the machine node is **TMachineAxis**. TMachineAxis is defined in MachineTypes.xml and has the next fields:

Matrix – defines the local coordinate system of the current node in the coordinate system of the parent node. This parameter will be described below

AxisType – defines the type of motion of the current node about the parent node. If AxisType is **linear** then current node shifts about the parent node. If **rotary** type then current mode rotates around parent.

VisualProperties – defines the default mode, color, transparency and other visual properties of the node to draw.

ImageFile – the file with 3d model of the current node. The extension of the file is *.OSD. The file must be located in the same folder like machine descriptor. These files are created by SprutCAM. To do it import any cad model in SprutCAM, select the surface or the surface group and execute command “Save as...” in popup menu of 3D model tabsheet.

Scale – Additional scale coefficient for the motion. All linear motions are performed in the linear measurement units (millimeters or inches). All rotary motions are performed in degrees. So the real machine axis position is the input axis position multiplied by the scale.

ParameterName – the reference to the according machine state parameter. Usually the machine axis and the machine state parameters are the complementary objects. One machine state parameter corresponds to one machine axis. Sometimes one machine state parameter corresponds to several axes. For example the 3 jaws of chuck (axes) corresponds to a one parameter (open diameter of chuck).

Direction – this value actual for the linear axes only. It defines the vector of the positive node motion in the node coordinate system (Parent LCS * Matrix).

Point – is not actual in the current version of SprutCAM.

The parameters editing of the existent machine

If you want to make a little change in the machine it means you want to create a new machine with other parameters. So create a new machine and define the desires ancestor. After that override the required parameters.

Example 1:

*It is necessary to change the positive direction of the 4th axis in the 4th-axis milling machine. To do it we must to set the **Scale** of the A axis to -1.*

```
<SCType ID="MachineID" Caption="Machine Caption" type="MillMachine4d" Enabled="true">
All lines of a header are required here!
  <Schema>
    <AxisA>
      <Scale DefaultValue="-1"/>
    </AxisA>
  </Schema>
</SCType>
```

Example 2

*It is necessary to define the node models for the abstract 5-axis machine. To do it we must to assign **ImageFile** for the every machine axis.*

```
<SCType ID="MachineID" Caption="Machine Caption" type="MillMachine5d" Enabled="true">
All lines of a header are required here!
  <Schema>
    <ImageFile DefaultValue="Frame.osd"/>
    <AxisX>
      <ImageFile DefaultValue="SupportX.osd"/>
    <AxisY>
      <ImageFile DefaultValue="SupportY.osd"/>
    <AxisZ>
      <ImageFile DefaultValue="SupportZ.osd"/>
    </AxisZ>
  </AxisY>
</AxisX>
<AxisA>
  <ImageFile DefaultValue="AxisA.osd"/>
<AxisC>
  <ImageFile DefaultValue="TableC.osd"/>
</AxisC>
</AxisA>
</Schema>
</SCType>
```
