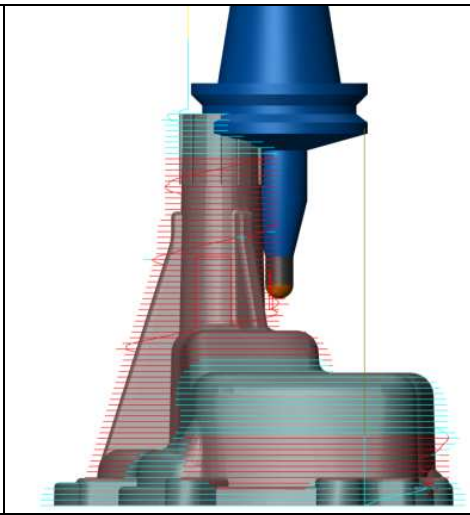
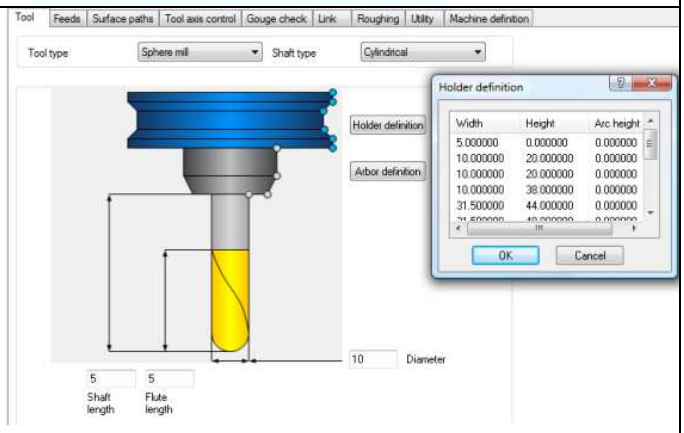
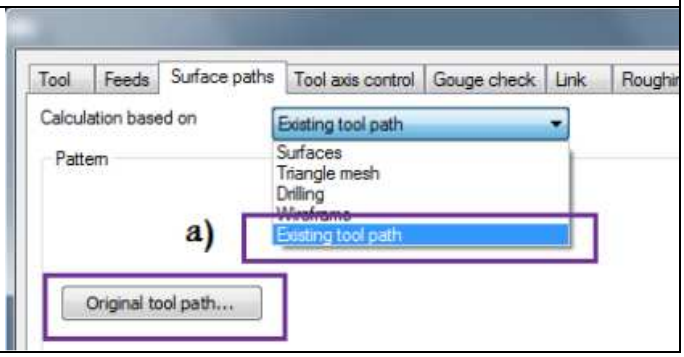
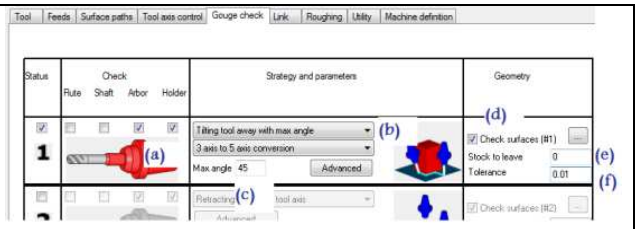
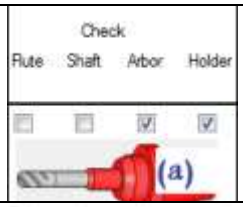
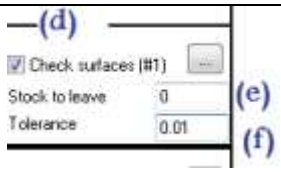
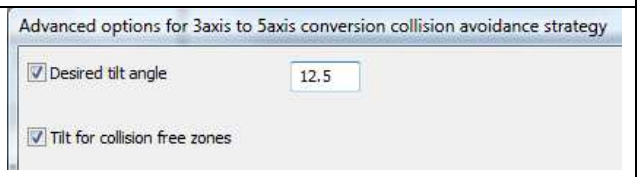
Using 3-5 Axis toolpath conversion for automatic collision avoidance

This example looks at how 3-5 Axis conversion of toolpaths can be used to avoid collisions between the stock and tool arbor/holder. This technique is particularly useful with deep cores or boss shapes and allows shorter series cutters to be employed, thereby improving surface finish.

Screenshots and graphical images are taken directly from the extensive ModuleWorks test harness application supplied to all of customers. Depending on implementation the target application may use different user interfaces and graphical display methods.

The first step is to load the target geometry and toolpath into the ModuleWorks test harness. Load the model.stl (or your chosen examples) In this case we are using a pre-defined 3-Axis toolpath from the host CAM system.	
Next, define the tool and holder geometry. This example uses a 10mm ball nose. Also make that both flute and overall shaft length are defined by entering the parameters in the dialog. The holder geometry is defined by selecting *'Holder Definition'* and entering the geometric definition into the dialog that follows. The points entered are revolved to generate a cylindrical representation of the holder.	
On the main dialog move to the '*Surface paths*' tab and select '*Existing toolpath*' from the *'Calculation based on'* drop down. Click the *'Original tool path'* button and specify the tool path loaded from disk. In this we will use 3AxToolpath.tpf, but again you may wish to use your own example.	

Now move to the 'Gouge Check' tab on the main dialog to specify the collision avoidance strategy. There are a number of stages to this (marked a) thru f) on the image. The detail is covered in the following steps.	
Firstly specify collision checking against *'Arbor'* and *'Holder' (a)*.	
Next specify the avoidance strategy by selecting specify *'Tilting tool away with max angle'* and *'3-5 Axis conversion'* (b). The maximum tilt angle is entered in the *'Max angle'* field, in this case 45 degrees (c).	
We are using check surfaces so tick the check box *'Check surface [#1]'* and click the button alongside to select an STL file making up the check surfaces. Also state the stock allowance (0.0) and tolerance (0.01) for collision checking ((e) and (f)).	
Finally click the 'A*dvanced*' button to bring up up this dialog. Check *'Desired tilt angle'* and specify a value of 12.5 degrees. This is used as the preferred tilt angle when a collision is found and will be used if this tilt angle is collision free. Also check *'Tilt for collision free zones'*. This option will maintain the preferred tilt angle even if no collision is present which will help to maintain a smooth tool path motion. Hit OK to return to the main dialog page.	

We are now ready to generate the final toolpath. Select OK on the main dialog page and the toolpath is calculated and shown. This can then be simulated and refined if necessary before posting out to the target machine tool.