

# Collision, Proximity and Overcut Detection

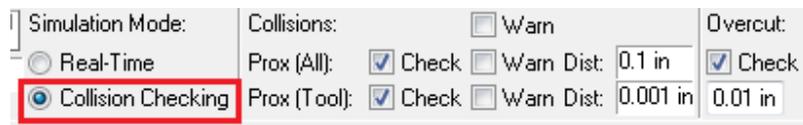
## 1.0 Enabling Collision Checking Mode

CAMplete TruePath will detect various errors in your program during "Collision" checking mode. Real Time simulations are only to see the motion in real time, but will not show you collisions or other problems.

You should always run Collision check simulations with the MACHINE MODE ON (ie. so you can see the machine) and Collision mode ON. To enable Machine Mode, click the Machine Move Mode button on the tool bar:



To Enable Collision Checking Mode, click Collision Checking on the simulation view:

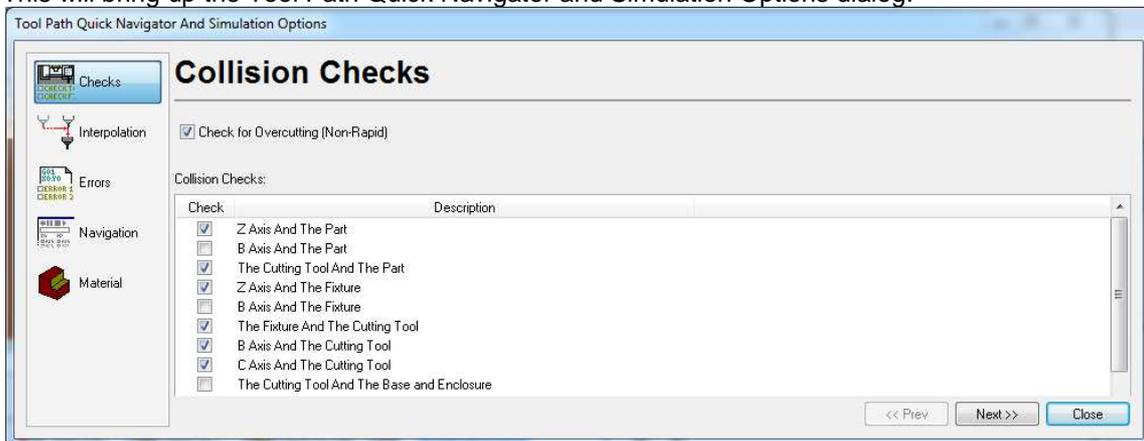


## 2.0 Collision Checking Preferences

Once you have Collision Checking mode enabled, it is time to confirm the Collision settings. Click Preferences on the simulation view:



This will bring up the Tool Path Quick Navigator and Simulation Options dialog:



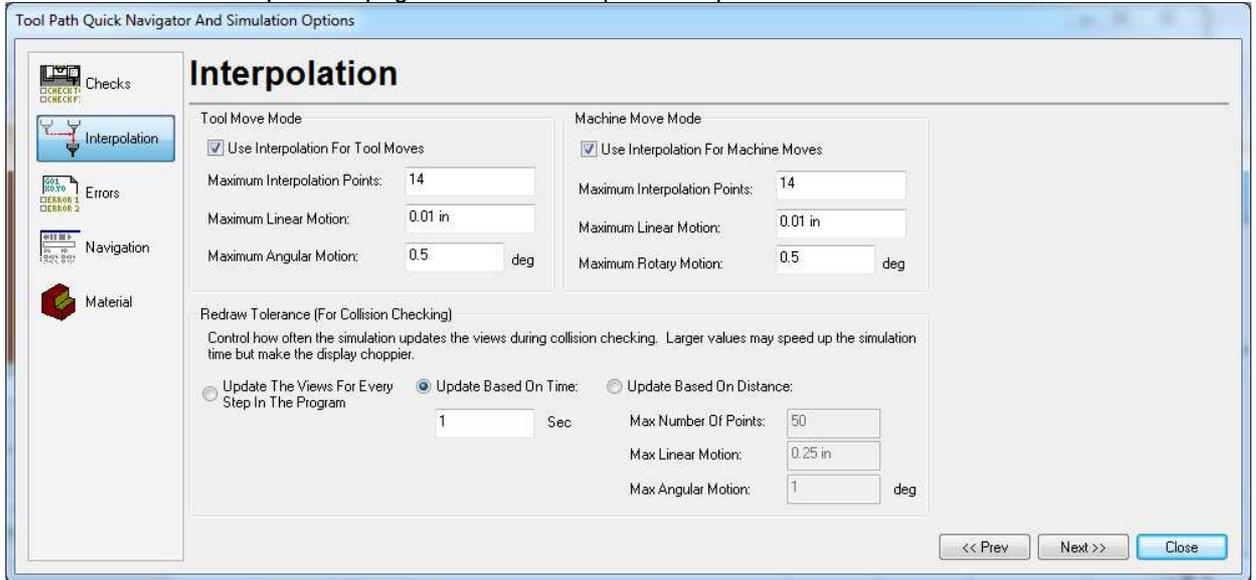
The Collision Checks page lets you control which parts of the machine/part/fixture are checked against each other. For example, on most machines, the tilt axis can never hit the enclosure of the machine, so this check will not appear. However, there are also instances where some collision will rarely occur. In the above machine, if you had a large part or fixture on the C-axis table, it could possibly hit the enclosure or the B-Axis. So there are checks for B Axis And The Part, B Axis and the Fixture, Enclosure and Part etc. However, if you knew you had a small part you can un-check those checks. That can speed up the simulation collision checking speed since less components will need to be checked.

**IMPORTANT: BE VERY CAREFUL WHEN CHANGING THESE SETTINGS TO MAKE SURE YOU DO NOT DISABLE ANY CHECKS THAT ARE IMPORTANT. IF YOU UNCHECK THE OPTION HERE, THAT COLLISION WILL NOT BE CHECKED.**

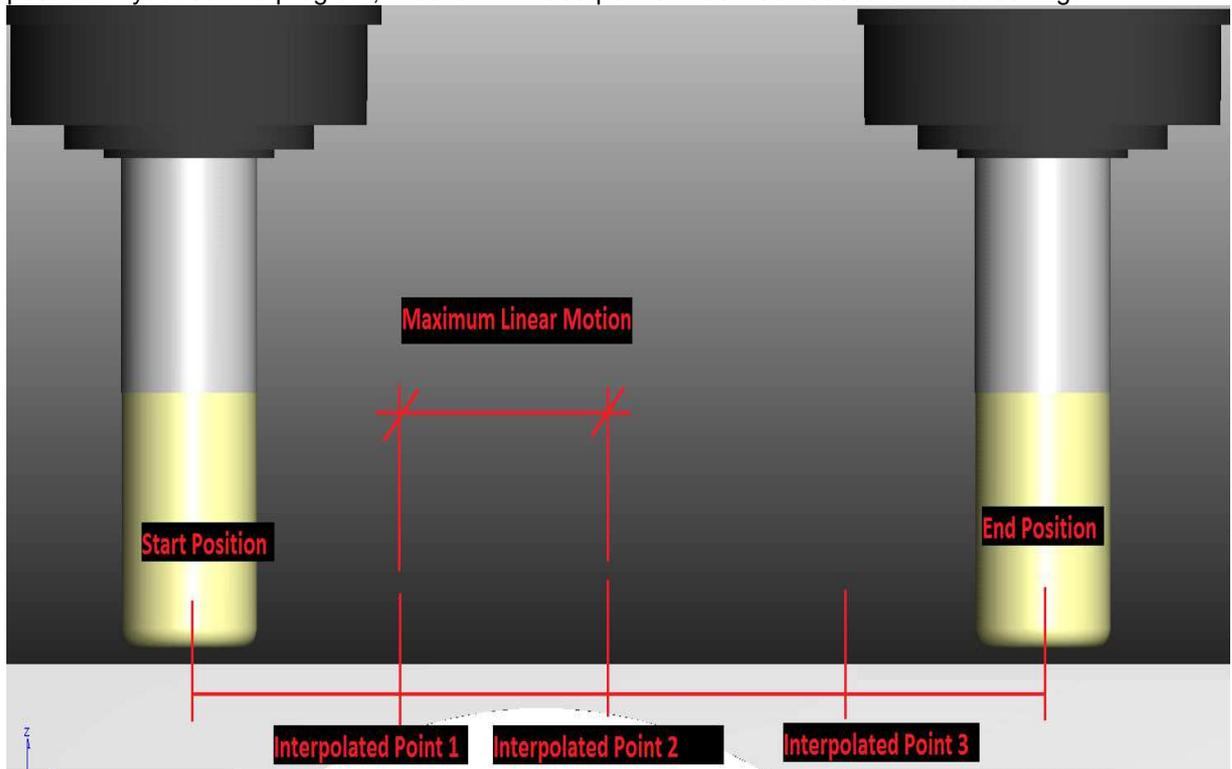
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Now switch to the Interpolation page to see the interpolation options:



The interpolation options control how many points are checked between program points. Between each position in your source program, TruePath will add points in-between based on these settings.



There are separate settings for Tool Move Mode and Machine Move Mode. The Maximum Interpolation Points sets the maximum number of points that can be inserted, Maximum Linear Motion sets the distance between each inserted point and Maximum Rotary Motion does the same thing for rotary moves.

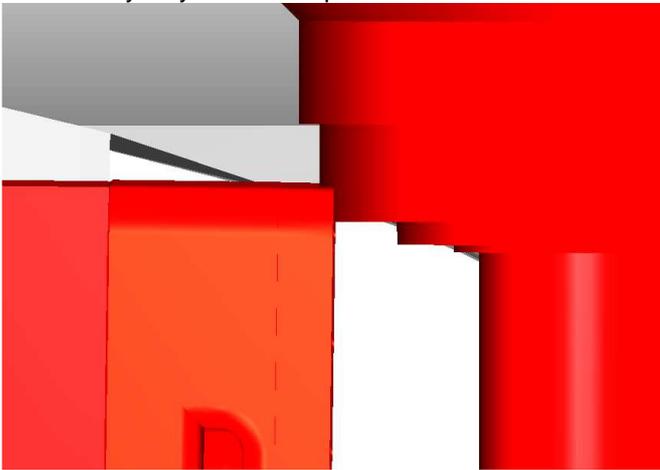
The Redraw Tolerance option controls how often the views are updated. The options are to update for every interpolated position, update based on time (every X seconds) or update based on the distance moved by the machines. View updating is CPU intensive and slows down the collision checking process

considerably. Using update based on time of 1 second is the recommended setting. Note that this ONLY controls how often the screen views are updated, not which points are checked. All interpolated points will still be checked. Also hiding parts of the machine does not remove them from the collision detection.

The collision updating speed can make it appear that simulation “jumps” around. This is because some moves can be simulated a lot faster than others. The simulation checking speed will always slow down when the tool is engaged in the part and speed when it’s away from the part. For this reason, it does not always appear that tool changes are happening. However, they are still happening and are checked, they just happen faster than the update speed.

### 3.0 Collision, Proximity and Overcut Detection

**Collisions:** Collisions are flagged whenever two components of the machine touch or interfere with each other in any way. For example:



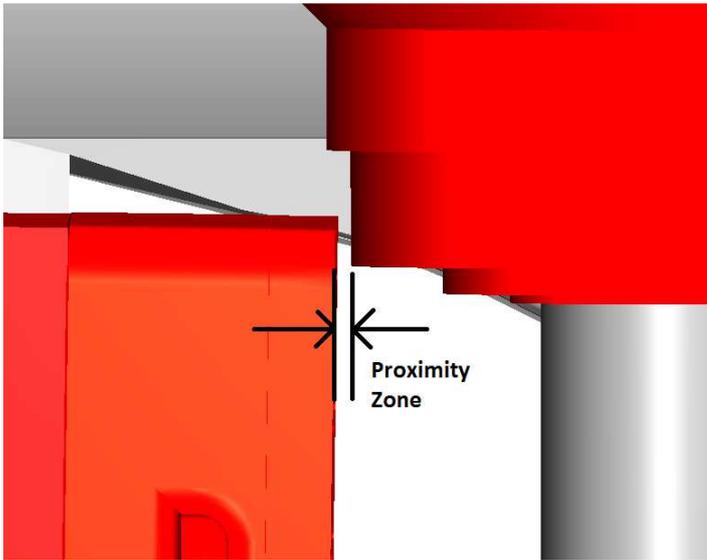
Cutting tools are the only exception to this rule. During simulation the CUTTING PORTION of the tool (the gold part) is allowed to touch the part during cutting moves only (G01 linear interpolation and G02/G03 arc interpolation). If the cutting portion touches the part during RAPID moves, it is considered a collision. Also, the non-cutting SHANK PORTION of the tool (the gray part) is not allowed to touch any other component even during cutting moves. These will always be flagged as collisions.

Collision checking cannot be turned off during collision checking simulations.

**Proximity:** Proximity Detection looks for the parts of the machine coming close to each other but not actually touching. This value sets the minimum distance that they can come to each other before a proximity violation is flagged:

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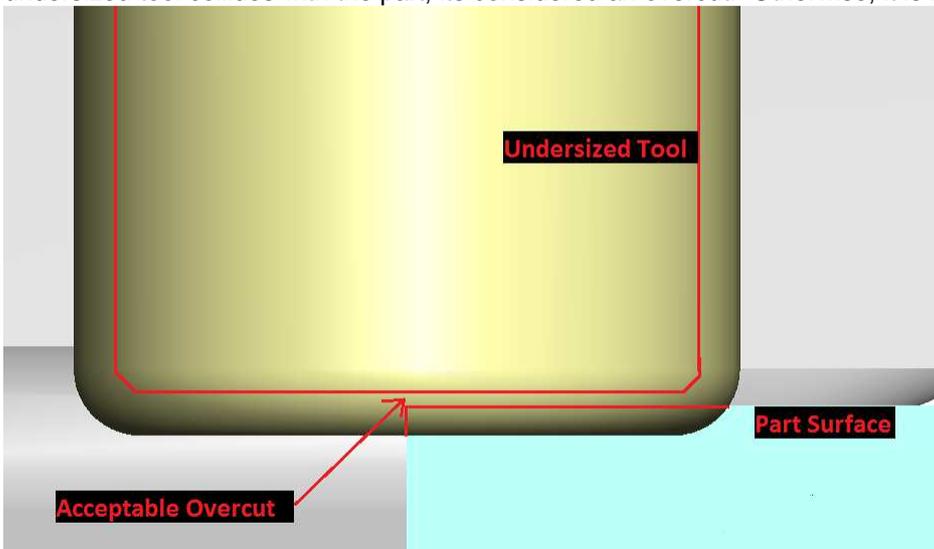
The Proximity is enabled by clicking Prox All and Prox Tool options and entering the minimum distance:



The Check options enable the proximity checking and the Warn options will stop the simulation when a proximity violation is found. The proximity values control the distances. For example, if you enter 0.01 inches as the proximity distance it will flag any cases where components are closer than 0.01 inches.

The Prox (All) sets the proximity distance for all of the components of machine, fixture, tool holder and part geometry. The Prox (Tool) controls the distance for the cutting tool to the part. This is because during cutting, the tool can get very close to the part.

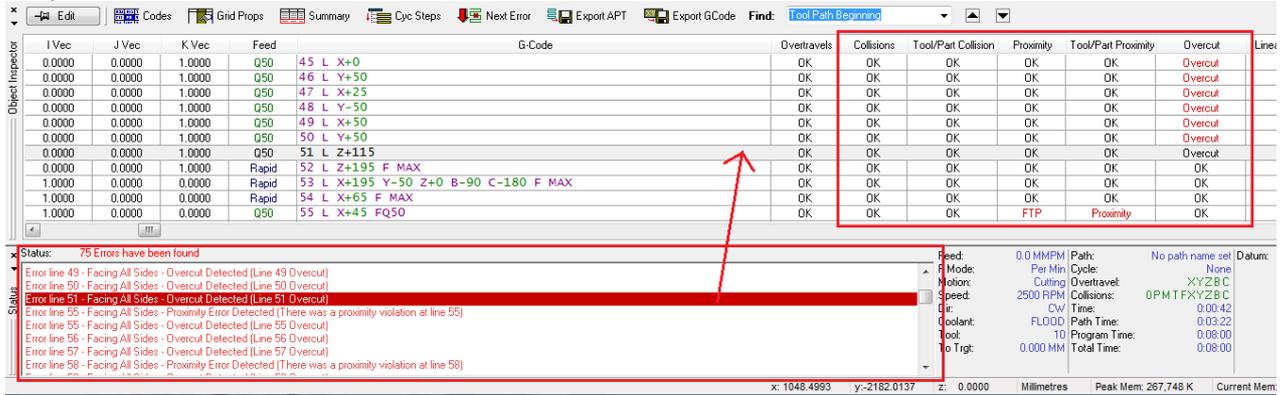
Overcut Detection: During cutting motions (G01/G02/G03) the cutting portion of the tool is allowed to touch the part. When Overcut is enabled, it only allows the tool to “gouge” the part by a certain distance. If the tool gouges the part by more than the given distance, it will be flagged as an overcut. One way to visualize that is to image a tool just like you cutting tool but undersized by the gouge checking amount. If this undersized tool collides with the part, its considered an overcut. Otherwise, it is not flagged:



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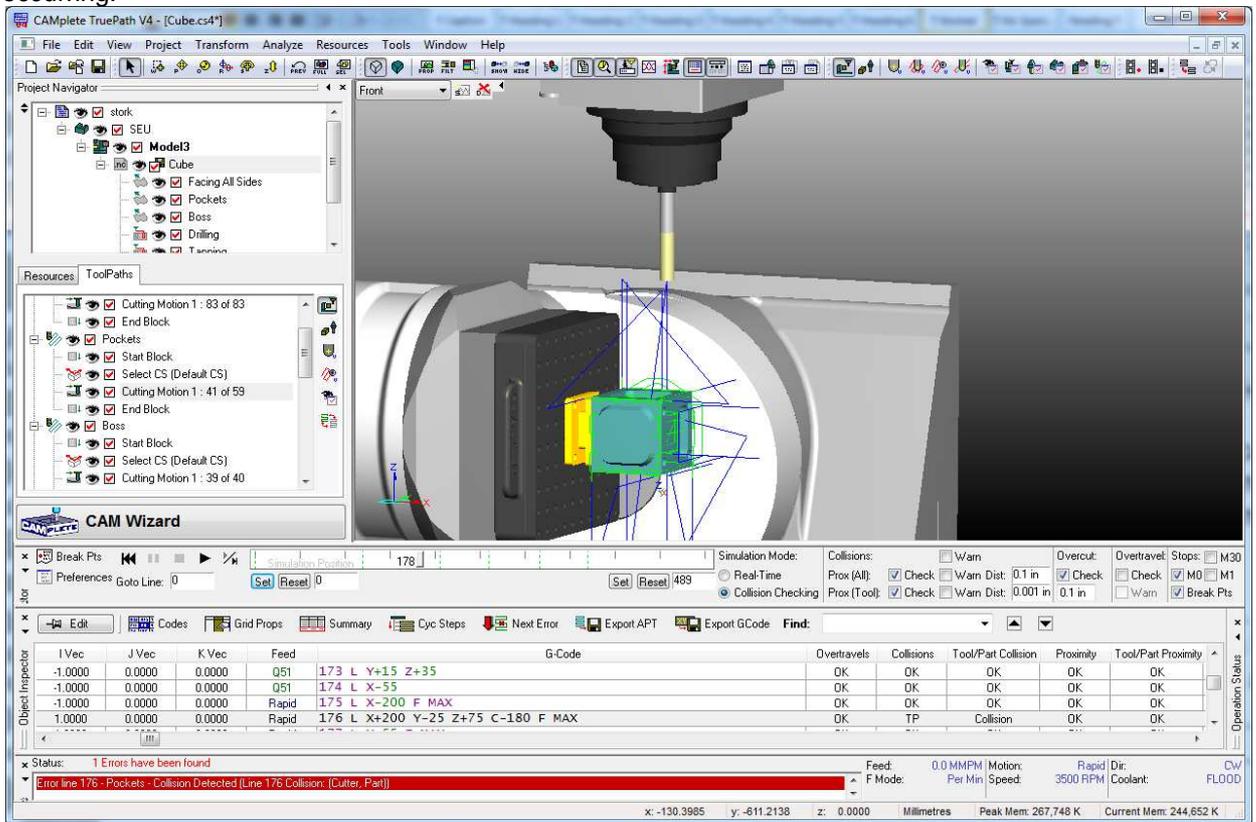
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During collision detection simulation, if any collision, proximity or overcut errors occur they are flagged in two places: the status window and in the columns of the Tool Path editor:



If you click on the error in the Status view, it takes you to that line in the program so you can see the error. The errors are also categorized by TYPE in the columns. There are Collisions (all machine parts), Tool/Part collisions for showing collisions between the cutting and the part or fixture, Proximity (all machine parts), Tool Part Proximity (tool versus the part) and Overcut.

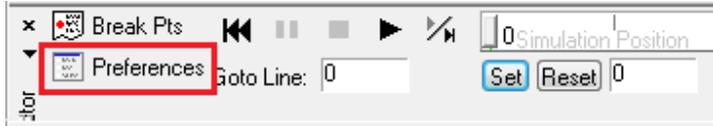
Sometimes, when a collision is shown, it might not be obvious where the collision occurs. In the example, below, a collision is shown on line 176. This means that collision occurred either right on line 176 or during the interpolation from line 175 to line 176. Clicking on 175 or 176 shows that no collision appears to be occurring:



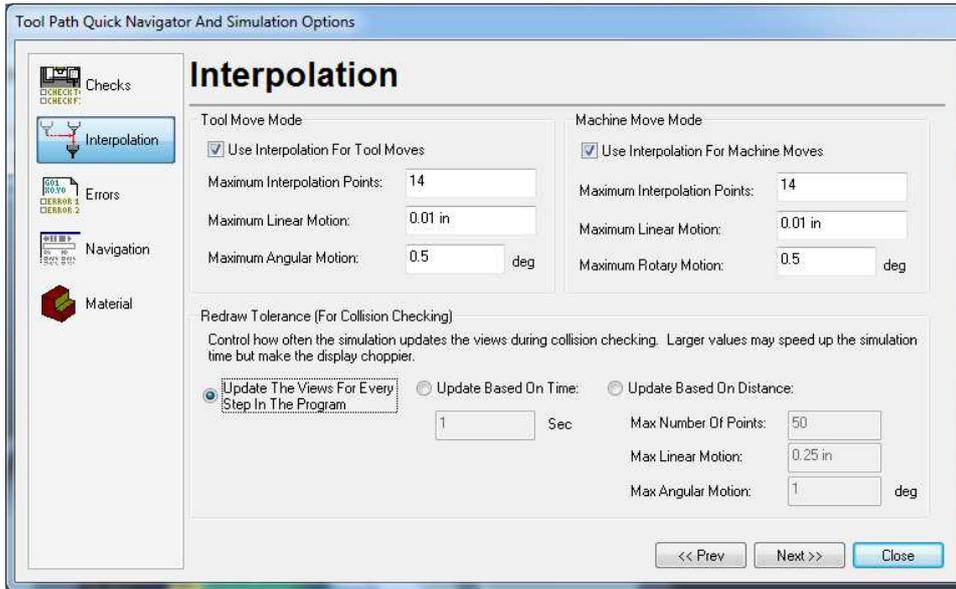
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So the collision must appear between the points. To see it clearly, click Preference again on the simulation tool bar:



On the Preferences page, switch the update to "Update The Views For Every Step In The Program":



Now, when you return to the simulation, move to the line BEFORE the collision (174 in this case) and click PLAY. You will see that the view updates as each interpolated position is checked. When the collision occurs, you will see it highlight in red:

