This document describes new features and enhancements introduced in MecSoft’s VisualCAD/CAM product.
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What’s New in VisualCAD/CAM 2019

This document describes the new functionality that is being introduced with the release of the VisualCAD/CAM 2019 product. This document is organized by listing and describing each of the enhancements incorporated into each of the constituent modules of VisualCAM.

**VisualCAD 2019**

The following enhancements have been made to VisualCAD 2019

1. Undo & redo view commands have been added to the view heads up toolbar in VisualCAD.

2. Better display support for high resolution (4K) has been implemented. VisualCAD now scales the icons up in the ribbon bar for higher resolution monitors so that they do not appear very small and hard to read.

3. When a view change command is invoked from the View toolbar, the existing view magnification factor is maintained. Previously a Fit View command would be performed by the system after the view is changed and bringing all of the displayable objects into view.

4. The Fit View command has been modified to perform the fit calculations about selected objects instead of all the objects in VisualCAD. When the user selects the Fit View command after selecting one or more objects, only these objects will be used in the fit view computations.

5. An option to allow curves to ignore depth testing in shaded mode has been implemented in the display options dialog. This allows for better visualization of wire frame geometry.

6. Dxf/Dwg translators have been updated using the latest OpenDWG libraries. The new libraries fix some important bugs in the translation of Dxf/Dwg files.

7. IGES/STEP/Parasolid/SAT translators have been updated with new libraries. This is a maintenance release with multiple bugs fixed in the translators.

8. Users can now edit a rectangle by directly entering the rectangle values in the properties dialog instead of having to always graphically define the rectangle.
VisualCAM 2019

VisualCAM 2019 is a plug-in that runs inside the VisualCAD 2019 CAD products and hosts the following modules:

1. MILL
2. TURN
3. NEST
4. ART

Each of these modules can be licensed and invoked separately of the other modules. This section describes the various enhancements and improvement to each of the modules.

MILL-TURN MODULE

A new MILL-TURN module is now included as a Beta release with the 2019 product. This module will be released during 2019 after some initial field testing by interested customers. This module will be a separately priced module that can be added to other modules or bought separately.
**What’s New in VisualCAD/CAM 2019**

**COMMON ENHANCEMENTS**

This section describes the common enhancements and changes to VisualCAM 2019, which is the base platform that hosts CAM modules such as MILL, TURN, NEST & ART.

1. A new licensing system from Nalpeiron Inc. has been incorporated in the 2019 product. This was introduced due to numerous issues encountered in the field with automatic transfer of node locked licenses when using the older libraries from Reprise Software Corp.
2. New simulation libraries from Machineworks has been incorporated into all the machining modules. These libraries have improved multi-threaded performance significantly as well as fixed many issues.

**WHAT’S NEW IN VISUALMILL 2019**

This section describes the enhancements and changes to the MILL module.

**CONFIGURATION CHANGES**

1. **The TURN module is now included with the STD,EXP,PRO,PRE configurations of the MILL product free of cost! Please note that it is NOT included in the Express (XPR) configuration.** A 2019 customer of a MILL license of STD,EXP,PRO,PRE configurations will now also be able to use the TURN module free of cost starting with the 2019 release.

   **The TURN module is now included with the STD,EXP,PRO and PRE configurations at no additional cost!**

**USABILITY ENHANCEMENTS**

1. A cutting depth value field has been added to all milling & turning tools as part of the tool properties. This cut depth value can be used in operations that require multiple depth passes.

![Diagram showing the tool properties with a cutting depth value field.]
2. Tool number conflicts are flagged before post-processing multiple operations. That is, when multiple machining operations using different tools but with one or more coincident tool numbers are posted, the user is notified of this condition.

3. Better display support for high resolution (4K) has been implemented. VisualCAM now scales the icons up in the ribbon bar for higher resolution monitors so that they do not appear very small and hard to read.

4. Loading of tool libraries and saving of tool libraries point to last loaded and last saved folders rather than the last accessed folder.

5. Tool preview is now performed in the Tool Coordinate System (also known as the Setup Coordinate System) to make visualization of the tool better.

6. When creating a cylinder stock, the axis of the cylinder is automatically set to the machine tool Z axis.

7. Removed the toolpath information box in the Toolpath Editor/Viewer to increase the display size. The information now is displayed in a single line on the title bar of the toolpath editor.

8. Setup information can now be displayed in the toolpath editor. Errors are flagged and displayed in the toolpath editor/viewer if the setup orientation is not reachable.

FEATURE BASED MACHINING ENHANCEMENTS

1. Feature Detection and Machining tab can now be displayed in the main Machining Browser by setting an option in the Features Preferences dialog. This will allow users who use Feature Based machining often an easier access to Feature Detection and Machining functions.

2. A new Feature Type called Silhouette Feature has been implemented. This feature can be useful when it necessary to profile the outer boundary or silhouette of a part model. The allowable machining operations for this feature type are 2 ½ Axis Profiling and Roughing.
The various types of features currently detected and machined in VisualCAD/CAM is shown below.

<table>
<thead>
<tr>
<th>Feature Types Detected</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hole</td>
</tr>
<tr>
<td>Prismatic Pocket</td>
</tr>
<tr>
<td>Open Prismatic Pocket</td>
</tr>
<tr>
<td>Boss</td>
</tr>
<tr>
<td>General Pocket (3 Axis)</td>
</tr>
<tr>
<td>Slot</td>
</tr>
<tr>
<td>Open Slot</td>
</tr>
<tr>
<td>T-Slot</td>
</tr>
<tr>
<td>V-Slot</td>
</tr>
<tr>
<td>Open General Pocket (3 Axis)</td>
</tr>
<tr>
<td>Planar Face</td>
</tr>
<tr>
<td>Fillet</td>
</tr>
<tr>
<td>Chamfer</td>
</tr>
<tr>
<td>Stepped Prismatic Pocket</td>
</tr>
<tr>
<td>Silhouette</td>
</tr>
</tbody>
</table>
What’s New in VisualCAD/CAM 2019

2-AXIS ENHANCEMENTS

1. A new knife machining operation has been added to VisualCAM. This operation allows users to program drag knives for cutting operations on thin sheets of materials. The knife will be retracted and swiveled to make sure the knife can cut the input shape.

2. New cornering options for profile machining have been implemented. These corner options are used in various different applications such as wood working, laser cutting etc. These are shown below.

Outside Loop  Outside Sharp  Outside Sharp Limited
3. Adding clustering option in Sorting for Profiling and Engraving machining operations. This option keeps nested profiles together for machining and does not treat them as independent curves. An example of nested curves and associated toolpaths is shown below.

4. Using stock model silhouette automatically for 2½ Axis Facing as stock boundary if no drive regions as selected for machining. The system computes the stock model silhouette, and then moves it to the top most Z value of the stock geometry and uses this region as the outermost/stock region. This is shown below.
5. Skim clearance settings uses 3D geometry if present in the model to compute the skim clearance heights. In previous versions, transfer motions ignored 3D geometry if present. In the 2019 version transfer motions consider 3D geometry in the calculation of the skim height. An example is shown below.

6. The Slot machining algorithm has been improved. Now the area between concentric circles are now treated as a single slot. In 2018 such cases would result in an error and with no toolpath being generated. An example is shown below.
### 3-AXIS ENHANCEMENTS

1. Trochoidal motions have been introduced for tool motions going from the start point to the first cut location. This reduces tool loading especially in high-speed machining. In 2018 the motion was a straight line inducing large amounts of tool loading. An example is shown below.

![Trochoidal Motion Diagram](image1)

2. Horizontal Clear Flats machining algorithm has been rewritten and been made more accurate. An example case is shown below.

![Clear Flats Machining in 2018](image2)

3. Adding clustering option in Sorting for 3 Axis Pocketing. This is similar to the clustering option added to 2 ½ Axis Profiling and Engraving machining operations.
4. Cut connection motions have been made smoother in parallel finishing. Arc fitting in these cut connection motions has also been implemented.

5. A new parameter called Minimum Cut Length has been added to Pencil Tracing toolpaths. This parameter allows for pruning small cuts in models that might result in too many small areas where pencil traces can be detected. In addition to this, the algorithm for Pencil Tracing has been revamped to handle large number of small areas with large performance improvements. An example is shown below.
What's New in VisualCAD/CAM 2019

4 AXIS TOOLPATH ENHANCEMENTS

1. When cut transfer is set to rapid, intermediate points are now not being output during transfer motions in 4 Axis continuous toolpaths. This allows the machine tool to rotate the part using an arc motion rather than using the linearized transfer motions that are computed by the system.

5 AXIS TOOLPATH ENHANCEMENTS

1. Machines with nutating heads can now be programmed. Nutating heads are heads where the primary axis of rotation and the secondary axis of rotation are not orthogonal (make a 90 degree angle). An example nutating head is shown below.

   ![Machine Tool Definition dialog for a Nutating Head Machine. The schematic of a Nutating Head is shown on the right. Here the C Axis (Red) Primary Rotation and the Nutating Axis (Green) Secondary Rotation.](image)

2. New variables have been introduced in the post to allow for posting in local coordinates. These variables allow mixing both World Coordinate System (WCS) coordinates and Setup Coordinate System coordinates in the same program. These variables are:

   \[ \text{START}_X_{\text{WCS}}; \text{START}_Y_{\text{WCS}}; \text{START}_Z_{\text{WCS}} \]
   \[ \text{CURR}_X_{\text{WCS}}; \text{CURR}_Y_{\text{WCS}}; \text{CURR}_Z_{\text{WCS}} \]
   \[ \text{NEXT}_X_{\text{WCS}}; \text{NEXT}_Y_{\text{WCS}}; \text{NEXT}_Z_{\text{WCS}} \]
   \[ \text{NEXT}_X_{\text{NONMDL}}_{\text{WCS}}; \text{NEXT}_Y_{\text{NONMDL}}_{\text{WCS}}; \text{NEXT}_Z_{\text{NONMDL}}_{\text{WCS}} \]
   \[ \text{NEXT}_X_{\text{ABS}}_{\text{WCS}}; \text{NEXT}_Y_{\text{ABS}}_{\text{WCS}}; \text{NEXT}_Z_{\text{ABS}}_{\text{WCS}} \]

DRILLING ENHANCEMENTS
1. User defined tools can now be used in drilling operations. This was done to allow multi-function tools to be defined as user defined tools and used in drilling operations. The available tools for Drilling operations are shown below.

FEEDS/SPEEDS ENHANCEMENTS

1. The Feedrate calculator has been enhanced to get the max spindle speed value from selected post into the feeds/speeds calculator. Maximum cut feed is also now obtained from the selected post.

SIMULATION ENHANCEMENTS

1. An option to stop simulation at the first error and display an error message has been implemented.
2. Collisions due to the shank of the tool, in addition to holder collisions, are now detected and flagged as errors.

3. Part/Stock comparison now displays the comparison results as soon as the Part/Stock comparison button is selected rather than waiting for the dialog to come up.

MACHINE TOOL SIMULATION ENHANCEMENTS

1. Additional machine tool models have been added as part of the installed machine tool simulation library.
What’s New in VisualCAD/CAM 2019

POST PROCESSOR ENHANCEMENTS

1. The ability to add coolant code after tool change rather than just before the first cut has been implemented.
2. Multiple new variables have been introduced to assist in 5 Axis programming.

BUGS FIXED

Over 100 bugs have been fixed to make the product more reliable and robust.

WHAT’S NEW IN VISUALTURN 2019

1. Solids with milling features can now be selected as part geometry in TURN. The solid will be spun about the turning axis and the actual TURN part geometry will be created. An example is shown below.

![Solid part with milling features selected as TURN Part](image)

![System created TURN Part geometry](image)

WHAT’S NEW IN VISUALNEST 2019

This section describes the enhancements and changes to the NEST module of VisualCAM 2019.

1. 3D Parts nesting has been implemented. Users can now select 3D parts such as door panels as parts in the Nesting module.
3D Parts staged for nesting in a rectangular sheet  

Partial results of nesting in one of four sheets

2. Rectangular sheets can now be defined parameterically instead of having to create geometry to represent them.

![Select Sheet(s) to Nest Parts in dialog](image)

3. The Preview & Commit Nest dialogs have been split into two for added usability. This is shown below.
4. Parts that have not been nested in a sheet can now be identified by highlighting them graphically.
5. The UI of some of the dialogs have been redesigned to be able to fit in a standard monitor of resolution 1440x900.
6. The Execute Nest button now automatically advances to the Preview Nest dialog and displays the preview of the nesting.

**What’s New in VisualART 2019**

No major enhancements were introduced in the ART module. Selected user reported bug-fixes were implemented.