Minute! Virtual Workbench Operation Manual

2017.May.28
Revision 2
Division Engineering

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Restriction

・If you don't use DirectX API Level11 or OpenGL API Level3 GPU, application error is occurred.

・System expects GCode file that is created by Minute! Powered By CACAM.

・System can process only one GCode file at a time.

・System cannot process Subprogram-Calling.

・Suporting GCode Command : Please refer to the section "".

・If you install application in your custom location, you have to change the "Resource Config File" by hand. In such case please refer to the section "".

Configuration File

・Minute! Virtual Workbench directory hierarchy is as follows:

```
1  %USERPROFILE%\
2    + Documents\
3      + MinuteVWorkbench\
4        + bin\                [Configuration and Cache Directory]
5          - ogre.cfg          [Display Configuration File]
6          - resources2.cfg    [Resource Configuration File]
7        + Machine\
8          + DivEng\           [Sample Machinary Directory]
9            + BFG-6A\         [Sample Machine Directory]
10             + mesh\         [Sample Mesh Directory]
11               - *.mesh      [Mesh File]
12             + material\     [Sample Color Directory]
13               - *.material  [Material File]
14
15 Any Directory\
16   + In\
17     + Post\
18       - Machine_nicbca.xml [Axis Configuration File]
19     - VWorkbench.xml       [Simulation Project File]
20   + Out\                   [GCode Directory]
21     + Any File             [GCode File
```

#	Type	Desctiption
1	OS Folder	
2	OS Folder	
3	Application Folder	Installer creates this.
4	Application Folder	Installer creates this.
5	File	Graphics Configuration file
6	File	Resource Configuration File
7	Application Folder	Installer creates this.
8	Sample Folder	User can customize this name.
9	Sample Folder	User can customize this name.
10	Sample Folder	User can customize this name.
11	Sample File	Mesh files folder. User can customize this name.
12	Sample Folder	User can customize this name.

13	Sample File	Material files folder.User can customize this name.
15	Application Folder	Minute! Powered By C3CAM cretas this folder. In “%USERPROFILE%¥Minute!¥Session” folder.
16	Application Folder	
17	Application Folder	
18	Configuration File	Axis Configuration File. Minute! Powered By C3CAM uses this file while calculating. Please refer to” Minute! Axis Configuration File Operation Manual”
19	Configuration File	Virtual Workbench Project File. Minute! Powered By C3CAM creates this file while calculation.
20	Application Folder	
21	GCode File	

Resource Configuration File

・This file can point to the folder of Machine.

・Last 2 lines(18 and 19lines) indicates that pointing to the folder of Machine. This Machine folder is installed by Installer as a sample. The description of folder is based on the below folder

%USERPROFILE%¥Documents¥Minute V Workbench¥bin

Note:

You can also use absolute folder style.

・If you customize the location of application while installing, you should replace from the folder, “C:\Program Files\Division Engineering\Minute! Virtual Workbench” to the folder of yours.

```
1  # Do not load this as a resource. It's here merely to tell the code where
2  # the Hlms templates are located
3  [Hlms]
4  DoNotUseAsResource=C:\Program Files\Division Engineering\Minute! Virtual
5  Workbench\Media_Template
6
7  [General]
8  FileSystem=C:\Program Files\Division Engineering\Minute! Virtual Workbench\MYGUI_Media
9  FileSystem=C:\Program Files\Division Engineering\Minute! Virtual Workbench\Media/compositors
10 FileSystem=C:\Program Files\Division Engineering\Minute! Virtual Workbench\Media/font
11 FileSystem=C:\Program Files\Division Engineering\Minute! Virtual Workbench\Media/gui
12 FileSystem=C:\Program Files\Division Engineering\Minute! Virtual
13 Workbench\Media/system_material
14 FileSystem=C:\Program Files\Division Engineering\Minute! Virtual Workbench\Media/system_mesh
```

```
15  FileSystem=C:\Program Files\Division Engineering\Minute! Virtual Workbench\Media/shader
16  FileSystem=C:\Program Files\Division Engineering\Minute! Virtual Workbench\Media/texture
17
18  FileSystem=..\Machine\DivEng\BFG-6A\mesh
19  FileSystem=..\Machine\DivEng\BFG-6A\material
```

Mesh File

・Mesh File format : Ogre V2 Mesh

・If you convert from various CADFormat(ex. STL,IGES,STEP…) , you can use utility in Minute! Powered By C3CAM. Please refer to" Minute! Powered By C3CAM Operation Manual."

・The name of Mesh file is specified in Axis Configuration File. Please refer to "Minute! Axis Configuration File Operation Manual.

Material File

・Material File Format : Ogre Hlms Json

・You can customize various shading properties. Normally you can change below items to change the model color :

- Line 33 : In the "pbs" section : Change element name(ex. "BFG-6A-BASE" to your mesh file name without extension)。
- Line 43 : In the diffuse element : Sets the color value(R,G,B).. The value range is from 0.0 to 1.0

```
1   {
2
3           "macroblocks" :
4           {
5                   "Macroblock_0" :
6                   {
7                           "scissor_test" : false,
8                           "depth_check" : true,
9                           "depth_write" : true,
10                          "depth_function" : "less_equal",
11                          "depth_bias_constant" : 0,
12                          "depth_bias_slope_scale" : 0,
13                          "cull_mode" : "clockwise",
```

```
14                              "polygon_mode" : "solid"
15                      }
16              },
17
18              "blendblocks" :
19              {
20                      "Blendblock_0" :
21                      {
22                              "alpha_to_coverage" : false,
23                              "blendmask" : "rgba",
24                              "separate_blend" : false,
25                              "src_blend_factor" : "one",
26                              "dst_blend_factor" : "zero",
27                              "blend_operation" : "add"
28                      }
29              },
30
31              "pbs" :
32              {
33                      "BFG-6A-BASE" :
34                      {
35                              "macroblock" : "Macroblock_0",
36                              "blendblock" : "Blendblock_0",
37                              "shadow_const_bias" : 0.01,
38                              "workflow" : "specular_fresnel",
39                              "brdf" : "default_uncorrelated",
40                              "diffuse" :
41                              {
42                                      "value" : [0.192157, 0.192157, 0.192157],
43                                      "background" : [1, 1, 1, 1]
44                              },
45                              "specular" :
46                              {
47                                      "value" : [1, 1, 1]
48                              },
49                              "fresnel" :
50                              {
51                                      "value" : 0.818,
52                                      "mode" : "coeff"
53                              },
54                              "roughness" :
55                              {
```

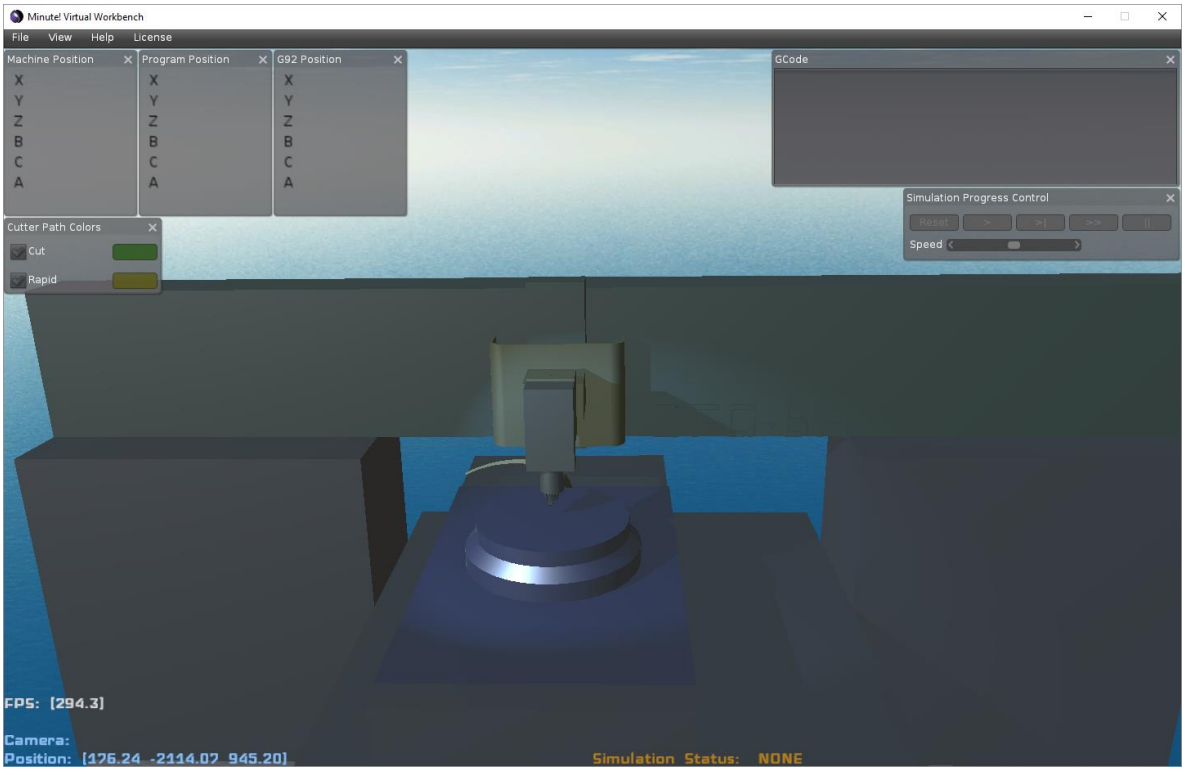
```
56                                          "value" : 0.2
57                                  }
58                          }
59                  }
60      }
```

Starting Application

You can see below icon in the desktop. You can start application in 2 ways.

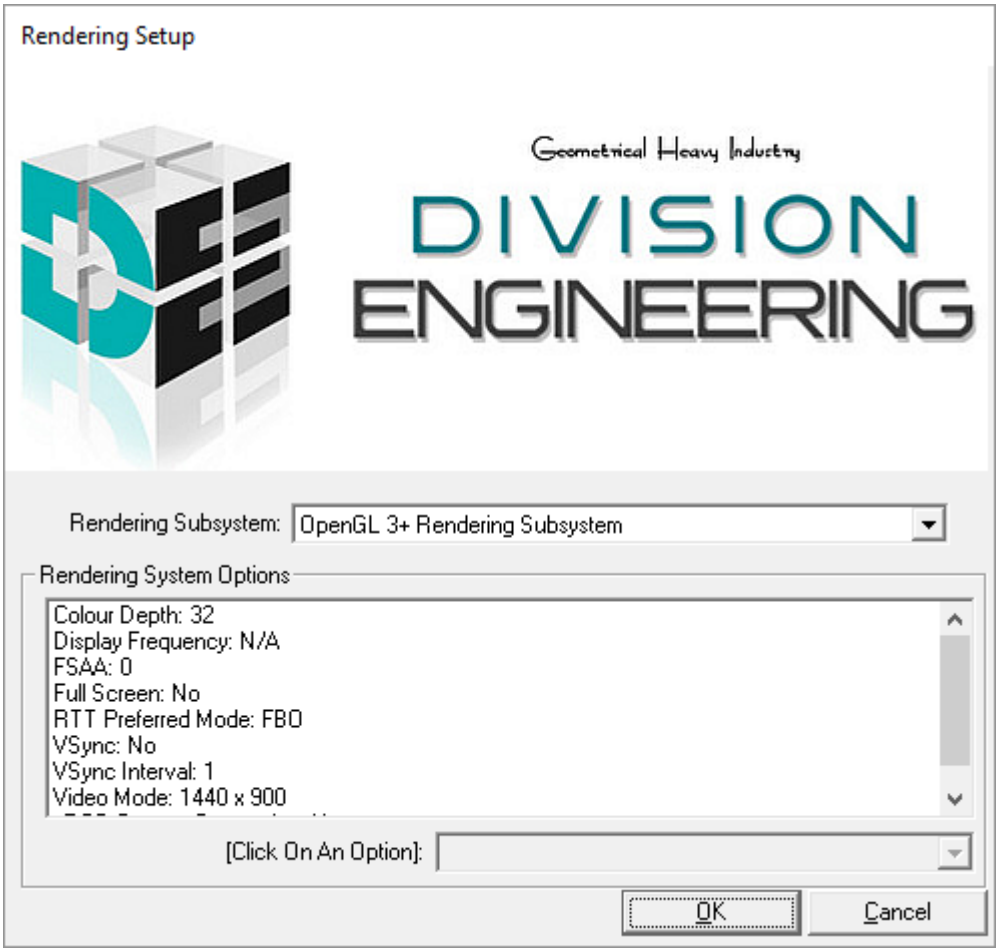
START NORMALLY

Select "VWorkbench.xml" file. That is the project file of Virtual Workbench. And then drag the file to the icon. If application is started, you can see below window.



START RENDERING SETUP

Double Click the desktop icon without drag and drop. You can see “Rendering Setup” window.



Setting items as follows:

- “Full Screen” : Select full screen or not.
- “Video Mode” : Set display resolution
- “OK” : Save rendering configuration and stop application. If you start application normally agnain, the changes takes effect.
- “Cancel” : Discard changed and stop application.

Note:

The configuration is saved into below:

%USERPROFILE%¥Documents¥MinuteVWorkbench¥bin¥ogre.cfg

If you want to reset every configuration items, remove the file and restart application.

GUI

・File Menu:

- “Set Main Program”: Set GCode File to simulate.
- “Tip Point Analysis” : Checkbox. of creation of Tip Point File
- “Displacement Analysis” : Checkbox of showing Axis Displacement Chart.

・View Menu:

Change the panel show and hide.

・Help Menu

Shows dependencies and Composer website.

・Simulation Progress Control Panel

“Reset” Button : Reset simulation.

“>” Button : Start simulation.

“>” Button : Proceed one block

“>>” Button : Forward simulation.

“||” Button : Pause simulation

“Speed” Button : Change speed.

・Cutter Path Colors Panel

“Cut” Button : Show or Hide Cutting Move Path

“Rapid” Button : Show or Hide Rapid Move Path

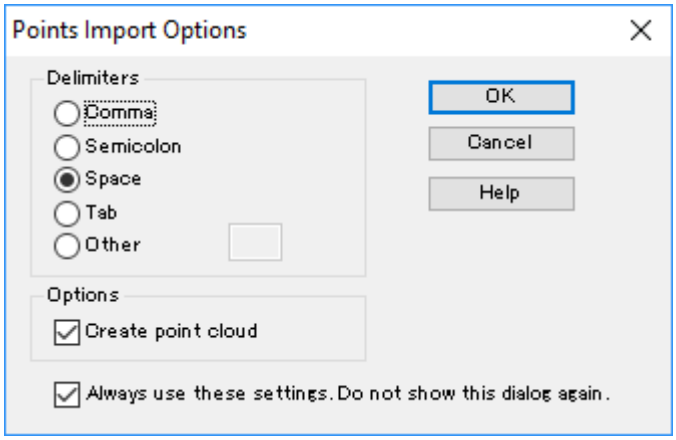
Tip Point Analysis

・Set true to “Tip Point Analysis” in the File menu and run simulation. You can get “.asc” file in the same of GCode’s folder. This file is “Tip Point File”.

・”Tip Point File” is a simple point data file.

・You can see deviation chart using Rhinoceros5. Instruction of Useful 3 commands as follows:

- “Import” : Import “Tip Point File” into current layer. Set delimiter to “Space” in the option panel.

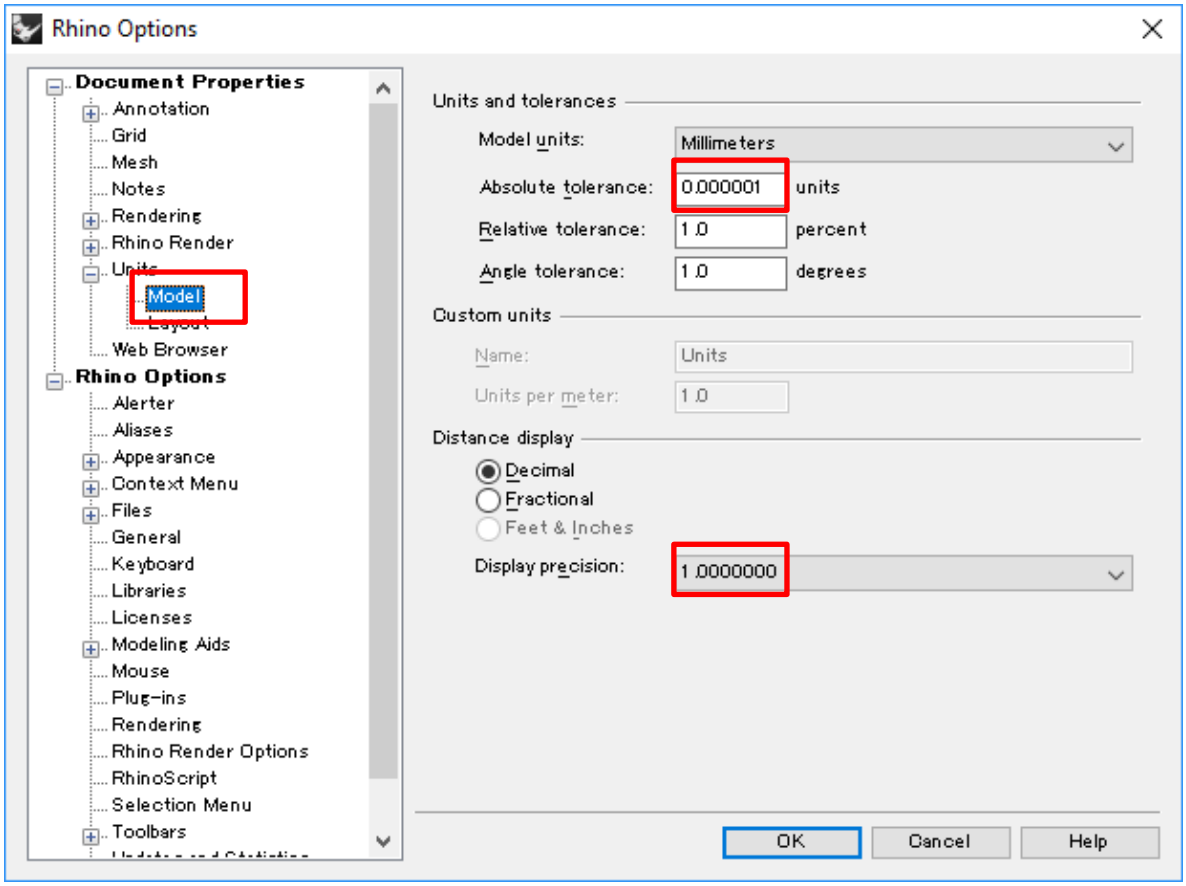


  By default, Rhinoceros 5 imports points as “Point Cloud” type. To recognize point each other, use “Explode” command.

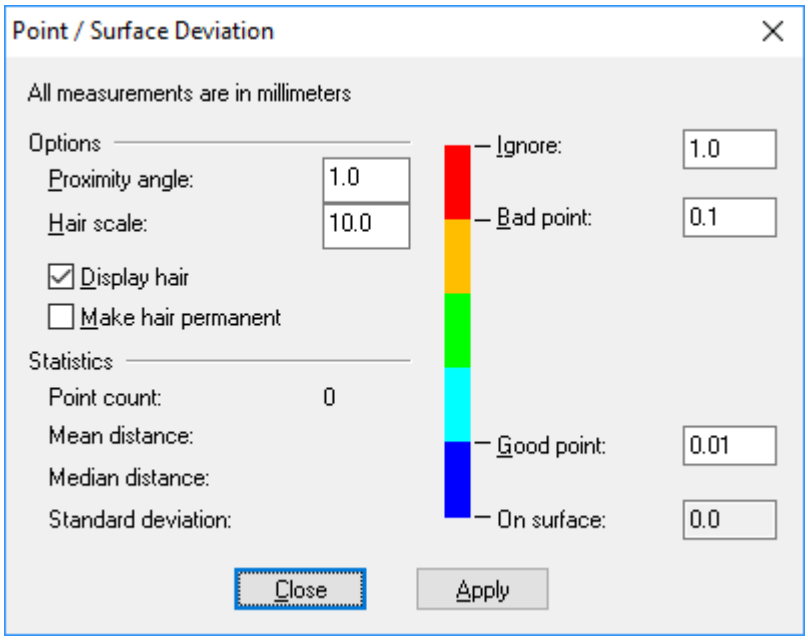
- “ClosestPT”: Major distance between point and surface.

Note:

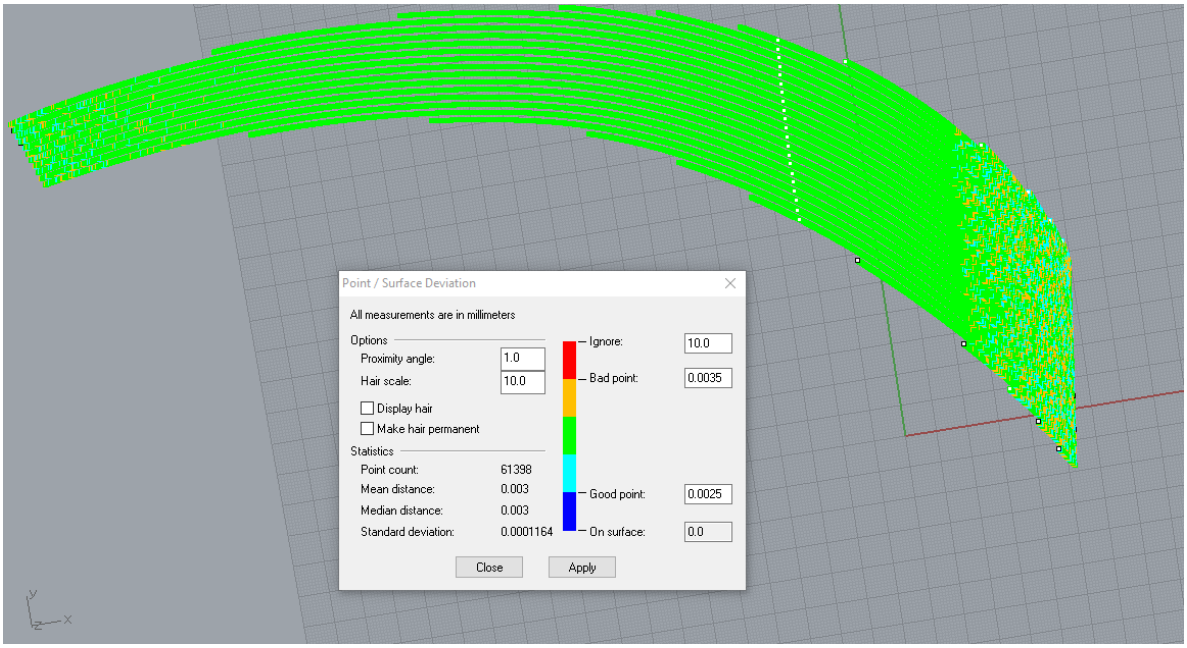
Change proper tolerance of distance below panel:



- “PointDeviation” :Reports the distance between selected points and a surface.



Below figure indicates that report deviation between +−0.0005 and ,−0.0005.



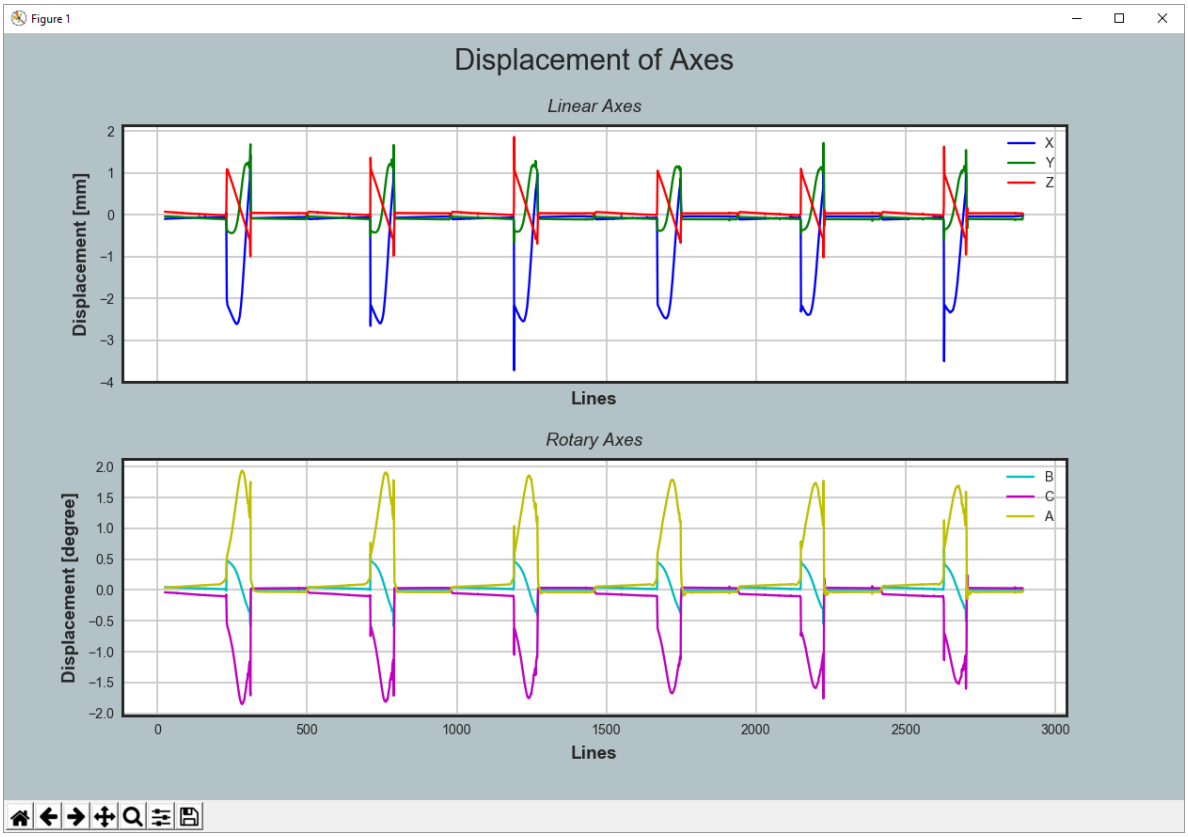
・Sample file of “Tip Point File”:

```
# tip point file
# Minute! Virtual Workbench
0.00000000 0.00000000 0.00000000
0.00000000 0.00000000 100.00000000
0.00000000 0.00000000 100.00000000
35.61877552 -6.88394910 198.19830417
35.61877552 -6.88394910 100.00007417
35.61877552 -6.88394910 53.24380417
35.61877552 -6.88394910 53.24380417
35.61877552 -6.88394910 53.24380417
```

Axis Displacement Analysis

・Set true to “Displacement Analysis” in the File menu and run simulation. You can see Axis Displacement Chart at the end of simulation. Buttons can change the range of analysis.

・Displacement analysis ignores rapid move.



“Home” Button : Reset move and zoom.

“Move” Button : Move graph.

“Zoom” Button : Drag graph. to zoom

“File” Button :Export chart to file.

・Sample file of “Displacement File”:

```
# X Y Z B C A
25 0.18900000 -0.05816000 -0.25130000 0.05490000 -0.00555000 0.00300000
26 0.19000000 -0.05816000 -0.25130000 0.05500000 -0.00554000 0.00500000
27 0.19100000 -0.05817000 -0.25130000 0.05500000 -0.00555000 0.00100000
28 0.19100000 -0.05818000 -0.25130000 0.05500000 -0.00556000 0.00300000
29 0.19100000 -0.05818000 -0.25130000 0.05510000 -0.00556000 0.00700000
30 0.19100000 -0.05819000 -0.25130000 0.05520000 -0.00556000 -0.01000000
31 0.19200000 -0.05819000 -0.25140000 0.05520000 -0.00557000 0.02300000
32 0.19300000 -0.05829000 -0.25140000 0.05530000 -0.00556000 0.09000000
33 0.19200000 -0.05846000 -0.25110000 0.05530000 -0.00554000 0.12600000
```

```
11    34 0.19300000 -0.05865000 -0.25080000 0.05520000 -0.00551000 0.09900000
12    35 0.19300000 -0.05874000 -0.25050000 0.05530000 -0.00550000 0.04100000
13
```

Supporting GCode

GCode	Description	Note
G0	Rapid Move	
G1	Cut Move	
G92	Reset Program Coordinate	One Shot
G90	Incremental	
G91	Aboslute	
G53	In the machine coordinate system	One Shot

Trouble Shooting

・If application stops after change something in “Display Config”, copy original template file to your folder:

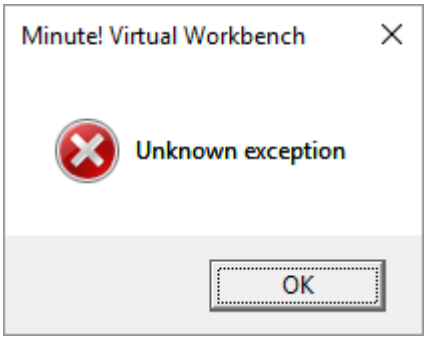
Copy Source

C:¥Program Files ¥Division Engineering¥Minute! Virtual Workbench¥Template¥ogre.cfg

Copy Destination

%USERPROFILE%¥Documents¥MinuteVWorkbench¥bin¥ogre.cfg

・Occasionally shader cache file failure is happened and application shows below message at the beginning.



In such case delete *hlsl, *.glsl and *.cache files.

%USERPROFILE%¥Documents¥MinuteVWorkbench¥bin¥.hlsl*

%USERPROFILE%¥Documents¥MinuteVWorkbench¥bin¥.glsl*

%USERPROFILE%¥Documents¥MinuteVWorkbench¥bin¥.cache*

Contact

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