

# Minute! Axis Configuration File Configuration Manual

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Revision 1

Division Engineering

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## Introduction

- This manual describes Instruction of Axis Configuration about below systems:
  - Minute! Powered By C3AM version
  - Minute! Virtual Workbench version
- Axis Configuration file can supply conversion information with converting coordinate systems between Work Coordinate System, Program Coordinate System and Machine Coordinate System. Also the file has information of generation of GCode and information of simulation.
- One Minute! Axis Configuration corresponds to one Machine.
- 

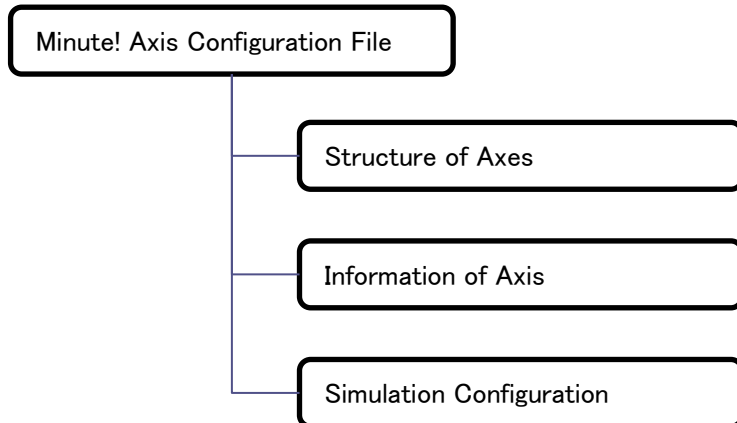
## Prerequisite

- File format is XML format.

- System uses Right hand coordinate system.

## Configuration General

- Minute! Axis Configuration File falls into 3 categories:



- XML Configuration sample of the categories is as follows:

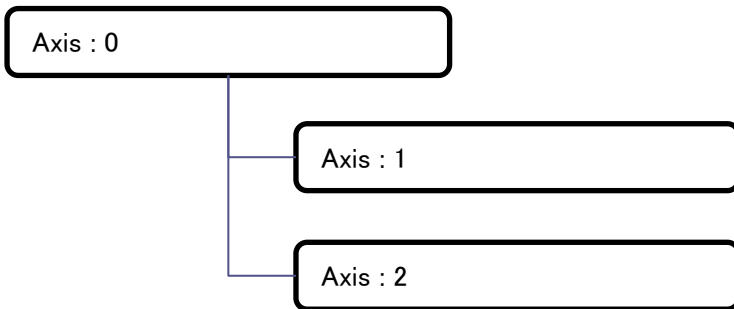
Note:

This is a sample to make them easier to follow. Strictly below is not proper file. There is complete sample at the end of this manual.

```
1 <?xml version="1.0"?>
2 <MinuteAxisConfiguration>
3
4   <machine name="nic-bca">
5     ... <!-- Structure of Axes -->
6   </machine>
7
8   <assemblies>
9     ... <!-- Information of Axis -->
10  </assemblies>
11
12  <workbench>
13    ... <!-- Simulation Configuration -->
14  </workbench>
15 </MinuteAxisConfiguration>
```

## Structure of Axes

- "Axis" has integer number as ID. Ex. 0,1,2...
- "Structure of Axis" means a hierarchical structure of axis. Below figure indicates that there is 2 structure between Axis 0, 1 and 2.



- XML Configuration sample of above figure is as follows:

Note:

This is a sample to make them easier to follow. Strictly below is not proper file. There is complete sample at the end of this manual.

```

1 <?xml version="1.0"?>
2 <MinuteAxisConfiguration>
3   <machine name="nic700-BCW-20170130">
4     <assembly_node id="0">
5       <assembly_node id="1">
6         </assembly_node>
7       <assembly_node id="2">
8         </assembly_node>
9     </assembly_node>
10  </machine>
11 </MinuteAxisConfiguration>

```

## Axis Configuration

- "Axis" has 4 Function as follows:

Function	Description	Note
<b>dummy</b>	This axis is ignored. No move. Axis can have child axis.	
<b>axis</b>	Move. Axis can have child axis.	
<b>work</b>	Virtual Axis. Axis has work coordinate. Axis cannot have child axis.	
<b>tool</b>	Virtual Axis. Axis has work coordinate. Axis cannot have child axis.	

- If Axis Function is “axis”, the Axis has one “Type” information. If Axis Function is not “axis”, “Type” information is ignored.

Type	Description	Note
linear	Linear Move	
rotary	Rotary Move	
fixed	Fixed	

- ”Axis” has one Name. If “Function” of “Axis” is “axis” value, name means Parameter Label in GCode. Ex.X, Y, Z, A, B, C

- ”Axis” has 2 geometrical information:

1. Translation vector from the parent “Axis”.

- 2-1. Direction of Linear Axis

- 2-2. Rotary Direction of Rotary Axis

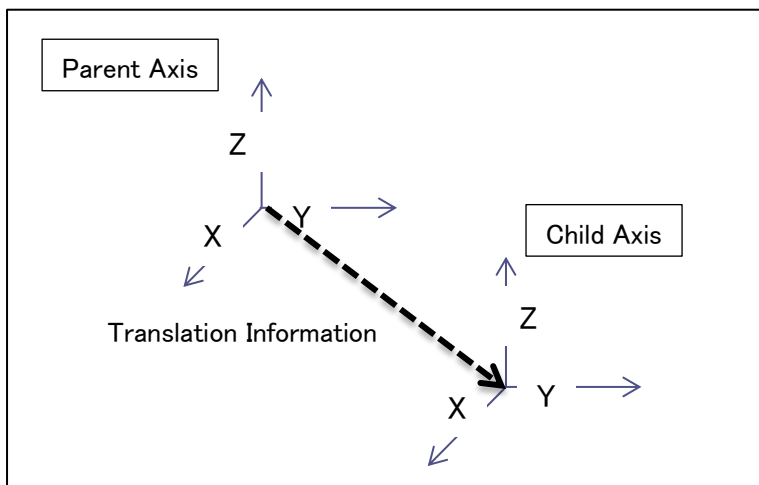


Figure: Translation Information

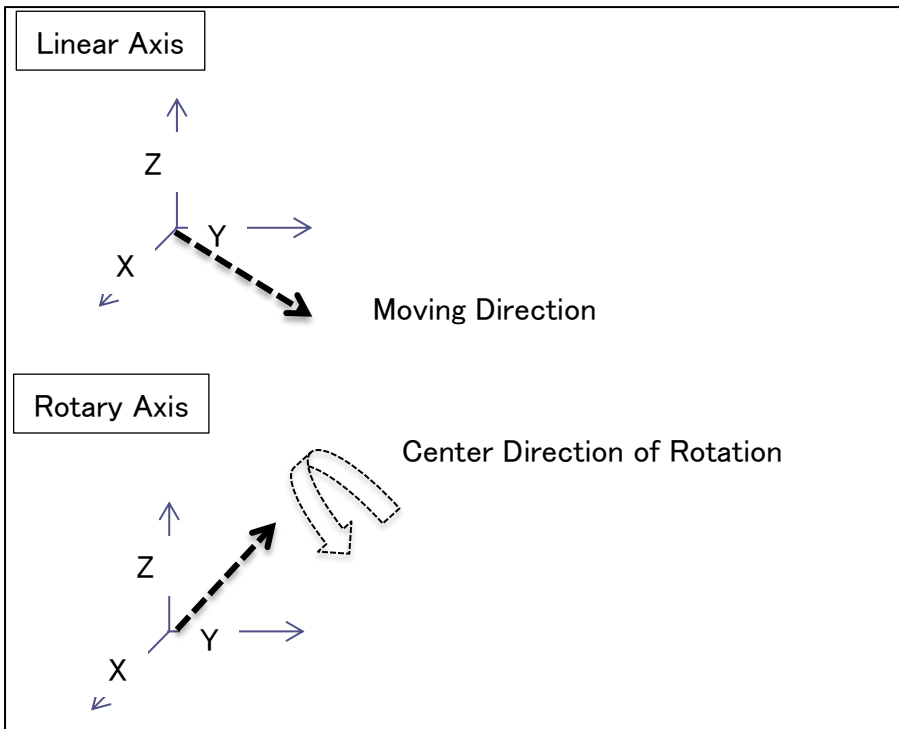


Figure : Direction Information

Item	Function	Note
<b>Offset Information (ov)</b>	Linear Axis, Rotary Axis and Fixed Axis	Vector
<b>Axis Direction Information – between Linear Axis and Rotary Axis(av)</b>	Linear Axis : Moving Direction Rotary Axis Center Direction of Rotation	Vector

- XML Configuration sample of “Axis” is as follows:

Note:

This is a sample to make them easier to follow. Strictly below is not proper file. There is complete sample at the end of this manual.

```

1 <?xml version="1.0"?>
2 <MinuteAxisConfiguration>
3   <assemblies>
4     <assembly>
5       <id>4</id>
6       <name>X</name>
7       <type>linear</type>
8       <function>axis</function>
9       <axis>
10        <ov>
11          <vector>0,0,0</vector>
12        </ov>
13        <av>
14          <vector>1,0,0</vector>
15        </av>
16      </axis>
17    </assembly>
18    <assembly>
19      <id>2</id>
20      <name>C</name>
21      <type>rotary</type>
22      <function>axis</function>
23      <axis>
24        <ov>
25          <vector>0.355728,-0.1031,0</vector>
26        </ov>
27        <av>
28          <vector>0,0,-1</vector>
29        </av>
30      </axis>
31    </assembly>
32  </assemblies>
33 </MinuteAxisConfiguration>

```

• The others

XML Element	Function	Note
<b>normal_vector_reaction</b>	Distinguish affection of Normal Vector or not	true or false.Only "Function": "Rotary" condition
<b>toward_vector_reaction</b>	Distinguish affection of Toward Vector or not	true or false.Only "Function": "Rotary" condition
<b>unlimited_rotation</b>	ex: When rotate -179 from 180, output +1.0 instead of -359.	true or false.Only "Function": "Rotary" condition
<b>model</b>	Registration of Simulation model	

<b>geometry</b>	Registration of Simulation Geometry.	type attribute : "v2mesh". Path attribute : path name
<b>machine_offset</b>	Initial value of Axis of Simulation	

## Simulation Configuration

- ID of axis can specify visibility of axis in the panel of Minute! Virtual Workbench.
- If you show XY Plane in Minute! Virtual Workbench, set the Value of Z Axis.
- XML Configuration sample of "Simulation Configuration" is as follows:

Note:

This is a sample to make them easier to follow. Strictly below is not proper file. There is complete sample at the end of this manual.

```

1 <?xml version="1.0"?>
2 <MinuteAxisConfiguration>
3   <workbench>
4     <axes>
5       <axis id="4" />
6       <axis id="1" />
7       <axis id="5" />
8       <axis id="6" />
9       <axis id="2" />
10      <axis id="7" />
11     </axes>
12     <plane z="-960" />
13     <assemblies>
14 </MinuteAxisConfiguration>
15
```

## Complete Sample

- Linear Axes are X,Y and Z. Rotary Axes are A,B and C.

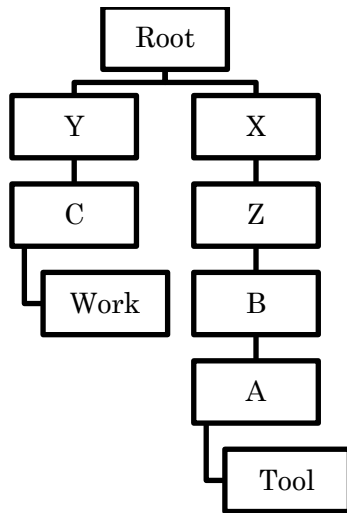


Figure : Structure of Axis of complete sample

```

1 <?xml version="1.0"?>
2 <MinuteAxisConfiguration xmlns:xsd=http://www.w3.org/2001/XMLSchema
3   xmlns:xsi=http://www.w3.org/2001/XMLSchema-instance
4   Version="1">
5   <machine name="nic700-bca">
6     <assembly_node id="0">
7       <assembly_node id="1">
8         <assembly_node id="2">
9           <assembly_node id="3">
10            </assembly_node>
11          </assembly_node>
12        </assembly_node>
13      <assembly_node id="4">
14        <assembly_node id="5">
15          <assembly_node id="6">
16            <assembly_node id="7">
17              <assembly_node id="8">
18                </assembly_node>
19              </assembly_node>
20            </assembly_node>
21          </assembly_node>
22        </assembly_node>
23      </assembly_node>
24    </machine>
25    <assemblies>
26      <assembly>
27        <id>0</id>
28        <name>Root</name>
29        <type>linear</type>
30        <function>dummy</function>
31        <axis>
32          <ov>

```



```
33     <vector>0,0,0</vector>
34 </ov>
35 <av>
36     <vector>1,0,0</vector>
37 </av>
38 <zero_adjust>
39     <vector>0,0,0</vector>
40 </zero_adjust>
41 </axis>
42 <model>
43     <geometry type="v2mesh" path="BFG-6A-BASE.mesh"></geometry>
44 </model>
45 </assembly>
46 <assembly>
47     <id>1</id>
48     <name>Y</name>
49     <type>linear</type>
50     <function>axis</function>
51     <axis>
52         <ov>
53             <vector>0,0,0</vector>
54         </ov>
55         <av>
56             <vector>0,-1,0</vector>
57         </av>
58     </axis>
59 <model>
60     <geometry type="v2mesh" path="BFG-6A-Y.mesh"></geometry>
61 </model>
62 </assembly>
63 <assembly>
64     <id>2</id>
65     <name>C</name>
66     <type>rotary</type>
67     <function>axis</function>
68     <axis>
69         <normal_vector_reaction>true</normal_vector_reaction>
70         <toward_vector_reaction>>false</toward_vector_reaction>
71         <unlimited_rotation>true</unlimited_rotation>
72         <ov>
73             <vector>0.355728,-0.1031,0</vector>
74         </ov>
75         <av>
76             <vector>0,0,-1</vector>
77         </av>
78     </axis>
79 <model>
80     <geometry type="v2mesh" path="BFG-6A-C.mesh"></geometry>
81 </model>
82 </assembly>
83 <assembly>
```

```
84     <id>3</id>
85     <name>Work</name>
86     <type>linear</type>
87     <function>work</function>
88     <axis>
89         <ov>
90             <vector>0,0,0</vector>
91         </ov>
92         <av>
93             <vector>0,0,1</vector>
94         </av>
95     </axis>
96     <model>
97         <geometry type="v2mesh" path="Work.mesh"></geometry>
98     </model>
99 </assembly>
100 <assembly>
101     <id>4</id>
102     <name>X</name>
103     <type>linear</type>
104     <function>axis</function>
105     <axis>
106         <ov>
107             <vector>0,0,0</vector>
108         </ov>
109         <av>
110             <vector>1,0,0</vector>
111         </av>
112     </axis>
113     <model>
114         <geometry type="v2mesh" path="BFG-6A-X.mesh"></geometry>
115     </model>
116 </assembly>
117 <assembly>
118     <id>5</id>
119     <name>Z</name>
120     <type>linear</type>
121     <function>axis</function>
122     <axis>
123         <ov>
124             <vector>0,0,0</vector>
125         </ov>
126         <av>
127             <vector>0,0,1</vector>
128         </av>
129         <machine_offset>-245.797666</machine_offset>
130     </axis>
131     <model>
132         <geometry type="v2mesh" path="BFG-6A-Z.mesh"></geometry>
133     </model>
134 </assembly>
```

```
135 <assembly>
136   <id>6</id>
137   <name>B</name>
138   <type>rotary</type>
139   <function>axis</function>
140   <axis>
141     <normal_vector_reaction>>true</normal_vector_reaction>
142     <toward_vector_reaction>>false</toward_vector_reaction>
143     <unlimited_rotation>>false</unlimited_rotation>
144     <ov>
145       <vector>0,0,0</vector>
146     </ov>
147     <av>
148       <vector>0,1,0</vector>
149     </av>
150   </axis>
151   <model>
152     <geometry type="v2mesh" path="BFG-6A-B.mesh"></geometry>
153   </model>
154 </assembly>
155 <assembly>
156   <id>7</id>
157   <name>A</name>
158   <type>rotary</type>
159   <function>axis</function>
160   <axis>
161     <normal_vector_reaction>>false</normal_vector_reaction>
162     <toward_vector_reaction>>true</toward_vector_reaction>
163     <unlimited_rotation>>true</unlimited_rotation>
164     <ov>
165       <vector>0.287228,0,0</vector>
166     </ov>
167     <av>
168       <vector>0,0,1</vector>
169     </av>
170   </axis>
171   <model>
172     <geometry type="v2mesh" path="BFG-6A-A.mesh"></geometry>
173   </model>
174 </assembly>
175 <assembly>
176   <id>8</id>
177   <name>Tool</name>
178   <type>linear</type>
179   <function>tool</function>
180   <axis>
181     <ov>
182       <vector>0,0,0,0,0</vector>
183     </ov>
184     <av>
185       <vector>0,0,1</vector>
```

```
186     </av>
187     <tv>
188         <vector>1,0,0</vector>
189     </tv>
190 </axis>
191 </model>
192     <geometry type="v2mesh" path="Tool.mesh"></geometry>
193 </model>
194 </assembly>
195 </assemblies>
196 <workbench>
197     <axes>
198         <axis id="4" />
199         <axis id="1" />
200         <axis id="5" />
201         <axis id="6" />
202         <axis id="2" />
203         <axis id="7" />
204     </axes>
205     <plane z="-960" />
206 </workbench>
207 </MinuteAxisConfiguration>
208
```

## Remarks

- Mesh File Format, "v2mesh" is the Ogre V2 Mesh. Minute! Powered By C3CAM can convert from various CAD Format to it.(ex. STL,IGES,STEP···,etc) .
- Translation information of "Tool" Virtual Axis is always ignored. Because it is supplied from Minute! Systems.
- "zero\_adjust" elements is always ignored in this version.

## Contact

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