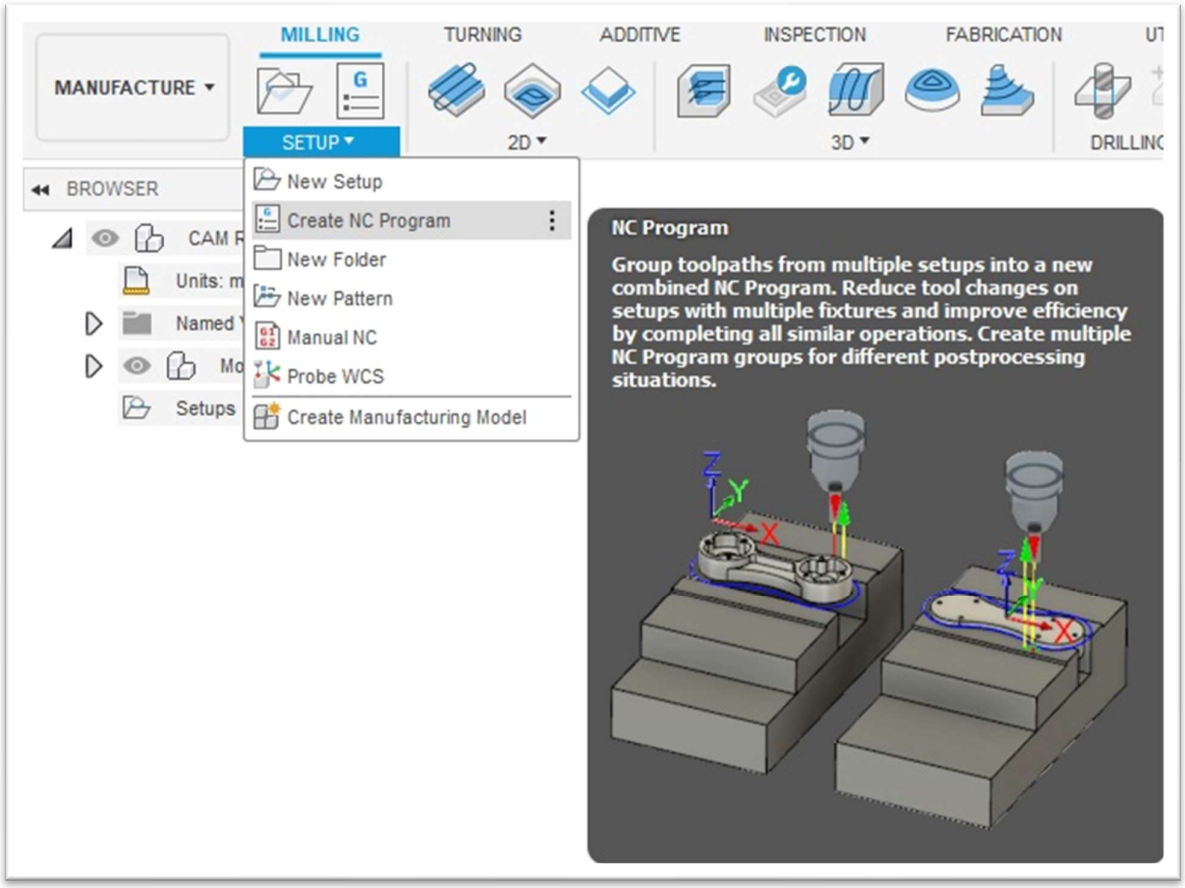
POSTPROCESSOR MANUAL

AUTODESK

1. Create NC Program

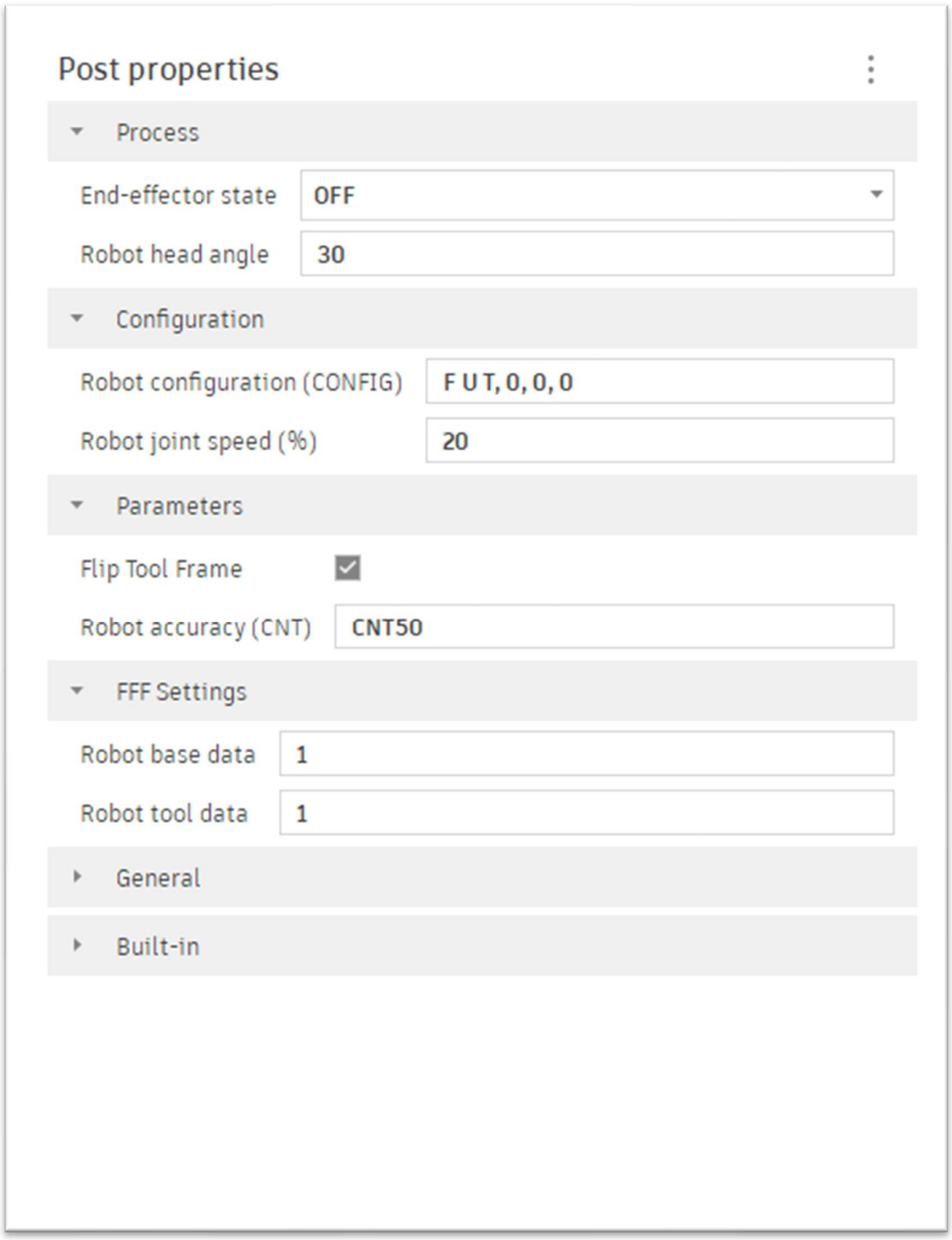
NC Program can organize several operations into a single NC program output, writing multiple toolpaths when needed:



It's important to use NC Program for writing your nc codes.
The NC Program dialog has an ordered tab to manage all the properties you need for the Fanuc nc code.

2. NC Program Settings properties

This is an overview of all the properties available for Fanuc output:

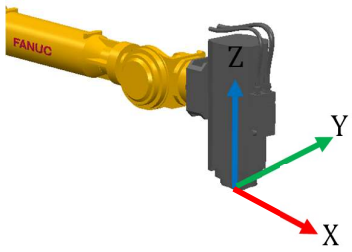


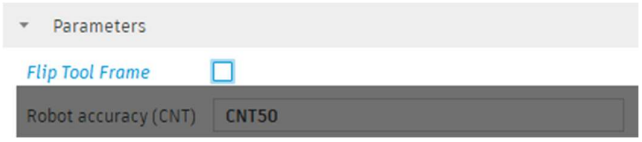
3- Confirm the tool orientation on the robot

The robot can be driven manually along the tool coordinate system, this is one option to check the orientation of the tool workplane.

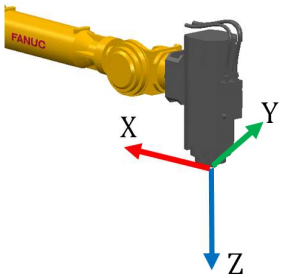
- Select the tool coordinate system
- Select the appropriate tool number to jog
- Use the teach pendant/enabling device to drive the robot along each axis individually
- This is a good way to check the orientation of X, Y and Z axis of the tool workplane.

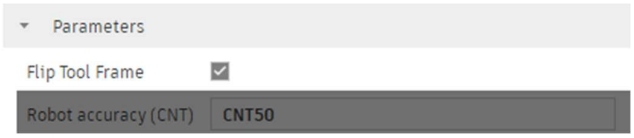
If Z+ is pointing up along the tool axis and the X+ is pointing in front, **use No Flip** option:





If Z+ is pointing down along the tool axis and X+ is pointing backwards, **use Flip** option:

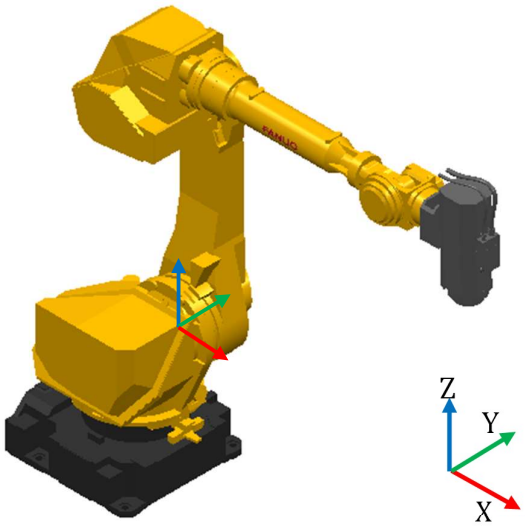




Note: if the tool orientation is **not** one of the above, Autodesk CAM post will not support the application correctly.

4 - WCS setup (workplane)

On the Fanuc robot it is possible to define a coordinate system on the part which is known as a **User Frame (UFRAME)**. The **User Frame**, located on the part/block, will be referenced from the zero of the robot, which is located at intersection of axes 1 and 2.

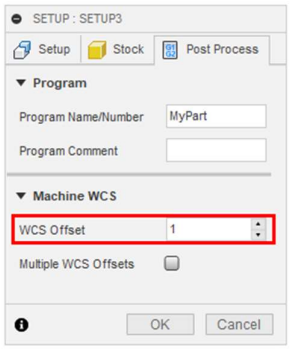


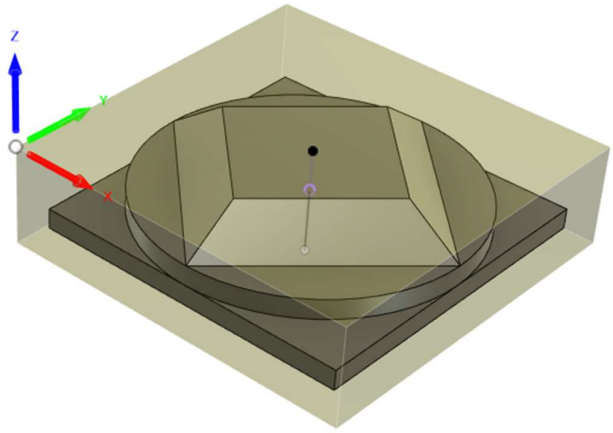
When a **User Frame** is defined on the part, the robot will have defined a:

- Number
- Position & Orientation

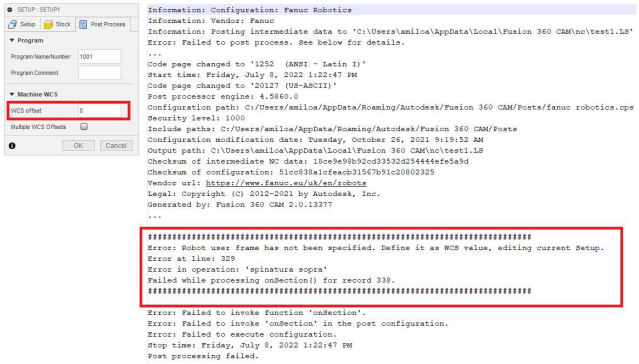
To run a toolpath successfully on the robot, users must ensure the robot User Frame and the WCS in Autodesk CAM are in the same location and orientation.

The WCS Offset number in Autodesk CAM defines the **Frame** number, select the number defined on the robot.

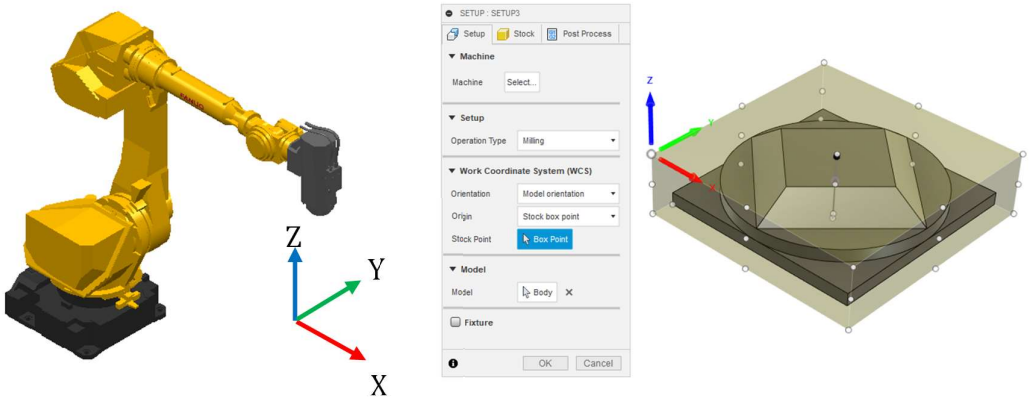




Note: WCS 0 cannot be use, if zero is selected an error will be raised while post processing and no output will be written.



Use the WCS setup menu to replicate the location and orientation of the **User Frame** on the part.

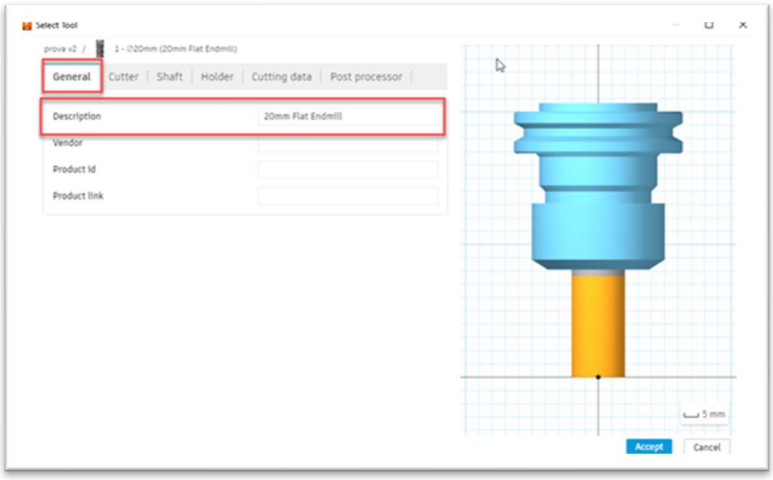


The robot can be jogged along the **User Frame** Coordinate System, this is one option to check the orientation of the **User Frame**.

- Select the **User Frame**
- Select the appropriate **User Frame** to jog
- Use the teach pendant/enabling device to drive the robot along each axis individually
- This is a good way to verify the orientation of X, Y and Z axis of the **User Frame**
- You can also jog the robot to the location of the origin and visualize the coordinates of the **User Frame**

5 - Define Tool Number (replicate settings on the robot)

The tool number is defined via the Tool Post Processor menu.

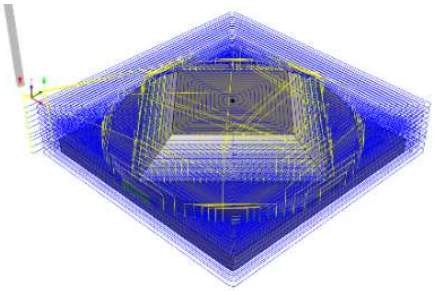


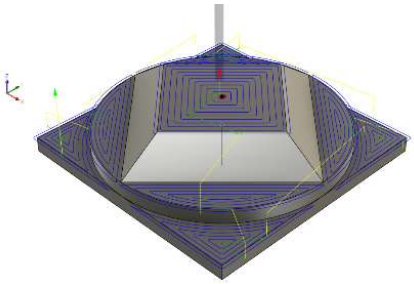
The tool will be declared in the main file, before the toolpath file is called.

```
/MN
  1:   ! CALL TOOL_CHANGE (1)
```

6 - Create a toolpath

Follow the usual steps inside Autodesk CAM in order to generate one or more toolpaths in your setup.



7 - Post processing

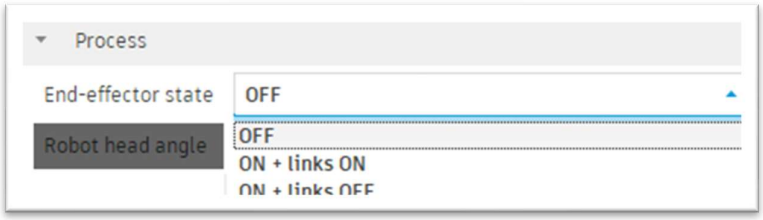
Autodesk CAM post-processor generates a few files with .LS extension:

- **Toolpath** files are named using the toolpath name given in Autodesk CAM.
- A **main** file is generated, this will manage the call of the toolpath(s) and define used tool(s). The main file uses the name defined in the NCProgram menu:

Once ready to post process, some post-processor properties need to be defined before output files can be generated:

Process properties

- End-effector state: This option is for all the non-subtractive operations when the end-effector needs to be turned on/off.



Codes to use end-effectors are non-standard and they must be customized according to the robot integration. The postprocessor simply writes these 2 lines as a comment:

==> END EFFECTOR ON: DEFINE YOUR CODE HERE IN THE POST

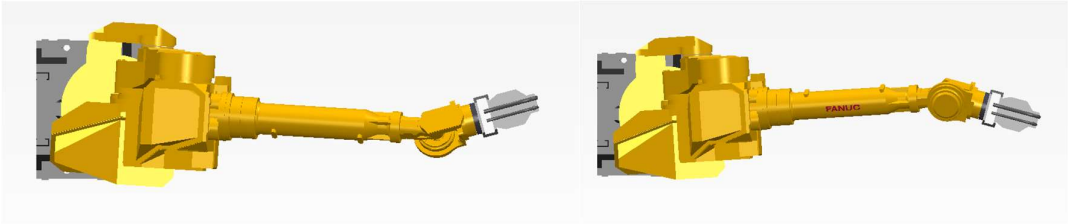
and

==> END EFFECTOR OFF: DEFINE YOUR CODE HERE IN THE POST

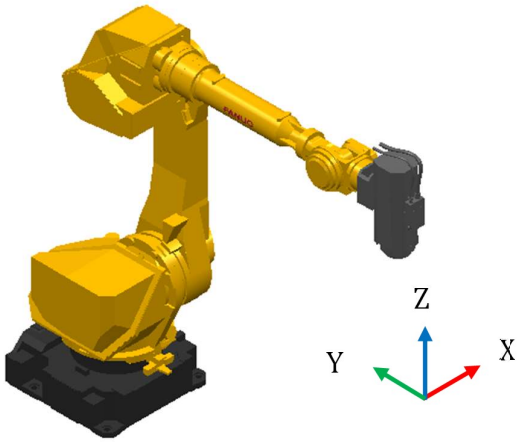
You can define your proper instructions inside the postprocessor editing these lines.

- Robot head angle: This allows the user to enter an angle of rotation around the tool axis, this will effectively rotate the spindle, the angle will be kept throughout the entire toolpath. This angle is relative to the X axis of the WCS defined on the part.

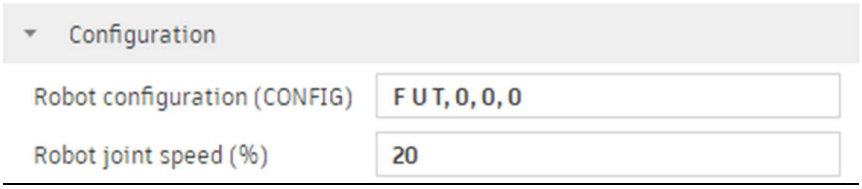
Below an example of a 15 degrees (left) and -15 degree (right) relative to the X axis, for a tool defined with Z+ going up the spindle.



If the X axis is defined on another orientation the spindle angle will be relative to this orientation.
Note: X axis on the **Base Data** is NOT pointing forward in this example

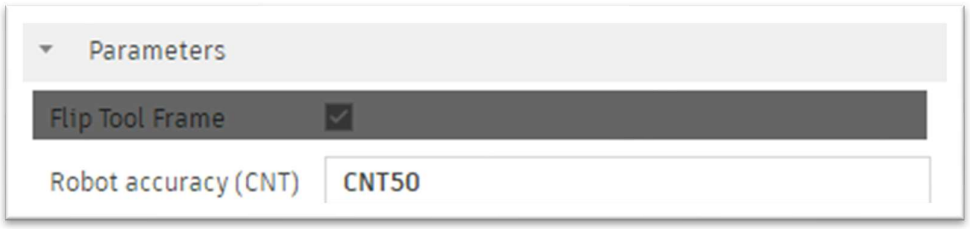


Configuration properties



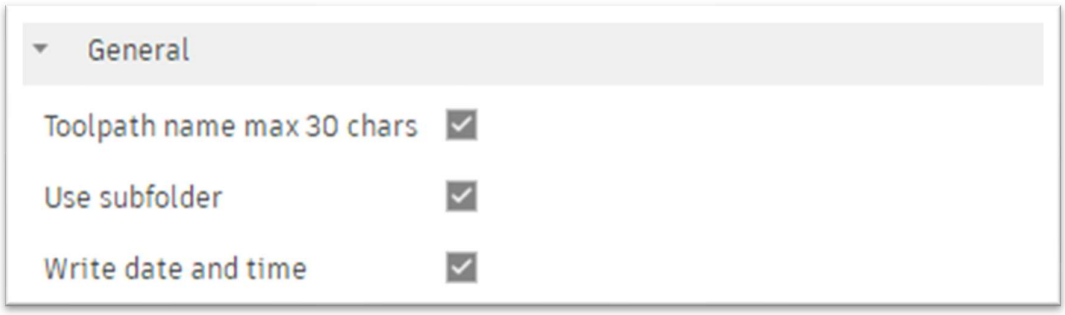
- Robot configuration: Robot configuration (CONFIG) must be read from the robot teach pendant and entered here.
- Robot joint speed: The speed of joint movements is defined as a percentage of the maximum speed.

Parameters properties



- Robot accuracy (CNT): The robot approaches the target position without stop and continues to the next point. The approach to the destination point can be adjusted by entering a value between 0 and 100.

General properties



- Use subfolder: Default is to write out all data in a sub folder.

A dummy file with standard information is created after posting if you chose to Use subfolder.
It contains the name of the directory where you can find your nc files.
It is called as the Program Name in NC Program form. This is a dummy file example:

```
*** Status File - Not for use ***
Files are saved to: C:\Users\xxxx\AppData\Local\Fusion 360 CAM\nc\fanuc robotics\FanucExample
Main program: FanucExample.LS
```

- Toolpath name max 30 chars: Default is to check each toolpath name length. An error will be raised when length is more than 30 char.
- Write date and time: Writes date & time of file creation in the main file and all the toolpath(s):

```
CREATE          = DATE 2022-07-06  TIME 15:29:34;
MODIFIED        = DATE 2022-07-06  TIME 15:29:34;
```

8 – General Information

For more information get help or post your questions on the forum:

https://forums.autodesk.com Select *"Fusion 360"* and then *"Fusion 360 Manufacturing"*

If the Autodesk CAM session is running in inches, the output file will still be written in mm as this is the unit system used on robots.

IMPORTANT: Please remember that program and toolpath names should not contain any symbol or special character.

9 – Program Sample

Autodesk CAM post-processor generates a few files, as described above on point 7.

This is an example of Fanuc postprocessor output. The example has three toolpaths.

```
--- FanucExample.LS file Start ---
/PROG FANUCEXAMPLE
/ATTR
OWNER           = xxxxx;
COMMENT         = "Autodesk";
PROG_SIZE       = 0;
CREATE          = DATE 2022-07-06  TIME 15:29:34;
MODIFIED        = DATE 2022-07-06  TIME 15:29:34;
FILE_NAME       = ;
VERSION         = 0;
LINE_COUNT      = 0;
MEMORY_SIZE     = 0;
PROTECT         = READ_WRITE;
TCD:  STACK_SIZE        = 0,
      TASK_PRIORITY     = 50,
      TIME_SLICE        = 0,
      BUSY_LAMP_OFF     = 0,
      ABORT_REQUEST     = 0,
      PAUSE_REQUEST     = 0;
DEFAULT_GROUP   = 1,*,*,*,*;
CONTROL_CODE    = 00000000 00000000;
/MN
  1:  ! CALL TOOL_CHANGE (1)
  2:  T1 ;
  3:  T2 ;
  4:  ! CALL TOOL_CHANGE (5)
  5:  T3 ;
/END
--- FanucExample.LS file End ---
```

--- T1.LS file Start ---

```
/PROG  T1
/ATTR
OWNER           = xxxxx;
COMMENT         = "Autodesk";
PROG_SIZE       = 0;
CREATE          = DATE 2022-07-11  TIME 10:39:22;
MODIFIED        = DATE 2022-07-11  TIME 10:39:22;
FILE_NAME       = ;
VERSION         = 0;
LINE_COUNT      = 0;
MEMORY_SIZE     = 0;
PROTECT         = READ_WRITE;
TCD:  STACK_SIZE        = 0,
      TASK_PRIORITY     = 50,
      TIME_SLICE        = 0,
      BUSY_LAMP_OFF     = 0,
      ABORT_REQUEST     = 0,
      PAUSE_REQUEST     = 0;
DEFAULT_GROUP   = 1,*,*,*,*;
CONTROL_CODE    = 00000000 00000000;
/MN
  1:  ! Generated by AUTODESK Fusion 360 CAM 2.0.13377
  2:  !
  3:  UFRAME_NUM=1  ;
  4:  UTOOL_NUM=1  ;
  5:  !
  6:J P[1] 20% CNT50  ;
  7:L P[2] 17mm/sec CNT50  ;
  8:  ! Plunge Move Starts
  9:L P[3] 1mm/sec CNT50  ;
  10:  ! Cutting Move Starts
  11:L P[4] 39mm/sec CNT50  ;
  12:  ! Lead Out Move Starts
  13:L P[5] 39mm/sec CNT50  ;
  14:  ! Rapid Move Starts
  15:L P[6] 17mm/sec CNT50  ;
  16:  !
/POS
P[1]{
  GP1:
  UF : 1, UT : 1,     CONFIG : 'F U T, 0, 0, 0',
  X =     -50.000  mm,  Y =      37.501  mm,  Z =      15.000  mm,
  W =     180.000 deg,  P =       0.000 deg,  R =    -150.000 deg
};
P[2]{
  GP1:
  UF : 1, UT : 1,     CONFIG : 'F U T, 0, 0, 0',
  X =     -50.000  mm,  Y =      37.501  mm,  Z =       4.000  mm,
  W =     180.000 deg,  P =       0.000 deg,  R =    -150.000 deg
};
P[3]{
  GP1:
  UF : 1, UT : 1,     CONFIG : 'F U T, 0, 0, 0',
  X =     -50.000  mm,  Y =      37.501  mm,  Z =      -1.000  mm,
  W =     180.000 deg,  P =       0.000 deg,  R =    -150.000 deg
};
P[4]{
  GP1:
  UF : 1, UT : 1,     CONFIG : 'F U T, 0, 0, 0',
  X =      37.500  mm,  Y =     -37.499  mm,  Z =      -1.000  mm,
  W =     180.000 deg,  P =       0.000 deg,  R =    -150.000 deg
};
P[5]{
  GP1:
  UF : 1, UT : 1,     CONFIG : 'F U T, 0, 0, 0',
  X =      37.500  mm,  Y =     -37.499  mm,  Z =       4.000  mm,
  W =     180.000 deg,  P =       0.000 deg,  R =    -150.000 deg
};
P[6]{
  GP1:
  UF : 1, UT : 1,     CONFIG : 'F U T, 0, 0, 0',
  X =      37.500  mm,  Y =     -37.499  mm,  Z =      15.000  mm,
  W =     180.000 deg,  P =       0.000 deg,  R =    -150.000 deg
};
/END
```

--- T1.LS file End ---