M6 remap in Python using Basic Probe in LinuxCNC 2.9.4 - Updated: Feb 16,2025

Objective is to be able to use a mix of fixed length tools using TTS tool holders and variable length tools. During the tool change I only wanted to measure the variable length tools like drill bits or other rarely user tools that I don't keep in a dedicated tool holder. My setup is a Sieg X3 mill running LinuxCNC 2.9.4 using the QTDragon_HD screen with an ASUS 1920x1080 touch screen and 3D probe. I based my remap on the work done by Peter Dam that I found through this post https://forum.linuxcnc.org/qtvcp/39423-qtdragon-new-tool-length-after-a-manual-tool-change?start=20#190243. I later adapted this process to use a Python remap.

Workflow

Start the machine and home all.
Touch off work piece X,Y,Z, using the 3D probe. See **Probe Note** below.
Load the G-Code file.
Press [Auto]
Press [Cycle start]

At each tool change the user is prompted to [Resume] and then to load the indicated tool. When the tool change is completed the user clicks OK.

- If the tool is a fixed length tool indicated by the presence of a Z value other than zero in the tool table machining will proceed using the offset from the tool table.

- If the tool is variable length, the tool will move to the tool setter location and will probe the sensor to determine the tool's length and then machining will proceed.

Probe Note: When the work piece is probed in the Z direction with the 3D probe, the value of the touch-off offset by the length of the probe is stored in parameters #4001-4008 for G54 thru G59.2 respectivly. This measurement would be as if the spindle nose is sitting on the work piece. The effective length of the probe (Tool 99) is stored in the tool-table Z value.

Note: The value in G59.3 is the reference value that is compared to the toolsetter trip value to calculate the tool length. To set this value, place the nose of th spindle within .25 inch of the toolsetter and run the measure_toolsetter_inch.ngc file. This will set the G59.3 coordinate system Z zero at the top of the toolsetter.

To verify the toolsetter, take a tool of known length and measure it buy running measure_tool_inch.ngc and using the tool setter. Next check the Z value written into the tool table for the test tool. If that matches the known measurement of the tool then all is good.

If the value is longer than the actual tool length then make the value in G59.3 less negative.
If the value is shorter than the actual tool length then make the value in G59.3 more negative.

Setup

Original files

`/usr/share/linuxcnc/ncfiles/remap_lib/python-stdglue/python/remap.py`
`/usr/lib/python3/dist-packages/qtvcp/widgets/probe_routines.py`

Place the modified **`remap.py`** in the **`~linuxcnc/configs/python`** directory.
Place the modified **`probe_routines.py`** in the **`/usr/lib/python3/dist-packages/qtvcp/widgets`** directory.

Place the **measure_tool.ngc** file in the **~linuxcnc/nc_files** director.
Place the **measure_toolsetter_inch.ngc** file in the **~linuxcnc/nc_files** directory.

Add the following lines to the .ini file under section [RS274NGC]
REMAP=M6 python=m6remap modalgroup=6
SUBROUTINE_PATH = macros

Add the following lines to the .ini.
[PROBE]
USE_PROBE = basicprobe

Add the following in the [TOOLSENSOR] section of the .ini file.
X_LOC = <ABS X location of tool setter>
Y_LOC = <ABS X =Ylocation of tool setter>
Z_PROBE_START = <ABS Z location to begin probing>
This value should keep your longest tool just above the tool setter. Otherwise the long tool will rapid into the tool setter.

```
G10 L2 P#5220 Z[#<z_minus_probed> + #<workspace_z>]
#[4000 + [#5220]] = [#<z_minus_probed> + #<workspace_z> - #<_ini[PROBE]LENGTH>]
```

Add the following lines to linuxcnc.var file. This will make parameters **#4001-#4008** persistent.
4001 0.000000
4002 0.000000
4003 0.000000
4004 0.000000
4005 0.000000
4006 0.000000
4007 0.000000
4008 0.000000

For every fixed length tool either enter the tool length in the tool table or insert the tool and select the tool from the tool table using the M6 Qn button. Move the tool to .25 inch above the tool-setter and run the measure_tool_ inch.ngc file. This will measure the tool and write the length value into the tool table.

File locations:
/usr/share/linuxcnc/ncfiles/remap_lib/python-stdglue/stdglue.py
/usr/share/linuxcnc/ncfiles/remap_lib/python-stdglue/python/stdglue.py
/home/john/linuxcnc/configs/python/stdglue.py

/usr/lib/python3/dist-packages/qtvcp/widgets/basic_probe.py
/home/john/linuxcnc/configs/python/basic_probe.py

/usr/share/linuxcnc/ncfiles/remap_lib/python-stdglue/python/toplevel.py
/home/john/linuxcnc/configs/python/toplevel.py

/usr/lib/python3/dist-packages/qtvcp/widgets/probe_routines.py

/usr/share/linuxcnc/ncfiles/remap_lib/python-stdglue/python/remap.py
/home/john/original/remap.py
/home/john/linuxcnc/original-py/remap.py
/home/john/linuxcnc/configs/python/remap.py

Code changes:

probe_routines.py – Changes to allow storage of 3D probe touch-off value into #400x

remap.py – Remaps M6 to auto-measure variable length tools after a manual tool change.