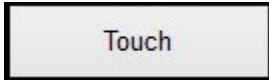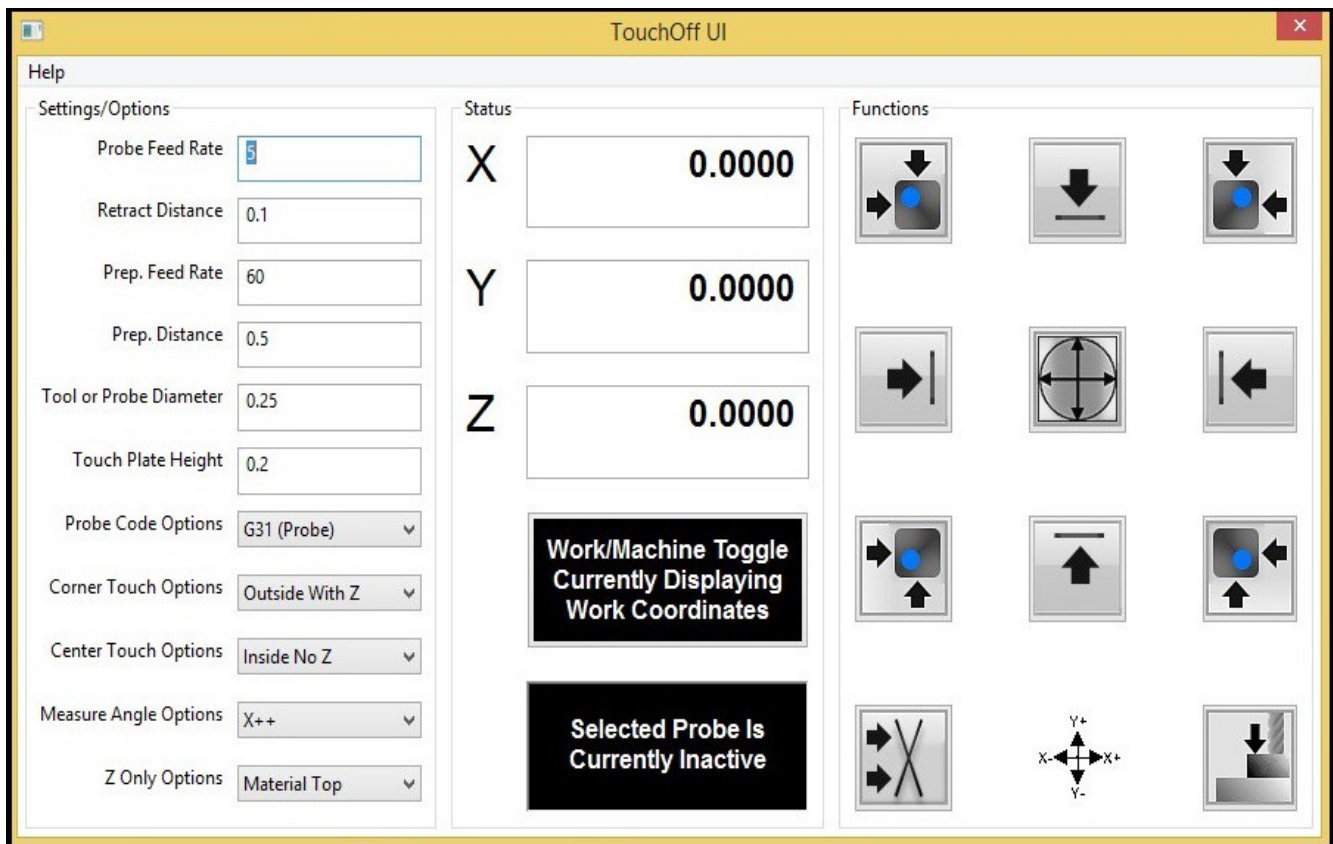# Using The Mach4 Touch Button Module

This document has been drafted to discuss the Touch Module user interface that is associated with the Touch Button that is located in the Tool Information window.

This Document will cover the user Settings/Options fields, Status window, and the Functions Buttons.
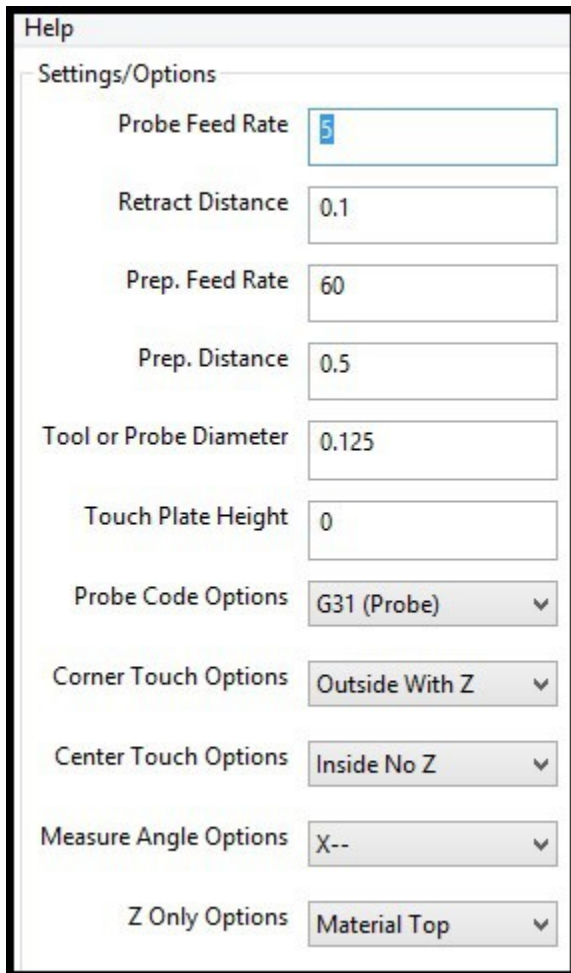
PRECAUTION

Before attempting to use any of the functions and features within the Touch Module, It is the users responsibility to fully under stand how their machine will react to the functions and features within the Module.
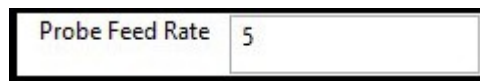
It is also a requirement for the user to have a probing device with a signal that Mach will be able to interpret as such.
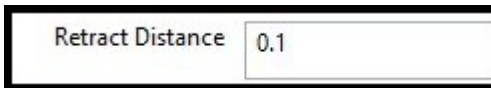
Settings/Options

When the "Touch Button" is clicked, the "Touch Off UI" will open, as depicted above. This section of this document will Discuss the user input fields that are with in the Settings/Options window of the UI.
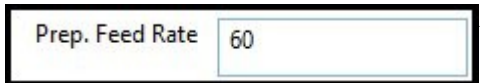
Probe Feed Rate	5

The first field is Probe Feed Rate. This is the actual feed rate (speed) at which the probe travels toward the current probe cycle's point of contact with the work piece.

It is recommended that this feed rate be set very low. Too high a rate could result in damaged tools, or inaccurate probe contact and inaccurate offset settings
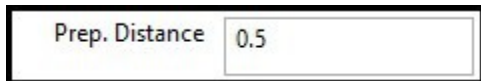
Retract Distance	0.1

The second field is Retract Distance. This is the distance the probe will retract after the probe makes contact during a cycle. The retract distance may have to be modified at times depending on the shape and size of the part to be probed.
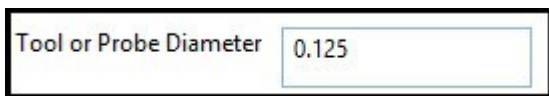
Prep. Feed Rate	60

Prep. Feed Rate is the feed rate, (speed) that the axis' will move during any "non" probing move.

Prep. Distance	0.5

The Prep Distance is used as a variable for the distance the Axis travel in a a prep move.

Tool or Probe Diameter	0.125

Tool or Probe Diameter is the actual diameter of the tool or probe being used during the function. When using tools for probing, this value will be changed frequently. It is vital for the correct value to be placed in this field.

| Touch Plate Height | 0 |

Touch Plate Height is a variable for the thickness of the touch plate being used in any of the functions.
It is important to keep in mind that if a touch plate is used for setting more than one Axis, it must maintain the same thickness for all of the axis' being probed

| Probe Code Options | G31 (Probe) ∨ |

Probe Code Options are the probe designations set up by the user in Mach4.
G31   (Probe)
G31.1 (Probe 1)
G31.2 (Probe 2)
G31.3 (Probe 3)

| ● Probe | ● Probe 1 | ● Probe 2 | ● Probe 3 |

The Probe Code indicator LED's are found on the Machine Diagnostics Tab In Mach4. The corresponding Led will light on a probe hit when wired/ mapped accordingly.

| Corner Touch Options | Outside With Z ∨ |

Corner Touch Option Outside With Z, is a setting for the corner touch functions. Users will manually jog the probe over the corner of the part to be probed within the limits set in the prep distance, in a way that the top of the part will be probed first. Next depending on function selected by the user, the probe will travel to one of the sides that make up the corner of the part, travel in Z beyond the initial Z probe contact point, probe feed rate until contact is made. A retract to the retract distance, and then in Z to the Z contact point, plus the retract distance, for the prep move to the other side that makes up the corner being probed.
When the function is complete, Z axis will travel to the retract point again and to the corner of the part

| Center Touch Options | Inside No Z ∨ |

Center Touch Options, Inside With No Z, is an option for users when finding the center of a pocket. It requires the user to manually jog the probe to the "approximate" center of the feature to be probed. Unlike the With Z Setting, the user is also required to manually jog the z down into the feature that is to be probed, deep enough for the probe to make contact with the inside walls during the function.

| Measure Angle Options | X-- ∨ |

Measure Angle Options are for setting axis direction probe travel for the Measure Angle function.

| Z Only Options | Material Top ∨ |

Z Only Option "Material Top". When this option is chosen, the Z Probe contact in the function will set the current work coordinates Z to zero.

| Z Only Options | Tool Length (TLO) ∨ |

Z Only Option "Tool Length (TLO)" When this option is chosen, the Z Probe contact in the function,

will set the Tool Length Offset for the tool being used as a probe. Users must make sure that the tool length off set for that tool has been made active prior to using this setting.

Status Window
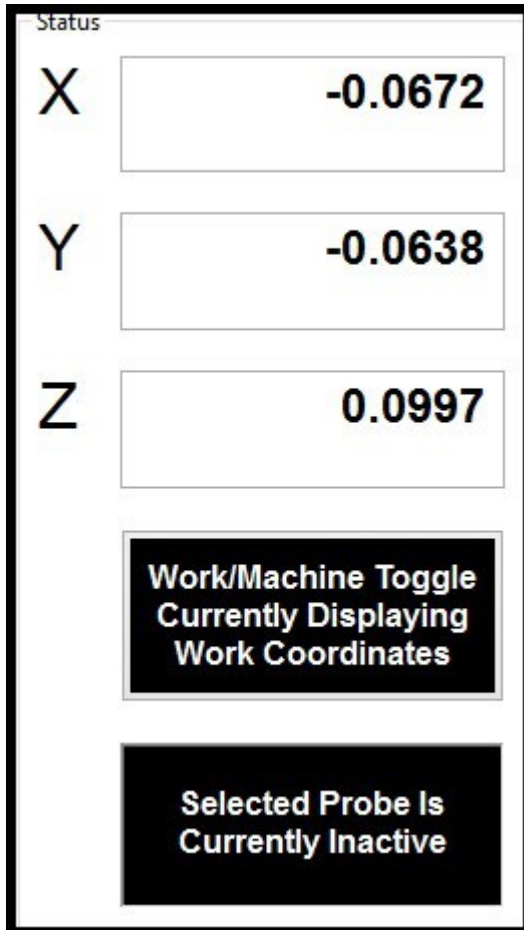
In the middle of the Touch Modules UI, is the Status Window.

From the top of the window, down to the middle there are three DRO's. X, Y, and Z.

These DRO's are a mirror of the Current Position DRO's found on Mach4's Run, and Offsets Tabs.

There is a toggle button and a large LED in this window.

The toggle button is The Work/Machine Toggle. When the DRO's are displaying the current Work Coordinates, The button will state that, and will show up in black and with text.

When users toggle the button to display the Work Coordinates, the button will state that, and it will also change back ground colors from black to red.

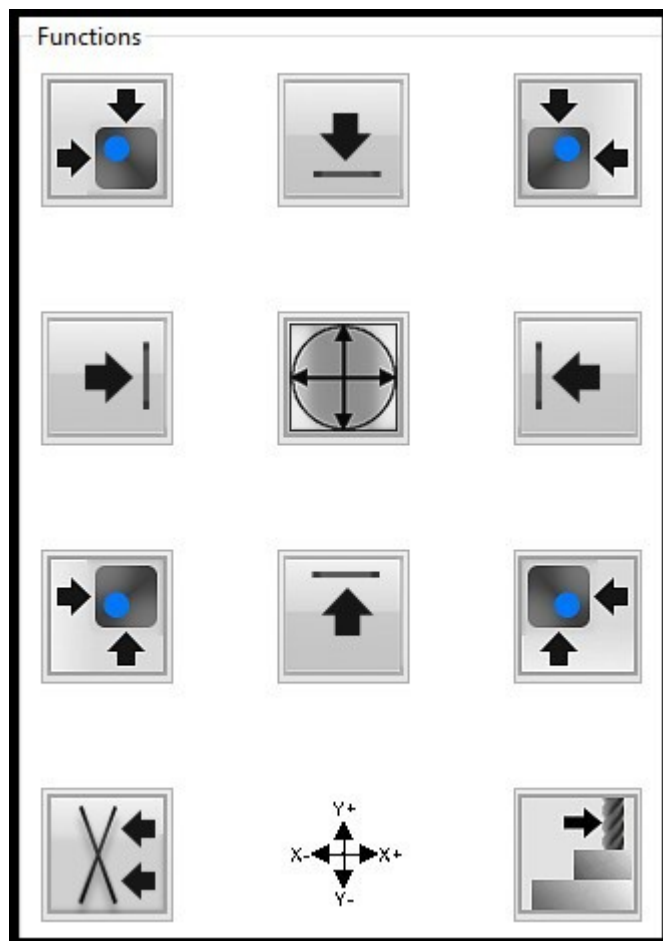The next item down is a large LED that is mapped to the current active probe. When the Probe signal is inactive the LED is light black and white.

When The active probe makes contact, this LED's background color changes from black to blue. The text changes to indicate it is active.
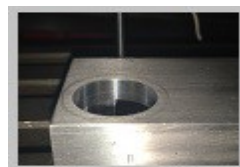
Functions

The Functions window contains all of the probing cycles that will run using user input from the Settings/Options window.

This Icon represents the Find Y ++ Function. To use this function the user will manually jog to a spot on their part with the probe on the positive Y surface. The Z axis will have to also be positioned below the top of the work piece to ensure the probe will contact the side of the work piece.

Once the probe is in position, click the Find Y++ Button. The cycle will travel in a negative direction in the Y axis, at the Probe Feed Rate until the probe makes contact with the work piece.

The probe will then back off the work piece to the Retract Distance at the Prep Feed Rate. Taking into consideration Tool /Probe Diameter, and Touch Plate height, the Y Offset for the current work coordinate has been set to this surface. Users can verify this by looking at the History bar.

Touch is finished. Y axis set to 0.6557

This Icon represents the Find Y-- Function. To use this function the user will manually jog to a spot on their part with the probe on the Negative Y surface. The Z axis will have to also be positioned below the top of the work piece to ensure the probe will contact the side of the work piece.
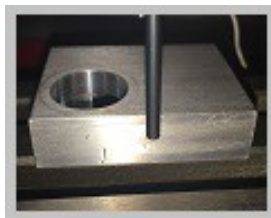
Once the probe is in position, click the Find Y-- Button. The cycle will travel in a Positive direction in the Y axis, at the Probe Feed Rate until the probe makes contact with the work piece.

The probe will then back off the work piece to the Retract Distance at the Prep Feed Rate. Taking into consideration Tool /Probe Diameter, and Touch Plate height, the Y Offset for the current work coordinate has been set to this surface. Users can verify this by looking at the History bar.

Touch is finished. Y axis set to 0.6557

This Icon represents the Find X-- Function. To use this function the user will manually jog to a spot on their part with the probe on the Negative X surface. The Z axis will have to also be positioned below the top of the work piece to ensure the probe will contact the side of the work piece.

Once the probe is in position, click the Find X-- Button. The cycle will travel in a Positive direction in the X axis, at the Probe Feed Rate until the probe makes contact with the work piece.
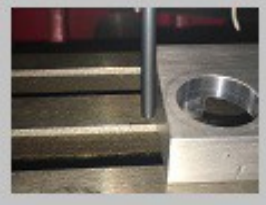
The probe will then back off the work piece to the Retract Distance at the Prep Feed Rate. Taking into consideration Tool /Probe Diameter, and Touch Plate height, the X Offset for the current work coordinate has been set to this surface. Users can verify this by looking at the History bar.

Touch is finished. X axis set to 0.2769

This Icon represents the Find X-- Function. To use this function the user will manually jog to a spot on their part with the probe on the Negative X surface. The Z axis will have to also be positioned below the top of the work piece to ensure the probe will contact the side of the work piece.

Once the probe is in position, click the Find X-- Button. The cycle will travel in a Positive direction in the X axis, at the Probe Feed Rate until the probe makes contact with the work piece.
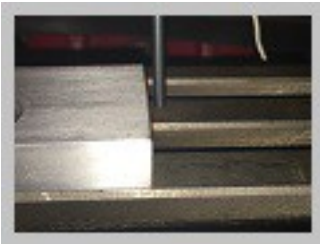
The probe will then back off the work piece to the Retract Distance at the Prep Feed Rate. Taking into consideration Tool /Probe Diameter, and Touch Plate height, the X Offset for the current work coordinate has been set to this surface. Users can verify this by looking at the History bar.

Touch is finished. X axis set to 0.2769

This Icon represents the Find Top Left Corner Function. To use this function the user will manually jog the Z axis over the top of the work surface , then position X, and Y so the probe is positioned over the top left corner of the part .

Once the probe is in position, click the Find Top Left Corner Button. The cycle will begin by

Invoked moves:

1) Traveling in a negative Z direction at the Probe Feed Rate until the probe makes contact with the work piece.

2) Retract in Z to the Retract Distance at the Prep Feed Rate.

3) Positive in the Y direction to a clearance position determined by User input from Setting/Options.

4) A negative Z travel below the now probed work surface.

5) At Probe Feed Rate, the probe will travel toward the work piece in a negative Y direction until the probe makes contact with the work piece.

6) A positive Y Retract move will take place

7) A positive retract in Z.

8) X, Y position move back to the users start point for this cycle.

9) Then a prep. move in the negative X direction.

10) Prep move in Z below the work surface will prepare the probe for contacting the X surface.

11) The X axis will now travel at the Probe Feed Rate in a positive direction toward the X surface being probed.

12) Once contact is made, a retract position in the X away from the probed surface,

13) then in the Z to the clearance point above the work surface will take place.

Taking into consideration Tool /Probe Diameter, and Touch Plate height, the X, Y , and Z Offsets for the current work coordinate have been set..

14) The last and final move for this cycle is in both X, and Y. The move positions these axis' at the newly set work coordinates X, Y Zero.

Users can verify this by looking at the History bar.

Touch combination is finished. X axis set to 0.08 Y axis set to 0.203 Z axis set to 0.4094

This Icon represents the Find Top Right Corner Function. To use this function the user will manually jog the Z axis over the top of the work surface , then position X, and Y so the probe is positioned over the top right corner of the part .
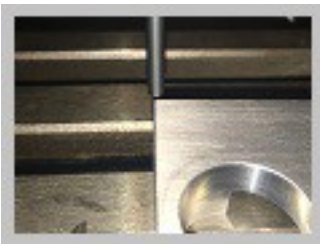
Once the probe is in position, click the Find Top Right Corner Button. The cycle will begin by

1) Traveling in a negative Z direction at the Probe Feed Rate until contact with the probe is made.

2) Retract in Z to the Retract Distance at the Prep Feed Rate.

3) Positive in the Y direction to a clearance position determined by User input from Setting/Options.

4) A negative Z travel below the now probed work surface.

5) At Probe Feed Rate, the probe will travel toward the work piece in a negative Y direction until the probe makes contact with the work piece.
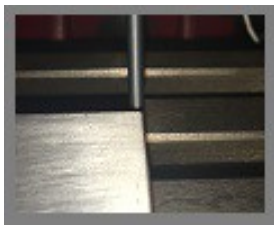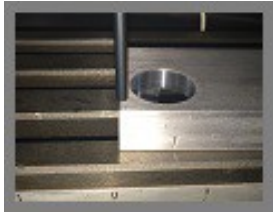
6) A positive Y Retract move will take place

7) A positive retract in Z.

8) X, Y position move back to the users start point for this cycle.

9) Then a prep. move in the positive X direction.

10) Prep move in Z below the work surface will prepare the probe for contacting the X surface.

11) The X axis will now travel at the Probe Feed Rate in a negative direction toward the X surface being probed.

12) Once contact is made, a retract position in the X away from the probed surface,

13) Then in the Z to the clearance point above the work surface will take place.

Taking into consideration Tool /Probe Diameter, and Touch Plate height, the X, Y , and Z Offsets for the current work coordinate have been set..

14) The last and final move for this cycle is in both X, and Y. The move positions these axis' at the newly set work coordinates X, Y Zero.

Users can verify this by looking at the History bar.

Touch combination is finished. X axis set to 0.08 Y axis set to 0.203 Z axis set to 0.4094

This Icon represents the Find Bottom Left Corner Function. To use this function the user will manually jog the Z axis over the top of the work surface , then position X, and Y so the probe is positioned over the bottom left corner of the part part .

Once the probe is in position, click the Find Bottom Left Corner Button. The cycle will begin by
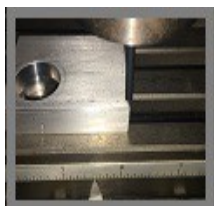1) Traveling in a negative Z direction at the Probe Feed Rate until contact with the probe is made.
2) Retract in Z to the Retract Distance at the Prep Feed Rate.
3) Negative in the Y direction to a clearance position determined by User input from Setting/Options.
4) A negative Z travel below the now probed work surface.
5) At Probe Feed Rate, the probe will travel toward the work piece in a positive Y direction until the probe makes contact with the work piece.
6) A negative Y Retract move will take place
7) A positive retract in Z.
8) X, Y position move back to the users start point for this cycle.
9) Then a prep. move in the negative X direction.
10) Prep move in Z below the work surface will prepare the probe for contacting the X surface.
11) The X axis will now travel at the Probe Feed Rate in a positive direction toward the X surface being probed.
12) Once contact is made, a retract position in the X away from the probed surface,
13) then in the Z to the clearance point above the work surface will take place.
Taking into consideration Tool /Probe Diameter, and Touch Plate height, the X, Y , and Z Offsets for the current work coordinate have been set..
14) The last and final move for this cycle is in both X, and Y. The move positions these axis' at the newly set work coordinates X, Y Zero.
Users can verify this by looking at the History bar.

Touch combination is finished. X axis set to 0.08 Y axis set to 0.203 Z axis set to 0.4094

This Icon represents the Find Bottom Right Corner Function. To use this function the user will manually jog the Z axis over the top of the work surface , then position X, and Y so the probe is positioned over the bottom right corner of the part part .

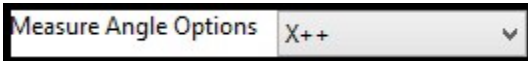Once the probe is in position, click the Find Bottom Right Corner Button. The cycle will begin by
1) Traveling in a negative Z direction at the Probe Feed Rate until contact with the probe is made.
2) Retract in Z to the Retract Distance at the Prep Feed Rate.
3) Negative in the Y direction to a clearance position determined by User input from Setting/Options.
4) A negative Z travel below the now probed work surface.
U5) At Probe Feed Rate, the probe will travel toward the work piece in a positive Y direction until the probe makes contact with the work piece.
6) A negative Y Retract move will take place

7) A positive retract in Z.

8) X, Y position move back to the users start point for this cycle.

9) Then a prep. move in the positive X direction.

10) Prep move in Z below the work surface will prepare the probe for contacting the X surface.

11) The X axis will now travel at the Probe Feed Rate in a negative direction toward the X surface being probed.

12) Once contact is made, a retract position in the X away from the probed surface,

13) then in the Z to the clearance point above the work surface will take place.

Taking into consideration Tool /Probe Diameter, and Touch Plate height, the X, Y , and Z Offsets for the current work coordinate have been set..

14) The last and final move for this cycle is in both X, and Y. The move positions these axis' at the newly set work coordinates X, Y Zero.

Users can verify this by looking at the History bar.

Touch combination is finished. X axis set to 0.08 Y axis set to 0.203 Z axis set to 0.4094
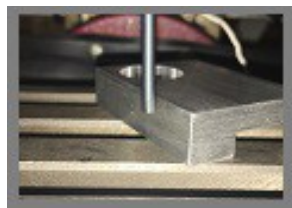

This Icon represents the Find Angle X++ Function. To use this function the user will need to determine the direction and axis of the angle to be probed. In the Settings/Options window, the Measure Angle Options drop down menu will have these selections. When the correct angle has been chosen, the image on the Find Angle button will change to reflect that.

| Measure Angle Options | X++ | ∨ |

This is X++ angle.

To set up to use this cycle, the user will jog the probe to the angled surface to be probed. A manual Z

position below the work surface is required as well to ensure probe contact. When in position clicking on the Find Angle Button will start the cycle. The cycle consists of two probing moves. Users will have to use caution where they position for the first move. When the first probe contact has been made, there will b a retract move to the start position. Depending on that distance, and the severity of the angle being probed, this may cause unwanted probe contact during the positioning move to the second probing position.

Enough clearance should be allowed for this when the user position their probe before running the cycle.
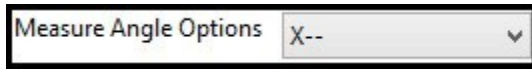
Once the cycle has been run successfully, Users will be able to obtain the measured angle from the history window for future reference.

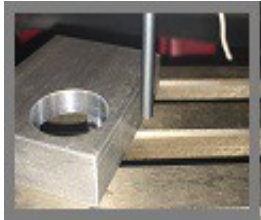**Angle (G68) has been set to 17.171149016027**

If users need to probe the corner of a work piece with one of the corner functions, and the corner to be probed is on angle, the Find Angle Function should be used first. Once the G68 is set any of the Find Corner Functions will be executed on the G68 angle that is now set.

This Icon represents the Find Angle X-- Function. To use this function the user will need to determine the direction and axis of the angle to be probed. In the Settings/Options window, the Measure Angle Options drop down menu will have these selections. When the correct angle has been chosen, the image on the Find Angle button will change to reflect that.

Measure Angle Options X--   This is X--angle.

To set up to use this cycle, the user will jog the probe to the angled surface to be probed. A manual Z position below the work surface is required as well to ensure probe contact.
When in position clicking on the Find Angle Button will start the cycle. The cycle consists of two probing moves. Users will have to use caution where they position for the first move. When the first probe contact has been made, there will b a retract move to the start position. Depending on that distance, and the severity of the angle being probed, this may cause unwanted probe contact during the positioning move to the second probing position.
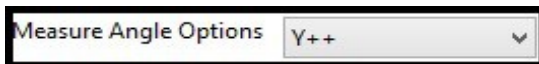Enough clearance should be allowed for this when the user position their probe before running the cycle.
Once the cycle has been run successfully, Users will be able to obtain the measured angle from the history window for future reference.

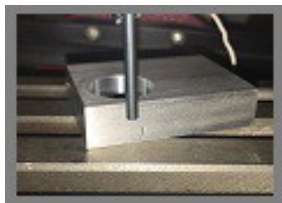Angle (G68) has been set to 17.171149016027

If users need to probe the corner of a work piece with one of the corner functions, and the corner to be probed is on angle, the Find Angle Function should be used first. Once the G68 is set any of the Find Corner Functions will be executed on the G68 angle that is now set.

This Icon represents the Find Angle Y++ Function. To use this function the user will need to determine the direction and axis of the angle to be probed. In the Settings/Options window, the Measure Angle Options drop down menu will have these selections. When the correct angle has been chosen, the image on the Find Angle button will change to reflect that.

Measure Angle Options Y++   This is Y++ angle.

To set up to use this cycle, the user will jog the probe to the angled surface to be probed. A manual Z position below the work surface is required as well to ensure probe contact.
When in position clicking on the Find Angle Button will start the cycle. The cycle consists of two probing moves. Users will have to use caution where they position for the first move. When the first probe contact has been made, there will b a retract move to the start position. Depending on that distance, and the severity of the angle being probed, this may cause unwanted probe contact during the positioning move to the second probing position.

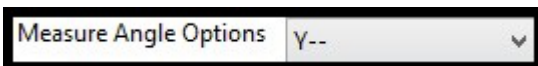Enough clearance should be allowed for this when the user position their probe before running the cycle.

Once the cycle has been run successfully, Users will be able to obtain the measured angle from the history window for future reference.

If users need to probe the corner of a work piece with one of the corner functions, and the corner to be probed is on angle, the Find Angle Function should be used first. Once the G68 is set any of the Find Corner Functions will be executed on the G68 angle that is now set.
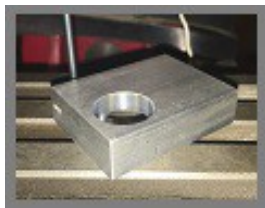
Angle (G68) has been set to 17.171149016027

This Icon represents the Find Angle Y-- Function. To use this function the user will need to determine the direction and axis of the angle to be probed. In the Settings/Options window, the Measure Angle Options drop down menu will have these selections. When the correct angle has been chosen, the image on the Find Angle button will change to reflect that.

Measure Angle Options Y--   This is Y-- angle.

To set up to use this cycle, the user will jog the probe to the angled surface to be probed. A manual Z position below the work surface is required as well to ensure probe contact.

When in position clicking on the Find Angle Button will start the cycle. The cycle consists of two probing moves. Users will have to use caution where they position for the first move. When the first probe contact has been made, there will b a retract move to the start position. Depending on that distance, and the severity of the angle being probed, this may cause unwanted probe contact during the positioning move to the second probing position.

Enough clearance should be allowed for this when the user position their probe before running the cycle.

Once the cycle has been run successfully, Users will be able to obtain the measured angle from the history window for future reference.

Angle (G68) has been set to 17.171149016027

PRECAUTION

If users need to probe the corner of a work piece with one of the corner functions, and the corner to be probed is on angle, the Find Angle Function should be used first. Once the G68 is set any of the Find Corner Functions will be executed on the G68 angle that the machine is now set to. If users only wish to find and angle, but proceed without a G68 rotation, A G69 in MDI followed by Cycle Start is required. This will cancel the rotation.

This Icon represents the Find Center Function. To use this function the user will need to determine the center of the pocket to be probed.
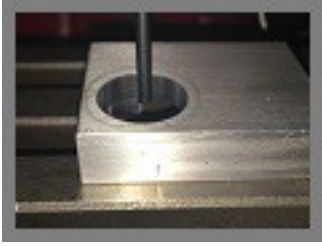
To set up to use this cycle, the user will jog their probe to the "approximate" center of the pocket that to be probed. A manual jog in Z below the top of the work surface to ensure contact with the probe, is required as well.

Once in position, clicking the Find Center Button will start the cycle. The cycle consists of four probe moves.
1. The first one is a negative move on the X axis until contact with the probe has been made.
2. The next move is positive on the X axis until the probe has made contact.
3. A position to the start point is next to set up the first Y probe move. This will be in the negative direction.
4. The final probe move will be in the positive direction on the Y axis.
 When the final probe move is done, the probe will be positioned at the newly set work coordinates X0., Y0.
The offsets are now set for the center of the pocket that has been probed. Users can verify this by glancing at the history window.

Touch combination is finished. X axis set to 0.31955 Y axis set to 0.30045

This Icon represents the Find Z Function. Z will be the only axis that will move with this function To use this function and the associated actions the user will need to have the appropriate tool and its offsets active.
There are two different actions with in this function. The actions for Find Z can be set in the Z Only Options in the Setting/Options window.

Z Only Options | Material Top

The first action is Material Top. When this has been selected, the user will need to jog the probe to a clearance point over the top of the work piece. Once in position, clicking the Find Z Button will probe the top of the work piece. With the Material Top selected, The current work coordinates Z offset has just been set. Users can verify this in the history window.

Touch is finished. Z axis set to -0.0825

Z Only Options | Tool Length (TLO)
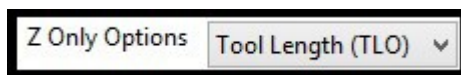
The second setting for the Find Z function is Tool Length (TLO).
When this option has been chosen, users will need to make sure that the tool and the corresponding offsets for that tool are active!!
once the tool or probe is in position, clicking the Find Z Button, will start the cycle. When complete, the current tool's length offset will be set. Users can verify this by viewing the history window.

Tool 1 Height Offset Set: -0.0002
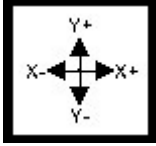
The last icon in the Functions Window does not have any function associated with it. It simply depicts the axis directions designated for the probing cycles.

This document is intended for users to better understand the Touch Module and the expected outcomes of its cycles within Mach4. Beyond this document, there are help tips built into the Touch module as well. These can be read by hovering over any of the buttons, or icons while in the Module.
It is still the end users responsibility to Wire and map a successful Probe Signal In Mach4 .
Understand, and read any and all the documents associated with the "Touch" module.

Touch Module Video