

# Tangential

- 1) The best method I know of to control a tangential axis is as follows:
  1. Write your G-code to include the tangential axis moves and do not enable tangential mode.
  2. Write your G-code so the tool path is executed in a counter clockwise direction.
  3. Write your G-code with line segments, not arcs.
- 2) Enabling tangential mode disables CV mode.
- 3) CV does work with 4 axis moves when the 4th axis is being driven by G-code rather than tangential mode.
- 4) Motion pauses when blending (CV) arcs in tangential mode.
- 5) CV works best with line segments, not arcs.
- 6) With CV and tangential mode active: If the CV settings are too high (blend units) the X and Y may move before the knife reaches its depth. A workaround for this is to double the feed rate in the G-code file and set the FRO to 50%.
- 7) G93 (Inverse time feed mode) can make noticeable differences when running a tangential axis.

The example G-code below is the G-code used in the video (in order).

(Helix)

G64

G90 G1 Z1

G0 A0

G91

G0X0Y0

G3 X0 Y0 I0 J2 Z-.5 A360 F900000

G3 X0 Y0 I0 J2 Z-.5 A360 F900000

G3 X0 Y0 I0 J2 Z-.5 A360 F900000

G90

G0 Z1

m30

(rad\_sq)

N2 G17G40G20G90G94G49G64

N5 G0X48.0000Y28.0377Z0.5000

N6 G1Z0.0000F200.0

N7 G1Y26.0000F1800.0

N8 G3X49.0000Y25.0000I1.0000J-0.0000

N9 G1X53.0000

N10 G3X54.0000Y26.0000I0.0000J1.0000

N11 G1Y30.0000

N12 G3X53.0000Y31.0000I-1.0000J0.0000

N13 G1X49.0000

N14 G3X48.0000Y30.0000I-0.0000J-1.0000

N15 G1Y28.0377

N16 G0Z0.5000

N19 M30

(rad\_sq\_A)

N2 G17G40G20G90G94G49G64

N5 G0X48.0000Y28.0377Z0.5000A270

N6 G1Z0.0000F200.0

N7 G1Y26.0000F50000

N8 G3X49.0000Y25.0000I1.0000J-0.0000A0

N9 G1X53.0000

N10 G3X54.0000Y26.0000I0.0000J1.0000A90

N11 G1Y30.0000

N12 G3X53.0000Y31.0000I-1.0000J0.0000A180

N13 G1X49.0000

N14 G3X48.0000Y30.0000I-0.0000J-1.0000A270

N15 G1Y28.0377

N16 G0Z0.5000

N19 M30

(rad\_sq\_G0)

N2 G17G40G20G90G94G49G64

N5 G0X48.0000Y28.0377Z0.5000

N6 G0Z0.0000F200.0

N7 G0Y26.0000F1800.0

N8 G3X49.0000Y25.0000I1.0000J-0.0000

N9 G0X53.0000

N10 G3X54.0000Y26.0000I0.0000J1.0000

N11 G0Y30.0000

N12 G3X53.0000Y31.0000I-1.0000J0.0000

N13 G0X49.0000

N14 G3X48.0000Y30.0000I-0.0000J-1.0000

N15 G0Y28.0377

N16 G0Z0.5000

N19 M30

(rad\_sq\_G0\_G1leadout)

N2 G17G40G20G90G94G49G64

N5 G0X48.0000Y28.0377Z0.5000

N6 G0Z0.0000F200.0

N7 G0Y26.0000F1800.0

N8 G3X49.0000Y25.0000I1.0000J-0.0000

N9 G0X53.0000

N10 G3X54.0000Y26.0000I0.0000J1.0000

N11 G0Y30.0000

N12 G3X53.0000Y31.0000I-1.0000J0.0000

N13 G0X49.0000

N14 G3X48.0000Y30.0000I-0.0000J-1.0000

N15 G0Y28.0377

**G1Y28.000**

N16 G0Z0.5000

N19 M30

(misc\_knife\_cuts What right looks like)

(Straight knife cut example)

N2 G17G40G20G90G94G49G61

N5 G0 Z1

N6 G0 X0 Y0 A90

N7 G1 Z0 F500

N8 G1 Y2 F1000

N9 G0 Z1

N10 G0 A0

N11 G1 Z0

N12 G1 X2

N13 G0 Z1

N14 G0 A270

N15 G1 Z0

N16 G1 Y0

N17 G0 Z1

N18 G0 A180

N19 G1 Z0

N20 G1 X0

N21 G0 Z.5

(CW Circle)

F60000

G0 Z.5

G0 x0 y0

G0 A-90

G1 z0

G2 X0 Y0 I2 J0 Z0 A-90.001

G0z.5

(CCW Circle)

F60000

G0 Z.5

G0 x0 y0

G0 A270

G1 z0

G3 X0 Y0 I2 J0 Z0 A269.999  
G0z1

(45deg Bevel knife cut example)

N5 G0 Z1  
N6 G0 X1 Y0 A90  
N7 G1 X0 Z0 F500  
N8 G1 Y2 F1000  
N9 G1 X1 Z1  
N10 G0 X0 Y1 A0  
N11 G1 Y2 Z0  
N12 G1 X2  
N13 G1 Y1 Z1  
N14 G0 X1 Y2 A270  
N15 G1 X2 Z0  
N16 G1 Y0  
N17 G1 X1 Z1  
N18 G0 X2 Y1 A180  
N19 G1 Y0 Z0  
N20 G1 X0  
N21 G1 Y1 Z1  
G0X10Y10A0  
N24 M30