

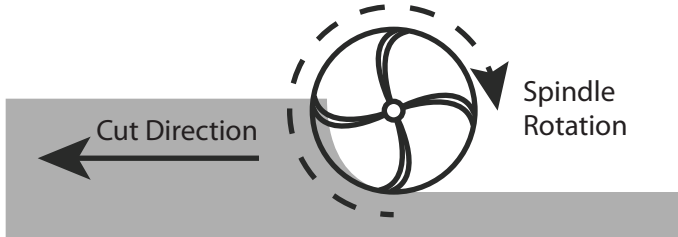
# CNC Quick Reference

## Conventional Cutting

**Definition:** Tool scoops up material, starting at zero thickness and increasing to maximum.

**Pros:** Less stress on machine. Less backlash.

**Cons:** Tool rubs against cutting surface, work hardening the material, generating heat, and increasing tool wear. Raking chips across the finished surface also produces a poorer surface finish.

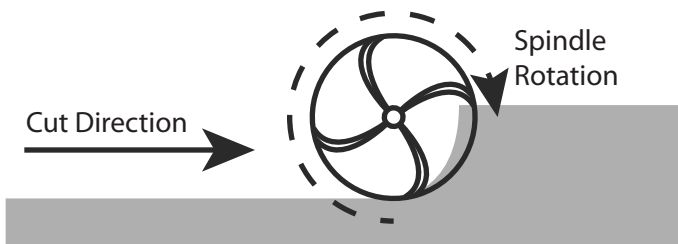


## Climb Cutting

**Definition:** Tool advances so cutting flute engages the material at maximum thickness and then decreases to zero

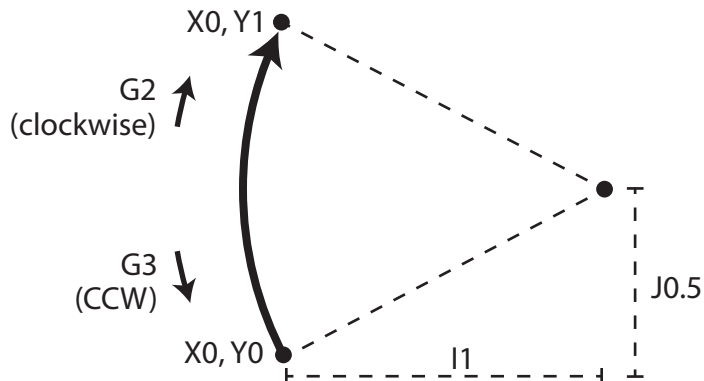
**Pros:** Better surface finish. Less heat. Longer tool life.

**Cons:** Significantly more stress on machine. Backlash.



## Arcs

**G2** X0 Y1 I1 J0.5



## Links

<http://www.shapeoko.com/forum>

<http://fusion360.autodesk.com/>

<http://linuxcnc.org/docs/html/gcode.html>

<http://www.ebay.com/usr/drillman1>

<http://www.hsmworks.com/docs/cncbook/en/>

<http://zero-divide.net/?page=fswizard>

## Most Common G Codes

### Setup

<b>G94</b>	Units per minute feed rate "FX" means move at X units/min (eg inches/min).
G93	Inverse time feed rate "FX" means move to be completed in 1/F mins.
G95	Units per revolution feed rate
G17	Select XY plane
<b>G20</b> / G21	Inches / mm units
<b>G90</b> / G91	Absolute / incremental positioning

### Cutting Operation Preamble

TN M6	Change to tool number N
M9	Coolant off
<b>SN</b>	Spindle speed N
<b>M3</b> / M4	Spindle on clockwise / CCW
G53	Select machine coordinate system
G54	Select stored coordinate system 1
G28 (X/Y/Z)	Return to predefined position Passing through optional X/Y/Z point
G28.1	Store predefined position

### Motion

<b>G0</b>	Rapid move (not in stock)
<b>G1</b>	Linear (point-to-point) motion
<b>G2/G3</b>	Arc clockwise / CCW (see diagram)
<b>G4</b>	Dwell

### Cleanup

<b>M5</b>	Stop spindle
<b>M30</b>	End program