



Innovative Tool Sales

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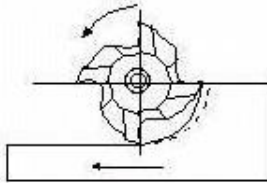
Technical Support Page CONVENTIONAL VS CLIMB MILLING

The direction of feed influenced machining performance.

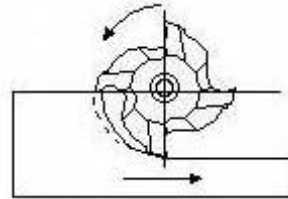
CONVENTIONAL MILLING – “UP” MILLING (Feed movement opposite to tool rotation)

- Width of chip starts from zero and increases.
- Tooth meets the workpiece at the bottom of cut.
- Upward force tends to lift up workpiece.
- More power required - rubbing provoked by chip beginning at minimum width.
- Surface finish marred (spoiled) due to the chips being carried upward by tooth.
- Chips fall in front of cutter - chip disposal difficult.
- Faster wear on tool than climb milling.

Conventional milling is preferred when milling castings or forgings with very rough surfaces.



CONVENTIONAL – “UP” MILLING



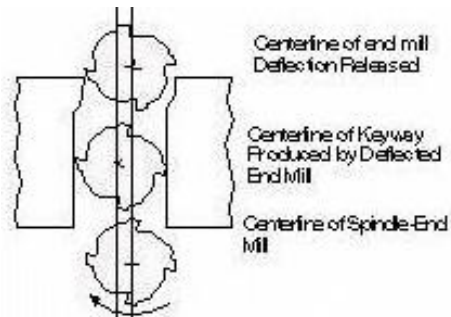
CLIMB – “DOWN” MILLING

DEFLECTION OF END MILLS



IN END MILLING, THE END MILL TENDS TO PIVOT AROUND THE LOADED TOOTH IN THE DIRECTION OF ROTATION

DEFLECTION OF A 4-FLUTE END MILL IN A SLOTTING OPERATION



Climb milling – “Down” milling

(Feed movement and tool rotation same direction.)

- Width of chip starts at maximum and decreases.
- Tooth meets workpiece at top of cut.
- Easier chip disposal - chips removed behind cutter.
- Less wear - increases tool life up to 50%.
- Improved surface finish - chips less like to be carried by the tooth.
- Less power required - cutter with high rake angle can be used.
- Climb milling exerts a downward force on workpiece - fixtures simple and less costly.

Climb milling is preferred when milling heat treated alloys, stainless steel - reduces work hardening. Climb milling may cause chipping in milling hot rolled materials due to hardened layer on the surface.