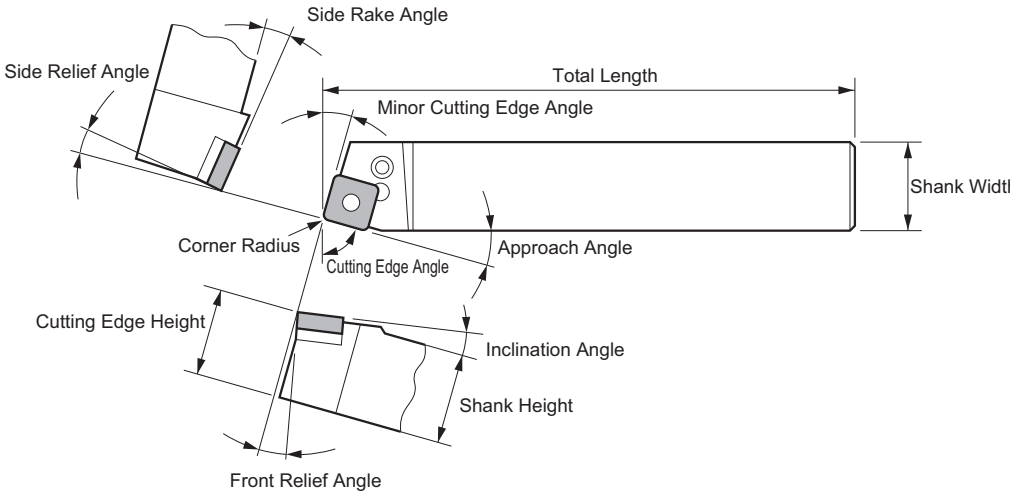
Terms and Angles of Toolholder

Terms and Angles of Turning Toolholder



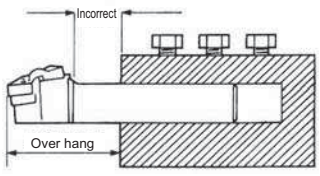
Function of Tool Angle

Tool Angle	Name	Function	Effect
Rake Angle	Side Rake Angle	• Affects cutting force, cutting heat, chip evacuation and tool life.	• If it is positive (+) angle, sharper cutting performance is obtained. (less cutting resistance, less edge strength) • Positive (+) angle is recommended for easy to machine workpieces or thin workpieces. • Smaller rake angle or negative (-) angle is recommended when a stronger edge is required like scale cutting or interrupted cutting.
	Inclination Angle		
Relief Angle	Front Relief Angle Side Relief Angle	• Prevents the tool's contact to the workpiece surface, except the cutting edge.	• When it is small, the cutting edge becomes strong, but the wear at relief faces may shorten the tool life.
Cuting Edge Angle	Cutting Edge Angle	• Affects chip control and the direction of cutting force.	• When it is large, chip thickness becomes thick and chip control improves.
	Approach Angle	• Affects chip control and the direction of cutting force.	• When it is large, chip thickness becomes thin and chip control worsens, but cutting force is dispersed and edge strength improves. • When it is small, chip control ability improves.
	Minor Cutting Edge Angle	• Prevents friction between cutting edge and work surface.	• When it is large, edge strength deteriorates.

Toolholder Rigidity

1. Flexure of Toolholder

$$\delta = \frac{4\times F\times L^3}{E\times b\times h^3} = \frac{4\times k\times d\times f\times L^3}{E\times b\times h^3}$$



Symbol	Name	Measure
δ (Delta)	Deflection	mm
b	Shank Width	mm
h	Shank Height	mm
E	Young ratio	N/mm²
d	ap	mm
f	Feed rate	mm/rev
k	Specific Cutting Resistance	N/mm²
L	Over hang	mm
F	Cutting force	N

(F=k x d x f)

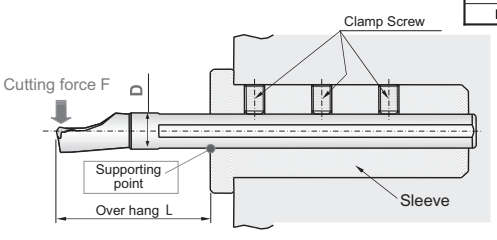
The flexure of toolholder will decrease by increasing of shank height by third root and will decrease of reducing over hang by third root. Minimizing toolholder shank over hang as much as possible is important as well as shank's sectional square measure.

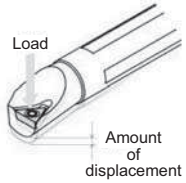
2. Flexure of Boring Bar

$$\delta = \frac{64\times F\times L^3}{3\times E\times \pi\times D^4} = \frac{64\times k\times d\times f\times L^3}{3\times E\times \pi\times D^4}$$

Symbol	Name	Measure
δ (Delta)	Deflection	mm
D	Shank Dia.	mm
E	Young ratio	N/mm²
d	ap	mm
f	Feed rate	mm/rev
k	Specific Cutting Resistance	N/mm²
L	Over hang	mm
F	Cutting force	N

(F=k x d x f)





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Technical Information