

Twister® Drill Icon Glossary

	Solid
	Coolant Fed
	Drill Length
	Drill Point Angle
	Helix Angle
	Coatings
	DIN Specs

Workpiece Material Group	
	Steels
	Stainless Steels
	Cast Iron
	Special Alloys
	Hardened Steels (35-65Rc)
	Non-Ferrous

Cutting Calculations and Definitions		Metric	U.S.
ae	= Width of cut, radial depth of cut	(mm)	(inch)
ap	= Depth of cut, axial depth of cut	(mm)	(inch)
Dc	= Cutter diameter	(mm)	(inch)
f	= Feed per revolution	(mm/rev)	(IPR)
fz	= Feed per tooth	(mm/tooth)	(IPT)
zn	= Number of teeth	Number	
n	= RPM	(rev/min)	(rev/min)
Q	= Metal removal rate	(cm³/min)	(in³/min)
vc	= Cutting speed	(m/min)	(SFM)
vf	= Feed speed	(mm/min)	(IPM)
Dw	= Working diameter	(mm)	(inch)

Formulas

Inch

RPM (n) = SFM (vc) x 3.82/Tool Diam.

IPM (vf) = RPM (n) x IPR (f)

Conversion Inch to Metric

SFM (vc) to m/min (vc) = SFM (vc) x .3048

IPM (vf) to mm/min (vf) = IPM (vf) x 25.4

Metric

RPM (n) = m/min (vc) x 318.057/Tool Diam.

mm/min (vf) = RPM (n) x mm/Revolution (f).

Conversion Metric to Inch

m/min (vc) to SFM (vc) = (m/min)/.3048

mm/min (vf) to IPM (vf) = (mm/min)/25.4

Safety Note

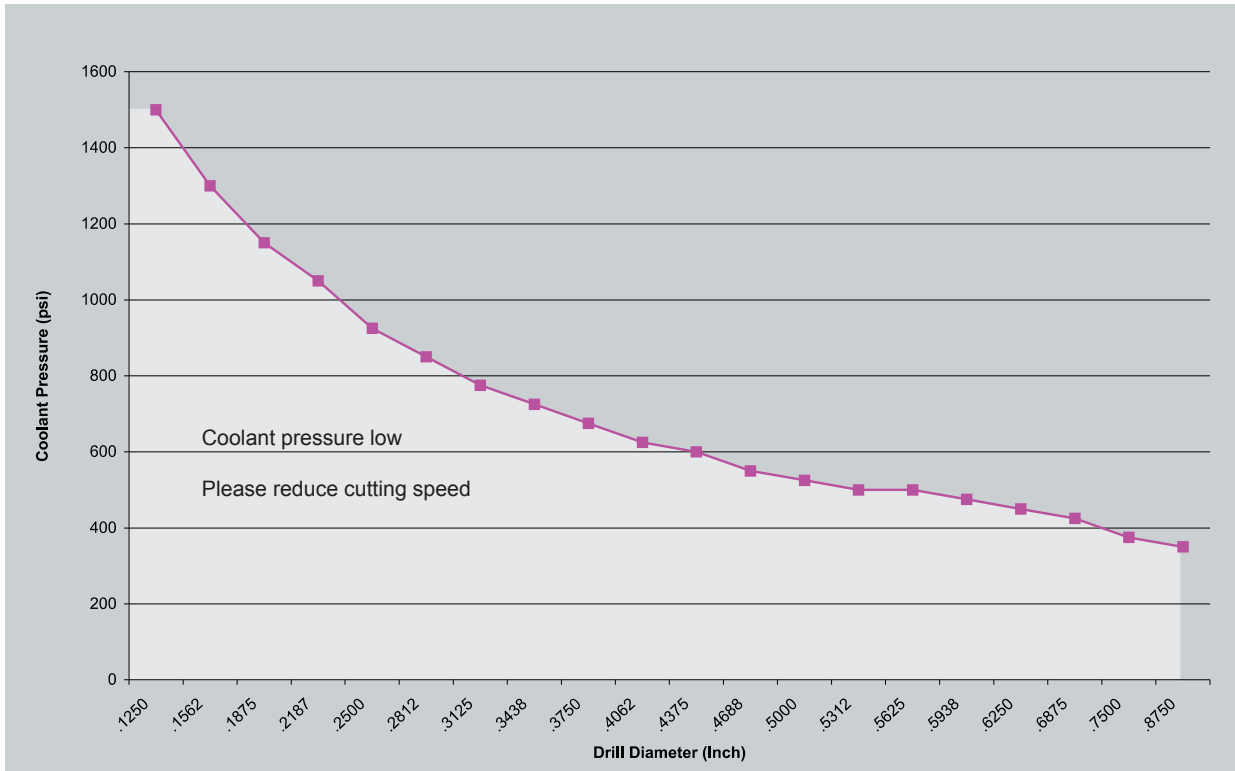
Always wear the appropriate personal protective equipment such as safety glasses and protective clothing when using solid carbide or HSS cutting tools. Machines should be fully guarded.

Drill Troubleshooting

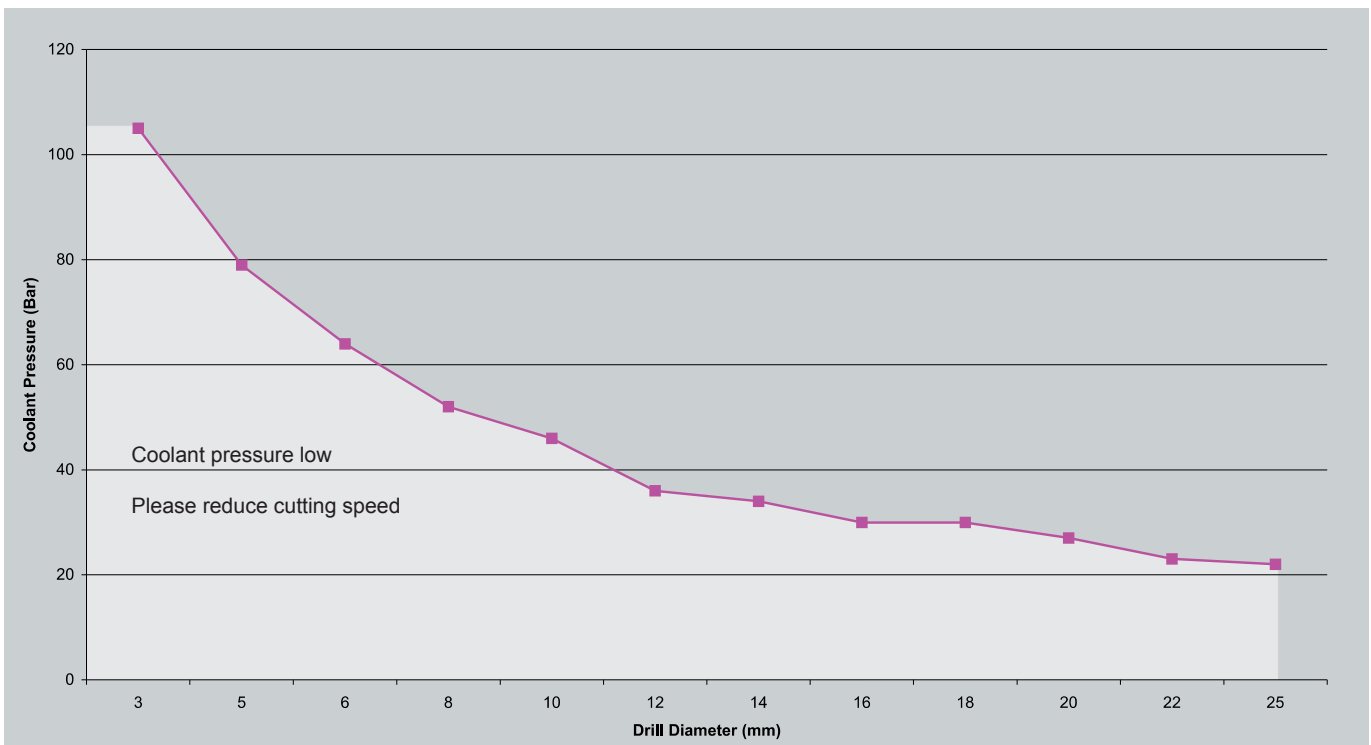
Possible Solutions	Problem																																	
	Tool Deterioration										Chip Formation		Tool Life		Workpiece				Process															
	Flank wear	Margin wear	Breakage	Flaking	Creater wear	Chisel edge wear	Corner chipping	Flute chipping	Cutting edge chipping	Cutting edge wear	Point center chipping	Rake face	Scoring on tool body	Long stringy	Varied chip form	Blue/brown chips	Tool Life	Undersized hole	Oversized hole	Poor alignment	Poor surface finish	Heavy burr breakout	Retract marks	Hole location	Hole straightness	Deflection	Point Deflection	Galling	Vibration	Abnormal noise	Chip packing	No drill penetration		
Reduce feed or reduce at exit	x		x			x	x	x	x								x	x	x		x											x		
Reduce feed at entrance			x															x		x			x									x		
Consistent feed rate			x											x	x														x			x		
Increase feed	x					x				x								x	x															
Reduce speed	x	x			x		x			x							x	x										x		x	x			
Increase speed																					x													
Coolant mix		x	x	x					x				x				x	x		x	x											x		
Coolant increase flow	x		x			x	x		x						x		x	x			x	x										x		
Coolant filter	x		x	x					x								x	x			x	x										x		
Workpiece clamp rigid		x	x			x	x		x				x				x		x	x	x	x	x	x	x							x		
Collet accuracy			x						x										x						x			x						
Tool holder fit .0008			x						x										x					x										
Alignment			x						x										x														x	
Peck drill			x																															
Concentricity		x	x	x					x											x	x			x	x	x		x		x				
Do not extract tool during peck									x																									

Technical data provided should be considered advisory only as variations may be necessary depending on the particular application.

Coolant Pressure - Inch
 Recommended Minimum Coolant Pressure



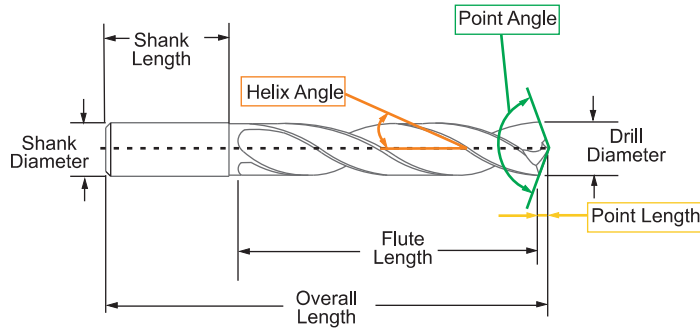
Coolant Pressure - Metric
 Recommended Minimum Coolant Pressure



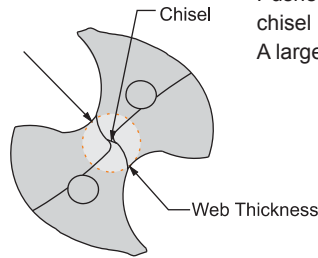
Technical data provided should be considered advisory only as variations may be necessary depending on the particular application.

For product information, call your local distributor.

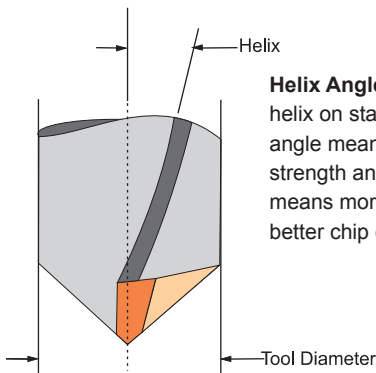
Drill Terminology



Chisel Edge – The non-cutting tip of the drill. Pushes, rather than cuts material. Having a smaller chisel means that a tool will cut more aggressively. A larger chisel means that a tool will be stronger.

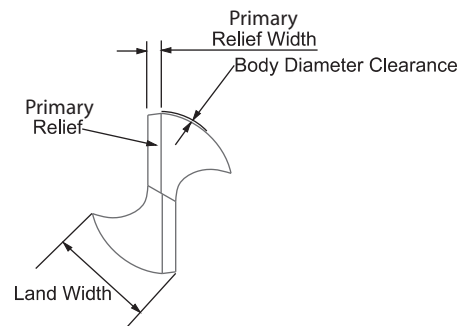


Web – The core of the drill that is left from the fluting operation. A thicker web means added rigidity, while a smaller web means more chip evacuation. On two flute drills, typically varies from 16% - 30% of the tool diameter.

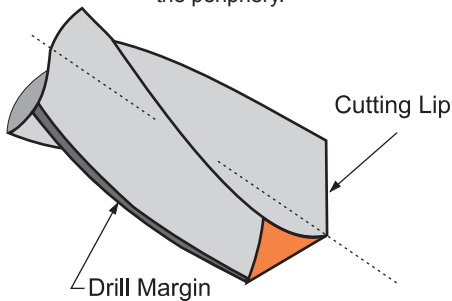


Helix Angle - Varies from 0° to 35° helix on standard tools. Lower helix angle means more rigidity and strength and a higher helix angle means more aggressive drilling and better chip evacuation.

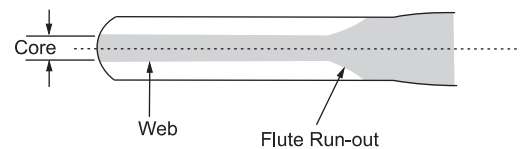
Margin Width – Provides a surface to support the drill inside the hole during the drilling operation. M.A. Ford® offers both single margin and double margin geometries. Margin widths are a balancing act between friction build-up vs. tool support in the drilling operation.



Cutting Lip - The cutting edges of a two flute drill extending from the chisel edge to the periphery.



Land Width – The amount of material left on the drill per side, from the fluting operation. Larger land widths mean more rigidity, while smaller land widths allow for better chip evacuation.



Having a problem with drill geometries? Circle the area where the problem exists. Include a detailed explanation of the issue and fax to Attn: Technical Application Support 800-892-9522 / 563-386-7660 or email: maftech@maford.com

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