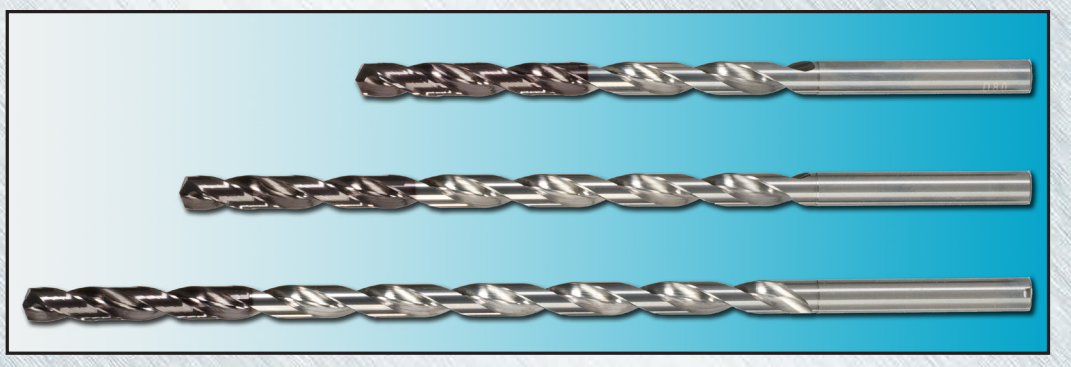
DRILL•IN XL™

For M.Q.L Systems



Series: DRXL 10:1
Shank Dia. Range: 4mm-10mm
Drill Dia. Range: 4mm-10mm
Max DOC Range: 50mm-122mm
Overall Length Range: 105mm-190mm

Series: DRXL 15:1
Shank Dia. Range: 4mm-10mm
Drill Dia. Range: 4mm-10mm
Max DOC Range: 70mm-172mm
Overall Length Range: 125mm-240mm

Series: DRXL 20:1
Shank Dia. Range: 4mm-10mm
Drill Dia. Range: 4mm-10mm
Max DOC Range: 85mm-217mm
Overall Length Range: 140mm-285mm

Ingersoll introduces additions to the Drill•InXL lines, for deep hole drilling up to 20xD. This drill series has optimized geometries for smooth chip evacuation with low cutting forces. A pecking cycle is not required – these drills help produce high productivity machining. These drills provide the customer with reliable machining and excellent cost savings and are designed to work with M.Q.L Systems.

- *Unique geometry with high performance.*
- *Strong cutting edges resist chipping and breakage.*
- *A wide flute design and lapping on the flute for smooth chip evacuation.*
- *Ultra fine substrate with TiAlN coating for a high level of wear-resistance and toughness.*
- *Increased body rigidity and high quality of holes with low cutting force.*

Applications:
- *Automotive Parts*
- *Mold & Die Parts*
- *Machine Tool Parts*

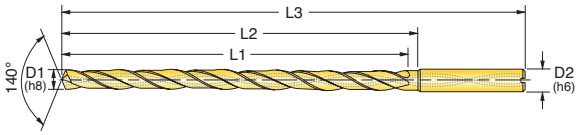
Member IMC Group
Ingersoll Cutting Tools

DRILLOIN XL™ SERIES DRXL

SOLID CARBIDE DRILLS 10:1 GEOMETRY

Drilling

Coolant



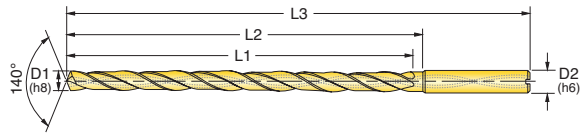
Part Number	D1 Drill Diameter (inch)	D1 Drill Diameter (mm)	D2 Shank Size/Style	L1 Max DOC	L2 Flute Length	L3 Overall Length
DRXL0400050U0R01 IN2005	0.157	4.00mm	4mm Cyl	50.00mm	55.00mm	105.00mm
DRXL0500060U1R01 IN2005	0.197	5.00mm	5mm Cyl	60.00mm	65.00mm	115.00mm
DRXL0600075T7R01 IN2005	0.236	6.00mm	6mm Cyl	75.00mm	80.00mm	130.00mm
DRXL0700085UAR01 IN2005	0.276	7.00mm	7mm Cyl	85.00mm	90.00mm	140.00mm
DRXL0800097T0R01 IN2005	0.315	8.00mm	6mm Cyl	97.00mm	105.00mm	155.00mm
DRXL0900107U9R01 IN2005	0.354	9.00mm	9mm Cyl	107.00mm	115.00mm	170.00mm
DRXL1000122T1R01 IN2005	0.394	10.00mm	10mm Cyl	122.00mm	130.00mm	190.00mm

DRILLOIN XL™ SERIES DRXL

SOLID CARBIDE DRILLS 15:1 GEOMETRY

Drilling

Coolant



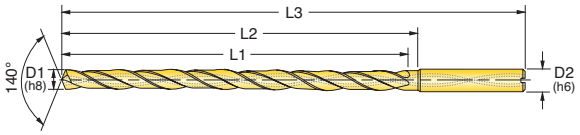
Part Number	D1 Drill Diameter (inch)	D1 Drill Diameter (mm)	D2 Shank Size/Style	L1 Max DOC	L2 Flute Length	L3 Overall Length
DRXL0400070U0R01 IN2005	0.157	4.00mm	4mm Cyl	70.00mm	75.00mm	125.00mm
DRXL0500085U1R01 IN2005	0.196	5.00mm	5mm Cyl	85.00mm	90.00mm	140.00mm
DRXL0600105T7R01 IN2005	0.236	6.00mm	6mm Cyl	105.00mm	110.00mm	160.00mm
DRXL0700120UAR01 IN2005	0.275	7.00mm	7mm Cyl	120.00mm	125.00mm	175.00mm
DRXL0800137T0R01 IN2005	0.314	8.00mm	8mm Cyl	137.00mm	145.00mm	195.00mm
DRXL0900152U9R01 IN2005	0.354	9.00mm	9mm Cyl	152.00mm	160.00mm	220.00mm
DRXL1000172T1R01 IN2005	0.394	10.00mm	10mm Cyl	172.00mm	180.00mm	240.00mm

DRILL-IN XL™ SERIES DRXL

SOLID CARBIDE DRILLS 20:1 GEOMETRY

Drilling

Coolant



Part Number	D1 Drill Diameter (inch)	D1 Drill Diameter (mm)	L1 Max DOC	L2 Flute Length	L3 Overall Length
DRXL0400070U0R01	4mm	4mm Cyl	85.00mm	90.00mm	140.00mm
DRXL0500100U1R01	5mm	5mm Cyl	110.00mm	115.00mm	165.00mm
DRXL0600120T7R01	6mm	6mm Cyl	135.00mm	140.00mm	190.00mm
DRXL0635127R6R01	0.250	.250" Cyl	5.00 inch	5.90 inch	7.87 inch
DRXL0700140UAR01	7mm	7mm Cyl	155.00mm	160.00mm	210.00mm
DRXL0793158R7R01	0.312	.312" Cyl	6.24 inch	7.08 inch	9.05 inch
DRXL0800160T0R01	8mm	8mm Cyl	172.00mm	180.00mm	230.00mm
DRXL0900180U9R01	9mm	9mm Cyl	197.00mm	205.00mm	265.00mm
DRXL0952190R8R01	0.375	.375" Cyl	7.50 inch	8.46 inch	10.82 inch
DRXL1000200T1R01	10mm	10mm Cyl	217.00mm	225.00mm	285.00mm

ADVANTAGES

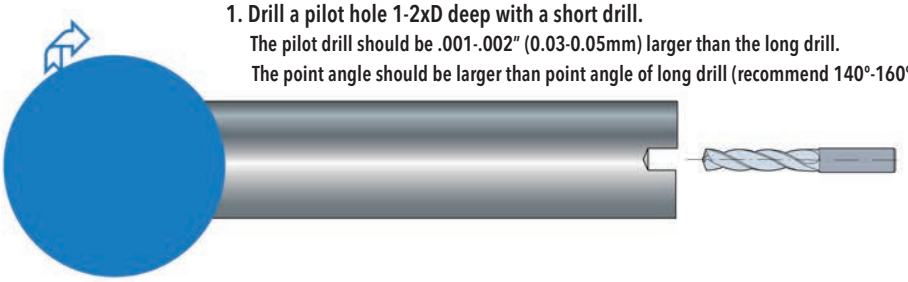
- Deep hole drilling up to 20xD without Pecking cycle.
- Higher productivity compared to conventional deep hole drills such as HSS drills & Gun drills.
- Application on conventional machining center.

APPLICATIONS

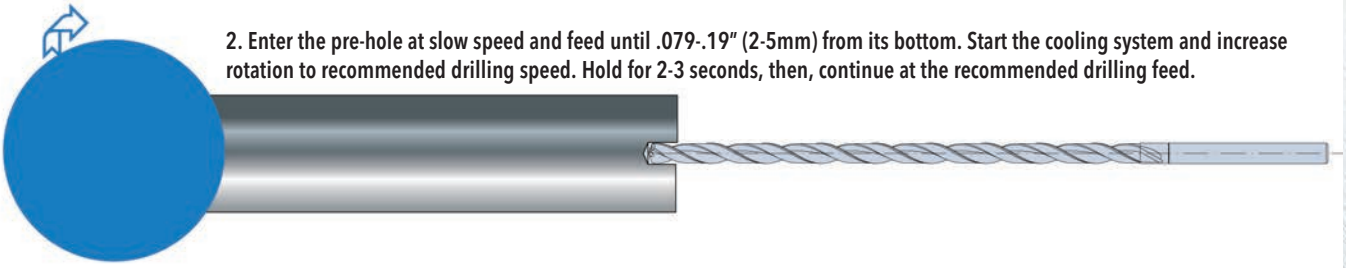
- Automotive Parts (i.e. Cylinder block, Crank shaft, Connecting rod)
- Mold & Die Parts
- Machine Tool Parts

RECOMMENDED DRILLING PROCESS

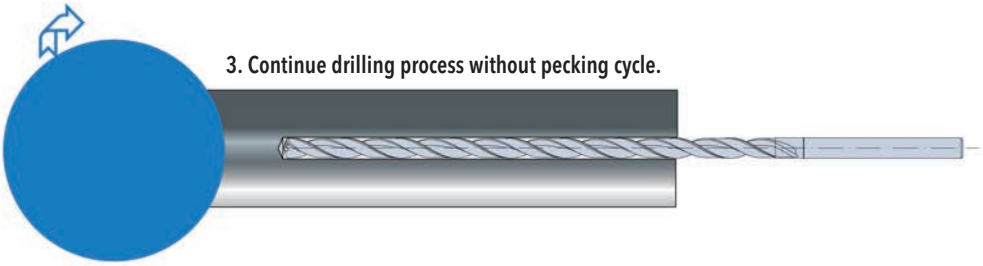
1. Drill a pilot hole 1-2xD deep with a short drill.
   The pilot drill should be .001-.002" (0.03-0.05mm) larger than the long drill.
   The point angle should be larger than point angle of long drill (recommend 140°-160°).



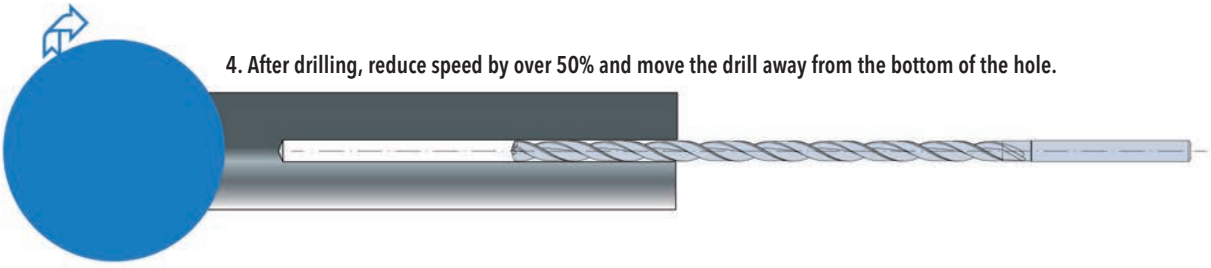
2. Enter the pre-hole at slow speed and feed until .079-.19" (2-5mm) from its bottom. Start the cooling system and increase rotation to recommended drilling speed. Hold for 2-3 seconds, then, continue at the recommended drilling feed.



3. Continue drilling process without pecking cycle.



4. After drilling, reduce speed by over 50% and move the drill away from the bottom of the hole.



M.Q.L. MACHINING (MINIMAL QUALITY LUBRICATION)

M.Q.L. is a new machining method that delivers the required minimum quantity of lubricant mixed with air and performs machining through a continuous supply of an oil/air mixture to the cutting edges. The M.Q.L. makes it possible to reduce the amount of coolant used to nearly zero.

In conventional mass-production system such as the automotive industry, a large volume of cutting fluid is used to improve productivity and machining accuracy.

Recently, the negative effects of cutting fluid upon people and the environment as well as high maintenance cost have become a serious problem, so the reduction of coolant is strongly required.

<u>Advantages of M.Q.L:</u>

Cut production costs

- No need for cutting fluid
- No need for cooling utilities

Improve productivity

- Remarkable reduction of production time
- High cutting efficiency and tool life
- No need to clean the work-piece after machining

Risks of machining with coolant

- Harm to humans
- Pollution
- High maintenance cost

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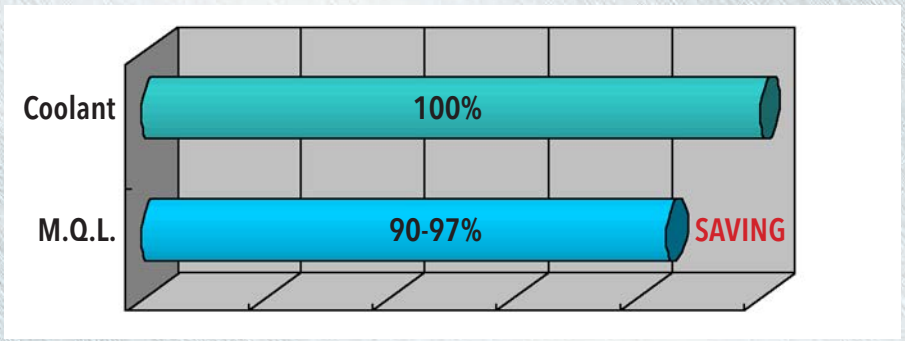
Advantages of M.Q.L.

- Safe
- Environmental-friendly
- Longer tool life
- Production efficiency

MACHINING COST COMPARISON

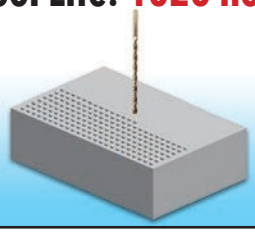
M.Q.L. vs. Coolant



CASE STUDY #1

Machine		Vertical Machining center (DAEWOO)
Part Name		Test workpiece
Material		KP 4 (Mould steel_HB280-320)
Drill		DRXL0700210UAR01 (Special 30xD)
Drill Diameter		7.0mm
Cutting speed	V (sfm)	262
Feed rate	f (ipr)	.008
Depth		4.13 (IN)
Coolant		M.Q.L. system
Air Pressure		8.5 [kgf/cm2], Oil quantity: 12.5 [cc/h]

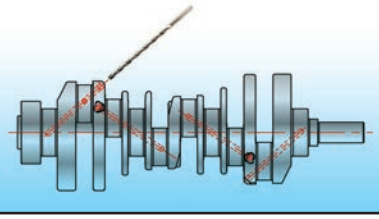
Tool Life: 1020 holes



CASE STUDY #2

Machine		Horizontal Machining center (HORKOS)
Part Name		Crank shaft (Oil way hole)
Material		S45CVMn (HBc 22-27)
Drill		DRXL0580184T7R01 (Special 30xD)
Drill Diameter		7.0mm
Cutting speed	V (sfm)	265
Feed rate	f (ipr)	.007
Depth		3.275 (IN)
Coolant		M.Q.L. system
Air Pressure		7-8 [kgf/cm2], Oil quantity: 40-50 [cc/h]

Tool Life: 200 holes



DR SOLID CARBIDE DRILLS OPERATING GUIDELINES

Designation		Dia 0.118 - 0.393	Dia 0.397 - 0.590	Dia 0.594 - 0.787
Mild Steel Alloy Steel Carbon Steel (HRC 25)	V (feet/min)	262 - 328	295 - 328	328 - 393
	V (inch/rev)	0.006 - 0.010	0.007 - 0.013	0.009 - 0.015
Alloy Steel Forged Steel (HRC 25 - 35)	V (feet/min)	213 - 328	295 - 328	295 - 360
	V (inch/rev)	0.006 - 0.009	0.006 - 0.011	0.006 - 0.011
Hardened Steel (HRC 35-45)	V (feet/min)	114 - 213	131 - 230	147 - 246
	V (inch/rev)	0.006 - 0.009	0.006 - 0.011	0.007 - 0.012
Stainless Steel	V (feet/min)	98 - 197	114 - 230	131 - 230
	V (inch/rev)	0.003 - 0.009	0.003 - 0.009	0.003 - 0.011
Ductile Cast Iron	V (feet/min)	213 - 295	246 - 328	279 - 360
	V (inch/rev)	0.006 - 0.011	0.007 - 0.013	0.009 - 0.015
Cast Iron	V (feet/min)	295 - 328	328 - 360	328 - 393
	V (inch/rev)	0.006 - 0.011	0.007 - 0.013	0.009 - 0.015