

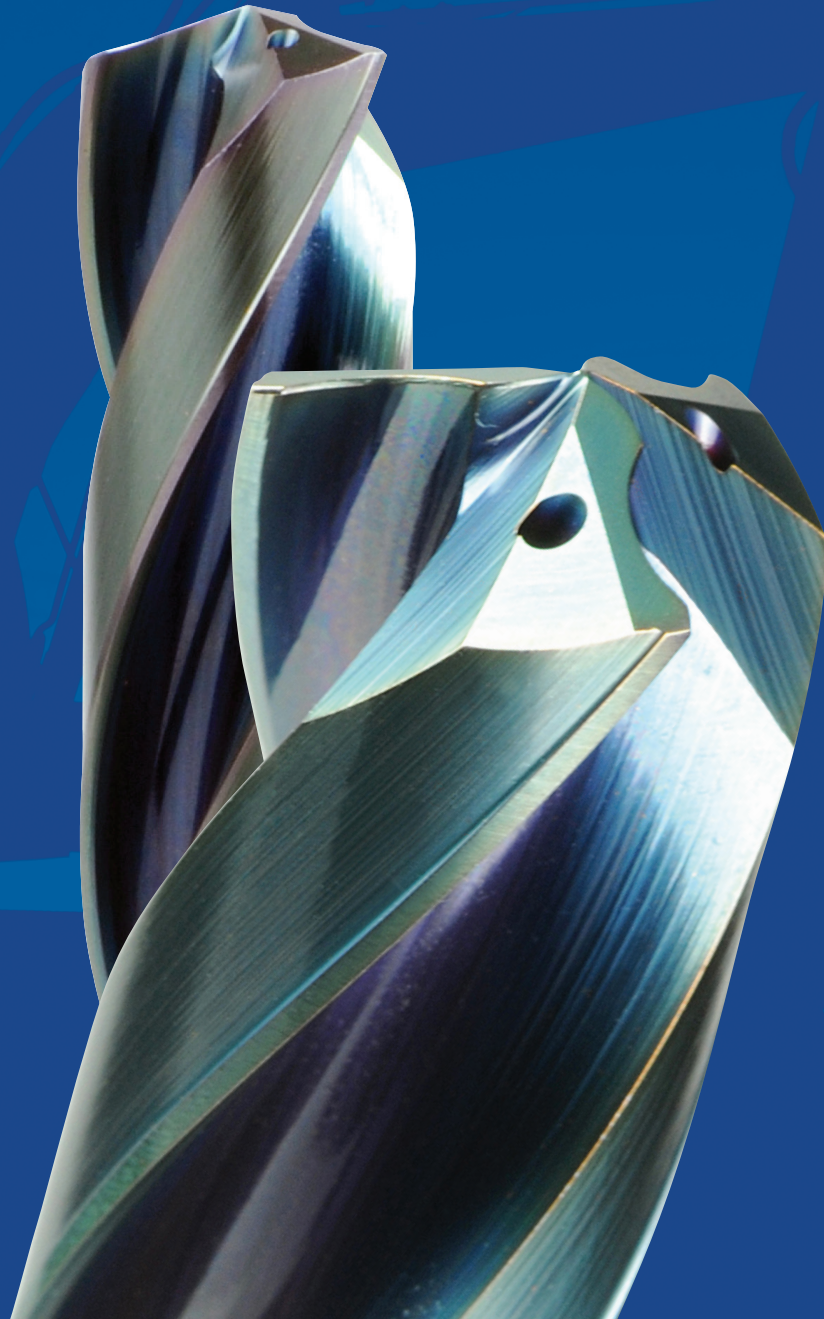


Vol 4

Extreme Performance High Feed Carbide Drills

EXOPRO[®] Mega Muscle[®]

3D & 5D



Mega Muscle® Drill Capability Chart

Availability With and Without Coolant-Through

Mega Muscle® Drill Type		2.5mm (0.00984")	4mm (0.1575")	5mm (0.1969")	8mm (0.3150")	12.7mm (1/2")	16mm (0.6299")	20mm (0.7874")	25.4mm (1")
With Coolant Hole	Mega Muscle® 3D	---	Standard						Special
	Mega Muscle® 5D	---	Standard						Special
	TRS-HO-8D	---	Special						
	TRS-HO-10D		Special						
	TRS-HO-SC*		Special						
Without Coolant Hole	TRS-3D		Special						
	TRS-5D		Special						
	TRS-SC*		Special						

* There is a limitation of diameter difference.
* Step type is only for drill-chamfer operation.



Diameter Difference: $D/d \leq 1.4$
Step Drill Available as Special

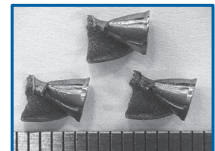
3-Flutes vs 2-Flutes

3 Key Concepts that Differentiate Mega Muscle® from 2-Flute Drills



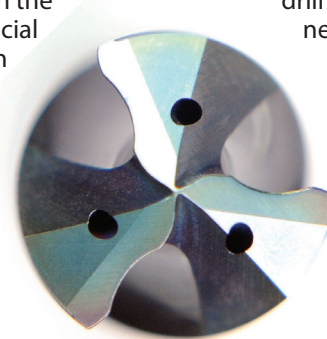
High Feed Rate

Conventional 3-fluted drills are most commonly used in the processing of materials with short cutting chips, such as cast irons and cast aluminums. Because 3-fluted drills have a smaller flute size (chip room) than 2-fluted drills, they are rarely used in difficult-to-machine materials like steels. However, OSG's Mega Muscle® drills have a specially shaped flute (PAT.P.) that breaks steel chips into small, manageable pieces for easy evacuation. This allows for increased feed rates up to 1.5 to 2 times faster than 2-fluted drills. More importantly, rotational speed can be decreased, thus decreasing the amount of wear on the drill to prolong tool life. Last but not least, the Mega Muscle® drills also have a special negative cutting edge to decrease the tendency of chipping of the corners on breakout of through holes.



High Precision

The 120° equal spacing margins of the 3-flute design allows for more stable, vibration-free hole processing, thereby increasing hole quality and tolerance. This stability is consistent throughout the 3-flute drill's tool life; whereas a 2-flute drill often has drastic changes of hole size and quality. With this 3-flute design, the Mega Muscle® drills are capable of achieving hole accuracy twice as precise as a 2-flute drill.



Reduced Work Hardening

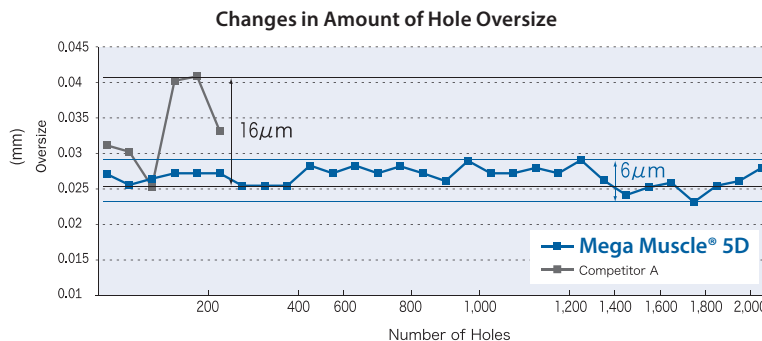
The amount of work hardening and depth of work hardening have a tendency to be proportional to the feed per revolution. When compared to conventional 2-flute drills with the same feed per revolution, the 3-flute design has proven to decrease work hardening. Therefore, if work hardening can be minimized for tap and reamer pilot holes, tool life of the secondary tool can be prolonged.

Amazing Speeds with Excellent Hole Accuracy

Hole Oversize Comparison in 4140 (30HRC)

Comparison between the amount of hole expansion vs. tool life. When compared to 2-fluted drills, the Mega Muscle® drill always shows a lower amount of hole expansion. The 2-fluted drills were found to have a hole expansion range of approximately 16 µm, while the Mega Muscle® drill only had a 6µm variation. The high hole accuracy is possible because the 3-fluted drill has 3 stable points of contact with a hole, when compared to a 2-fluted drill, which only has 2 points of contact.

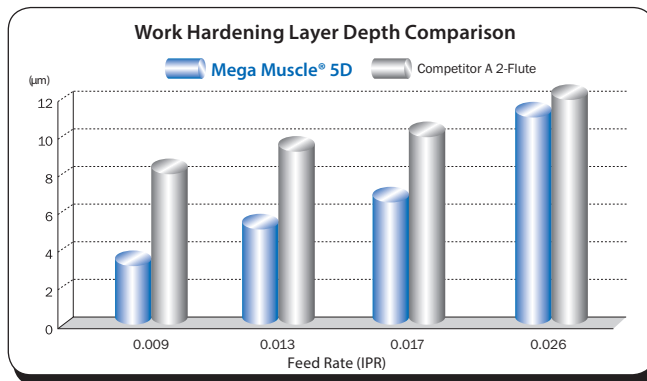
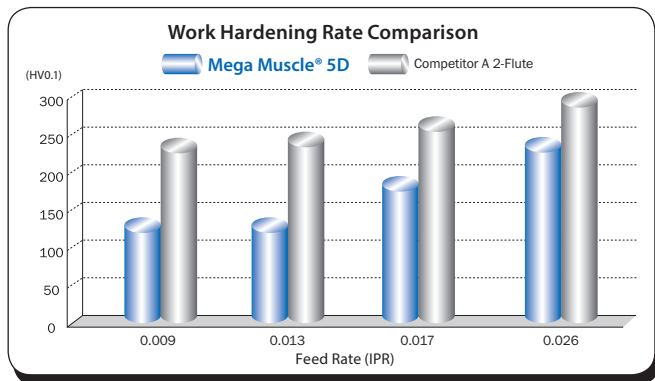
Tool	Mega Muscle® 5D Ø10.8mm
Work Material	4140 (30HRC)
Drilling Speed	230 SFM (2,060 RPM)
Feed	39.8 IPM (0.019 IPR)
Depth of Hole	1.96" (Through)
Coolant	Water Soluble
Machine	Horizontal Machining Center



Reduced Work Hardening

Comparison of the Amount of Work Hardening vs Feed Per Revolution in Carbon Steel

The below graphs show the level and depth of work hardening in carbon steel when comparing the Mega Muscle® drill versus 2-fluted drills. The amount of feed per revolution ranges from 0.009 to 0.026 IPR. Regardless of the number of flutes, work hardening has the tendency to increase as the feed rate increases. It can be noted, when the same feed rate is applied to both drills, the 3-fluted type has a much lower work hardening effect. Three-fluted drills always achieve lower work hardening rates when compared to 2-flute drills. Thus, it is best practice to keep the work hardening as low as possible when secondary operations such as tapping or reaming are required. The Mega Muscle® drill is able to offer this process stability to help reduce the burden for taps and reamers to prolong their tool life.



Tool	Mega Muscle® 5D Ø10.8mm
Work Material	1050
Drilling Speed	328 SFM (2,950 RPM)
Feed	Variable
Depth of Hole	1" (Through)
Coolant	Water Soluble
Machine	Horizontal Machining Center

Feed Rate	Mega Muscle® 5D		Competitor A (2-Flute)	
	Work Hardening Level	Work Hardening Depth	Work Hardening Level	Work Hardening Depth
	(HV0.1)	(µm)	(HV0.1)	(µm)
f=0.009 IPR	120	3	220	8
f=0.013 IPR	120	5	240	9
f=0.019 IPR	185	6.5	265	10
f=0.026 IPR	220	11	295	12

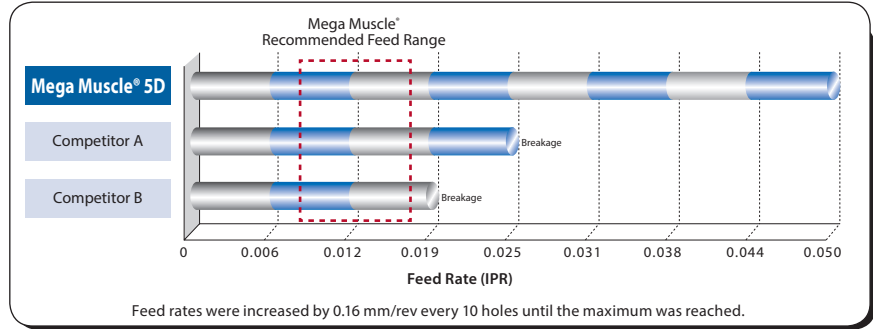
Amazingly High Feed Rates - 200 IPM!

2.0 to 2.6 Times More Productive than Competitor Drills

When processing ductile cast iron, the Mega Muscle® drill achieved a feed rate up to 200 IPM. This was achieved by combining the new point and flute design with superior rigidity. This rate is 2.0 to 2.6 times more productive than our competitors' drills. In this case, the actual recommended feed rate is approximately 0.014 IPR, which is the maximum limitation of our competitors' drills. However, as illustrated in the test, the Mega Muscle® drill has a large range of achievable feed rates. The priorities in any cutting condition should always be safety and application stability.

Tool	Mega Muscle® 5D Ø8mm
Work Material	Ductile Cast Iron
Drilling Speed	328 SFM (4,000 RPM)
Feed	Variable
Depth of Hole	1.57" (Through)
Coolant	Water Soluble (External)
Machine	Horizontal Machining Center

Note: Because the competitors' drills were not coolant-through, Coolant had to be fed externally during the test.



Efficiency Comparison During Maximum Feed


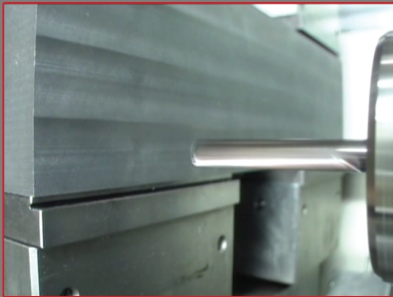
Tool	Drilling Speed (SFM)	Feed Rate (IPR)	Feed (IPM)
Mega Muscle® 5D	328	0.050	200
Competitor A	328	0.025	100
Competitor B	328	0.019	75

See the Mega Muscle® in Action on YouTube

Visit: youtube.com/user/osgtool

Discover the power of the Mega Muscle® drill at OSG's official YouTube channel: <http://www.youtube.com/user/osgtool> and see how Mega Muscle® outperforms the competition.

Mega Muscle® on YouTube®

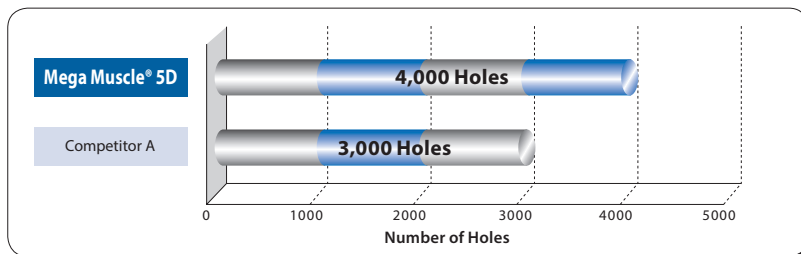
Mega Muscle® Drill (Dia. 5.0mm)	Mega Muscle® Drill (Dia. 6.8mm)
	
<p>Material: 6150 (50CrV4) Speed: 500 SFM Feed: 187 IPM (0.0193 IPR) Hole: 0.79" (Through)</p>	<p>Material: Cast Iron 40 Speed: 656 SFM Feed: 670.83 IPM (0.072 IPR) Hole: 1.07" (Blind)</p>

24% Total Cost Reduction

Meat Grinding Plate in Tool Steel (13 HRC)

The Mega Muscle® drill was able to achieve 33% longer tool life and 55% cycle time reduction, resulting in **24% total cost reduction**.

Tool	Mega Muscle® 5D Ø3/8"
Work Material	Tool Steel (13HRC)
Depth of Hole	1.18" (Through)
Coolant	Water Soluble
Machine	Horizontal Machining Center



Tool	Speed	Feed Rate		Feed	Efficiency Improvement
	(SFM)	(IPR)	(%xD)	(IPM)	(%)
Mega Muscle® 5D	230	0.017	4.5	39.8	159
Competitor A	294	0.009	2.3	25.0	100

Cut Equipment Requirements in HALF

Machining 6150 Alloy Steel

The Mega Muscle® is capable of **reducing machine costs by 50%** by saving one machine investment.

Tool	Mega Muscle® 3D Ø5mm
Work Material	6150 Alloy Steel
Depth of Hole	0.79" (Through)
Coolant	Water Soluble
Machine	Vertical Machining Center



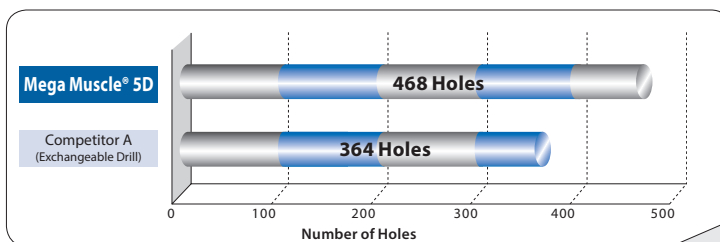
Tool	Drilling Speed	Feed Rate		Feed	Number of Holes	Number of Machines
	SFM	IPR	(%xD)	IPM		
Mega Muscle® 3D	500	0.018	9	171.4	12,000	1
Competitor A	490	0.004	2	38.2	2,712	2

Higher Efficiency than Exchangeable Drills

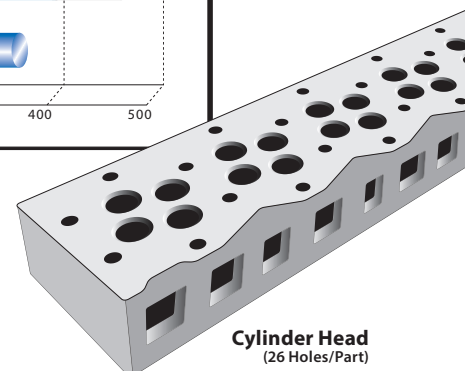
Head Cylinder, Head Bolt Hole in Gray Cast Iron

With the higher efficiency, the Mega Muscle® is capable of **an estimated cost savings of \$26,400!**

Tool	Mega Muscle® 5D Ø18mm
Work Material	Gray Cast Iron
Depth of Hole	4.72" (Through)
Coolant	Water Soluble
Machine	Horizontal Machining Center



	Depth of Hole (inch)	Mega Muscle® Drill			Competitor Head Exchangeable Drill		
		Speed (SFM)	Feed (IPM)	Cycle Time (min)	Speed (SFM)	Feed (IPM)	Cycle Time (min)
Entrance	0.87	262	55.7	3.6	197	4.2	19.0
Middle	2.56					8.3	
Bottom	0.91					4.2	

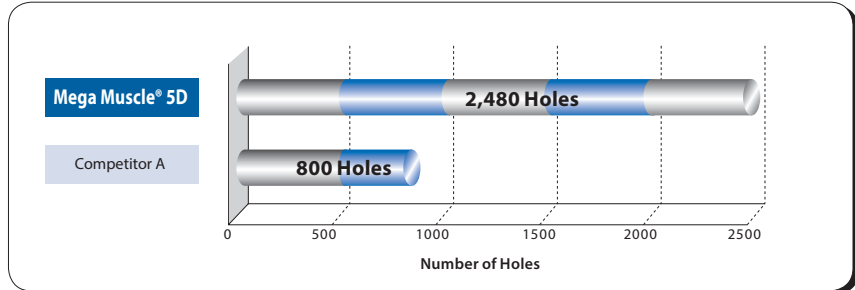


High Efficiency Drilling with MQL

Machining a Connecting Rod in Carbon Steel

When machining a connecting rod, the Mega Muscle® realized *a cost savings of over \$13,000.*

Tool	Mega Muscle® 5D Ø1/2" (12.7mm)
Work Material	Carbon Steel
Depth of Hole	2.13" (Blind)
Coolant	MQL
Machine	Horizontal Machining Center



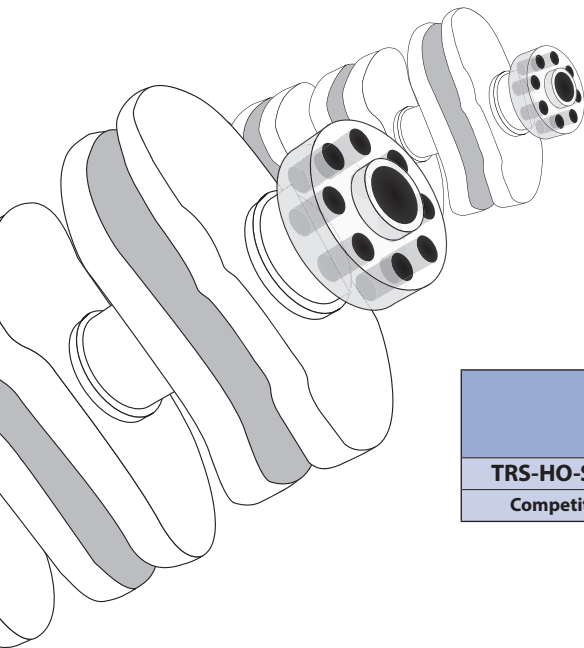
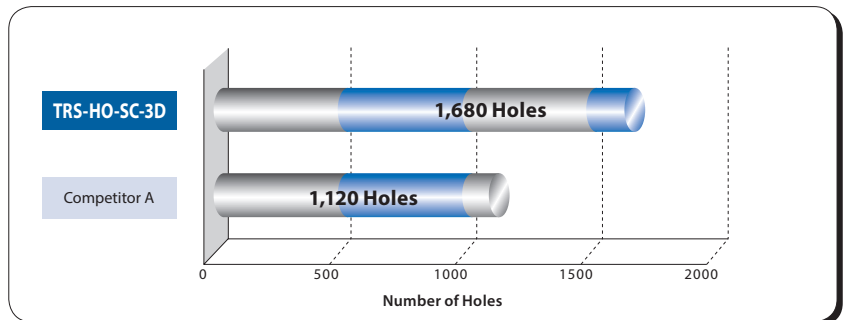
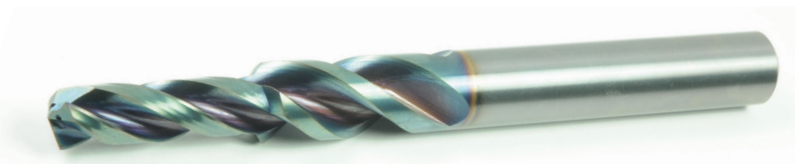
	Speed	Feed Rate		Feed	Cycle Time	Cost Per Unit
	(SFM)	(IPR)	(%)	(IPM)	(sec)	(\$)
Mega Muscle® 5D	207	0.022	4.5	35.4	120	0.143
Competitor A	295	0.013	2.5	28.4	160	0.313

Huge Cycle Time Reduction with Step Drill

Crankshaft Flange End Drilling in Forged Steel

With the Mega Muscle® step drill available as a special order, the *cycle time was reduced by 40 seconds.*

Tool	TRS-HO-SC-3D Ø15.24x60°
Work Material	Forged Steel
Depth of Hole	35mm (Through)
Coolant	Water Soluble
Machine	Horizontal Machining Center



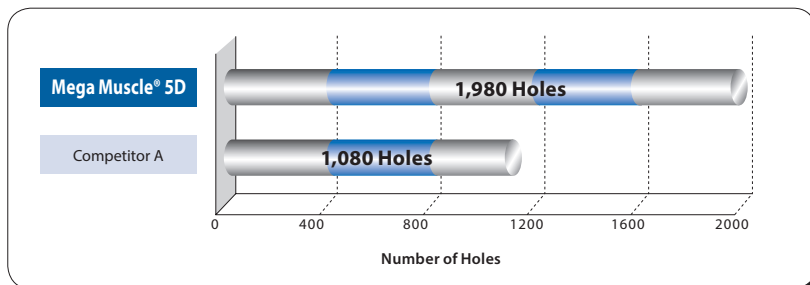
	Speed	Feed Rate		Feed	Ratio
	(SFM)	(IPR)	(%)	(IPM)	(%)
TRS-HO-SC-3D	240	0.02	3.9	31.8	177
Competitor A	246	0.011	1.9	18	100

2x the Feed Rate & 2x the Tool Life

Machining a Manifold Block in 4130

Mega Muscle® achieved *double the feed rate and double the tool life* than our competitor.

Tool	Mega Muscle® 5D Ø14mm
Work Material	4130
Depth of Hole	30mm
Coolant	Water Soluble
Machine	Horizontal Machining Center

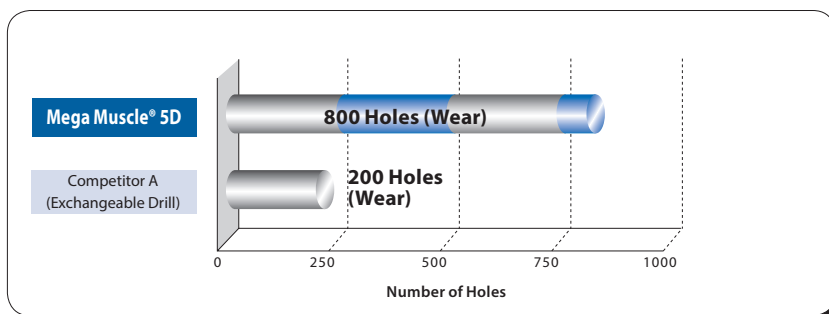


	Speed	Feed Rate		Feed	Ratio
	(SFM)	(IPR)	(%xD)	(IPM)	(%)
Mega Muscle® 5D	245	0.018	4.6	42.1	220
Competitor A	200	0.008	2.0	19.2	100

4x the Tool Life than Exchangeable Drills

Machining a Heat Exchange Plate in Mild Steel

Tool	Mega Muscle® 5D Ø10.8mm
Work Material	Mild Steel
Depth of Hole	1.22" (Through)
Coolant	Water Soluble
Machine	Vertical Machining Center



	Speed	Feed Rate		Feed	Ratio
	(SFM)	(IPR)	(%xD)	(IPM)	(%)
Mega Muscle® 5D	367	0.014	3.3	47.2	140
Competitor A	560	0.007	1.5	33.5	100

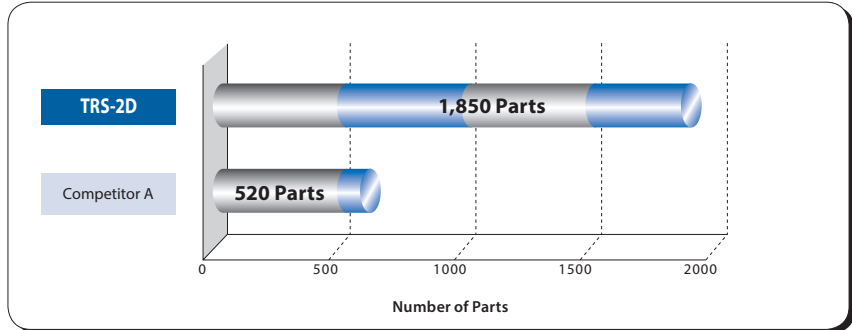


Huge Cost Savings

Machining a Wheel Hub in 1055 Steel

The Mega Muscle® reached **an estimated savings of over \$16,000.**

Tool	TRS-2D (Special) Ø13.9 mm
Work Material	1055
Depth of Hole	0.5" (Through)
Coolant	Water Soluble
Machine	Vertical Machining Center



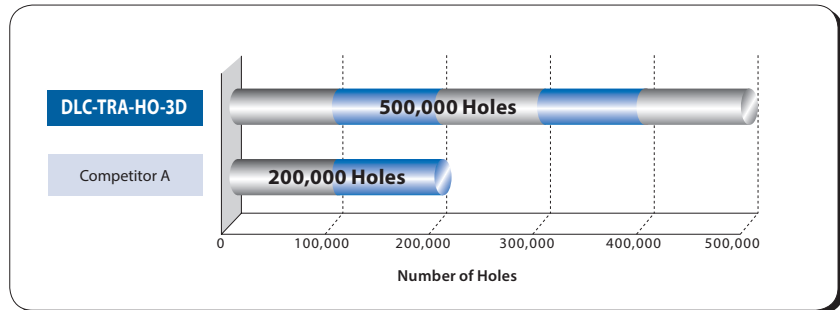
	Speed	Feed Rate		Feed	Efficiency Improvement	Cost Per Unit
	(SFM)	(IPR)	(%)	(IPM)	(%)	(\$)
TRS-2D	230	0.014	2.5	22.1	157	0.025
Competitor A	197	0.010	1.9	14.1	100	0.067

Extreme High Feed Operation

Feed Rates Over 300 IPM for Machine Parts in A5056

The Mega Muscle® was able to achieve **feed rates over 300 IPM.**

Tool	DLC-TRA-HO-3D (Special) Ø6.8 mm
Work Material	A5056
Depth of Hole	0.63" (Blind)
Coolant	Water Soluble
Machine	Horizontal Machining Center



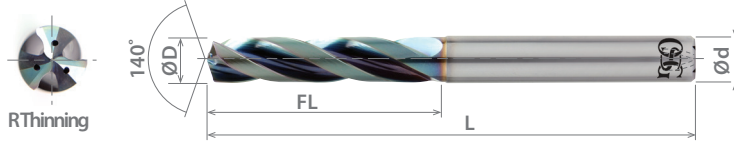
Aluminum Specification Available as Special

	Speed	Feed Rate		Feed	Efficiency Improvement
	(SFM)	(IPR)	(%)	(IPM)	(%)
DLC-TRA-HO-3D	492	0.043	16.2	304.2	275
Competitor A	394	0.020	7.4	110.6	100

List 5600 NEW SIZES

SPEED FEED P242	CARBIDE	WD1	COOLANT THROUGH 30°	SHRINK h6
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TRS-HO-3D, Coolant-Through



Cutting Diameter Tolerance (h8)		
Size	mm	inch
4 ≤ D ≤ 6	+0 / -0.018	+0 / -0.0007
6 < D ≤ 10	+0 / -0.022	+0 / -0.0009
10 < D ≤ 18	+0 / -0.027	+0 / -0.0011
18 < D ≤ 20	+0 / -0.033	+0 / -0.0013

EDP Number	Diameter					Flute Length FL	Overall Length L	Shank Diameter d
	Fractional Size	Wire Gage	Letter Size	mm	Inch			
560015711	-	-	-	4.00	0.1575	24	74	4
560015911	-	-	-	4.05	0.1594	25	80	5
560016011	-	20	-	4.09	0.1610	25	80	5
560016111	-	-	-	4.10	0.1614	25	80	5
560016311	-	-	-	4.16	0.1638	25	80	5
560016511	-	-	-	4.20	0.1654	26	80	5
560016811	-	-	-	4.27	0.1681	26	80	5
560016911	-	-	-	4.30	0.1693	26	80	5
560017211	11/64	-	-	4.37	0.1720	27	80	3/16
560017311	-	-	-	4.40	0.1732	27	80	5
560017511	-	-	-	4.46	0.1756	27	80	5
560017711	-	-	-	4.50	0.1772	27	80	5
560018111	-	-	-	4.60	0.1811	28	80	5
560018311	-	-	-	4.66	0.1835	28	80	5
560018511	-	13	-	4.70	0.1850	29	80	5
560018711	3/16	-	-	4.76	0.1874	29	80	3/16
560018911	-	12	-	4.80	0.1890	29	80	5
560019211	-	-	-	4.90	0.1929	30	80	5
8660500	-	-	-	5.00	0.1969	25	80	5
8660510	-	-	-	5.10	0.2008	26	82	6
560020311	13/64	-	-	5.16	0.2031	26	82	15/64
8660520	-	-	-	5.20	0.2047	26	82	6
8660530	-	-	-	5.30	0.2087	27	82	6
8660540	-	-	-	5.40	0.2126	27	82	6
560021311	-	3	-	5.41	0.2130	28	82	1/4
8660550	-	-	-	5.50	0.2165	28	82	6
560021911	7/32	-	-	5.56	0.2189	28	82	15/64
8660560	-	-	-	5.60	0.2205	28	82	6
8660570	-	-	-	5.70	0.2244	29	82	6
8660580	-	-	-	5.80	0.2283	29	82	6
8660590	-	-	-	5.90	0.2323	30	80	6
560023411	15/64	-	-	5.95	0.2343	30	82	15/64
8660600	-	-	-	6.00	0.2362	30	82	6
8660610	-	-	-	6.10	0.2402	31	88	7
8660620	-	-	-	6.20	0.2441	31	88	7
8660630	-	-	-	6.30	0.2480	32	88	7
560025011	1/4	-	E	6.35	0.2500	32	88	1/4
8660640	-	-	-	6.40	0.2520	32	88	7
8660650	-	-	-	6.50	0.2559	33	88	7
560025711	-	-	F	6.53	0.2571	33	88	17/64
8660660	-	-	-	6.60	0.2598	33	88	7
8660670	-	-	-	6.70	0.2638	34	88	7
560026611	17/64	-	-	6.75	0.2657	34	88	17/64
8660680	-	-	-	6.80	0.2677	34	88	7
8660690	-	-	I	6.90	0.2717	35	88	7
8660700	-	-	-	7.00	0.2756	35	88	7
8660710	-	-	-	7.10	0.2795	36	94	8
560028111	9/32	-	-	7.14	0.2811	36	94	9/32
8660720	-	-	-	7.20	0.2835	36	94	8
8660730	-	-	-	7.30	0.2874	37	94	8
8660740	-	-	-	7.40	0.2913	37	94	8
8660750	-	-	-	7.50	0.2953	38	94	8

Packed: 1 pc.
Available WD1 Coating Only.

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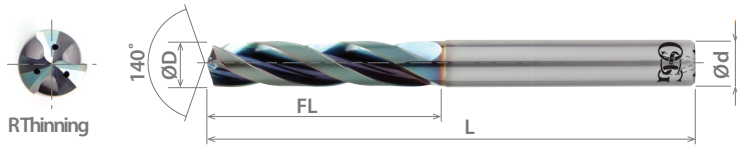
List No.	Work Material																
	P					M			K	N		S		H			
	Carbon Steels			Alloy Steels	Die Steels	Stainless Steels			Cast Iron	Aluminum		Nickel Alloy	Titanium	Hardened Steels			
	Low	Med.	High	4140		300	400	17-4 PH		6061	Casting	Inconel	6Al4V (30 HRC)	~35 HRC	35-45 HRC	45-50 HRC	50-70 HRC
5600	1010	1035	1045	1065	4340					7075							
	1018	1045	1065	4340													

good best



List 5600 (Continued) **NEW SIZES**

TRS-HO-3D, Coolant-Through



SPEED FEED P242	CARBIDE	WD1	COOLANT THROUGH 30°	SHRINK h6
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Cutting Diameter Tolerance (h8)		
Size	mm	inch
4 ≤ D ≤ 6	+0 / -0.018	+0 / -0.0007
6 < D ≤ 10	+0 / -0.022	+0 / -0.0009
10 < D ≤ 18	+0 / -0.027	+0 / -0.0011
18 < D ≤ 20	+0 / -0.033	+0 / -0.0013

EDP Number	Diameter					Flute Length FL	Overall Length L	Shank Diameter d
	Fractional Size	Wire Gage	Letter Size	mm	Inch			
560029711	19/64	-	-	7.54	0.2969	38	94	5/16
8660760	-	-	-	7.60	0.2992	38	94	8
8660770	-	-	-	7.70	0.3031	39	94	8
8660780	-	-	-	7.80	0.3071	39	94	8
8660790	-	-	-	7.90	0.3110	40	94	8
560031311	5/16	-	-	7.94	0.3126	40	94	5/16
8660800	-	-	-	8.00	0.3150	40	94	8
8660810	-	-	-	8.10	0.3189	41	101	9
8660820	-	-	P	8.20	0.3228	41	101	9
8660830	-	-	-	8.30	0.3268	42	101	9
560032811	21/64	-	-	8.33	0.3280	42	101	11/32
8660840	-	-	-	8.40	0.3307	42	101	9
560033211	-	-	Q	8.43	0.3319	43	101	11/32
8660850	-	-	-	8.50	0.3346	43	101	9
8660860	-	-	-	8.60	0.3386	43	101	9
8660870	-	-	-	8.70	0.3425	44	101	9
560034411	11/32	-	-	8.73	0.3437	44	101	11/32
8660880	-	-	-	8.80	0.3465	44	101	9
8660890	-	-	-	8.90	0.3504	45	101	9
8660900	-	-	-	9.00	0.3543	45	101	9
8660910	-	-	-	9.10	0.3583	46	106	10
560035911	23/64	-	-	9.13	0.3594	46	106	25/64
8660920	-	-	-	9.20	0.3622	46	106	10
8660930	-	-	-	9.30	0.3661	47	106	10
8660940	-	-	-	9.40	0.3701	47	106	10
8660950	-	-	-	9.50	0.3740	48	106	10
560037511	3/8	-	-	9.53	0.3752	48	106	3/8
8660960	-	-	-	9.60	0.3780	48	106	10
8660970	-	-	-	9.70	0.3819	49	106	10
8660980	-	-	W	9.80	0.3858	49	106	10
8660990	-	-	-	9.90	0.3898	50	106	10
560039111	25/64	-	-	9.92	0.3906	50	106	25/64
8661000	-	-	-	10.00	0.3937	50	106	10
8661010	-	-	-	10.10	0.3976	51	113	11
8661020	-	-	-	10.20	0.4016	51	113	11
8661030	-	-	-	10.30	0.4055	52	113	11
560040611	13/32	-	-	10.32	0.4063	52	113	27/64
8661040	-	-	-	10.40	0.4094	52	113	11
8661050	-	-	-	10.50	0.4134	53	113	11
8661060	-	-	-	10.60	0.4173	53	113	11
8661070	-	-	-	10.70	0.4213	54	113	11
560042211	27/64	-	-	10.72	0.4220	54	113	27/64
8661080	-	-	-	10.80	0.4252	54	113	11
8661090	-	-	-	10.90	0.4291	55	113	11
8661100	-	-	-	11.00	0.4331	55	113	11
8661110	-	-	-	11.10	0.4370	56	120	12
560043711	7/16	-	-	11.11	0.4374	56	120	7/16
8661120	-	-	-	11.20	0.4409	56	120	12
8661130	-	-	-	11.30	0.4449	57	120	12
8661140	-	-	-	11.40	0.4488	57	120	12
8661150	-	-	-	11.50	0.4528	58	120	12
560045311	29/64	-	-	11.51	0.4531	58	120	15/32
8661160	-	-	-	11.60	0.4567	58	120	12
8661170	-	-	-	11.70	0.4606	59	120	12
8661180	-	-	-	11.80	0.4646	59	120	12
8661190	-	-	-	11.90	0.4685	60	120	12
560046911	15/32	-	-	11.91	0.4689	60	120	15/32
8661200	-	-	-	12.00	0.4724	60	120	12
8661210	-	-	-	12.10	0.4764	61	128	13
8661220	-	-	-	12.20	0.4803	61	128	13
8661230	-	-	-	12.30	0.4843	62	128	13
560048411	31/64	-	-	12.30	0.4843	62	128	1/2

Packed: 1 pc.
Available WD1 Coating Only.



List 5600 (Continued) NEW SIZES

TRS-HO-3D, Coolant-Through



EDP Number	Diameter					Flute Length	Overall Length	Shank Diameter
	Fractional Size	Wire Gage	Letter Size	mm	Inch	FL	L	d
8661240	-	-	-	12.40	0.4882	62	128	13
8661250	-	-	-	12.50	0.4921	63	128	13
8661260	-	-	-	12.60	0.4961	63	128	13
560050011	1/2	-	-	12.70	0.5000	64	128	1/2
8661270	-	-	-	12.70	0.5000	64	128	13
8661280	-	-	-	12.80	0.5039	64	128	13
8661290	-	-	-	12.90	0.5079	65	128	13
8661300	-	-	-	13.00	0.5118	65	128	13
8661310	33/64	-	-	13.10	0.5157	66	134	14
8661320	-	-	-	13.20	0.5197	66	134	14
8661330	-	-	-	13.30	0.5236	67	134	14
8661340	-	-	-	13.40	0.5276	67	134	14
560053111	17/32	-	-	13.49	0.5311	68	134	35/64
8661350	-	-	-	13.50	0.5315	68	134	14
8661360	-	-	-	13.60	0.5354	68	134	14
8661370	-	-	-	13.70	0.5394	69	134	14
8661380	-	-	-	13.80	0.5433	69	134	14
8661390	-	-	-	13.90	0.5472	70	134	14
8661400	-	-	-	14.00	0.5512	70	134	14
8661410	-	-	-	14.10	0.5551	71	140	15
8661420	-	-	-	14.20	0.5591	71	140	15
560056311	9/16	-	-	14.29	0.5626	72	140	9/16
8661430	-	-	-	14.30	0.5630	72	140	15
8661440	-	-	-	14.40	0.5669	72	140	15
8661450	-	-	-	14.50	0.5709	73	140	15
8661460	-	-	-	14.60	0.5748	73	140	15
8661470	-	-	-	14.70	0.5787	74	140	15
8661480	-	-	-	14.80	0.5827	74	140	15
8661490	-	-	-	14.90	0.5866	75	140	15
8661500	-	-	-	15.00	0.5906	75	140	15
560059311	19/32	-	-	15.08	0.5937	76	145	5/8
8661510	-	-	-	15.10	0.5945	76	145	16
8661520	-	-	-	15.20	0.5984	76	145	16
8661530	-	-	-	15.30	0.6024	77	145	16
8661540	-	-	-	15.40	0.6063	77	145	16
8661550	-	-	-	15.50	0.6102	78	145	16
8661560	-	-	-	15.60	0.6142	78	145	16
8661570	-	-	-	15.70	0.6181	79	145	16
8661580	-	-	-	15.80	0.6220	79	145	16
560062511	5/8	-	-	15.88	0.6252	80	145	5/8
8661590	-	-	-	15.90	0.6260	80	145	16
8661600	-	-	-	16.00	0.6299	80	145	16
560063311	-	-	-	16.10	0.6339	81	150	18
8661650	-	-	-	16.50	0.6496	83	150	17
560065611	21/32	-	-	16.67	0.6563	85	150	21/32
560066311	-	-	-	16.84	0.6630	85	150	18
8661700	-	-	-	17.00	0.6693	85	150	17
560068711	11/16	-	-	17.46	0.6874	88	155	3/4
8661750	-	-	-	17.50	0.6890	88	155	18
560070311	45/64	-	-	17.86	0.7031	90	155	3/4
8661800	-	-	-	18.00	0.7087	90	155	18
560071811	23/32	-	-	18.26	0.7189	92	160	3/4
8661850	-	-	-	18.50	0.7283	93	160	19
8661900	-	-	-	19.00	0.7480	95	160	19
560075011	3/4	-	-	19.05	0.7500	95	160	3/4
560075711	-	-	-	19.25	0.7579	97	165	20
8661950	-	-	-	19.50	0.7677	98	165	20
8662000	-	-	-	20.00	0.7874	100	165	20

Packed: 1 pc.
Available WD1 Coating Only.



List No.	Work Material																
	P					M			K	N		S		H			
	Carbon Steels			Alloy Steels	Die Steels	Stainless Steels			Cast Iron	Aluminum		Nickel Alloy	Titanium	Hardened Steels			
	Low	Med.	High			300	400	17-4 PH		6061 7075	Casting			Inconel	6Al4V (30 HRC)	~35 HRC	35-45 HRC
5600	☐	☐	☐	☐	☐		☐	☐	☐		☐		☐	☐	☐	☐	

☐ good ☐ best

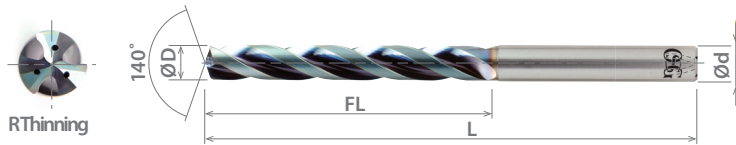


EXOPRO® Mega Muscle®

Extreme Performance High Feed Carbide Drills

List 5610 NEW SIZES

TRS-HO-5D, Coolant-Through



Cutting Diameter Tolerance (h8)		
Size	mm	inch
4 ≤ D ≤ 6	+0 / -0.018	+0 / -0.0007
6 < D ≤ 10	+0 / -0.022	+0 / -0.0009
10 < D ≤ 18	+0 / -0.027	+0 / -0.0011
18 < D ≤ 20	+0 / -0.033	+0 / -0.0013

EDP Number	Diameter					Flute Length FL	Overall Length L	Shank Diameter d
	Fractional Size	Wire Gage	Letter Size	mm	Inch			
561015711	-	-	-	4.00	0.1575	36	86	4
561016011	-	20	-	4.09	0.1610	37	95	5
561016111	-	-	-	4.10	0.1614	37	95	5
561016511	-	-	-	4.20	0.1654	38	95	5
561016911	-	-	-	4.30	0.1693	39	95	5
561017211	11/64	-	-	4.37	0.1720	40	95	3/16
561017311	-	-	-	4.40	0.1732	40	95	5
561017711	-	-	-	4.50	0.1772	41	95	5
561018111	-	-	-	4.60	0.1811	42	95	5
561018511	-	13	-	4.70	0.1850	43	95	5
561018711	3/16	-	-	4.76	0.1874	43	95	3/16
561018911	-	12	-	4.80	0.1890	44	95	5
561019211	-	-	-	4.90	0.1929	45	95	5
8662500	-	-	-	5.00	0.1969	45	95	5
8662510	-	-	-	5.10	0.2008	41	100	6
561020311	13/64	-	-	5.16	0.2031	42	100	15/64
8662520	-	-	-	5.20	0.2047	42	100	6
8662530	-	-	-	5.30	0.2087	43	100	6
8662540	-	-	-	5.40	0.2126	44	100	6
561021311	-	3	-	5.41	0.2130	44	100	1/4
8662550	-	-	-	5.50	0.2165	44	100	6
561021911	7/32	-	-	5.56	0.2189	45	100	15/64
8662560	-	-	-	5.60	0.2205	45	100	6
8662570	-	-	-	5.70	0.2244	46	100	6
8662580	-	-	-	5.80	0.2283	47	100	6
8662590	-	-	-	5.90	0.2323	48	100	6
561023411	15/64	-	-	5.95	0.2343	48	100	15/64
8662600	-	-	-	6.00	0.2362	48	100	6
8662610	-	-	-	6.10	0.2402	49	109	7
8662620	-	-	-	6.20	0.2441	50	109	7
8662630	-	-	-	6.30	0.2480	51	109	7
561025011	1/4	-	E	6.35	0.2500	52	109	1/4
8662640	-	-	-	6.40	0.2520	52	109	7
8662650	-	-	-	6.50	0.2559	52	109	7
561025711	-	-	F	6.53	0.2571	53	109	17/64
8662660	-	-	-	6.60	0.2598	53	109	7
8662670	-	-	-	6.70	0.2638	54	109	7
561026611	17/64	-	-	6.75	0.2657	55	109	17/64
8662680	-	-	-	6.80	0.2677	55	109	7
8662690	-	-	I	6.90	0.2717	56	109	7
8662700	-	-	-	7.00	0.2756	56	109	7
8662710	-	-	-	7.10	0.2795	57	118	8
561028111	9/32	-	-	7.14	0.2811	58	118	9/32
8662720	-	-	-	7.20	0.2835	58	118	8
8662730	-	-	-	7.30	0.2874	59	118	8
8662740	-	-	-	7.40	0.2913	60	118	8
8662750	-	-	-	7.50	0.2953	60	118	8
561029711	19/64	-	-	7.54	0.2969	60	118	5/16
8662760	-	-	-	7.60	0.2992	61	118	8
8662770	-	-	-	7.70	0.3031	62	118	8
8662780	-	-	-	7.80	0.3071	63	118	8
8662790	-	-	-	7.90	0.3110	64	118	8
561031311	5/16	-	-	7.94	0.3126	64	118	5/16
8662800	-	-	-	8.00	0.3150	64	118	8
8662810	-	-	-	8.10	0.3189	65	128	9
8662820	-	-	P	8.20	0.3228	66	128	9
8662830	-	-	-	8.30	0.3268	67	128	9
561032811	21/64	-	-	8.33	0.3280	67	128	11/32
8662840	-	-	-	8.40	0.3307	68	128	9
561033211	-	-	Q	8.43	0.3319	68	128	11/32
8662850	-	-	-	8.50	0.3346	68	128	9

Packed: 1 pc.
Available WD1 Coating Only.



List 5610 (Continued) **NEW SIZES**

TRS-HO-5D, Coolant-Through



EDP Number	Diameter					Flute Length FL	Overall Length L	Shank Diameter d
	Fractional Size	Wire Gage	Letter Size	mm	Inch			
8662860	-	-	-	8.60	0.3386	69	128	9
8662870	-	-	-	8.70	0.3425	70	128	9
561034411	11/32	-	-	8.73	0.3437	70	128	11/32
8662880	-	-	-	8.80	0.3465	71	128	9
8662890	-	-	-	8.90	0.3504	72	128	9
8662900	-	-	-	9.00	0.3543	72	128	9
8662910	-	-	-	9.10	0.3583	73	136	10
561035911	23/64	-	-	9.13	0.3594	73	136	25/64
8662920	-	-	-	9.20	0.3622	74	136	10
8662930	-	-	-	9.30	0.3661	75	136	10
8662940	-	-	-	9.40	0.3701	76	136	10
8662950	-	-	-	9.50	0.3740	76	136	10
561037511	3/8	-	-	9.53	0.3752	76	136	3/8
8662960	-	-	-	9.60	0.3780	77	136	10
8662970	-	-	-	9.70	0.3819	78	136	10
8662980	-	-	W	9.80	0.3858	79	136	10
8662990	-	-	-	9.90	0.3898	80	136	10
561039111	25/64	-	-	9.92	0.3906	80	136	25/64
8663000	-	-	-	10.00	0.3937	80	136	10
8663010	-	-	-	10.10	0.3976	81	146	11
8663020	-	-	-	10.20	0.4016	82	146	11
8663030	-	-	-	10.30	0.4055	83	146	11
561040611	13/32	-	-	10.32	0.4063	83	146	27/64
8663040	-	-	-	10.40	0.4094	84	146	11
8663050	-	-	-	10.50	0.4134	84	146	11
8663060	-	-	-	10.60	0.4173	85	146	11
8663070	-	-	-	10.70	0.4213	86	146	11
561042211	27/64	-	-	10.72	0.4220	86	146	27/64
8663080	-	-	-	10.80	0.4252	87	146	11
8663090	-	-	-	10.90	0.4291	88	146	11
8663100	-	-	-	11.00	0.4331	88	146	11
8663110	-	-	-	11.10	0.4370	89	156	12
561043711	7/16	-	-	11.11	0.4374	89	156	7/16
8663120	-	-	-	11.20	0.4409	90	156	12
8663130	-	-	-	11.30	0.4449	91	156	12
8663140	-	-	-	11.40	0.4488	92	156	12
8663150	-	-	-	11.50	0.4528	92	156	12
561045311	29/64	-	-	11.51	0.4531	92	156	15/32
8663160	-	-	-	11.60	0.4567	93	156	12
8663170	-	-	-	11.70	0.4606	94	156	12
8663180	-	-	-	11.80	0.4646	95	156	12
8663190	-	-	-	11.90	0.4685	96	156	12
561046911	15/32	-	-	11.91	0.4689	96	156	15/32
8663200	-	-	-	12.00	0.4724	96	156	12
8663210	-	-	-	12.10	0.4764	97	167	13
8663220	-	-	-	12.20	0.4803	98	167	13
8663230	-	-	-	12.30	0.4843	99	167	13
561048411	31/64	-	-	12.30	0.4843	99	167	1/2
8663240	-	-	-	12.40	0.4882	100	167	13
8663250	-	-	-	12.50	0.4921	100	167	13
8663260	-	-	-	12.60	0.4961	101	167	13
561050011	1/2	-	-	12.70	0.5000	102	167	1/2
8663270	-	-	-	12.70	0.5000	102	167	13
8663280	-	-	-	12.80	0.5039	103	167	13
8663290	-	-	-	12.90	0.5079	104	167	13
8663300	-	-	-	13.00	0.5118	104	167	13
8663310	33/64	-	-	13.10	0.5157	105	176	14

Packed: 1 pc.
Available WD1 Coating Only.

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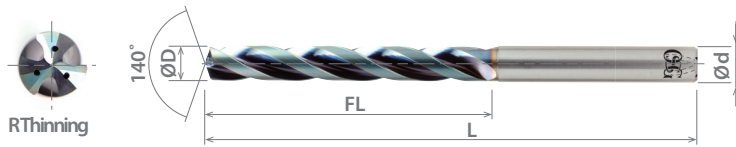
List No.	Work Material																	
	P					M			K	N		S		H				
	Carbon Steels			Alloy Steels	Die Steels	Stainless Steels			Cast Iron	Aluminum		Nickel Alloy	Titanium	Hardened Steels				
	Low	Med.	High			300	400	17-4 PH		6061 7075	Casting			Inconel	6Al4V (30 HRC)	~35 HRC	35-45 HRC	45-50 HRC
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List 5610 (Continued) **NEW SIZES**

TRS-HO-5D, Coolant-Through



SPEED FEED P242	CARBIDE	WD1	COOLANT THROUGH 30°	SHRINK h6
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Cutting Diameter Tolerance (h8)		
Size	mm	inch
4 ≤ D ≤ 6	+0 / -0.018	+0 / -0.0007
6 < D ≤ 10	+0 / -0.022	+0 / -0.0009
10 < D ≤ 18	+0 / -0.027	+0 / -0.0011
18 < D ≤ 20	+0 / -0.033	+0 / -0.0013

EDP Number	Diameter					Flute Length FL	Overall Length L	Shank Diameter d
	Fractional Size	Wire Gage	Letter Size	mm	Inch			
8663320	-	-	-	13.20	0.5197	106	176	14
8663330	-	-	-	13.30	0.5236	107	176	14
8663340	-	-	-	13.40	0.5276	108	176	14
561053111	17/32	-	-	13.49	0.5311	108	176	35/64
8663350	-	-	-	13.50	0.5315	108	176	14
8663360	-	-	-	13.60	0.5354	109	176	14
8663370	-	-	-	13.70	0.5394	110	176	14
8663380	-	-	-	13.80	0.5433	111	176	14
8663390	-	-	-	13.90	0.5472	112	176	14
8663400	-	-	-	14.00	0.5512	112	176	14
8663410	-	-	-	14.10	0.5551	113	185	15
8663420	-	-	-	14.20	0.5591	114	185	15
561056311	9/16	-	-	14.29	0.5626	115	185	9/16
8663430	-	-	-	14.30	0.5630	115	185	15
8663440	-	-	-	14.40	0.5669	116	185	15
8663450	-	-	-	14.50	0.5709	116	185	15
8663460	-	-	-	14.60	0.5748	117	185	15
8663470	-	-	-	14.70	0.5787	118	185	15
8663480	-	-	-	14.80	0.5827	119	185	15
8663490	-	-	-	14.90	0.5866	120	185	15
8663500	-	-	-	15.00	0.5906	120	185	15
561059311	19/32	-	-	15.08	0.5937	121	193	5/8
8663510	-	-	-	15.10	0.5945	121	193	16
8663520	-	-	-	15.20	0.5984	122	193	16
8663530	-	-	-	15.30	0.6024	123	193	16
8663540	-	-	-	15.40	0.6063	124	193	16
8663550	-	-	-	15.50	0.6102	124	193	16
8663560	-	-	-	15.60	0.6142	125	193	16
8663570	-	-	-	15.70	0.6181	126	193	16
8663580	-	-	-	15.80	0.6220	127	193	16
561062511	5/8	-	-	15.88	0.6252	128	193	5/8
8663590	-	-	-	15.90	0.6260	128	193	16
8663600	-	-	-	16.00	0.6299	128	193	16
561063311	-	-	-	16.10	0.6339	129	201	18
8663650	-	-	-	16.50	0.6496	132	201	17
561065611	21/32	-	-	16.67	0.6563	134	201	21/32
561066311	-	-	-	16.84	0.6630	135	201	18
8663700	-	-	-	17.00	0.6693	136	201	17
561068711	11/16	-	-	17.46	0.6874	140	209	3/4
8663750	-	-	-	17.50	0.6890	140	209	18
561070311	45/64	-	-	17.86	0.7031	143	209	3/4
8663800	-	-	-	18.00	0.7087	144	209	18
561071811	23/32	-	-	18.26	0.7189	147	217	3/4
8663850	-	-	-	18.50	0.7283	148	217	19
8663900	-	-	-	19.00	0.7480	152	217	19
561075011	3/4	-	-	19.05	0.7500	154	217	3/4
561075711	-	-	-	19.25	0.7579	154	217	20
8663950	-	-	-	19.50	0.7677	156	225	20
8664000	-	-	-	20.00	0.7874	160	225	20

Packed: 1 pc.
Available WD1 Coating Only.



List No.	Work Material																
	P					M			K	N		S		H			
	Carbon Steels			Alloy Steels	Die Steels	Stainless Steels			Cast Iron	Aluminum		Nickel Alloy	Titanium	Hardened Steels			
	Low	Med.	High			300	400	17-4 PH		6061	Casting			Inconel	6Al4V (30 HRC)	~35 HRC	35-45 HRC
5610	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>				

good best



List 5600-EXOPRO® Mega Muscle®: 3D
List 5610-EXOPRO® Mega Muscle®: 5D

General Drilling Operations

Work Material		Carbon Steels, Mild Steel 1010, 1050, 12L14		Alloy Steels 4140, 4130		Stainless Steels 400SS, 17-4PH		Cast Iron		Ductile Cast Iron	
Drilling Speed		260-395 SFM		260-395 SFM		130-200 SFM		260-395 SFM		195-330 SFM	
Drill Dia.		Speed RPM	Feed IPR	Speed RPM	Feed IPR	Speed RPM	Feed IPR	Speed RPM	Feed IPR	Speed RPM	Feed IPR
mm	Inch										
4	-	8,000	0.005-0.009	8,000	0.005-0.009	4,000	0.005-0.007	8,000	0.005-0.009	6,300	0.005-0.009
6	-	5,300	0.007-0.013	5,300	0.007-0.013	2,700	0.007-0.009	5,300	0.008-0.014	4,200	0.007-0.013
-	1/4	5,000	0.007-0.014	5,000	0.007-0.014	2,500	0.007-0.010	5,000	0.009-0.015	4,000	0.007-0.014
8	-	4,000	0.009-0.017	4,000	0.009-0.017	2,000	0.009-0.013	4,000	0.011-0.019	3,200	0.009-0.017
-	3/8	3,300	0.012-0.021	3,300	0.012-0.021	1,700	0.011-0.015	3,300	0.013-0.023	2,700	0.012-0.021
10	-	3,200	0.012-0.022	3,200	0.012-0.022	1,600	0.012-0.016	3,200	0.014-0.024	2,500	0.012-0.022
-	7/16	2,900	0.013-0.023	2,900	0.013-0.023	1,400	0.013-0.017	2,900	0.015-0.026	2,300	0.013-0.023
12	-	2,700	0.014-0.024	2,700	0.014-0.024	1,300	0.014-0.019	2,700	0.017-0.028	2,100	0.014-0.024
-	1/2	2,500	0.015-0.025	2,500	0.015-0.025	1,300	0.015-0.020	2,500	0.018-0.028	2,000	0.015-0.025
14	-	2,300	0.017-0.028	2,300	0.017-0.028	1,100	0.017-0.022	2,300	0.019-0.030	1,800	0.017-0.028
-	5/8	2,000	0.019-0.031	2,000	0.019-0.031	1,000	0.019-0.025	2,000	0.022-0.034	1,600	0.019-0.031
18	-	1,800	0.021-0.032	1,800	0.021-0.032	900	0.021-0.028	1,800	0.025-0.035	1,400	0.021-0.032
-	3/4	1,700	0.023-0.034	1,700	0.023-0.034	800	0.023-0.030	1,700	0.026-0.037	1,300	0.023-0.034
20	-	1,600	0.024-0.035	1,600	0.024-0.035	800	0.024-0.031	1,600	0.028-0.039	1,300	0.024-0.035

General Drilling Operations

Work Material		Cast Aluminum		Special Alloy Steels, Hardened Steels					
Drilling Speed		260-660 SFM		195-295 SFM		160-230 SFM		130-160 SFM	
Drill Dia.		Speed RPM	Feed IPR	Speed RPM	Feed IPR	Speed RPM	Feed IPR	Speed RPM	Feed IPR
mm	Inch								
4	-	11,100	0.006-0.012	6,000	0.005-0.008	4,800	0.005-0.008	3,600	0.005-0.007
6	-	7,400	0.009-0.019	4,000	0.007-0.012	3,200	0.007-0.012	2,400	0.007-0.009
-	1/4	7,000	0.010-0.020	3,700	0.007-0.012	3,000	0.007-0.012	2,200	0.007-0.010
8	-	5,600	0.013-0.025	3,000	0.009-0.016	2,400	0.009-0.016	1,800	0.009-0.013
-	3/8	4,700	0.015-0.030	2,500	0.011-0.019	2,000	0.011-0.019	1,500	0.011-0.015
10	-	4,500	0.016-0.031	2,400	0.012-0.020	1,900	0.012-0.020	1,400	0.012-0.016
-	7/16	4,000	0.017-0.035	2,100	0.013-0.022	1,700	0.013-0.022	1,300	0.013-0.017
12	-	3,700	0.019-0.038	2,000	0.014-0.024	1,600	0.014-0.024	1,200	0.014-0.019
-	1/2	3,500	0.020-0.040	1,900	0.015-0.024	1,500	0.015-0.024	1,100	0.015-0.020
14	-	3,200	0.022-0.044	1,700	0.017-0.025	1,400	0.017-0.025	1,000	0.017-0.022
-	5/8	2,800	0.025-0.050	1,500	0.019-0.025	1,200	0.019-0.025	900	0.019-0.025
18	-	2,500	0.028-0.057	1,300	0.021-0.028	1,100	0.021-0.028	800	0.021-0.028
-	3/4	2,300	0.030-0.060	1,200	0.023-0.030	1,000	0.023-0.030	700	0.023-0.030
20	-	2,200	0.031-0.063	1,200	0.024-0.031	1,000	0.024-0.031	700	0.024-0.031





shaping your dreams

 **Safe use of cutting tools**

- Use safety cover, safety glasses and safety shoes during operation.
- Do not touch cutting edges with bare hands.
- Do not touch cutting chips with bare hands. Chips will be hot after cutting.
- Stop cutting when the tool becomes dull.
- Stop cutting operation immediately if you hear any abnormal cutting sounds.
- Do not modify tools.
- Please use appropriate tools for the operation. Check dimensions to ensure proper selection.

TEXAS
(National Headquarters)

1945 W. Walnut Hill Ln.
Irving, TX 75038, USA
Toll Free: 800-837-2223
Fax: 800-837-3334

ILLINOIS

676 East Fullerton Avenue
Glendale Heights, IL 60139, USA
Toll Free: 800-837-2223
Fax: 800-837-3334

CALIFORNIA

1921 Miraloma Ave. Suite B
Placentia, CA 92870, USA
Toll Free: 800-837-2223
Fax: 714-528-9209

OHIO

3611 Socialville Foster Rd.
Ste 102
Mason, OH 45040, USA
Phone: 513-755-3360
Fax: 513-755-3362

GEORGIA

5324 Highway 85 Ste 100
Forest Park, GA 30297, USA
Toll Free: 800-837-2223
Fax: 800-837-3334

CANADA

538 King Forest Court
Burlington, ON L7P 5C1, Canada
Toll Free: 800-263-4861
Fax: 905-632-8466

MEXICO

Avenida Central No. 186
Col. Nueva Industrial Vallejo
07700 Ciudad de Mexico, D.F.,
Mexico
Phone: (52) 55-51-19-3363
Fax: (52) 55-51-19-3370