PRODUCT INFORMATION

PAT.P.

New Sizes TRS-HO-3D
New Sizes TRS-HO-5D
NEW TRS-HO-10D

TOKO-TON SPIRIT 70th Anniversary

VOL.2

Coolant-Through, Three fluted, Carbide Drills

High Efficient Processing of Steel & Cast Irons
Drilling Feeds exceeding 1.000 mm/min!

MEGA MUSCLE DRILL

The 3 flute design enables high speed hole processing !

Unmatched cost savings!

Unbelievable processing efficiency, archievable by extremely high feed rates.

Mega Muscle Drill !!

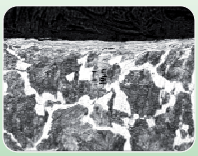
Three concepts differentiate the TRS series from two-flute & convetional drills

Improved Feed Rate

- The higher the feed rate, the more the output
- Reduced cost per unit

Higher Precision

- Better tapping process from improved pilot holes
- Reamer-less drilling can be achieved



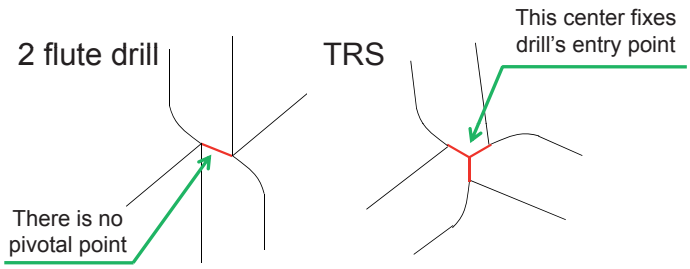
Reduced Work Hardening

- Optimal conditions for thread making
- Improved tool life for succeeding cutting tools

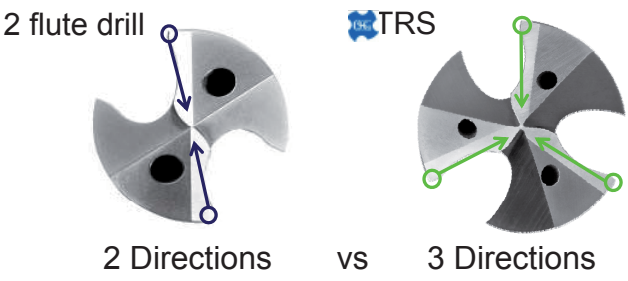
Higher Precision !

There are 2 keys to High Precision Drilling

1. Good biting properties to minimize deflection



2. Stable guide to keep the drilling process straight.

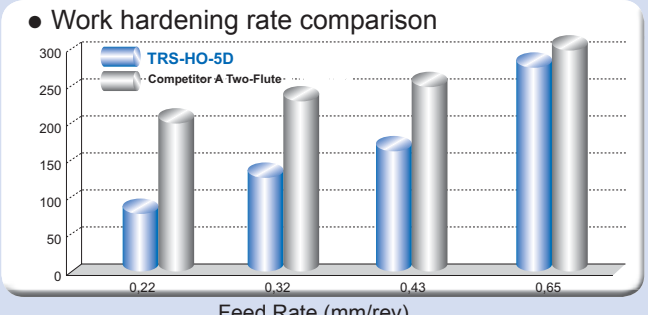


WDI Coating

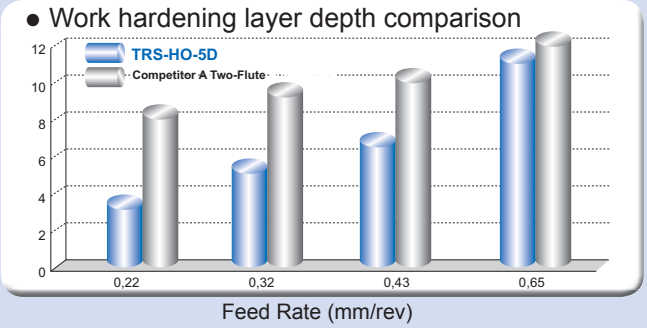
The WDI coating is effective in high feed drilling

■ Comparison of the amount of work hardening versus feed per revolution in carbon steel.

● Work hardening rate comparison



● Work hardening layer depth comparison

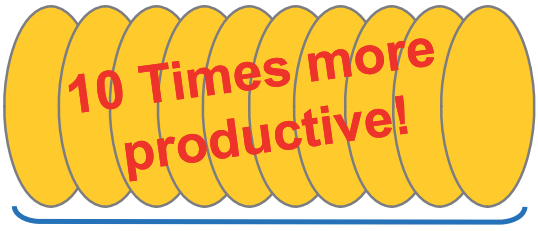


Improved feed rate !

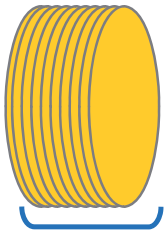
If we needed to drill 10mm through hole…

TRS will complete the process in 10 revolutions with feed rate of 1mm/rev.

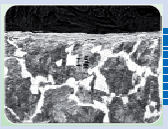
Conventional Drill, on the other hand, will require 100 revolutions at 0.1mm/rev feed rate



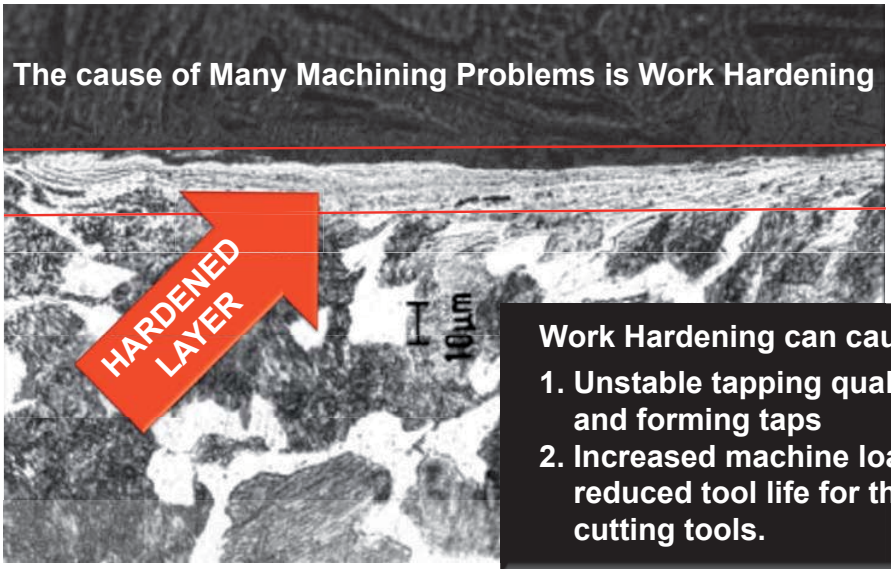
10 revolutions = 10mm



10 revolutions = 1.0mm



Reduced work hardening !



Work Hardening can cause :

1. **Unstable tapping quality for both cutting and forming taps**
2. **Increased machine load that often result in reduced tool life for the drill and succeeding cutting tools.**

Tool	TRS-HO-5D ø10,8
Work Material	S50c (DIN CK50) (AISI 1050)
Drilling Speed	100m/min (2.950min^{-1})
Feed	Variable (See chart)
Depth of Hole	25mm (Through)
Coolant	Water Soluble
Machine	Horizontal Machining Center

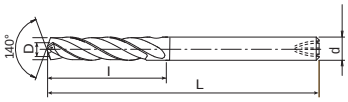
	TRS-5D		Competitor A Two-Flute	
	Work Hardening Level	Work Hardening Depth	Work Hardening Depth	Work Hardening Depth
Feed Rate	(Hv0,1)	(µm)	(Hv0,1)	(µm)
f=0,22mm/rev	120	3	220	8
f=0,32mm/rev	120	5	240	9
f=0,43mm/rev	185	6,5	265	10
f=0,65mm/rev	220	11	295	12

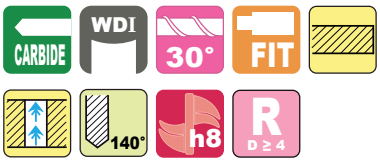
These graphs shows the level and depth of work hardening in carbon steel when comparing the Mega Muscle drill versus 2 fluted drills. The amount of feed per revolution ranges from 0.22 to 0.65mm/rev . Regardless of the number of flutes, work hardening has the tendency to increase with the increase of the feed rate. 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. 3 fluted drills always achieve lower work hardening rates when compared to 2 fluted 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 offers this process stability, reducing the burden of the taps and reamers increasing their tool life.

TRS-HO-3D New Sizes

AVAILABLE IN JANUARY 2013

R thinning





- To ensure a stable flow of coolant, there ia groove on the bottom of the shank
- On some drills, the coating may have some discoloration. This does not pose any performance problems.

EDP	D	L	l	d	Stock	Price	EDP	D	L	l	d	Stock	Price
48157050	5	80	25	6	●		48157955	9,55	106	48	10	●	
8660510	5,1	82	26	6	●		8660960	9,6	106	48	10	●	
8660520	5,2	82	26	6	●		8660970	9,7	106	49	10	●	
8660530	5,3	82	27	6	●		8660980	9,8	106	49	10	●	
8660540	5,4	82	27	6	●		8660990	9,9	106	50	10	●	
8660550	5,5	82	28	6	●		8661000	10	106	50	10	●	
48157555	5,55	82	28	6	●		48157101	10,1	113	51	12	●	
8660560	5,6	82	28	6	●		48157102	10,2	113	51	12	●	
8660570	5,7	82	29	6	●		48157103	10,3	113	52	12	●	
8660580	5,8	82	29	6	●		48157104	10,4	113	52	12	●	
8660590	5,9	82	30	6	●		48157105	10,5	113	53	12	●	
8660600	6	82	30	6	●		48157106	10,6	113	53	12	●	
48157061	6,1	88	31	8	●		48157107	10,7	113	54	12	●	
48157062	6,2	88	31	8	●		48157108	10,8	113	54	12	●	
48157063	6,3	88	32	8	●		48157109	10,9	113	55	12	●	
48157064	6,4	88	32	8	●		48157110	11	113	55	12	●	
48157065	6,5	88	33	8	●		8661110	11,1	120	56	12	●	
48157066	6,6	88	33	8	●		8661120	11,2	120	56	12	●	
48157067	6,7	88	34	8	●		8661130	11,3	120	57	12	●	
48157068	6,8	88	34	8	●		8661140	11,4	120	57	12	●	
48157069	6,9	88	35	8	●		8661150	11,5	120	58	12	●	
48157070	7	88	35	8	●		8661160	11,6	120	58	12	●	
8660710	7,1	94	36	8	●		8661170	11,7	120	59	12	●	
8660720	7,2	94	36	8	●		8661180	11,8	120	59	12	●	
8660730	7,3	94	37	8	●		8661190	11,9	120	60	12	●	
8660740	7,4	94	37	8	●		8661200	12	120	60	12	●	
8660750	7,5	94	38	8	●		48157121	12,1	128	61	14	●	
48157755	7,55	94	38	8	●		48157122	12,2	128	61	14	●	
8660760	7,6	94	38	8	●		48157123	12,3	128	62	14	●	
8660770	7,7	94	39	8	●		48157124	12,4	128	62	14	●	
8660780	7,8	94	39	8	●		48157125	12,5	128	63	14	●	
8660790	7,9	94	40	8	●		48157126	12,6	128	63	14	●	
8660800	8	94	40	8	●		48157127	12,7	128	64	14	●	
48157081	8,1	101	41	10	●		48157128	12,8	128	64	14	●	
48157082	8,2	101	41	10	●		48157129	12,9	128	65	14	●	
48157083	8,3	101	42	10	●		48157130	13	128	65	14	●	
48157084	8,4	101	42	10	●		8661350	13,5	134	68	14	●	
48157085	8,5	101	43	10	●		8661400	14	134	70	14	●	
48157086	8,6	101	43	10	●		48157145	14,5	140	73	16	●	
48157087	8,7	101	44	10	●		48157150	15	140	75	16	●	
48157088	8,8	101	44	10	●		8661550	15,5	145	78	16	●	
48157089	8,9	101	45	10	●		8661160	16	145	80	16	●	
48157090	9	101	45	10	●		48157165	16,5	150	83	18	●	
8660910	9,1	106	46	10	●		48157170	17	150	85	18	●	
8660920	9,2	106	46	10	●		8661750	17,5	155	88	18	●	
8660930	9,3	106	47	10	●		8661800	18	155	90	18	●	
8660940	9,4	106	47	10	●		48157185	18,5	160	93	20	●	
8660950	9,5	106	48	10	●								

Different diameters and lengths are available as specials.
Also a special design for aluminium alloys are available upon request.

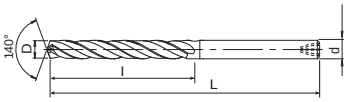
● Delivery from stock
○ Available on short notice

Applications - Anwendungen - Applicazioni - Applications - Applikation - Applikation - Aplicaciones - Применение								
C≤0.2%	0.25<C≤0.4%	C≥0.45%	SCM	~35 HRC	35~45 HRC	45~50 HRC	50~70 HRC	SUS
◎	◎	◎	◎	◎	○	○		○
SKD	GG	GGG	Cu	Al	AC	Ti	Tiall	Inc
	◎	◎					○	

TRS-HO-5D New Sizes

AVAILABLE IN JANUARY 2013

R thinning



CARBIDE WDI 30° FIT

140° h8 R D≥4

- To ensure a stable flow of coolant, there ia groove on the bottom of the shank
- On some drills, the coating may have some discoloration. This does not pose any performance problems.

	EDP	D	L	l	d	Stock	Price	EDP	D	L	l	d	Stock	Price
New Sizes	48158050	5	95	45	6	●		48158955	9,55	136	77	10	●	
	8662510	5,1	100	41	6	●		8662960	9,6	136	77	10	●	
	8662520	5,2	100	42	6	●		8662970	9,7	136	78	10	●	
New Sizes	8662530	5,3	100	43	6	●		8662980	9,8	136	79	10	●	
New Sizes	8662540	5,4	100	44	6	●		8662990	9,9	136	80	10	●	
	8662550	5,5	100	44	6	●		8663000	10	136	80	10	●	
New Sizes	48158555	5,55	100	45	6	●		48158101	10,1	146	81	12	●	
New Sizes	8662560	5,6	100	45	6	●		48158102	10,2	146	82	12	●	
New Sizes	8662570	5,7	100	46	6	●		48158103	10,3	146	83	12	●	
	8662580	5,8	100	47	6	●		48158104	10,4	146	84	12	●	
New Sizes	8662590	5,9	100	48	6	●		48158105	10,5	146	84	12	●	
	8662600	6	100	48	6	●		48158106	10,6	146	85	12	●	
New Sizes	48158061	6,1	109	49	8	●		48158107	10,7	146	86	12	●	
New Sizes	48158062	6,2	109	50	8	●		48158108	10,8	146	87	12	●	
New Sizes	48158063	6,3	109	51	8	●		48158109	10,9	146	88	12	●	
New Sizes	48158064	6,4	109	52	8	●		48158110	11	146	88	12	●	
New Sizes	48158065	6,5	109	52	8	●		8663110	11,1	156	89	12	●	
New Sizes	48158066	6,6	109	53	8	●		8663120	11,2	156	90	12	●	
New Sizes	48158067	6,7	109	54	8	●		8663130	11,3	156	91	12	●	
New Sizes	48158068	6,8	109	55	8	●		8663140	11,4	156	92	12	●	
New Sizes	48158069	6,9	109	56	8	●		8663150	11,5	156	92	12	●	
New Sizes	48158070	7	109	56	8	●		8663160	11,6	156	93	12	●	
	8662710	7,1	118	57	8	●		8663170	11,7	156	94	12	●	
New Sizes	8662720	7,2	118	58	8	●		8663180	11,8	156	95	12	●	
	8662730	7,3	118	59	8	●		8663190	11,9	156	96	12	●	
New Sizes	8662740	7,4	118	60	8	●		8663200	12	156	96	12	●	
	8662750	7,5	118	60	8	●		48158121	12,1	167	97	14	●	
New Sizes	48158755	7,55	118	61	8	●		48158122	12,2	167	98	14	●	
	8662760	7,6	118	61	8	●		48158123	12,3	167	99	14	●	
New Sizes	8662770	7,7	118	62	8	●		48158124	12,4	167	100	14	●	
New Sizes	8662780	7,8	118	63	8	●		48158125	12,5	167	100	14	●	
New Sizes	8662790	7,9	118	64	8	●		48158126	12,6	167	101	14	●	
	8662800	8	118	64	8	●		48158127	12,7	167	102	14	●	
New Sizes	48158081	8,1	128	65	10	●		48158128	12,8	167	103	14	●	
New Sizes	48158082	8,2	128	66	10	●		48158129	12,9	167	104	14	●	
New Sizes	48158083	8,3	128	67	10	●		48158130	13	167	104	14	●	
New Sizes	48158084	8,4	128	68	10	●		8663350	13,5	176	108	14	●	
New Sizes	48158085	8,5	128	68	10	●		8663400	14	176	112	14	●	
New Sizes	48158086	8,6	128	69	10	●		48158145	14,5	185	116	16	●	
New Sizes	48158087	8,7	128	70	10	●		48158150	15	185	120	16	●	
New Sizes	48158088	8,8	128	71	10	●		8663550	15,5	193	124	16	●	
New Sizes	48158089	8,9	128	72	10	●		8663600	16	193	128	16	●	
New Sizes	48158090	9	128	72	10	●		48158165	16,5	201	132	18	●	
New Sizes	8662910	9,1	136	73	10	●		48158170	17	201	136	18	●	
New Sizes	8662920	9,2	136	74	10	●		8663750	17,5	209	140	18	●	
New Sizes	8662930	9,3	136	75	10	●		8663800	18	209	144	18	●	
New Sizes	8662940	9,4	136	76	10	●		48158185	18,5	217	148	20	●	
	8662950	9,5	136	76	10	●								

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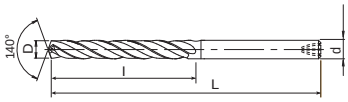
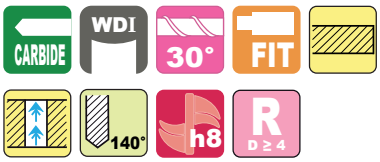
◎	◎	◎	◎	◎	○	○		○
SKD	GG	GGG	Cu	Al	AC	Ti	Tiall	Inc
	◎	◎					○	

TRS-HO-10D NEW

AVAILABLE IN MARCH 2013

R thinning





- To ensure a stable flow of coolant, there ia groove on the bottom of the shank
- On some drills, the coating may have some discoloration. This does not pose any performance problems.

EDP	D	L	l	d	Stock	Price
NEW 48159050	5	115	65	6	●	
NEW 8664055	5,5	128	78	6	●	
NEW 8664060	6	128	78	6	●	
NEW 48159065	6,5	140	87	8	●	
NEW 48159070	7	140	90	8	●	

EDP	D	L	l	d	Stock	Price
NEW 8664075	7,5	155	100	8	●	
NEW 8664080	8	155	105	8	●	
NEW 48159085	8,5	165	110	10	●	
NEW 48159090	9	165	115	10	●	
NEW 8664100	10	190	130	10	●	
NEW 8664120	12	215	155	12	●	

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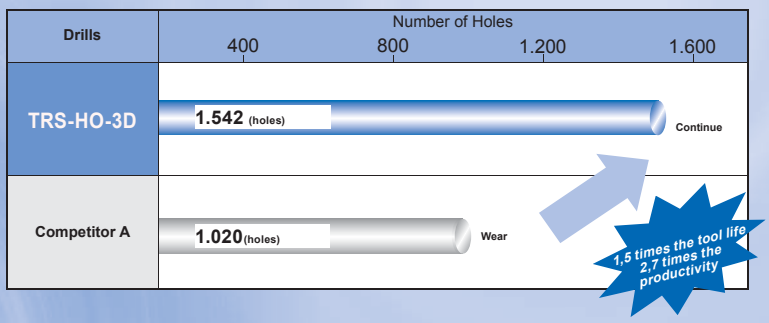
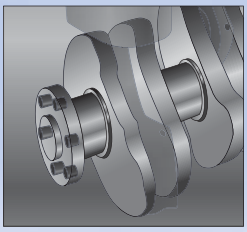
◎	◎	◎	◎	◎	○	○		○
SKD	GG	GGG	Cu	Al	AC	Ti	Tiall	Inc
	◎	◎					○	

Unmatched Processing Efficiency !
Drilling feeds exceeding 1.000 mm/min !

■Feed rates of F = 1480mm/min were achieved in this crankshaft application (carbon steel)

Tool	TRS-HO-3D ø 10,3	Competitor A
Work Material	S50C [DIN CK50 / AISI 1050]	
Drilling Speed	100m/min (2.950min^{-1})	
Feed	1.480mm/min (0,5mm/rev)	560mm/min 0,19mm/rev
Depth of Hole	24mm (Blind)	
Coolant	Water Soluble	
Machine	Horizontal Machining Center	

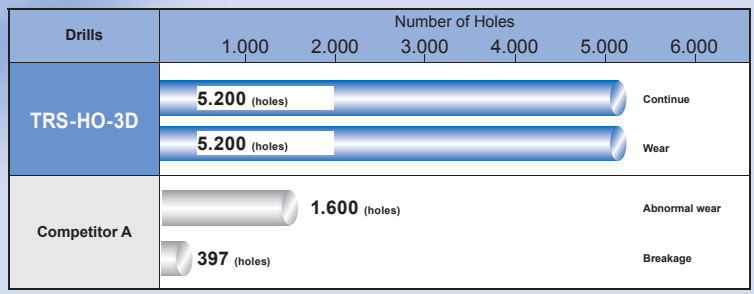




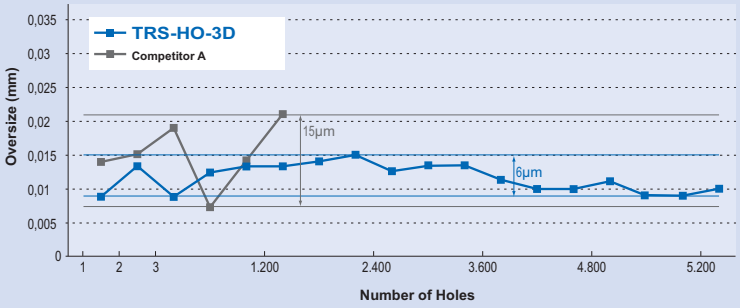
Example of the hole processing for the mounting holes on the crankshaft flywheel. The Mega Muscle Drill achieved 1.5 times the tool life and 2.7 times the productivity over Competitor A's 2 fluted drill. With the ability to control work hardening, one has the ability to extend tool life on secondary processes such as tapping, thus decreasing overall tooling and part cost per unit. For example, by lowering the cutting speed to 80m/min, tool life of the drill and all secondary process tools can be extended.

■In the processing of carbon steel, feed rates of of F=1.480mm/min were achieved, with overall cutting lengths of 166m.

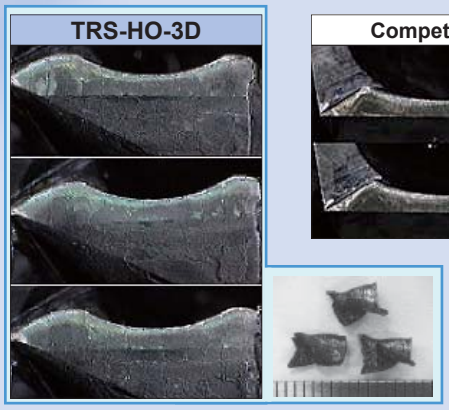
Tool	TRS-HO-3D ø 10,3
Work Material	S50C [DIN CK50 / AISI 1050]
Drilling Speed	100m/min (3.090 min^{-1})
Feed	1.480mm/min (0,48mm/rev)
Depth of Hole	32mm (Through)
Coolant	Water Soluble
Machine	Horizontal Machining Center



■ Changes in amount of hole oversize



■ Tool wear comparison

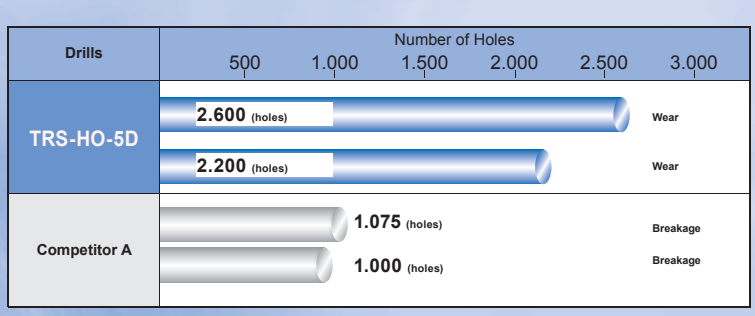


Example of carbon steel processing. Because of the high feed rate of 0.48mm/rev, the competitor company's drill showed a large variation in hole expansion as well as low tool life. However, the Mega Muscle Drill was able to achieve 5200 holes (cutting length 166m) with stable hole sizes.
The competitor A's hole expansion ranged up to 15um, while the Mega Muscle Drill had only a 6um variation.

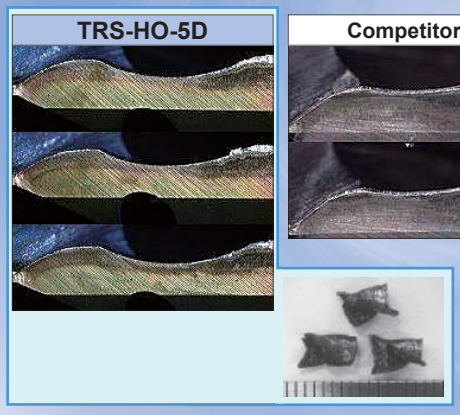
Unmatched Processing Efficiency !
Drilling feeds exceeding 1.000 mm/min !

■In the processing of alloy steel, feed rates of F=1.140mm/min were achieved, with overall cutting lengths of 110m

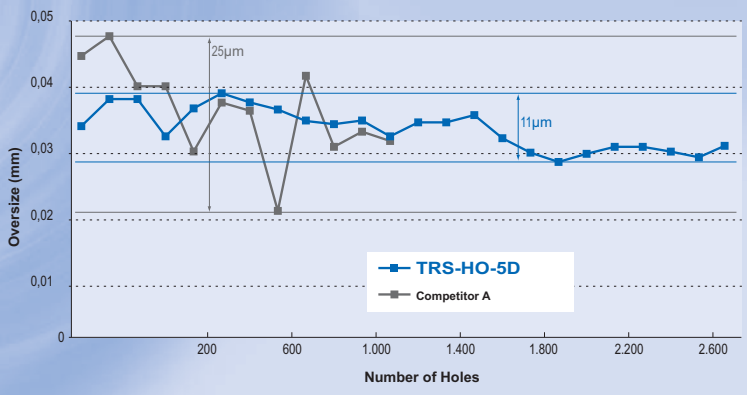
Tool	TRS-HO-5D ø10,5
Work Material	SCM440 (Alloy Steel)
Drilling Speed	80m/min (2.430min^{-1})
Feed	1.140mm/min (0,47mm/rev)
Depth of Hole	50mm (Through)
Coolant	Water Soluble
Machine	Horizontal Machining Center



■ Tool wear comparison



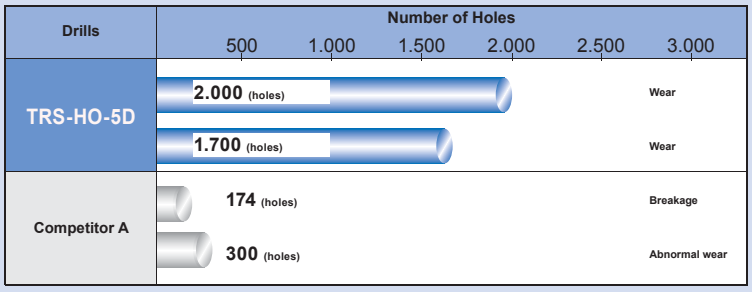
■ Changes in amount of hole oversize



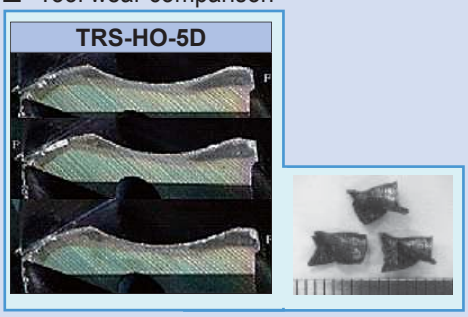
Example of hole processing in alloy steel. At high feed machining of 0.47mm/rev, Competitor A's drill was found to be unstable in hole size as well as having low tool life. However, the Mega Muscle Drill exceeded 2200 (cutting length 110m) holes of tool life, limited by normal wear, thus decreasing overall tooling and part cost per unit. When comparing the hole expansion values, Competitor A was found to have a large variation of up to 25µm.While the Mega Muscle Drill had up to 11µm.

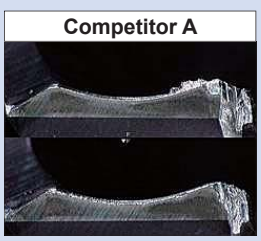
■Feed rates of F=1010mm/min were achieved in 30HRC alloy steel.

Tool	TRS-HO-5D ø10,8
Work Material	SCM440 (30HRC) (Alloy Steel)
Drilling Speed	70m/min (2.060min^{-1})
Feed	1.010mm/min (0,49mm/rev)
Depth of Hole	50mm (Through)
Coolant	Water Soluble
Machine	Horizontal Machining Center



■ Tool wear comparison





Example of hole processing in 30HRC alloy steel.At high feed drilling rates such as 0.49mm.rev, the Competitor A's product shows abnormal wear and premature breakage. After the drilling of 1700 holes, the wear of the Mega Muscle drill was stable, thus allowing for more regrinds and processing time per drill, reducing the overall process cost.

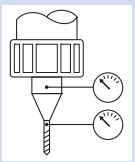
TRS-HO-3D/5D

	Mild Steels - Low Carbon Steels SS400 ■ S10C ■ ~150HB ~500 N/mm²		Carbon Steels S35C ■ S50C ■ ~210HB ~710 N/mm²		Alloys Steels SCM ■ SCr ■ SNCM ■ 16~28HRC 710~900 N/mm²	
Vc	80 ~ 120 m/min		80 ~ 120 m/min		60 ~ 90 m/min	
Ø	**S (min⁻¹)**	**F (mm/rev.)**	**S (min⁻¹)**	**F (mm/rev.)**	**S (min⁻¹)**	**F (mm/rev.)**
5	6.400	0,18 ~ 0,25	6.400	0,18 ~ 0,25	4.800	0,18 ~ 0,25
6	5.300	0,21 ~ 0,30	5.300	0,21 ~ 0,30	4.000	0,21 ~ 0,30
7	4.500	0,25 ~ 0,35	4.500	0,25 ~ 0,35	3.400	0,25 ~ 0,35
8	4.000	0,28 ~ 0,40	4.000	0,28 ~ 0,40	3.000	0,28 ~ 0,40
9	3.500	0,32 ~ 0,45	3.500	0,32 ~ 0,45	2.700	0,32 ~ 0,45
10	3.200	0,35 ~ 0,50	3.200	0,35 ~ 0,50	2.400	0,35 ~ 0,50
11	2.900	0,39 ~ 0,55	2.900	0,39 ~ 0,55	2.200	0,39 ~ 0,50
12	2.700	0,42 ~ 0,60	2.700	0,42 ~ 0,60	2.000	0,42 ~ 0,54
13	2.400	0,46 ~ 0,65	2.400	0,46 ~ 0,65	1.800	0,46 ~ 0,59
14	2.300	0,49 ~ 0,70	2.300	0,49 ~ 0,70	1.700	0,49 ~ 0,63
16	2.000	0,48 ~ 0,72	2.000	0,48 ~ 0,72	1.500	0,48 ~ 0,64
18	1.800	0,54 ~ 0,81	1.800	0,54 ~ 0,81	1.300	0,54 ~ 0,72

TRS-HO-3D/5D

	Alloys Steels SCM ■ SCr ■ SNCM ■ 28~35HRC 900~1100 N/mm²		Cast Iron GG FC250 ~350 N/mm²		Ductile Cast Iron GGG FCD450 ■ FCD600 400~600 N/mm²	
Vc	60 ~ 90 m/min		80 ~ 120 m/min		60 ~ 100 m/min	
Ø	**S (min⁻¹)**	**F (mm/rev.)**	**S (min⁻¹)**	**F (mm/rev.)**	**S (min⁻¹)**	**F (mm/rev.)**
5	4.800	0,18 ~ 0,25	6.400	0,18 ~ 0,30	5.100	0,18 ~ 0,25
6	4.000	0,21 ~ 0,30	5.300	0,21 ~ 0,36	4.200	0,21 ~ 0,30
7	3.400	0,25 ~ 0,35	4.500	0,25 ~ 0,42	3.600	0,25 ~ 0,35
8	3.000	0,28 ~ 0,40	4.000	0,28 ~ 0,48	3.200	0,28 ~ 0,40
9	2.700	0,32 ~ 0,45	3.500	0,32 ~ 0,54	2.800	0,32 ~ 0,45
10	2.400	0,35 ~ 0,50	3.200	0,35 ~ 0,60	2.500	0,35 ~ 0,50
11	2.200	0,39 ~ 0,50	2.900	0,39 ~ 0,66	2.300	0,39 ~ 0,55
12	2.000	0,42 ~ 0,54	2.700	0,42 ~ 0,72	2.100	0,42 ~ 0,60
13	1.800	0,46 ~ 0,59	2.400	0,46 ~ 0,78	2.000	0,46 ~ 0,65
14	1.700	0,49 ~ 0,63	2.300	0,49 ~ 0,84	1.800	0,49 ~ 0,70
16	1.500	0,48 ~ 0,64	2.000	0,56 ~ 0,80	1.600	0,48 ~ 0,72
18	1.300	0,54 ~ 0,72	1.800	0,63 ~ 0,90	1.400	0,54 ~ 0,81

1. The indicated speeds and feeds are for water soluble oil.
2. Suitable cutting fluid is water-emulsifiable high density oil (less than 20 times dilution).
3. When using non-water soluble oil or water-emulsifiable (over 20times dilution), reduce drilling speed by 30%.
4. When inserting a drill into the machine, use a collet that does not have any scratches or dust located within internal bore. Also, reduce deflection of drill to less than 0.02mm.
5. Fasten the work material to reduce the possibility of work deformation, deflection of machined surface, or vibration.
6. A clogged oil hole can lead to a breakage. Make sure that a filter is attached to the oil feeder.

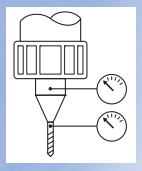


Recommended Drilling Conditions

TRS-HO-10D

	Mild Steels Low Carbon Steels SS400 - S10C ~150 HB ~500 N/mm²		Carbon Steels S35C - S10C ~210 HB ~710 N/mm²		Alloy Steels SCM - SCr - SNCM 16 ~ 28 HRC 710 ~ 900 N/mm²		Cast Iron FC 250 350N/mm²		Ductile Cast Iron FCD 450 FCD 650 400 ~ 600N/mm²	
Vc	80 ~ 120 m/min		80 ~ 120 m/min		60 ~ 120 m/min					
Ø	S (min⁻¹)	F (mm/rev.)	S (min⁻¹)	F (mm/rev.)	S (min⁻¹)	F (mm/rev.)	S (min⁻¹)	F (mm/rev.)	S (min⁻¹)	F (mm/rev.)
5	6.400	0,18 ~ 0,25	6.400	0,18 ~ 0,25	5.700	0,18 ~ 0,25	6.400	0,18 ~ 0,25	5.100	0,18 ~ 0,25
6	5.300	0,21 ~ 0,30	5.300	0,21 ~ 0,30	4.800	0,21 ~ 0,30	5.300	0,21 ~ 0,36	4.200	0,21 ~ 0,30
7	4.500	0,25 ~ 0,35	4.500	0,25 ~ 0,35	4.100	0,25 ~ 0,35	4.500	0,25 ~ 0,42	3.600	0,25 ~ 0,35
8	4.000	0,28 ~ 0,40	4.000	0,28 ~ 0,40	3.600	0,28 ~ 0,40	4.000	0,28 ~ 0,48	3.200	0,28 ~ 0,40
9	3.500	0,32 ~ 0,45	3.500	0,32 ~ 0,45	3.200	0,32 ~ 0,45	3.500	0,32 ~ 0,54	2.800	0,32 ~ 0,45
10	3.200	0,35 ~ 0,50	3.200	0,35 ~ 0,50	2.900	0,35 ~ 0,50	3.200	0,35 ~ 0,60	2.500	0,35 ~ 0,50
11	2.900	0,39 ~ 0,55	2.900	0,39 ~ 0,55	2.600	0,39 ~ 0,55	2.900	0,39 ~ 0,66	2.300	0,39 ~ 0,55
12	2.700	0,42 ~ 0,60	2.700	0,42 ~ 0,60	2.400	0,42 ~ 0,60	2.700	0,42 ~ 0,72	2.100	0,42 ~ 0,60

1. The indicated speeds and feeds are for water soluble oil or MQL (approx.50ml/hour)
2. Suitable cutting fluid is water-emulsifiable high density oil (less than 20 times dilution).
3. When using non-water soluble oil or water-emulsifiable (over 20times dilution), reduce drilling speed by 30%.
4. When inserting a drill into the machine, use a collet that does not have any scratches or dust located within internal bore. Also, reduce deflection of drill to less than 0.02mm.
5. Fasten the work material to reduce the possibility of work deformation, deflection of machined surface, or vibration.
6. A clogged oil hole can lead to a breakage. Make sure that a filter is attached to the oil feeder.
7. ake a pilot hole before using TRS-HO-10D in accordance with recommended operation.



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Tool specifications subject to change without notice

EUR**TRS-HO-(3D-5D-10D)**09R12a