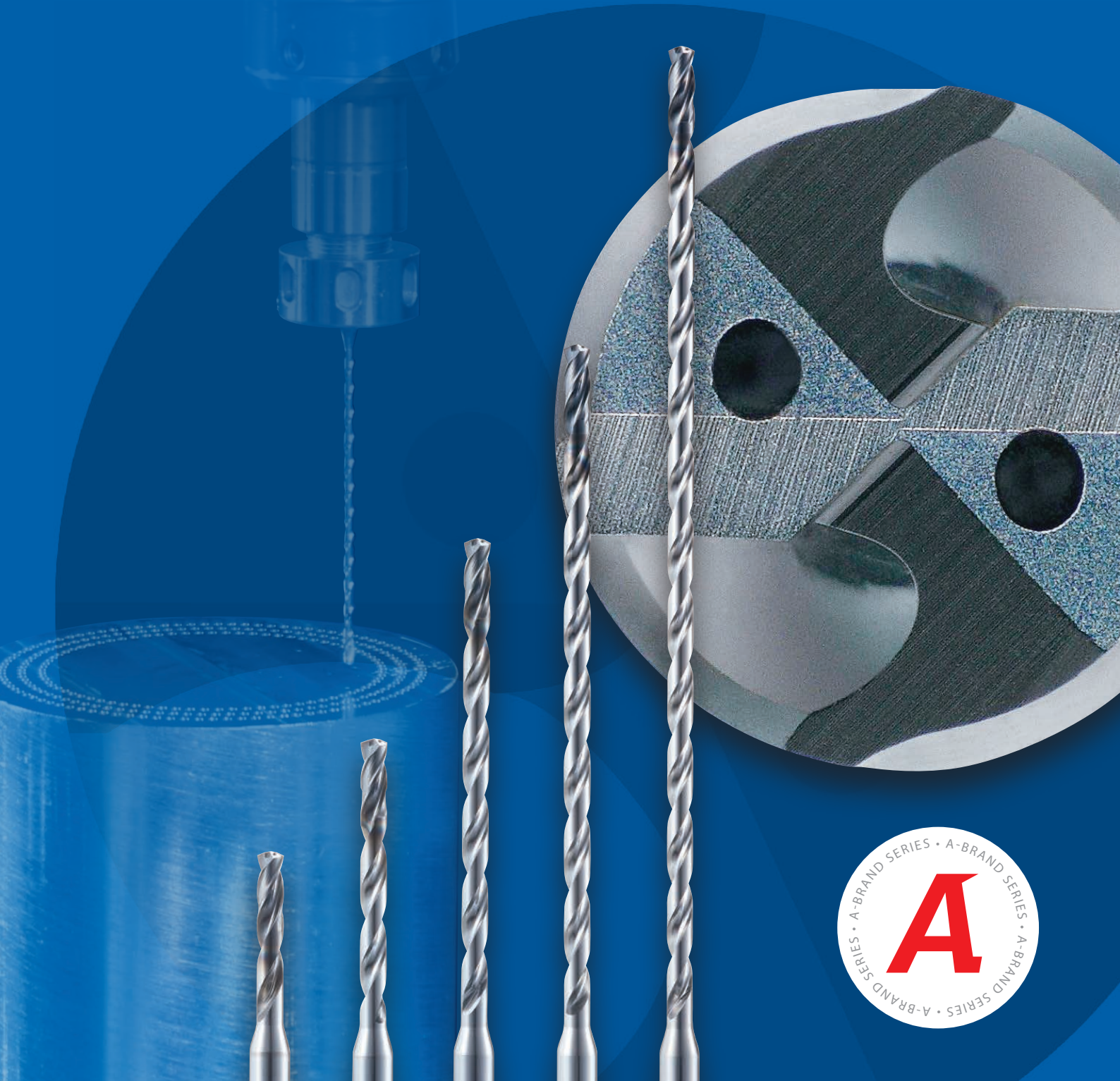




Small diameter carbide drills with oil holes

ADO-MICRO

Volume 2.1



KEY FEATURES: ADO-MICRO



1 Double margin

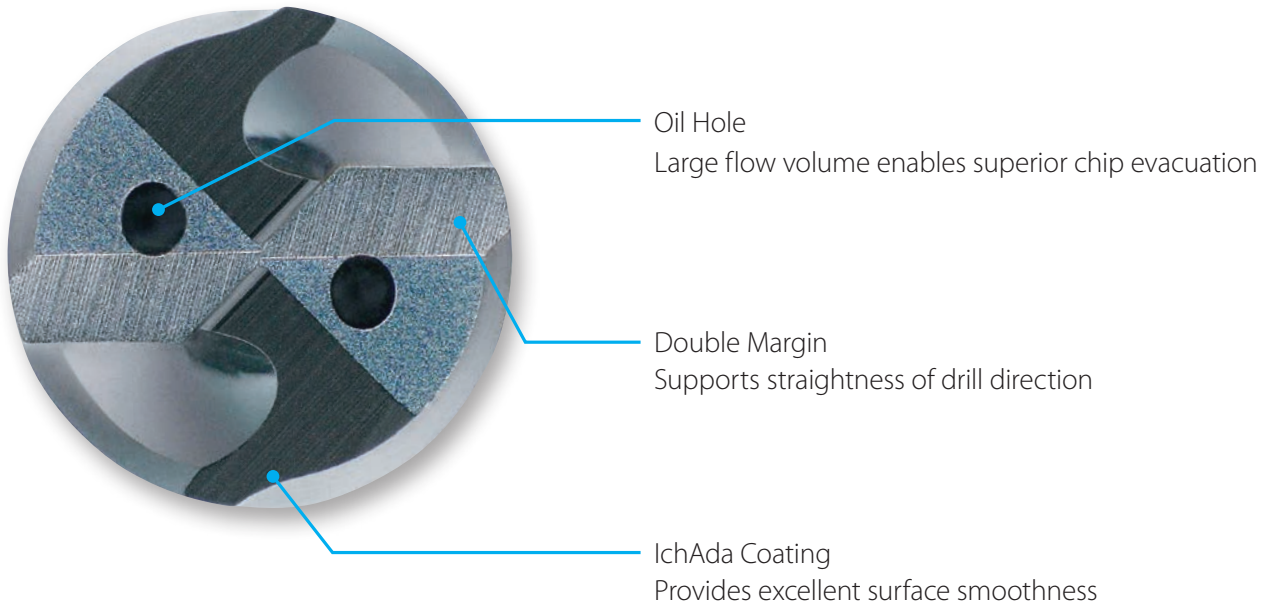
2 Coolant through

3 IchAda coating
Excellent surface smoothness

4 Large size range
2D/5D: $\text{Ø}0,7 \sim \text{Ø}2$
12D/20D/30D: $\text{Ø}1 \sim \text{Ø}2$
71 items total



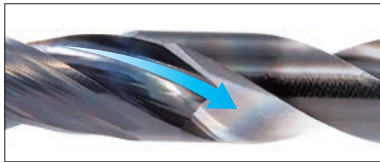
"STABLE" AND "HIGH EFFICIENCY" SMALL DIAMETER DEEP-HOLE DRILLING



Features that enable outstanding chip evacuation performance

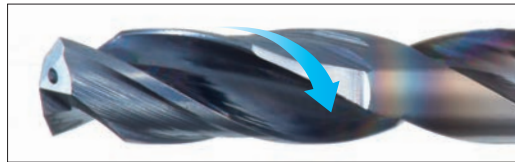
Flute structure

Stable performance even in difficult small diameter deep-hole applications



Extended Flute

Chips are discharged from the tip of the flute to the extended flute with enhanced evacuation capability



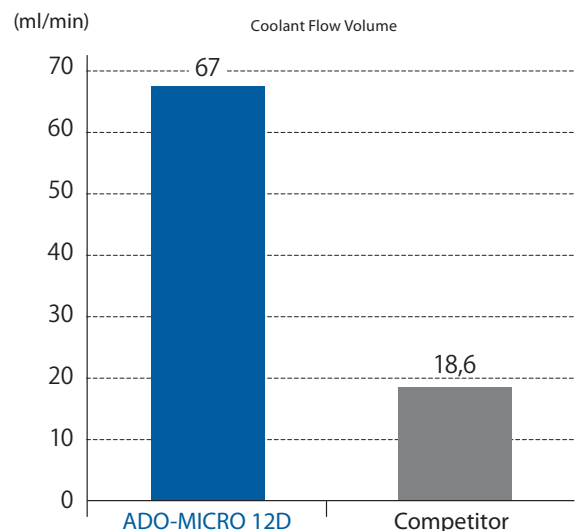
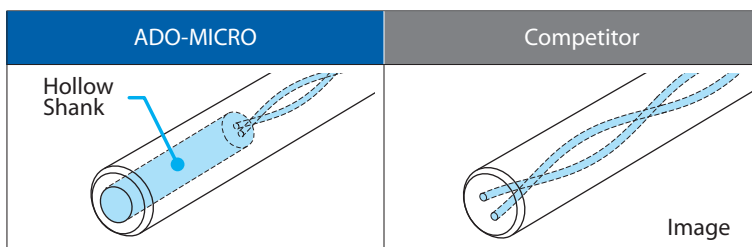
Removed End of Margin

Capability to smoothly discharge "micro sludges" that can be easily accumulated around the outer periphery of the tool, which is a key cause of abrupt tool breakage.

Oil Holes

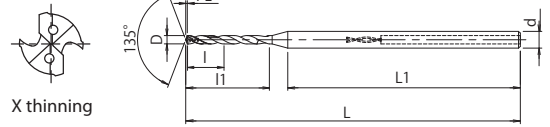
Greater coolant flow volume achieved by the hollow shank design to enable smooth chip evacuation

Tool	ADO-MICRO 12D Ø 1,5	Competitor Ø 1,5
Hollow Shank	Hollow	Solid
Coolant	Water Soluble (Internal)	
Coolant pressure	1,5 Mpa	
Time of Lubricant supply	60 sec.	



ADO-MICRO 5D

Drilling | Solid carbide | 5xD



- First choice in quality and performance
- 2 flute carbide drill with internal coolant, IchAda coating
- Up to 5xD
- 19 sizes

P C: ≤0,2%	P C: 0,25-0,4%	P C: ≥0,45%	P SCM	M INOX	K GG	K GGG	N AC,ADC	S Ti	H 25-35 HRC	H 35-45 HRC	H 45-52 HRC
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A	CARBIDE	IchAda	±30°	0~ -0.009	SHRINK FIT	135°
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EDP	D	L	L1	l	l1	PL	d	Price
8732018	0,7	47	35,7	3,5	7	0,1	3	
8732019	0,75	47	35,3	3,8	7,5	0,2	3	
8732020	0,8	50	37,9	4	8	0,2	3	
8732021	0,85	50	37,5	4,3	8,5	0,2	3	
8732022	0,9	50	37,1	4,5	9	0,2	3	
8732023	0,95	50	36,7	4,8	9,5	0,2	3	
8732024	1	55	40,8	5	10	0,2	3	
8732025	1,1	55	40	5,5	11	0,2	3	
8732026	1,2	60	44,1	6	12	0,2	3	
8732027	1,3	60	43,3	6,5	13	0,3	3	
8732028	1,4	60	42,5	7	14	0,3	3	
8732029	1,5	60	41,7	7,5	15	0,3	3	
48337155	1,55	60	41,3	7,8	15,5	0,3	3	
8732030	1,6	60	40,9	8	16	0,3	3	
8732031	1,7	60	40,1	8,5	17	0,4	3	
8732032	1,8	65	44,3	9	18	0,4	3	
48337184	1,84	65	43,9	9,2	18,4	0,4	3	
8732033	1,9	65	43,4	9,5	19	0,4	3	
8732034	2	65	42,6	10	20	0,4	3	

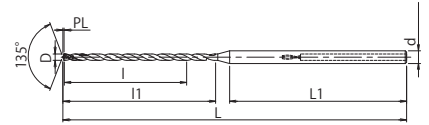
Drilling | Solid carbide
5xD

ADO-MICRO 20D

Drilling | Solid carbide | 20xD



X thinning



- First choice in quality and performance
- 2 flute carbide drill with internal coolant, IchAda coating
- Up to 20xD, long type
- 11 sizes



EDP	D	L	L1	I	I1	PL	d	Price
8732046*	1	68	39,8	20	24	0,2	3	
8732047*	1,1	75	44,6	22	26,4	0,2	3	
8732048*	1,2	75	42,3	24	28,8	0,2	3	
8732049	1,3	75	40,1	26	31,2	0,3	3	
8732050	1,4	81	43,9	28	33,6	0,3	3	
8732051	1,5	81	41,7	30	36	0,3	3	
8732052	1,6	81	39,5	32	38,4	0,3	3	
8732053	1,7	88	44,3	34	40,8	0,4	3	
8732054	1,8	88	42,1	36	43,2	0,4	3	
8732055	1,9	88	39,8	38	45,6	0,4	3	
8732056	2	95	44,6	40	48	0,4	3	

* Temporarily unavailable

ADO-MICRO 25D

Drilling | Solid carbide | 25xD

EDP	D	L	L1	I	I1	PL	d	Price
48337320	2	105	44,6	50	58	0,4	3	

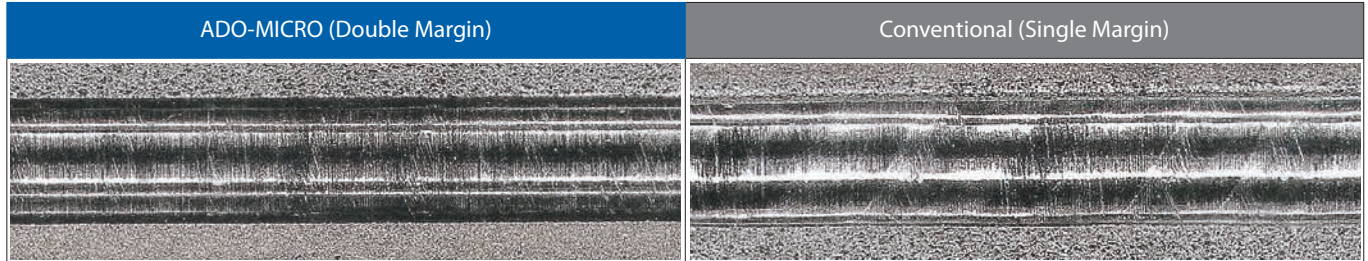
Drilling | Solid carbide

20xD - 25xD

Stable Performance

Stable performance even in deep-hole applications

The double margin enhances the straightness stability of drill to enable stable drilling performance > Also reduces the rifle marks on the inner surface of hole



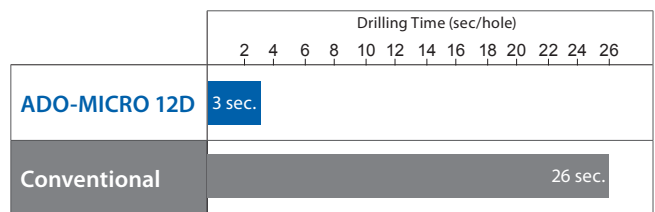
Tool: ADO-MICRO 20D Ø 2 Work Material: SUS304 Depth of Hole: 40mm

High Efficiency

Approximately 9 times the drilling efficiency by non-step drilling

Non-step drilling is possible even for deep holes, enabling high efficiency processing

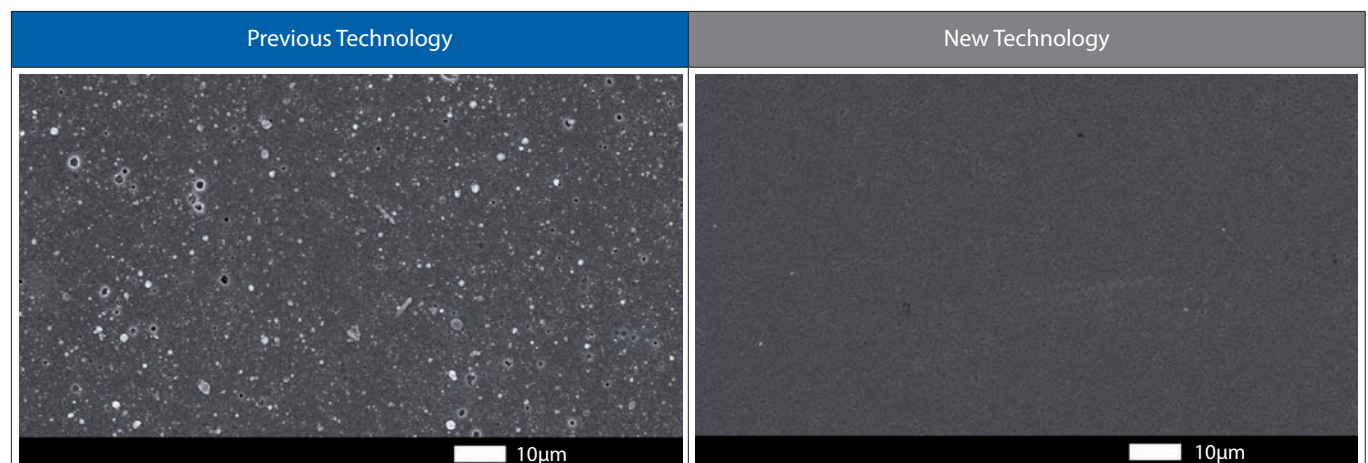
Tool	ADO-MICRO 12D Ø 15	Conventional
Work Material	SUS304	
Machining	Non-step drilling	Step drilling (0,5mm step)
Cutting Speed	50m/min (10.610min ⁻¹)	28m/min (5.940min ⁻¹)
Feed	318mm (0,03mm/rev)	89mm (0,015mm/rev)
Depth of Hole	12mm (Blind) with pilot hole	
Coolant	Water-Soluble (Internal)	Water-Soluble (External)
Machine	Vertical machining center (HSK-A40)	



Coating

IchAda coating with excellent surface smoothness

The excellent smoothness in conjunction with high abrasion resistance and heat resistance enable small diameter tools to achieve long tool life

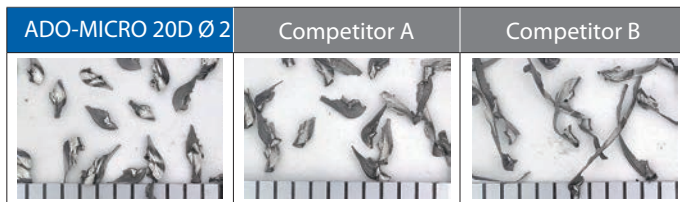
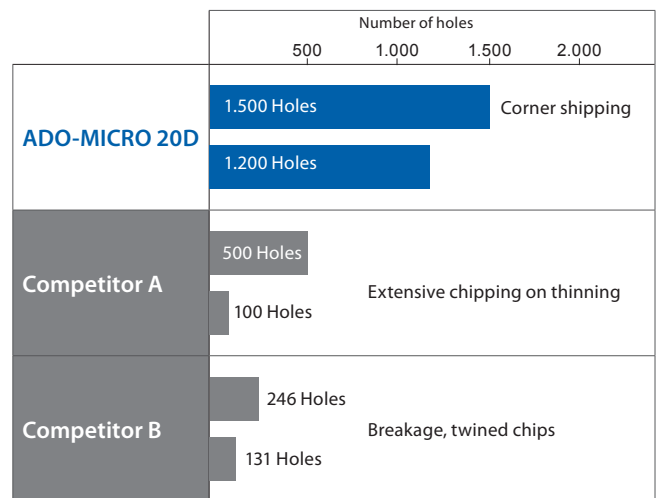


IchAda is a registered trademark of OSG Corporation.

Long tool life achieved by stable drilling

Benefit of unique flute geometry

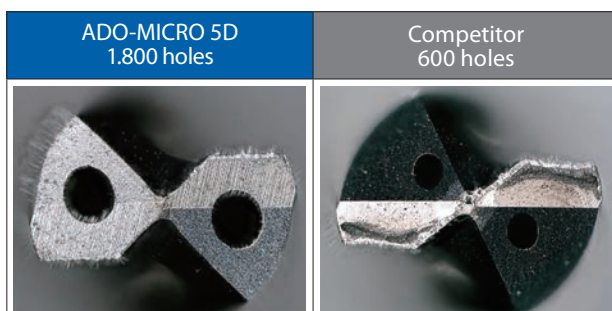
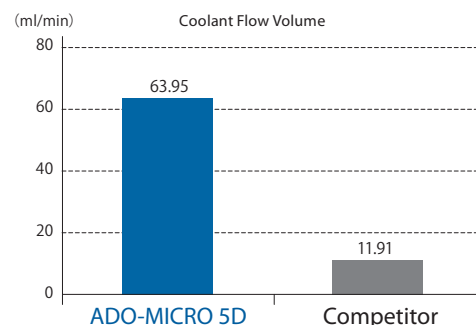
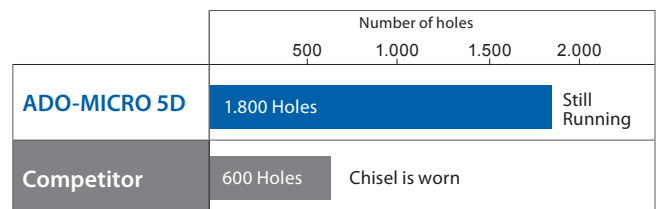
Tool	ADO-MICRO 20D Ø 2
Work Material	SCM440
Cutting Speed	50m/min (7.960min ⁻¹)
Feed	557mm/min (0,07mm/rev)
Depth of Hole	38mm (Blind) with pilot hole
Coolant	Water-Soluble (Internal)
Coolant Pressure	3Mpa
Machine	Vertical machining center (HSK-A40)



Large coolant flow volume to enable stable drilling

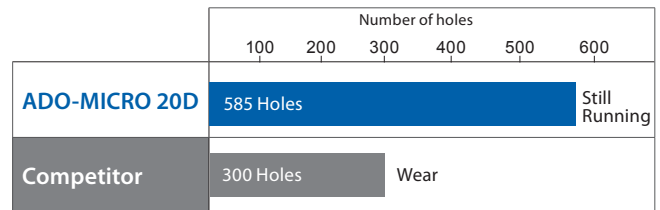
Benefit of enlarged oil holes

Tool	ADO-MICRO 5D Ø 0,7
Work Material	SUS304
Cutting Speed	30m/min (13.640min ⁻¹)
Feed	136mm/min (0,01mm/rev)
Depth of Hole	3,5mm (Blind)
Coolant	Water-Soluble (Internal)
Coolant Pressure	5Mpa
Machine	Vertical machining center (HSK-A63)



Efficiency improvement in the machining of titanium alloy bolts

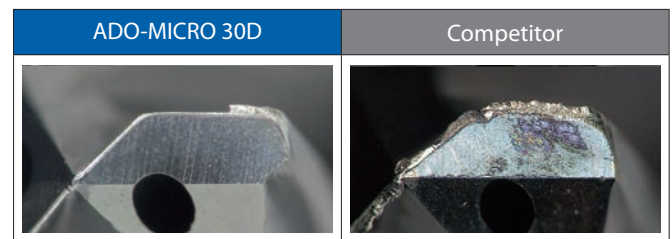
Tool	ADO-MICRO 20D Ø 1,2	Competitor Ø 1,2
Work Material	Ti-Al-4V	
Machining	Non-step drilling	Step drilling (0,12mm step)
Cutting Speed	35m/min (9.300min ⁻¹)	10m/min (2.600min ⁻¹)
Feed	167mm/min (0,02mm/rev)	30mm/min (0,01mm/rev)
Depth of Hole	15mm (Blind) with pilot hole	
Coolant	Water-Soluble (Internal)	
Coolant Pressure	2Mpa	
Machine	Vertical machining center (BT30)	



Excellent durability achieved by combining "automatic lathe + oil-based coolant"

Tool	ADO-MICRO 30D Ø 1,6
Work Material	SUS440C
Cutting Speed	20m/min (4.000min ⁻¹)
Feed	120mm/min (0,03mm/rev)
Depth of Hole	45mm (Blind) with pilot hole
Coolant	Oil-based coolant (Internal)
Coolant Pressure	7Mpa
Machine	CNC Automatic lathe

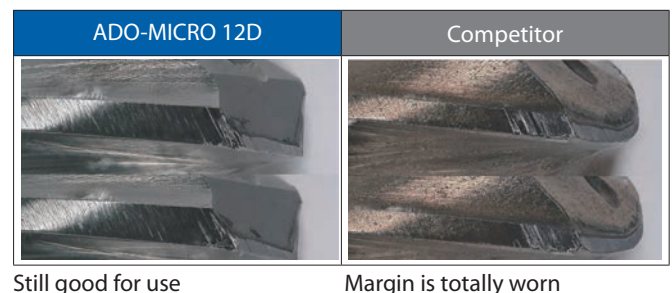
Wear condition of cutting edge after drilling 1.200 holes



Cutting edge condition in special steel drilling application

Tool	ADO-MICRO 12D Ø 1,5
Work Material	SUJ2
Cutting Speed	45m/min (9.550min ⁻¹)
Feed	430mm/min (0,045mm/rev)
Depth of Hole	9mm (Blind) with pilot hole
Coolant	Water-Soluble (Internal)
Coolant Pressure	1,5Mpa
Machine	Vertical machining center (HSK-A40)

Cutting edge wear condition after drilling 900 holes



Still good for use

Margin is totally worn

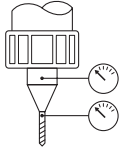
CUTTING CONDITIONS

Drilling | Solid | Cutting conditions

ADO-MICRO 2D/5D

Vc	Mild Steel - Low Carbon Steel SS400 - S10C ~150HB ~500 N/mm ²		Carbon Steel S35C - S50C ~210HB ~710 N/mm ²		Alloy Steel SCM - SCr - SNCM 710 ~900 N/mm ²		Alloy Steel SCM - SCr - SNCM 710 ~900 N/mm ²		Austenitic Stainless Steel SUS303 - SUS304 SUS316 - SUS316L		Special Alloy Steel SUJ2 - SUS440	
	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.)	S (min ⁻¹)	F (mm/rev.)
20~40~60m/min			20~40~60m/min		20~40~60m/min		20~30~40m/min		20~30~70m/min		25~35~45m/min	
0.7	18.200	0,007 ~ 0,021	18.200	0,007 ~ 0,021	18.200	0,014 ~ 0,028	13.600	0,014 ~ 0,028	13.600	0,007 ~ 0,021	15.900	0,007 ~ 0,021
1	12.700	0,01 ~ 0,03	12.700	0,01 ~ 0,03	12.700	0,02 ~ 0,04	9.500	0,02 ~ 0,04	9.500	0,01 ~ 0,03	11.100	0,01 ~ 0,03
1,5	8.500	0,015 ~ 0,045	8.500	0,015 ~ 0,045	8.500	0,03 ~ 0,06	6.400	0,03 ~ 0,06	6.400	0,015 ~ 0,045	7.400	0,015 ~ 0,045
2	6.400	0,02 ~ 0,06	6.400	0,02 ~ 0,06	6.400	0,04 ~ 0,08	4.800	0,04 ~ 0,08	4.800	0,02 ~ 0,06	5.600	0,02 ~ 0,06

Vc	Cast Iron FC250 ~350N/mm ²		Ductile Cast Iron FCD450 - FCD600 400 ~600 N/mm ²		Aluminium Alloy AC4C - ADC		Aluminium A5052 - A7075		Titanium Alloy		Heat Resistant Alloy Inconel 718	
	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.)	S (min ⁻¹)	F (mm/rev.)
20~50~60m/min			30~40~50m/min		30~50~70m/min		20~40~60m/min		40~50~60m/min		5~10~15m/min	
0.7	22.700	0,014 ~ 0,028	18.200	0,014 ~ 0,028	22.700	0,014 ~ 0,042	18.200	0,007 ~ 0,021	22.700	0,011 ~ 0,018	4.500	0,004 ~ 0,014
1	15.900	0,02 ~ 0,04	12.700	0,02 ~ 0,04	15.900	0,02 ~ 0,06	12.700	0,01 ~ 0,03	15.900	0,015 ~ 0,025	3.200	0,005 ~ 0,02
1,5	10.600	0,03 ~ 0,06	8.500	0,03 ~ 0,06	10.600	0,03 ~ 0,09	8.500	0,015 ~ 0,045	10.600	0,023 ~ 0,038	2.100	0,008 ~ 0,03
2	8.000	0,04 ~ 0,08	6.400	0,04 ~ 0,08	8.000	0,04 ~ 0,12	6.400	0,02 ~ 0,06	8.000	0,03 ~ 0,05	1.600	0,01 ~ 0,04

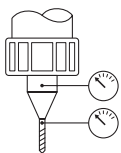


1. This cutting condition chart is based on the usage of **water-soluble coolant and internal oil supply**.
2. Please use quality water-soluble coolant with a dilution factor of approximately 20 times.
3. Please use a precision filter (approximation of 3µm to 5µm) to prevent the oil holes from clogging.
4. Although the recommended coolant pressure is 3 MPa or more, please adjust accordingly if the level of flow volume is unsatisfactory due to the type and concentration of cutting oil used.
5. For accurate mounting, acceptable deflection of the body cylindrical part at the shank end should be **less than 0.002µm**, as shown in the illustrated figure.
6. For work material with poor chip evacuation characteristic, please perform step drilling as required.
7. Please always use the appropriate cutting fluid recommended by the cutting fluid manufacturer in the machining of magnesium alloys. Be cautious with the cutting chips as they are highly flammable and may pose a serious fire risk if not properly handled.

ADO-MICRO 12D/15D/20D/25D/30D

Vc	Mild Steel - Low Carbon Steel SS400 - S10C ~150HB ~500 N/mm ²		Carbon Steel S35C - S50C ~210HB ~710 N/mm ²		Alloy Steel SCM - SCr - SNCM 710 ~900 N/mm ²		Alloy Steel SCM - SCr - SNCM 710 ~900 N/mm ²		Austenitic Stainless Steel SUS303 - SUS304 SUS316 - SUS316L		Special Alloy Steel SUJ2 - SUS440	
	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.)	S (min ⁻¹)	F (mm/rev.)
20~40~60m/min			20~40~60m/min		20~40~60m/min		20~30~40m/min		20~30~70m/min		25~35~45m/min	
1	12.700	0,01 ~ 0,03	12.700	0,01 ~ 0,03	12.700	0,02 ~ 0,04	9.500	0,02 ~ 0,04	9.500	0,01 ~ 0,03	11.100	0,01 ~ 0,03
1,5	8.500	0,015 ~ 0,045	8.500	0,015 ~ 0,045	8.500	0,03 ~ 0,06	6.400	0,03 ~ 0,06	6.400	0,015 ~ 0,045	7.400	0,015 ~ 0,045
2	6.400	0,02 ~ 0,06	6.400	0,02 ~ 0,06	6.400	0,04 ~ 0,08	4.800	0,04 ~ 0,08	4.800	0,02 ~ 0,06	5.600	0,02 ~ 0,06

Vc	Cast Iron FC250 ~350N/mm ²		Ductile Cast Iron FCD450 - FCD600 400 ~600 N/mm ²		Aluminium Alloy AC4C - ADC		Aluminium A5052 - A7075		Titanium Alloy		Heat Resistant Alloy Inconel 718	
	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.)	S (min ⁻¹)	F (mm/rev.)
20~50~60m/min			30~40~50m/min		30~50~70m/min		20~40~60m/min		40~50~60m/min		5~10~15m/min	
1	15.900	0,02 ~ 0,04	12.700	0,02 ~ 0,04	15.900	0,02 ~ 0,06	12.700	0,01 ~ 0,03	15.900	0,015 ~ 0,025	3.200	0,005 ~ 0,02
1,5	10.600	0,03 ~ 0,06	8.500	0,03 ~ 0,06	10.600	0,03 ~ 0,09	8.500	0,015 ~ 0,045	10.600	0,023 ~ 0,038	2.100	0,008 ~ 0,03
2	8.000	0,04 ~ 0,08	6.400	0,04 ~ 0,08	8.000	0,04 ~ 0,12	6.400	0,02 ~ 0,06	8.000	0,03 ~ 0,05	1.600	0,01 ~ 0,04



1. This cutting condition chart is based on the usage of **water-soluble coolant and internal oil supply**.
2. Please use quality water-soluble coolant with a dilution factor of approximately 20 times.
3. Please use a precision filter (approximation of 3µm to 5µm) to prevent the oil holes from clogging.
4. Although the recommended coolant pressure is 3 MPa or more, please adjust accordingly if the level of flow volume is unsatisfactory due to the type and concentration of cutting oil used.
5. For accurate mounting, acceptable deflection of the body cylindrical part at the shank end should be **less than 0.002µm**, as shown in the illustrated figure.
6. For work material with poor chip evacuation characteristic, please perform step drilling as required.
7. From 12D type included, please use a 2D type drill to prepare a pilot hole prior to processing.
8. Please always use the appropriate cutting fluid recommended by the cutting fluid manufacturer in the machining of magnesium alloys. Be cautious with the cutting chips as they are highly flammable and may pose a serious fire risk if not properly handled.

Recommended drilling method for deep-holes

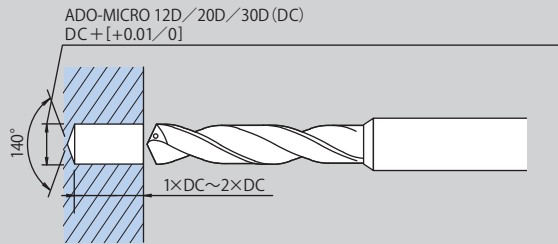
① ADO-MICRO 2D

Make a pilot hole with the ADO-MICRO 2D.

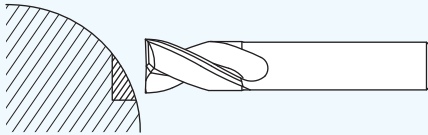
ADO-MICRO 12D/20D/30D

ADO-MICRO 2D (140°)

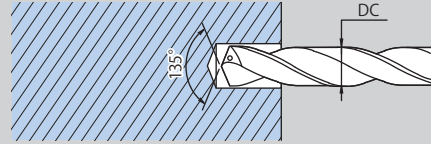
The ADO-MICRO 2D (140° point angle) is the recommended pilot hole drills of the ADO-MICRO 12D/20D/30D.



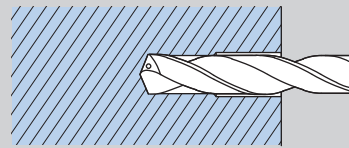
★ When working on a curved surface, use the FX-ZDS (end mill for counterboring) or the ADF (carbide flat drill) to counterbore a flat surface before drilling a pilot hole.



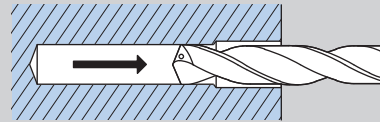
② Insert the long drill into a pilot hole with a low revolution of 500 to 1,000 min⁻¹ (n).



③ Increase the revolution to the designated speed and start drilling.



④ After drilling, move the drill away from the bottom of the hole; then reduce its speed to 500 to 1,000 min⁻¹ (n) while pulling it out of the hole.



※ Make sure to use internal coolant supply when drilling.

For drilling applications exceeding Ø2

Carbide Drill Series

AD•ADO



Carbide Drill Series for Stainless Steel and Titanium Alloy

ADO-SUS



SWEDEN

Branch office of OSG SCANDINAVIA
Abrahams Gränd 8
295 35 Bromölla
Sweden
Tel: +46 40 41 22 55
osg@osg-scandinavia.com

OSG SCANDINAVIA

(For Scandinavian countries)
Langebjergvaenget 16
4000 Roskilde
Denmark
Tel: +45 46 75 65 55
osg@osg-scandinavia.com

OSG NETHERLANDS

Bedrijfsweg 5
3481 MG Harmelen
The Netherlands
Tel: +31 348 44 2764
Fax: +31 348 44 2144
info@osg-nl.com

OSG UK

Shelton house, 5 Bentalls
Pipps Hill Ind Est, Basildon Essex SS14 3BY
United Kingdom
Tel: +44 1268 567660
Fax: +44 1268 567661
sales@osg-uk.com

OSG EUROPE LOGISTICS

Avenue Lavoisier 1
B-1300 Z.I. Wavre - Nord
Belgium
Tel: +32 10 23 05 07
Fax: +32 10 23 05 51
info@osgeurope.com

OSG BELUX

Avenue Lavoisier 1
B-1300 Z.I. Wavre - Nord
Belgium
Tel: +32 10 23 05 11
Fax: +32 10 23 05 31
info@osg-belgium.com

OSG IBÉRICA

Bekolarra 4
E - 01010 Vitoria-Gasteiz
Spain
Tel: +34 945 242 400
Fax: +34 945 228 883
osg.iberica@osg-ib.com

OSG FRANCE

Parc Icade, Paris Nord 2
Immeuble "Le Rimbaud"
22 Avenue des Nations
CS66191 - 93420 Villepinte
France
Tel: +33 1 49 90 10 10
Fax: +33 1 49 90 10 15
sales@osg-france.com

OSG ITALY

Via Ferrero, 65 A/B
I - 10098 Rivoli
Italian
Tel: +39 0117705211
Fax: +39 0117705215
info@osg-italia.it





CZECH REPUBLIC, SLOVAKIA, HUNGARY

OSG Europe Logistics S.A.
Slovakia, organizačná zložka
Račianska 22/A, Bratislava 831 02
Slovakia
Tel.: +421 24 32 91 295
info@osgeurope.com

OSG POLAND

ul. Spółdzielcza 57
05-074 Halinów
Polska
Tel: +22 760 82 71
Mob. +48 570 677 711
osg@osg-poland.com

OSG RUSSIA

Butlerova street, 17B, office 5069
117342 Moscow
Russia
Tel: +7 (495) 150 41 54
info@osg-russia.com

ROMSAN INTERNATIONAL CO. SRL

Reprezentant Exclusiv OSG
25C, Bucuresti-Magurele Street
051431 Bucuresti
România
Tel: +40 21 322 07 47
Fax: +40 21 321 56 00
romsan.int@romsan.ro

OSG TURKEY

Rami Kişla Cad.No:56 Eyüp
Istanbul 34056
Turkey
Tel: +90 212 565 24 00
Fax: +90 212 565 44 00
info@osg-turkey.com

Vischer & Bolli AG

Machining and Workholding
Im Schossacher 17
CH-8600 Dübendorf
Schweiz
Tel.: +41 44 802 15 15
Fax: +41 44 802 15 95
info@vb-tools.com

OSG GERMANY

Karl-Ehmann-Str. 25
D - 73037 Göppingen
Germany
Tel: +49 7161 6064 - 0
Fax: +49 7161 6064 - 444
info@osg-germany.de



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OSG EUROPE LOGISTICS

Avenue Lavoisier 1
B-1300 Z.I. Wavre - Nord - Belgium
Tel: +32 10 23 05 07
Fax: +32 10 23 05 51
info@osgeurope.com

OSG BELUX

Avenue Lavoisier 1
B-1300 Z.I. Wavre - Nord - Belgium
Tel: +32 10 23 05 11
Fax: +32 10 23 05 31
info@osg-belgium.com

OSG FRANCE

Parc Icade, Paris Nord 2
Immeuble "Le Rimbaud"
22 Avenue des Nations
CS66191 - 93420 Villepinte - France
Tel: +33 1 49 90 10 10
Fax: +33 1 49 90 10 15
sales@osg-france.com

OSG NETHERLANDS

Bedrijfsweg 5 - 3481 MG Harmelen
Tel: +31 348 44 2764
Fax: +31 348 44 2144
info@osg-nl.com

OSG UK

Shelton house, 5 Bentalls
Pipps Hill Ind Est, Basildon Essex SS14 3BY
Tel: +44 1268 567 660
Fax: +44 1268 567 661
uk_sales@osg-uk.com

CZECH, SLOVAKIA, HUNGARY

OSG Europe Logistics S.A.
Slovakia organizacna zlozka
Racianská 22/A, SK-83102 Bratislava
Slovakia
Tel. +421 24 32 91 295
Orders-osgsvk@osgeurope.com

OSG POLAND Sp. z.o.o.

Spółdzielcza 57
05-074 Halinów - Poland
Tel: +22 760 82 71
Fax: +22 760 82 71
osg@osg-poland.com

OSG GERMANY

Karl-Ehmann-Str. 25
D - 73037 Göppingen - Germany
Tel: +49 7161 6064 - 0
Fax: +49 7161 6064 - 444
info@osg-germany.de

OSG SCANDINAVIA

(For Scandinavian countries)
Langebjergvaenget 16
4000 Roskilde - Denmark
Tel: +45 46 75 65 55
Fax: +45 46 75 67 00
osg@osg-scandinavia.com

SWEDEN

Branch office of OSG SCANDINAVIA
Abrahams Gränd 8
295 35 Bromölla - Sweden
Tel: +46 40 41 22 55
Fax: +46 40 41 32 55
osg@osg-scandinavia.com

OSG IBERICA

Bekolarra 4
E - 01010 Vitoria-Gasteiz - Spain
Tel: +34 945 242 400
Fax: +34 945 228 883
osg.iberica@osg-ib.com

RUSSIA

Butlerova street, 17B, office 5069
117342 Moscow - Russia
Tel: +7 (495) 150 41 54
info@osg-russia.com

OSG TURKEY

Rami Kişla Cad.No:56 Eyüp
Istanbul 34056 - Turkey
Tel:+90 212 565 24 00
Fax: +90 212 565 44 00
info@osg-turkey.com

ROMSAN INTERNATIONAL CO. SRL

Reprezentant Exclusiv OSG
25C, Bucuresti-Magurele Street
051431 Bucuresti - România
Tel: +40 21 322 07 47
Fax: +40 21 321 56 00
romsan.int@romsan.ro

AUSTRIA

Branch office of OSG GERMANY
Messestraße 11
A-6850 Dornbirn
Tel: +49 7161 6064-0
Fax: +49 7161 6064-444
info@osg-germany.de

OSG ITALIA

Via Ferrero, 65 A/B
I - 10098 Rivoli - Italy
Tel: +39 0117705211
Fax: +39 0117705215
info@osg-italia.it

Vischer & Bolli AG

Machining and Workholding
Im Schossacher 17
CH-8600 Dübendorf
T +41 44 802 15 15
F +41 44 802 15 95
info@vb-tools.com

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