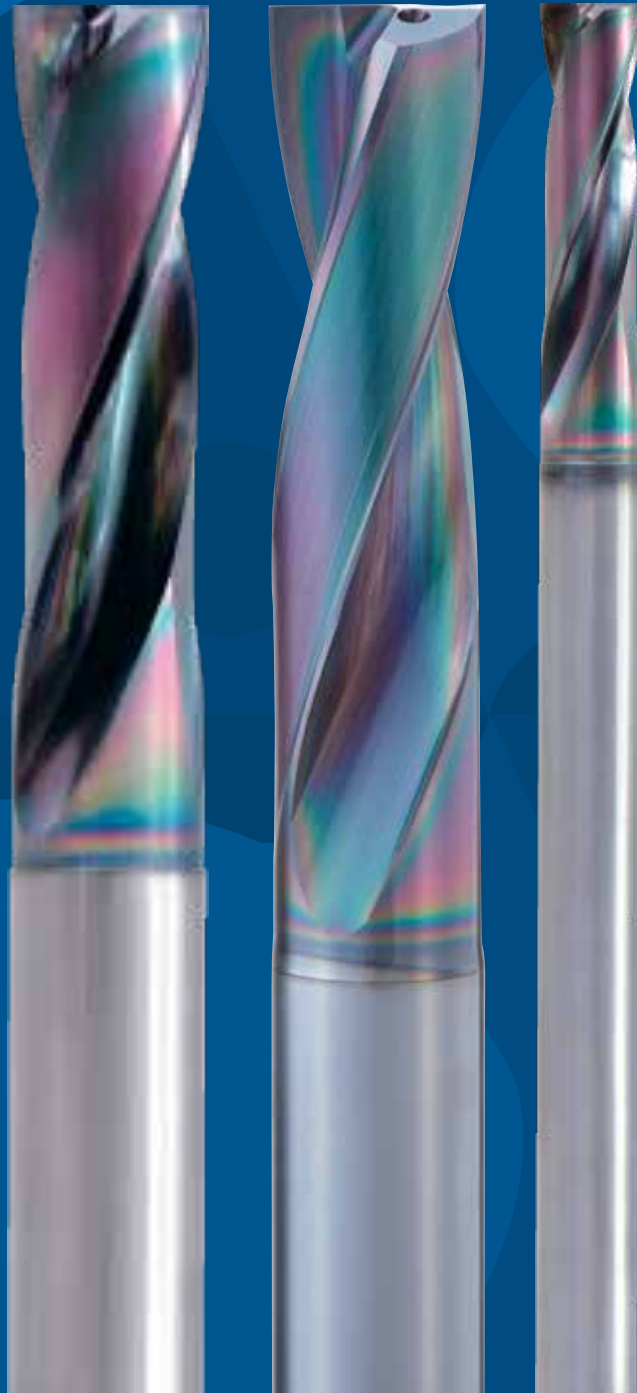




Carbide flat drills with/without internal coolant & for deep reach

# ADF(O) Series

Volume 4

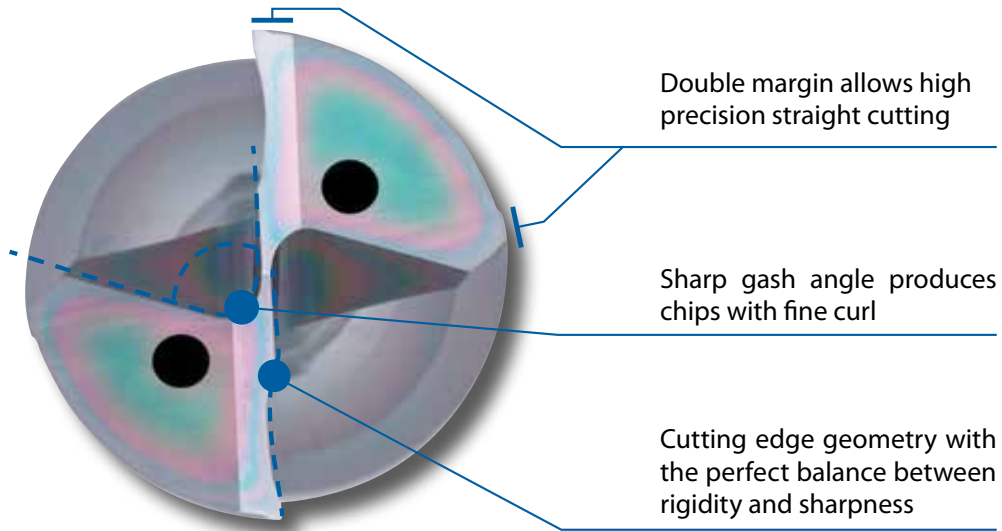


# KEY FEATURES: ADF(O) SERIES

- 
- 1 Carbide flat drill with or without internal coolant
  - 2 Designed for a wide variety of applications
  - 3 New EgiAs Coating: exceptional wear resistance & toughness
  - 4 Unique end cut geometry for stable cutting resistance
  - 5 20° helical grooves with high rigidity
  - 6 ADFLS for deep reach flat drilling application



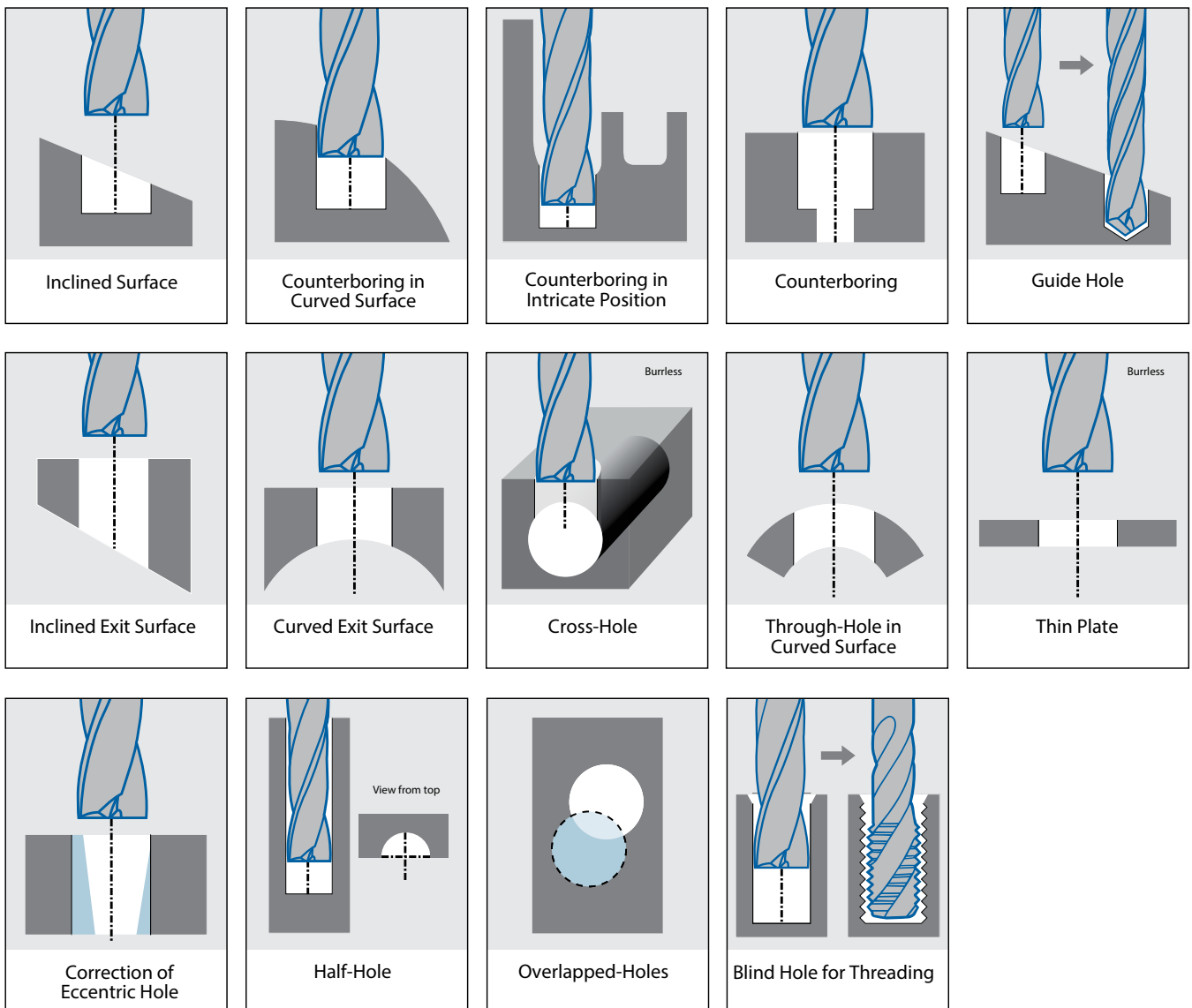
# KEY FEATURES & BENEFITS



## 1 One drill does it all

Applicable for a multitude of drilling applications such as inclined surface, curved surface, flat-bottom hole, eccentric hole, and more.

### Standard lineup for thread forming of pilot holes under M6



Radial cutting is not recommended.

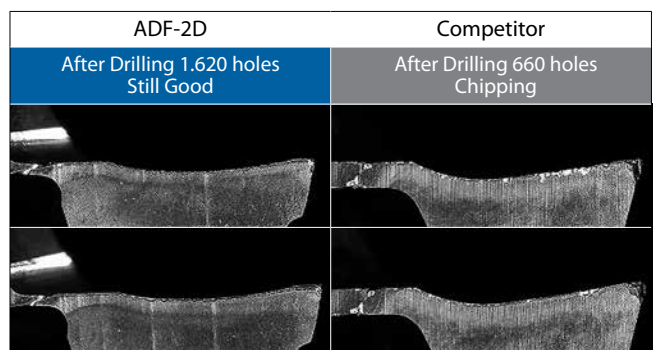
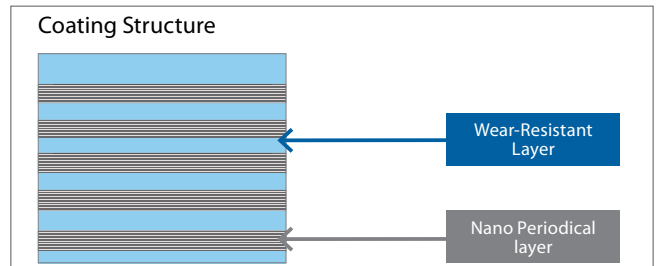
# KEY FEATURES & BENEFITS

## 2 New coating: EgiAs

### Exceptional wear resistance & toughness

Suppresses friction with the wear resistance layer; prevents breakage with the nano periodical layer.

Tool	ADF-2D Ø6
Machined Surface	(30°) Angled Surface
Work Material	S50C
Cutting Speed	75m/min (3.981 min <sup>-1</sup> )
Feed Rate	239 mm/min (0,06 mm/rev)
Depth of Hole	12 mm (Blind)
Coolant	Water Soluble
Machine	Horizontal Machining Center



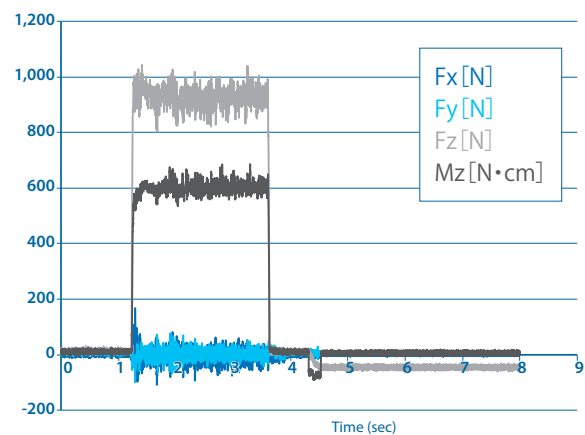
## 3 End cut geometry

### Stable cutting resistance

Unique end cut geometry reduces cutting force to enable stable machining.

Tool	ADF-2D Ø10
Machined Surface	Flat Surface
Work Material	S50C
Cutting Speed	60m/min (1.911 min <sup>-1</sup> )
Feed Rate	382 mm/min (0,2 mm/rev)
Depth of Hole	20 mm (Blind)
Coolant	Water Soluble
Machine	Vertical Machining Center

### Cutting resistance wave form

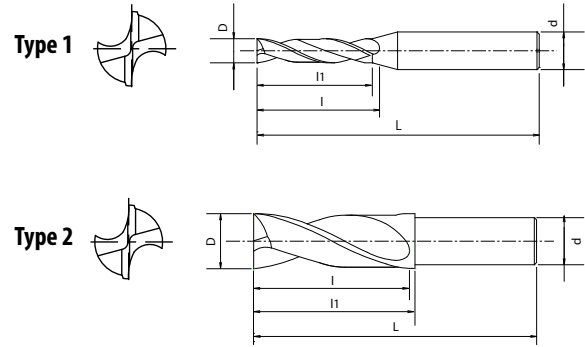


### Oversize

Mouth **0,01mm** Depth of hole **0,01mm**

# ADF-2D

Drilling | Solid carbide | Flat drills



- First choice in quality and performance
- Carbide drill with EgiAs coating
- Up to 2xD
- Flat drilling application
- 176 sizes

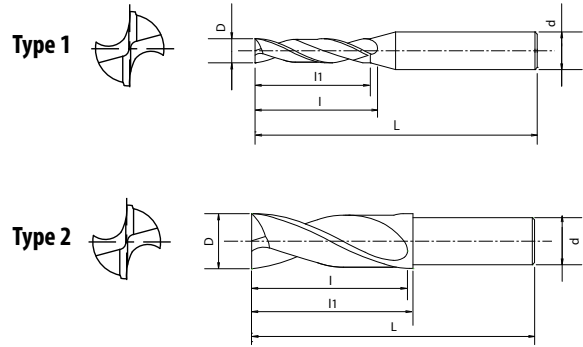


EDP	D	L	l	l1	d	Type	Price
3330200	2	50	10,3	10	4	1	
3330210	2,1	50	10,5	10	4	1	
3330220	2,2	50	11	10,6	4	1	
3330230	2,3	50	11	10,8	4	1	
3330232	2,32	50	11	10,9	4	1	
3330240	2,4	50	12	11	4	1	
3330242	2,42	50	12	11,1	4	1	
3330250	2,5	50	12	11,2	4	1	
3330254	2,54	50	12	11,3	4	1	
3330258	2,58	50	12	11,4	4	1	
3330260	2,6	50	13	11,4	4	1	
3330270	2,7	50	13	11,6	4	1	
3330276	2,76	50	13	11,7	4	1	
3330278	2,78	50	13	11,7	4	1	
3330280	2,8	50	14	11,8	4	1	
3330290	2,9	50	14	11,9	4	1	
3330300	3	55	15	11,4	6	1	
3330303	3,03	55	15	11,5	6	1	
3330310	3,1	55	15	11,6	6	1	
3330315	3,15	55	15	11,7	6	1	
3330320	3,2	55	15	11,8	6	1	
3330330	3,3	55	15	12	6	1	
3330340	3,4	55	16	12,1	6	1	
3330350	3,5	55	16	12,3	6	1	
3330353	3,53	55	16	12,4	6	1	
3330360	3,6	55	16	12,5	6	1	
3330366	3,66	55	16	12,6	6	1	
3330368	3,68	55	16	12,7	6	1	
3330370	3,7	55	16	12,7	6	1	
3330380	3,8	60	19	17,9	6	1	
3330390	3,9	60	19	18,1	6	1	
3330400	4	60	19	18,3	6	1	
3330403	4,03	60	19	18,3	6	1	
3330410	4,1	60	19	18,5	6	1	
3330420	4,2	60	21	18,6	6	1	
3330430	4,3	60	21	18,8	6	1	
3330440	4,4	60	21	19	6	1	
3330450	4,5	60	21	19,2	6	1	
3330453	4,53	60	21	19,3	6	1	
3330460	4,6	60	21	19,4	6	1	
3330462	4,62	60	21	19,4	6	1	
3330464	4,64	60	21	19,5	6	1	
3330470	4,7	60	21	19,6	6	1	
3330480	4,8	65	24,8	24	6	1	
3330490	4,9	65	24,9	24	6	1	

EDP	D	L	l	l1	d	Type	Price
3330500	5	65	25,1	24	6	1	
3330503	5,03	65	25,2	24	6	1	
3330510	5,1	65	25,3	24	6	1	
3330520	5,2	65	25,5	24	6	1	
3330530	5,3	65	25,7	24	6	1	
3330540	5,4	65	27	25,9	6	1	
3330550	5,5	65	27	26,1	6	1	
3330552	5,52	65	27	26,1	6	1	
3330554	5,54	65	27	26,1	6	1	
3330560	5,6	65	27	26,3	6	1	
3330570	5,7	65	27	26,4	6	1	
3330580	5,8	65	27	26,6	6	1	
3330590	5,9	65	27	26,8	6	1	
3330600	6	65	27	27	6	2	
3330603	6,03	70	30	32	6	2	
3330610	6,1	70	30	32	6	2	
3330620	6,2	70	30	32	6	2	
3330630	6,3	70	30	32	6	2	
3330640	6,4	70	30	32	6	2	
3330650	6,5	70	30	32	6	2	
3330653	6,53	70	30	32	6	2	
3330660	6,6	70	30	32	6	2	
3330670	6,7	70	30	32	6	2	
3330680	6,8	70	30	32	6	2	
3330690	6,9	70	30	32	6	2	
3330700	7	70	30	32	6	2	
3330703	7,03	75	34	36	6	2	
3330710	7,1	75	34	36	6	2	
3330720	7,2	75	34	36	6	2	
3330730	7,3	75	34	36	6	2	
3330740	7,4	75	34	36	6	2	
3330750	7,5	75	34	36	6	2	
3330760	7,6	75	34	36	6	2	
3330770	7,7	75	34	36	6	2	
3330780	7,8	75	34	36	6	2	
3330790	7,9	75	34	36	6	2	
3330800	8	75	34	36	8	2	
3330803	8,03	80	38	40	8	2	
3330810	8,1	80	38	40	8	2	
3330820	8,2	80	38	40	8	2	
3330830	8,3	80	38	40	8	2	
3330840	8,4	80	38	40	8	2	
3330850	8,5	80	38	40	8	2	
3330853	8,53	80	38	40	8	2	
3330860	8,6	80	38	40	8	2	

# ADF-2D

Drilling | Solid carbide | Flat drills



- First choice in quality and performance
- Carbide drill with EgiAs coating
- Up to 2xD
- Flat drilling application
- 176 sizes



Drilling | Solid carbide

Flat drills

EDP	D	L	l	l1	d	Type	Price
3330870	8,7	80	38	40	8	2	
3330880	8,8	80	38	40	8	2	
3330890	8,9	80	38	40	8	2	
3330900	9	80	38	40	8	2	
3330903	9,03	85	42	44	8	2	
3330910	9,1	85	42	44	8	2	
3330920	9,2	85	42	44	8	2	
3330930	9,3	85	42	44	8	2	
3330940	9,4	85	42	44	8	2	
3330950	9,5	85	42	44	8	2	
3330960	9,6	85	42	44	8	2	
3330970	9,7	85	42	44	8	2	
3330980	9,8	85	42	44	8	2	
3330990	9,9	85	42	44	8	2	
3331000	10	85	42	44	10	2	
3331003	10,03	90	46	48	10	2	
3331010	10,1	90	46	48	10	2	
3331020	10,2	90	46	48	10	2	
3331030	10,3	90	46	48	10	2	
3331040	10,4	90	46	48	10	2	
3331050	10,5	90	46	48	10	2	
3331060	10,6	90	46	48	10	2	
3331070	10,7	90	46	48	10	2	
3331080	10,8	90	46	48	10	2	
3331090	10,9	90	46	48	10	2	
3331100	11	90	46	48	10	2	
3331103	11,03	95	50	52	10	2	
3331110	11,1	95	50	52	10	2	
3331120	11,2	95	50	52	10	2	
3331130	11,3	95	50	52	10	2	
3331140	11,4	95	50	52	10	2	
3331150	11,5	95	50	52	10	2	
3331160	11,6	95	50	52	10	2	
3331170	11,7	95	50	52	10	2	
3331180	11,8	95	50	52	10	2	
3331190	11,9	95	50	52	10	2	
3331200	12	95	50	52	12	2	
3331203	12,03	100	56	58	12	2	
3331210	12,1	100	56	58	12	2	
3331220	12,2	100	56	58	12	2	
3331230	12,3	100	56	58	12	2	
3331240	12,4	100	56	58	12	2	
3331250	12,5	100	56	58	12	2	
3331260	12,6	100	56	58	12	2	
3331270	12,7	100	56	58	12	2	

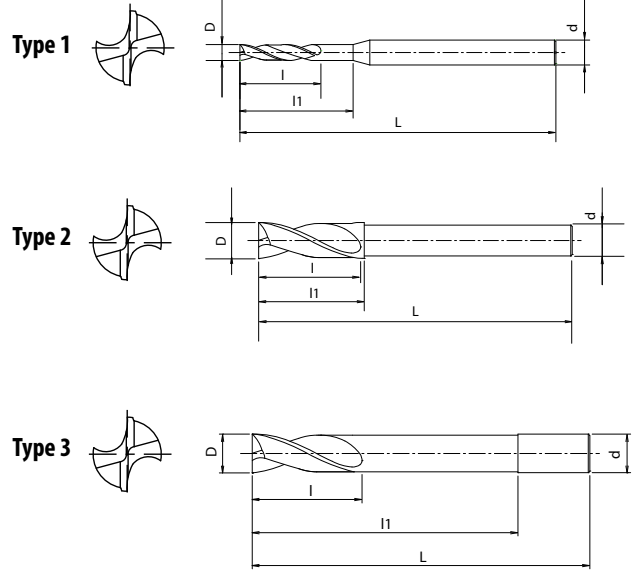
EDP	D	L	l	l1	d	Type	Price
3331280	12,8	100	56	58	12	2	
3331290	12,9	100	56	58	12	2	
3331300	13	100	56	58	12	2	
3331310	13,1	105	60	62	12	2	
3331320	13,2	105	60	62	12	2	
3331330	13,3	105	60	62	12	2	
3331340	13,4	105	60	62	12	2	
3331350	13,5	105	60	62	12	2	
3331360	13,6	105	60	62	12	2	
3331370	13,7	105	60	62	12	2	
3331380	13,8	105	60	62	12	2	
3331390	13,9	105	60	62	12	2	
3331400	14	105	60	62	12	2	
3331410	14,1	110	64	66	12	2	
3331420	14,2	110	64	66	12	2	
3331430	14,3	110	64	66	12	2	
3331440	14,4	110	64	66	12	2	
3331450	14,5	110	64	66	12	2	
3331460	14,6	110	64	66	12	2	
3331470	14,7	110	64	66	12	2	
3331480	14,8	110	64	66	12	2	
3331490	14,9	110	64	66	12	2	
3331500	15	110	64	66	12	2	
3331510	15,1	115	68	70	12	2	
3331520	15,2	115	68	70	12	2	
3331530	15,3	115	68	70	12	2	
3331540	15,4	115	68	70	12	2	
3331550	15,5	115	68	70	12	2	
3331560	15,6	115	68	70	12	2	
3331570	15,7	115	68	70	12	2	
3331580	15,8	115	68	70	12	2	
3331590	15,9	115	68	70	12	2	
3331600	16	115	68	70	16	2	
3331650	16,5	125	74	76	16	2	
3331700	17	125	74	76	16	2	
3331750	17,5	130	78	80	16	2	
3331800	18	130	78	80	16	2	
3331850	18,5	135	84	86	16	2	
3331900	19	135	84	86	16	2	
3331950	19,5	140	88	90	16	2	
3332000	20	140	88	90	20	2	

# ADFLS-2D

Drilling | Solid carbide | Flat drills



- First choice in quality and performance
- Carbide drill with EgiAs coating
- Up to 2xD
- For deep reach flat drilling application
- 64 sizes



<b>P</b> ○ C: ≤0,2%	<b>P</b> ○ C: 0,25-0,4%	<b>P</b> ○ C: ≥0,45%	<b>P</b> ○ SCM	<b>K</b> ○ GG	<b>K</b> ○ GGG	<b>N</b> ○ Al	<b>H</b> ○ 25-35 HRC	<b>H</b> ○ 35-45 HRC
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<b>A</b>	<b>CARBIDE</b>	<b>EG</b>	<b>20°</b>	<b>h8</b>
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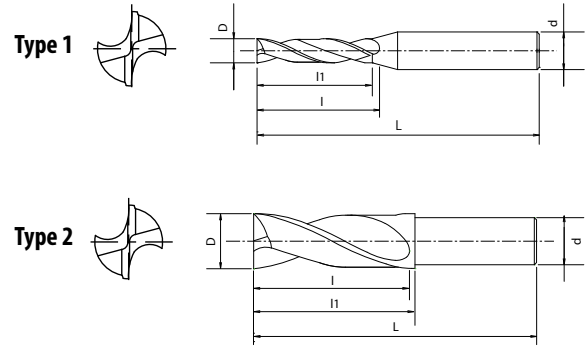
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EDP	D	L	I	I1	d	Type	Price
3332300	3	100	15	30	6	1	
3332310	3,1	100	15	31	6	1	
3332320	3,2	100	15	32	6	1	
3332330	3,3	100	15	33	6	1	
3332340	3,4	100	16	34	6	1	
3332350	3,5	100	16	35	6	1	
3332360	3,6	100	16	36	6	1	
3332370	3,7	100	16	37	6	1	
3332380	3,8	100	19	38	6	1	
3332390	3,9	100	19	39	6	1	
3332400	4	100	19	40	6	1	
3332410	4,1	100	19	41	6	1	
3332420	4,2	100	21	42	6	1	
3332430	4,3	100	21	43	6	1	
3332440	4,4	100	21	44	6	1	
3332450	4,5	100	21	45	6	1	
3332460	4,6	100	21	46	6	1	
3332470	4,7	100	21	47	6	1	
3332480	4,8	100	24	48	6	1	
3332490	4,9	100	24	49	6	1	
3332500	5	110	24	50	6	1	
3332510	5,1	110	24	51	6	1	
3332520	5,2	110	24	52	6	1	
3332530	5,3	110	24	53	6	1	
3332540	5,4	110	27	54	6	1	
3332550	5,5	110	27	55	6	1	
3332560	5,6	110	27	56	6	1	
3332570	5,7	110	27	57	6	1	
3332580	5,8	110	27	58	6	1	
3332590	5,9	110	27	59	6	1	
3332600	6	110	27	29	6	2	
3334060	6	110	27	60	6	3	
3332650	6,5	120	30	32	6	2	
3332680	6,8	120	30	32	6	2	
3332700	7	120	30	32	6	2	
3332750	7,5	130	34	36	6	2	
3332780	7,8	130	34	36	6	2	
3332800	8	130	34	36	8	2	
3334080	8	130	34	80	8	3	
3332850	8,5	140	38	40	8	2	
3332880	8,8	140	38	40	8	2	
3332900	9	140	38	40	8	2	
3332950	9,5	150	42	44	8	2	
3332980	9,8	150	42	44	8	2	
3333000	10	150	42	44	10	2	

EDP	D	L	I	I1	d	Type	Price
3334100	10	150	42	100	10	3	
3333050	10,5	160	46	48	10	2	
3333080	10,8	160	46	48	10	2	
3333100	11	160	46	48	10	2	
3333180	11,8	170	50	52	10	2	
3333200	12	170	50	52	12	2	
3334120	12	170	50	120	12	3	
3333250	12,5	180	56	58	12	2	
3333300	13	180	56	58	12	2	
3333350	13,5	190	60	62	12	2	
3333400	14	190	60	62	12	2	
3333500	15	200	64	66	12	2	
3333600	16	210	68	70	16	2	
3334160	16	210	68	160	16	3	
3333700	17	220	74	76	16	2	
3333750	17,5	230	78	80	16	2	
3333800	18	230	78	80	16	2	
3334000	20	250	88	90	20	2	
3334200	20	250	88	200	20	3	

# ADFO-3D NEW

Drilling | Solid carbide | Flat drills



- First choice in quality and performance
- Carbide drill with internal coolant, EgiAs coating
- Up to 3xD
- Flat drilling application
- 160 sizes

<b>P</b> C: ≤0,2%	<b>P</b> C: 0,25-0,4%	<b>P</b> C: ≥0,45%	<b>P</b> SCM	<b>M</b> INOX	<b>K</b> GG	<b>K</b> GGG	<b>N</b> Al	<b>N</b> AC,ADC	<b>H</b> 25-35 HRC	<b>H</b> 35-45 HRC	<b>H</b> 45-52 HRC
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<b>A</b>	<b>CARBIDE</b>	<b>EG</b>	<b>20°</b>	<b>SHRINK FIT</b>	<b>h8</b>
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Drilling | Solid carbide

Flat drills

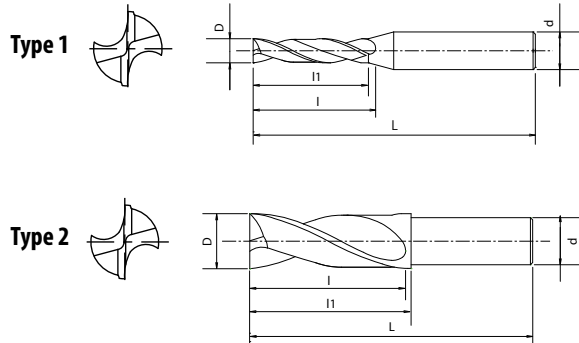
EDP	D	L	l	l1	d	Type	Price
3334300	3	55	16	15	4	1	
3334301	3.03	55	16	15	4	1	
3334302	3.1	55	16	15	4	1	
3334303	3.15	55	16	15	4	1	
3334304	3.2	55	16	15	4	1	
3334305	3.3	55	16	15	4	1	
3334306	3.4	55	17	16	4	1	
3334307	3.5	55	17	16	4	1	
3334308	3.53	55	17	16	4	1	
3334309	3.6	55	17	16	4	1	
3334310	3.66	55	17	16	4	1	
3334311	3.68	55	17	16	4	1	
3334312	3.7	55	17	16	4	1	
3334313	3.8	60	20	19	4	1	
3334314	3.9	60	20	19	4	1	
3334315	4	60	20	19	4	2	
3334316	4.03	60	22	21	6	1	
3334317	4.1	60	22	21	6	1	
3334318	4.2	60	22	21	6	1	
3334319	4.3	60	22	21	6	1	
3334320	4.4	60	22	21	6	1	
3334321	4.5	60	22	21	6	1	
3334322	4.53	60	21	21	6	1	
3334323	4.6	60	21	21	6	1	
3334324	4.62	60	21	21	6	1	
3334325	4.64	60	21	21	6	1	
3334326	4.7	60	21	21	6	1	
3334327	4.8	65	24	24	6	1	
3334328	4.9	65	24	24	6	1	
3334329	5	65	24	24	6	1	
3334330	5.03	65	24	24	6	1	
3334331	5.1	65	24	24	6	1	
3334332	5.2	65	24	24	6	1	
3334333	5.3	65	24	24	6	1	
3334334	5.4	65	27	27	6	1	
3334335	5.5	65	27	27	6	1	
3334336	5.52	65	27	27	6	1	
3334337	5.54	65	27	27	6	1	
3334338	5.6	65	27	27	6	1	
3334339	5.7	65	27	27	6	1	
3334340	5.8	65	27	27	6	1	
3334341	5.9	65	27	27	6	1	
3334342	6	65	27	27	6	2	
3334343	6.03	70	30	30	8	1	
3334344	6,1	70	30	30	8	1	

EDP	D	L	l	l1	d	Type	Price
3334345	6.2	70	31	30	8	1	
3334346	6.3	70	31	30	8	1	
3334347	6.4	70	31	30	8	1	
3334348	6.5	70	31	30	8	1	
3334349	6.53	70	31	30	8	1	
3334350	6.6	70	31	30	8	1	
3334351	6.7	70	31	30	8	1	
3334352	6.8	70	31	30	8	1	
3334353	6.9	70	31	30	8	1	
3334354	7	70	31	30	8	1	
3334355	7.03	70	31	30	8	1	
3334356	7.1	75	35	34	8	1	
3334357	7.2	75	35	34	8	1	
3334358	7.3	75	35	34	8	1	
3334359	7.4	75	35	34	8	1	
3334360	7.5	75	35	34	8	1	
3334361	7.6	75	35	34	8	1	
3334362	7.7	75	35	34	8	1	
3334363	7.8	75	35	34	8	1	
3334364	7.9	75	35	34	8	1	
3334365	8	75	35	34	8	2	
3334366	8.03	80	39	38	10	1	
3334367	8.1	80	39	38	10	1	
3334368	8.2	80	39	38	10	1	
3334369	8.3	80	39	38	10	1	
3334370	8.4	80	39	38	10	1	
3334371	8.5	80	39	38	10	1	
3334372	8.53	80	39	38	10	1	
3334373	8.6	80	39	38	10	1	
3334374	8.7	80	39	38	10	1	
3334375	8.8	80	39	38	10	1	
3334376	8.9	80	39	38	10	1	
3334377	9	80	39	38	10	1	
3334378	9.03	80	39	38	10	1	
3334379	9.1	85	43	42	10	1	
3334380	9.2	85	43	42	10	1	
3334381	9.3	85	43	42	10	1	
3334382	9.4	85	43	42	10	1	
3334383	9.5	85	43	42	10	1	
3334384	9.6	85	43	42	10	1	
3334385	9.7	85	43	42	10	1	
3334386	9.8	85	43	42	10	1	
3334387	9.9	85	43	42	10	1	
3334388	10	85	43	42	10	2	
3334389	10.03	90	47	46	12	1	



# ADFO-3D NEW

Drilling | Solid carbide | Flat drills



- First choice in quality and performance
- Carbide drill with internal coolant, EgiAs coating
- Up to 3xD
- Flat drilling application
- 160 sizes

<b>P</b> C: ≤0,2%	<b>P</b> C: 0,25-0,4%	<b>P</b> C: ≥0,45%	<b>P</b> SCM	<b>M</b> INOX	<b>K</b> GG	<b>K</b> GGG	<b>N</b> Al	<b>N</b> AC,ADC	<b>H</b> 25-35 HRC	<b>H</b> 35-45 HRC	<b>H</b> 45-52 HRC
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<b>A</b>	<b>CARBIDE</b>	<b>EG</b>	<b>20°</b>	<b>SHRINK FIT</b>	<b>h8</b>
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EDP	D	L	l	l1	d	Type	Price
3334390	10.1	90	47	46	12	1	
3334391	10.2	90	47	46	12	1	
3334392	10.3	90	47	46	12	1	
3334393	10.4	90	47	46	12	1	
3334394	10.5	90	47	46	12	1	
3334395	10.6	90	47	46	12	1	
3334396	10.7	90	47	46	12	1	
3334397	10.8	90	47	46	12	1	
3334398	10.9	90	47	46	12	1	
3334399	11	90	47	46	12	1	
3334400	11.03	90	47	46	12	1	
3334401	11.1	95	51	50	12	1	
3334402	11.2	95	51	50	12	1	
3334403	11.3	95	51	50	12	1	
3334404	11.4	95	51	50	12	1	
3334405	11.5	95	51	50	12	1	
3334406	11.6	95	51	50	12	1	
3334407	11.7	95	51	50	12	1	
3334408	11.8	95	51	50	12	1	
3334409	11.9	95	51	50	12	1	
3334410	12	95	51	50	12	2	
3334411	12.03	100	57	56	14	1	
3334412	12.1	100	57	56	14	1	
3334413	12.2	100	57	56	14	1	
3334414	12.3	100	57	56	14	1	
3334415	12.4	100	57	56	14	1	
3334416	12.5	100	57	56	14	1	
3334417	12.6	100	57	56	14	1	
3334418	12.7	100	57	56	14	1	
3334419	12.8	100	57	56	14	1	
3334420	12.9	100	57	56	14	1	
3334421	13	100	57	56	14	1	
3334422	13.1	105	61	60	14	1	
3334423	13.2	105	61	60	14	1	
3334424	13.3	105	61	60	14	1	
3334425	13.4	105	61	60	14	1	
3334426	13.5	105	61	60	14	1	
3334427	13.6	105	61	60	14	1	
3334428	13.7	105	61	60	14	1	
3334429	13.8	105	61	60	14	1	
3334430	13.9	105	61	60	14	1	
3334431	14	105	61	60	14	2	
3334432	14.1	110	65	64	16	1	
3334433	14.2	110	65	64	16	1	
3334434	14.3	110	65	64	16	1	

EDP	D	L	l	l1	d	Type	Price
3334435	14.4	110	65	64	16	1	
3334436	14.5	110	65	64	16	1	
3334437	14.6	110	65	65	16	1	
3334438	14.7	110	65	65	16	1	
3334439	14.8	110	65	65	16	1	
3334440	14.9	110	65	65	16	1	
3334441	15	110	65	65	16	1	
3334442	15.1	115	69	69	16	1	
3334443	15.2	115	69	69	16	1	
3334444	15.3	115	69	69	16	1	
3334445	15.4	115	69	69	16	1	
3334446	15.5	115	69	69	16	1	
3334447	15.6	115	69	69	16	1	
3334448	15.7	115	69	69	16	1	
3334449	15.8	115	69	69	16	1	
3334450	15.9	115	69	69	16	1	
3334451	16	115	69	69	16	2	
3334452	16.5	125	75	75	18	1	
3334453	17	125	75	75	18	1	
3334454	17.5	130	79	79	18	1	
3334455	18	130	79	79	18	2	
3334456	18.5	135	85	85	20	1	
3334457	19	135	85	85	20	1	
3334458	19.5	140	89	88	20	1	
3334459	20	140	89	88	20	2	

Drilling | Solid carbide  
Flat drills

# CUTTING CONDITIONS

Drilling | Solid | Cutting conditions

## ADF-2D

Vc	Low Carbon Steel - Alloy Steel (C<0.3%) SS400 • SCM ~710N/mm <sup>2</sup>		Carbon Steel S35C • S50C ~210HB ~710N/mm <sup>2</sup>		Alloy Steel SCM • SCr • SNCM 28~35HRC 900~1,100N/mm <sup>2</sup>		Plastic Mold Steel NAK80 ~40HRC		Special Alloy Steel-Hardened Steel-Pre-hardened steel SKD61 ~50HRC	
	60~100m/min		60~100m/min		30~90m/min		20~40m/min		20~30m/min	
Ø	Speed (min <sup>-1</sup> )	Feed Rate (mm/rev.)	Speed (min <sup>-1</sup> )	Feed Rate (mm/rev.)	Speed (min <sup>-1</sup> )	Feed Rate (mm/rev.)	Speed (min <sup>-1</sup> )	Feed Rate (mm/rev.)	Speed (min <sup>-1</sup> )	Feed Rate (mm/rev.)
2	12.700	0,01 ~ 0,06	12.700	0,01 ~ 0,06	9.550	0,01 ~ 0,06	4.750	0,01 ~ 0,04	4.000	0,01 ~ 0,03
3	8.500	0,015 ~ 0,09	8.500	0,015 ~ 0,09	6.350	0,015 ~ 0,09	3.200	0,015 ~ 0,06	2.650	0,015 ~ 0,045
4	6.350	0,02 ~ 0,12	6.350	0,02 ~ 0,12	4.750	0,02 ~ 0,12	2.400	0,02 ~ 0,08	2.000	0,02 ~ 0,06
6	4.250	0,03 ~ 0,18	4.250	0,03 ~ 0,18	3.200	0,03 ~ 0,18	1.600	0,03 ~ 0,12	1.350	0,03 ~ 0,09
8	3.200	0,04 ~ 0,24	3.200	0,04 ~ 0,24	2.400	0,04 ~ 0,24	1.200	0,04 ~ 0,16	1.000	0,04 ~ 0,12
10	2.550	0,05 ~ 0,3	2.550	0,05 ~ 0,3	1.900	0,05 ~ 0,3	950	0,05 ~ 0,2	800	0,05 ~ 0,15
12	2.100	0,06 ~ 0,3	2.100	0,06 ~ 0,3	1.600	0,06 ~ 0,3	800	0,06 ~ 0,24	650	0,06 ~ 0,18
14	1.800	0,07 ~ 0,35	1.800	0,07 ~ 0,35	1.350	0,07 ~ 0,35	700	0,07 ~ 0,28	550	0,07 ~ 0,21
16	1.600	0,08 ~ 0,36	1.600	0,08 ~ 0,36	1.200	0,08 ~ 0,36	600	0,08 ~ 0,32	500	0,08 ~ 0,24
18	1.400	0,09 ~ 0,38	1.400	0,09 ~ 0,38	1.050	0,09 ~ 0,38	550	0,09 ~ 0,36	450	0,09 ~ 0,27
20	1.250	0,1 ~ 0,4	1.250	0,1 ~ 0,4	950	0,1 ~ 0,4	500	0,1 ~ 0,4	400	0,1 ~ 0,3

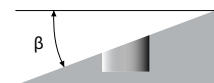
Vc	Cast Iron FC250 ~350N/mm <sup>2</sup>		Ductile Cast Iron FCD600 400~600N/mm <sup>2</sup>		Aluminium A5052 • A7075 ~350N/mm <sup>2</sup>		Aluminium Alloy AC4C • ADC 400~600N/mm <sup>2</sup>	
	60~120m/min		50~80m/min		80~200m/min		80~200m/min	
Ø	Speed (min <sup>-1</sup> )	Feed Rate (mm/rev.)	Speed (min <sup>-1</sup> )	Feed Rate (mm/rev.)	Speed (min <sup>-1</sup> )	Feed Rate (mm/rev.)	Speed (min <sup>-1</sup> )	Feed Rate (mm/rev.)
2	14.300	0,01 ~ 0,06	10.350	0,01 ~ 0,06	22.300	0,01 ~ 0,06	22.300	0,01 ~ 0,06
3	9.550	0,015 ~ 0,09	6.900	0,015 ~ 0,09	14.850	0,015 ~ 0,09	14.850	0,015 ~ 0,09
4	7.150	0,02 ~ 0,12	5.150	0,02 ~ 0,12	11.150	0,02 ~ 0,12	11.150	0,02 ~ 0,12
6	4.750	0,03 ~ 0,18	3.450	0,03 ~ 0,18	7.450	0,03 ~ 0,18	7.450	0,03 ~ 0,18
8	3.600	0,04 ~ 0,24	2.600	0,04 ~ 0,24	5.550	0,04 ~ 0,24	5.550	0,04 ~ 0,24
10	2.850	0,05 ~ 0,3	2.050	0,05 ~ 0,3	4.450	0,05 ~ 0,3	4.450	0,05 ~ 0,3
12	2.400	0,06 ~ 0,3	1.700	0,06 ~ 0,3	3.700	0,06 ~ 0,36	3.700	0,06 ~ 0,36
14	2.050	0,07 ~ 0,35	1.500	0,07 ~ 0,35	3.200	0,07 ~ 0,42	3.200	0,07 ~ 0,42
16	1.800	0,08 ~ 0,36	1.300	0,08 ~ 0,36	2.800	0,08 ~ 0,48	2.800	0,08 ~ 0,48
18	1.600	0,09 ~ 0,38	1.150	0,09 ~ 0,38	2.500	0,09 ~ 0,54	2.500	0,09 ~ 0,54
20	1.450	0,1 ~ 0,4	1.050	0,1 ~ 0,4	2.250	0,1 ~ 0,6	2.250	0,1 ~ 0,6

## ADFLS-2D

Vc	Low Carbon Steel - Alloy Steel (C<0.3%) SS400 • SCM ~710N/mm <sup>2</sup>		Carbon Steel S35C • S50C ~210HB ~710N/mm <sup>2</sup>		Alloy Steel SCM • SCr • SNCM 28~35HRC 900~1,100N/mm <sup>2</sup>		Plastic Mold Steel NAK80 ~40HRC		Special Alloy Steel-Hardened Steel-Pre-hardened steel SKD61 ~50HRC	
	60~100m/min		60~100m/min		30~90m/min		20~40m/min		20~30m/min	
Ø	Speed (min <sup>-1</sup> )	Feed Rate (mm/rev.)	Speed (min <sup>-1</sup> )	Feed Rate (mm/rev.)	Speed (min <sup>-1</sup> )	Feed Rate (mm/rev.)	Speed (min <sup>-1</sup> )	Feed Rate (mm/rev.)	Speed (min <sup>-1</sup> )	Feed Rate (mm/rev.)
3	8.500	0,045 ~ 0,075	8.500	0,045 ~ 0,075	6.350	0,045 ~ 0,075	3.200	0,045 ~ 0,06	2.650	0,03 ~ 0,06
4	6.350	0,06 ~ 0,1	6.350	0,06 ~ 0,1	4.750	0,06 ~ 0,1	2.400	0,06 ~ 0,08	2.000	0,04 ~ 0,08
6	4.250	0,09 ~ 0,15	4.250	0,09 ~ 0,15	3.200	0,09 ~ 0,15	1.600	0,09 ~ 0,12	1.350	0,06 ~ 0,12
8	3.200	0,12 ~ 0,2	3.200	0,12 ~ 0,2	2.400	0,12 ~ 0,2	1.200	0,12 ~ 0,16	1.000	0,08 ~ 0,16
10	2.550	0,15 ~ 0,25	2.550	0,15 ~ 0,25	1.900	0,15 ~ 0,25	950	0,15 ~ 0,2	800	0,1 ~ 0,2
12	2.100	0,18 ~ 0,3	2.100	0,18 ~ 0,3	1.600	0,18 ~ 0,3	800	0,18 ~ 0,24	650	0,12 ~ 0,24
14	1.800	0,21 ~ 0,35	1.800	0,21 ~ 0,35	900	0,21 ~ 0,35	700	0,21 ~ 0,28	550	0,14 ~ 0,28
16	1.600	0,24 ~ 0,4	1.600	0,24 ~ 0,4	800	0,24 ~ 0,4	600	0,24 ~ 0,32	500	0,16 ~ 0,32
18	1.400	0,27 ~ 0,45	1.400	0,27 ~ 0,45	700	0,27 ~ 0,45	550	0,27 ~ 0,36	450	0,18 ~ 0,36
20	1.250	0,3 ~ 0,5	1.250	0,3 ~ 0,5	650	0,3 ~ 0,5	500	0,3 ~ 0,4	400	0,2 ~ 0,4

Vc	Cast Iron FC250 ~350N/mm <sup>2</sup>		Ductile Cast Iron FCD600 400~600N/mm <sup>2</sup>		Aluminium A5052 • A7075 ~350N/mm <sup>2</sup>		Aluminium Alloy AC4C • ADC 400~600N/mm <sup>2</sup>	
	60~120m/min		50~80m/min		80~200m/min		80~200m/min	
Ø	Speed (min <sup>-1</sup> )	Feed Rate (mm/rev.)	Speed (min <sup>-1</sup> )	Feed Rate (mm/rev.)	Speed (min <sup>-1</sup> )	Feed Rate (mm/rev.)	Speed (min <sup>-1</sup> )	Feed Rate (mm/rev.)
3	9.550	0,06 ~ 0,09	6.900	0,06 ~ 0,09	14.850	0,015 ~ 0,09	14.850	0,015 ~ 0,09
4	7.150	0,08 ~ 0,12	5.150	0,08 ~ 0,12	11.150	0,02 ~ 0,12	11.150	0,02 ~ 0,12
6	4.750	0,12 ~ 0,18	3.450	0,12 ~ 0,18	7.450	0,03 ~ 0,18	7.450	0,03 ~ 0,18
8	3.600	0,16 ~ 0,24	2.600	0,16 ~ 0,24	5.550	0,04 ~ 0,24	5.550	0,04 ~ 0,24
10	2.850	0,2 ~ 0,3	2.050	0,2 ~ 0,3	4.450	0,05 ~ 0,3	4.450	0,05 ~ 0,3
12	2.400	0,24 ~ 0,36	1.700	0,24 ~ 0,36	3.700	0,06 ~ 0,36	3.700	0,06 ~ 0,36
14	2.050	0,28 ~ 0,42	1.500	0,28 ~ 0,42	3.200	0,07 ~ 0,42	3.200	0,07 ~ 0,42
16	1.800	0,32 ~ 0,48	1.300	0,32 ~ 0,48	2.800	0,08 ~ 0,48	2.800	0,08 ~ 0,48
18	1.600	0,36 ~ 0,54	1.150	0,36 ~ 0,54	2.500	0,09 ~ 0,54	2.500	0,09 ~ 0,54
20	1.450	0,4 ~ 0,6	1.050	0,4 ~ 0,6	2.250	0,1 ~ 0,6	2.250	0,1 ~ 0,6

- To process flat surfaces, prior Centre-drilling with a larger diameter is required.
- Water-soluble coolant may be applied as noted in the above table only under the premise that the work surface has been flattened by milling.
- When using non-water soluble oil or water-emulsifiable (over 20 times dilution), reduce cutting speed by 30%.
- Use a rigid and precise machine and holder.
- Please minimize tool hang over as much as possible during machining.
- Adjust the rotational speed and the feed rate in accordance with conditions such as the machining shape, machine rigidity, or work holding.
- Please set up the drill so that the runout of the cutting edge is under 0.01 mm.
- When machining an inclined plane, adjust the rotational speed and the feed rate in accordance with the angle of the incline (β).
  - When the machining incline angle(β) is less than 30°, please reduce the feed to 40~60%.
  - When the machining incline angle(β) is over 30°, please reduce the speed to 60~80%, the feed to 20~40%.
- Please use step drilling in pilot holes to improve cutting chip separation.
- If it is necessary to ensure the locating precision of the hole to be machined, adjust the rotational speed and the feed rate as indicated above (in accordance with the machining precision requirement).



Drilling | Solid carbide

Cutting conditions

# CUTTING CONDITIONS

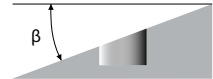
Drilling | Solid | Cutting conditions

## ADFO-3D

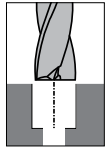
Vc	Low Carbon Steel - Alloy Steel (C<0.3%) SS400 • SCM ~710N/mm <sup>2</sup>		Carbon Steel S35C • S50C ~210HB ~710N/mm <sup>2</sup>		Alloy Steel SCM • SCr • SNCM 28~35HRC 900~1,100N/mm <sup>2</sup>		Plastic Mold Steel NAK80 ~40HRC		Stainless Steel SUS304 480~800N/mm <sup>2</sup>	
	80~120m/min		80~120m/min		50~90m/min		20~40m/min		40~60m/min	
Ø	Speed (min <sup>-1</sup> )	Feed Rate (mm/rev.)	Speed (min <sup>-1</sup> )	Feed Rate (mm/rev.)	Speed (min <sup>-1</sup> )	Feed Rate (mm/rev.)	Speed (min <sup>-1</sup> )	Feed Rate (mm/rev.)	Speed (min <sup>-1</sup> )	Feed Rate (mm/rev.)
3	10.600	0,045 ~ 0,09	10.600	0,045 ~ 0,09	7.450	0,045 ~ 0,09	3.200	0,045 ~ 0,09	5.300	0,045 ~ 0,09
4	8.000	0,045 ~ 0,12	8.000	0,045 ~ 0,12	5.550	0,045 ~ 0,12	2.400	0,045 ~ 0,12	4.000	0,045 ~ 0,12
6	5.300	0,06 ~ 0,18	5.300	0,06 ~ 0,18	3.700	0,06 ~ 0,18	1.600	0,06 ~ 0,18	2.650	0,06 ~ 0,18
8	4.000	0,08 ~ 0,24	4.000	0,08 ~ 0,24	2.800	0,08 ~ 0,24	1.200	0,08 ~ 0,24	2.000	0,08 ~ 0,24
10	3.200	0,10 ~ 0,30	3.200	0,10 ~ 0,30	2.250	0,10 ~ 0,30	950	0,10 ~ 0,30	1.600	0,10 ~ 0,30
12	2.650	0,12 ~ 0,36	2.650	0,12 ~ 0,36	1.850	0,12 ~ 0,36	800	0,12 ~ 0,36	1.350	0,12 ~ 0,36
14	2.250	0,14 ~ 0,42	2.250	0,14 ~ 0,42	1.600	0,14 ~ 0,42	700	0,14 ~ 0,42	1.150	0,14 ~ 0,42
16	2.000	0,16 ~ 0,48	2.000	0,16 ~ 0,48	1.400	0,16 ~ 0,48	600	0,16 ~ 0,48	1.000	0,16 ~ 0,48
18	1.750	0,18 ~ 0,54	1.750	0,18 ~ 0,54	1.250	0,18 ~ 0,54	550	0,18 ~ 0,54	900	0,18 ~ 0,54
20	1.600	0,20 ~ 0,60	1.600	0,20 ~ 0,60	1.100	0,20 ~ 0,60	500	0,20 ~ 0,60	800	0,20 ~ 0,60

Vc	Cast Iron FC250 ~350N/mm <sup>2</sup>		Ductile Cast Iron FCD600 400~600N/mm <sup>2</sup>		Aluminium A5052 • A7075 ~350N/mm <sup>2</sup>		Aluminium Alloy AC4C • ADC 400~600N/mm <sup>2</sup>	
	80~120m/min		60~100m/min		120~200m/min		120~200m/min	
Ø	Speed (min <sup>-1</sup> )	Feed Rate (mm/rev.)	Speed (min <sup>-1</sup> )	Feed Rate (mm/rev.)	Speed (min <sup>-1</sup> )	Feed Rate (mm/rev.)	Speed (min <sup>-1</sup> )	Feed Rate (mm/rev.)
3	10.600	0,045 ~ 0,09	8.500	0,045 ~ 0,09	17.000	0,045 ~ 0,09	17.000	0,045 ~ 0,09
4	8.000	0,045 ~ 0,12	6.350	0,045 ~ 0,12	12.750	0,045 ~ 0,12	12.750	0,045 ~ 0,12
6	5.300	0,06 ~ 0,18	4.250	0,06 ~ 0,18	8.500	0,06 ~ 0,18	8.500	0,06 ~ 0,18
8	4.000	0,08 ~ 0,24	3.200	0,08 ~ 0,24	6.350	0,08 ~ 0,24	6.350	0,08 ~ 0,24
10	3.200	0,10 ~ 0,30	2.550	0,10 ~ 0,30	5.100	0,10 ~ 0,30	5.100	0,10 ~ 0,30
12	2.650	0,12 ~ 0,36	2.100	0,12 ~ 0,36	4.250	0,12 ~ 0,36	4.250	0,12 ~ 0,36
14	2.250	0,14 ~ 0,42	1.800	0,14 ~ 0,42	3.650	0,14 ~ 0,42	3.650	0,14 ~ 0,42
16	2.000	0,16 ~ 0,48	1.600	0,16 ~ 0,48	3.200	0,16 ~ 0,48	3.200	0,16 ~ 0,48
18	1.750	0,18 ~ 0,54	1.400	0,18 ~ 0,54	2.850	0,18 ~ 0,54	2.850	0,18 ~ 0,54
20	1.600	0,20 ~ 0,60	1.250	0,20 ~ 0,60	2.550	0,20 ~ 0,60	2.550	0,20 ~ 0,60

- Water-soluble coolant may be applied as noted in the above table only under the premise that the work surface has been flattened by milling.
- Use a rigid and precise machine and holder.
- Please minimize overhang length as much as possible during machining.
- Adjust the rotational speed and the feed in accordance with conditions such as the machining shape, machine rigidity, or work holding.
- Please set up the drill so that the runout of the cutting edge is under 0.02 mm.
- Please select a cutting fluid that is most suitable for the work material with minimal smoke formation.
- In the case of dry machining, please use air blow to remove chips to prevent clogging.  
Please do not machine stainless steel dry.
- When machining an inclined plane, adjust the rotational speed and the feed in accordance with the angle of the incline (β).  
When the machining incline angle (β) is less than 30°, please reduce the feed to 40-60%.  
When the machining incline angle (β) is over 30°, please reduce the speed to 60-80%, the feed to 20-40%.
- Please use step drilling in pilot holes to improve cutting chip separation.
- If it is necessary to ensure the locating precision of the hole to be machined, adjust the rotational speed and the feed as indicated above (in accordance with the machining precision requirement).
- 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.

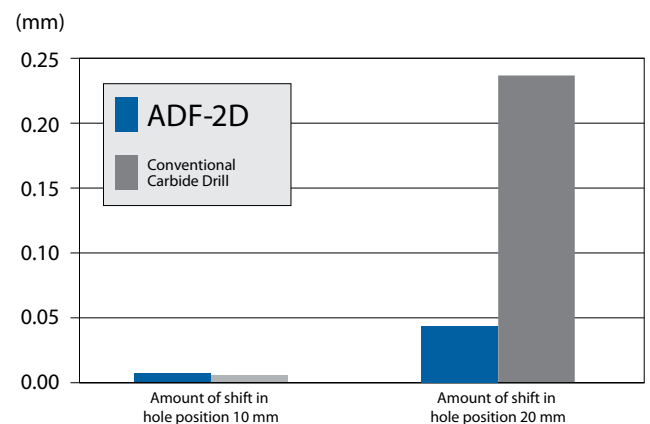
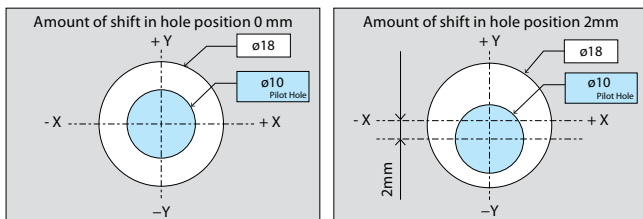


## Counterboring

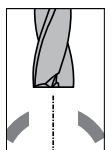


Tool	ADF-2D Ø18
Machined Surface	Flat Surface
Work Material	FC250
Cutting Speed	75m/min (1.327 min <sup>-1</sup> )
Feed Rate	133 mm/min (0,1 mm/rev)
Depth of Hole	34 mm (blind)
Coolant	Water soluble
Machine	Horizontal Machining Center

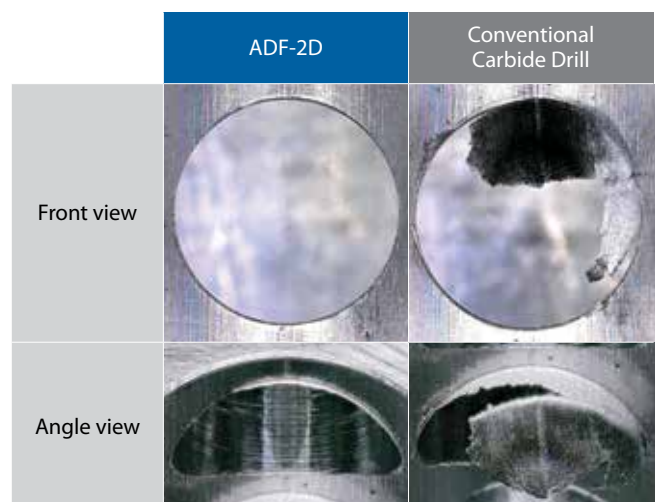
### ■ Shift length in hole position



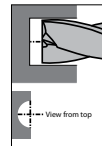
## Through-hole in curved surface



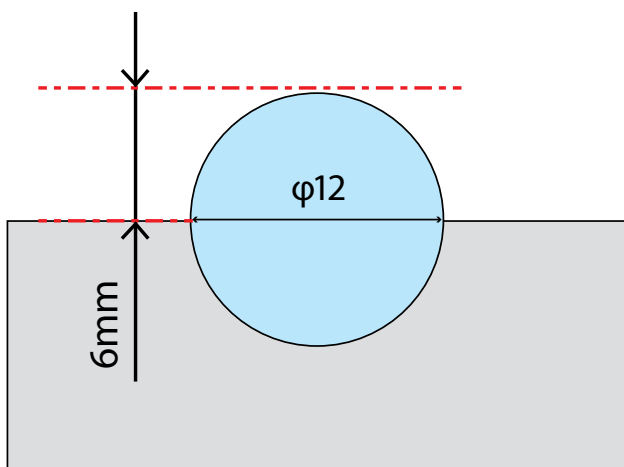
Tool	ADF-2D Ø6
Machined Surface	Flat Surface - Curved Surface
Work Material	S50C
Cutting Speed	75m/min (3.981 min <sup>-1</sup> )
Feed Rate	398 mm/min (0,1 mm/rev)
Depth of Hole	15 mm (Through)
Coolant	Water Soluble
Machine	Horizontal Machining Center



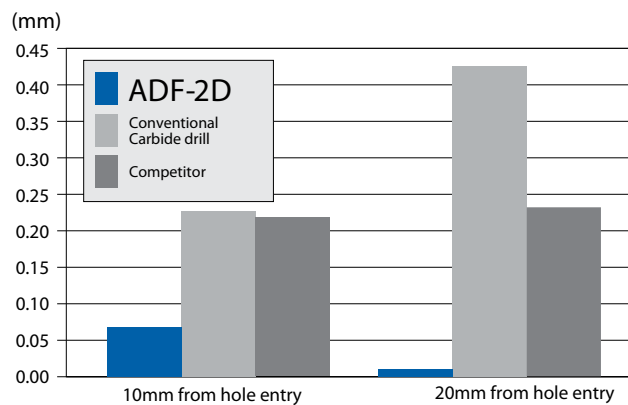
## Half-hole



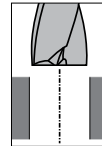
Tool	ADF-2D Ø12
Machined surface	Flat Surface
Work Material	S50C
Cutting Speed	37m/min (982 min <sup>-1</sup> )
Feed Rate	157 mm/min (0,16 mm/rev)
Depth of Hole	24 mm (Blind)
Coolant	Water Soluble
Machine	Horizontal Machining Center



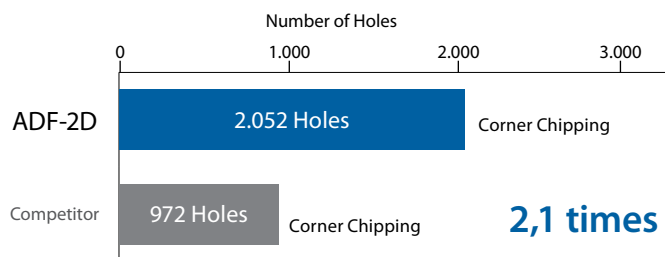
■ Fallen amount (based on the value of 1mm for hole entry)



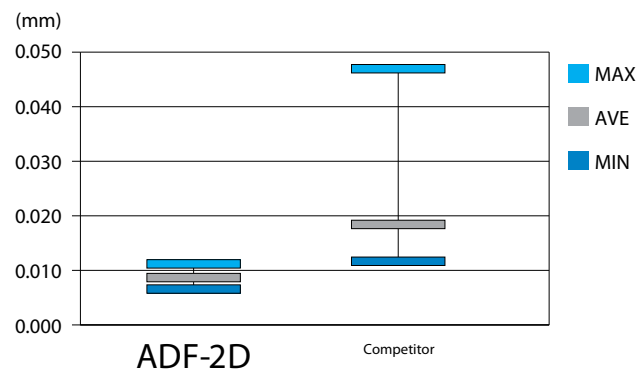
## Flat surface



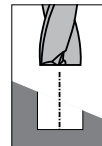
<b>Tool</b>	ADF-2D Ø10
<b>Machined Surface</b>	Flat Surface
<b>Work Material</b>	S50C
<b>Cutting Speed</b>	75m/min (2.387 min <sup>-1</sup> )
<b>Feed Rate</b>	430 mm/min (0,18 mm/rev)
<b>Depth of Hole</b>	20 mm (Through)
<b>Coolant</b>	Water Soluble
<b>Machine</b>	Horizontal Machining Center



### ■ Oversize

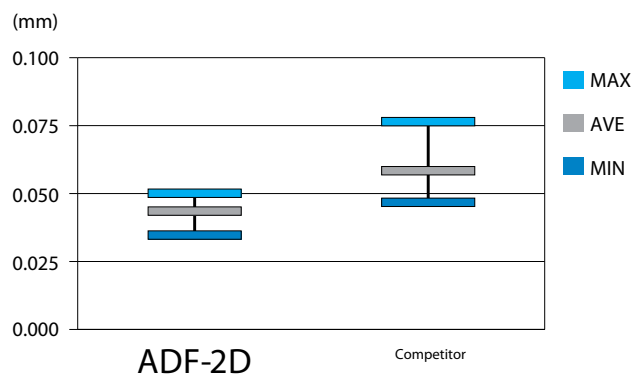
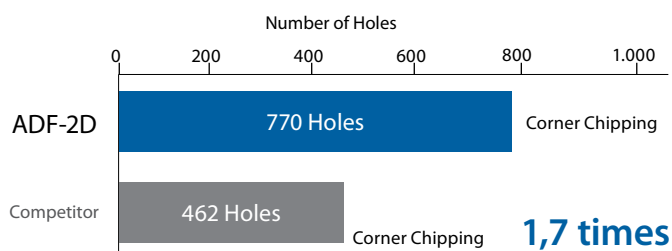


## Inclined Surface

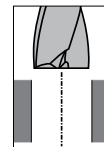


<b>Tool</b>	ADF-2D Ø10
<b>Machined Surface</b>	Angled Surface
<b>Work Material</b>	SCM440(30HRC)
<b>Cutting Speed</b>	60m/min (1.910 min <sup>-1</sup> )
<b>Feed Rate</b>	191 mm/min (0,1 mm/rev)
<b>Depth of Hole</b>	20 mm (Blind)
<b>Coolant</b>	Water Soluble
<b>Machine</b>	Horizontal Machining Center

### ■ Shift length in hole position



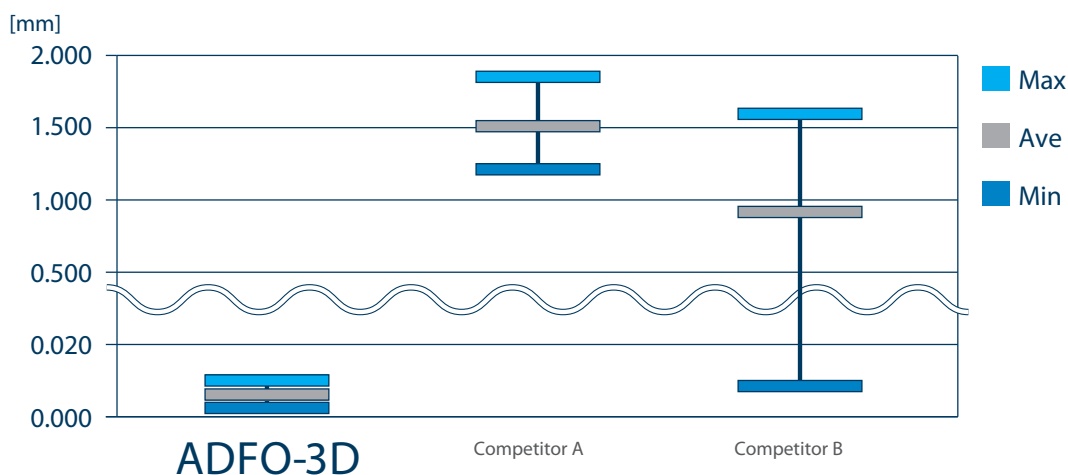
## Superior performance even in stainless steel



Tool	ADFO-3D Ø10
Machined Surface	Flat Surface
Work Material	SUS304
Cutting Speed	50m/min (1.592 min <sup>-1</sup> )
Feed Rate	239 mm/min (0,15 mm/rev)
Depth of Hole	30 mm (Through)
Coolant	Water Soluble
Machine	Horizontal Machining Center

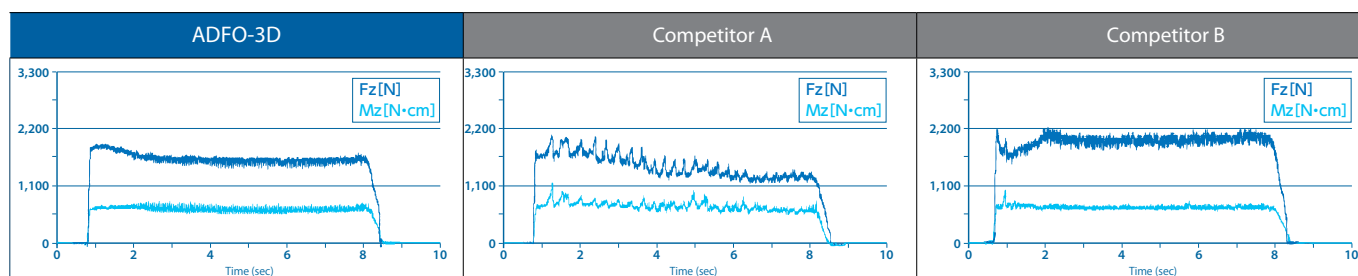
### Hole expansion comparison

ADFO-3D with minimal hole expansion variation



### Cutting Resistance Waveform

Stable thrust and torque (rigidity supported by the 20° helical grooves). Good chip evacuation (with no clogging of chips inside hole)

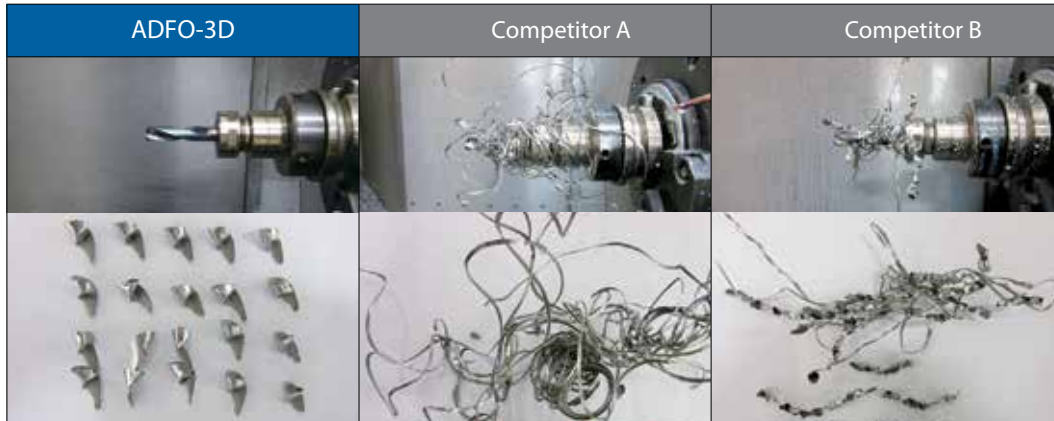




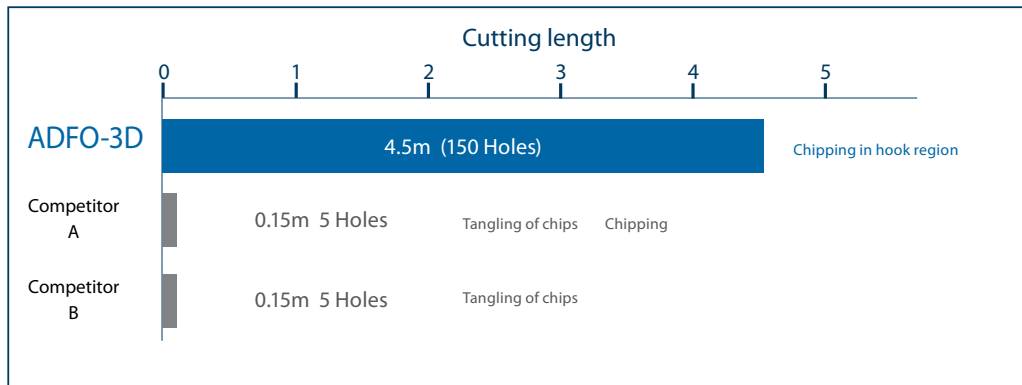
# MACHINING DATA

## ■ Chips

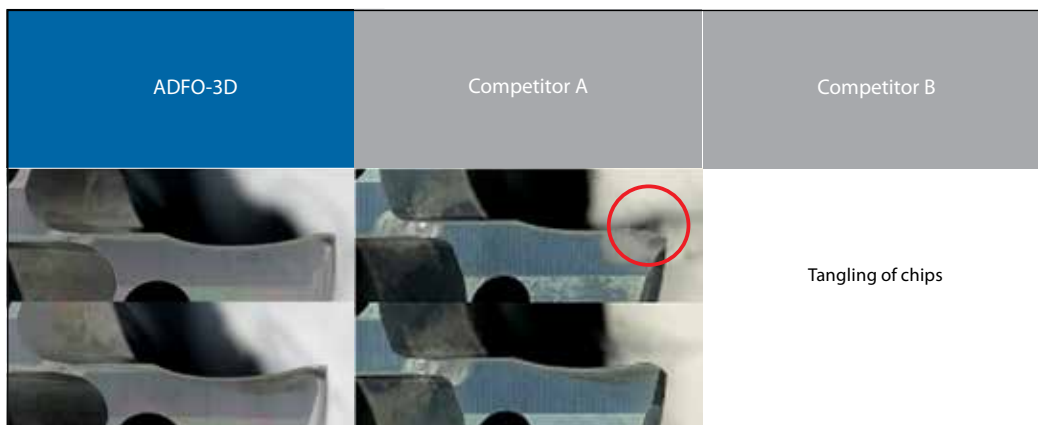
Only the ADFO-3D was capable of breaking chips into small, manageable pieces



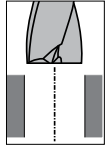
## ■ Durability



Only the ADFO-3D demonstrated durability over 100 holes

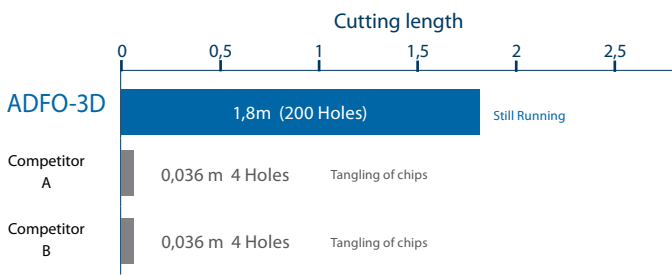


## Stable processing of stainless steel even in small diameter

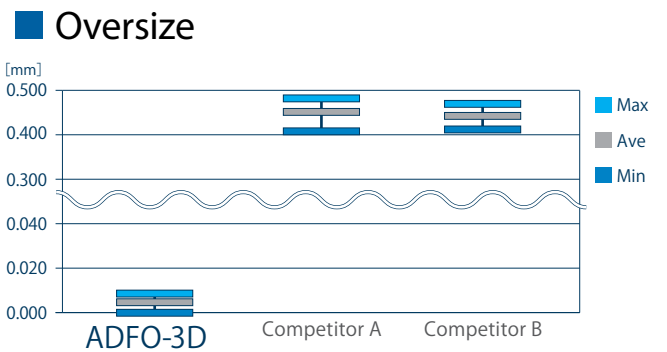


Tool	ADFO-3D Ø3
Machined Surface	Flat Surface
Work Material	SUS304
Cutting Speed	50m/min (5.305 min <sup>-1</sup> )
Feed Rate	239 mm/min (0,045 mm/rev)
Depth of Hole	9 mm (Through)
Coolant	Water Soluble
Machine	Horizontal Machining Center

ADFO-3D demonstrated controlled hole expansion and good durability



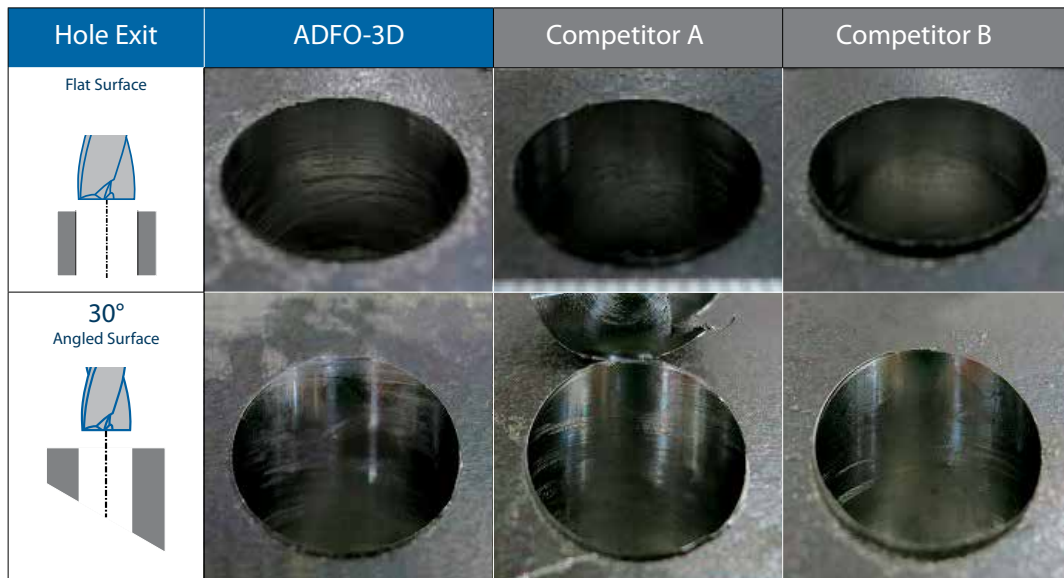
Only the ADFO-3D demonstrated durability over 100 holes



## Burrs suppressed by proprietary cutting edge geometry

Tool	ADFO-3D Ø16	
Machined Surface	Flat Surface	
Work Material	SS400	
Cutting Speed	100m/min (1.989 min <sup>-1</sup> )	
Feed Rate	636 mm/min (0,32 mm/rev)	318 mm/min (0,16 mm/rev)
Depth of Hole	10 mm (Through)	16,5 mm (Through)
Coolant	Water Soluble	
Machine	Horizontal Machining Center	

### ■ Comparison of exit burrs





*shaping your dreams*

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