OSL®
Only Simplicity Last

Solid Carbide End Mills / Drills

COMPANY PROFILE

7-Leaders Corp. specializes in production and marketing of tungsten carbide cutting tools such as End mills, Drills, Reamers, and etc.

Established in 1990, the company manufactures high quality products and provides best services along with the trade mark " OSL " all over the world. 7Leaders manufactures solid carbide cutting tools for Mold& Die, Machine Tools, Automotive, Aerospace, 3C, Watches, Optical and Medical solutions.

OSL - Only Simplicity Last, presents the more simplicity it is, the more self-value being revealed. Consolidate common specification, arrange mass production, fulfill the most economy products service; all for delivery Just-in-Time.

PRODUCTION PROCESS

24 Hours a Day
365 Days a Year
Automated Production Capabilities

Tungsten Carbide Rods

01

7-Leaders cooperates with the world's First Class tungsten carbide rod manufacturer, producing high quality tungsten carbide rods in ETM brand

Tools Manufacturing

02

7Leaders manufactured and mills, drills and reamers by "Walter" & "Rollomatic" CNC machines.

Coating Service

03

Our Nano thin film coating center uses cathodic arc evaporation splitting coating machines from Switzerland.
7-Leaders is the first company applying “splitting arc” technology in Taiwan. We provide variable coating service.

Application

04

7-Leaders manufactures cutting tools through strict cutting test and fulfill customers’ requirements on application.

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	Work Materials (◎ The most recommended/ ○ recommended)													
	Carbon Steel, Tool Steel / Alloy Steel, Pre-hardend Steel	Pre-hardend Steel / Hardened Steel			Stainless Steel	Cast Steel	Nonferrous Metals					Aerospace Materials		
	~30HRC	~48HRC	~56HRC	~68HRC			Aluminium	Copper	Plastics	Composite Material	Graphite	Titanium	Nickel	Heat-resistant Steel
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Index

	Work Materials (◎ The most recommended/ ○ recommended)													
	Carbon Steel	Tool Steel	Pre-hardend Steel			Stainless Steel	Cast Steel	Nonferrous Metals					Aerospace Materials		
	Alloy Steel	Pre-hardend Steel	Hardened Steel					Aluminium	Copper	Plastics	Composite Material	Graphite	Titanium	Nickel	Heat- resistant Steel
	~30HRC		~48HRC	~56HRC	~68HRC										
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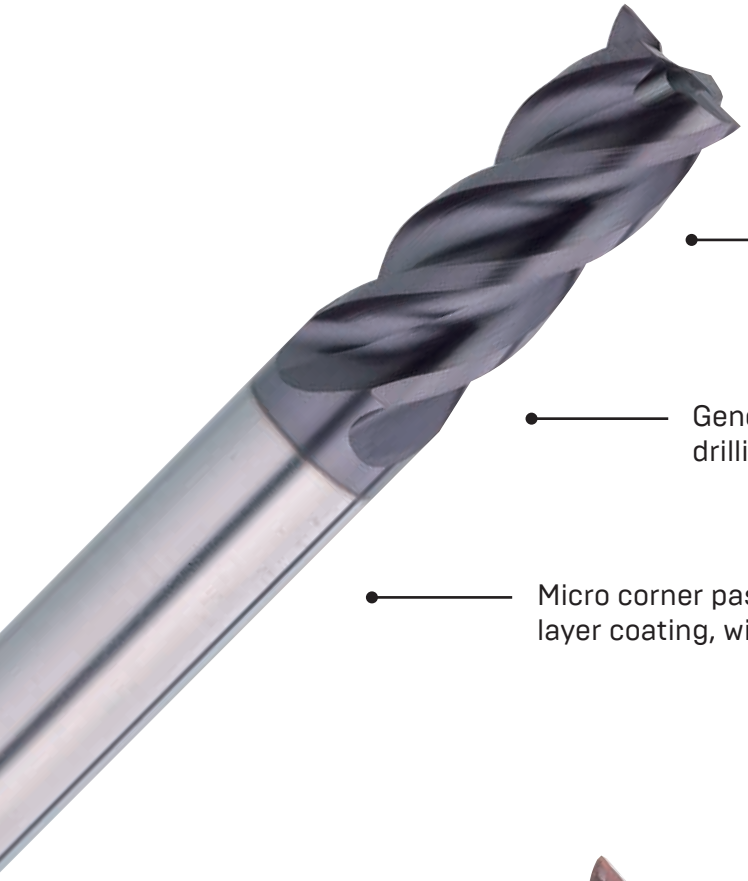
S428FX / S528TX

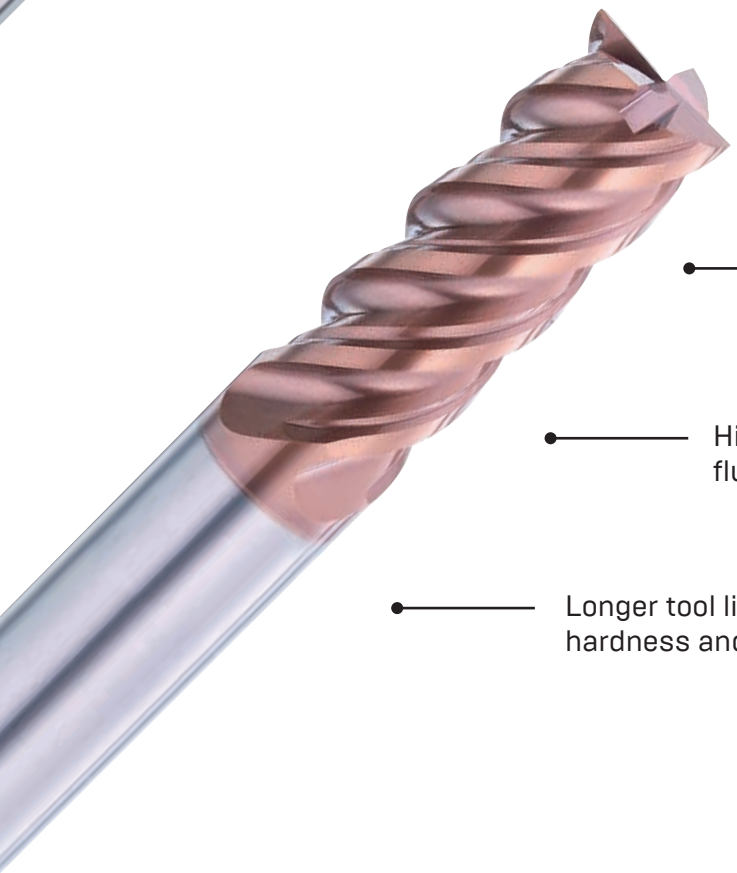
Super Roughing & Finishing End Mills

S428FX



- High efficiency on roughing with excellent chip evacuation.
- Designed with two unequal helix, a small edge cutting land with the relief angle.
- General applications for rough, medium and fine cutting, drilling, and ramping in different materials.
- Micro corner passivation protection design, with AlCrN nano multilayer coating, with superior wear resistance and anti-chipping.

S528TX



- High quality carbide material grade for excellent wear resistance.
- Designed with unequal flute, anti-vibration design, for good surface finishing.
- High rigidity with thick core design, with round arc fluting, for good chip evacuation.
- Longer tool life with AlTiSiN nano multilayer coating, for high hardness and superior wear resistance.

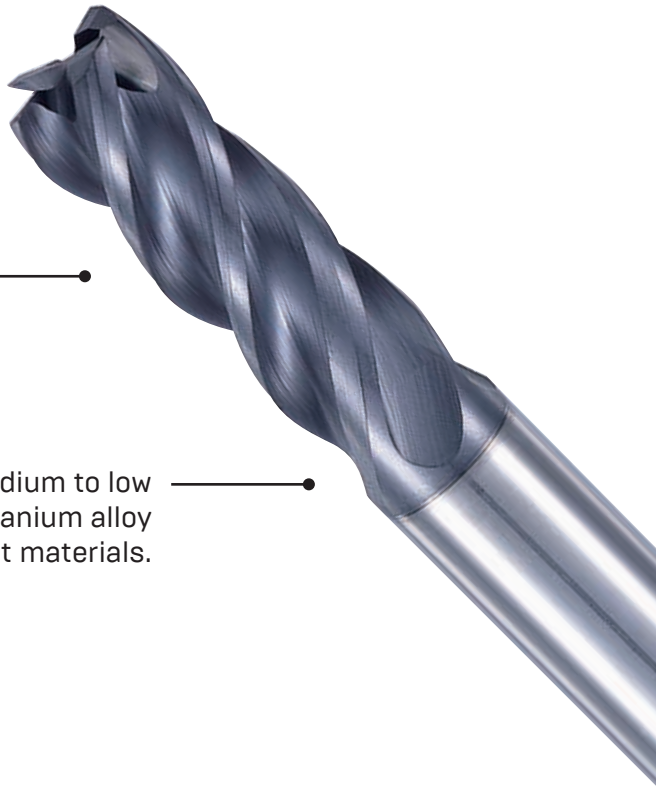
End Mills

S446FX

End tip is protected big Chamfer. with three variable helix geometry, three unequal big evacuation flutes design.

With excellet anti chipping edgeDesigned with sharp cutting edge.

With AlCrN nano multilayer coating Suitable for medium to low hardness carbon steel, alloy steel, stainless steel and titanium alloy in different materials.



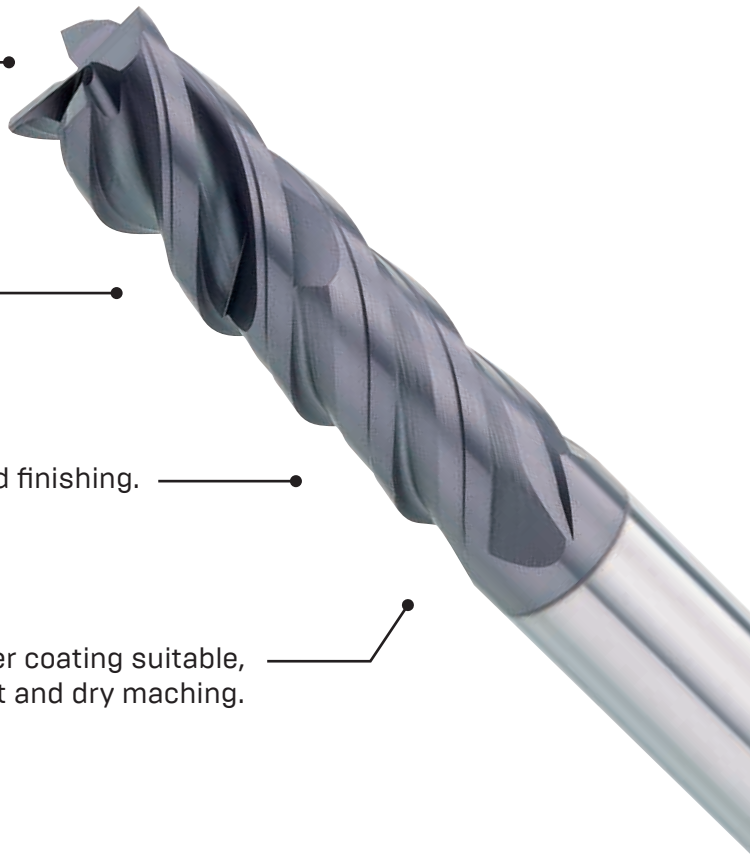
S554-3.0FX

Suitable for high speed trochoidal side-milling.

Double flutes with high rigidity design and high helix geometry.

With excellent performance in roughing and finishing.

Positive rake angle, with AlCrN nano multilayer coating suitable, with superior wear resistance, Works on both wet and dry maching.



Easy Cut End Mills

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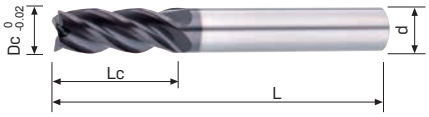
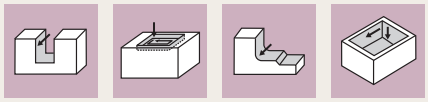
S445HX



Tool Material/ Coating Type	MG Carbide	AlTiCrN
Specification	36°~38°	4	N γ8°	90°

Type of Operation



Work Materials (◎ The most recommended/ ○ recommended)

Carbon Steel / Alloy Steel ~30HRC	Tool Steel / Pre-hardend Steel	Pre-hardend Steel Hardened Steel ~48HRC	~56HRC	~68HRC	Stainless Steel	Cast Steel	Nonferrous Metals: Aluminium	Copper	Plastics	Composite Material	Graphite	Aerospace Materials: Titanium	Nickel	Heat- resistant Steel
S445HX	◎	◎			◎	◎						○	○	○

※Feature of product

S445HX Easy Cut End Mills with three variable helix geometry, three unequal big evacuation flutes design with sharp cutting edge.
With AlCrN nano multilayer coating which is suitable for roughing, finishing, drilling, and ramping. Can perform high speed cutting on various cutting directions. Suitable for medium to low hardness carbon steel, alloy steel, stainless steel and titanium alloy in different materials.

Code No. S445HX-Dc

Dc 0 -0.02	**Lc** mm	**L** mm	**d** h6	**S445HX** MG AlTiCrN
1	3	50	4	●
1.5	5	50	4	●
2	6	50	4	●
2.5	8	50	4	●
3A	8	50	4	●
4A	11	50	4	●
3	8	50	6	●
4	11	50	6	●
5	13	50	6	●
6	16	50	6	●
8	20	60	8	●
10	25	75	10	●
12	30	75	12	●
14	32	90	16	●
16	40	100	16	●
18	NEW45(40)	100	20	●
20	NEW50(40)	100	20	●

Recommended Milling Conditions

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Side Milling

Work Material		GR.1 Carbon Steel		GR.2 Low-alloyed Steel (~24HRC)		GR.3 Hi-alloyed Steel (~30HRC)		GR.4 Hardened Steel (30~38HRC)		GR.5 Hardened Steel (38~48HRC)		GR.8 Stainless Steel		GR.9 Cast Iron		GR.15 Titanium	
Vc m/min		120		120		80		65		60		65		120		30	
Code No.	Dc	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)
S445HX-1	1	31,800	240	31,800	240	25,000	210	19,750	180	19,000	85	19,750	180	31,800	240	7,100	50
S445HX-1.5	1.5	21,200	245	21,200	245	16,500	210	13,000	180	12,700	90	13,000	180	21,200	245	5,100	100
S445HX-2	2	15,900	245	15,900	245	12,420	210	9,850	180	9,550	90	9,850	180	15,900	245	4,000	120
S445HX-2.5	2.5	12,700	370	12,700	370	10,000	300	7,900	275	7,600	90	7,900	275	12,700	370	3,200	150
S445HX-3	3	12,700	683	12,700	683	10,000	530	6,550	389	6,400	105	6,550	389	10,600	683	3,200	180
S445HX-4	4	9,550	735	9,550	735	7,640	590	3,950	413	3,800	120	3,950	413	6,350	735	2,400	180
S445HX-5	5	7,640	875	7,640	875	6,100	625	2,800	448	2,730	125	2,800	448	4,550	875	2,000	190
S445HX-6	6	6,300	875	6,300	875	5,000	600	2,200	413	2,100	125	2,200	413	3,540	875	1,600	190
S445HX-8	8	5,000	770	5,000	770	4,000	600	1,975	413	1,900	125	1,975	413	3,185	770	1,200	170
S445HX-10	10	3,800	770	3,800	770	3,000	595	1,645	375	1,595	120	1,645	375	3,650	770	1,000	160
S445HX-12	12	2,275	670	2,275	670	1,770	560	1,410	350	1,365	120	1,410	350	2,275	670	800	160
S445HX-14	14	2,130	670	2,130	670	1,660	540	1,320	320	1,270	110	1,320	320	2,130	670	700	150
S445HX-16	16	1,990	670	1,990	670	1,550	520	1,230	312	1,190	100	1,230	312	1,990	670	600	150
S445HX-18	18	1,790	580	1,790	580	1,400	450	1,100	300	1,070	100	1,100	300	1,790	580	540	150
S445HX-20	20	1,590	535	1,590	535	1,240	415	985	277	950	90	985	277	1,590	535	480	160
Depth of Cut (mm) 		ap:1.5D		ap:1.5D		ap:1.5D		ap:1.5D		ap:1.5D		ap:1.5D		ap:1.5D		ap:1.5D	
		ae:0.2D		ae:0.2D		ae:0.2D		ae:0.2D		ae:0.1D		ae:0.2D		ae:0.2D		ae:0.1D	

Slotting

Work Material		GR.1 Carbon Steel		GR.2 Low-alloyed Steel (~24HRC)		GR.3 Hi-alloyed Steel (~30HRC)		GR.4 Hardened Steel (30~38HRC)		GR.5 Hardened Steel (38~48HRC)		GR.8 Stainless Steel		GR.9 Cast Iron		GR.15 Titanium	
Vc m/min		120		120		80		65		60		65		120		30	
Code No.	Dc	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)
S445HX-1	1	31,800	200	31,800	200	25,000	180	19,750	150	19,000	85	19,750	150	31,800	200	7,100	50
S445HX-1.5	1.5	21,200	200	21,200	200	16,500	180	13,000	150	12,700	90	13,000	150	21,200	200	5,100	80
S445HX-2	2	15,900	220	15,900	220	12,420	180	9,850	150	9,550	90	9,850	150	15,900	220	4,000	100
S445HX-2.5	2.5	12,700	330	12,700	330	10,000	220	7,900	175	7,600	90	7,900	175	12,700	330	3,200	100
S445HX-3	3	12,700	600	12,700	600	10,000	430	6,550	290	6,400	105	6,550	290	10,600	600	3,200	130
S445HX-4	4	9,550	635	9,550	635	7,640	500	3,950	325	3,800	120	3,950	325	6,350	635	2,400	150
S445HX-5	5	7,640	775	7,640	775	6,100	525	2,800	348	2,730	125	2,800	348	4,550	775	2,000	160
S445HX-6	6	6,300	775	6,300	775	5,000	500	2,200	313	2,100	125	2,200	313	3,540	775	1,600	145
S445HX-8	8	5,000	650	5,000	650	4,000	500	1,975	313	1,900	125	1,975	313	3,185	650	1,200	120
S445HX-10	10	3,800	670	3,800	670	3,000	490	1,645	288	1,595	120	1,645	288	3,650	670	1,000	145
S445HX-12	12	2,275	560	2,275	560	1,770	460	1,410	275	1,365	120	1,410	275	2,275	560	800	150
S445HX-14	14	2,130	600	2,130	600	1,660	440	1,320	260	1,270	110	1,320	260	2,130	600	700	150
S445HX-16	16	1,990	660	1,990	660	1,550	420	1,230	240	1,190	100	1,230	240	1,990	660	600	150
S445HX-18	18	1,790	580	1,790	580	1,400	390	1,100	220	1,070	100	1,100	220	1,790	580	540	140
S445HX-20	20	1,590	500	1,590	500	1,240	360	985	200	950	90	985	200	1,590	500	480	130
Depth of Cut (mm) 		ap:0.5D		ap:0.5D		ap:0.5D		ap:0.5D		ap:0.05D		ap:0.5D		ap:0.5D		ap:0.05D	

1. Please work with good rigidity / high precision facilities and collet chuck.
2. Please choose proper cutting fluid.
3. The cutting data is reference value only. Please adjust it according to your real working conditions.
4. If RPM is lower the reference value, the Feed rate (fz) and RPM should be reduced by the same proportion.
5. If vibration occurs during cutting, please reduce cutting parameter.

Easy Cut End Mills (Chamfer Corner)

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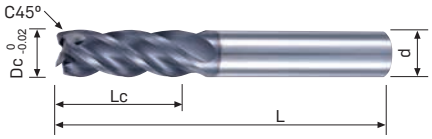
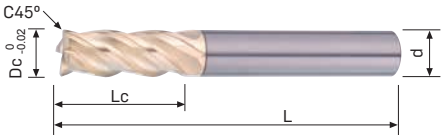
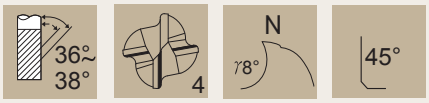
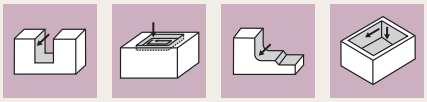
S446FX



S446SX



Tool Material/ Coating Type	**MG Carbide** **AlCrN AlTiXZrN**
Specification	
Type of Operation	

Work Materials (◎ The most recommended/ ○ recommended)

	Carbon Steel	Tool Steel	Pre-hardend Steel			Stainless Steel	Cast Steel	Nonferrous Metals					Aerospace Materials		
	Alloy Steel	Pre-hardend Steel	Hardened Steel												
	~30HRC		~48HRC	~56HRC	~68HRC			Aluminium	Copper	Plastics	Composite Material	Graphite	Titanium	Nickel	Heat- resistant Steel
S446FX	◎		◎			◎	◎	○	○				○	○	○
S446SX	◎		◎			◎	◎	○	○				○	○	○

※Feature of product

S446FX / S446SX Easy Cut End Mills with three variable helix geometry, three unequal big evacuation flutes design with sharp cutting edge, which is suitable for roughing, finishing, drilling, and ramping. Can perform high speed cutting on various cutting directions.

S446FX / S446SX Front cutting edge with corner chamfer protection. High efficiency on roughing with excellent anti-chipping.

With AlCrN / AlTiXZrN nano multilayer coating. Suitable for medium to low hardness carbon steel, alloy steel, stainless steel and titanium alloy in different materials.

S446FX-Dc / S446SX-Dc

Dc 0 -0.02	**C45°** mm	**Lc** mm	**L** mm	**d** h6	**S446FX** MG AlCrN	**S446SX** MG AlTiXZrN
3	0.08	8	50	6	●	●
4	0.1	11	50	6	●	●
5	0.13	13	50	6	●	●
6	0.15	16	50	6	●	●
8	0.2	20	60	8	●	●
10	0.25	25	75	10	●	●
12	0.3	30	75	12	●	●
16	0.4	40	100	16	●	●
20	0.5	50	100	20	●	●

Recommended Milling Conditions

OSL® Only Simplicity Last

Side Milling

Work Material		GR.1 Carbon Steel		GR.2 Low-alloyed Steel (~24HRC)		GR.3 Hi-alloyed Steel (~30HRC)		GR.4 Hardened Steel (30~38HRC)		GR.5 Hardened Steel (38~48HRC)		GR.8 Stainless Steel		GR.9 Cast Iron		GR.15 Titanium	
Vc m/min		120		120		80		65		60		65		120		30	
Code No. FX=SX	Dc	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)
S446FX-3	3	12,700	683	12,700	683	10,000	530	6,550	389	6,400	105	6,550	389	10,600	683	3,200	180
S446FX-4	4	9,550	735	9,550	735	7,640	590	3,950	413	3,800	120	3,950	413	6,350	735	2,400	180
S446FX-5	5	7,640	1,050	7,640	1,050	6,100	625	2,800	448	2,730	125	2,800	448	4,550	875	2,000	190
S446FX-6	6	6,300	1,050	6,300	1,050	5,000	720	2,200	413	2,100	125	2,200	495	3,540	1,050	1,600	190
S446FX-8	8	5,000	920	5,000	920	4,000	720	1,975	413	1,900	125	1,975	495	3,185	920	1,200	170
S446FX-10	10	3,800	920	3,800	920	3,000	700	1,645	375	1,595	120	1,645	450	3,650	920	1,000	160
S446FX-12	12	2,275	800	2,275	800	1,770	670	1,410	350	1,365	120	1,410	420	2,275	800	800	160
S446FX-16	16	1,990	800	1,990	800	1,550	670	1,230	312	1,190	100	1,230	370	1,990	800	600	150
S446FX-20	20	1,590	650	1,590	650	1,240	500	985	277	950	90	985	330	1,590	650	480	160
Depth of Cut (mm) 		ap:1.5D ae:0.2D		ap:1.5D ae:0.2D		ap:1.5D ae:0.2D		ap:1.5D ae:0.2D		ap:1.5D ae:0.1D		ap:1.5D ae:0.2D		ap:1.5D ae:0.2D		ap:1.5D ae:0.1D	

Slotting

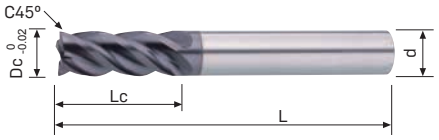
Work Material		GR.1 Carbon Steel		GR.2 Low-alloyed Steel (~24HRC)		GR.3 Hi-alloyed Steel (~30HRC)		GR.4 Hardened Steel (30~38HRC)		GR.5 Hardened Steel (38~48HRC)		GR.8 Stainless Steel		GR.9 Cast Iron		GR.15 Titanium	
Vc m/min		120		120		80		65		60		65		120		30	
Code No. FX=SX	Dc	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)
S446FX-3	3	12,700	600	12,700	600	10,000	430	6,550	290	6,400	105	6,550	290	10,600	600	3,200	130
S446FX-4	4	9,550	635	9,550	635	7,640	500	3,950	325	3,800	120	3,950	325	6,350	635	2,400	150
S446FX-5	5	7,640	775	7,640	775	6,100	525	2,800	348	2,730	125	2,800	348	4,550	775	2,000	160
S446FX-6	6	6,300	930	6,300	930	5,000	600	2,200	313	2,100	125	2,200	380	3,540	930	1,600	145
S446FX-8	8	5,000	780	5,000	780	4,000	600	1,975	313	1,900	125	1,975	380	3,185	780	1,200	120
S446FX-10	10	3,800	800	3,800	800	3,000	490	1,645	288	1,595	120	1,645	350	3,650	800	1,000	145
S446FX-12	12	2,275	670	2,275	670	1,770	550	1,410	275	1,365	120	1,410	330	2,275	670	800	150
S446FX-16	16	1,990	660	1,990	660	1,550	500	1,230	240	1,190	100	1,230	290	1,990	660	600	150
S446FX-20	20	1,590	600	1,590	600	1,240	430	985	200	950	90	985	240	1,590	600	480	130
Depth of Cut (mm) 		ap:0.5D		ap:0.5D		ap:0.5D		ap:0.5D		ap:0.05D		ap:0.5D		ap:0.5D		ap:0.05D	

1. Please work with good rigidity / high precision facilities and collet chuck.
2. Please choose proper cutting fluid.
3. The cutting data is reference value only. Please adjust it according to your real working conditions.
4. If RPM is lower the reference value, the Feed rate (fz) and RPM should be reduced by the same proportion.
5. If vibration occurs during cutting, please reduce cutting parameter.

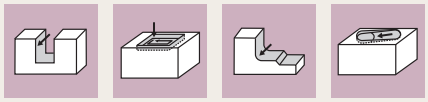
Super Cut End Mills (Chamfer Corner)

OSL Only Simplicity Last

S428FX



Tool Material/ Coating Type	MG Carbide	AlCrN
Specification	   	

Type of Operation 

Work Materials (◎ The most recommended/ ○ recommended)

	Carbon Steel	Tool Steel	Pre-hardend Steel			Stainless Steel	Cast Steel	Nonferrous Metals					Aerospace Materials		
	Alloy Steel	Pre-hardend Steel	Hardened Steel					Aluminium	Copper	Plastics	Composite Material	Graphite	Titanium	Nickel	Heat- resistant Steel
	~30HRC		~48HRC	~56HRC	~68HRC										
S428FX	◎		◎			◎	◎	○	○				○	○	○

※Feature of product

S428FX Front cutting edge with corner chamfer protection. High efficiency roughing with excellent anti-chipping.
S428FX Super Cut End Mills with two unequal big evacuation flutes design with sharp cutting edge.
A small edge cutting land with the relief angle, able to perform in high efficiency cutting as well for unstable cutting conditions.
General applications for rough, medium and fine cutting, drilling and ramping. Can perform high speed cutting on various cutting directions.
With AlCrN nano multilayer coating Suitable in different materials. From medium to low hardness carbon steel, alloy steel, stainless steel and titanium alloy etc.

Code No. S428FX-Dc×C45°

Dc 0 -0.02	**C45°** mm	**Lc** mm	**L** mm	**d** h6	**S428FX** MG AlCrN
3	0.05	8	50	6	●
4	0.06	11	50	6	●
5	0.08	13	50	6	●
6	0.09	16	50	6	●
8	0.12	20	60	8	●
10	0.15	25	75	10	●
12	0.18	30	75	12	●
16	0.24	40	100	16	●
20	0.30	50	100	20	●

※S428-3.0FX-DC×R Super corner radius end mill can accept ordering, ordering and delivery base on demand

Recommended Milling Conditions

OSL® Only Simplicity Last

Side Milling

Work Material		GR.1 Carbon Steel		GR.2 Low-alloyed Steel (~24HRC)		GR.3 Hi-alloyed Steel (~30HRC)		GR.4 Hardened Steel (30~38HRC)		GR.5 Hardened Steel (38~48HRC)		GR.8 Stainless Steel		GR.9 Cast Iron		GR.15 Titanium	
Vc m/min		120		120		80		65		60		65		120		30	
Code No.	Dc	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)
S428FX-3	3	12,700	683	12,700	683	10,000	530	6,550	389	6,400	105	6,550	389	10,600	683	3,200	180
S428FX-4	4	9,550	735	9,550	735	7,640	590	3,950	413	3,800	120	3,950	413	6,350	735	2,400	180
S428FX-5	5	7,640	875	7,640	875	6,100	625	2,800	448	2,730	125	2,800	448	4,550	875	2,000	190
S428FX-6	6	6,300	875	6,300	875	5,000	600	2,200	413	2,100	125	2,200	413	3,540	875	1,600	190
S428FX-8	8	5,000	770	5,000	770	4,000	600	1,975	413	1,900	125	1,975	413	3,185	770	1,200	170
S428FX-10	10	3,800	770	3,800	770	3,000	595	1,645	375	1,595	120	1,645	375	3,650	770	1,000	160
S428FX-12	12	2,275	670	2,275	670	1,770	560	1,410	350	1,365	120	1,410	350	2,275	670	800	160
S428FX-16	16	1,990	670	1,990	670	1,550	520	1,230	312	1,190	100	1,230	312	1,990	670	600	150
S428FX-20	20	1,590	535	1,590	535	1,240	415	985	277	950	90	985	277	1,590	535	480	160
Depth of Cut (mm) 		ap:1.5D ae:0.2D		ap:1.5D ae:0.2D		ap:1.5D ae:0.2D		ap:1.5D ae:0.2D		ap:1.5D ae:0.1D		ap:1.5D ae:0.2D		ap:1.5D ae:0.2D		ap:1.5D ae:0.1D	

Slotting

Work Material		GR.1 Carbon Steel		GR.2 Low-alloyed Steel (~24HRC)		GR.3 Hi-alloyed Steel (~30HRC)		GR.4 Hardened Steel (30~38HRC)		GR.5 Hardened Steel (38~48HRC)		GR.8 Stainless Steel		GR.9 Cast Iron		GR.15 Titanium	
Vc m/min		120		120		80		65		60		65		120		30	
Code No.	Dc	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)
S428FX-3	3	12,700	600	12,700	600	10,000	430	6,550	290	6,400	105	6,550	290	10,600	600	3,200	130
S428FX-4	4	9,550	635	9,550	635	7,640	500	3,950	325	3,800	120	3,950	325	6,350	635	2,400	150
S428FX-5	5	7,640	775	7,640	775	6,100	525	2,800	348	2,730	125	2,800	348	4,550	775	2,000	160
S428FX-6	6	6,300	775	6,300	775	5,000	500	2,200	313	2,100	125	2,200	313	3,540	775	1,600	145
S428FX-8	8	5,000	650	5,000	650	4,000	500	1,975	313	1,900	125	1,975	313	3,185	650	1,200	120
S428FX-10	10	3,800	670	3,800	670	3,000	490	1,645	288	1,595	120	1,645	288	3,650	670	1,000	145
S428FX-12	12	2,275	560	2,275	560	1,770	460	1,410	275	1,365	120	1,410	275	2,275	560	800	150
S428FX-16	16	1,990	660	1,990	660	1,550	420	1,230	240	1,190	100	1,230	240	1,990	660	600	150
S428FX-20	20	1,590	500	1,590	500	1,240	360	985	200	950	90	985	200	1,590	500	480	130
Depth of Cut (mm) 		ap:0.5D		ap:0.5D		ap:0.5D		ap:0.5D		ap:0.05D		ap:0.5D		ap:0.5D		ap:0.05D	

1. Please work with good rigidity / high precision facilities and collet chuck.
2. Please choose proper cutting fluid.
3. The cutting data is reference value only. Please adjust it according to your real working conditions.
4. If RPM is lower the reference value, the Feed rate (fz) and RPM should be reduced by the same proportion.
5. If vibration occurs during cutting, please reduce cutting parameter.

Super Cut End Mills

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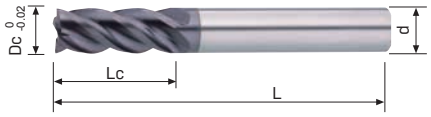
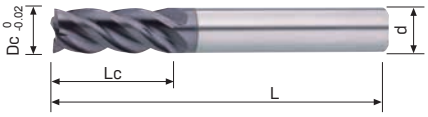
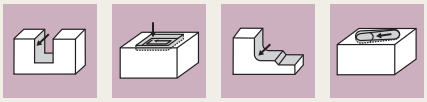
S428X1 / S428FX



S428-3.0X1 / S428-3.0FX



Tool Material/ Coating Type	**MG Carbide** **AlTiXN AlCrN**
Specification	
Type of Operation	

Work Materials (◎ The most recommended/ ○ recommended)

Carbon Steel / Alloy Steel ~30HRC	Tool Steel / Pre-hardend Steel	Pre-hardend Steel / Hardened Steel ~48HRC	~56HRC	~68HRC	Stainless Steel	Cast Steel	Nonferrous Metals: Aluminium	Copper	Plastics	Composite Material	Graphite	Aerospace Materials: Titanium	Nickel	Heat- resistant Steel
S428X1	◎	◎			◎	◎	○	○				○	○	○
S428FX	◎	◎			◎	◎	○	○				○	○	○
S428-3.0X1	◎	◎			◎	◎	○	○				○	○	○
S428-3.0FX	◎	◎			◎	◎	○	○				○	○	○

※Feature of product

S428X1 / S428FX / S428-3.0X1 / S428-3.0FX Super Cut End Mills with two unequal big evacuation flutes design with sharp cutting edge. A small edge cutting land with the relief angle, able to perform in high efficiency cutting as well for unstable cutting conditions.

FX coating, Diameter over 3.0mm with micro corner passivation protection design which suitable for rough, medium and fine cutting, drilling, and ramping.

With AlCrN nano multilayer coating medium to low hardness carbon steel, alloy steel, stainless steel and titanium alloy in different materials.

Code No. S428X1-Dc / S428FX-Dc

Dc 0 -0.02	**Lc** mm	**L** mm	**d** h6	**S428X1** MG AlTiXN	**S428FX** MG AlCrN
1	3	50	4	●	●
1.5	5	50	4	●	●
2	6	50	4	●	●
2.5	8	50	4	●	●
3A	8	50	4	●	●
4A	11	50	4	●	●
3	8	50	6	●	●
4	11	50	6	●	●
5	13	50	6	●	●
6	16	50	6	●	●
6L	16	75	6	●	●
8	20	60	8	●	●
8L	20	75	8	●	●
10	25	75	10	●	●
10L	25	100	10	●	●
12	30	75	12	●	●
12L	30	100	12	●	●
14	32	90	16	●	●
16	40	100	16	●	●
18	45	100	20	●	●
20	50	100	20	●	●

Code No. S428-3.0X1-Dc / S428-3.0FX-Dc

Dc 0 -0.02	**Lc** mm	**L** mm	**d** h6	**S428-3.0X1** MG AlTiXN	**S428-3.0FX** MG AlCrN
3	9	50	6	●	●
4	12	50	6	●	●
5	15	50	6	●	●
6	18	50	6	●	●
8	24	60	8	●	●
10	30	75	10	●	●
12	36	75	12	●	●
16	50	100	16	●	●
20	60	120	20	●	●

Recommended Milling Conditions

OSL® Only Simplicity Last

Side Milling

Work Material		GR.1 Carbon Steel		GR.2 Low-alloyed Steel (~24HRC)		GR.3 Hi-alloyed Steel (~30HRC)		GR.4 Hardened Steel (30~38HRC)		GR.5 Hardened Steel (38~48HRC)		GR.8 Stainless Steel		GR.9 Cast Iron		GR.15 Titanium	
Vc m/min		120		120		80		65		60		65		120		30	
Code No. X1=FX	Dc	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)
S428FX-1	1	31,800	240	31,800	240	25,000	210	19,750	180	19,000	85	19,750	180	31,800	240	7,100	50
S428FX-1.5	1.5	21,200	245	21,200	245	16,500	210	13,000	180	12,700	90	13,000	180	21,200	245	5,100	100
S428FX-2	2	15,900	245	15,900	245	12,420	210	9,850	180	9,550	90	9,850	180	15,900	245	4,000	120
S428FX-2.5	2.5	12,700	370	12,700	370	10,000	300	7,900	275	7,600	90	7,900	275	12,700	370	3,200	150
S428FX-3	3	12,700	683	12,700	683	10,000	530	6,550	389	6,400	105	6,550	389	10,600	683	3,200	180
S428FX-4	4	9,550	735	9,550	735	7,640	590	3,950	413	3,800	120	3,950	413	6,350	735	2,400	180
S428FX-5	5	7,640	875	7,640	875	6,100	625	2,800	448	2,730	125	2,800	448	4,550	875	2,000	190
S428FX-6	6	6,300	875	6,300	875	5,000	600	2,200	413	2,100	125	2,200	413	3,540	875	1,600	190
S428FX-8	8	5,000	770	5,000	770	4,000	600	1,975	413	1,900	125	1,975	413	3,185	770	1,200	170
S428FX-10	10	3,800	770	3,800	770	3,000	595	1,645	375	1,595	120	1,645	375	3,650	770	1,000	160
S428FX-12	12	2,275	670	2,275	670	1,770	560	1,410	350	1,365	120	1,410	350	2,275	670	800	160
S428FX-14	14	2,130	670	2,130	670	1,660	540	1,320	320	1,270	110	1,320	320	2,130	670	700	150
S428FX-16	16	1,990	670	1,990	670	1,550	520	1,230	312	1,190	100	1,230	312	1,990	670	600	150
S428FX-18	18	1,790	580	1,790	580	1,400	450	1,100	300	1,070	100	1,100	300	1,790	580	540	150
S428FX-20	20	1,590	535	1,590	535	1,240	415	985	277	950	90	985	277	1,590	535	480	160
Depth of Cut (mm) 		ap:1.5D		ap:1.5D		ap:1.5D		ap:1.5D		ap:1.5D		ap:1.5D		ap:1.5D		ap:1.5D	
		ae:0.2D		ae:0.2D		ae:0.2D		ae:0.2D		ae:0.1D		ae:0.2D		ae:0.2D		ae:0.1D	

Slotting

Work Material		GR.1 Carbon Steel		GR.2 Low-alloyed Steel (~24HRC)		GR.3 Hi-alloyed Steel (~30HRC)		GR.4 Hardened Steel (30~38HRC)		GR.5 Hardened Steel (38~48HRC)		GR.8 Stainless Steel		GR.9 Cast Iron		GR.15 Titanium	
Vc m/min		120		120		80		65		60		65		120		30	
Code No. X1=FX	Dc	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)
S428FX-1	1	31,800	200	31,800	200	25,000	180	19,750	150	19,000	85	19,750	150	31,800	200	7,100	50
S428FX-1.5	1.5	21,200	200	21,200	200	16,500	180	13,000	150	12,700	90	13,000	150	21,200	200	5,100	80
S428FX-2	2	15,900	220	15,900	220	12,420	180	9,850	150	9,550	90	9,850	150	15,900	220	4,000	100
S428FX-2.5	2.5	12,700	330	12,700	330	10,000	220	7,900	175	7,600	90	7,900	175	12,700	330	3,200	100
S428FX-3	3	12,700	600	12,700	600	10,000	430	6,550	290	6,400	105	6,550	290	10,600	600	3,200	130
S428FX-4	4	9,550	635	9,550	635	7,640	500	3,950	325	3,800	120	3,950	325	6,350	635	2,400	150
S428FX-5	5	7,640	775	7,640	775	6,100	525	2,800	348	2,730	125	2,800	348	4,550	775	2,000	160
S428FX-6	6	6,300	775	6,300	775	5,000	500	2,200	313	2,100	125	2,200	313	3,540	775	1,600	145
S428FX-8	8	5,000	650	5,000	650	4,000	500	1,975	313	1,900	125	1,975	313	3,185	650	1,200	120
S428FX-10	10	3,800	670	3,800	670	3,000	490	1,645	288	1,595	120	1,645	288	3,650	670	1,000	145
S428FX-12	12	2,275	560	2,275	560	1,770	460	1,410	275	1,365	120	1,410	275	2,275	560	800	150
S428FX-14	14	2,130	600	2,130	600	1,660	440	1,320	260	1,270	110	1,320	260	2,130	600	700	150
S428FX-16	16	1,990	660	1,990	660	1,550	420	1,230	240	1,190	100	1,230	240	1,990	660	600	150
S428FX-18	18	1,790	580	1,790	580	1,400	390	1,100	220	1,070	100	1,100	220	1,790	580	540	140
S428FX-20	20	1,590	500	1,590	500	1,240	360	985	200	950	90	985	200	1,590	500	480	130
Depth of Cut (mm) 		ap:0.5D		ap:0.5D		ap:0.5D		ap:0.5D		ap:0.05D		ap:0.5D		ap:0.5D		ap:0.05D	

1. Please work with good rigidity / high precision facilities and collet chuck.
2. Please choose proper cutting fluid.
3. The cutting data is reference value only. Please adjust it according to your real working conditions.
4. If RPM is lower the reference value, the Feed rate (fz) and RPM should be reduced by the same proportion.
5. If vibration occurs during cutting, please reduce cutting parameter.

Super Cut End Mills

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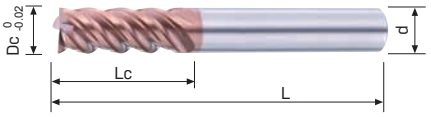
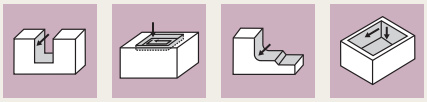
S528TX



Tool Material/ Coating Type	MG Carbide	AlTiSiN
Specification	48°	4	N γ3°	90°

Type of Operation



Work Materials (◎ The most recommended/ ○ recommended)

Carbon Steel / Alloy Steel	Tool Steel / Pre-hardend Steel	Pre-hardend Steel / Hardened Steel ~48HRC	~56HRC	~68HRC	Stainless Steel	Cast Steel	Nonferrous Metals: Aluminium	Copper	Plastics	Composite Material	Graphite	Aerospace Materials: Titanium	Nickel	Heat-resistant Steel
~30HRC														
S528TX	◎	◎	○		◎	◎						○	○	○

※Feature of product

S528TX Super cut end mill with micro corner radius passivation protection, unequal flutes, 48° helix angle design.
With round arc fluting and rigid core design.
Suitable for fine cutting on various material.

Code No. S528TX-Dc

Dc 0 -0.02	**Lc** mm	**L** mm	**d** h6	**S528TX** MG AlTiSiN
3	8	50	6	●
4	11	50	6	●
5	13	50	6	●
6	16	50	6	●
8	20	60	8	●
10	25	75	10	●
12	30	75	12	●
16	40	100	16	●
20	50	100	20	●

Recommended Milling Conditions

OSL® Only Simplicity Last

Side Milling

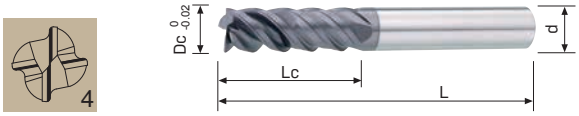
Work Material		GR.1 Carbon Steel		GR.2 Low-alloyed Steel (~24HRC)		GR.3 Hi-alloyed Steel (~30HRC)		GR.4 Hardened Steel (30~38HRC)		GR.5 Hardened Steel (38~48HRC)		GR.8 Stainless Steel		GR.9 Cast Iron	
Vc m/min		120		120		80		65		60		65		120	
Code No.	Dc	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)
S528TX-3	3	14,863	595	13,802	552	12,740	510	8,493	340	7,432	297	8,493	340	14,863	595
S528TX-4	4	11,148	669	10,351	621	9,555	573	6,370	382	5,574	334	6,370	382	11,148	669
S528TX-5	5	8,918	535	8,281	497	7,644	459	5,096	306	4,459	268	5,096	306	8,918	535
S528TX-6	6	7,432	595	6,901	552	6,370	510	4,247	340	3,716	297	4,247	340	8,918	713
S528TX-8	8	5,574	669	5,176	621	4,778	573	3,185	382	2,787	334	3,185	382	5,574	669
S528TX-10	10	4,459	535	4,141	497	3,822	459	2,548	306	2,230	268	2,548	306	4,459	535
S528TX-12	12	3,716	446	3,450	414	3,185	382	2,123	255	1,858	223	2,123	255	3,716	446
S528TX-16	16	2,787	334	2,588	311	2,389	287	1,593	191	1,393	167	1,593	191	2,787	334
S528TX-20	20	2,230	268	2,070	248	1,911	229	1,274	153	1,115	134	1,274	153	2,230	268
Depth of Cut (mm) 		ap:2.0D		ap:2.0D		ap:1.5D		ap:2.0D		ap:2.0D		ap:2.0D		ap:2.0D	
		ae:0.015D		ae:0.015D		ae:0.015D		ae:0.015D		ae:0.01D		ae:0.015D		ae:0.02D	

1. Please work with good rigidity / high precision facilities and collet chuck.
2. Please choose proper cutting fluid.
3. The cutting data is reference value only. Please adjust it according to your real working conditions.
4. If RPM is lower the reference value, the Feed rate (fz) and RPM should be reduced by the same proportion.
5. If vibration occurs during cutting, please reduce cutting parameter.

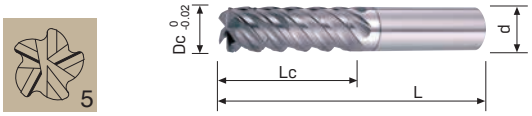
Premium Cut End Mills

OSL Only Simplicity Last

S554-3.0X1 / S554-3.0FX

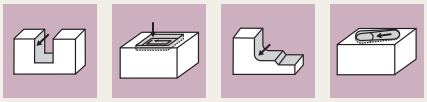


S555-3.0FX



Tool Material/ Coating Type	MG Carbide	AlTiXN AlCrN
Specification	48°	N, γ8°
	90°	

Type of Operation



Work Materials (◎ The most recommended/ ○ recommended)

	Carbon Steel	Tool Steel	Pre-hardend Steel			Stainless Steel	Cast Steel	Nonferrous Metals					Aerospace Materials		
	Alloy Steel	Pre-hardend Steel	Hardened Steel					Aluminium	Copper	Plastics	Composite Material	Graphite	Titanium	Nickel	Heat- resistant Steel
	~30HRC		~48HRC	~56HRC	~68HRC										
S554-3.0X1	◎		◎			◎	◎						○	○	○
S554-3.0FX	◎		◎			◎	◎						○	○	○
S555-3.0FX	◎		◎			◎	◎						○	○	○

※Feature of product

S554-3.0X1 / S554-3.0FX / S555-3.0FX High-Efficiency, High-Precision End Mills, with four (five) variable helix geometry, high helix dual core with high rigidity design.

Excellent performance in roughing and finishing. Suitable for high speed trochoidal side-milling.

FX coating with micro corner passivation protection design.

With AlCrN nano multilayer coating suitable for medium to low hardness carbon steel, alloy steel, stainless steel and titanium alloy in different materials.

Code No. S554-3.0X1-Dc / S554-3.0FX-Dc

Dc 0 -0.02	**Lc** mm	**L** mm	**d** h6	**Z** teeth	**S554-3.0X1** MG AlTiXN	**S554-3.0FX** MG AlCrN
3	9	50	6	4	●	●
4	12	50	6	4	●	●
5	15	50	6	4	●	●
6	18	50	6	4	●	●
8	24	60	8	4	●	●
10	30	75	10	4	●	●
12	36	75	12	4	●	●
16	50	100	16	4	●	●
20	60	120	20	4	●	●

Code No. S555-3.0FX-Dc

Dc 0 -0.02	**Lc** mm	**L** mm	**d** h6	**Z** teeth	**S555-3.0FX** MG AlCrN
6	18	50	6	5	●
8	24	60	8	5	●
10	30	75	10	5	●
12	36	75	12	5	●
16	50	100	16	5	●
20	60	120	20	5	●

Recommended Milling Conditions

OSL® Only Simplicity Last

Side Milling

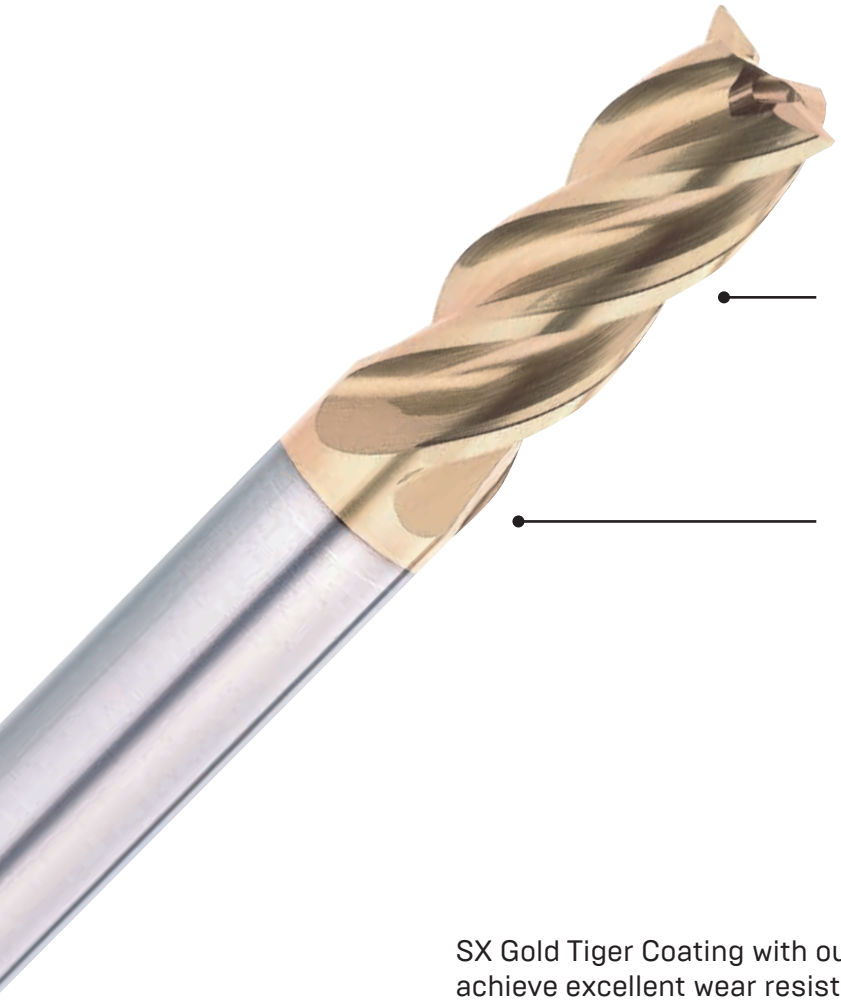
Work Material		GR.1 Carbon Steel		GR.2 Low-alloyed Steel (~24HRC)		GR.3 Hi-alloyed Steel (~30HRC)		GR.4 Hardened Steel (30~38HRC)		GR.5 Hardened Steel (38~48HRC)		GR.8 Stainless Steel		GR.9 Cast Iron		GR.15 Titanium	
Vc m/min		120		120		120		65		60		65		120		30	
Code No. X1=FX	Dc	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)
S554-3.0FX-3	3	12,740	900	12,740	683	12,740	530	6,550	389	6,400	105	6,550	389	10,600	683	3,200	180
S554-3.0FX-4	4	9,555	920	9,555	735	9,555	590	3,950	413	3,800	120	3,950	413	6,350	735	2,400	180
S554-3.0FX-5	5	7,644	900	7,644	875	7,644	625	2,800	448	2,730	125	2,800	448	4,550	875	2,000	190
S554-3.0FX-6	6	6,370	900	6,370	875	6,370	600	2,200	413	2,100	125	2,200	413	3,540	875	1,600	190
S554-3.0FX-8	8	4,778	1,000	4,778	770	4,778	600	1,975	413	1,900	125	1,975	413	3,185	770	1,200	170
S554-3.0FX-10	10	3,822	760	3,822	770	3,822	595	1,645	375	1,595	120	1,645	375	3,650	770	1,000	160
S554-3.0FX-12	12	3,185	560	3,185	670	3,185	560	1,410	350	1,365	120	1,410	350	2,275	670	800	160
S554-3.0FX-16	16	2,389	660	2,389	670	2,389	520	1,230	312	1,190	100	1,230	312	1,990	670	600	150
S554-3.0FX-20	20	1,911	500	1,911	535	1,911	415	985	277	950	90	985	277	1,590	535	480	160
Depth of Cut (mm) 		ap:1.5D		ap:1.5D		ap:1.5D		ap:1.5D		ap:1.5D		ap:1.5D		ap:1.5D		ap:1.5D	
		ae:0.2D		ae:0.2D		ae:0.2D		ae:0.2D		ae:0.1D		ae:0.2D		ae:0.2D		ae:0.1D	

Side Milling

Work Material		GR.1 Carbon Steel		GR.2 Low-alloyed Steel (~24HRC)		GR.3 Hi-alloyed Steel (~30HRC)		GR.4 Hardened Steel (30~38HRC)		GR.5 Hardened Steel (38~48HRC)		GR.8 Stainless Steel		GR.9 Cast Iron		GR.15 Titanium	
Vc m/min		160		140		120		100		80		80		120		60	
Code No. X1=FX	Dc	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)
S555-3.0FX-6	6	8,493	0	7,432	0	6,370	0	5,308	0	4,247	0	4,247	0	6,370	0	3,185	0
S555-3.0FX-8	8	6,370	0	5,574	0	4,778	0	3,981	0	3,185	0	3,185	0	4,778	0	2,389	0
S555-3.0FX-10	10	5,096	0	4,459	0	3,822	0	3,185	0	2,548	0	2,548	0	3,822	0	1,911	0
S555-3.0FX-12	12	4,247	0	3,716	0	3,185	0	2,654	0	2,123	0	2,123	0	3,185	0	1,593	0
S555-3.0FX-16	16	3,185	0	2,787	0	2,389	0	1,991	0	1,593	0	1,593	0	2,389	0	1,194	0
S555-3.0FX-20	20	2,548	0	2,230	0	1,911	0	1,593	0	1,274	0	1,274	0	1,911	0	956	0
Depth of Cut (mm) 		ap:2.5D		ap:1.5D		ap:1.5D		ap:1.5D		ap:1.5D		ap:1.5D		ap:1.5D		ap:1.5D	
		ae:0.1D		ae:0.1D		ae:0.1D		ae:0.1D		ae:0.1D		ae:0.1D		ae:0.2D		ae:0.1D	

1. Please work with good rigidity / high precision facilities and collet chuck.
2. Please choose proper cutting fluid.
3. The cutting data is reference value only. Please adjust it according to your real working conditions.
4. If RPM is lower the reference value, the Feed rate (fz) and RPM should be reduced by the same proportion.
5. If vibration occurs during cutting, please reduce cutting parameter.

S445SX



High rigidity & Anti-vibrations Designed with variable helix geometry, uneven flutes distribution.

Enhance fluting design for high chip evacuation.

Improve heat resistance and wear resistance, enhance tool life by the advanced coating facilities.

SX Gold Tiger Coating with outer layer 'Yellow Gold' ZrN coating to achieve excellent wear resistance, with inner multilayer nano film AlTiSiN coating to perform extreme heat resistance and heat-proof quality.

Premium Cut End Mills

S554-3.0SX

Excellent tool life for the front cutting edge.

Front cutting edge with corner chamfer protection.

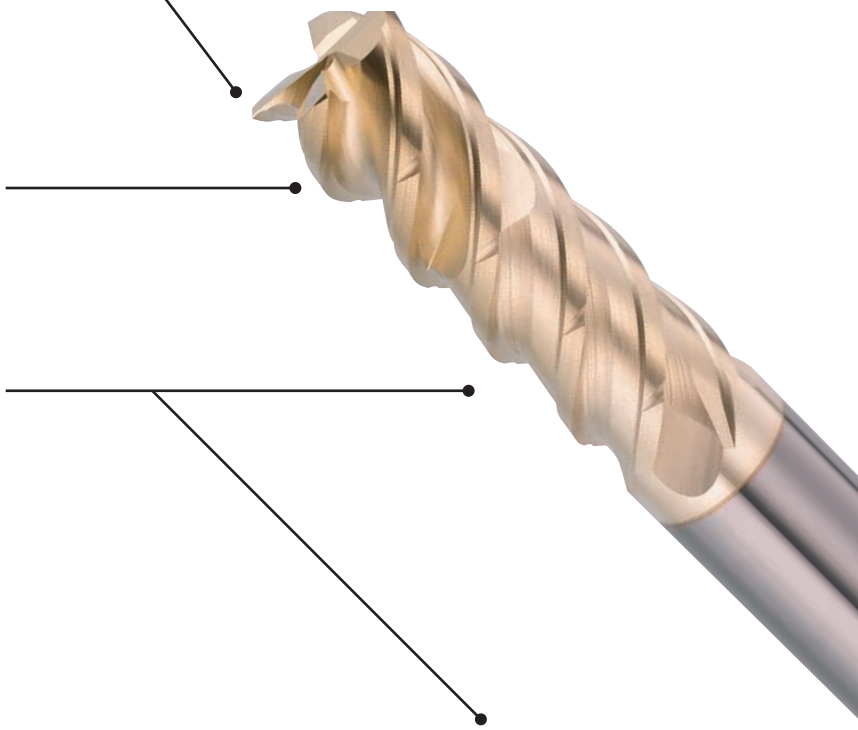
Uneven flutes distribution & high helix design.

Excellent fine surface finishing quality.

Excellent Efficiency chip evacuation

Double fluting with high rigidity design

Excellent efficiency roughing performance.

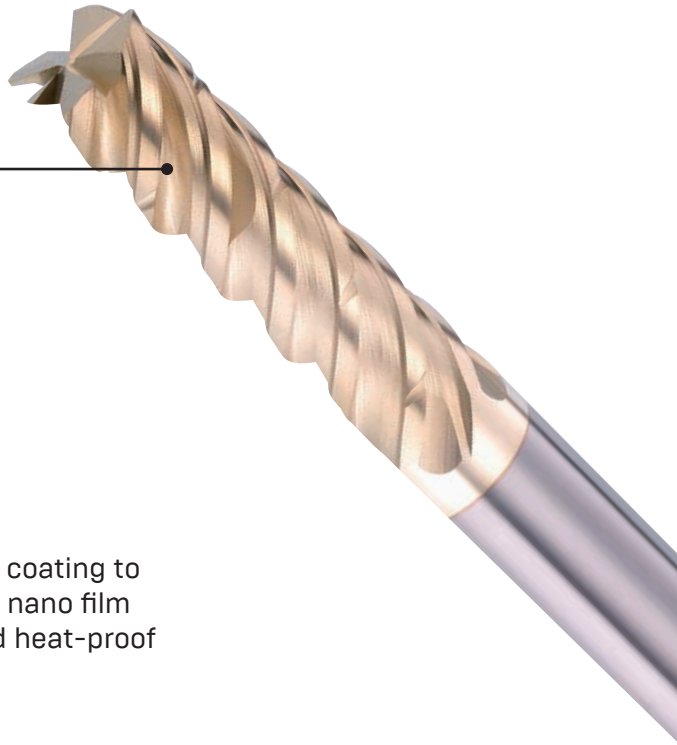


S555-3.0SX

High chip removal rate

separated flutes Chip breaker design, breaking chips effectively

Suitable for high speed trochoidal side milling.

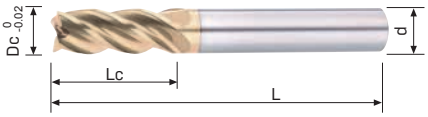


SX Gold Tiger Coating with outer layer 'Yellow Gold' ZrN coating to achieve excellent wear resistance, with inner multilayer nano film AlTiSiN coating to perform extreme heat resistance and heat-proof quality.

Easy Cut End Mills

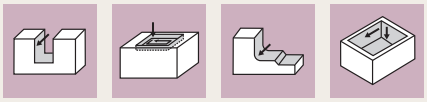
OSL
Only Simplicity Last

S445SX



Tool Material/ Coating Type	MG Carbide	AlTiXZrN
Specification	36°~ 38°	4	N γ8°	90°

Type of Operation



Work Materials (◎ The most recommended/ ○ recommended)

	Carbon Steel	Tool Steel	Pre-hardend Steel			Stainless Steel	Cast Steel	Nonferrous Metals					Aerospace Materials		
	Alloy Steel	Pre-hardend Steel	Hardened Steel												
	~30HRC		~48HRC	~56HRC	~68HRC			Aluminium	Copper	Plastics	Composite Material	Graphite	Titanium	Nickel	Heat- resistant Steel
S445SX	◎		◎			◎	◎						○	○	○

※Feature of product

S445SX Easy Cut End Mills with three variable helix geometry, three unequal flutes with high chip removal rate, and sharp cutting edge. Suitable for roughing, finishing, drilling, and ramping. Work on any cutting direction with high speed condition.

Code No. S445SX-Dc

Dc 0 -0.02	**Lc** mm	**L** mm	**d** h6	**S445SX** MG AlTiXZrN
1	3	50	4	●
1.5	5	50	4	●
2	6	50	4	●
2.5	8	50	4	●
3A	8	50	4	●
4A	11	50	4	●
3	8	50	6	●
4	11	50	6	●
5	13	50	6	●
6	16	50	6	●
8	20	60	8	●
10	25	75	10	●
12	30	75	12	●
14	32	90	16	●
16	40	100	16	●
18	45	100	20	●
20	NEW50(40)	100	20	●

Recommended Milling Conditions

OSL® Only Simplicity Last

Side Milling

Work Material		GR.1 Carbon Steel		GR.2 Low-alloyed Steel (~24HRC)		GR.3 Hi-alloyed Steel (~30HRC)		GR.4 Hardened Steel (30~38HRC)		GR.5 Hardened Steel (38~48HRC)		GR.8 Stainless Steel		GR.9 Cast Iron		GR.15 Titanium	
Vc m/min		120		120		80		65		60		65		120		30	
Code No.	Dc	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)
S445SX-1	1	31,800	240	31,800	240	25,000	210	19,750	180	19,000	85	19,750	180	31,800	240	7,100	50
S445SX-1.5	1.5	21,200	245	21,200	245	16,500	210	13,000	180	12,700	90	13,000	180	21,200	245	5,100	100
S445SX-2	2	15,900	245	15,900	245	12,420	210	9,850	180	9,550	90	9,850	180	15,900	245	4,000	120
S445SX-2.5	2.5	12,700	370	12,700	370	10,000	300	7,900	275	7,600	90	7,900	275	12,700	370	3,200	150
S445SX-3	3	12,700	683	12,700	683	10,000	530	6,550	389	6,400	105	6,550	389	10,600	683	3,200	180
S445SX-4	4	9,550	735	9,550	735	7,640	590	3,950	413	3,800	120	3,950	413	6,350	735	2,400	180
S445SX-5	5	7,640	875	7,640	875	6,100	625	2,800	448	2,730	125	2,800	448	4,550	875	2,000	190
S445SX-6	6	6,300	875	6,300	875	5,000	600	2,200	413	2,100	125	2,200	413	3,540	875	1,600	190
S445SX-8	8	5,000	770	5,000	770	4,000	600	1,975	413	1,900	125	1,975	413	3,185	770	1,200	170
S445SX-10	10	3,800	770	3,800	770	3,000	595	1,645	375	1,595	120	1,645	375	3,650	770	1,000	160
S445SX-12	12	2,275	670	2,275	670	1,770	560	1,410	350	1,365	120	1,410	350	2,275	670	800	160
S445SX-14	14	2,130	670	2,130	670	1,660	540	1,320	320	1,270	110	1,320	320	2,130	670	700	150
S445SX-16	16	1,990	670	1,990	670	1,550	520	1,230	312	1,190	100	1,230	312	1,990	670	600	150
S445SX-18	18	1,790	580	1,790	580	1,400	450	1,100	300	1,070	100	1,100	300	1,790	580	540	150
S445SX-20	20	1,590	535	1,590	535	1,240	415	985	277	950	90	985	277	1,590	535	480	160
Depth of Cut (mm) 		ap:1.5D		ap:1.5D		ap:1.5D		ap:1.5D		ap:1.5D		ap:1.5D		ap:1.5D		ap:1.5D	
		ae:0.2D		ae:0.2D		ae:0.2D		ae:0.2D		ae:0.1D		ae:0.2D		ae:0.2D		ae:0.1D	

Slotting

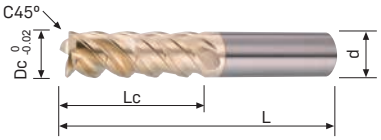
Work Material		GR.1 Carbon Steel		GR.2 Low-alloyed Steel (~24HRC)		GR.3 Hi-alloyed Steel (~30HRC)		GR.4 Hardened Steel (30~38HRC)		GR.5 Hardened Steel (38~48HRC)		GR.8 Stainless Steel		GR.9 Cast Iron		GR.15 Titanium	
Vc m/min		120		120		80		65		60		65		120		30	
Code No.	Dc	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)
S445SX-1	1	31,800	200	31,800	200	25,000	180	19,750	150	19,000	85	19,750	150	31,800	200	7,100	50
S445SX-1.5	1.5	21,200	200	21,200	200	16,500	180	13,000	150	12,700	90	13,000	150	21,200	200	5,100	80
S445SX-2	2	15,900	220	15,900	220	12,420	180	9,850	150	9,550	90	9,850	150	15,900	220	4,000	100
S445SX-2.5	2.5	12,700	330	12,700	330	10,000	220	7,900	175	7,600	90	7,900	175	12,700	330	3,200	100
S445SX-3	3	12,700	600	12,700	600	10,000	430	6,550	290	6,400	105	6,550	290	10,600	600	3,200	130
S445SX-4	4	9,550	635	9,550	635	7,640	500	3,950	325	3,800	120	3,950	325	6,350	635	2,400	150
S445SX-5	5	7,640	775	7,640	775	6,100	525	2,800	348	2,730	125	2,800	348	4,550	775	2,000	160
S445SX-6	6	6,300	775	6,300	775	5,000	500	2,200	313	2,100	125	2,200	313	3,540	775	1,600	145
S445SX-8	8	5,000	650	5,000	650	4,000	500	1,975	313	1,900	125	1,975	313	3,185	650	1,200	120
S445SX-10	10	3,800	670	3,800	670	3,000	490	1,645	288	1,595	120	1,645	288	3,650	670	1,000	145
S445SX-12	12	2,275	560	2,275	560	1,770	460	1,410	275	1,365	120	1,410	275	2,275	560	800	150
S445SX-14	14	2,130	600	2,130	600	1,660	440	1,320	260	1,270	110	1,320	260	2,130	600	700	150
S445SX-16	16	1,990	660	1,990	660	1,550	420	1,230	240	1,190	100	1,230	240	1,990	660	600	150
S445SX-18	18	1,790	580	1,790	580	1,400	390	1,100	220	1,070	100	1,100	220	1,790	580	540	140
S445SX-20	20	1,590	500	1,590	500	1,240	360	985	200	950	90	985	200	1,590	500	480	130
Depth of Cut (mm) 		ap:0.5D		ap:0.5D		ap:0.5D		ap:0.5D		ap:0.05D		ap:0.5D		ap:0.5D		ap:0.05D	

1. Please work with good rigidity / high precision facilities and collet chuck.
2. Please choose proper cutting fluid.
3. The cutting data is reference value only. Please adjust it according to your real working conditions.
4. If RPM is lower the reference value, the Feed rate (fz) and RPM should be reduced by the same proportion.
5. If vibration occurs during cutting, please reduce cutting parameter.

Premium Cut End Mills (Chamfer Corner)

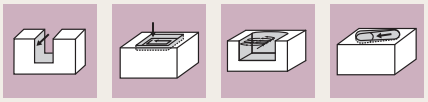
OSL
Only Simplicity Last

S554-3.0SX



Tool Material/ Coating Type	MG Carbide	AlTiXZrN
Specification	   	

Type of Operation



Work Materials (◎ The most recommended/ ○ recommended)

Carbon Steel	Tool Steel	Pre-hardend Steel			Stainless Steel	Cast Steel	Nonferrous Metals					Aerospace Materials		
Alloy Steel	Pre-hardend Steel	Hardened Steel												
~30HRC		~48HRC	~56HRC	~68HRC			Aluminium	Copper	Plastics	Composite Material	Graphite	Titanium	Nickel	Heat- resistant Steel
S554-3.0SX	◎	◎			◎							◎	◎	◎

※Feature of product

S554-3.0SX - High-Efficiency, High-Precision End Mills, with four variable helix geometry, dual core with high rigidity design, high helix and separated chip breaker flutes design.

Excellent performance in roughing and finishing, Front cutting edge with corner chamfer protection.

Suitable for high speed trochoidal side-milling.

Code No. S554-3.0SX-Dc×C45°

Dc 0 -0.02	C45° mm	**Lc** mm	**L** mm	**d** h6	**S554-3.0SX** MG AlTiXZrN
6	0.09	18	50	6	●
8	0.12	24	60	8	●
10	0.15	30	75	10	●
12	0.18	36	75	12	●
16	0.24	50	100	16	●
20	0.30	60	120	20	●

Recommended Milling Conditions

OSL Only Simplicity Last

Side Milling

Work Material		GR.1 /GR.2 /GR.3 Carbon Steels/Low-alloyed Steel/Hi-alloyed Steel (~24HRC) (~30HRC)		GR.4 /GR.5 Hardened Steel/Hardened Steel (30~38HRC) (38~48HRC)		GR.8 Stainless Steel		GR.15 Titanium		GR.15 Nickel	
Vc m/min		140		100		80		80		50	
Code No.	Dc	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)
S554-3.0SX-6	6	7432	1486	5308	1359	4247	849	4247	849	2654	531
S554-3.0SX-8	8	5574	1338	3981	1529	3185	764	3185	892	1991	438
S554-3.0SX-10	10	4459	1249	3185	1427	2548	713	2548	815	1593	382
S554-3.0SX-12	12	3716	1189	2654	1359	2123	679	2123	764	1327	345
S554-3.0SX-16	16	2787	1003	1991	1019	1593	573	1593	637	995	279
S554-3.0SX-20	20	2230	892	1593	917	1274	510	1274	510	796	255
Depth of Cut (mm) 		ap:2.0D		ap:2.0D		ap:2.0D		ap:2.0D		ap:2.0D	
		ae:0.12D		ae:0.1D		ae:0.1D		ae:0.05D		ae:0.05D	

High SpeedSide Milling

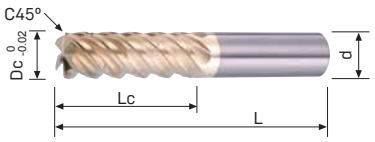
Work Material		GR.1 /GR.2 /GR.3 Carbon Steels/Low-alloyed Steel/Hi-alloyed Steel (~24HRC) (~30HRC)		GR.4 /GR.5 Hardened Steel/Hardened Steel (30~38HRC) (38~48HRC)		GR.8 Stainless Steel		GR.15 Titanium		GR.15 Nickel	
Vc m/min		200		160		130		130		100	
Code No.	Dc	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)
S554-3.0SX-6	6	10617	2973	8493	1359	6901	1380	6901	828	5308	637
S554-3.0SX-8	8	7963	2548	6370	1274	5176	1242	5176	828	3981	478
S554-3.0SX-10	10	6370	2293	5096	1631	4141	1159	4141	994	3185	382
S554-3.0SX-12	12	5308	2123	4247	1699	3450	1104	3450	897	2654	319
S554-3.0SX-16	16	3981	1752	3185	1274	2588	932	2588	725	1991	239
S554-3.0SX-20	20	3185	1529	2548	1223	2070	828	2070	662	1593	191
Depth of Cut (mm) 		ap:2.0D		ap:2.0D		ap:2.0D		ap:2.0D		ap:2.0D	
		ae:0.1D		ae:0.05D		ae:0.1D		ae:0.05D		ae:0.05D	

1. Please work with good rigidity / high precision facilities and collet chuck.
2. Please choose proper cutting fluid.
3. The cutting data is reference value only. Please adjust it according to your real working conditions.
4. If RPM is lower the reference value, the Feed rate (fz) and RPM should be reduced by the same proportion.
5. If vibration occurs during cutting, please reduce cutting parameter.

Premium Cut End Mills (Chamfer Corner • Chipbreaker)

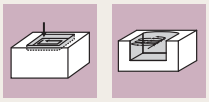
OSL Only Simplicity Last

S555-3.0SX



Tool Material/ Coating Type	MG Carbide	AlTiXZrN
Specification	48°	5 / N / γ8° / 0.09-0.3 / 45°

Type of Operation



Work Materials (◎ The most recommended/ ○ recommended)

Carbon Steel	Tool Steel	Pre-hardend Steel			Stainless Steel	Cast Steel	Nonferrous Metals					Aerospace Materials		
Alloy Steel	Pre-hardend Steel	Hardened Steel												
~30HRC		~48HRC	~56HRC	~68HRC			Aluminium	Copper	Plastics	Composite Material	Graphite	Titanium	Nickel	Heat- resistant Steel
S555-3.0SX ◎		◎			◎							◎	◎	◎

※Feature of product

S555-3.0SX - High-Efficiency, High-Precision End Mills, with five variable helix geometry, dual core with high rigidity design, high helix and separated chip breaker flutes design.

Excellent performance in roughing and finishing, Front cutting edge with corner chamfer protection.

Suitable for high speed trochoidal side-milling.

Code No. S555-3.0SX-Dc×C45°

Dc 0 -0.02	C45° mm	**Lc** mm	**L** mm	**d** h6	**S555-3.0SX** MG AlTiXZrN
6	0.09	18	50	6	●
8	0.12	24	60	8	●
10	0.15	30	75	10	●
12	0.18	36	75	12	●
16	0.24	50	100	16	●
20	0.30	60	120	20	●

Recommended Milling Conditions

OSL
Only Simplicity Last

Side Milling

Work Material		GR.1 /GR.2 /GR.3 Carbon Steels/Low-alloyed Steel/Hi-alloyed Steel (~24HRC) (~30HRC)		GR.4 /GR.5 Hardened Steel/Hardened Steel (30~38HRC) (38~48HRC)		GR.8 Stainless Steel		GR.15 Titanium		GR.15 Nickel	
Vc m/min		140		100		80		80		50	
Code No.	Dc	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)
S555-3.0SX-6	6	7432	1188	5308	1090	4247	680	4247	680	2654	425
S555-3.0SX-8	8	5574	1070	3981	1225	3185	610	3185	715	1991	350
S555-3.0SX-10	10	4459	1100	3185	1140	2548	570	2548	650	1593	305
S555-3.0SX-12	12	3716	950	2654	1090	2123	545	2123	610	1327	275
S555-3.0SX-16	16	2787	800	1991	815	1593	460	1593	510	995	225
S555-3.0SX-20	20	2230	715	1593	735	1274	410	1274	410	796	200
Depth of Cut (mm) 		ap:2.0D		ap:2.0D		ap:2.0D		ap:2.0D		ap:2.0D	
		ae:0.12D		ae:0.1D		ae:0.1D		ae:0.05D		ae:0.05D	

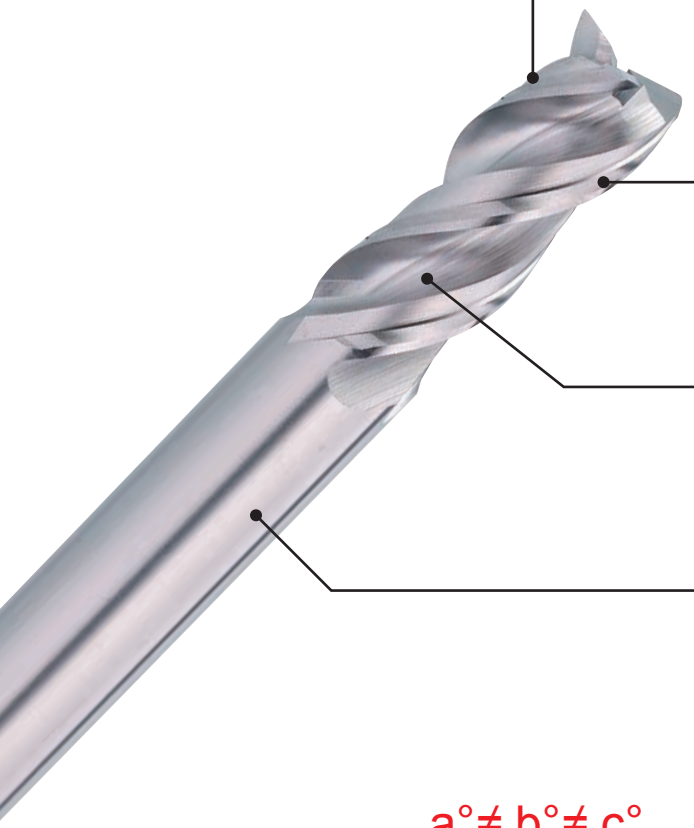
High SpeedSide Milling

Work Material		GR.1 /GR.2 /GR.3 Carbon Steels/Low-alloyed Steel/Hi-alloyed Steel (~24HRC) (~30HRC)		GR.4 /GR.5 Hardened Steel/Hardened Steel (30~38HRC) (38~48HRC)		GR.8 Stainless Steel		GR.15 Titanium		GR.15 Nickel	
Vc m/min		200		160		130		130		100	
Code No.	Dc	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)
S555-3.0SX-6	6	10617	2380	8493	1090	6901	1100	6901	660	5308	510
S555-3.0SX-8	8	7963	2040	6370	1020	5176	995	5176	660	3981	380
S555-3.0SX-10	10	6370	1835	5096	1300	4141	930	4141	795	3185	305
S555-3.0SX-12	12	5308	1700	4247	1360	3450	880	3450	720	2654	255
S555-3.0SX-16	16	3981	1400	3185	1020	2588	745	2588	580	1991	190
S555-3.0SX-20	20	3185	1225	2548	980	2070	660	2070	530	1593	150
Depth of Cut (mm) 		ap:2.0D		ap:2.0D		ap:2.0D		ap:2.0D		ap:2.0D	
		ae:0.1D		ae:0.05D		ae:0.1D		ae:0.05D		ae:0.05D	

1. Please work with good rigidity / high precision facilities and collet chuck.
2. Please choose proper cutting fluid.
3. The cutting data is reference value only. Please adjust it according to your real working conditions.
4. If RPM is lower the reference value, the Feed rate (fz) and RPM should be reduced by the same proportion.
5. If vibration occurs during cutting, please reduce cutting parameter.

Two in One - Roughing & Finishing

S450



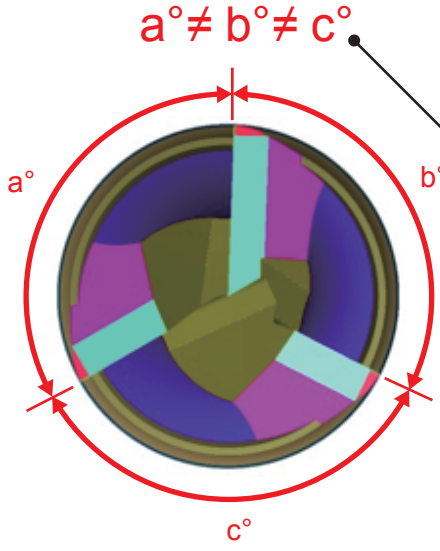
Anti breakage resistance. Variable helix geometry design with big evacuation flutes. Anti- breakage cutter design.

Good quality of cutting edge surface Cutting edge with Mirror grinding finishing, prevent chip adhesion while machining.

Side wall surface finishing without shadow during cutting.

High chip removal rate. Big volume fluting design, provide cutter with high volume chip removal rate.

Anti breakage resistance. Selected superior carbide grade, improved impact resistance.



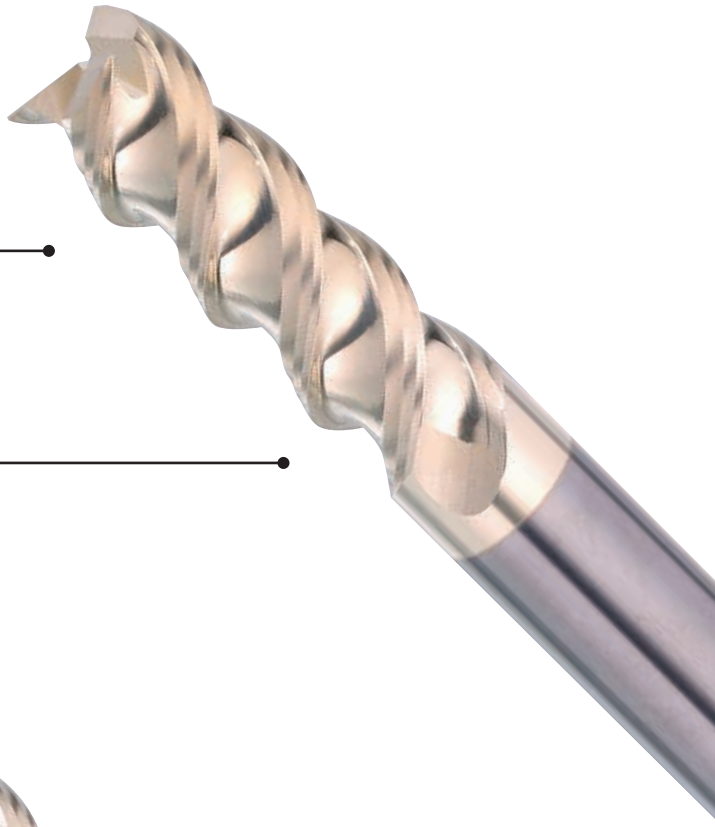
Anti Vibration Uneven flutes distribution design, reduce vibration during cutting.

Unique front cutting edge design Perform high feed cutting without chipping. Provide high precision flatness for surface milling finishing.

Twin Twisters

High Rigidity

Best for Semi & Finishing



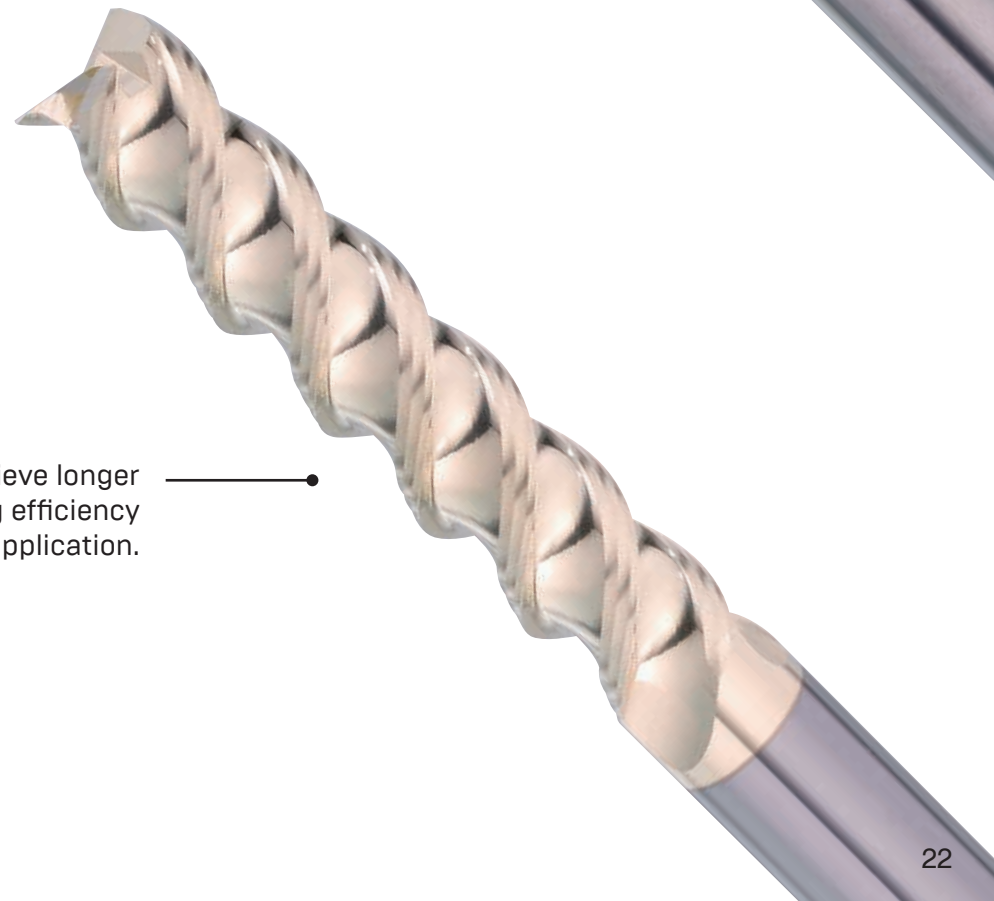
S250-3.0ZX

Design with special curvature flutes, mirror surface of small edge cutting land Thick core diameter strengthen its rigidity

High helix design provide good cutting surface quality.

ZrN Shining gold coating, provide smoothness and reduce cutting friction. Prevent from chemical affinity with Alu metal,

improve surface hardness Enhance cutter tool life.



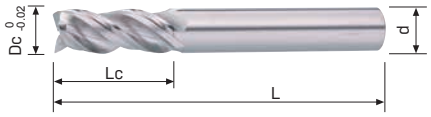
S250-4.0ZX

4XD long cutting length Achieve longer cutting length, increase cutting efficiency Performance 'Twister' cutting application.

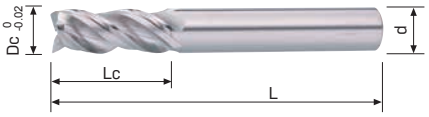
Alu Cut End Mills

OSL Only Simplicity Last

S450

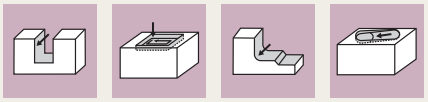


S450-3.0 / S450-4.0



Tool Material/ Coating Type	MG Carbide	Uncoated Bright
Specification		

Type of Operation



Work Materials (◎ The most recommended/ ○ recommended)

	Carbon Steel	Tool Steel	Pre-hardend Steel			Stainless Steel	Cast Steel	Nonferrous Metals					Aerospace Materials		
	Alloy Steel	Pre-hardend Steel	Hardened Steel					Aluminium	Copper	Plastics	Composite Material	Graphite	Titanium	Nickel	Heat- resistant Steel
	~30HRC		~48HRC	~56HRC	~68HRC										
S450								◎		◎					
S450-3.0								◎		◎					
S450-4.0								◎		◎					

※Feature of product

S450 / S450-3.0 / S450-4.0 Strong and rigid Aluminium End Mills Design with three variable helix and three unequal flutes geometric, improve the high efficiency for slotting, with excellent finishing on side milling.

Code No. S450-Dc

Dc 0 -0.02	**Lc** mm	**L** mm	**d** h6	**S450** MG Bright
1	3	50	4	●
1.5	5	50	4	●
2	6	50	4	●
2.5	8	50	4	●
3A	8	50	4	●
4A	11	50	4	●
3	8	50	6	●
4	11	50	6	●
5	13	50	6	●
6	16	50	6	●
8	20	60	8	●
10	25	75	10	●
12	30	75	12	●
16	40	100	16	●
20	50	100	20	●

Code No. S450-3.0-Dc

Dc 0 -0.02	**Lc** mm	**L** mm	**d** h6	**S450-3.0** MG Bright
3	9	50	6	●
4	12	50	6	●
5	15	50	6	●
6	18	50	6	●
8	24	60	8	●
10	30	75	10	●
12	36	75	12	●
16	50	100	16	●
20	60	120	20	●

Code No. S450-4.0-Dc

Dc 0 -0.02	**Lc** mm	**L** mm	**d** h6	**S450-4.0** MG Bright
6	25	75	6	●
8	35	75	8	●
10	45(40)	100	10	●
12	50	100	12	●
16	65	120	16	●
20	80	140	20	●

Recommended Milling Conditions

OSL® Only Simplicity Last

Side Milling

Work Material		GR.10 Aluminium	
Vc m/min		400	
Code No.	Dc	RPM (min-1)	Feed (mm/min)
S450-1	1	63,000	1,890
S450-1.5	1.5	50,000	1,500
S450-2	2	45,000	1,755
S450-2.5	2.5	42,000	1,800
S450-3	3	40,000	1,800
S450-4	4	29,500	2,100
S450-5	5	24,000	2,100
S450-6	6	20,000	2,300
S450-8	8	15,200	2,500
S450-10	10	12,000	2,850
S450-12	12	10,000	3,000
S450-16	16	7,600	3,000
S450-20	20	6,000	2,500
Depth of Cut (mm) 		ap:1.5D	
		ae:0.1D	

Slotting

Work Material		GR.10 Aluminium		GR.12 Plastics	
Vc m/min		400		400	
Code No.	Dc	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)
S450-1	1	63,000	1,320	63,000	1,580
S450-1.5	1.5	50,000	1,050	50,000	1,200
S450-2	2	45,000	1,230	45,000	1,470
S450-2.5	2.5	42,000	1,260	42,000	1,500
S450-3	3	40,000	1,340	40,000	1,600
S450-4	4	29,500	1,400	29,500	1,680
S450-5	5	24,000	1,480	24,000	1,770
S450-6	6	20,000	1,640	20,000	1,970
S450-8	8	15,200	1,720	15,200	2,060
S450-10	10	12,000	1,940	12,000	2,330
S450-12	12	10,000	2,100	10,000	2,520
S450-16	16	7,600	2,100	7,600	2,520
S450-20	20	6,000	1,800	6,000	2,160
Depth of Cut (mm) 		ap:0.5D		ap:0.5D	

1. Please work with good rigidity / high precision facilities and collet chuck.
2. Please choose proper cutting fluid.
3. The cutting data is reference value only. Please adjust it according to your real working conditions.
4. If RPM is lower the reference value, the Feed rate (fz) and RPM should be reduced by the same proportion.
5. If vibration occurs during cutting, please reduce cutting parameter.

End Mills For Aluminium

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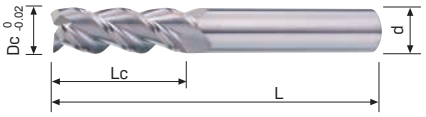
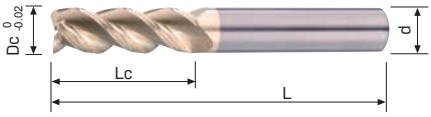
S245-3.0

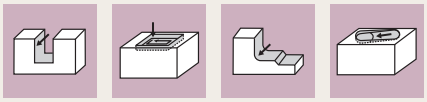


S245-3.0ZX



Tool Material/ Coating Type	MG Carbide	Bright ZrN
Specification	45°	3 / H / γ12° / 90°

Type of Operation



Work Materials (◎ The most recommended/ ○ recommended)

Carbon Steel	Tool Steel	Pre-hardend Steel			Stainless Steel	Cast Steel	Nonferrous Metals					Aerospace Materials		
Alloy Steel	Pre-hardend Steel	Hardened Steel												
~30HRC		~48HRC	~56HRC	~68HRC			Aluminium	Copper	Plastics	Composite Material	Graphite	Titanium	Nickel	Heat- resistant Steel
S245-3.0							◎	◎						
S245-3.0ZX							◎	◎						

※Feature of product

S245-3.0 General Alu End Mills

For various applications in machining Aluminium from roughing to finishing, provide good cutting quality

S245-3.0ZX General Alu End Mills

With 45° helix angle and sharp cutting edge design, for various applications on Aluminium machining from roughing to finishing, with good cutting quality.

With ZrN coating which is excluded AlTi formula would prevent from chemical affinity with Alu metal and to have better surface hardness, smoothness and reduce cutting friction to enhance tool life.

Code No. S245-3.0-Dc / S245-3.0ZX-Dc

Dc 0 -0.02	**Lc** mm	**L** mm	**d** h6	**S245-3.0** MG Bright	**S245-3.0ZX** MG ZrN
1	3	50	4	●	●
1.5	5	50	4	●	●
2	6	50	4	●	●
2.5	8	50	4	●	●
3A	9	50	4	●	●
4A	12	50	4	●	●
3	9	50	6	●	●
4	12	50	6	●	●
5	15	50	6	●	●
6	18	50	6	●	●
8	24	60	8	●	●
10	30	75	10	●	●
12	36	75	12	●	●
16	50	100	16	●	●
20	60	120	20	●	●

Recommended Milling Conditions

OSL
Only Simplicity Last

Side Milling

Work Material		GR.10 Aluminium	
Vc m/min		400	
Code No.	Dc	RPM (min-1)	Feed (mm/min)
S245/S245ZX-1	1	63,000	1,890
S245/S245ZX-1.5	1.5	50,000	1,500
S245/S245ZX-2	2	45,000	1,755
S245/S245ZX-2.5	2.5	42,000	1,800
S245/S245ZX-3	3	40,000	1,800
S245/S245ZX-4	4	29,500	2,100
S245/S245ZX-5	5	24,000	2,100
S245/S245ZX-6	6	20,000	2,300
S245/S245ZX-8	8	15,200	2,500
S245/S245ZX-10	10	12,000	2,850
S245/S245ZX-12	12	10,000	3,000
S245/S245ZX-16	16	7,600	3,000
S245/S245ZX-20	20	6,000	2,500
Depth of Cut (mm) 		ap:1.5D	
		ae:0.1D	

Slotting

Work Material		GR.10 Aluminium	
Vc m/min		400	
Code No.	Dc	RPM (min-1)	Feed (mm/min)
S245/S245ZX-1	1	63,000	1,320
S245/S245ZX-1.5	1.5	50,000	1,050
S245/S245ZX2	2	45,000	1,230
S245/S245ZX-2.5	2.5	42,000	1,260
S245/S245ZX-3	3	40,000	1,340
S245/S245ZX-4	4	29,500	1,400
S245/S245ZX-5	5	24,000	1,480
S245/S245ZX-6	6	20,000	1,640
S245/S245ZX-8	8	15,200	1,720
S245/S245ZX-10	10	12,000	1,940
S245/S245ZX-12	12	10,000	2,100
S245/S245ZX-16	16	7,600	2,100
S245/S245ZX-20	20	6,000	1,800
Depth of Cut (mm) 		ap:0.5D	

1. Please work with good rigidity / high precision facilities and collet chuck.
2. Please choose proper cutting fluid.
3. The cutting data is reference value only. Please adjust it according to your real working conditions.
4. If RPM is lower the reference value, the Feed rate (fz) and RPM should be reduced by the same proportion.
5. If vibration occurs during cutting, please reduce cutting parameter.

End Mills For Aluminium

OSL
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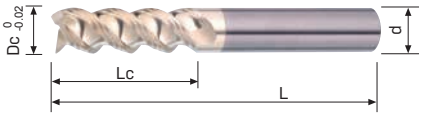
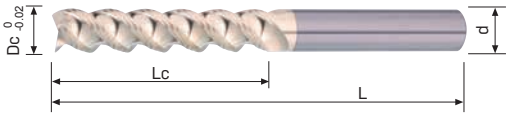
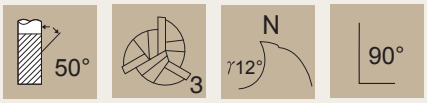
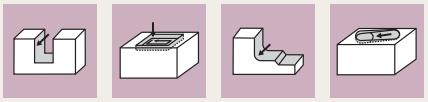
S250-3.0ZX



S250-4.0ZX



Tool Material/ Coating Type	MG Carbide	Bright ZrN
Specification		
Type of Operation		

Work Materials (◎ The most recommended/ ○ recommended)

Carbon Steel	Tool Steel	Pre-hardend Steel			Stainless Steel	Cast Steel	Nonferrous Metals					Aerospace Materials		
Alloy Steel	Pre-hardend Steel	Hardened Steel												
~30HRC		~48HRC	~56HRC	~68HRC			Aluminium	Copper	Plastics	Composite Material	Graphite	Titanium	Nickel	Heat- resistant Steel
S250-3.0ZX							◎							
S250-4.0ZX							◎							

※Feature of product

S250-3.0ZX General Round Flutes End Mills for Aluminium

With special curvature, the mirror surface cutting edge with a small cutting land is designed for various applications on Aluminium materials.

Machining in high efficiency from roughing to finishing, obtain a good mirror surface quality.

With ZrN coating which is excluded AlTi formula would prevent from chemical affinity with Alu metal and to have better surface hardness, smoothness and reduce cutting friction to enhance tool life.

S250-4.0ZX General Round Flutes Long Length End Mills for Aluminium

With special curvature, the mirror surface cutting edge with a small cutting land is designed for various applications on Aluminium materials. Machining in high efficiency from semi to finishing, obtain a good mirror surface.

With ZrN coating which is excluded AlTi formula would prevent from chemical affinity with Alu metal and to have better surface hardness, smoothness and reduce cutting friction to enhance tool life.

Code No. S250-3.0-Dc / S250-3.0ZX-Dc

Dc 0 -0.02	**Lc** mm	**L** mm	**d** h6	**S250-3.0** MG Bright	**S250-3.0ZX** MG ZrN
3A	9	50	4	●	●
4A	12	50	4	●	●
3	9	50	6	●	●
4	12	50	6	●	●
5	15	50	6	●	●
6	18	50	6	●	●
7	21	60	8	●	●
8	24	60	8	●	●
9	27	75	10	●	●
10	30	75	10	●	●
12	36	75	12	●	●
16	50	100	16	●	●
20	60	120	20	●	●

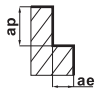
Code No. S250-4.0-Dc / S250-4.0ZX-Dc

Dc 0 -0.02	**Lc** mm	**L** mm	**d** h6	**S250-4.0** MG Bright	**S250-4.0ZX** MG ZrN
6	25	75	6	●	●
8	35	75	8	●	●
10	45(40)	100	10	●	●
12	50	100	12	●	●
16	65	120	16	●	●
20	80	140	20	●	●

Recommended Milling Conditions

OSL® Only Simplicity Last

Side Milling

Work Material		GR.10 Aluminium	
Vc m/min		400	
Code No.	Dc	RPM (min-1)	Feed (mm/min)
S250-3.0-3	3	26,500	1,600
S250-3.0-4	4	19,900	2,000
S250-3.0-5	5	16,000	1,550
S250-3.0-6	6	13,500	2,300
S250-3.0-7	7	11,750	2,350
S250-3.0-8	8	10,000	2,400
S250-3.0-9	9	9,000	2,400
S250-3.0-10	10	8,000	2,400
S250-3.0-12	12	6,600	2,200
S250-3.0-16	16	5,000	2,100
S250-3.0-20	20	4,000	2,000
Depth of Cut (mm) 		ap:1.5D ae:0.1D	

Slotting

Work Material		GR.10 Aluminium	
Vc m/min		400	
Code No.	Dc	RPM (min-1)	Feed (mm/min)
S250-3.0-3	3	26,500	1,440
S250-3.0-4	4	19,900	1,800
S250-3.0-5	5	16,000	1,400
S250-3.0-6	6	13,500	2,000
S250-3.0-7	7	11,750	2,080
S250-3.0-8	8	10,000	2,160
S250-3.0-9	9	9,000	2,180
S250-3.0-10	10	8,000	2,200
S250-3.0-12	12	6,600	2,000
S250-3.0-16	16	5,000	1,900
S250-3.0-20	20	4,000	1,700
Depth of Cut (mm) 		ap:0.5D	

1. Please work with good rigidity / high precision facilities and collet chuck.
2. Please choose proper cutting fluid.
3. The cutting data is reference value only. Please adjust it according to your real working conditions.
4. If RPM is lower the reference value, the Feed rate (fz) and RPM should be reduced by the same proportion.
5. If vibration occurs during cutting, please reduce cutting parameter.

Ball Nose End Mills For Aluminium

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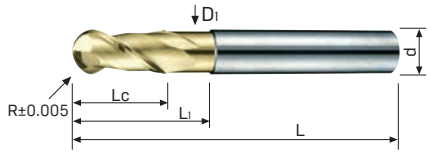
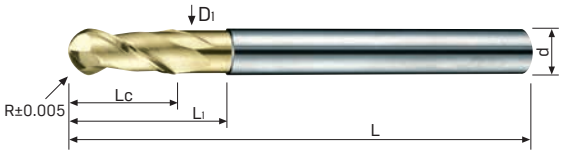
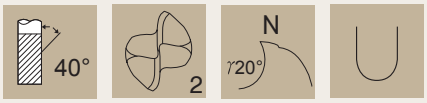
S618ZX



S620ZX



Tool Material/ Coating Type	UMG Carbide — Bright / ZrN
Specification	
Type of Operation	

Work Materials (◎ The most recommended/ ○ recommended)

Carbon Steel	Tool Steel	Pre-hardend Steel			Stainless Steel	Cast Steel	Nonferrous Metals					Aerospace Materials		
Alloy Steel	Pre-hardend Steel	Hardened Steel												
~30HRC		~48HRC	~56HRC	~68HRC			Aluminium	Copper	Plastics	Composite Material	Graphite	Titanium	Nickel	Heat- resistant Steel
S618ZX							◎							
S620ZX							◎							

※Feature of product

S618ZX / S620ZX Ball Nose End Mills for Aluminium
40° helix with mirror shine grinding on radius cutting edge and side cutting edge.
Various applications on Aluminium for contour profile milling.
With ZrN coating which is excluded AlTi formula would prevent from chemical affinity with Alu metal and to have better surface hardness, smoothness and reduce cutting friction to enhance tool life.

Code No. S618ZX-Dc

Dc 0 -0.02	**R** ±0.005	**Lc** mm	**L** mm	**d** mm	**L1** mm	**D1** h5	**S618** MG Bright	**S618ZX** UMG ZrN
1	0.5R	2	50	4	3	0.9	●	●
2	1R	4	50	4	6	1.9	●	●
3	1.5R	6	57	6	9	2.8	●	●
4	2R	8	57	6	12	3.7	●	●
5	2.5R	10	57	6	15	4.6	●	●
6	3R	12	57	6	20	5.5	●	●
8	4R	16	63	8	26	7.4	●	●
10	5R	20	72	10	31	9.2	●	●
12	6R	24	83	12	37	11	●	●

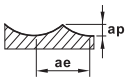
Code No. S620ZX-Dc

Dc 0 -0.02	**R** ±0.005	**Lc** mm	**L** mm	**d** mm	**L1** mm	**D1** h5	**S620** MG Bright	**S620ZX** UMG ZrN
3	1.5R	6	70	6	9	2.8	●	●
4	2R	8	70	6	12	3.7	●	●
5	2.5R	10	80	6	15	4.6	●	●
6	3R	12	80	6	20	5.5	●	●
8	4R	16	100	8	26	7.4	●	●
10	5R	20	100	10	31	9.2	●	●
12	6R	24	110	12	37	11	●	●

Recommended Milling Conditions

OSL® Only Simplicity Last

High-speed machining

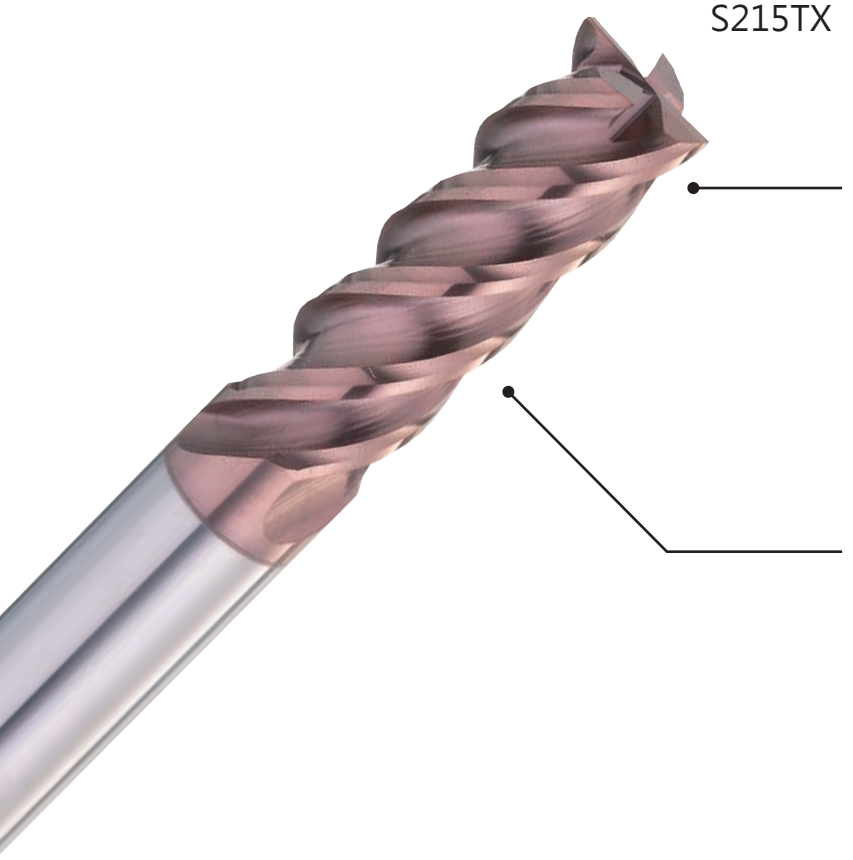
Work Material		GR.10-1 Wrought Aluminium alloys		GR.10-2 Aluminium cast alloys <10%		GR.10-3 Aluminium cast alloys >10%	
Vc m/min		400		400		350	
Code No.	Dc	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)
S618ZX/S620ZX-R1.5	3	42,463	5,350	42,463	5,350	37,155	4,682
S618ZX/S620ZX-R2	4	31,847	5,605	31,847	5,605	27,866	4,904
S618ZX/S620ZX-R2.5	5	25,478	6,369	25,478	6,369	22,293	5,573
S618ZX/S620ZXR3	6	21,231	7,134	21,231	7,134	18,577	6,242
S618ZX/S620ZX-R4	8	15,924	7,643	15,924	7,643	13,933	6,688
S618ZX/S620ZX-R5	10	12,739	8,408	12,739	8,408	11,146	7,357
S618ZX/S620ZX-R6	12	10,616	8,153	10,616	8,153	9,289	7,134
Depth of Cut (mm) 		ap:0.02D		ap:0.02D		ap:0.02D	
		ae:0.02D		ae:0.02D		ae:0.02D	

1. Please work with good rigidity / high precision facilities and collet chuck.
2. Please choose proper cutting fluid.
3. The cutting data is reference value only. Please adjust it according to your real working conditions.
4. If RPM is lower the reference value, the Feed rate (fz) and RPM should be reduced by the same proportion.
5. If vibration occurs during cutting, please reduce cutting parameter.

High Performance End Mills

Economy High Performance Series

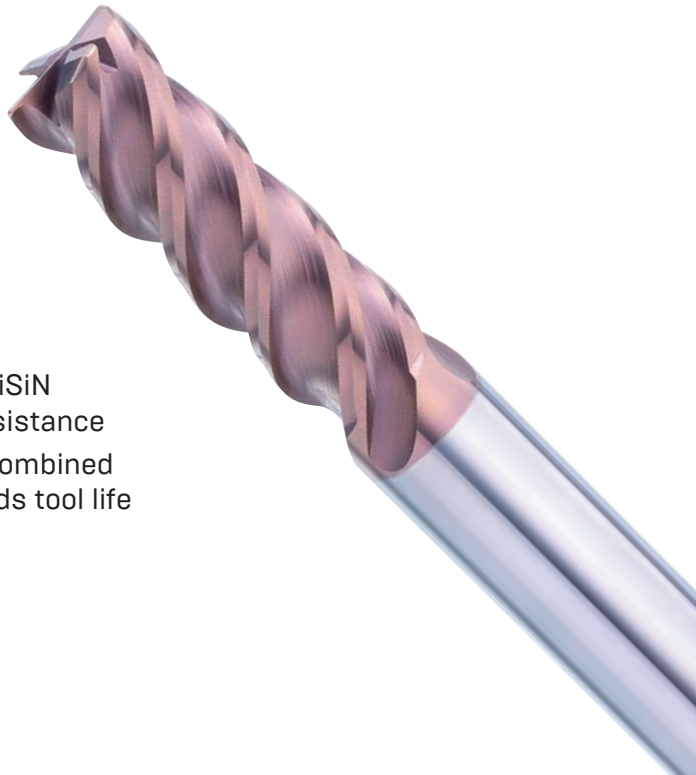
S215TX



High wear resistance Positive rake angle with AlTiSiN coating Excellent wear resistance

High rigidity & Anti-vibrations Designed with double helix round flutes geometry, 42°/45° helix angle

Uneven flutes distribution for anti-vibration.



S216-3.0TX

TX Bronze Tiger Coating with outer layer of Bronze AlTiSiN multilayer nano film coating, perform extreme heat resistance and provide heat-proof quality. AlTiCrN coating base combined with solid carbide increase the wear resistance, extends tool life while cutting steels and stainless steels.

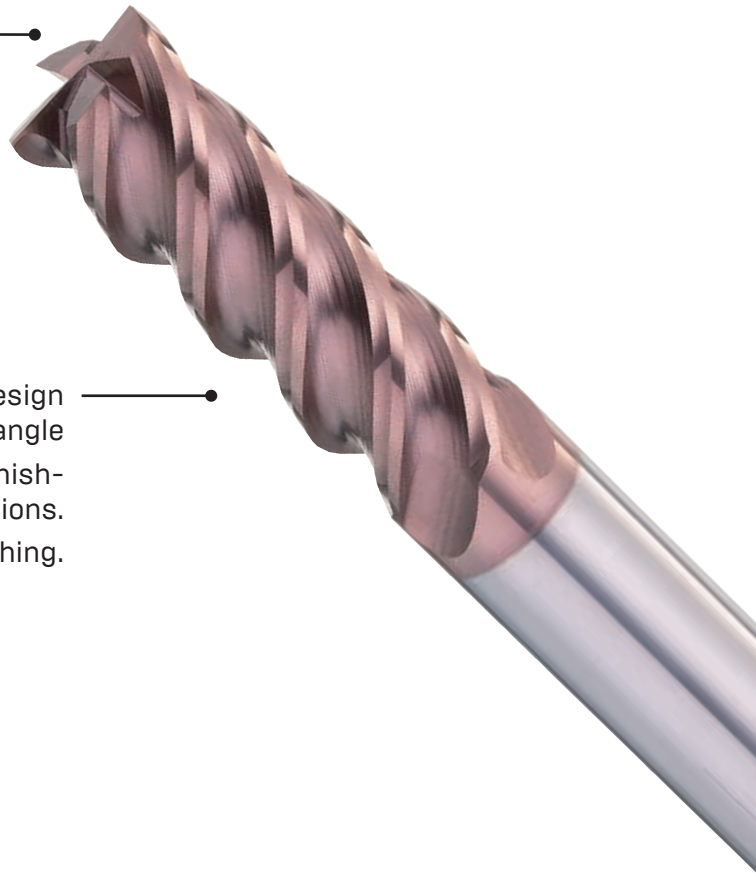
High Performance End Mills

Equal flutes distribution, Easy for re-grinding

S225-3.0TX

MG Anti-breakage strength Selected high anti-breakage strength of MG carbide

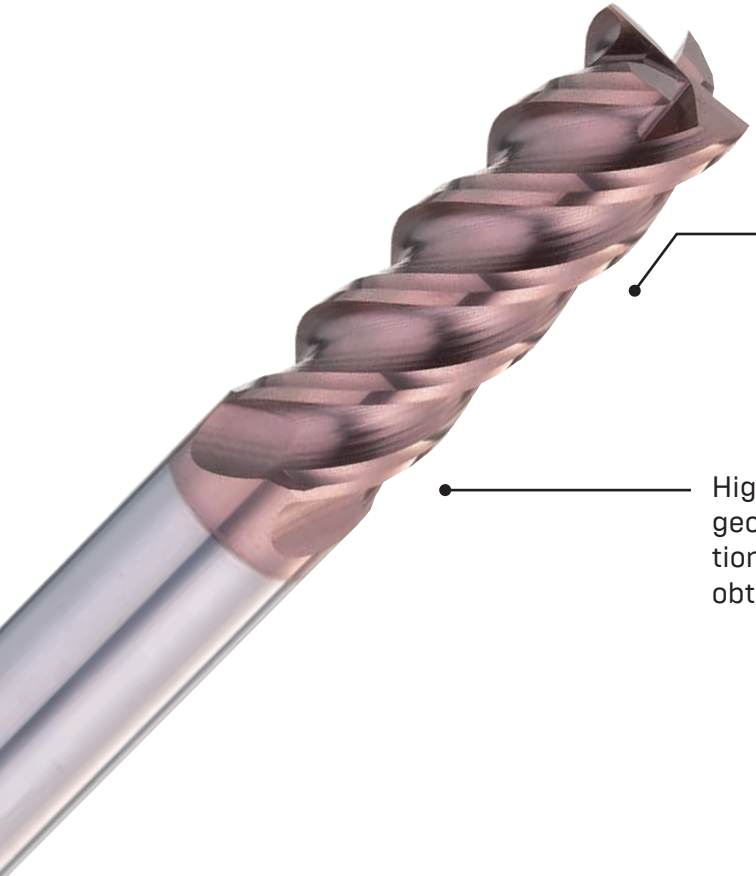
Positive rake angle with AlTiSiN coating for excellent wear resistance.



High rigidity round flutes design Round flutes design with 45° helix angle

Various applications from roughing to semi-finishing...etc. in general cutting applications.

To obtain good quality surface while finishing.



S235-3.0TX

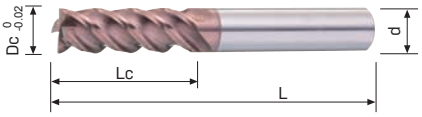
UMG high wear resistance Selected high wear resistance UMG carbide. Negative rake angle with AlTiSiN coating, excellent wear resistance

High rigidity round flutes High strength geometry with 45° helix angle design Applications from semi-finishing to finishin and obtain good surface quality.

High Performance End Mills

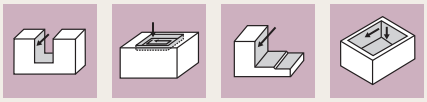
OSL Only Simplicity Last

S215TX



Tool Material/ Coating Type	MG Carbide	AlTiSiN
Specification	42° 45°	4	N γ5°	90°

Type of Operation



Work Materials (◎ The most recommended/ ○ recommended)

Carbon Steel / Alloy Steel	Tool Steel / Pre-hardend Steel	Pre-hardend Steel / Hardened Steel ~48HRC	~56HRC	~68HRC	Stainless Steel	Cast Steel	Nonferrous Metals: Aluminium	Copper	Plastics	Composite Material	Graphite	Aerospace Materials: Titanium	Nickel	Heat- resistant Steel
~30HRC														
S215TX	◎	◎			◎	◎						○	○	○

※Feature of product

S215TX Round flute with double Helix End Mills

42° / 45° Unequal helix angle, high-rigidity round flute with anti-vibration design, for various applications from roughing to semi- finishing. Positive rake angle with AlTiSiN coating for excellent wear resistance.

Diameter over 3.0mm with micro chamfer protection design Machine various steel and stainless steel materials up to HRC45.

Code No. S215TX-Dc

Dc 0 -0.02	**Lc** mm	**L** mm	**d** h6	**S215TX** MG AlTiSiN
1	3	50	4	●
1.5	5	50	4	●
2	6	50	4	●
2.5	8	50	4	●
3A	8	50	4	●
4A	11	50	4	●
3	8	50	6	●
4	11	50	6	●
5	13	50	6	●
6	16	50	6	●
8	20	60	8	●
10	25	75	10	●
12	30	75	12	●
16	40	100	16	●
20	50	100	20	●

Recommended Milling Conditions

OSL® Only Simplicity Last

Side Milling

Work Material		GR.1 Carbon Steel		GR.2 Low-alloyed Steel (~24HRC)		GR.3 Hi-alloyed Steel (~30HRC)		GR.4 Hardened Steel (30~38HRC)		GR.5 Hardened Steel (38~48HRC)		GR.8 Stainless Steel		GR.9 Cast Iron		GR.15 Titanium	
Vc m/min		120		120		80		65		60		65		120		30	
Code No.	Dc	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)
S215TX-1	1	38220	459	38220	459	25480	306	20703	248	19110	76	20703	248	38220	459	9555	115
S215TX-1.5	1.5	25480	510	25480	510	16987	340	13802	276	12740	76	13802	276	25480	510	6370	127
S215TX-2	2	19110	573	19110	573	12740	382	10351	311	9555	96	10351	311	19110	573	4778	143
S215TX-2.5	2.5	15288	612	15288	612	10192	408	6901	276	7644	107	8281	331	15288	612	3822	153
S215TX-3	3	12,700	683	12,700	683	10,000	530	6,550	389	6,400	110	6,550	389	10,600	683	3,200	180
S215TX-4	4	9,550	735	9,550	735	7,640	590	3,950	413	3,800	120	3,950	413	6,350	735	2,400	180
S215TX-5	5	7,640	875	7,640	875	6,100	625	2,800	448	2,730	125	2,800	448	4,550	875	2,000	190
S215TX-6	6	6,300	875	6,300	875	5,000	600	2,200	413	2,100	125	2,200	413	3,540	875	1,600	190
S215TX-8	8	5,000	770	5,000	770	4,000	600	1,975	413	1,900	125	1,975	413	3,185	770	1,200	170
S215TX-10	10	3,800	770	3,800	770	3,000	595	1,645	375	1,595	120	1,645	375	3,650	770	1,000	160
S215TX-12	12	2,275	670	2,275	670	1,770	560	1,410	350	1,365	120	1,410	350	2,275	670	800	160
S215TX-16	16	1,990	670	1,990	670	1,550	520	1,230	312	1,190	100	1,230	312	1,990	670	600	150
S215TX-20	20	1,590	535	1,590	535	1,240	415	985	277	950	90	985	277	1,590	535	480	160
Depth of Cut (mm) 		ap:2.5D		ap:2.5D		ap:2.5D		ap:2.5D		ap:2.5D		ap:2.5D		ap:2.5D		ap:2.5D	
		ae:0.2D		ae:0.2D		ae:0.2D		ae:0.15D		ae:0.1D		ae:0.1D		ae:0.2D		ae:0.1D	

Slotting

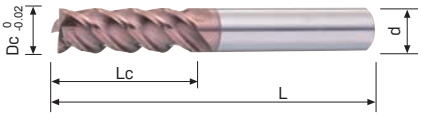
Work Material		GR.1 Carbon Steel		GR.2 Low-alloyed Steel (~24HRC)		GR.3 Hi-alloyed Steel (~30HRC)		GR.4 Hardened Steel (30~38HRC)		GR.5 Hardened Steel (38~48HRC)		GR.8 Stainless Steel		GR.9 Cast Iron		GR.15 Titanium	
Vc m/min		120		120		80		65		60		65		120		30	
Code No.	Dc	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)
S215TX-1	1	38220	306	38220	306	25480	204	20703	248	19110	76	20703	248	38220	459	9555	115
S215TX-1.5	1.5	25480	357	25480	357	16987	238	13802	276	12740	76	13802	276	25480	510	6370	127
S215TX-2	2	19110	459	19110	459	12740	306	10351	311	9555	96	10351	311	19110	573	4778	143
S215TX-2.5	2.5	15288	489	15288	489	10192	326	6901	276	7644	107	8281	331	15288	612	3822	153
S215TX-3	3	12,700	600	12,700	600	10,000	430	6,550	290	6,400	105	6,550	290	10,600	600	3,200	130
S215TX-4	4	9,550	635	9,550	635	7,640	500	3,950	325	3,800	120	3,950	325	6,350	635	2,400	150
S215TX-5	5	7,640	775	7,640	775	6,100	525	2,800	348	2,730	125	2,800	348	4,550	775	2,000	160
S215TX-6	6	6,300	775	6,300	775	5,000	500	2,200	313	2,100	125	2,200	313	3,540	775	1,600	145
S215TX-8	8	5,000	650	5,000	650	4,000	500	1,975	313	1,900	125	1,975	313	3,185	650	1,200	120
S215TX-10	10	3,800	670	3,800	670	3,000	490	1,645	288	1,595	120	1,645	288	3,650	670	1,000	145
S215TX-12	12	2,275	560	2,275	560	1,770	460	1,410	275	1,365	120	1,410	275	2,275	560	800	150
S215TX-16	16	1,990	660	1,990	660	1,550	420	1,230	240	1,190	100	1,230	240	1,990	660	600	150
S215TX-20	20	1,590	500	1,590	500	1,240	360	985	200	950	90	985	200	1,590	500	480	130
Depth of Cut (mm) 		ap:0.5D		ap:0.5D		ap:0.5D		ap:0.3D		ap:0.1D		ap:0.5D		ap:0.5D		ap:0.05D	

1. Please work with good rigidity / high precision facilities and collet chuck.
2. Please choose proper cutting fluid.
3. The cutting data is reference value only. Please adjust it according to your real working conditions.
4. If RPM is lower the reference value, the Feed rate (fz) and RPM should be reduced by the same proportion.
5. If vibration occurs during cutting, please reduce cutting parameter.

High Performance End Mills

OSL Only Simplicity Last

S215-3.0TX / S217-3.0TX



Tool Material/ Coating Type	MG Carbide	AlTiSiN	Type of Operation	
Specification	42° 45°	4	N 7.5°	90°

Work Materials (◎ The most recommended/ ○ recommended)

	Carbon Steel	Tool Steel	Pre-hardend Steel			Stainless Steel	Cast Steel	Nonferrous Metals					Aerospace Materials		
	Alloy Steel	Pre-hardend Steel	Hardened Steel					Aluminium	Copper	Plastics	Composite Material	Graphite	Titanium	Nickel	Heat- resistant Steel
	~30HRC		~48HRC	~56HRC	~68HRC										
S215-3.0TX	◎		◎			◎	◎						○	○	○
S217-3.0TX	◎		◎			◎	◎						○	○	○

※Feature of product

S215-3.0TX / S217-3.0TX Round flute with double Helix End Mills
42° / 45° Unequal helix angle, high-rigidity round flute with anti-vibration design, for various applications from roughing to semi- finishing.
Positive rake angle with AlTiSiN coating for excellent wear resistance.
Diameter over 3.0mm with micro chamfer protection design Machine various steel and stainless steel materials up to HRC45.

Code No. S215-3.0TX-Dc

Dc 0 -0.02	**Lc** mm	**L** mm	**d** h6	**S215-3.0TX** MG AlTiSiN
3A	9	50	4	●
4A	12	50	4	●
3	9	50	6	●
4	12	50	6	●
5	15	50	6	●
6	18	50	6	●
8	24	60	8	●
10	30	75	10	●
12	36	75	12	●
16	50	100	16	●
20	60	100	20	●

Code No. S217-3.0TX-Dc

Dc 0 -0.02	**Lc** mm	**L** mm	**d** h6	**S217-3.0TX** MG AlTiSiN
3A	9	75	4	●
4A	12	75	4	●
6	18	75	6	●
8	24	75	8	●
8L	24	100	8	●
10	30	100	10	●
12	36	100	12	●
16	50	120	16	●
20	60	140	20	●

Recommended Milling Conditions

OSL® Only Simplicity Last

Side Milling

Work Material		GR.1 Carbon Steel		GR.2 Low-alloyed Steel (~24HRC)		GR.3 Hi-alloyed Steel (~30HRC)		GR.4 Hardened Steel (30~38HRC)		GR.5 Hardened Steel (38~48HRC)		GR.8 Stainless Steel		GR.9 Cast Iron		GR.15 Titanium	
Vc m/min		120		120		80		65		60		65		120		30	
Code No.	Dc	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)
S215-3.0TX-3 S217-3.0TX-3A	3	12,700	683	12,700	683	10,000	530	6,550	389	6,400	105	6,550	389	10,600	683	3,200	180
S215-3.0TX-4 S217-3.0TX-4A	4	9,550	735	9,550	735	7,640	590	3,950	413	3,800	120	3,950	413	6,350	735	2,400	180
S215-3.0TX-5	5	7,640	875	7,640	875	6,100	625	2,800	448	2,730	125	2,800	448	4,550	875	2,000	190
S215-3.0TX S217-3.0TX-6	6	6,300	875	6,300	875	5,000	600	2,200	413	2,100	125	2,200	413	3,540	875	1,600	190
S215-3.0TX S217-3.0TX-8	8	5,000	770	5,000	770	4,000	600	1,975	413	1,900	125	1,975	413	3,185	770	1,200	170
S215-3.0TX S217-3.0TX-10	10	3,800	770	3,800	770	3,000	595	1,645	375	1,595	120	1,645	375	3,650	770	1,000	160
S215-3.0TX S217-3.0TX-12	12	2,275	670	2,275	670	1,770	560	1,410	350	1,365	120	1,410	350	2,275	670	800	160
S215-3.0TX S217-3.0TX-16	16	1,990	670	1,990	670	1,550	520	1,230	312	1,190	100	1,230	312	1,990	670	600	150
S215-3.0TX S217-3.0TX-20	20	1,590	535	1,590	535	1,240	415	985	277	950	90	985	277	1,590	535	480	160
Depth of Cut (mm) 		ap:2.5D		ap:2.5D		ap:2.5D		ap:2.5D		ap:2.5D		ap:2.5D		ap:2.5D		ap:2.5D	
		ae:0.2D		ae:0.2D		ae:0.2D		ae:0.15D		ae:0.1D		ae:0.1D		ae:0.2D		ae:0.1D	

Slotting

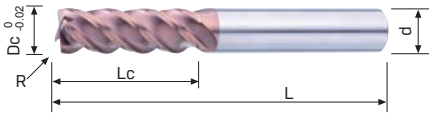
Work Material		GR.1 Carbon Steel		GR.2 Low-alloyed Steel (~24HRC)		GR.3 Hi-alloyed Steel (~30HRC)		GR.4 Hardened Steel (30~38HRC)		GR.5 Hardened Steel (38~48HRC)		GR.8 Stainless Steel		GR.9 Cast Iron		GR.15 Titanium	
Vc m/min		120		120		80		65		60		65		120		30	
Code No.	Dc	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)
S215-3.0TX-3 S217-3.0TX-3A	3	12,700	600	12,700	600	10,000	430	6,550	290	6,400	105	6,550	290	10,600	600	3,200	130
S215-3.0TX-4 S217-3.0TX-4A	4	9,550	635	9,550	635	7,640	500	3,950	325	3,800	120	3,950	325	6,350	635	2,400	150
S215-3.0TX-5	5	7,640	775	7,640	775	6,100	525	2,800	348	2,730	125	2,800	348	4,550	775	2,000	160
S215-3.0TX S217-3.0TX-6	6	6,300	775	6,300	775	5,000	500	2,200	313	2,100	125	2,200	313	3,540	775	1,600	145
S215-3.0TX S217-3.0TX-8	8	5,000	650	5,000	650	4,000	500	1,975	313	1,900	125	1,975	313	3,185	650	1,200	120
S215-3.0TX S217-3.0TX-10	10	3,800	670	3,800	670	3,000	490	1,645	288	1,595	120	1,645	288	3,650	670	1,000	145
S215-3.0TX S217-3.0TX-12	12	2,275	560	2,275	560	1,770	460	1,410	275	1,365	120	1,410	275	2,275	560	800	150
S215-3.0TX S217-3.0TX-16	16	1,990	660	1,990	660	1,550	420	1,230	240	1,190	100	1,230	240	1,990	660	600	150
S215-3.0TX S217-3.0TX-20	20	1,590	500	1,590	500	1,240	360	985	200	950	90	985	200	1,590	500	480	130
Depth of Cut (mm) 		ap:0.5D		ap:0.5D		ap:0.5D		ap:0.3D		ap:0.1D		ap:0.5D		ap:0.5D		ap:0.05D	

1. Please work with good rigidity / high precision facilities and collet chuck.
2. Please choose proper cutting fluid.
3. The cutting data is reference value only. Please adjust it according to your real working conditions.
4. If RPM is lower the reference value, the Feed rate (fz) and RPM should be reduced by the same proportion.
5. If vibration occurs during cutting, please reduce cutting parameter.

High Performance End Mills With Corner Radius

OSL Only Simplicity Last

S216-3.0TX



Tool Material/ Coating Type	MG Carbide	AlTiSiN	Type of Operation	
Specification	42° 45°	4	N γ5°	R

Work Materials (◎ The most recommended/ ○ recommended)

Carbon Steel	Tool Steel	Pre-hardend Steel			Stainless Steel	Cast Steel	Nonferrous Metals					Aerospace Materials		
Alloy Steel	Pre-hardend Steel	Hardened Steel												
~30HRC		~48HRC	~56HRC	~68HRC			Aluminium	Copper	Plastics	Composite Material	Graphite	Titanium	Nickel	Heat- resistant Steel
S216-3.0TX	◎	◎			◎	◎						○	○	○

※Feature of product

S216-3.0TX Round flute with double Helix End Mills
42° / 45° Unequal helix angle, high-rigidity round flute with anti-vibration design, for various applications from roughing to semi- finishing.
Positive rake angle with AlTiSiN coating for excellent wear resistance.
Cutting edge with corner radius design, increase cutting edge rigidity and toughness, to avoid damaging work piece and end mill Improve longer tool life.
Machine various steel and stainless steel materials up to HRC45.

Code No. S216-3.0TX-Dc×R

Dc 0 -0.02	R	Lc mm	L mm	d h6	S216-3.0TX MG AlTiSiN
3A	R0.2	9	50	4	●
3A	R0.5	9	50	4	●
4A	R0.2	12	50	4	●
4A	R0.5	12	50	4	●
3	R0.2	9	50	6	●
3	R0.5	9	50	6	●
4	R0.2	12	50	6	●
4	R0.5	12	50	6	●
5	R0.2	15	50	6	●
5	R0.5	15	50	6	●
6	R0.2	18	50	6	●
6	R0.3	18	50	6	●
6	R0.5	18	50	6	●
6	R1	18	50	6	●
6	R1.5	18	50	6	●
6	R2	18	50	6	●
8	R0.2	24	60	8	●
8	R0.3	24	60	8	●
8	R0.5	24	60	8	●
8	R1	24	60	8	●
8	R1.5	24	60	8	●
8	R2	24	60	8	●
10	R0.2	30	75	10	●
10	R0.3	30	75	10	●
10	R0.5	30	75	10	●
10	R1	30	75	10	●
10	R1.5	30	75	10	●
10	R2	30	75	10	●
12	R0.2	36	75	12	●
12	R0.3	36	75	12	●
12	R0.5	36	75	12	●
12	R1	36	75	12	●
12	R1.5	36	75	12	●
12	R2	36	75	12	●

Recommended Milling Conditions

OSL® Only Simplicity Last

Side Milling

Work Material		GR.1 Carbon Steel		GR.2 Low-alloyed Steel (~24HRC)		GR.3 Hi-alloyed Steel (~30HRC)		GR.4 Hardened Steel (30~38HRC)		GR.5 Hardened Steel (38~48HRC)		GR.8 Stainless Steel		GR.9 Cast Iron		GR.15 Titanium	
Vc m/min		120		120		80		65		60		65		120		30	
Code No.	Dc	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)
S216-3.0TX-3×R	3xR	12,700	683	12,700	683	10,000	530	6,550	389	6,400	105	6,550	389	10,600	683	3,200	180
S216-3.0TX-4×R	4xR	9,550	735	9,550	735	7,640	590	3,950	413	3,800	120	3,950	413	6,350	735	2,400	180
S216-3.0TX-5×R	5xR	7,640	875	7,640	875	6,100	625	2,800	448	2,730	125	2,800	448	4,550	875	2,000	190
S216-3.0TX-6×R	6xR	6,300	875	6,300	875	5,000	600	2,200	413	2,100	125	2,200	413	3,540	875	1,600	190
S216-3.0TX-8×R	8xR	5,000	770	5,000	770	4,000	600	1,975	413	1,900	125	1,975	413	3,185	770	1,200	170
S216-3.0TX-10×R	10xR	3,800	770	3,800	770	3,000	595	1,645	375	1,595	120	1,645	375	3,650	770	1,000	160
S216-3.0TX-12×R	12xR	2,275	670	2,275	670	1,770	560	1,410	350	1,365	120	1,410	350	2,275	670	800	160
S216-3.0TX-16×R	16xR	1,990	670	1,990	670	1,550	520	1,230	312	1,190	100	1,230	312	1,990	670	600	150
S216-3.0TX-20×R	20xR	1,590	535	1,590	535	1,240	415	985	277	950	90	985	277	1,590	535	480	160
Depth of Cut (mm) 		ap:2.5D ae:0.2D		ap:2.5D ae:0.2D		ap:2.5D ae:0.2D		ap:2.5D ae:0.15D		ap:2.5D ae:0.1D		ap:2.5D ae:0.1D		ap:2.5D ae:0.2D		ap:2.5D ae:0.1D	

Slotting

Work Material		GR.1 Carbon Steel		GR.2 Low-alloyed Steel (~24HRC)		GR.3 Hi-alloyed Steel (~30HRC)		GR.4 Hardened Steel (30~38HRC)		GR.5 Hardened Steel (38~48HRC)		GR.8 Stainless Steel		GR.9 Cast Iron		GR.15 Titanium	
Vc m/min		120		120		80		65		60		65		120		30	
Code No.	Dc	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)
S216-3.0TX-3×R	3xR	12,700	600	12,700	600	10,000	430	6,550	290	6,400	105	6,550	290	10,600	600	3,200	130
S216-3.0TX-4×R	4xR	9,550	635	9,550	635	7,640	500	3,950	325	3,800	120	3,950	325	6,350	635	2,400	150
S216-3.0TX-5×R	5xR	7,640	775	7,640	775	6,100	525	2,800	348	2,730	125	2,800	348	4,550	775	2,000	160
S216-3.0TX-6×R	6xR	6,300	775	6,300	775	5,000	500	2,200	313	2,100	125	2,200	313	3,540	775	1,600	145
S216-3.0TX-8×R	8xR	5,000	650	5,000	650	4,000	500	1,975	313	1,900	125	1,975	313	3,185	650	1,200	120
S216-3.0TX-10×R	10xR	3,800	670	3,800	670	3,000	490	1,645	288	1,595	120	1,645	288	3,650	670	1,000	145
S216-3.0TX-12×R	12xR	2,275	560	2,275	560	1,770	460	1,410	275	1,365	120	1,410	275	2,275	560	800	150
S216-3.0TX-16×R	16xR	1,990	660	1,990	660	1,550	420	1,230	240	1,190	100	1,230	240	1,990	660	600	150
S216-3.0TX-20×R	20xR	1,590	500	1,590	500	1,240	360	985	200	950	90	985	200	1,590	500	480	130
Depth of Cut (mm) 		ap:0.5D		ap:0.5D		ap:0.5D		ap:0.3D		ap:0.05D		ap:0.5D		ap:0.5D		ap:0.05D	

1. Please work with good rigidity / high precision facilities and collet chuck.
2. Please choose proper cutting fluid.
3. The cutting data is reference value only. Please adjust it according to your real working conditions.
4. If RPM is lower the reference value, the Feed rate (fz) and RPM should be reduced by the same proportion.
5. If vibration occurs during cutting, please reduce cutting parameter.

High Performance End Mills With Corner Radius

OSL Only Simplicity Last

S218-3.0TX

Tool Material/ Coating Type	MG Carbide	AlTiSiN	Type of Operation	
Specification	42° 45°	4	N 5°	R

Work Materials (◎ The most recommended/ ○ recommended)

	Carbon Steel	Tool Steel	Pre-hardend Steel			Stainless Steel	Cast Steel	Nonferrous Metals					Aerospace Materials		
	Alloy Steel	Pre-hardend Steel	Hardened Steel												
	~30HRC		~48HRC	~56HRC	~68HRC			Aluminium	Copper	Plastics	Composite Material	Graphite	Titanium	Nickel	Heat- resistant Steel
S218-3.0TX	◎		◎			◎	◎						○	○	○

※Feature of product

S218-3.0TX Round flute with double Helix End Mills
42° / 45° Unequal helix angle, high-rigidity round flute with anti-vibration design, for various applications from roughing to semi- finishing.
Positive rake angle with AlTiSiN coating for excellent wear resistance.
Cutting edge with corner radius design, increase cutting edge rigidity and toughness, to avoid damaging work piece and end mill Improve longer tool life.
Machine various steel and stainless steel materials up to HRC45.

Code No. S218-3.0TX-Dc×R

Dc 0 -0.02	R	Lc mm	L mm	d h6	S218-3.0TX MG AlTiSiN
3A	R0.2	9	75	4	●
3A	R0.5	9	75	4	●
4A	R0.2	12	75	4	●
4A	R0.5	12	75	4	●
6	R0.2	18	75	6	●
6	R0.5	18	75	6	●
6	R1	18	75	6	●
6	R2	18	75	6	●
8	R0.2	24	75	8	●
8	R0.5	24	75	8	●
8	R1	24	75	8	●
8	R2	24	75	8	●
8L	R0.2	24	100	8	●
8L	R0.5	24	100	8	●
8L	R1	24	100	8	●
8L	R2	24	100	8	●
10	R0.2	30	100	10	●
10	R0.5	30	100	10	●
10	R1	30	100	10	●
10	R2	30	100	10	●
12	R0.2	36	100	12	●
12	R0.5	36	100	12	●
12	R1	36	100	12	●
12	R2	36	100	12	●

Recommended Milling Conditions

OSL
Only Simplicity Last

Side Milling

Work Material		GR.1 Carbon Steel		GR.2 Low-alloyed Steel (~24HRC)		GR.3 Hi-alloyed Steel (~30HRC)		GR.4 Hardened Steel (30~38HRC)		GR.5 Hardened Steel (38~48HRC)		GR.8 Stainless Steel		GR.9 Cast Iron		GR.15 Titanium	
Vc m/min		120		120		80		65		60		65		120		30	
Code No.	Dc	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)
S218-3.0T×-3×R	3×R	12,700	683	12,700	683	10,000	530	6,550	389	6,400	105	6,550	389	10,600	683	3,200	180
S218-3.0T×-4×R	4×R	9,550	735	9,550	735	7,640	590	3,950	413	3,800	120	3,950	413	6,350	735	2,400	180
S218-3.0T×-6×R	6×R	6,300	875	6,300	875	5,000	600	2,200	413	2,100	125	2,200	413	3,540	875	1,600	190
S218-3.0T×-8×R	8×R	5,000	770	5,000	770	4,000	600	1,975	413	1,900	125	1,975	413	3,185	770	1,200	170
S218-3.0T×-10×R	10×R	3,800	770	3,800	770	3,000	595	1,645	375	1,595	120	1,645	375	3,650	770	1,000	160
S218-3.0T×-12×R	12×R	2,275	670	2,275	670	1,770	560	1,410	350	1,365	120	1,410	350	2,275	670	800	160
S218-3.0T×-16×R	16×R	1,990	670	1,990	670	1,550	520	1,230	312	1,190	100	1,230	312	1,990	670	600	150
S218-3.0T×-20×R	20×R	1,590	535	1,590	535	1,240	415	985	277	950	90	985	277	1,590	535	480	160
Depth of Cut (mm) 		ap:2.5D		ap:2.5D		ap:2.5D		ap:2.5D		ap:2.5D		ap:2.5D		ap:2.5D		ap:2.5D	
		ae:0.2D		ae:0.2D		ae:0.15D		ae:0.05D		ae:0.1D		ae:0.1D		ae:0.2D		ae:0.1D	

Slotting

Work Material		GR.1 Carbon Steel		GR.2 Low-alloyed Steel (~24HRC)		GR.3 Hi-alloyed Steel (~30HRC)		GR.4 Hardened Steel (30~38HRC)		GR.5 Hardened Steel (38~48HRC)		GR.8 Stainless Steel		GR.9 Cast Iron		GR.15 Titanium	
Vc m/min		120		120		80		65		60		65		120		30	
Code No.	Dc	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)
S218-3.0T×-3×R	3×R	12,700	600	12,700	600	10,000	430	6,550	290	6,400	105	6,550	290	10,600	600	3,200	130
S218-3.0T×-4×R	4×R	9,550	635	9,550	635	7,640	500	3,950	325	3,800	120	3,950	325	6,350	635	2,400	150
S218-3.0T×-6×R	6×R	6,300	775	6,300	775	5,000	500	2,200	313	2,100	125	2,200	313	3,540	775	1,600	145
S218-3.0T×-8×R	8×R	5,000	650	5,000	650	4,000	500	1,975	313	1,900	125	1,975	313	3,185	650	1,200	120
S218-3.0T×-10×R	10×R	3,800	670	3,800	670	3,000	490	1,645	288	1,595	120	1,645	288	3,650	670	1,000	145
S218-3.0T×-12×R	12×R	2,275	560	2,275	560	1,770	460	1,410	275	1,365	120	1,410	275	2,275	560	800	150
S218-3.0T×-16×R	16×R	1,990	660	1,990	660	1,550	420	1,230	240	1,190	100	1,230	240	1,990	660	600	150
S218-3.0T×-20×R	20×R	1,590	500	1,590	500	1,240	360	985	200	950	90	985	200	1,590	500	480	130
Depth of Cut (mm) 		ap:0.3D		ap:0.3D		ap:0.3D		ap:0.1D		ap:0.1D		ap:0.3D		ap:0.5D		ap:0.05D	

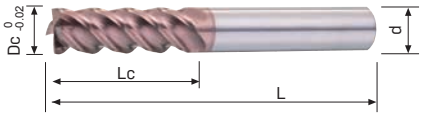
1. Please work with good rigidity / high precision facilities and collet chuck.
2. Please choose proper cutting fluid.
3. The cutting data is reference value only. Please adjust it according to your real working conditions.
4. If RPM is lower the reference value, the Feed rate (fz) and RPM should be reduced by the same proportion.
5. If vibration occurs during cutting, please reduce cutting parameter.

High Performance End Mills

OSL Only Simplicity Last

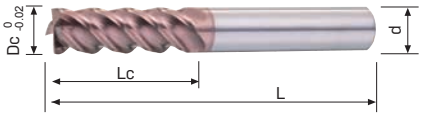
S225-3.0TX / S225-4.0TX γ5°

MG Carbide



S235-3.0TX / S235-4.0TX γ-5°

UMG Carbide



Tool Material/ Coating Type	AlTiSiN	Type of Operation	
Specification	45° / 4 / N / γ / 90°		

Work Materials (◎ The most recommended/ ○ recommended)

	Carbon Steel	Tool Steel	Pre-hardend Steel			Stainless Steel	Cast Steel	Nonferrous Metals					Aerospace Materials		
	Alloy Steel	Pre-hardend Steel	Hardened Steel												
	~30HRC		~48HRC	~56HRC	~68HRC			Aluminium	Copper	Plastics	Composite Material	Graphite	Titanium	Nickel	Heat- resistant Steel
S225-3.0TX	◎		◎			◎	◎						○	○	○
S225-4.0TX	◎		◎			◎	◎						○	○	○
S235-3.0TX	◎		◎	◎	○	◎	◎						○	○	○
S235-4.0TX	◎		◎	◎	○	◎	◎						○	○	○

※Feature of product

S225-3.0TX / S225-4.0TX General Round Flute End Mills Designed with 45° helix angle and high-rigidity round flute, for various applications from roughing to semi-finishing...etc. in general cutting applications.

Good surface finishing quality.

Positive rake angle with AlTiSiN coating performs excellent wear resistance.

Machine on various steels up to HRC45.

S235-3.0TX / S235-4.0TX General Round Flutes End Mills Designed with 45° helix angle, with high-rigidity round flutes for various applications from roughing to semi-finishing...etc. in general cutting applications.

Good surface finishing quality.

Negative rake angle with AlTiSiN coating performs excellent wear resistance.

Machine on various steels up to HRC62.

Code No. S225-3.0TX-Dc / S235-3.0TX-Dc

Dc 0 -0.02	**Lc** mm	**L** mm	**d** h6	**S225-3.0TX** MG AlTiSiN < 45HRC	**S235-3.0TX** UMG AlTiSiN < 62HRC
1	3	50	4	●	●
1.5	5	50	4	●	●
2	6	50	4	●	●
2.5	8	50	4	●	●
3A	9	50	4	●	●
4A	12	50	4	●	●
3	9	50	6	●	●
3.5	11	50	6	●	●
4	12	50	6	●	●
4.5	14	50	6	●	●
5	15	50	6	●	●
6	18	50	6	●	●
7	21	60	8	●	●
8	24	60	8	●	●
9	27	75	10	●	●
10	30	75	10	●	●
12	36	75	12	●	●
16	50	100	16	●	●
20	60	120	20	●	●

Code No. S225-4.0TX-Dc / S235-4.0TX-Dc

Dc 0 -0.02	**Lc** mm	**L** mm	**d** h6	**S225-4.0TX** MG AlTiSiN < 45HRC	**S235-4.0TX** UMG AlTiSiN < 62HRC
6	25	75	6	●	●
8	35	75	8	●	●
10	45(40)	100	10	●	●
12	50	100	12	●	●
16	65	120	16	●	●
20	80	140	20	●	●

Recommended Milling Conditions

OSL® Only Simplicity Last

Side Milling

Work Material		GR.1 Carbon Steel		GR.2 Low-alloyed Steel (~24HRC)		GR.3 Hi-alloyed Steel (~30HRC)		GR.4 Hardened Steel (30~38HRC)		GR.5 Hardened Steel (38~48HRC)		GR.8 Stainless Steel		GR.9 Cast Iron		GR.15 Titanium	
Vc m/min		120		120		80		65		60		65		120		30	
Code No.	Dc	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)
S225-3.0TX1	1	31,800	240	31,800	240	25,000	210	19,750	180	19,000	85	19,750	180	31,800	240	7,100	50
S225-3.0TX-1.5	1.5	21,200	245	21,200	245	16,500	210	13,000	180	12,700	90	13,000	180	21,200	245	5,100	100
S225-3.0TX2	2	15,900	245	15,900	245	12,420	210	9,850	180	9,550	90	9,850	180	15,900	245	4,000	120
S225-3.0TX-2.5	2.5	12,700	370	12,700	370	10,000	300	7,900	275	7,600	90	7,900	275	12,700	370	3,200	150
S225-3.0TX-3	3	12,700	683	12,700	683	10,000	530	6,550	389	6,400	105	6,550	389	10,600	683	3,200	180
S225-3.0TX-4	4	9,550	735	9,550	735	7,640	590	3,950	413	3,800	120	3,950	413	6,350	735	2,400	180
S225-3.0TX-5	5	7,640	875	7,640	875	6,100	625	2,800	448	2,730	125	2,800	448	4,550	875	2,000	190
S225-3.0TX-6	6	6,300	875	6,300	875	5,000	600	2,200	413	2,100	125	2,200	413	3,540	875	1,600	190
S225-3.0TX-8	8	5,000	770	5,000	770	4,000	600	1,975	413	1,900	125	1,975	413	3,185	770	1,200	170
S225-3.0TX-10	10	3,800	770	3,800	770	3,000	595	1,645	375	1,595	120	1,645	375	3,650	770	1,000	160
S225-3.0TX-12	12	2,275	670	2,275	670	1,770	560	1,410	350	1,365	120	1,410	350	2,275	670	800	160
S225-3.0TX-16	16	1,990	670	1,990	670	1,550	520	1,230	312	1,190	100	1,230	312	1,990	670	600	150
S225-3.0TX-20	20	1,590	535	1,590	535	1,240	415	985	277	950	90	985	277	1,590	535	480	160
Depth of Cut (mm) 		ap:1.5D		ap:1.5D		ap:1.5D		ap:1.5D		ap:1.5D		ap:1.5D		ap:1.5D		ap:1.5D	
		ae:0.2D		ae:0.2D		ae:0.2D		ae:0.2D		ae:0.1D		ae:0.2D		ae:0.2D		ae:0.1D	

Side Milling

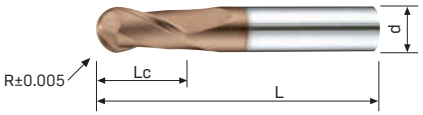
Work Material		GR.1 Carbon Steel		GR.2 Low-alloyed Steel (~24HRC)		GR.3 Hi-alloyed Steel (~30HRC)		GR.4 Hardened Steel (30~38HRC)		GR.5 Hardened Steel (38~48HRC)		GR.8 Stainless Steel		GR.9 Cast Iron	
Vc m/min		100		100		80		65		60		60		120	
Code No.	Dc	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)
S235-3.0TX-1	1	25,440	190	25,440	190	20,000	170	21,233	1,000	23,900	1,050	23,900	950	31,800	240
S235-3.0TX-1.5	1.5	17,000	196	17,000	196	13,200	170	21,233	1,100	21,233	1,100	21,233	1,000	21,200	245
S235-3.0TX-2	2	15,900	196	15,900	196	9,935	170	21,233	1,100	21,233	1,100	21,233	820	15,900	245
S235-3.0TX-2.5	2.5	10,000	300	10,000	300	8,000	240	21,233	1,270	19,100	1,150	19,100	715	12,700	370
S235-3.0TX-3	3	10,000	550	10,000	550	8,000	420	21,233	1,270	15,925	955	15,925	630	10,600	683
S235-3.0TX-4	4	7,640	590	7,640	590	6,110	740	15,925	1,270	11,943	955	11,943	630	6,350	735
S235-3.0TX-5	5	6,100	700	6,100	700	6,110	500	12,740	1,528	9,555	1,146	9,555	765	4,550	875
S235-3.0TX-6	6	5,000	700	5,000	700	4,000	480	10,500	1,800	8,000	1,350	8,000	900	3,540	875
S235-3.0TX-8	8	4,000	620	4,000	620	3,200	480	8,000	1,700	5,900	1,350	5,900	850	3,185	770
S235-3.0TX-10	10	3,000	620	3,000	620	2,400	480	6,300	1,650	4,700	1,300	4,700	800	3,650	770
S235-3.0TX-12	12	2,400	536	2,400	536	1,420	450	5,300	1,650	4,000	1,300	4,000	785	2,275	670
S235-3.0TX-16	16	1,920	536	1,920	536	1,240	520	4,000	1,600	3,000	1,200	3,000	780	1,990	670
S235-3.0TX-20	20	1,270	535	1,270	535	990	420	3,200	1,450	2,400	1,100	2,400	730	1,590	535
Depth of Cut (mm) 		ap:1.5D		ap:1.5D		ap:1.5D		ap:1.5D		ap:1.5D		ap:1.5D		ap:1.5D	
		ae:0.2D		ae:0.2D		ae:0.2D		ae:0.2D		ae:0.1D		ae:0.1D		ae:0.2D	

1. Please work with good rigidity / high precision facilities and collet chuck.
2. Please choose proper cutting fluid.
3. The cutting data is reference value only. Please adjust it according to your real working conditions.
4. If RPM is lower the reference value, the Feed rate (fz) and RPM should be reduced by the same proportion.
5. If vibration occurs during cutting, please reduce cutting parameter.

Ball Nose End Mills

OSL
Only Simplicity Last

S208TX



Tool Material/ Coating Type	MG Carbide	AlTiSiN	Type of Operation	
Specification	30°	2	N γ10°	

Work Materials (◎ The most recommended/ ○ recommended)

	Carbon Steel	Tool Steel	Pre-hardend Steel			Stainless Steel	Cast Steel	Nonferrous Metals					Aerospace Materials		
	Alloy Steel	Pre-hardend Steel	Hardened Steel					Aluminium	Copper	Plastics	Composite Material	Graphite	Titanium	Nickel	Heat- resistant Steel
	~30HRC		~48HRC	~56HRC	~68HRC										
S208TX	◎		◎			◎	◎		○				○	○	○

※Feature of product

S208TX Standard Length Ball Nose End Mills- 2 Flutes
Standard ball nose end mills, suitable to machine on steel material.
Cutting edge with S shape geometry designed, stable for continuous cutting.
Good wear resistance and lubricating effect with Nano multilayer coating.

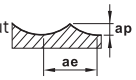
Code No. S208TX-Dc

Dc 0 -0.02	**R** ±0.005	**Lc** mm	**d** h6	**L** mm	**S208TX** MG AlTiSiN <45HRC
1	0.5R	2	4	50	●
1.5	0.75R	3	4	50	●
2	1R	4	4	50	●
2.5	1.25R	5	4	50	●
3A	1.5R	6	4	50	●
4A	2R	8	4	50	●
3	1.5R	6	6	50	●
4	2R	8	6	50	●
5	2.5R	10	6	50	●
6	3R	12	6	50	●
8	4R	14	8	60	●
10	5R	18	10	75	●
12	6R	22	12	75	●

Recommended Milling Conditions

OSL® Only Simplicity Last

General processing

Work Material		GR.1 Carbon Steel		GR.2 Low-alloyed Steel (~24HRC)		GR.3 Hi-alloyed Steel (~30HRC)		GR.4 Hardened Steel (30~38HRC)		GR.5 Hardened Steel (38~48HRC)		GR.8 Stainless Steel		GR.9 Cast Iron		GR.11 Copper	
Vc m/min		100		100		65		65		55		65		100		100	
Code No.	Dc	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)
S208TX-R0.5	1	31,500	564	31,500	564	25,000	412	25,000	412	22,000	296	25,000	412	31,500	564	32,000	700
S208TX-R0.75	1.5	26,250	578	26,250	578	20,860	418	20,860	418	14,800	302	20,860	418	26,250	578	25,500	715
S208TX-R1	2	21,000	582	21,000	582	16,720	425	16,720	425	11,000	310	16,720	425	21,000	582	19,000	730
S208TX-R1.25	2.5	15,750	596	15,750	596	12,580	430	12,580	430	8,900	316	12,580	430	15,750	596	12,700	745
S208TX-R1.5	3	10,500	620	10,500	620	8,450	435	8,450	435	7,400	322	8,450	435	10,500	620	12,500	760
S208TX-R2	4	9,250	630	9,250	630	6,350	442	6,350	442	5,550	342	6,350	442	9,250	630	9,500	765
S208TX-R2.5	5	7,950	640	7,950	640	5,095	447	5,095	447	4,460	377	5,095	447	7,950	640	7,650	775
S208TX-R3	6	5,300	670	5,300	670	4,200	465	4,200	465	3,700	390	4,200	465	5,300	670	6,300	800
S208TX-R4	8	3,950	790	3,950	790	3,150	555	3,150	555	2,750	455	3,150	555	3,950	790	4,750	950
S208TX-R5	10	3,150	745	3,150	745	2,500	525	2,500	525	2,200	430	2,500	525	3,150	745	3,800	890
S208TX-R6	12	2,650	700	2,650	700	2,100	490	2,100	490	1,850	430	2,100	490	2,650	700	3,170	840
S208TX-R8	16	1,990	525	1,990	525	1,580	370	1,580	370	1,390	325	1,580	370	1,990	525	2,400	630
S208TX-R10	20	1,590	420	1,590	420	1,260	290	1,260	290	1,110	260	1,260	290	1,590	420	1,900	500
Depth of Cut (mm) 		ap:0.1D		ap:0.1D		ap:0.1D		ap:0.1D		ap:0.1D		ap:0.1D		ap:0.1D		ap:0.1D	
		ae:0.2D		ae:0.2D		ae:0.2D		ae:0.2D		ae:0.1D		ae:0.1D		ae:0.2D		ae:0.2D	

1. Please work with good rigidity / high precision facilities and collet chuck.
2. Please choose proper cutting fluid.
3. The cutting data is reference value only. Please adjust it according to your real working conditions.
4. If RPM is lower the reference value, the Feed rate (fz) and RPM should be reduced by the same proportion.
5. If vibration occurs during cutting, please reduce cutting parameter.

Ball Nose End Mills

OSL
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S210TX

Tool Material/ Coating Type	MG Carbide	AlTiSiN	Type of Operation	
Specification	30°	2	N γ10°	

Work Materials (◎ The most recommended/ ○ recommended)

	Carbon Steel	Tool Steel	Pre-hardend Steel			Stainless Steel	Cast Steel	Nonferrous Metals					Aerospace Materials		
	Alloy Steel	Pre-hardend Steel	Hardened Steel					Aluminium	Copper	Plastics	Composite Material	Graphite	Titanium	Nickel	Heat- resistant Steel
	~30HRC		~48HRC	~56HRC	~68HRC										
S210TX	◎		◎			◎	◎		○				○	○	○

※Feature of product

S210TX Long Length Ball Nose End Mills- 2 Flutes.
Standard long length ball nose end mills, suitable to machine on various steel material.
Cutting edge with S shape geometry designed, stable for continuous cutting.
Good wear resistance and lubricating effect with Nano multilayer coating

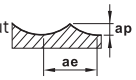
Code No. S210TX-Dc

Dc 0 -0.02	**R** ±0.005	**Lc** mm	**d** h6	**L** mm	**S210TX** MG AlTiSiN <45HRC
3A	1.5R	6	4	75	●
4A	2R	8	4	75	●
3	1.5R	6	6	75	●
4	2R	8	6	75	●
5	2.5R	10	6	75	●
6	3R	12	6	75	●
6L	3R	12	6	100	●
8	4R	14	8	75	●
8L	4R	14	8	100	●
10	5R	18	10	100	●
12	6R	22	12	100	●

Recommended Milling Conditions

OSL® Only Simplicity Last

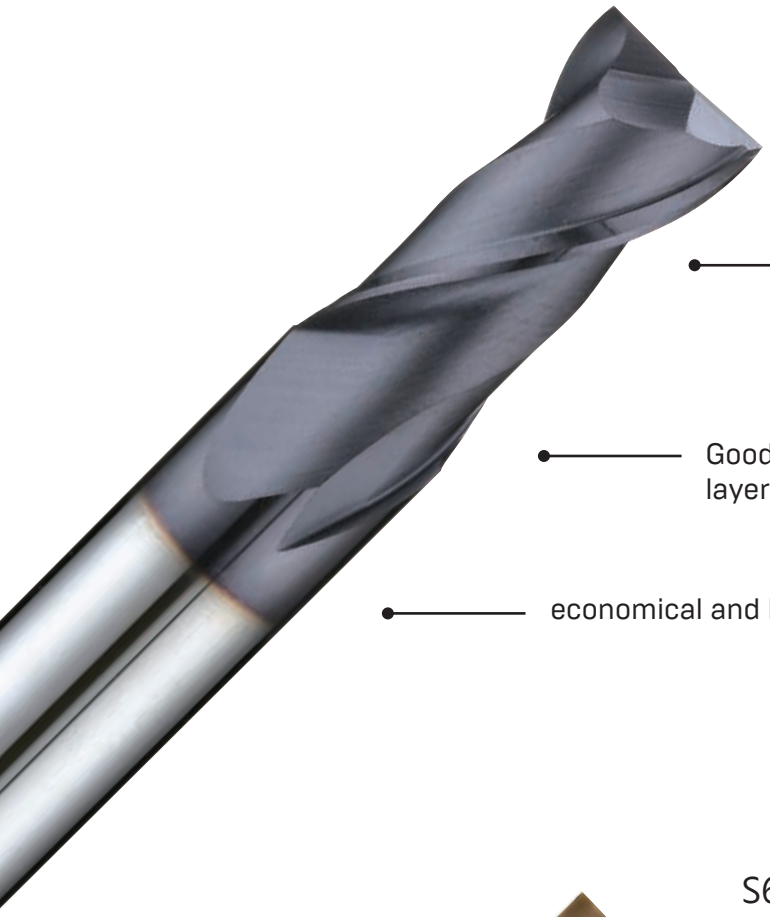
General processing

Work Material		GR.1 Carbon Steel		GR.2 Low-alloyed Steel (~24HRC)		GR.3 Hi-alloyed Steel (~30HRC)		GR.4 Hardened Steel (30~38HRC)		GR.5 Hardened Steel (38~48HRC)		GR.8 Stainless Steel		GR.9 Cast Iron		GR.11 Copper	
Vc m/min		100		100		65		65		55		65		100		100	
Code No.	Dc	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)
S210TX-R0.5	1	25,200	480	25,200	480	20,000	320	20,000	320	17,600	225	20,000	320	25,200	480	25,600	560
S210TX-R0.75	1.5	16,640	480	16,640	480	13,600	320	13,600	320	11,840	225	13,600	320	16,640	480	20,400	560
S210TX-R1	2	12,400	480	12,400	480	10,000	320	10,000	320	8,800	230	10,000	320	12,400	480	15,200	560
S210TX-R1.25	2.5	12,400	480	12,400	480	8,160	320	8,160	320	7,120	230	8,160	320	12,400	480	10,160	560
S210TX-R1.5	3	8,400	500	8,400	500	6,760	325	6,760	325	5,920	230	6,760	325	8,400	500	10,000	608
S210TX-R2	4	6,360	500	6,360	500	5,080	355	5,080	355	4,440	300	5,080	355	6,360	500	7,600	608
S210TX-R2.5	5	6,360	500	6,360	500	4,070	355	4,070	355	3,568	300	4,070	355	6,360	500	6,120	608
S210TX-R3	6	4,240	535	4,240	535	3,360	370	3,360	370	2,960	310	3,360	370	4,240	535	5,040	640
S210TX-R4	8	3,160	630	3,160	630	2,520	445	2,520	445	2,200	360	2,520	445	3,160	630	3,800	760
S210TX-R5	10	2,520	600	2,520	600	2,000	420	2,000	420	1,760	340	2,000	420	2,520	600	3,040	710
S210TX-R6	12	2,120	560	2,120	560	1,680	390	1,680	390	1,480	340	1,680	390	2,120	560	2,530	670
S210TX-R8	16	1,590	420	1,590	420	1,260	295	1,260	295	1,110	260	1,260	295	1,590	420	1,920	500
S210TX-R10	20	1,270	335	1,270	335	1,000	230	1,000	230	888	200	1,000	230	1,270	335	1,520	400
Depth of Cut (mm) 		ap:0.1D		ap:0.1D		ap:0.1D		ap:0.1D		ap:0.1D		ap:0.1D		ap:0.1D		ap:0.1D	
		ae:0.2D		ae:0.2D		ae:0.2D		ae:0.2D		ae:0.1D		ae:0.1D		ae:0.2D		ae:0.2D	

1. Please work with good rigidity / high precision facilities and collet chuck.
2. Please choose proper cutting fluid.
3. The cutting data is reference value only. Please adjust it according to your real working conditions.
4. If RPM is lower the reference value, the Feed rate (fz) and RPM should be reduced by the same proportion.
5. If vibration occurs during cutting, please reduce cutting parameter.

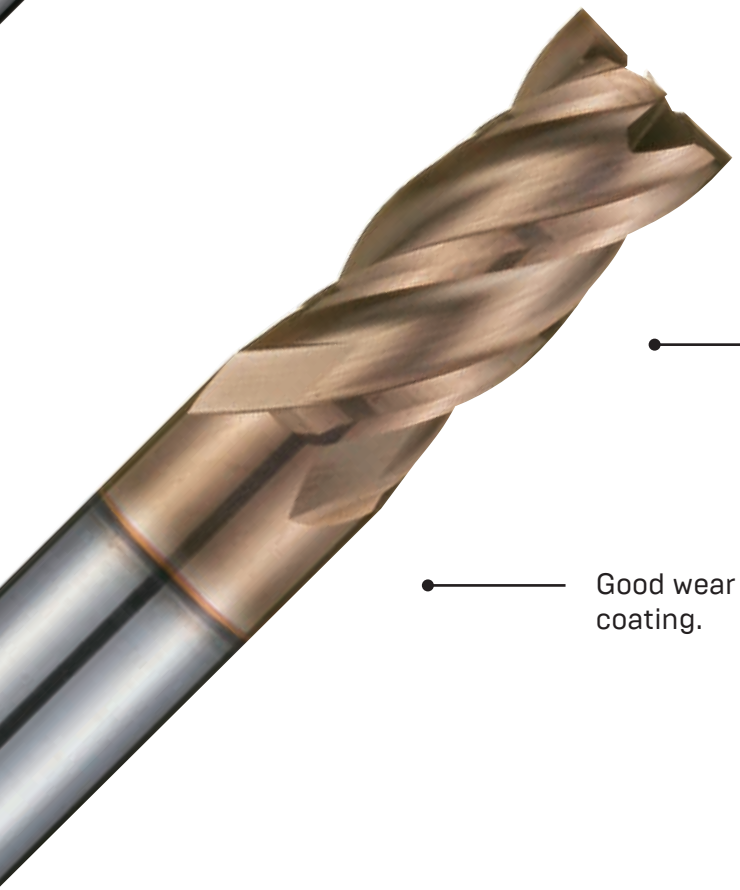
Universal End Mills

S200F



- Universal Standard Length End Mills- 2 Flutes.
- General cutting applications for side milling, slotting...etc.
- Good wear resistance and lubrication with Nano multi-layer coating.
- economical and high cost performance ratio.

S640TX



- Standard Length Finishing End Mills- 4 Flutes.
- Good quality surface finishing on precision side and surface milling.
- Good wear resistance and lubrication with Nano multilayer coating.

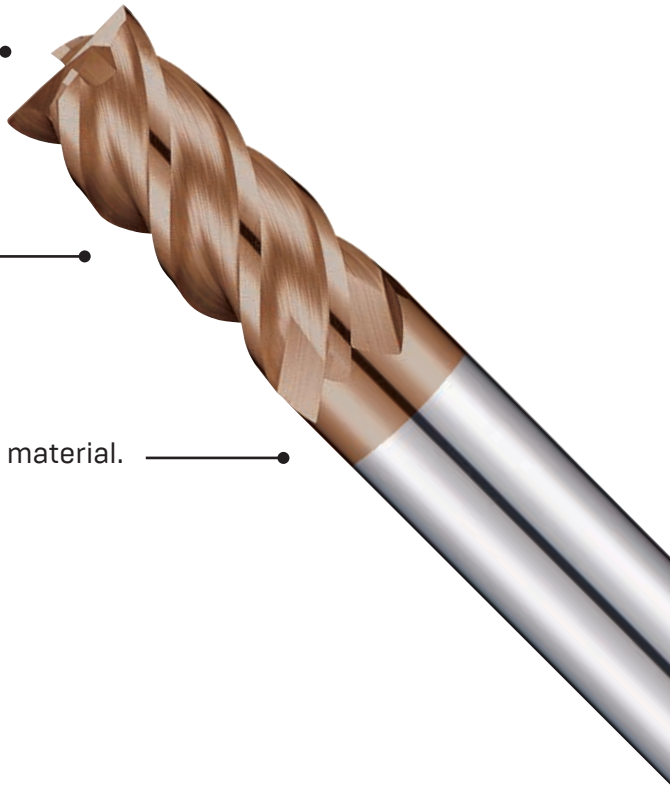
High Performance End Mills

S645TX

Negative rake angle and passivated corner radius applied for high hardness material cutting.

With AlTiSiN multilayer coating which has excellent wear resistance.

Use general sustainable UMG material.



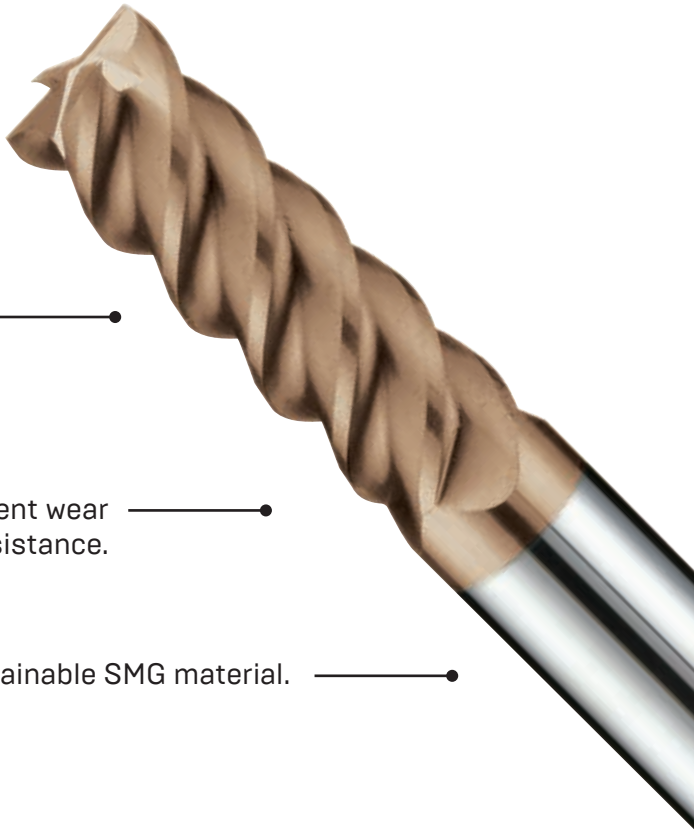
S676ATX

High Hardness End Mills, with high helix angle.

Negative rake angle cutting edge with small corner radius design for cutting high hardness material.

AlTiSiN nano multilayer coating which has excellent wear resistance.

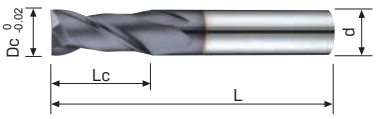
Use general sustainable SMG material.



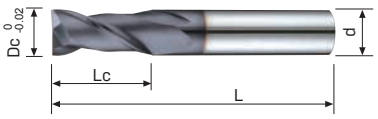
Universal End Mills

OSL
Only Simplicity Last

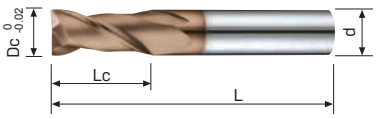
S200F / γ10°



S630X / γ5°



S630TX / γ5°



Tool Material/ Coating Type	MG Carbide	UMG Carbide	TiAlN AlCrN AlTiSiN		Type of Operation	
Specification	35°	2	N, γ	90°		

Work Materials (◎ The most recommended/ ○ recommended)

Carbon Steel / Alloy Steel	Tool Steel / Pre-harden Steel	Pre-hardend Steel / Hardened Steel ~48HRC	~56HRC	~68HRC	Stainless Steel	Cast Steel	Nonferrous Metals: Aluminium	Copper	Plastics	Composite Material	Graphite	Aerospace Materials: Titanium	Nickel	Heat- resistant Steel
~30HRC														
S200X	◎	◎			○	◎		○						
S630X	◎	◎	◎											
S630TX	◎	◎	◎	○										

※Feature of product

S200F Universal Standard Length End Mills- 2 Flutes

General cutting applications for side milling, slotting, drilling...etc. suitable for cutting steel, cast iron, and copper material.

Good wear resistance and lubricating effect with Nano multilayer coating.

S630X Universal Standard Length End Mills- 2 Flutes

General cutting applications for side milling, slotting, drilling...etc. suitable for cutting steel, cast iron, and mold steel material.

Good wear resistance and lubricating effect with Nano multilayer coating.

S630TX Universal Standard Length End Mills- 2 Flutes

General cutting applications for side milling, slotting, drilling...etc. suitable for cutting medium alloy steel and mold steel material.

Good wear resistance and lubricating effect with Nano multilayer coating.

Code No. S200F-Dc / S630X-Dc / S630TX-Dc

Dc 0 -0.02	**Lc** mm	**L** mm	**d** h6	**S200F** MG TiAlN <45HRC	**S630X** UMG AlCrN <55HRC	**S630TX** UMG AlTiSiN <62HRC
1	3	50	4	●	●	●
1.5	5	50	4	●	●	●
2	6	50	4	●	●	●
2.5	8	50	4	●	●	●
3A	8	50	4	●	●	●
4A	11	50	4	●	●	●
3B	8	50	3	●	●	●
3	8	50	6	●	●	●
3.5	10	50	6	●	-	-
4	11	50	6	●	●	●
4.5	11	50	6	●	-	-
5	13	50	6	●	●	●
6	16	50	6	●	●	●
7	20	60	8	●	-	-
8	20	60	8	●	●	●
9	25	75	10	●	-	-
10	25	75	10	●	●	●
12	30	75	12	●	●	●
14	32	90	16	●	●	●
16	40	100	16	●	●	●
18	NEW45(40)	100	20	●	●	●
20	NEW50(40)	100	20	●	●	●

Recommended Milling Conditions

OSL® Only Simplicity Last

Slotting

Work Material		GR.1 Carbon Steel		GR.2 Low-alloyed Steel (~24HRC)		GR.3 Hi-alloyed Steel (~30HRC)		GR.4 Hardened Steel (30~38HRC)		GR.5 Hardened Steel (38~48HRC)		GR.8 Stainless Steel		GR.9 Cast Iron		GR.11 Copper	
Vc m/min		80		80		80		55		45		55		80		125	
Code No.	Dc	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)
S200F-1	1	17,500	120	17,500	120	17,500	108	12,500	90	11,000	60	12,500	90	17,500	120	47,500	300
S200F-1.5	1.5	12,500	122	12,500	122	12,500	110	8,900	90	7,900	60	8,900	90	12,500	122	32,000	300
S200F-2	2	9,700	130	9,700	130	9,700	117	7,000	90	6,300	70	7,000	90	9,700	130	24,000	300
S200F-2.5	2.5	8,200	155	8,200	155	8,200	140	6,100	90	5,300	70	6,100	90	8,200	155	20,000	350
S200F-3	3	6,900	170	6,900	170	6,900	153	5,300	100	4,400	70	5,300	100	8,493	200	16,000	400
S200F-3.5	3.5	6,000	190	6,000	190	6,000	190	4,700	100	3,860	70	4,700	100	7,280	210	13,650	415
S200F-4	4	5,400	210	5,400	210	5,400	190	4,200	120	3,500	90	4,200	120	6,370	215	12,000	430
S200F-4.5	4.5	4,850	240	4,850	240	4,850	240	3,800	120	3,200	90	3,800	120	5,660	220	10,600	465
S200F-5	5	4,500	265	4,500	265	4,500	240	3,500	130	3,000	95	3,500	130	5,096	225	9,500	500
S200F-5.5	5.5	4,200	268	4,200	268	4,200	268	3,200	130	2,720	95	3,200	130	4,630	225	8,700	510
S200F-6	6	4,000	270	4,000	270	4,000	243	2,900	130	2,500	100	2,900	130	4,247	230	7,900	520
S200F-7	7	3,500	265	3,500	265	3,500	265	2,550	120	2,200	100	2,550	120	3,640	235	6,900	520
S200F-8	8	3,000	265	3,000	265	3,000	265	2,200	120	1,900	100	2,200	120	3,185	235	5,900	520
S200F-9	9	2,700	260	2,700	260	2,700	260	1,950	120	1,650	95	1,950	120	2,830	215	5,300	500
S200F-10	10	2,400	255	2,400	255	2,400	255	1,700	120	1,400	95	1,700	120	2,548	215	4,700	500
S200F-12	12	2,000	246	2,000	246	2,000	246	1,400	120	1,200	95	1,400	120	2,123	215	4,000	500
S200F-14	14	1,700	240	1,700	240	1,700	240	1,200	90	1,000	80	1,200	90	1,820	210	3,500	400
S200F-16	16	1,500	200	1,500	200	1,500	200	1,100	90	800	80	1,100	90	1,593	210	3,000	400
S200F-18	18	1,300	180	1,300	180	1,300	180	900	90	700	70	900	90	1,416	205	2,700	350
S200F-20	20	1,200	155	1,200	155	1,200	155	800	90	600	60	800	90	1,274	205	2,400	300
Depth of Cut (mm) 		ap: 0.5D		ap: 0.5D		ap: 0.5D		ap:0.5D		ap:0.5D		ap:0.5D		ap:0.5D		ap:0.5D	

Slotting

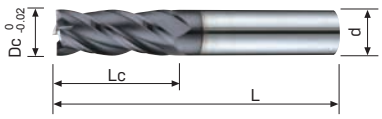
Work Material		GR.1 Carbon Steel		GR.2 Low-alloyed Steel (~24HRC)		GR.3 Hi-alloyed Steel (~30HRC)		GR.4 Hardened Steel (30~38HRC)		GR.5 Hardened Steel (38~48HRC)		GR.6 Hardened Steel (48~56HRC)	
Vc m/min		110		110		110		70		70		45	
Code No.	Dc	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)
S630X/S630TX-1	1	28,500	500	28,500	500	28,500	500	25,000	380	19,000	250	12,500	110
S630X/S630TX-1.5	1.5	22,000	505	22,000	505	22,000	505	19,250	390	14,500	255	9,650	115
S630X/S630TX-2	2	15,500	510	15,500	510	15,500	510	13,500	400	10,000	260	6,800	120
S630X/S630TX-2.5	2.5	13,000	530	13,000	530	13,000	530	11,000	405	8,150	270	5,800	130
S630X/S630TX-3	3	10,500	550	10,500	550	10,500	550	8,500	410	6,300	280	4,800	140
S630X/S630TX-4	4	8,700	560	8,700	560	8,700	560	7,000	400	5,200	270	3,800	135
S630X/S630TX-5	5	7,500	545	7,500	545	7,500	545	6,150	475	4,450	250	3,225	125
S630X/S630TX-6	6	6,300	530	6,300	530	6,300	530	5,300	550	3,700	235	2,650	120
S630X/S630TX-8	8	4,800	530	4,800	530	4,800	530	4,000	370	2,800	250	2,000	130
S630X/S630TX-10	10	3,800	550	3,800	550	3,800	550	3,200	380	2,300	250	1,600	150
S630X/S630TX-12	12	3,200	530	3,200	530	3,200	530	2,600	380	1,950	260	1,400	155
S630X/S630TX-14	14	2,750	510	2,750	510	2,750	510	2,500	360	1,600	250	1,000	135
S630X/S630TX-16	16	2,400	500	2,400	500	2,400	500	2,200	350	1,400	240	900	120
S630X/S630TX-18	18	2,200	480	2,200	480	2,200	480	1,950	320	1,200	220	800	110
S630X/S630TX-20	20	1,900	460	1,900	460	1,900	460	1,750	300	1,100	200	720	110
Depth of Cut (mm) 		ap: 0.5D		ap: 0.5D		ap: 0.5D		ap:0.5D		ap:0.5D		ap:0.5D	

1. Please work with good rigidity / high precision facilities and collet chuck.
2. Please choose proper cutting fluid.
3. The cutting data is reference value only. Please adjust it according to your real working conditions.
4. If RPM is lower the reference value, the Feed rate (fz) and RPM should be reduced by the same proportion.
5. If vibration occurs during cutting, please reduce cutting parameter.

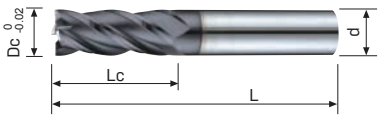
Finishing End Mills

OSL
Only Simplicity Last

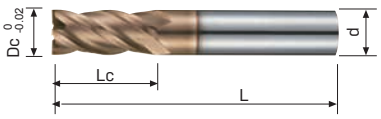
S204F / γ10°



S640X / γ5°



S640TX / γ5°



Tool Material/ Coating Type	MG Carbide	UMG Carbide	TiAlN AlCrN AlTiSiN		Type of Operation	
Specification	35°	4	N γ	90°		

Work Materials (◎ The most recommended/ ○ recommended)

Carbon Steel	Tool Steel	Pre-hardend Steel			Stainless Steel	Cast Steel	Nonferrous Metals					Aerospace Materials		
Alloy Steel	Pre-hardend Steel	Hardened Steel												
~30HRC		~48HRC	~56HRC	~68HRC			Aluminium	Copper	Plastics	Composite Material	Graphite	Titanium	Nickel	Heat- resistant Steel
S204X	◎	◎			○	◎		○						
S630X	◎	◎	◎											
S630TX	◎	◎	◎	○										

※Feature of product

S204F Universal Standard Length End Mills- 4 Flutes

General cutting applications, provide good surface finishing for side milling in steel, cast iron, and copper material.

Good wear resistance and lubricating effect with Nano multilayer coating.

S640X Universal Standard Length End Mills- 4 Flutes

General cutting applications, provide good surface finishing for side milling in steel, cast iron, and mold steel material.

Good wear resistance and lubricating effect with Nano multilayer coating.

S640TX Universal Standard Length End Mills- 4 Flutes

General cutting applications, provide good surface finishing for side milling in medium alloy steel and mold steel material.

Good wear resistance and lubricating effect with Nano multilayer coating.

Code No. S204F-Dc / S640X-Dc / S640TX-Dc

Dc 0 -0.02	**Lc** mm	**L** mm	**d** h6	**S204F** MG TiAlN <45HRC	**S640X** UMG AlCrN <55HRC	**S640TX** UMG AlTiSiN <62HRC
1	3	50	4	●	●	●
1.5	5	50	4	●	●	●
2	6	50	4	●	●	●
2.5	8	50	4	●	●	●
3A	8	50	4	●	●	●
4A	11	50	4	●	●	●
3B	8	50	3	●	●	●
3	8	50	6	●	●	●
3.5	10	50	6	●	●	●
4	11	50	6	●	●	●
4.5	11	50	6	●	●	●
5	13	50	6	●	●	●
6	16	50	6	●	●	●
7	20	60	8	●	●	●
8	20	60	8	●	●	●
9	25	75	10	●	●	●
10	25	75	10	●	●	●
10-30	30	75	10	●	●	●
12	30	75	12	●	●	●
12-36	36	75	12	●	●	●
14	32	90	16	●	●	●
16	40	100	16	●	●	●
18	NEW45(40)	100	20	●	●	●
20	NEW50(40)	100	20	●	●	●

Recommended Milling Conditions

OSL® Only Simplicity Last

Side Milling

Work Material		GR.1 Carbon Steel		GR.2 Low-alloyed Steel (~24HRC)		GR.3 Hi-alloyed Steel (~30HRC)		GR.4 Hardened Steel (30~38HRC)		GR.5 Hardened Steel (38~48HRC)		GR.8 Stainless Steel		GR.9 Cast Iron		GR.11 Copper	
Vc m/min		85		85		75		60		50		60		85		150	
Code No.	Dc	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)
S204F-1	1	20,000	240	20,000	240	15,000	210	11,000	85	7,100	40	11,000	85	20,000	240	47,600	420
S204F-1.5	1.5	13,500	250	13,500	250	12,500	215	8,000	90	6,900	80	8,000	90	13,500	250	31,800	620
S204F-2	2	13,000	300	13,000	300	11,000	280	7,000	110	6,350	100	7,000	110	13,000	300	24,000	590
S204F-2.5	2.5	11,000	370	11,000	370	9,500	245	6,300	110	5,500	105	6,300	110	11,000	370	19,200	960
S204F-3	3	9,000	480	9,000	480	7,400	350	5,300	120	4,800	110	5,300	120	9,000	480	15,800	860
S204F-4	4	6,650	500	6,650	500	5,500	350	4,250	135	3,700	115	4,250	135	6,650	500	12,000	900
S204F-5	5	5,300	600	5,300	600	4,500	420	3,500	130	3,200	120	3,500	130	5,300	600	9,400	1,040
S204F-6	6	4,500	600	4,500	600	3,700	425	3,000	140	2,650	125	3,000	140	4,500	600	7,800	1,040
S204F-7	7	3,900	575	3,900	575	2,950	410	2,420	130	2,250	125	2,420	130	3,900	557	6,800	1,025
S204F-8	8	3,300	550	3,300	550	2,600	410	1,850	120	1,900	125	1,850	120	3,300	550	5,800	1,010
S204F-9	9	2,950	535	2,950	535	2,350	405	1,650	125	1,700	130	1,650	125	2,950	535	5,300	1,010
S204F-10	10	2,600	520	2,600	520	2,100	400	1,500	125	1,500	130	1,500	125	2,600	520	4,800	1,010
S204F-12	12	2,200	520	2,200	520	1,800	405	1,200	120	1,200	120	1,200	120	2,200	520	4,000	1,010
S204F-14	14	1,900	550	1,900	550	1,600	410	1,200	140	1,100	120	1,200	140	1,900	550	3,400	990
S204F-16	16	1,700	530	1,700	530	1,400	410	1,100	130	1,000	100	1,100	130	1,700	530	3,000	960
S204F-18	18	1,500	520	1,500	520	1,200	405	950	100	880	95	950	100	1,500	520	2,600	940
S204F-20	20	1,300	500	1,300	500	1,100	370	900	90	800	90	900	90	1,300	500	2,400	890
Depth of Cut (mm) 		ap:1.5D		ap:1.5D		ap:1.5D		ap:1.5D		ap:1.5D		ap:1.5D		ap:1.5D		ap:1.5D	
		ae: 0.1D		ae: 0.1D		ae: 0.1D		ae: 0.1D		ae: 0.02D		ae: 0.1D		ae: 0.1D		ae: 0.1D	

Side Milling

Work Material		GR.1 Carbon Steel		GR.2 Low-alloyed Steel (~24HRC)		GR.3 Hi-alloyed Steel (~30HRC)		GR.4 Hardened Steel (30~38HRC)		GR.5 Hardened Steel (38~48HRC)		GR.6 Hardened Steel (48~56HRC)		GR.7 Hardened Steel (56~68HRC)	
Vc m/min		110		110		110		70		70		45		40	
Code No.	Dc	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)
S640X/S640TX-1	1	20,000	240	20,000	240	20,000	240	20,000	185	20,000	185	10,000	60	9,500	40
S640X/S640TX-1.5	1.5	15,000	245	15,000	245	15,000	245	15,000	185	15,000	185	7,100	70	6,300	50
S640X/S640TX-2	2	11,000	480	11,000	480	11,000	480	10,000	300	10,000	300	6,400	150	4,800	95
S640X/S640TX-2.5	2.5	8,800	600	8,800	600	8,800	600	8,500	350	8,500	350	5,600	170	4,500	100
S640X/S640TX-3	3	11,500	500	11,500	500	11,500	500	7,300	450	7,300	450	4,800	220	4,000	150
S640X/S640TX-4	4	8,600	515	8,600	515	8,600	515	5,600	500	5,600	500	3,600	250	3,200	220
S640X/S640TX-5	5	6,800	515	6,800	515	6,800	515	4,500	550	4,500	550	2,900	280	2,600	220
S640X/S640TX-6	6	5,800	520	5,800	520	5,800	520	3,700	600	3,700	600	2,400	300	2,100	220
S640X/S640TX-8	8	4,300	520	4,300	520	4,300	520	2,800	620	2,800	620	1,800	310	1,600	210
S640X/S640TX-10	10	3,400	540	3,400	540	3,400	540	2,300	620	2,300	620	1,400	300	1,300	180
S640X/S640TX-12	12	2,900	545	2,900	545	2,900	545	1,900	620	1,900	620	1,200	300	1,100	150
S640X/S640TX-14	14	2,650	575	2,650	575	2,650	575	1,650	550	1,650	550	1,050	265	950	125
S640X/S640TX-16	16	2,400	610	2,400	610	2,400	610	1,400	480	1,400	480	900	230	800	120
S640X/S640TX-18	18	2,250	620	2,250	620	2,250	620	1,250	450	1,250	450	810	220	720	105
S640X/S640TX-20	20	1,950	630	1,950	630	1,950	630	1,100	420	1,100	420	720	210	640	90
Depth of Cut (mm) 		ap:1.5D		ap:1.5D		ap:1.5D		ap:1.5D		ap:1.5D		ap:1.5D		ap:1.5D	
		ae: 0.05D		ae: 0.05D		ae: 0.05D		ae: 0.05D		ae: 0.05D		ae:0.02D		ae:0.02D	

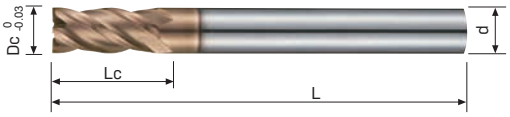
1. Please work with good rigidity / high precision facilities and collet chuck.
2. Please choose proper cutting fluid.
3. The cutting data is reference value only. Please adjust it according to your real working conditions.
4. If RPM is lower the reference value, the Feed rate (fz) and RPM should be reduced by the same proportion.
5. If vibration occurs during cutting, please reduce cutting parameter.

Finishing End Mills

OSL
Only Simplicity Last

S206F / γ10° S660X / γ5°

S660TX / γ5°



Tool Material/ Coating Type	**MG Carbide** **UMG Carbide** **TiAlN AlCrN AlTiSiN**
Specification	35° 4 N γ 90°
Type of Operation	

Work Materials (◎ The most recommended/ ○ recommended)

Carbon Steel / Alloy Steel ~30HRC	Tool Steel / Pre-hardend Steel	Pre-hardend Steel / Hardened Steel ~48HRC	~56HRC	~68HRC	Stainless Steel	Cast Steel	Nonferrous Metals: Aluminium	Copper	Plastics	Composite Material	Graphite	Aerospace Materials: Titanium	Nickel	Heat- resistant Steel
S206F	◎	◎			○	◎		○						
S660X	◎	◎	◎											
S660TX	◎	◎	◎	○										

※Feature of product

S206F Finishing Long Length End Mills- 4 Flutes
General cutting applications, provide good surface finishing for side milling in steel, cast iron, and copper material.
Good wear resistance and lubricating effect with Nano multilayer coating.

S660X Finishing Long Length End Mills- 4
General cutting applications, provide good surface finishing for side milling in steel, cast iron, and mold steel material.
Good wear resistance and lubricating effect with Nano multilayer coating.

S660TX Finishing Long Length End Mills- 4
General cutting applications, provide good surface finishing for side milling in medium alloy steel and mold steel material.
Good wear resistance and lubricating effect with Nano multilayer coating.

Code No. S206F-Dc / S660X-Dc / S660TX-Dc

Dc 0 -0.02	**Lc** mm	**L** mm	**d** h6	**S206F** MG TiAlN <45HRC	**S660X** UMG AlCrN <55HRC	**S660TX** UMG AlTiSiN <62HRC
3A	12	70	4	●	●	●
4A	15	70	4	●	●	●
3	12	70	6	●	●	●
4	15	70	6	●	●	●
5	20	80	6	●	●	●
6	20	80	6	●	●	●
8	25	100	8	●	●	●
10	30	100	10	●	●	●
12	40	110	12	●	●	●
16	50	140	16	●	●	●
20	60	160	20	●	●	●

Recommended Milling Conditions

OSL Only Simplicity Last

Side Milling

Work Material		GR.1 Carbon Steel		GR.2 Low-alloyed Steel (~24HRC)		GR.3 Hi-alloyed Steel (~30HRC)		GR.4 Hardened Steel (30~38HRC)		GR.5 Hardened Steel (38~48HRC)		GR.8 Stainless Steel		GR.9 Cast Iron		GR.11 Copper	
Vc m/min		65		65		55		40		38		40		65		115	
Code No.	Dc	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)
S206F-3	3	6,750	360	6,750	360	5,550	265	3,975	90	3,600	85	3,975	90	6,750	360	11,850	645
S206F-4	4	5,000	375	5,000	375	4,125	265	3,200	100	2,775	85	3,200	100	5,000	375	9,000	675
S206F-5	5	3,975	450	3,975	450	3,375	315	2,625	100	2,400	90	2,625	100	3,975	450	7,050	780
S206F-6	6	3,375	450	3,375	450	2,775	320	2,250	105	1,988	95	2,250	105	3,375	450	5,850	780
S206F-8	8	2,475	410	2,475	410	1,950	310	1,400	90	1,425	95	1,400	90	2,475	410	4,350	760
S206F-10	10	1,950	390	1,950	390	1,575	300	1,125	95	1,125	100	1,125	95	1,950	390	3,600	760
S206F-12	12	1,650	390	1,650	390	1,350	305	900	90	900	90	900	90	1,650	390	3,000	760
S206F-16	16	1,275	400	1,275	400	1,050	310	825	100	750	75	825	100	1,275	400	2,250	720
S206F-20	20	975	375	975	375	825	275	675	70	600	70	675	70	975	375	1,800	670
Depth of Cut (mm) 		ap:2.5D		ap:2.5D		ap:2.5D		ap:2.5D		ap:2.5D		ap:2.5D		ap:2.5D		ap:2.5D	
		ae:0.1D		ae:0.1D		ae:0.1D		ae:0.1D		ae:0.1D		ae:0.1D		ae:0.1D		ae:0.1D	

Side Milling

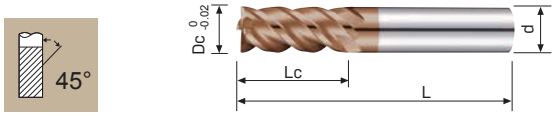
Work Material		GR.1 Carbon Steel		GR.2 Low-alloyed Steel (~24HRC)		GR.3 Hi-alloyed Steel (~30HRC)		GR.4 Hardened Steel (30~38HRC)		GR.5 Hardened Steel (38~48HRC)		GR.6 Hardened Steel (48～56HRC)		GR.7 Hardened Steel (56～68HRC)	
Vc m/min		110		110		110		70		70		45		40	
Code No.	Dc	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)
S660X/S660TX-3	3	11,500	500	11,500	500	11,500	500	7,300	450	7,300	450	4,800	220	4,000	150
S660X/S660TX-4	4	8,600	515	8,600	515	8,600	515	5,600	500	5,600	500	3,600	250	3,200	220
S660X/S660TX-5	5	6,800	515	6,800	515	6,800	515	4,500	550	4,500	550	2,900	280	2,600	220
S660X/S660TX-6	6	5,800	520	5,800	520	5,800	520	3,700	600	3,700	600	2,400	300	2,100	220
S660X/S660TX-8	8	4,300	520	4,300	520	4,300	520	2,800	620	2,800	620	1,800	310	1,600	210
S660X/S660TX-10	10	3,400	540	3,400	540	3,400	540	2,300	620	2,300	620	1,400	300	1,300	180
S660X/S660TX-12	12	2,900	545	2,900	545	2,900	545	1,900	620	1,900	620	1,200	300	1,100	150
S660X/S660TX-16	16	2,400	610	2,400	610	2,400	610	1,400	480	1,400	480	900	230	800	120
S660X/S660TX-20	20	1,950	630	1,950	630	1,950	630	1,100	420	1,100	420	720	210	640	90
Depth of Cut (mm) 		ap:1.5D		ap:1.5D		ap:1.5D		ap:1.5D		ap:1.5D		ap:1.5D		ap:1.5D	
		ae: 0.05D		ae: 0.05D		ae: 0.05D		ae: 0.05D		ae: 0.05D		ae:0.02D		ae:0.02D	

1. Please work with good rigidity / high precision facilities and collet chuck.
2. Please choose proper cutting fluid.
3. The cutting data is reference value only. Please adjust it according to your real working conditions.
4. If RPM is lower the reference value, the Feed rate (fz) and RPM should be reduced by the same proportion.
5. If vibration occurs during cutting, please reduce cutting parameter.

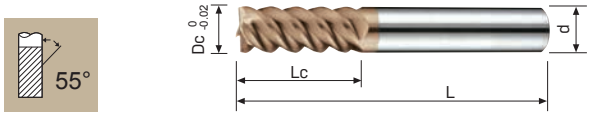
High Performance End Mills

OSL
Only Simplicity Last

S645TX / γ-5°



S676ATX / γ-10°



Tool Material/ Coating Type	UMG/SMG Carbide	AlTiSiN	Type of Operation
Specification	4	N, γ	90°

Work Materials (◎ The most recommended/ ○ recommended)

Carbon Steel / Alloy Steel	Tool Steel / Pre-hardend Steel	Pre-hardend Steel / Hardened Steel ~48HRC	~56HRC	~68HRC	Stainless Steel	Cast Steel	Nonferrous Metals: Aluminium	Copper	Plastics	Composite Material	Graphite	Aerospace Materials: Titanium	Nickel	Heat- resistant Steel
~30HRC														
S645TX	◎	◎	◎	○	○	○	○	○				○	○	○
S676ATX	◎	◎	◎	◎										

※Feature of product

S645TX High hardness Standard Length End Mills- 4 Flutes.
High efficiency with 45° helix angle for cutting high hardness material.
Negative rake angle with AlTiSiN coating for excellent wear resistance.
Machine pre-hardened and hardened steel up to HRC62.

S676ATX High Hardness End mills With Standard Length- 4 Flutes,
High efficiency with 55° helix angle for cutting high hardness material.
Negative rake angle with AlTiSiN coating for excellent wear resistance.
Cutting edge with small corner chamfer design increases tool life.
Machine pre-hardened and hardened steel up to HRC70.

Code No. S645TX-Dc / S676ATX-Dc

Dc 0 -0.02	**Lc** mm	**L** mm	**d** h6	**S645TX** UMG AlTiSiN <62HRC	**S676ATX** SMG AlTiSiN <70HRC
1	3	50	4	●	
1.5	5	50	4	●	
2	6	50	4	●	
2.5	8	50	4	●	
3A	8	50	4	●	
4A	11	50	4	●	
3	8	50	6	●	●
4	11	50	6	●	●
5	13	50	6	●	●
6	16	50	6	●	●
8	20	60	8	●	●
10	25	75	10	●	●
10-30	30	75	10	●	●
12	30	75	12	●	●
12-36	36	75	12	●	●
16	40	100	16	●	●
20	NEW50(40)	100	20	●	●

Recommended Milling Conditions

OSL Only Simplicity Last

S645TX / Side Milling (High-speed machining)

Work Material		GR.4 Hardened Steel (30~38HRC)		GR.5 Hardened Steel (38~48HRC)		GR.6 Hardened Steel (48~56HRC)		GR.7 Hardened Steel (56~68HRC)	
Vc m/min		200		150		100		80	
Code No.	Dc	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)
S645TX-1	1	21,233	1,000	23,900	1,050	23,900	950	25,477	1,020
S645TX-1.5	1.5	21,233	1,100	21,233	1,100	21,231	1,000	16,980	815
S645TX-2	2	21,233	1,100	21,233	1,100	15,900	820	12,740	660
S645TX-2.5	2.5	21,233	1,274	19,100	1,150	12,740	715	10,200	570
S645TX-3	3	21,233	1,274	15,925	955	10,616	637	8493	509
S645TX-4	4	15,925	1,274	11,943	955	7,962	637	6370	509
S645TX-5	5	12,740	1,528	9,555	1,146	6,370	764	5096	509
S645TX-6	6	10,500	1,800	8,000	1,350	5,300	900	4,200	600
S645TX-8	8	8,000	1,700	5,900	1,350	4,000	850	3,200	550
S645TX-10	10	6,300	1,650	4,700	1,300	3,200	800	2,500	500
S645TX-12	12	5,300	1,650	4,000	1,300	2,600	785	2,100	480
S645TX-16	16	4,000	1,600	3,000	1,200	2,000	780	1,600	480
S645TX-20	20	3,200	1,450	2,400	1,100	1,600	730	1,300	475
Depth of Cut (mm) 		ap:1.5D		ap:1.5D		ap:1.0D		ap:1.0D	
		ae:0.05D		ae:0.05D		ae:0.02D		ae:0.02D	

S676ATX / High SpeedSide Milling

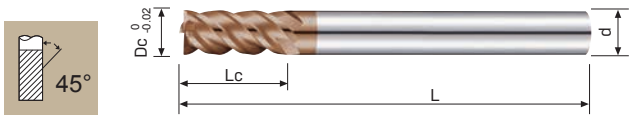
Work Material		GR.5 Hardened Steel (38~48HRC)		GR.6 Hardened Steel (48~56HRC)		GR.7 Hardened Steel (56~68HRC)	
Vc m/min		200		150		100	
Code No.	Dc	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)
S676ATX-3	3	21,233	1,620	15,925	1,130	10,617	424
S676ATX-4	4	15,925	1,725	11,944	1,200	7,963	477
S676ATX-5	5	12,740	1,750	9,555	1,200	6,370	510
S676ATX-6	6	10,617	1,200	7,963	700	5,308	530
S676ATX-8	8	7,963	1,200	5,972	700	3,981	530
S676ATX-10	10	6,370	850	4,778	630	3,185	420
S676ATX-12	12	5,308	850	3,981	630	2,654	420
S676ATX-16	16	3,981	900	2,986	650	1,991	420
S676ATX-20	20	3,185	900	2,389	650	1,593	420
Depth of Cut (mm) 		ap:1.5D		ap:1.5D		ap:1.5D	
		ae:0.01D		ae:0.01D		ae:0.01D	

1. Please work with good rigidity / high precision facilities and collet chuck.
2. Please choose proper cutting fluid.
3. The cutting data is reference value only. Please adjust it according to your real working conditions.
4. If RPM is lower the reference value, the Feed rate (fz) and RPM should be reduced by the same proportion.
5. If vibration occurs during cutting, please reduce cutting parameter.

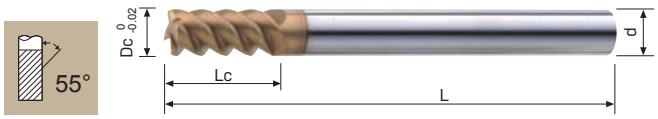
High Performance End Mills

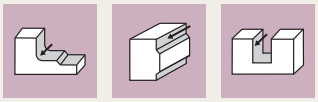
OSL
Only Simplicity Last

S665TX / γ-5°



S678ATX / γ-10°



Tool Material/ Coating Type	UMG/SMG Carbide, AlTiSiN
Specification	4, N, γ, 90°
Type of Operation	

Work Materials (◎ The most recommended/ ○ recommended)

	Carbon Steel	Tool Steel	Pre-hardend Steel			Stainless Steel	Cast Steel	Nonferrous Metals					Aerospace Materials		
	Alloy Steel	Pre-hardend Steel	Hardened Steel												
	~30HRC		~48HRC	~56HRC	~68HRC			Aluminium	Copper	Plastics	Composite Material	Graphite	Titanium	Nickel	Heat- resistant Steel
S665TX	◎		◎	◎	○	○	○	○	○				○	○	○
S678ATX	◎		◎	◎	◎										

※Feature of product

S665TX High hardness Long Length End Mills- 4 Flutes.
High efficiency with 45° helix angle for cutting high hardness material.
Negative rake angle with AlTiSiN coating for excellent wear resistance.
Machine pre-hardened and hardened steel up to HRC62.

S678ATX High Hardness Long Length End Mills- 4 Flutes,
High efficiency with 55° helix angle for cutting high hardness material.
Negative rake angle with AlTiSiN coating for excellent wear resistance.
Cutting edge with small corner chamfer design increases tool life.
Machine pre-hardened and hardened steel up to HRC70.

Code No. S665TX-Dc / S678ATX-Dc

Dc 0 -0.02	**Lc** mm	**L** mm	**d** h6	**S665TX** UMG AlTiSiN <62HRC	**S678ATX** SMG AlTiSiN <70HRC
3A	12	70	4	●	
4A	15	70	4	●	
3	12	70	6	●	
4	15	70	6	●	
5	20	80	6	●	
6	20	80	6	●	●
8	25	100	8	●	●
10	30	100	10	●	●
12	40	110	12	●	●
16	50	140	16	●	●
20	60	160	20	●	●

Recommended Milling Conditions

OSL Only Simplicity Last

S665TX / Side Milling (High-speed machining)

Work Material		GR.4 Hardened Steel (30~38HRC)		GR.5 Hardened Steel (38~48HRC)		GR.6 Hardened Steel (48~56HRC)		GR.7 Hardened Steel (56~68HRC)	
Vc m/min		200		150		100		80	
Code No.	Dc	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)
S665TX-1	1	21,233	1,000	23,900	1,050	23,900	950	25,477	1,020
S665TX-1.5	1.5	21,233	1,100	21,233	1,100	21,231	1,000	16,980	815
S665TX-2	2	21,233	1,100	21,233	1,100	15,900	820	12,740	660
S665TX-2.5	2.5	21,233	1,274	19,100	1,150	12,740	715	10,200	570
S665TX-3	3	21,233	1,274	15,925	955	10,616	637	8493	509
S665TX-4	4	15,925	1,274	11,943	955	7,962	637	6370	509
S665TX-5	5	12,740	1,528	9,555	1,146	6,370	764	5096	509
S665TX-6	6	10,500	1,800	8,000	1,350	5,300	900	4,200	600
S665TX-8	8	8,000	1,700	5,900	1,350	4,000	850	3,200	550
S665TX-10	10	6,300	1,650	4,700	1,300	3,200	800	2,500	500
S665TX-12	12	5,300	1,650	4,000	1,300	2,600	785	2,100	480
S665TX-16	16	4,000	1,600	3,000	1,200	2,000	780	1,600	480
S665TX-20	20	3,200	1,450	2,400	1,100	1,600	730	1,300	475
Depth of Cut (mm) 		ap:1.5D		ap:1.5D		ap:1.0D		ap:1.0D	
		ae:0.05D		ae:0.05D		ae:0.02D		ae:0.02D	

S678ATX / High SpeedSide Milling

Work Material		GR.5 Hardened Steel (38~48HRC)		GR.6 Hardened Steel (48~56HRC)		GR.7 Hardened Steel (56~68HRC)	
Vc m/min		200		150		100	
Code No.	Dc	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)
S678ATX-3	3	21,233	1,620	15,925	1,130	10,617	424
S678ATX-4	4	15,925	1,725	11,944	1,200	7,963	477
S678ATX-5	5	12,740	1,750	9,555	1,200	6,370	510
S678ATX-6	6	10,617	1,200	7,963	700	5,308	530
S678ATX-8	8	7,963	1,200	5,972	700	3,981	530
S678ATX-10	10	6,370	850	4,778	630	3,185	420
S678ATX-12	12	5,308	850	3,981	630	2,654	420
S678ATX-16	16	3,981	900	2,986	650	1,991	420
S678ATX-20	20	3,185	900	2,389	650	1,593	420
Depth of Cut (mm) 		ap:1.5D		ap:1.5D		ap:1.5D	
		ae:0.01D		ae:0.01D		ae:0.01D	

1. Please work with good rigidity / high precision facilities and collet chuck.
2. Please choose proper cutting fluid.
3. The cutting data is reference value only. Please adjust it according to your real working conditions.
4. If RPM is lower the reference value, the Feed rate (fz) and RPM should be reduced by the same proportion.
5. If vibration occurs during cutting, please reduce cutting parameter.

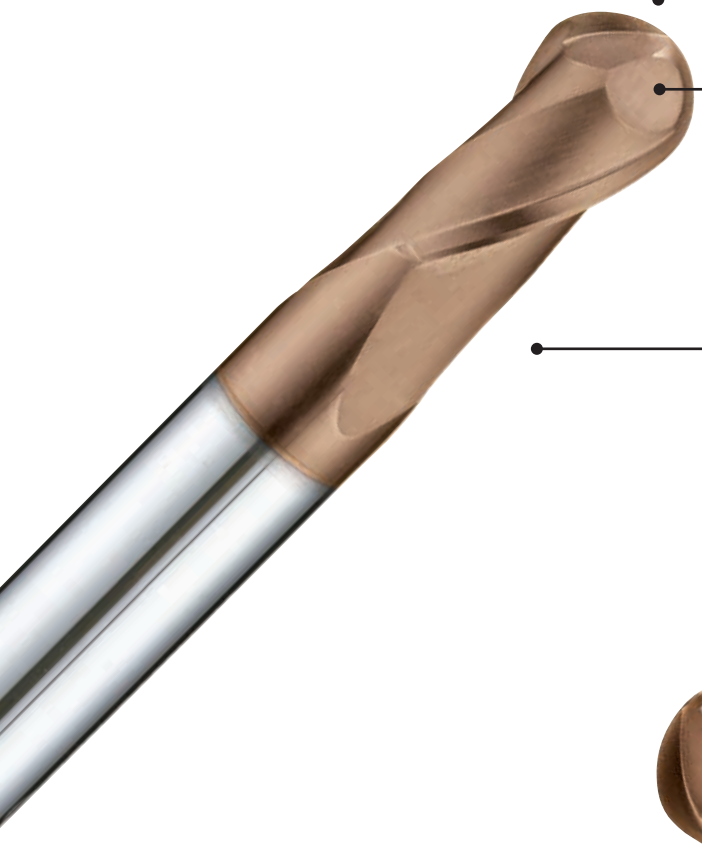
Ball Nose End Mills

S618ATX

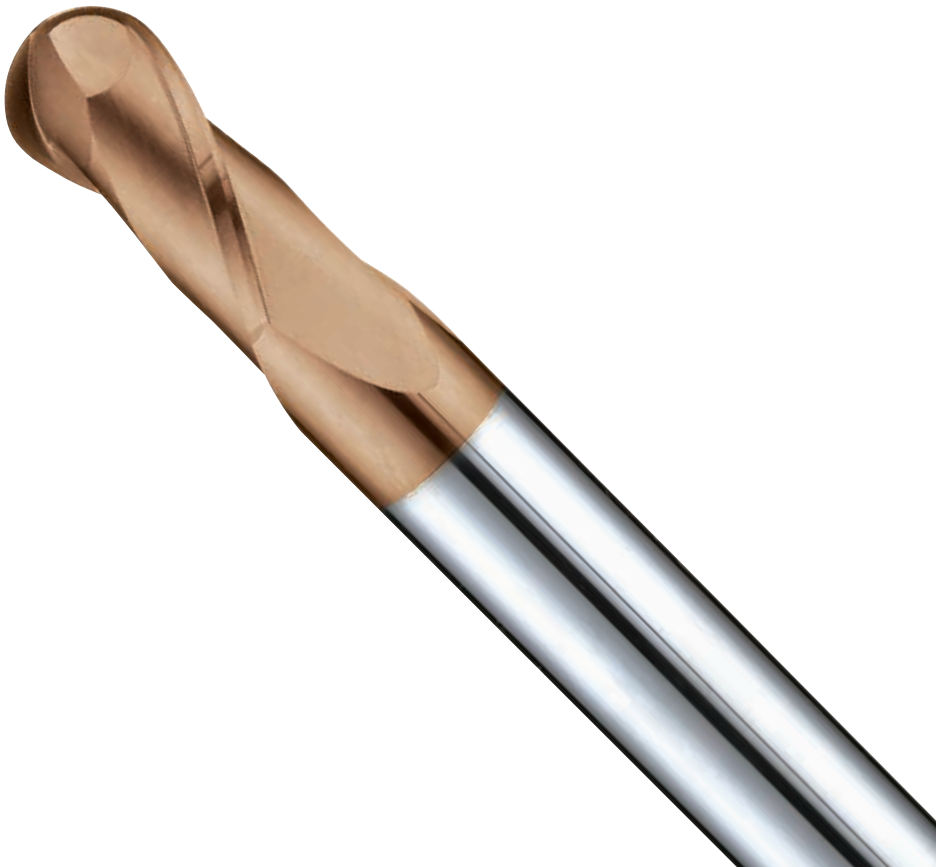
High Finest Surface Quality Unique small edge cutting land design with high rigidity cutting edge Excellent surface finishing quality.

Stronger and rigid cutting edge Radius edge with higher core thickness, improve cutting edge rigidity.

Excellent lubricating & wear resistance Improved AlTiSiN multilayer nano film coating Effectively improve anti-heat resistance and heat-proof quality Able to cut pre-hardened and hardened steel to 70HRC



S620ATX



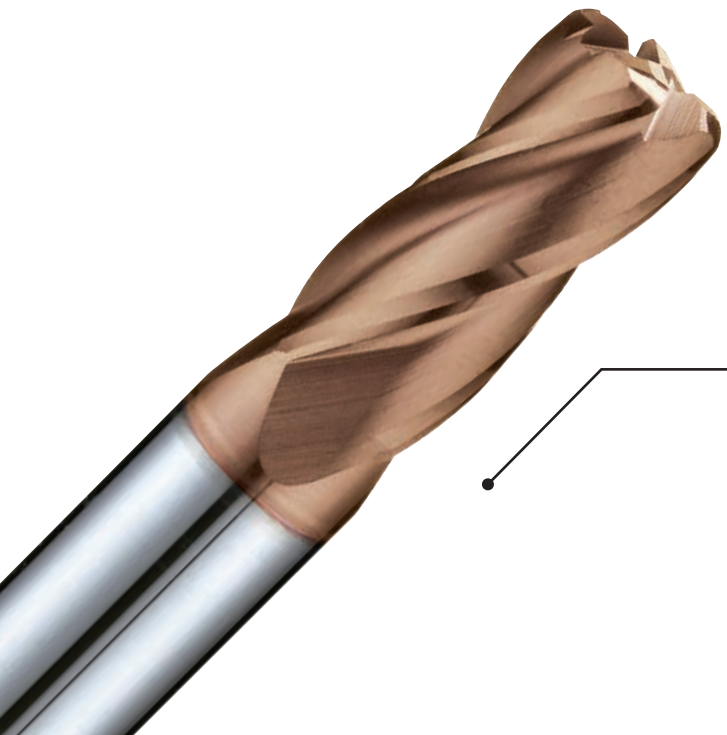
High Performance End Mills With Radius Corner

B276ATX

SMG extreme high wear resistance Selected extreme high wear resistance SMG carbide.

High Finest Surface Quality Negative rake angle and a small edge cutting land Excellent surface finishing on profile contour machining.

Excellent lubricating & wear resistance Improved AlTiSiN multilayer nano film coating Effectively improve anti-heat resistance and heat-proof quality Able to cut pre-hardened and hardened steel up to HRC70.



B266TX

Low rake angle with AlTiSiN coating Excellent wear resistance Various application roughing to semifinishing on profile contour machining.

UMG high wear resistance Selected high wear resistance UMG carbide.

Ball Nose End Mills

OSL
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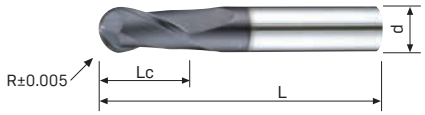
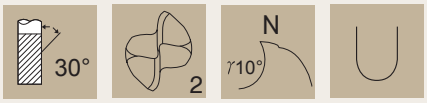
S208F



S210F

Tool Material/ Coating Type	MG Carbide / TiAlN
Specification	
Type of Operation	

Work Materials (◎ The most recommended/ ○ recommended)

Carbon Steel / Alloy Steel ~30HRC	Tool Steel / Pre-harden Steel	Pre-hardend Steel / Hardened Steel ~48HRC	~56HRC	~68HRC	Stainless Steel	Cast Steel	Nonferrous Metals: Aluminium	Copper	Plastics	Composite Material	Graphite	Aerospace Materials: Titanium	Nickel	Heat- resistant Steel
S208F	◎	◎			○	◎		○						
S210F	◎	◎			○	◎		○						

※Feature of product

S208F Standard Length Ball Nose End Mills- 2 Flutes.
Standard ball nose end mills, suitable to machine on various material.
Radius cutting edge S shape geometry designed, stable for continuous cutting.
Good wear resistance and lubricating effect with Nano multilayer coating.

S210F Long Length Ball Nose End Mills- 2 Flutes.
Standard long ball nose end mills, suitable to machine on various material.
Radius cutting edge S shape geometry designed, stable for continuous cutting.
Good wear resistance and lubricating effect with Nano multilayer coating

Code No. S208F-Dc

Dc 0 -0.02	**R** ±0.005	**Lc** mm	**L** mm	**d** h6	**S208F** MG TiAlN <45HRC
1	0.5R	2	50	4	●
1.5	0.75R	3	50	4	●
2	1R	4	50	4	●
2.5	1.25R	5	50	4	●
3A	1.5R	6	50	4	●
4A	2R	8	50	4	●
3B	1.5R	6	50	3	●
3	1.5R	6	50	6	●
4	2R	8	50	6	●
5	2.5R	10	50	6	●
6	3R	12	50	6	●
8	4R	14	60	8	●
10	5R	18	75	10	●
12	6R	22	75	12	●
16	8R	30	100	16	●
20	10R	38	100	20	●

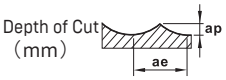
Code No. S210F-Dc

Dc 0 -0.02	**R** ±0.005	**Lc** mm	**L** mm	**d** h6	**S210F** MG TiAlN <45HRC
3A	1.5R	6	70	4	●
4A	2R	8	70	4	●
3	1.5R	6	70	6	●
4	2R	8	70	6	●
5	2.5R	10	80	6	●
6	3R	12	80	6	●
8	4R	14	100	8	●
10	5R	18	100	10	●
12	6R	22	110	12	●
16	8R	30	140	16	●
20	10R	38	160	20	●

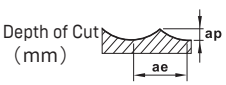
Recommended Milling Conditions

OSL® Only Simplicity Last

General processing

Work Material		GR.1 Carbon Steel		GR.2 Low-alloyed Steel (~24HRC)		GR.3 Hi-alloyed Steel (~30HRC)		GR.4 Hardened Steel (30~38HRC)		GR.5 Hardened Steel (38~48HRC)		GR.8 Stainless Steel		GR.9 Cast Iron		GR.11 Copper	
Vc m/min		100		100		65		65		55		65		100		100	
Code No.	Dc	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)
S208F-R0.5	1	31,500	564	31,500	564	25,000	412	25,000	412	22,000	296	25,000	412	31,500	564	32,000	700
S208F-R0.75	1.5	26,250	578	26,250	578	20,860	418	20,860	418	14,800	302	20,860	418	26,250	578	25,500	715
S208F-R1	2	21,000	582	21,000	582	16,720	425	16,720	425	11,000	310	16,720	425	21,000	582	19,000	730
S208F-R1.25	2.5	15,750	596	15,750	596	12,580	430	12,580	430	8,900	316	12,580	430	15,750	596	12,700	745
S208F-R1.5	3	10,500	620	10,500	620	8,450	435	8,450	435	7,400	322	8,450	435	10,500	620	12,500	760
S208F-R2	4	9,250	630	9,250	630	6,350	442	6,350	442	5,550	342	6,350	442	9,250	630	9,500	765
S208F-R2.5	5	7,950	640	7,950	640	5,095	447	5,095	447	4,460	377	5,095	447	7,950	640	7,650	775
S208F-R3	6	5,300	670	5,300	670	4,200	465	4,200	465	3,700	390	4,200	465	5,300	670	6,300	800
S208F-R4	8	3,950	790	3,950	790	3,150	555	3,150	555	2,750	455	3,150	555	3,950	790	4,750	950
S208F-R5	10	3,150	745	3,150	745	2,500	525	2,500	525	2,200	430	2,500	525	3,150	745	3,800	890
S208F-R6	12	2,650	700	2,650	700	2,100	490	2,100	490	1,850	430	2,100	490	2,650	700	3,170	840
S208F-R8	16	1,990	525	1,990	525	1,580	370	1,580	370	1,390	325	1,580	370	1,990	525	2,400	630
S208F-R10	20	1,590	420	1,590	420	1,260	290	1,260	290	1,110	260	1,260	290	1,590	420	1,900	500
Depth of Cut (mm) 		ap:0.1D		ap:0.1D		ap:0.1D		ap:0.1D		ap:0.1D		ap:0.1D		ap:0.1D		ap:0.1D	
		ae:0.2D		ae:0.2D		ae:0.2D		ae:0.2D		ae:0.1D		ae:0.1D		ae:0.2D		ae:0.2D	

General processing

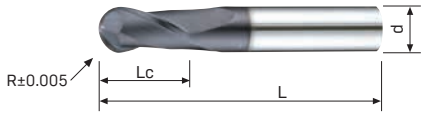
Work Material		GR.1 Carbon Steel		GR.2 Low-alloyed Steel (~24HRC)		GR.3 Hi-alloyed Steel (~30HRC)		GR.4 Hardened Steel (30~38HRC)		GR.5 Hardened Steel (38~48HRC)		GR.8 Stainless Steel		GR.9 Cast Iron		GR.11 Copper	
Vc m/min		100		100		65		65		55		65		100		100	
Code No.	Dc	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)
S210F-R0.5	1	25,200	480	25,200	480	20,000	320	20,000	320	17,600	225	20,000	320	25,200	480	25,600	560
S210F-R0.75	1.5	16,640	480	16,640	480	13,600	320	13,600	320	11,840	225	13,600	320	16,640	480	20,400	560
S210F-R1	2	12,400	480	12,400	480	10,000	320	10,000	320	8,800	230	10,000	320	12,400	480	15,200	560
S210F-R1.25	2.5	12,400	480	12,400	480	8,160	320	8,160	320	7,120	230	8,160	320	12,400	480	10,160	560
S210F-R1.5	3	8,400	500	8,400	500	6,760	325	6,760	325	5,920	230	6,760	325	8,400	500	10,000	608
S210F-R2	4	6,360	500	6,360	500	5,080	355	5,080	355	4,440	300	5,080	355	6,360	500	7,600	608
S210F-R2.5	5	6,360	500	6,360	500	4,070	355	4,070	355	3,568	300	4,070	355	6,360	500	6,120	608
S210F-R3	6	4,240	535	4,240	535	3,360	370	3,360	370	2,960	310	3,360	370	4,240	535	5,040	640
S210F-R4	8	3,160	630	3,160	630	2,520	445	2,520	445	2,200	360	2,520	445	3,160	630	3,800	760
S210F-R5	10	2,520	600	2,520	600	2,000	420	2,000	420	1,760	340	2,000	420	2,520	600	3,040	710
S210F-R6	12	2,120	560	2,120	560	1,680	390	1,680	390	1,480	340	1,680	390	2,120	560	2,530	670
S210F-R8	16	1,590	420	1,590	420	1,260	295	1,260	295	1,110	260	1,260	295	1,590	420	1,920	500
S210F-R10	20	1,270	335	1,270	335	1,000	230	1,000	230	888	200	1,000	230	1,270	335	1,520	400
Depth of Cut (mm) 		ap:0.1D		ap:0.1D		ap:0.1D		ap:0.1D		ap:0.1D		ap:0.1D		ap:0.1D		ap:0.1D	
		ae:0.2D		ae:0.2D		ae:0.2D		ae:0.2D		ae:0.1D		ae:0.1D		ae:0.2D		ae:0.2D	

1. Please work with good rigidity / high precision facilities and collet chuck.
2. Please choose proper cutting fluid.
3. The cutting data is reference value only. Please adjust it according to your real working conditions.
4. If RPM is lower the reference value, the Feed rate (fz) and RPM should be reduced by the same proportion.
5. If vibration occurs during cutting, please reduce cutting parameter.

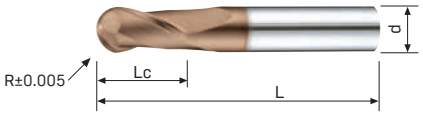
Ball Nose End Mills

OSL
Only Simplicity Last

S618X



S618TX / S618ATX



Tool Material/ Coating Type	UMG/SMG Carbide	AlCrN AlTiSiN
Specification		

Type of Operation

Work Materials (◎ The most recommended/ ○ recommended)

	Carbon Steel	Tool Steel	Pre-hardend Steel			Stainless Steel	Cast Steel	Nonferrous Metals					Aerospace Materials		
	Alloy Steel	Pre-hardend Steel	Hardened Steel												
	~30HRC		~48HRC	~56HRC	~68HRC			Aluminium	Copper	Plastics	Composite Material	Graphite	Titanium	Nickel	Heat- resistant Steel
S618X	◎		◎	◎											
S618TX	◎		◎	◎	○										
S618ATX			◎	◎	◎										

※Feature of product

S618X Standard Length Ball Nose End Mills- 2 Flutes.

Standard ball nose end mills with short flute helix, Suitable to machine on various material.

S618TX / S618ATX Standard Length Ball Nose End Mills- 2 Flutes.

Ball nose front cutting edge with a small cutting land, can improve tool life and surface finishing.

Strong ball nose end mills with short flute helix, Suitable to machine on various material.

Good wear resistance and lubricating effect with Nano multilayer coating.

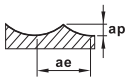
Code No. S618X-Dc / S618TX-Dc / S618ATX-Dc

Dc 0 -0.02	**R** ±0.005	**Lc** mm	**L** mm	**d** h6	**S618X** UMG AlCrN <55HRC	**S618TX** UMG AlTiSiN <62HRC	**S618ATX** SMG AlTiSiN 48~68HRC
1	0.5R	2	50	4	●	●	●
1.5	0.75R	3	50	4	●	●	●
2	1R	4	50	4	●	●	●
2.5	1.25R	5	50	4	●	●	●
3A	1.5R	6	50	4	●	●	●
4A	2R	8	50	4	●	●	●
3B	1.5R	6	50	3	●	●	●
3	1.5R	6	50	6	●	●	●
4	2R	8	50	6	●	●	●
5	2.5R	10	50	6	●	●	●
6	3R	12	50	6	●	●	●
8	4R	14	60	8	●	●	●
8L	4R	14	75	8	●	●	●
10	5R	18	75	10	●	●	●
12	6R	22	75	12	●	●	●
16	8R	30	100	16	●	●	●
20	10R	38	100	20	●	●	●

Recommended Milling Conditions

OSL Only Simplicity Last

High-speed machining

Work Material		GR.1 Carbon Steel		GR.2 Low-alloyed Steel (~24HRC)		GR.3 Hi-alloyed Steel (~30HRC)		GR.4 Hardened Steel (30~38HRC)		GR.5 Hardened Steel (38~48HRC)		GR.6 Hardened Steel (48~56HRC)		GR.7 Hardened Steel (56~68HRC)	
Vc m/min		220		220		190		180		170		140		120	
Code No.	Dc	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)
S618X/S618TX/S618ATX-R0.5	1	50,000	2,800	50,000	2,800	50,000	2,800	50,000	2,500	47,500	2,200	32,000	1,400	25,000	1,000
S618X/S618TX/S618ATX-R0.75	1.5	41,800	2,800	41,800	2,800	33,000	2,800	30,000	2,500	26,500	2,200	24,000	1,400	19,500	1,000
S618X/S618TX/S618ATX-R1	2	31,500	3,500	31,500	3,500	25,000	2,800	24,500	2,500	23,500	2,250	17,000	1,500	12,500	1,000
S618X/S618TX/S618ATX-R1.25	2.5	41,800	3,500	41,800	3,500	21,000	2,800	20,000	25,000	19,500	2,200	14,000	1,500	10,000	950
S618X/S618TX/S618ATX-R1.5	3	21,000	3,500	21,000	3,500	16,500	2,800	16,000	2,500	15,500	2,200	11,000	1,500	8,400	950
S618X/S618TX/S618ATX-R2	4	18,000	3,700	18,000	3,700	15,500	3,200	15,000	2,700	13,500	2,400	11,000	1,900	7,900	1,000
S618X/S618TX/S618ATX-R2.5	5	15,500	4,000	15,500	4,000	15,000	4,000	14,000	2,800	11,000	2,300	10,000	2,000	7,600	1,200
S618X/S618TX/S618ATX-R3	6	15,000	4,800	15,000	4,800	13,500	4,300	11,500	2,700	9,500	2,200	9,500	2,200	6,600	1,050
S618X/S618TX/S618ATX-R4	8	11,500	3,600	11,500	3,600	10,000	3,200	8,900	2,000	7,100	1,700	7,100	1,700	4,900	880
S618X/S618TX/S618ATX-R5	10	9,500	3,000	9,500	3,000	8,200	2,500	7,100	1,700	5,700	1,300	5,700	1,300	3,900	700
S618X/S618TX/S618ATX-R6	12	7,900	2,450	7,900	2,450	6,800	2,100	5,900	1,350	4,700	1,000	4,700	1,000	3,300	580
S618X/S618TX/S618ATX-R8	16	5,900	1,800	5,900	1,800	5,000	1,500	4,500	1,000	3,500	800	3,500	800	2,450	400
S618X/S618TX/S618ATX-R10	20	4,700	1,300	4,700	1,300	4,000	1,200	3,500	800	2,800	650	2,800	650	2,000	320
Depth of Cut (mm) 		ap:0.02D		ap:0.02D		ap:0.02D		ap:0.02D		ap:0.02D		ap:0.02D		ap:0.02D	
		ae:0.02D		ae:0.02D		ae:0.02D		ae:0.02D		ae:0.02D		ae:0.02D		ae:0.02D	

1. Please work with good rigidity / high precision facilities and collet chuck.
2. Please choose proper cutting fluid.
3. The cutting data is reference value only. Please adjust it according to your real working conditions.
4. If RPM is lower the reference value, the Feed rate (fz) and RPM should be reduced by the same proportion.
5. If vibration occurs during cutting, please reduce cutting parameter.

Ball Nose End Mills

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S620X

S620TX / S620ATX

Tool Material/ Coating Type	UMG/SMG Carbide; AlCrN AlTiSiN
Specification	
Type of Operation	

Work Materials (◎ The most recommended/ ○ recommended)

	Carbon Steel	Tool Steel	Pre-hardend Steel			Stainless Steel	Cast Steel	Nonferrous Metals					Aerospace Materials		
	Alloy Steel	Pre-hardend Steel	Hardened Steel												
	~30HRC		~48HRC	~56HRC	~68HRC			Aluminium	Copper	Plastics	Composite Material	Graphite	Titanium	Nickel	Heat- resistant Steel
S620X	◎		◎	◎											
S620TX	◎		◎	◎	○										
S620ATX			◎	◎	◎										

※Feature of product

S620X Long Length Ball Nose End Mills- 2 Flutes.

Standard long length ball nose end mills with short flute helix, Suitable to machine on various material

Strong S shape geometry designed, stable for continuous cutting.

S620TX / S620ATX Long Length Ball Nose End Mills- 2 Flutes.

Ball nose front cutting edge with a small cutting land, can improve tool life and surface finishing.

Strong ball nose end mills with short flute helix, Suitable to machine on various material.

Good wear resistance and lubricating effect with Nano multilayer coating.

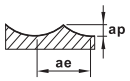
Code No. S620X-Dc / S620TX-Dc / S620ATX-Dc

Dc 0 -0.02	**R** ±0.005	**Lc** mm	**L** mm	**d** h6	**S620X** UMG AlCrN <55HRC	**S620TX** UMG AlTiSiN <62HRC	**S620ATX** SMG AlTiSiN 48~68HRC
3A	1.5R	6	70	4	●	●	●
4A	2R	8	70	4	●	●	●
3	1.5R	6	70	6	●	●	●
4	2R	8	70	6	●	●	●
5	2.5R	10	80	6	●	●	●
6	3R	12	80	6	●	●	●
8	4R	14	100	8	●	●	●
10	5R	18	100	10	●	●	●
12	6R	22	110	12	●	●	●
16	8R	30	140	16	●	●	●
20	10R	38	160	20	●	●	●

Recommended Milling Conditions

OSL Only Simplicity Last

High-speed machining

Work Material		GR.1 Carbon Steel		GR.2 Low-alloyed Steel (~24HRC)		GR.3 Hi-alloyed Steel (~30HRC)		GR.4 Hardened Steel (30~38HRC)		GR.5 Hardened Steel (38~48HRC)		GR.6 Hardened Steel (48~56HRC)		GR.7 Hardened Steel (56~68HRC)	
Vc m/min		220		220		190		180		170		140		120	
Code No.	Dc	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)
S620X/S620TX/S620ATX-R1.5	3	21,000	3,500	21,000	3,500	16,500	2,800	16,000	2,500	15,500	2,200	11,000	1,500	8,400	950
S620X/S620TX/S620ATX-R2	4	18,000	3,700	18,000	3,700	15,500	3,200	15,000	2,700	13,500	2,400	11,000	1,900	7,900	1,000
S620X/S620TX/S620ATX-R2.5	5	15,500	4,000	15,500	4,000	15,000	4,000	14,000	2,800	11,000	2,300	10,000	2,000	7,600	1,200
S620X/S620TX/S620ATX-R3	6	15,000	4,800	15,000	4,800	13,500	4,300	11,500	2,700	9,500	2,200	9,500	2,200	6,600	1,050
S620X/S620TX/S620ATX-R4	8	11,500	3,600	11,500	3,600	10,000	3,200	8,900	2,000	7,100	1,700	7,100	1,700	4,900	880
S620X/S620TX/S620ATX-R5	10	9,500	3,000	9,500	3,000	8,200	2,500	7,100	1,700	5,700	1,300	5,700	1,300	3,900	700
S620X/S620TX/S620ATX-R6	12	7,900	2,450	7,900	2,450	6,800	2,100	5,900	1,350	4,700	1,000	4,700	1,000	3,300	580
S620X/S620TX/S620ATX-R8	16	5,900	1,800	5,900	1,800	5,000	1,500	4,500	1,000	3,500	800	3,500	800	2,450	400
S620X/S620TX/S620ATX-R10	20	4,700	1,300	4,700	1,300	4,000	1,200	3,500	800	2,800	650	2,800	650	2,000	320
Depth of Cut (mm) 		ap:0.02D		ap:0.02D		ap:0.02D		ap:0.02D		ap:0.02D		ap:0.02D		ap:0.02D	
		ae:0.02D		ae:0.02D		ae:0.02D		ae:0.02D		ae:0.02D		ae:0.02D		ae:0.02D	

1. Please work with good rigidity / high precision facilities and collet chuck.
2. Please choose proper cutting fluid.
3. The cutting data is reference value only. Please adjust it according to your real working conditions.
4. If RPM is lower the reference value, the Feed rate (fz) and RPM should be reduced by the same proportion.
5. If vibration occurs during cutting, please reduce cutting parameter.

End Mills With Corner Radius

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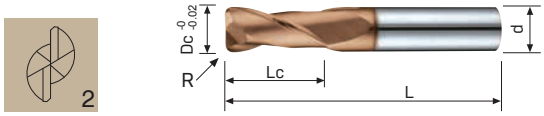
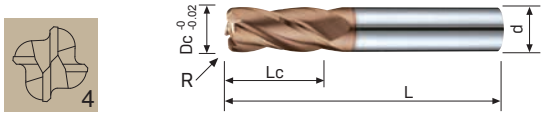
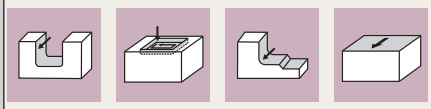
B265TX



B266TX



Tool Material/ Coating Type	UMG Carbide / AlTiSiN
Specification	30° / N γ1°30' / R
Type of Operation	

Work Materials (◎ The most recommended/ ○ recommended)

	Carbon Steel	Tool Steel	Pre-hardend Steel			Stainless Steel	Cast Steel	Nonferrous Metals					Aerospace Materials		
	Alloy Steel	Pre-hardend Steel	Hardened Steel					Aluminium	Copper	Plastics	Composite Material	Graphite	Titanium	Nickel	Heat- resistant Steel
	~30HRC		~48HRC	~56HRC	~68HRC										
B265TX	◎		◎	◎	○	○	○		○				○	○	○
B266TX	◎		◎	◎	○	○	○		○				○	○	○

※Feature of product

B265TX Standard Length End Mills with Corner Radius- 2 Flutes.
Roughing and finishing applications on contour and profile machining.
Low rake angle with AlTiSiN coating which has excellent wear resistance.
Able to machine pre-hardened and hardened steel up to HRC62.

B266TX Standard Length End Mills with Corner Radius- 4 Flutes.
Roughing and finishing applications on contour and profile machining.
Low rake angle and a small edge cutting land with AlTiSiN coating which has excellent wear resistance.
Able to cut pre-hardened and hardened steel up to HRC62.

Code No. B265TX-Dc×R / B266TX-Dc×R

Dc 0 -0.02	**R** ±0.01	**Lc** mm	**L** mm	**d** h6	**B265TX-2** UMG AlTiSiN	**B266TX-4** UMG AlTiSiN
1	R0.1	3	50	4	●	●
1	R0.2	3	50	4	●	●
1	R0.3	3	50	4	●	●
1.5	R0.1	5	50	4	●	●
1.5	R0.2	5	50	4	●	●
1.5	R0.3	5	50	4	●	●
1.5	R0.5	5	50	4	●	●
2	R0.1	6	50	4	●	●
2	R0.2	6	50	4	●	●
2	R0.3	6	50	4	●	●
2	R0.5	6	50	4	●	●
2.5	R0.1	8	50	4	●	●
2.5	R0.2	8	50	4	●	●
2.5	R0.3	8	50	4	●	●
2.5	R0.5	8	50	4	●	●
3A	R0.1	8	50	4	●	●
3A	R0.2	8	50	4	●	●
3A	R0.3	8	50	4	●	●
3A	R0.5	8	50	4	●	●
4A	R0.1	11	50	4	●	●
4A	R0.2	11	50	4	●	●
4A	R0.3	11	50	4	●	●
4A	R0.5	11	50	4	●	●
4A	R1	11	50	4	●	●

End Mills With Corner Radius

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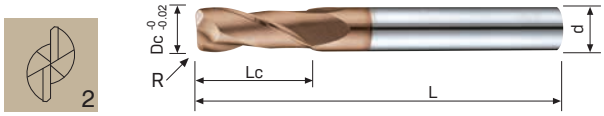
Dc 0 -0.02	R ±0.01	Lc mm	L mm	d h6	B265TX-2 UMG AlTiSiN	B266TX-4 UMG AlTiSiN
3	R0.1	8	50	6	●	●
3	R0.2	8	50	6	●	●
3	R0.3	8	50	6	●	●
3	R0.5	8	50	6	●	●
4	R0.1	11	50	6	●	●
4	R0.2	11	50	6	●	●
4	R0.3	11	50	6	●	●
4	R0.5	11	50	6	●	●
4	R1	11	50	6	●	●
5	R0.2	13	50	6	●	●
5	R0.3	13	50	6	●	●
5	R0.5	13	50	6	●	●
5	R1	13	50	6	●	●
6	R0.2	16	50	6	●	●
6	R0.3	16	50	6	●	●
6	R0.5	16	50	6	●	●
6	R1	16	50	6	●	●
6	R1.5	16	50	6	●	●
6	R2	16	50	6	●	●
8	R0.2	20	60	8	●	●
8	R0.3	20	60	8	●	●
8	R0.5	20	60	8	●	●
8	R1	20	60	8	●	●
8	R1.5	20	60	8	●	●
8	R2	20	60	8	●	●
8	R3	20	60	8	●	●
10	R0.2	22	NEW75(72)	10	●	●
10	R0.3	22	NEW75(72)	10	●	●
10	R0.5	22	NEW75(72)	10	●	●
10	R1	22	NEW75(72)	10	●	●
10	R1.5	22	NEW75(72)	10	●	●
10	R2	22	NEW75(72)	10	●	●
10	R3	22	NEW75(72)	10	●	●
12	R0.2	26	75	12	●	●
12	R0.3	26	75	12	●	●
12	R0.5	26	75	12	●	●
12	R1	26	75	12	●	●
12	R1.5	26	75	12	●	●
12	R2	26	75	12	●	●
12	R3	26	75	12	●	●

Please refer to page 71 for parameters
※10×72L - Sold until stock last.

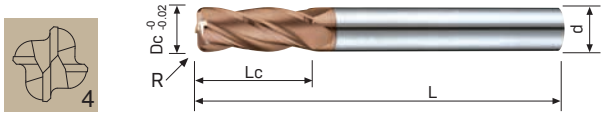
End Mills With Corner Radius

OSL Only Simplicity Last

B267TX



B268TX



Tool Material/ Coating Type	UMG Carbide	AlTiSiN	Type of Operation
Specification	30°	N 71°30'	R

Work Materials (◎ The most recommended/ ○ recommended)

	Carbon Steel	Tool Steel	Pre-hardend Steel			Stainless Steel	Cast Steel	Nonferrous Metals					Aerospace Materials		
	Alloy Steel	Pre-hardend Steel	Hardened Steel					Aluminium	Copper	Plastics	Composite Material	Graphite	Titanium	Nickel	Heat- resistant Steel
	~30HRC		~48HRC	~56HRC	~68HRC										
B267TX	◎		◎	◎	○	○	○		○				○	○	○
B268TX	◎		◎	◎	○	○	○		○				○	○	○

※Feature of product

B267TX Long Length End Mills with Corner Radius- 2 Flutes.
Roughing and finishing applications on contour and profile machining.
Low rake angle with AlTiSiN coating which has excellent wear resistance.
Able to machine pre-hardened and hardened steel up to HRC62.

B268TX Long Length End Mills with Corner Radius- 4 Flutes.
Roughing and finishing applications on contour and profile machining.
Low rake angle and a small edge cutting land with AlTiSiN coating which has excellent wear resistance.
Able to cut pre-hardened and hardened steel up to HRC62.

Code No. B267TX-Dc×R / B268TX-Dc×R

Dc 0 -0.02	**R** ±0.01	**Lc** mm	**L** mm	**d** h6	**B267TX-2** UMG AlTiSiN	**B268TX-4** UMG AlTiSiN
3	R0.1	10	50	3	●	●
3	R0.2	10	50	3	●	●
3	R0.3	10	50	3	●	●
3	R0.5	10	50	3	●	●
4	R0.1	15	60	4	●	●
4	R0.2	15	60	4	●	●
4	R0.3	15	60	4	●	●
4	R0.5	15	60	4	●	●
4	R1.0	15	60	4	●	●
6	R0.2	20	80	6	●	●
6	R0.3	20	80	6	●	●
6	R0.5	20	80	6	●	●
6	R1	20	80	6	●	●
6	R1.5	20	80	6	●	●
8	R0.2	25	100	8	●	●
8	R0.3	25	100	8	●	●
8	R0.5	25	100	8	●	●
8	R1	25	100	8	●	●
8	R1.5	25	100	8	●	●
8	R2	25	100	8	●	●
10	R0.2	30	100	10	●	●
10	R0.3	30	100	10	●	●
10	R0.5	30	100	10	●	●
10	R1	30	100	10	●	●
10	R1.5	30	100	10	●	●
10	R2	30	100	10	●	●

End Mills With Corner Radius

OSL® Only Simplicity Last

Dc 0 -0.02	R ±0.01	Lc mm	L mm	d h6	B267TX-2 UMG AlTiSiN	B268TX-4 UMG AlTiSiN
10	R3	30	100	10	●	●
12	R0.2	40	110	12	●	●
12	R0.3	40	110	12	●	●
12	R0.5	40	110	12	●	●
12	R1	40	110	12	●	●
12	R1.5	40	110	12	●	●
12	R2	40	110	12	●	●
12	R3	40	110	12	●	●

Please refer to page 72 for parameters

Recommended Milling Conditions

OSL Only Simplicity Last

Slotting

Work Material		GR.1 Carbon Steel		GR.2 Low-alloyed Steel (~24HRC)		GR.3 Hi-alloyed Steel (~30HRC)		GR.4 Hardened Steel (30~38HRC)		GR.5 Hardened Steel (38~48HRC)		GR.6 Hardened Steel (48~56HRC)		GR.9 Cast Iron	
Vc m/min		80		80		70		55		50		30		80	
Code No.	Dc	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)
B265TX-1	1	19,500	120	19,500	120	14,500	120	12,500	85	11,000	65	7,000	30	19,500	120
B265TX-1.5	1.5	14,000	120	14,000	120	10,500	120	8,500	85	8,000	65	5,000	40	14,000	120
B265TX-2	2	11,000	130	11,000	130	8,350	120	7,000	85	6,300	70	3,900	40	11,000	130
B265TX-2.5	2.5	9,900	115	9,900	115	7,000	130	6,000	85	5,000	70	3,500	40	9,900	115
B265TX-3	3	7,500	190	7,500	190	6,350	150	5,300	100	4,350	75	2,700	40	7,500	190
B265TX-4	4	6,000	225	6,000	225	4,900	180	4,200	120	3,500	90	2,200	50	6,000	225
B265TX-5	5	5,200	300	5,200	300	4,300	230	3,500	125	3,000	100	1,900	55	5,200	300
B265TX-6	6	4,500	300	4,500	300	3,600	230	2,900	120	2,500	100	1,600	55	4,500	300
B265TX-8	8	3,300	280	3,300	280	2,700	230	2,200	120	1,900	100	1,100	50	3,300	280
B265TX-10	10	2,600	270	2,600	270	2,100	220	1,700	120	1,500	90	950	50	2,600	270
B265TX-12	12	2,200	270	2,200	270	1,800	210	1,450	125	1,200	95	800	45	2,200	270
Depth of Cut (mm) 		ap:≤3 0.3D >3 0.5D		ap:≤3 0.3D >3 0.5D		ap:≤3 0.3D >3 0.5D		ap:≤3 0.3D >3 0.5D		ap:≤3 0.3D >3 0.5D		ap:0.05D		ap:≤3 0.3D >3 0.5D	

Side Milling

Work Material		GR.1 Carbon Steel		GR.2 Low-alloyed Steel (~24HRC)		GR.3 Hi-alloyed Steel (~30HRC)		GR.4 Hardened Steel (30~38HRC)		GR.5 Hardened Steel (38~48HRC)		GR.6 Hardened Steel (48~56HRC)		GR.9 Cast Iron	
Vc m/min		80		80		70		55		50		30		80	
Code No.	Dc	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)
B266TX-1	1	20,000	240	20,000	240	15,000	215	15,000	215	10,000	85	7,100	40	20,000	240
B266TX-1.5	1.5	13,500	245	13,500	245	12,000	215	12,000	215	8,000	90	5,100	50	13,500	245
B266TX-2	2	13,000	300	13,000	300	11,000	280	11,000	280	7,000	110	3,900	60	13,000	300
B266TX-2.5	2.5	10,000	320	10,000	320	9,000	300	9,000	300	6,000	120	3,000	60	10,000	320
B266TX-3	3	8,800	500	8,800	500	7,200	350	7,200	350	5,300	125	2,700	60	8,800	500
B266TX-4	4	6,600	530	6,600	530	5,500	360	5,500	360	4,200	130	2,200	70	6,600	530
B266TX-5	5	5,300	600	5,300	600	4,350	420	4,350	420	3,500	140	1,900	75	5,300	600
B266TX-6	6	4,500	610	4,500	610	3,700	425	3,700	425	2,900	145	1,500	70	4,500	610
B266TX-8	8	3,300	590	3,300	590	2,700	425	2,700	425	2,200	145	1,100	65	3,300	590
B266TX-10	10	2,600	580	2,600	580	2,200	420	2,200	420	1,700	145	950	65	2,600	580
B266TX-12	12	2,200	580	2,200	580	1,800	420	1,800	420	1,400	140	800	60	2,200	580
B266TX-14	14	2,650	575	2,650	575	2,650	575	1,650	550	1,650	550	1,050	265	950	125
B266TX-16	16	2,400	610	2,400	610	2,400	610	1,400	480	1,400	480	900	230	800	120
B266TX-18	18	2,250	620	2,250	620	2,250	620	1,250	450	1,250	450	810	220	720	105
B266TX-20	20	1,950	630	1,950	630	1,950	630	1,100	420	1,100	420	720	210	640	90
Depth of Cut (mm) 		ap:1.5D		ap:1.5D		ap:1.5D		ap:1.5D		ap:1.5D		ap:1.5D		ap:1.5D	
		ae:<3 0.05D ≥3 0.1D		ae:<3 0.05D ≥3 0.1D		ae:<3 0.05D ≥3 0.1D		ae:<3 0.05D ≥3 0.1D		ae:3 0.05D ≥3 0.1D		ae:0.02D		ae:<3 0.05D ≥3 0.1D	

1. Please work with good rigidity / high precision facilities and collet chuck.
2. Please choose proper cutting fluid.
3. The cutting data is reference value only. Please adjust it according to your real working conditions.
4. If RPM is lower the reference value, the Feed rate (fz) and RPM should be reduced by the same proportion.
5. If vibration occurs during cutting, please reduce cutting parameter.

Recommended Milling Conditions

OSL
Only Simplicity Last

Slotting

Work Material		GR.1 Carbon Steel		GR.2 Low-alloyed Steel (~24HRC)		GR.3 Hi-alloyed Steel (~30HRC)		GR.4 Hardened Steel (30~38HRC)		GR.5 Hardened Steel (38~48HRC)		GR.6 Hardened Steel (48~56HRC)		GR.9 Cast Iron	
Vc m/min		80		80		70		55		50		30		80	
Code No.	Dc	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)
B267TX-3	3	7,500	190	7,500	190	6,350	150	5,300	100	4,350	75	2,700	40	7,500	190
B267TX-4	4	6,000	225	6,000	225	4,900	180	4,200	120	3,500	90	2,200	50	6,000	225
B267TX-5	5	5,200	300	5,200	300	4,300	230	3,500	125	3,000	100	1,900	55	5,200	300
B267TX-6	6	4,500	300	4,500	300	3,600	230	2,900	120	2,500	100	1,600	55	4,500	300
B267TX-8	8	3,300	280	3,300	280	2,700	230	2,200	120	1,900	100	1,100	50	3,300	280
B267TX-10	10	2,600	270	2,600	270	2,100	220	1,700	120	1,500	90	950	50	2,600	270
B267TX-12	12	2,200	270	2,200	270	1,800	210	1,450	125	1,200	95	800	45	2,200	270
Depth of Cut (mm) 		ap:≤3 0.3D >3 0.5D		ap:≤3 0.3D >3 0.5D		ap:≤3 0.3D >3 0.5D		ap:≤3 0.3D >3 0.5D		ap:≤3 0.3D >3 0.5D		ap:0.05D		ap:≤3 0.3D >3 0.5D	

Side Milling

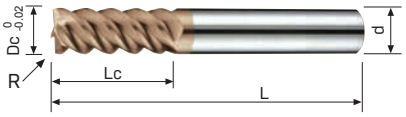
Work Material		GR.1 Carbon Steel		GR.2 Low-alloyed Steel (~24HRC)		GR.3 Hi-alloyed Steel (~30HRC)		GR.4 Hardened Steel (30~38HRC)		GR.5 Hardened Steel (38~48HRC)		GR.6 Hardened Steel (48~56HRC)		GR.9 Cast Iron	
Vc m/min		80		80		70		55		50		30		80	
Code No.	Dc	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)
B268TX-3	3	8,800	500	8,800	500	7,200	350	7,200	350	5,300	125	2,700	60	8,800	500
B268TX-4	4	6,600	530	6,600	530	5,500	360	5,500	360	4,200	130	2,200	70	6,600	530
B268TX-5	5	5,300	600	5,300	600	4,350	420	4,350	420	3,500	140	1,900	75	5,300	600
B268TX-6	6	4,500	610	4,500	610	3,700	425	3,700	425	2,900	145	1,500	70	4,500	610
B268TX-8	8	3,300	590	3,300	590	2,700	425	2,700	425	2,200	145	1,100	65	3,300	590
B268TX-10	10	2,600	580	2,600	580	2,200	420	2,200	420	1,700	145	950	65	2,600	580
B268TX-12	12	2,200	580	2,200	580	1,800	420	1,800	420	1,400	140	800	60	2,200	580
Depth of Cut (mm) 		ap:1.5D		ap:1.5D		ap:1.5D		ap:1.5D		ap:1.5D		ap:1.5D		ap:1.5D	
		ae:<3 0.05D ≥3 0.1D		ae:<3 0.05D ≥3 0.1D		ae:<3 0.05D ≥3 0.1D		ae:<3 0.05D ≥3 0.1D		ae:3 0.05D ≥3 0.1D		ae:0.02D		ae:<3 0.05D ≥3 0.1D	

1. Please work with good rigidity / high precision facilities and collet chuck.
2. Please choose proper cutting fluid.
3. The cutting data is reference value only. Please adjust it according to your real working conditions.
4. If RPM is lower the reference value, the Feed rate (fz) and RPM should be reduced by the same proportion.
5. If vibration occurs during cutting, please reduce cutting parameter.

High Performance End Mills With Corner Radius

OSL Only Simplicity Last

B276ATX



Tool Material/ Coating Type	SMG Carbide	AlTiSiN	Type of Operation	
Specification	55°	4	N γ-10°	R

Work Materials (◎ The most recommended/ ○ recommended)

Carbon Steel / Alloy Steel	Tool Steel / Pre-hardend Steel	Pre-hardend Steel / Hardened Steel			Stainless Steel	Cast Steel	Nonferrous Metals					Aerospace Materials		
		~30HRC	~48HRC	~56HRC	~68HRC			Aluminium	Copper	Plastics	Composite Material	Graphite	Titanium	Nickel	Heat- resistant Steel
B276ATX			◎	◎	◎										

※Feature of product

B276ATX Standard Length End Mills with Corner Radius- 4 Flutes.
Finishing application for high-hardness contour and profile machining.
Negative rake angle and cutting edge with small cutting land, with AlTiSiN coating provide excellent wear resistance.
Excellent surface finishing on profile contour machining, able to cut pre-hardened and hardened steel up to HRC70.

Code No. B276ATX-Dc×R

Dc 0 -0.02	**R** ±0.005	**Lc** mm	**L** mm	**d** h6	**B276ATX** SMG AlTiSiN 48~68HRC
3	R0.2	8	50	6	●
3	R0.5	8	50	6	●
4	R0.2	11	50	6	●
4	R0.5	11	50	6	●
5	R0.2	13	50	6	●
5	R0.5	13	50	6	●
6	R0.2	16	50	6	●
6	R0.5	16	50	6	●
6	R1	16	50	6	●
6	R1.5	16	50	6	●
8	R0.2	20	60	8	●
8	R0.5	20	60	8	●
8	R1	20	60	8	●
8	R2	20	60	8	●
10	R0.2	25	75	10	●
10	R0.5	25	75	10	●
10	R1	25	75	10	●
10	R2	25	75	10	●
12	R0.2	30	75	12	●
12	R0.5	30	75	12	●
12	R1	30	75	12	●
12	R2	30	75	12	●
16	R0.5	40	100	16	●
16	R1	40	100	16	●
16	R2	40	100	16	●
16	R3	40	100	16	●
20	R0.5	40	100	20	●
20	R1	40	100	20	●
20	R2	40	100	20	●
20	R3	40	100	20	●

Recommended Milling Conditions

OSL® Only Simplicity Last

Side Milling

Work Material		GR.5 Hardened Steel (38~48HRC)		GR.6 Hardened Steel (48～56HRC)		GR.7 Hardened Steel (56～68HRC)	
Vc m/min		150		100		50	
Code No.	Dc	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)
B276ATX-3	3	15,800	1,200	10,500	820	3,800	120
B276ATX-4	4	12,000	1,300	8,000	800	2,650	135
B276ATX-5	5	9,500	1,300	6,300	850	2,250	140
B276ATX-6	6	8,000	1,200	5,300	820	2,200	175
B276ATX-8	8	6,000	1,100	4,000	750	1,650	185
B276ATX-10	10	4,800	1,100	3,200	745	1,300	165
B276ATX-12	12	4,000	1,065	2,700	740	1,100	145
B276ATX-16	16	3,000	1,000	2,000	730	840	170
B276ATX-20	20	2,400	955	1,600	700	670	170
Depth of Cut (mm) 		ap:1.5D		ap:1.5D		ap:1.5D	
		ae:0.01D		ae:0.01D		ae:0.01D	

High Speed Side Milling

Work Material		GR.5 Hardened Steel (38~48HRC)		GR.6 Hardened Steel (48～56HRC)		GR.7 Hardened Steel (56～68HRC)	
Vc m/min		200		150		100	
Code No.	Dc	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)
B276ATX-3	3	21,233	1,620	15,925	1,130	10,617	424
B276ATX-4	4	15,925	1,725	11,944	1,200	7,963	477
B276ATX-5	5	12,740	1,750	9,555	1,200	6,370	510
B276ATX-6	6	10,617	1,200	7,963	700	5,308	530
B276ATX-8	8	7,963	1,200	5,972	700	3,981	530
B276ATX-10	10	6,370	850	4,778	630	3,185	420
B276ATX-12	12	5,308	850	3,981	630	2,654	420
B276ATX-16	16	3,981	900	2,986	650	1,991	420
B276ATX-20	20	3,185	900	2,389	650	1,593	420
Depth of Cut (mm) 		ap:1.5D		ap:1.5D		ap:1.5D	
		ae:0.01D		ae:0.01D		ae:0.01D	

1. Please work with good rigidity / high precision facilities and collet chuck.
2. Please choose proper cutting fluid.
3. The cutting data is reference value only. Please adjust it according to your real working conditions.
4. If RPM is lower the reference value, the Feed rate (fz) and RPM should be reduced by the same proportion.
5. If vibration occurs during cutting, please reduce cutting parameter.

High Performace End Mills With Corner Radius

OSL
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B278ATX

Tool Material/ Coating Type	SMG Carbide	AlTiSiN	Type of Operation	
Specification	55°	4	N γ-10°	R

Work Materials (◎ The most recommended/ ○ recommended)

Carbon Steel	Tool Steel	Pre-hardend Steel			Stainless Steel	Cast Steel	Nonferrous Metals					Aerospace Materials		
Alloy Steel	Pre-hardend Steel	Hardened Steel												
~30HRC		~48HRC	~56HRC	~68HRC			Aluminium	Copper	Plastics	Composite Material	Graphite	Titanium	Nickel	Heat- resistant Steel
B278ATX		◎	◎	◎										

※Feature of product

B278ATX Long Length End Mills with Corner Radius- 4 Flutes
Finishing application for high-hardness contour and profile machining.
Negative rake angle and cutting edge with a small cutting land, with AlTiSiN coating provide excellent wear resistance.
Excellent surface finishing on profile contour machining, able to cut pre-hardened and hardened steel up to HRC70.

Code No. B278ATX-Dc×R

Dc 0 -0.02	**R** ±0.005	**Lc** mm	**L** mm	**d** h6	**B278ATX** SMG AlTiSiN 48~68HRC
6	R0.2	20	80	6	●
6	R0.5	20	80	6	●
6	R1	20	80	6	●
6	R1.5	20	80	6	●
8	R0.2	25	100	8	●
8	R0.5	25	100	8	●
8	R1	25	100	8	●
8	R2	25	100	8	●
10	R0.2	30	100	10	●
10	R0.5	30	100	10	●
10	R1	30	100	10	●
10	R2	30	100	10	●
12	R0.2	40	110	12	●
12	R0.5	40	110	12	●
12	R1	40	110	12	●
12	R2	40	110	12	●
16	R0.5	50	140	16	●
16	R1	50	140	16	●
16	R2	50	140	16	●
16	R3	50	140	16	●
20	R0.5	60	160	20	●
20	R1	60	160	20	●
20	R2	60	160	20	●
20	R3	60	160	20	●

Recommended Milling Conditions

OSL Only Simplicity Last

Side Milling

Work Material		GR.5 Hardened Steel (38~48HRC)		GR.6 Hardened Steel (48～56HRC)		GR.7 Hardened Steel (56～68HRC)	
Vc m/min		150		100		50	
Code No.	Dc	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)
B278ATX-3	3	15,800	1,200	10,500	820	3,800	120
B278ATX-4	4	12,000	1,300	8,000	800	2,650	135
B278ATX-5	5	9,500	1,300	6,300	850	2,250	140
B278ATX-6	6	8,000	1,200	5,300	820	2,200	175
B278ATX-8	8	6,000	1,100	4,000	750	1,650	185
B278ATX-10	10	4,800	1,100	3,200	745	1,300	165
B278ATX-12	12	4,000	1,065	2,700	740	1,100	145
B278ATX-16	16	3,000	1,000	2,000	730	840	170
B278ATX-20	20	2,400	955	1,600	700	670	170
Depth of Cut (mm) 		ap:1.5D		ap:1.5D		ap:1.5D	
		ae:0.01D		ae:0.01D		ae:0.01D	

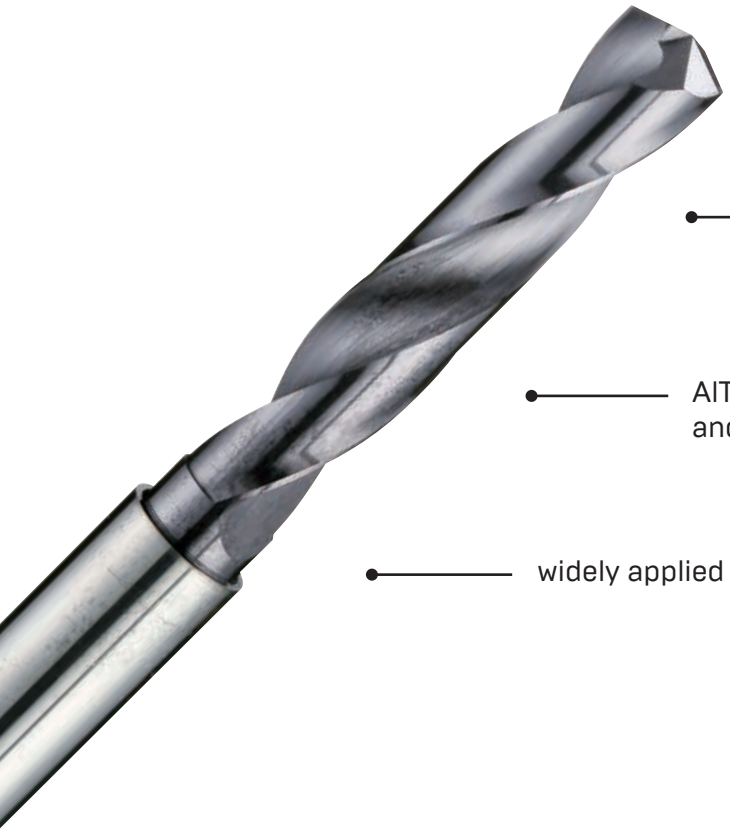
High Speed Side Milling

Work Material		GR.5 Hardened Steel (38~48HRC)		GR.6 Hardened Steel (48～56HRC)		GR.7 Hardened Steel (56～68HRC)	
Vc m/min		200		150		100	
Code No.	Dc	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)	RPM (min-1)	Feed (mm/min)
B278ATX-3	3	21,233	1,620	15,925	1,130	10,617	424
B278ATX-4	4	15,925	1,725	11,944	1,200	7,963	477
B278ATX-5	5	12,740	1,750	9,555	1,200	6,370	510
B278ATX-6	6	10,617	1,200	7,963	700	5,308	530
B278ATX-8	8	7,963	1,200	5,972	700	3,981	530
B278ATX-10	10	6,370	850	4,778	630	3,185	420
B278ATX-12	12	5,308	850	3,981	630	2,654	420
B278ATX-16	16	3,981	900	2,986	650	1,991	420
B278ATX-20	20	3,185	900	2,389	650	1,593	420
Depth of Cut (mm) 		ap:1.5D		ap:1.5D		ap:1.5D	
		ae:0.01D		ae:0.01D		ae:0.01D	

1. Please work with good rigidity / high precision facilities and collet chuck.
2. Please choose proper cutting fluid.
3. The cutting data is reference value only. Please adjust it according to your real working conditions.
4. If RPM is lower the reference value, the Feed rate (fz) and RPM should be reduced by the same proportion.
5. If vibration occurs during cutting, please reduce cutting parameter.

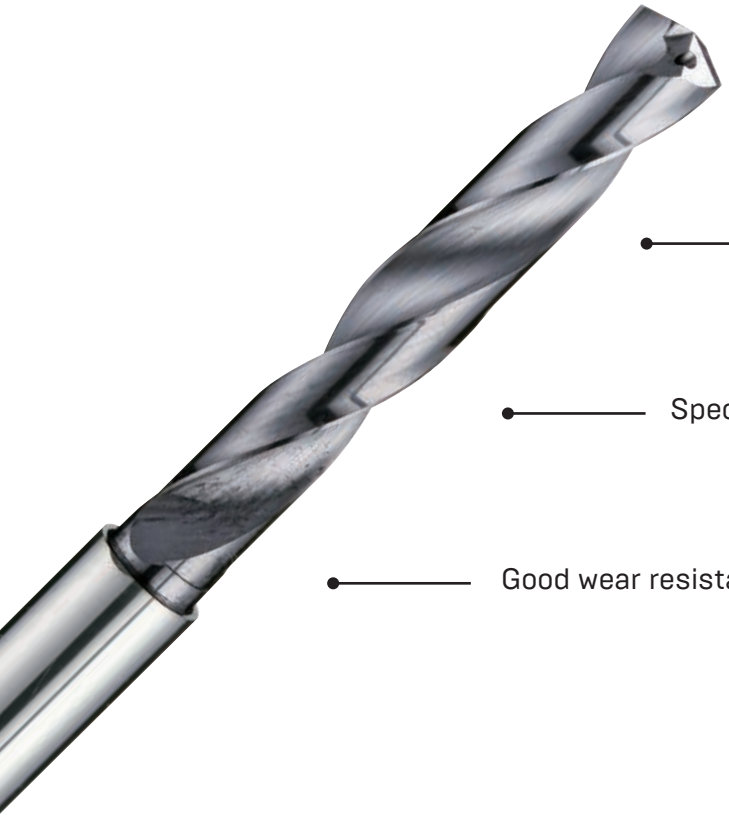
High Performance Drills

S292X1-2



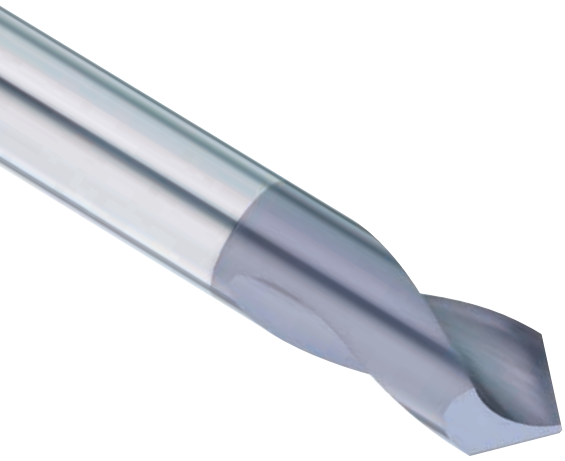
- 2XD and 4XD High Performance Drills.
  Two drilling depth applications.
- With new fluting and combine with different curvature design of R value.
- AlTiSiN multilayer coating has excellent wear resistance and lubrication.
- widely applied on drilling for different steels.

S293X1-3



- 3XD and 5XD High Performance Drills.
  Two drilling depth applications.
- 140° S shape point angle.
- Special chip room makes chip removal efficient.
- Good wear resistance and lubrication with Nano multilayer coating.

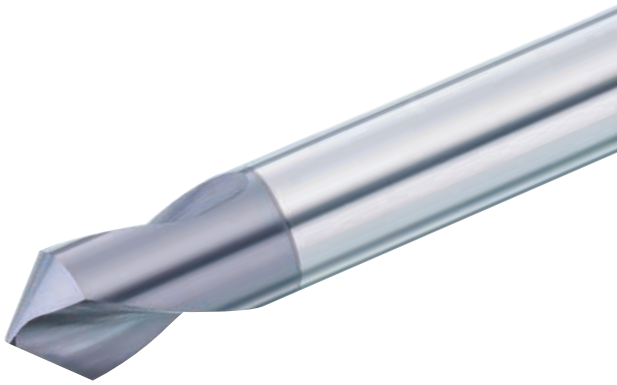
NC Spot Drills 90° / 120°



S290X1-90

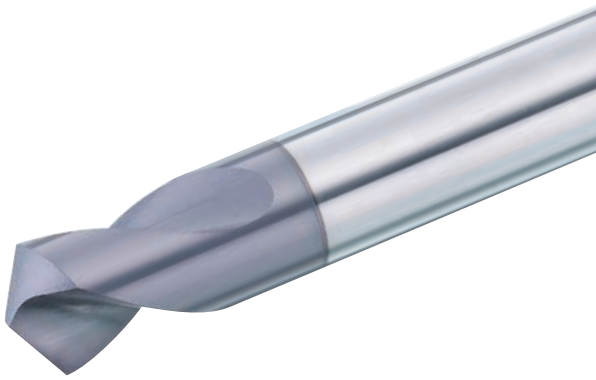
- 90 deg Spot drill
- General applications for spot drilling and 45 deg chamfering
- Nano Multilayer Coating for wear resistance and lubricating effect

S291X1-90



- 90 deg short flute rigid spot drill, strong radial arc drill point.
- General applications for steel and stainless steel spot drilling.
- Nano Multilayer Coating for wear resistance and lubricating effect.

S291X1-120



- 120 deg short flute rigid spot drill, strong radial arc drill point.
- General applications for steel and stainless steel spot drilling.
- Nano Multilayer Coating for wear resistance and lubricating effect.

NC Spot Drills 60° / 90° / 120°

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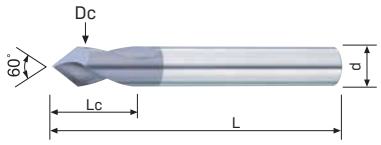
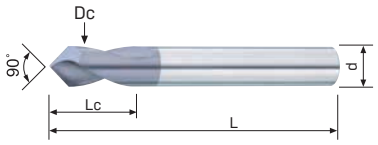
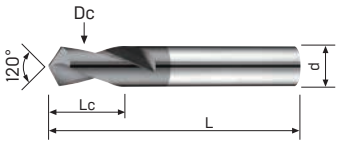
S290X1-60

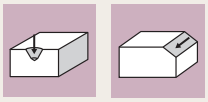


S290X1-90



S290X1-120



Tool Material/ Coating Type	MG Carbide	AlTiXN			Type of Operation	
Specification						

Work Materials (◎ The most recommended/ ○ recommended)

	Carbon Steel	Tool Steel	Pre-hardend Steel			Stainless Steel	Cast Steel	Nonferrous Metals					Aerospace Materials		
	Alloy Steel	Pre-hardend Steel	Hardened Steel					Aluminium	Copper	Plastics	Composite Material	Graphite	Titanium	Nickel	Heat- resistant Steel
	~30HRC		~48HRC	~56HRC	~68HRC										
S290X1-60	◎		◎			○	◎	◎	◎				○	○	○
S290X1-90	◎		◎			○	◎	◎	◎				○	○	○
S290X1-120	◎		◎			○	◎	◎	◎				○	○	○

※Feature of product

S290X1-60 NC Spot Drills 60°
General application on various steels for positioning before drilling and
60° chamfering .
Good wear resistance and lubricating effect with Nano multilayer coating.

S290X1-90 NC Spot Drills 90°
General application on various steels for positioning before drilling and
45° chamfering .
Good wear resistance and lubricating effect with Nano multilayer coating.

S290X1-120 NC Spot Drills 120°
General application on various steels for positioning before drilling and
30° chamfering .
Good wear resistance and lubricating effect with Nano multilayer coating.

Code No. S290X1-60-Dc / S290X1-90-Dc / S290X1-120-Dc

Dc h6	**Lc** mm	**L** mm	**d** h6	**S290X1-60** 60°	**S290X1-90** 90°	**S290X1-120** 120°
3	10	38	3	●	●	●
4	12	50	4	●	●	●
5	15	50	5	●	●	●
6	20	50	6	●	●	●
8	25	60	8	●	●	●
10	25	75	10	●	●	●
12	30	75	12	●	●	●

Recommended Milling Conditions

OSL® Only Simplicity Last

Side Milling

Work Material		GR.1 Carbon Steel		GR.2 Low-alloyed Steel (~24HRC)		GR.3 Hi-alloyed Steel (~30HRC)		GR.4 Hardened Steel (30~38HRC)		GR.5 Hardened Steel (38~48HRC)		GR.9 Cast Iron		GR.10 Aluminium		GR.11 Copper	
Vc m/min		40~85		40~85		40~85		20~30		15~25		65~100		150~200		100~150	
Code No.	Dc	RPM (min-1)	Feed (mm/rev)	RPM (min-1)	Feed (mm/rev)	RPM (min-1)	Feed (mm/rev)	RPM (min-1)	Feed (mm/rev)	RPM (min-1)	Feed (mm/rev)	RPM (min-1)	Feed (mm/rev)	RPM (min-1)	Feed (mm/rev)	RPM (min-1)	Feed (mm/rev)
S290X1-3	3	7,500	0.04~0.085	7,500	0.04~0.085	7,500	0.04~0.085	2,500	0.04~0.085	1,500	0.04~0.085	8,000	0.05~0.095	15,923	0.05~0.11	10,615	0.05~0.095
S290X1-4	4	5,700	0.05~0.12	5,700	0.05~0.12	5,700	0.05~0.12	1,900	0.05~0.12	1,100	0.05~0.12	6,500	0.07~0.15	11,942	0.07~0.18	7,961	0.07~0.15
S290X1-6	6	3,800	0.06~0.13	3,800	0.06~0.13	3,800	0.06~0.13	1,300	0.06~0.13	750	0.06~0.13	4,300	0.12~0.2	9,554	0.12~0.24	6,369	0.12~0.2
S290X1-8	8	2,800	0.08~0.16	2,800	0.08~0.16	2,800	0.08~0.16	1,000	0.08~0.16	550	0.08~0.16	3,200	0.15~0.2	7,961	0.15~0.24	3,980	0.15~0.2
S290X1-10	10	2,300	0.1~0.2	2,300	0.1~0.2	2,300	0.1~0.2	750	0.1~0.2	450	0.1~0.2	2,600	0.1~0.25	4,777	0.1~0.27	3,184	0.1~0.25
S290X1-12	12	1,900	0.15~0.25	1,900	0.15~0.25	1,900	0.15~0.25	650	0.15~0.25	370	0.15~0.25	2,200	0.2~0.3	3,980	0.2~0.3	2,653	0.2~0.3

1. Please work with good rigidity / high precision facilities and collet chuck.
2. Please choose proper cutting fluid.
3. The cutting data is reference value only. Please adjust it according to your real working conditions.
4. If RPM is lower the reference value, the Feed rate (fz) and RPM should be reduced by the same proportion.
5. If vibration occurs during cutting, please reduce cutting parameter.

NC Spot Drills 90° / 120° / 142°

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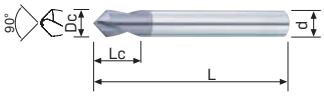
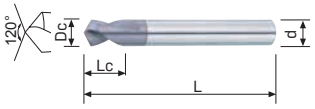
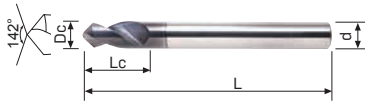
S291X1-90



S291X1-120



S291X1-142



Tool Material/ Coating Type	MG Carbide / AlTiXN
Specification	D / 2 / 90° / 120° / 142°
Type of Operation	

Work Materials (◎ The most recommended/ ○ recommended)

	Carbon Steel	Tool Steel	Pre-hardend Steel			Stainless Steel	Cast Steel	Nonferrous Metals					Aerospace Materials		
	Alloy Steel	Pre-hardend Steel	Hardened Steel												
	~30HRC		~48HRC	~56HRC	~68HRC			Aluminium	Copper	Plastics	Composite Material	Graphite	Titanium	Nickel	Heat- resistant Steel
S291X1-90	◎		◎			◎	◎		○				○	○	○
S291X1-120	◎		◎			◎	◎		○				○	○	○
S291X1-142	◎		◎			◎	◎		○				○	○	○

※Feature of product

S291X1-90 Short Flute Rigid NC Spot Drills
90° Enhance with high rigid Arc drill point.
General application on various steels and stainless steels for positioning.
Good wear resistance and lubricating effect with Nano multilayer coating.

S291X1-120 Short Flute Rigid NC Spot Drills
120° Enhance with high rigid Arc drill point.
General application on various steels and stainless steels for positioning.
Good wear resistance and lubricating effect with Nano multilayer coating.

S291X1-142 Short Flute Rigid NC Spot Drills
142° Enhance with high rigid Arc drill point.
General application on various steels and stainless steels for positioning.
Good wear resistance and lubricating effect with Nano multilayer coating.

Code No. S291X1-90-Dc / S291X1-120-Dc / S291X1-142-Dc

Dc h6	**Lc** mm	**L** mm	**d** h6	**S291X1-90** 90°	**S291X1-120** 120°	**S291X1-142** 142°
3	6	38	3	●	●	●
4	8	50	4	●	●	●
5	10	50	5	●	●	●
6	12	50	6	●	●	●
8	16	60	8	●	●	●
10	20	75	10	●	●	●
12	24	75	12	●	●	●

Recommended Milling Conditions

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Side Milling

Work Material		GR.1 Carbon Steel		GR.2 Low-alloyed Steel (~24HRC)		GR.3 Hi-alloyed Steel (~30HRC)		GR.4 Hardened Steel (30~38HRC)		GR.5 Hardened Steel (38~48HRC)		GR.8 不鏽鋼 Stainless Steel	
Vc m/min		40~85		40~85		40~85		20~30		15~25		20~30	
Code No.	Dc	RPM (min-1)	Feed (mm/rev)	RPM (min-1)	Feed (mm/rev)	RPM (min-1)	Feed (mm/rev)	RPM (min-1)	Feed (mm/rev)	RPM (min-1)	Feed (mm/rev)	RPM (min-1)	Feed (mm/rev)
S291X1-3	3	7,500	0.04~0.085	7,500	0.04~0.085	7,500	0.04~0.085	2,500	0.04~0.085	1,500	0.04~0.085	2,500	0.04~0.085
S291X1-4	4	5,700	0.05~0.12	5,700	0.05~0.12	5,700	0.05~0.12	1,900	0.05~0.12	1,100	0.05~0.12	1,900	0.05~0.09
S291X1-6	6	3,800	0.06~0.13	3,800	0.06~0.13	3,800	0.06~0.13	1,300	0.06~0.13	750	0.06~0.13	1,300	0.06~0.10
S291X1-8	8	2,800	0.08~0.16	2,800	0.08~0.16	2,800	0.08~0.16	1,000	0.08~0.16	550	0.08~0.16	1,000	0.08~0.13
S291X1-10	10	2,300	0.1~0.2	2,300	0.1~0.2	2,300	0.1~0.2	750	0.1~0.2	450	0.1~0.2	750	0.1~0.15
S291X1-12	12	1,900	0.15~0.25	1,900	0.15~0.25	1,900	0.15~0.25	650	0.15~0.25	370	0.15~0.25	650	0.12~0.17

1. Please work with good rigidity / high precision facilities and collet chuck.
2. Please choose proper cutting fluid.
3. The cutting data is reference value only. Please adjust it according to your real working conditions.
4. If RPM is lower the reference value, the Feed rate (fz) and RPM should be reduced by the same proportion.
5. If vibration occurs during cutting, please reduce cutting parameter.

High Performance Drills

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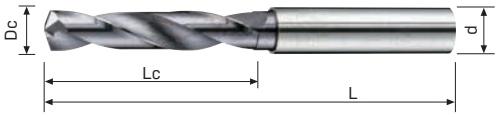
S292X1-2



Tool Material/ Coating Type	MG Carbide	AlTiXN	Type of Operation	
Specification	2XD	2	140°	

Work Materials (◎ The most recommended/ ○ recommended)

Carbon Steel	Tool Steel	Pre-hardend Steel			Stainless Steel	Cast Steel	Nonferrous Metals					Aerospace Materials		
Alloy Steel	Pre-hardend Steel	Hardened Steel												
~30HRC		~48HRC	~56HRC	~68HRC			Aluminium	Copper	Plastics	Composite Material	Graphite	Titanium	Nickel	Heat- resistant Steel
S292X1-2 ◎		◎			◎	◎						○	○	○

※Feature of product

S292X1-2 2XD High Performance Drills.
With new fluting combine with different R value curvature design, for higher cutting ability and stability.
Drilling for various type of steels.
With AlTiSiN coating for excellent wear resistance and lubricating effect.

Code No. S292X1-2-Dc

Dc h7	**Lc** mm	**L** mm	**d** h6	**S292X1-2** MG AlTiXN
2	8	50	4	●
2.1	10	50	4	●
2.2	10	50	4	●
2.3	10	50	4	●
2.4	10	50	4	●
2.5	10	50	4	●
2.6	12	50	4	●
2.7	12	50	4	●
2.8	12	50	4	●
2.9	12	50	4	●
3	12	50	4	●
3.1	15	50	4	●
3.2	15	50	4	●
3.3	15	50	4	●
3.4	15	50	4	●
3.5	15	50	4	●
3.6	15	50	4	●
3.7	15	50	4	●
3.8	15	50	4	●
3.9	15	50	4	●
4	15	50	4	●
4.1	18	50	6	●
4.2	18	50	6	●
4.3	18	50	6	●
4.4	18	50	6	●
4.5	18	50	6	●
4.6	18	50	6	●
4.7	18	50	6	●
4.8	18	50	6	●
4.9	18	50	6	●

High Performance Drills

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Dc h7	Lc mm	L mm	d h6	S292X1-2 MG AlTiXN
5	18	50	6	●
5.1	20	50	6	●
5.2	20	50	6	●
5.3	20	50	6	●
5.4	20	50	6	●
5.5	20	50	6	●
5.6	20	50	6	●
5.7	20	50	6	●
5.8	20	50	6	●
5.9	20	50	6	●
6	20	50	6	●
6.1	25	60	8	●
6.2	25	60	8	●
6.3	25	60	8	●
6.4	25	60	8	●
6.5	25	60	8	●
6.6	25	60	8	●
6.7	25	60	8	●
6.8	25	60	8	●
6.9	25	60	8	●
7	25	60	8	●
7.1	28	60	8	●
7.2	28	60	8	●
7.3	28	60	8	●
7.4	28	60	8	●
7.5	28	60	8	●
7.6	28	60	8	●
7.7	28	60	8	●
7.8	28	60	8	●
7.9	28	60	8	●
8	28	60	8	●
8.1	32	75	10	●
8.2	32	75	10	●
8.3	32	75	10	●
8.4	32	75	10	●
8.5	32	75	10	●
8.6	32	75	10	●
8.7	32	75	10	●
8.8	32	75	10	●
8.9	32	75	10	●
9	32	75	10	●
9.1	35	75	10	●
9.2	35	75	10	●
9.3	35	75	10	●
9.4	35	75	10	●
9.5	35	75	10	●
9.6	35	75	10	●
9.7	35	75	10	●
9.8	35	75	10	●
9.9	35	75	10	●
10	35	75	10	●
10.2	38	75	12	●
10.5	38	75	12	●
10.8	38	75	12	●
11	38	75	12	●
11.5	40	75	12	●
12	40	75	12	●

Please refer to page 89 for parameters

High Performance Drills

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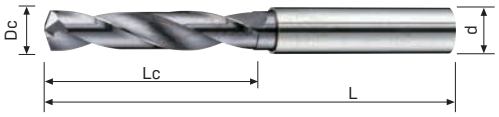
S292X1-4



Tool Material/ Coating Type	MG Carbide	AlTiXN	Type of Operation	
Specification	4XD	2	140°	

Work Materials (◎ The most recommended/ ○ recommended)

Carbon Steel	Tool Steel	Pre-hardend Steel			Stainless Steel	Cast Steel	Nonferrous Metals					Aerospace Materials		
Alloy Steel	Pre-hardend Steel	Hardened Steel												
~30HRC		~48HRC	~56HRC	~68HRC			Aluminium	Copper	Plastics	Composite Material	Graphite	Titanium	Nickel	Heat- resistant Steel
S292X1-4 ◎		◎			◎	◎						○	○	○

※Feature of product

S292X1-4 4XD High Performance Drills
With new fluting combine with different R value curvature design, for higher cutting ability and stability.
Drilling for various type of steels.
With AlTiXN coating for excellent wear resistance and lubricating effect.

Code No. S292X1-4-Dc

Dc h7	**Lc** mm	**L** mm	**d** h6	**S292X1-4** MG AlTiXN
2	14	50	4	●
2.1	16	50	4	●
2.2	16	50	4	●
2.3	16	50	4	●
2.4	16	50	4	●
2.5	16	50	4	●
2.6	18	50	4	●
2.7	18	50	4	●
2.8	18	50	4	●
2.9	18	50	4	●
3	18	50	4	●
3.1	20	50	4	●
3.2	20	50	4	●
3.3	20	50	4	●
3.4	20	50	4	●
3.5	20	50	4	●
3.6	21	50	4	●
3.7	21	50	4	●
3.8	21	50	4	●
3.9	21	50	4	●
4	21	50	4	●
4.1	23	63	6	●
4.2	23	63	6	●
4.3	23	63	6	●
4.4	23	63	6	●
4.5	23	63	6	●
4.6	25	63	6	●
4.7	25	63	6	●
4.8	25	63	6	●
4.9	25	63	6	●

High Performance Drills

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Dc h7	Lc mm	L mm	d h6	S292X1-4 MG AlTiXN
5	25	63	6	●
5.1	28	63	6	●
5.2	28	63	6	●
5.3	28	63	6	●
5.4	28	63	6	●
5.5	28	63	6	●
5.6	30	63	6	●
5.7	30	63	6	●
5.8	30	63	6	●
5.9	30	63	6	●
6	30	63	6	●
6.1	33	75	8	●
6.2	33	75	8	●
6.3	33	75	8	●
6.4	33	75	8	●
6.5	33	75	8	●
6.6	35	75	8	●
6.7	35	75	8	●
6.8	35	75	8	●
6.9	35	75	8	●
7	35	75	8	●
7.1	38	75	8	●
7.2	38	75	8	●
7.3	38	75	8	●
7.4	38	75	8	●
7.5	38	75	8	●
7.6	40	75	8	●
7.7	40	75	8	●
7.8	40	75	8	●
7.9	40	75	8	●
8	40	75	8	●
8.1	41	100	10	●
8.2	41	100	10	●
8.3	41	100	10	●
8.4	41	100	10	●
8.5	41	100	10	●
8.6	43	100	10	●
8.7	43	100	10	●
8.8	43	100	10	●
8.9	43	100	10	●
9	43	100	10	●
9.1	45	100	10	●
9.2	45	100	10	●
9.3	45	100	10	●
9.4	45	100	10	●
9.5	45	100	10	●
9.6	47	100	10	●
9.7	47	100	10	●
9.8	47	100	10	●
9.9	47	100	10	●
10	47	100	10	●
10.2	48	100	12	●
10.5	48	100	12	●
10.8	49	100	12	●
11	49	100	12	●
11.5	51	100	12	●
12	53	100	12	●

Please refer to page 89 for parameters

Oil-Feed High Performance Drills

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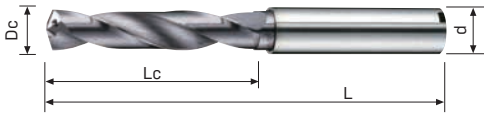
S293X1-3



Tool Material/ Coating Type	MG Carbide	AlTiXN	Type of Operation	
Specification	3XD	2	140°	

Work Materials (◎ The most recommended/ ○ recommended)

	Carbon Steel	Tool Steel	Pre-hardend Steel			Stainless Steel	Cast Steel	Nonferrous Metals					Aerospace Materials		
	Alloy Steel	Pre-hardend Steel	Hardened Steel					Aluminium	Copper	Plastics	Composite Material	Graphite	Titanium	Nickel	Heat- resistant Steel
	~30HRC		~48HRC	~56HRC	~68HRC										
S293X1-3	◎		◎			◎	◎						○	○	○

※Feature of product

S293X1-3 3XD High Performance Drills with internal coolant supply
With new fluting combine with different R value curvature design, for higher cutting ability and stability.
Drilling for various type of steels.
With AlTiSiN coating for excellent wear resistance and lubricating effect.

Code No. S293X1-3-Dc

Dc h7	**Lc** mm	**L** mm	**d** h6	**S293X1-3** MG AlTiXN
2	8	60	3	●
2.2、2.5	10	60	3	●
3	11	60	3	●
3.3、3.4、3.5	13	62	4	●
3.7、3.8、3.9、4	15	62	4	●
4.1、4.2、4.5	17	64	5	●
4.6、4.7、5	19	64	5	●
5.1、5.2、5.3、5.5	21	66	6	●
5.6、5.8、6	23	66	6	●
6.5	25	76	8	●
6.6、6.8、6.9、7	26	76	8	●
7.1、7.3、7.4、7.5	28	76	8	●
8	30	76	8	●
8.5	32	89	10	●
8.7、8.8、9	34	89	10	●
9.3、9.4、9.5	36	89	10	●
9.8、9.9、10	38	89	10	●
10.2、10.3、10.5	40	102	12	●
11	41	102	12	●
11.2、11.5	43	102	12	●
11.8、12	45	102	12	●

Please refer to page 89 for parameters

Oil-Feed High Performance Drills

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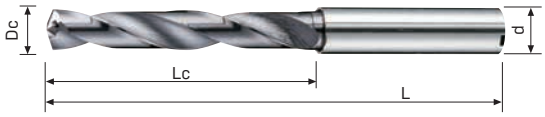
S293X1-5



材質	MG Carbide / AlTiXN	加工形態	
樣式	5XD / 2 / 140°		

被切削材料應用表（◎最適用 / ○適用）

合金鋼	工具鋼 預硬鋼	預硬鋼 ~48HRC	預硬鋼 ~56HRC	預硬鋼 ~68HRC	不鏽鋼		非鐵金屬 鋁		非鐵金屬 塑膠	非鐵金屬 複合材料	非鐵金屬 石墨	航太材料	航太材料 鎳	航太材料 高溫合金
~30HRC														
S293X1-5	◎	◎			◎	◎						○	○	○

※Feature of product

S293X1-5 5XD High Performance Drills with internal coolant supply
With new fluting combine with different R value curvature design, for higher cutting ability and stability.
Drilling for various type of steels.
With AlTiSiN coating for excellent wear resistance and lubricating effect.

Code No. S293X1-5-Dc

Dc h7	**Lc** mm	**L** mm	**d** h6	**S293X1-5** MG AlTiXN
2	13	68	3	●
2.2、2.5	16	68	3	●
3	19	68	3	●
3.3、3.4、3.5	22	72	4	●
3.7、3.8、3.9、4	25	72	4	●
4.1、4.2 、4.5	28	82	5	●
4.6、4.7、5	31	82	5	●
5.1、5.2、5.3、5.5	35	82	6	●
5.6、5.8、6	38	82	6	●
6.5	41	96	8	●
6.6、6.8、6.9、7	44	96	8	●
7.1、7.3、7.4、7.5	47	96	8	●
8	50	96	8	●
8.5	53	110	10	●
8.7、8.8、9	56	110	10	●
9.3、9.4、9.5	60	110	10	●
9.8、9.9、10	63	110	10	●
10.2、10.3、10.5	66	132	12	●
11	69	132	12	●
11.2、11.5	72	132	12	●
11.8、12	75	132	12	●

Please refer to page 89 for parameters

Cutting Conditions

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S292X1-2
S292X1-4
S293X1-3
S293X1-5

		S292X1-2		S292X1-4		S293X1-3		S293X1-5	
		cutting speed Vc (m/min)	feed per tooth Fn (mm/rev)	cutting speed Vc (m/min)	feed per tooth Fn (mm/rev)	cutting speed Vc (m/min)	feed per tooth Fn (mm/rev)	cutting speed Vc (m/min)	feed per tooth Fn (mm/rev)
P		Carbon Steel Materials							
P	GR1 Carbon Steel	80	0.023xDc	70	0.023xDc	100	0.023xDc	100	0.023xDc
P	GR2 <24HRC Low-alloyed Steel	80	0.023xDc	70	0.023xDc	100	0.023xDc	100	0.023xDc
P	GR3 <30HRC Hi-alloyed Steel	70	0.021xDc	60	0.021xDc	90	0.021xDc	90	0.021xDc
H		Hardened Steel Materials							
H	GR4 30~38HRC Hardened Steel	50	0.020xDc	40	0.020xDc	50	0.020xDc	50	0.020xDc
H	GR5 38~48HRC Hardened Steel	40	0.015xDc	30	0.015xDc	40	0.015xDc	40	0.015xDc
M		Stainless Steel Materials							
M	GR8-1 Ferritic、Martensitic					50	0.013xDc	50	0.013xDc
M	GR8-2 Austenitic					50	0.013xDc	50	0.013xDc
M	GR8-3 Austenitic-ferritic					50	0.013xDc	50	0.013xDc
M	GR8-4 Austenitic-ferritic Heat-resistant					40	0.012xDc	40	0.012xDc
K		Cast Lron Materials							
K	GR9-1 Grey cast iron	80	0.023xDc	70	0.023xDc	100	0.023xDc	100	0.023xDc
K	GR9-2 Nodular cast iron	80	0.023xDc	70	0.023xDc	100	0.023xDc	100	0.023xDc

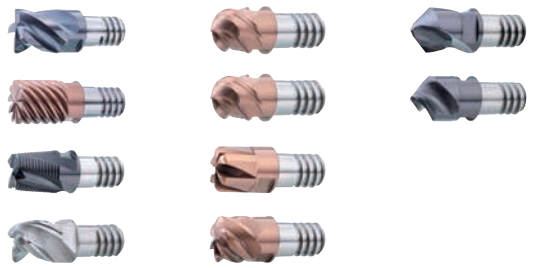
All cutting data serve for orientation only and should be adapted individually to the technical conditions on location
1. Please work with good rigidity / high precision facilities and collet chuck.
2. Please choose proper cutting fluid.
3. The cutting data is reference value only. Please adjust it according to your real working conditions.
4. If RPM is lower the reference value, the Feed rate (fz) and RPM should be reduced by the same proportion.
5. If vibration occurs during cutting, please reduce cutting parameter.

IMP Series Interchangeable Multi-Purpose End Mills Cutter And Shank

7leaders® The Art of Cutting

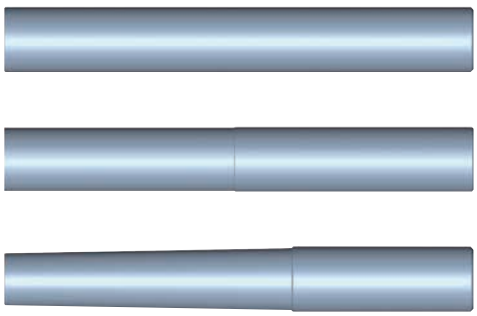
Tools Part

Cutter



+

Shank



±0.01mm
Runout Tolerance

Code No.

◆ Cutter

IMP10 - B252 FX 1600 16 R05
① ② ③ ④ ⑤ ⑥

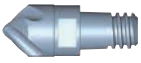
① Pair with Shank	② Series	③ Coating	④ Dc	⑤ Lc	⑥ Edge
			Dc 16mm → 1600 Dc 15.88mm → 1588	Lc 4mm → 04 Lc 10mm → 10	A Angle R Corner Radius

◆ Shank

IMP10 U 10 070 015
① ② ③ ④ ⑤

① Pair with Cutter	② Type	③ d	④ L	⑤ L1
	S Straight U Neck A Conical Neck			

Index

Series	Code No.	Appearance	Flute	Product Name	Page
Interchangeable End Mills	IMP..-E140FX		4	Interchangeable Multipurpose End Mills	92
	IMP..-B252FX		4	Interchangeable Multipurpose End Mills With Corner Radius	93
	IMP..-F660TX		Z	Interchangeable End Mills With Corner Radius	94
	IMP..-F608FX		4	Interchangeable Roughing End Mills	95
	IMP..-E143		3	Interchangeable End Mills For Aluminium	95
	IMP..-E145		3	Interchangeable End Mills For Aluminium With Corner Radius	96
	IMP..-B253TX		3	Interchangeable Ball Nose End Mills	97
	IMP..-B254TX		4	Interchangeable Ball Nose End Mills	97
	IMP..-B271TX		4	Interchangeable High Performance End Mills With Corner Radius	98
	IMP..-F678TX		6	Interchangeable High Feed End Mills	98
	IMP..-D908FX		2	Combined Drills and Countersink 60°	99
	IMP..-D922FX		2	Interchangeable NC Spot Drills	99
	IMP..-E109FX		4	Interchangeable End Mills For Chamfering 60°/90°/120°	100
	IMP..-E121FX		3	Interchangeable End Mills For Chamfering	101
	IMP..-Q138		4	Interchangeable Cirular Arc Finishing End Mills for Multi-Axis Machining	102
	IMP..-Q138		4	Interchangeable Cirular Arc Finishing End Mills for Multi-Axis Machining	103
	IMP..-Q138		4	Interchangeable Cirular Arc Finishing End Mills for Multi-Axis Machining	104
	IMP..-Q139		4	Interchangeable Cirular Arc Finishing End Mills for Multi-Axis Machining	105

Interchangeable Multipurpose End Mills

7leaders® The Art of Cutting

Multipurpose End Mills- 4 Flutes

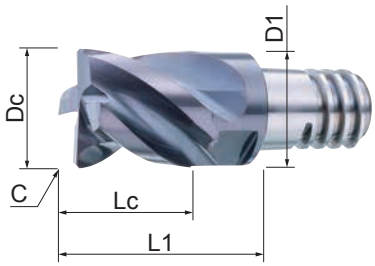
Effectively decrease the vibration by the designs of various helix geometry and unequal flutes.

Big chip breaker is designed to reach high removal rate for various work materials.

Nano multilayer coating AlCrN is suitable for carbon steel, alloy steel and stainless steel with impurities and sticky materials.

P	H	M	K	N	S
●	●	●	●	○	○

MG Carbide | AlCrN FX | 38° 41° | 4 | N 75° | 0.25~0.6 45°



Code No.	Dc 0 -0.03	C mm	Lc mm	L1 mm	D1 mm	Z	AlCrN FX
IMP10-E140FX100010	10	0.25	10	16	9.7	4	●
IMP12-E140FX120012	12	0.3	12	19	11.7	4	●
IMP16-E140FX160016	16	0.4	16	24	15.5	4	●
IMP20-E140FX200020	20	0.5	20	30	19.5	4	●
IMP25-E140FX250025	25	0.6	25	37.5	24.5	4	●

Interchangeable Multipurpose End Mills With Corner Radius

7leaders® The Art of Cutting

Multipurpose End Mills with Corner Radius- 4 Flutes

Using UMG carbide material enable to enhance lubrication and wear resistance.

Effectively decrease the vibration by various helix geometry and unequal flutes designs.

Big chip breaker is designed to reach high removal rate for various work materials.

Cutting edge with corner radius design and nano multilayer coating AlCrN are suitable for carbon steel, alloy steel and stainless steel with impurities and sticky materials.

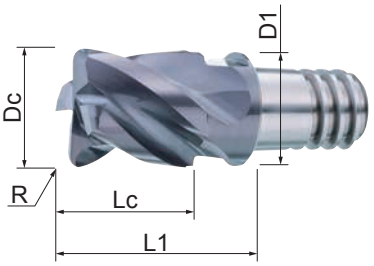
Suitable for various kinds of work materials from the end of roughing to finishing.

P	H	M	K	N	S
●	●	●	●		●

UMG Carbide

AlCrN FX

R



Code No.	Dc 0 -0.03	R ±0.01	Lc mm	L1 mm	D1 mm	Z	AlCrN FX
IMP10-B252FX100010R05	10	0.5	10	16	9.7	4	●
IMP10-B252FX100010R10	10	1	10	16	9.7	4	●
IMP10-B252FX100010R20	10	2	10	16	9.7	4	●
IMP10-B252FX100010R30	10	3	10	16	9.7	4	●
IMP12-B252FX120012R05	12	0.5	12	19	11.7	4	●
IMP12-B252FX120012R10	12	1	12	19	11.7	4	●
IMP12-B252FX120012R20	12	2	12	19	11.7	4	●
IMP12-B252FX120012R30	12	3	12	19	11.7	4	●
IMP16-B252FX160016R05	16	0.5	16	24	15.5	4	●
IMP16-B252FX160016R10	16	1	16	24	15.5	4	●
IMP16-B252FX160016R20	16	2	16	24	15.5	4	●
IMP16-B252FX160016R30	16	3	16	24	15.5	4	●
IMP20-B252FX200020R05	20	0.5	20	30	19.5	4	●
IMP20-B252FX200020R10	20	1	20	30	19.5	4	●
IMP20-B252FX200020R20	20	2	20	30	19.5	4	●
IMP20-B252FX200020R30	20	3	20	30	19.5	4	●
IMP25-B252FX250025R10	25	1	25	37.5	24.5	4	●
IMP25-B252FX250025R20	25	2	25	37.5	24.5	4	●
IMP25-B252FX250025R30	25	3	25	37.5	24.5	4	●

Interchangeable End Mills With Corner Radius

Multi-flute Finishing End Mills

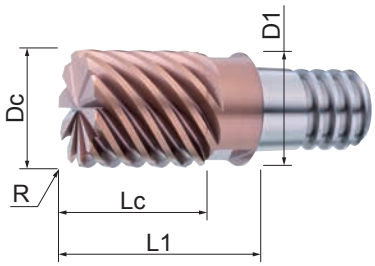
Negative rake angle is good for cutting hardened materials.

Application for finishing cutting process.

Good wear resistance and lubricating effect with Nano multilayer coating.

P	H	M	K	N	S
	●		○		

MG Carbide | AlTiSiN TX | 55° | Z | N γ-10° | R



Code No.	Dc 0 -0.03	R ±0.01	Lc mm	L1 mm	D1 mm	Z	AlTiSiN TX
IMP10-F660TX100010R05	10	0.5	10	16	9.7	6	●
IMP10-F660TX100010R10	10	1	10	16	9.7	6	●
IMP10-F660TX100010R20	10	2	10	16	9.7	6	●
IMP12-F660TX120012R05	12	0.5	12	19	11.7	6	●
IMP12-F660TX120012R10	12	1	12	19	11.7	6	●
IMP12-F660TX120012R20	12	2	12	19	11.7	6	●
IMP16-F660TX160016R10	16	1	16	24	15.5	8	●
IMP16-F660TX160016R20	16	2	16	24	15.5	8	●
IMP16-F660TX160016R30	16	3	16	24	15.5	8	●
IMP20-F660TX200020R10	20	1	20	30	19.5	10	●
IMP20-F660TX200020R20	20	2	20	30	19.5	10	●
IMP20-F660TX200020R30	20	3	20	30	19.5	10	●
IMP25-F660TX250025R10	25	1	25	37.5	24.5	10	●
IMP25-F660TX250025R20	25	2	25	37.5	24.5	10	●
IMP25-F660TX250025R30	25	3	25	37.5	24.5	10	●

IMP..-F608FX

Interchangeable Roughing End Mills

7leaders® The Art of Cutting

Roughing End Mills – 4 Flutes

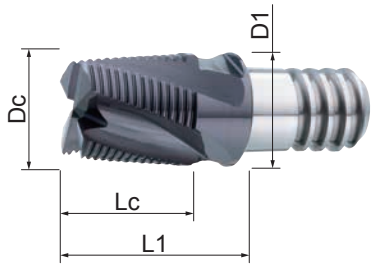
Fine tooth staggered chip breaker design on cutting flutes are good for chip breaking.

Application for roughing cutting process.

Good wear resistance and lubricating effect with Nano multilayer coating.

P	H	M	K	N	S
●	●	○	●		

MG Carbide | AlCrN FX | 20° | 4 | HR | 0.5~0.6 | 45°



Code No.	Dc h10	Lc mm	L1 mm	D1 mm	C mm	Z	AlCrN FX
IMP10-F608FX100010	10	10	16	9.7	0.5	4	●
IMP12-F608FX120012	12	12	19	11.7	0.5	4	●
IMP16-F608FX160016	16	16	24	15.5	0.5	4	●
IMP20-F608FX200020	20	20	30	19.5	0.5	4	●
IMP25-F608FX250025	25	25	37.5	24.5	0.6	4	●

IMP..-E143

Interchangeable End Mills For Aluminium

End Mills for Aluminium- 3 Flutes

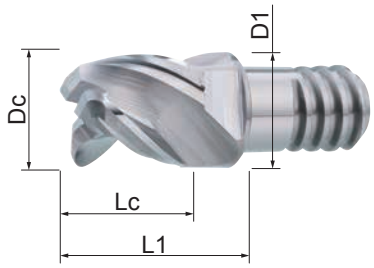
Design with sharp cutting edge, high removal cutting geometry, and fine grinding smooth surface to prevent sticking problem.

Higher finishing of cutting edge to have better surface roughness after processing.

Application for roughing and finishing in various Aluminium.

P	H	M	K	N	S
				●	

MG Carbide | Uncoated Bright | 40° | 3 | N γ20° | 90°



Code No.	Dc 0 -0.03	Lc mm	L1 mm	D1 mm	Z	Uncoated Bright
IMP10-E143100015	10	15	21	9.7	3	●
IMP12-E143120018	12	18	25	11.7	3	●
IMP16-E143160024	16	24	32	15.5	3	●
IMP20-E143200030	20	30	40	19.5	3	●
IMP25-E143250037	25	37.5	50	24.5	3	●

Interchangeable End Mills For Aluminium With Corner Radius

7leaders® The Art of Cutting

End Mills with Corner Radius for Aluminium- 3 Flutes.

Design with sharp cutting edge, high removal cutting geometry, and fine grinding smooth surface to prevent sticking problem.

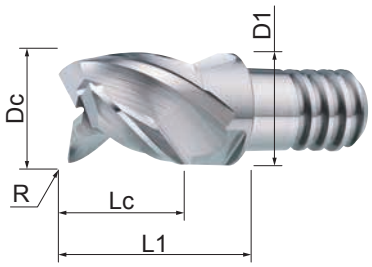
Higher finishing of cutting edge to have better surface roughness after processing.

With corner Radius to enhance tool life.

Application for roughing and finishing in various Aluminium.

P	H	M	K	N	S
				●	

MG Carbide | Uncoated Bright | 40° | 3 | N γ20° | R



Code No.	Dc 0 -0.03	R ±0.01	Lc mm	L1 mm	D1 mm	Z	Uncoated Bright
IMP10-E145100015R10	10	1	15	21	9.7	3	●
IMP10-E145100015R20	10	2	15	21	9.7	3	●
IMP12-E145120018R10	12	1	18	25	11.7	3	●
IMP12-E145120018R20	12	2	18	25	11.7	3	●
IMP12-E145120018R30	12	3	18	25	11.7	3	●
IMP16-E145160024R10	16	1	24	32	15.5	3	●
IMP16-E145160024R20	16	2	24	32	15.5	3	●
IMP16-E145160024R30	16	3	24	32	15.5	3	●
IMP16-E145160024R40	16	4	24	32	15.5	3	●
IMP20-E145200030R10	20	1	30	40	19.5	3	●
IMP20-E145200030R20	20	2	30	40	19.5	3	●
IMP20-E145200030R30	20	3	30	40	19.5	3	●
IMP20-E145200030R40	20	4	30	40	19.5	3	●
IMP25-E145250037R10	25	1	37.5	50	24.5	3	●
IMP25-E145250037R30	25	3	37.5	50	24.5	3	●
IMP25-E145250037R50	25	5	37.5	50	24.5	3	●

IMP..-B253TX

Interchangeable Ball Nose End Mills

7leaders® The Art of Cutting

Ball Nose End Mills- 3 Flutes

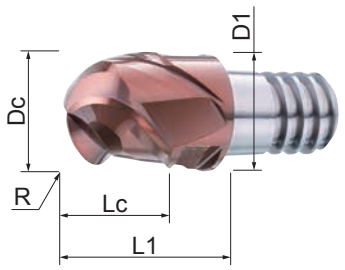
S shape ball nose geometry enable to keep tool life longer.

High radius precision of ball nose suitable to work on high hardness and high precision mold process.

Nano multilayer coating enables to enhance lubrication and wear resistance.

P	H	M	K	N	S
	●		○		○

UMG Carbide | AlTiSiN TX | 45° | 3 | N γ-10°



Code No.	Dc 0 -0.03	R ±0.01	Lc mm	L1 mm	D1 mm	Z	AlTiSiN TX
IMP10-B253TX100007	10	5	7.5	13.5	9.7	3	●
IMP12-B253TX120009	12	6	9	16	11.7	3	●
IMP16-B253TX160012	16	8	12	20	15.5	3	●
IMP20-B253TX200015	20	10	15	25	19.5	3	●

IMP..-B254TX

Interchangeable Ball Nose End Mills

Ball Nose End Mills- 4 Flutes

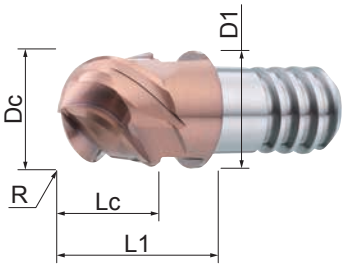
S shape ball nose geometry enable to keep tool life longer.

High radius precision of ball nose suitable to work on high hardness and high precision mold process.

Nano multilayer coating enables to enhance lubrication and wear resistance.

P	H	M	K	N	S
	●		○		○

UMG Carbide | AlTiSiN TX | 45° | 4 | N γ-10°



Code No.	Dc 0 -0.03	R ±0.01	Lc mm	L1 mm	D1 mm	Z	AlTiSiN TX
IMP10-B254TX100007	10	5	7.5	13.5	9.7	4	●
IMP12-B254TX120009	12	6	9	16	11.7	4	●
IMP16-B254TX160012	16	8	12	20	15.5	4	●
IMP20-B254TX200015	20	10	15	25	19.5	4	●

IMP..-B271TX

Interchangeable High Performance End Mills With Corner Radius

7leaders® The Art of Cutting

Stepped High Performance End Mills with Corner Radius

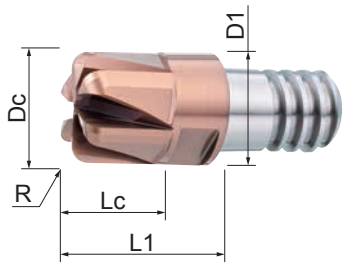
High precision R value and strong short cutting length.

Suitable for working high hardness materials and high precision mold in layer machining.

Nano multilayer coating, wear resistance and lubrication effect are highly enhanced to have better tool life.

P	H	M	K	N	S
	●		●		

UMG Carbide | AlTiSiN TX | 0° | 4 | N γ0° | R



Code No.	Dc 0 -0.03	R ±0.01	Lc mm	L1 mm	D1 mm	Z	AlTiSiN TX
IMP10-B271TX100007R20	10	2	7.5	13.5	9.7	4	●
IMP12-B271TX120009R20	12	2	9	16	11.7	4	●
IMP16-B271TX160012R30	16	3	12	20	15.5	6	●
IMP20-B271TX200015R30	20	3	15	25	19.5	6	●

IMP..-F678TX

Interchangeable High Feed End Mills

High Feed End Mills – 6 Flutes

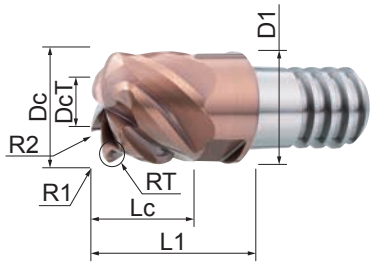
Design with Special R curvature.

Suitable for 3D profile surface machining, roughing in cutting different steel below 62HRC.

Honing cutting edge with AlTiSiN Nano multilayer coating to improve tool life effectively.

P	H	M	K	N	S
	●		○		

UMG Carbide | AlTiSiN TX | 45° | 6 | N γ-10° | R



Code No.	Dc 0 -0.03	RT mm	DcT mm	R1 mm	R2 mm	Lc mm	L1 mm	D1 mm	Z	AlTiSiN TX
IMP12-F678TX120009R15	12	1.5	6	1.2	7	9	16	11.7	6	●
IMP16-F678TX160012R20	16	2	8	1.6	9.5	12	20	15.5	6	●
IMP20-F678TX200015R25	20	2.5	10	2	12	15	25	19.5	6	●

IMP..-D908FX

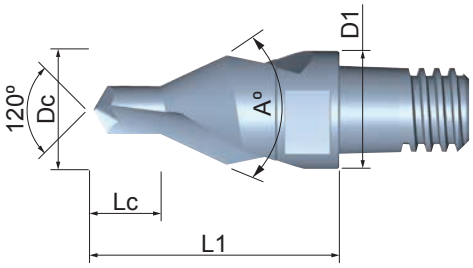
Combined Drills and Countersink 60°

7leaders® The Art of Cutting

Improved strength design for cutting different steels below 48HRC, cast iron, aluminium and copper.
Application for centre hole preparations for lathe and Cylindrical grinding.

P	H	M	K	N	S
●	●	●	●	○	○

MG Carbide | AlCrN FX | 60° | 2 | 120°



Code No.	Dc 0 -0.03	Lc mm	L1 mm	D1 mm	A A°	AlCrN FX
IMP10-D908FX040	4	5	21	9.7	60	●
IMP12-D908FX050	5	6.3	25	11.7	60	●
IMP16-D908FX063	6.3	8.6	32	15.5	60	●

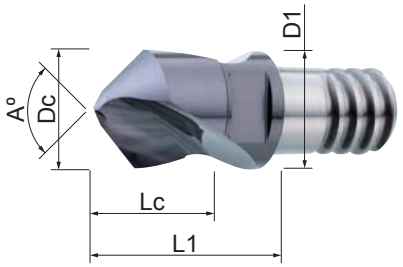
IMP..-D922FX

Interchangeable NC Spot Drills

D922X NC Spot Drills 90°
Design with double drill tip angle to enhance the strength of drill tip.
Apply with AlTiN coating to increase wear resistance and improved tool life.
Application for spot drilling in different steels.

P	H	M	K	N	S
●	●	○	●	○	○

MG Carbide | AlCrN FX | D | 2 | 120° 90°



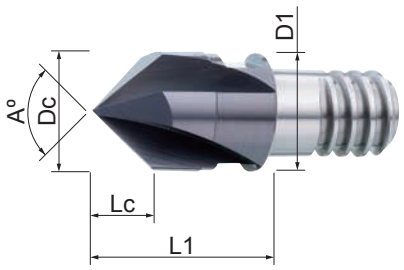
Code No.	Dc 0 -0.03	Lc mm	L1 mm	D1 mm	A A°	Z	AlCrN FX
IMP10-D922FX100010A090	10	10	16	9.7	90	2	●
IMP12-D922FX120012A090	12	12	19	11.7	90	2	●
IMP16-D922FX160016A090	16	16	24	15.5	90	2	●
IMP20-D922FX200020A090	20	20	30	19.5	90	2	●
IMP25-D922FX250025A090	25	25	37.5	24.5	90	2	●

Interchangeable End Mills For Chamfering 60°/90°/120°

End Mills for Chamfering 90°- 4 Flutes
Suitable for drilling, tappering, countersinking, NC
Spot drilling and frame milling.

P	H	M	K	N	S
●	●	○	●	●	

UMG Carbide | AlCrN FX | 0° | 不等 4 | N 75°



Code No.	Dc 0 -0.03	Lc mm	L1 mm	D1 mm	A A°	Z	AlCrN FX
IMP10-E109FX100008A060	10	8.6	16	9.7	60	4	●
IMP12-E109FX120010A060	12	10.3	19	11.7	60	4	●
IMP16-E109FX160013A060	16	13.8	24	15.5	60	4	●
IMP20-E109FX200017A060	20	17.3	30	19.5	60	4	●
IMP25-E109FX250021A060	25	21.6	37.5	24.5	60	4	●
IMP10-E109FX100005A090	10	5	16	9.7	90	4	●
IMP12-E109FX120006A090	12	6	19	11.7	90	4	●
IMP16-E109FX160008A090	16	8	24	15.5	90	4	●
IMP20-E109FX200010A090	20	10	30	19.5	90	4	●
IMP25-E109FX250012A090	25	12.5	37.5	24.5	90	4	●
IMP10-E109FX100002A120	10	2.8	16	9.7	120	4	●
IMP12-E109FX120003A120	12	3.4	19	11.7	120	4	●
IMP16-E109FX160004A120	16	4.6	24	15.5	120	4	●
IMP20-E109FX200005A120	20	5.7	30	19.5	120	4	●
IMP25-E109FX250007A120	25	7.2	37.5	24.5	120	4	●

Interchangeable End Mills For Chamfering

End Mills for Chamfering 90° - 3 Flutes

With Helix cutting edge design, reduce vibration during cutting process.

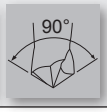
Sharp cutting edge could get better surface roughness and reduce burrs.

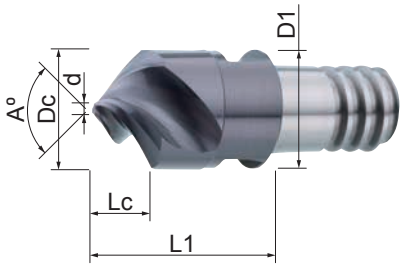
Apply AlTiCrN coating type to enhance tool life and gain better cutting efficiency of cutting tools.

P	H	M	K	N	S
○	●		○		

MG Carbide

AlCrN FX





Code No.	Dc 0 -0.03	d mm	Lc mm	L1 mm	D1 mm	A A°	Z	AlCrN FX
IMP10-E121FX100004A090	10	1	4.5	16	9.7	90	3	●
IMP12-E121FX120005A090	12	1.2	5.4	19	11.7	90	3	●
IMP16-E121FX160007A090	16	1.6	7.2	24	15.5	90	3	●
IMP20-E121FX200009A090	20	2	9	30	19.5	90	3	●
IMP25-E121FX250011A090	25	2.5	11.25	37.5	24.5	90	3	●

Interchangeable Cirular Arc Finishing End Mills for Multi-Axis Machining

7leaders® The Art of Cutting

Specially defined profile, reduce cycle time and improved surface finish.

Taper form with three tangential radius, offered in a variety angles, provide maximun performance and optimal clearance angle for any workpiece.

4 Flute geometry specifically designed for semi-finishing and finishing in stainless steel, high temperature alloys, and other ferrous materials.

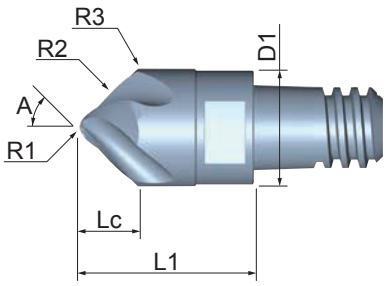
Bright w/o coating with sharp cutting edge for Aluminium.

AlCrN coating for high hardness and best lubricating effect, for Steel, Stainless Steel etc.

AlTiXZrN coating for high lubricating effect, anti-stick, for Nickle Alloys, High Tempreature Alloys, Stainless Steel and Titianium etc.

P	H	M	K	N	S
●	●	●	●	○	○

MG Carbide | Uncoated Bright | AlCrN FX | AlTiXN+ZrN SX | 30° | 4 | H γ8°



Code No.	A A°	R1 0.015 -0.015	R2 0.015 -0.015	R3 0.015 -0.015	Lc mm	L1 mm	D1 mm	Uncoated Bright	AlCrN FX	AlTiXN+ZrN SX
IMP10-Q138FX033005A45	45	1.2	300	1.2	5	16	9.7	●	○	○
IMP10-Q138FX067505A45	45	1.2	675	1.2	5	16	9.7	●	○	○
IMP12-Q138FX040006A45	45	1.5	400	1.5	6	19	11.7	●	○	○
IMP12-Q138FX090006A45	45	1.5	900	1.5	6	19	11.7	●	○	○
IMP16-Q138FX050008A45	45	2	500	2	8	24	15.5	●	○	○
IMP16-Q138FX112508A45	45	2	1125	2	8	24	15.5	●	○	○
IMP20-Q138FX060010A45	45	2.5	600	2.5	10	30	19.5	●	○	○
IMP20-Q138FX135010A45	45	2.5	1350	2.5	10	30	19.5	●	○	○

Interchangeable Cirular Arc Finishing End Mills for Multi-Axis Machining

7leaders® The Art of Cutting

Specially defined profile, reduce cycle time and improved surface finish.

Taper form with three tangential radius, offered in a variety angles, provide maximun performance and optimal clearance angle for any workpiece.

4 Flute geometry specifically designed for semi-finishing and finishing in stainless steel, high temperature alloys, and other ferrous materials.

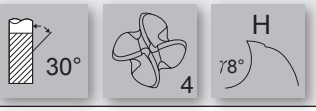
Bright w/o coating with sharp cutting edge for Aluminium.

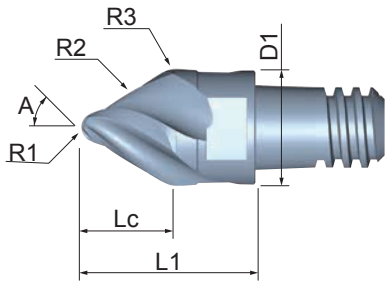
AlCrN coating for high hardness and best lubricating effect, for Steel, Stainless Steel etc.

AlTiXZrN coating for high lubricating effect, anti-stick, for Nickle Alloys, High Tempreature Alloys, Stainless Steel and Titianium etc.

P	H	M	K	N	S
●	●	●	●	○	○

MG Carbide | **Uncoated Bright** | **AlCrN FX** | **AlTiXN+ZrN SX**





Code No.	A A°	R1 0.015 -0.015	R2 0.015 -0.015	R3 0.015 -0.015	Lc mm	L1 mm	D1 mm	Uncoated Bright	AlCrN FX	AlTiXN+ZrN SX
IMP10-Q138FX033009A30	30	1.2	300	2.5	8.78	16	9.7	●	○	○
IMP10-Q138FX067509A30	30	1.2	675	2.5	8.78	16	9.7	●	○	○
IMP12-Q138FX040010A30	30	1.5	400	3	10.48	19	11.7	●	○	○
IMP12-Q138FX090010A30	30	1.5	900	3	10.48	19	11.7	●	○	○
IMP16-Q138FX050014A30	30	2	500	4	13.97	24	15.5	●	○	○
IMP16-Q138FX112514A30	30	2	1125	4	13.97	24	15.5	●	○	○
IMP20-Q138FX060017A30	30	2.5	600	5	17.46	30	19.5	●	○	○
IMP20-Q138FX135017A30	30	2.5	1350	5	17.46	30	19.5	●	○	○

Interchangeable Cirular Arc Finishing End Mills for Multi-Axis Machining

7leaders® The Art of Cutting

Specially defined profile, reduce cycle time and improved surface finish.

Taper form with three tangential radius, offered in a variety angles, provide maximun performance and optimal clearance angle for any workpiece.

4 Flute geometry specifically designed for semi-finishing and finishing in stainless steel, high temperature alloys, and other ferrous materials.

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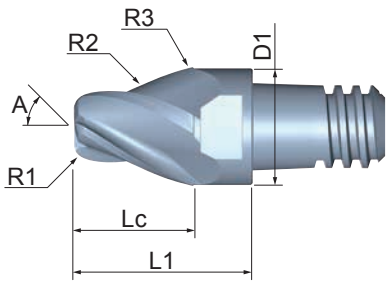
AlTiXZrN coating for high lubricating effect, anti-stick, for Nickle Alloys, High Tempreature Alloys, Stainless Steel and Titianium etc.

P	H	M	K	N	S
●	●	●	●	○	○

MG Carbide | Uncoated Bright | AlCrN FX | AlTiXN+ZrN SX | 30° | 4 | H γ8°



Code No.	A A°	R1 0.015 -0.015	R2 0.015 -0.015	R3 0.015 -0.015	Lc mm	L1 mm	D1 mm	Uncoated Bright	AlCrN FX	AlTiXN+ZrN SX
IMP10-Q138FX033010A15	15	1.2	300	2.5	10	16	9.7	●	○	○
IMP10-Q138FX067510A15	15	1.2	675	2.5	10	16	9.7	●	○	○
IMP12-Q138FX040012A15	15	1.5	400	3	12	19	11.7	●	○	○
IMP12-Q138FX090012A15	15	1.5	900	3	12	19	11.7	●	○	○
IMP16-Q138FX050016A15	15	2	500	4	16	24	15.5	●	○	○
IMP16-Q138FX112516A15	15	2	1125	4	16	24	15.5	●	○	○
IMP20-Q138FX060020A15	15	2.5	600	5	20	30	19.5	●	○	○
IMP20-Q138FX135020A15	15	2.5	1350	5	20	30	19.5	●	○	○

Interchangeable Cirular Arc Finishing End Mills for Multi-Axis Machining

7leaders® The Art of Cutting

4 Flute Lens Form, Specially defined profile, reduce cycle time and improved surface finish.

4 Flute geometry specifically designed for finishing in stainless steel, high temperature alloys, and other ferrous materials.

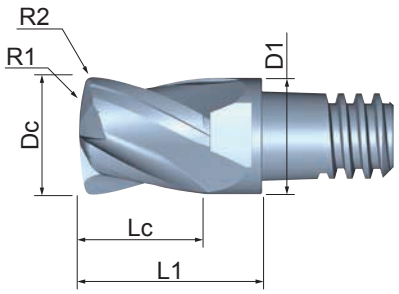
Bright w/o coating with sharp cutting edge for Aluminium.

AlCrN coating for high hardness and best lubricating effect, for Steel, Stainless Steel etc.

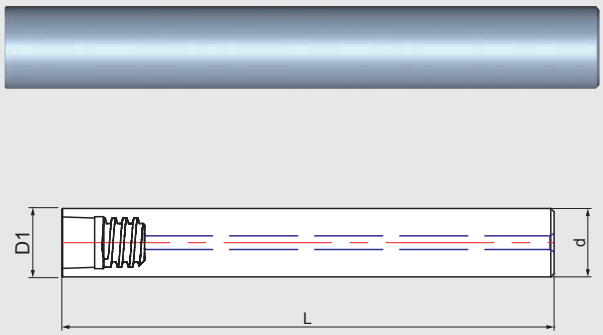
AlTiXZrN coating for high lubricating effect, anti-stick, for Nickle Alloys, High Tempreature Alloys, Stainless Steel and Titianium etc.

P	H	M	K	N	S
●	●	●	●	○	○

MG Carbide | Uncoated Bright | AlCrN FX | AlTiXN+ZrN SX

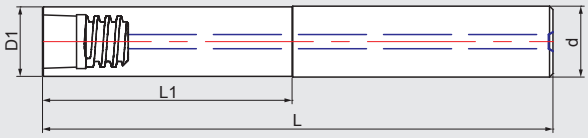


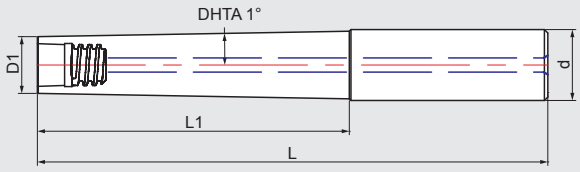
Code No.	Dc 0 -0.03	R1 mm	R2 mm	Lc mm	L1 mm	D1 mm	Uncoated Bright	AlCrN FX	AlTiXN+ZrN SX
IMP10-Q139FX100010R20	10	20	0.6	10	16	9.7	●	○	○
IMP12-Q139FX120012R24	12	24	0.72	12	19	11.7	●	○	○
IMP16-Q139FX160016R32	16	32	0.96	16	24	15.5	●	○	○
IMP20-Q139FX200020R40	20	40	1.2	20	30	19.5	●	○	○



Code No.	D1 mm	L1 mm	DHTA mm	L mm	d h6	Stock	Cutter	Torque Wrench
IMP10S10070000	10	-	-	70	10	•	IMP10·····	IMP10-TW
IMP10S10090000	10	-	-	90	10	•	IMP10·····	IMP10-TW
IMP10S10110000	10	-	-	110	10	•	IMP10·····	IMP10-TW
IMP12S12080000	12	-	-	80	12	•	IMP12·····	IMP12-TW
IMP12S12100000	12	-	-	100	12	•	IMP12·····	IMP12-TW
IMP12S12130000	12	-	-	130	12	•	IMP12·····	IMP12-TW
IMP16S16090000	16	-	-	90	16	•	IMP16·····	IMP16-TW
IMP16S16120000	16	-	-	120	16	•	IMP16·····	IMP16-TW
IMP16S16150000	16	-	-	150	16	•	IMP16·····	IMP16-TW
IMP20S20100000	20	-	-	100	20	•	IMP20·····	IMP20-TW
IMP20S20140000	20	-	-	140	20	•	IMP20·····	IMP20-TW
IMP20S20180000	20	-	-	180	20	•	IMP20·····	IMP20-TW
IMP25S25110000	25	-	-	110	25	•	IMP25·····	IMP25-TW
IMP25S25160000	25	-	-	160	25	•	IMP25·····	IMP25-TW
IMP25S25210000	25	-	-	210	25	•	IMP25·····	IMP25-TW

Interchangeable Multi-Purpose End Mill Shanks

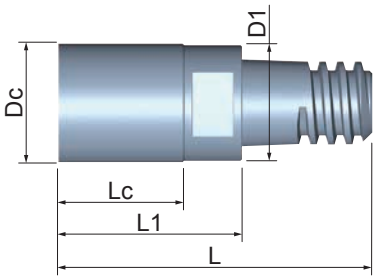




Code No.	D1 mm	L1 mm	DHTA mm	L mm	d h6	Stock	Picture	Cutter	Torque Wrench
IMP10U10070015	9.7	15	-	70	10	○	1	IMP10·····	IMP10-TW
IMP10U10090035	9.7	35	-	90	10	○	1	IMP10·····	IMP10-TW
IMP10U10110055	9.7	55	-	110	10	○	1	IMP10·····	IMP10-TW
IMP10A12110055	9.7	55	1°	110	12	○	2	IMP10·····	IMP10-TW
IMP12U12080018	11.7	18	-	80	12	○	1	IMP12·····	IMP12-TW
IMP12U12100038	11.7	38	-	100	12	○	1	IMP12·····	IMP12-TW
IMP12U12130068	11.7	68	-	130	12	○	1	IMP12·····	IMP12-TW
IMP12A16130068	11.7	68	1°	130	16	○	2	IMP12·····	IMP12-TW
IMP16U16090024	15.5	24	-	90	16	○	1	IMP16·····	IMP16-TW
IMP16U16120054	15.5	54	-	120	16	○	1	IMP16·····	IMP16-TW
IMP16U16150084	15.5	84	-	150	16	○	1	IMP16·····	IMP16-TW
IMP16A20150084	15.5	84	1°	150	20	○	2	IMP16·····	IMP16-TW
IMP20U20100030	19.5	30	-	100	20	○	1	IMP20·····	IMP20-TW
IMP20U20140070	19.5	70	-	140	20	○	1	IMP20·····	IMP20-TW
IMP20U20180110	19.5	110	-	180	20	○	1	IMP20·····	IMP20-TW
IMP20A25180110	19.5	110	1°	180	25	○	2	IMP20·····	IMP20-TW
IMP25U25110038	24.5	38	-	110	25	○	1	IMP25·····	IMP25-TW
IMP25U25160088	24.5	88	-	160	25	○	1	IMP25·····	IMP25-TW
IMP25U25210138	24.5	138	-	210	25	○	1	IMP25·····	IMP25-TW

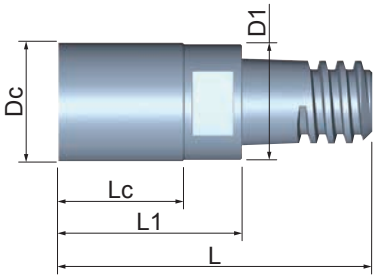
Interchangeable Blank Cutter Heads

Code No.	Dc mm	Lc mm	L1 mm	D1 mm	L mm	Blank MG
IMP10-100010MG	10	10	16	9.7	27	•
IMP12-120012MG	12	12	19	11.7	32	•
IMP16-160016MG	16	16	24	15.5	42	•
IMP20-200020MG	20	20	30	19.5	52	•
IMP25-250025MG	25	25	37.5	24.5	65	•



Interchangeable Blank Cutter Heads

Code No.	Dc mm	Lc mm	L1 mm	D1 mm	L mm	Blank UMG
IMP10-100010UMG	10	10	16	9.7	27	•
IMP12-120012UMG	12	12	19	11.7	32	•
IMP16-160016UMG	16	16	24	15.5	42	•
IMP20-200020UMG	20	20	30	19.5	52	•
IMP25-250025UMG	25	25	37.5	24.5	65	•



Torque Wrench

7leaders® The Art of Cutting

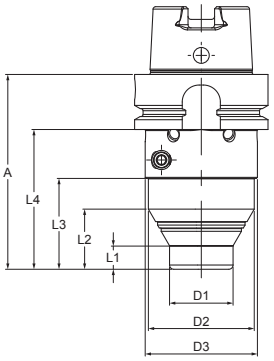
Code No.	Price NT.
TW0525NM	4284

Code No.	Torque (N.m)	Price
IMP10-TW	10	•
IMP12-TW	12	•
IMP16-TW	18	•
IMP20-TW	22	•
IMP25-TW	25	•

APC Made In Germany

HSK

1. 1.Precision Chuck APC, DIN 69893 (ISO 12164) with fine balancing holes 6xM6
2. Easy exchange of tools by setting of hex-key. Maintenance free.
3. Collet with special coating.
4. System-Runout-Accuracy 3µm at 2.5×D.



APC 14

HSK50 A 2 - 14 mm

Code No.	A	L1	L2	L3	L4	D1	D2	D3	Balanced	kg	Stock
HSK50-APC14-101	101	11	28	43	75	30	50	53	20.000 G=2.5	1.1	•
HSK63 A											
HSK63-APC14-92	92	11	28	43	66	30	50	53	20.000 G=2.5	1.3	•

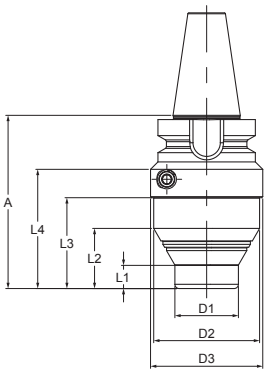
APC 20

HSK50 A 2 - 20 mm

Code No.	A	L1	L2	L3	L4	D1	D2	D3	Balanced	kg	Stock
HSK50-APC20-101	101	20	31	56	75	40	53		20.000 G=2.5	1.1	•
HSK63 A											
HSK63-APC20-92	92	20	31		66	40	53		20.000 G=2.5	1.3	•
HSK100 A											
HSK100-APC20-100	100	18	38	43	71	40	63	70	20.000 G=2.5	3.8	•

BT

1. Precision Chuck APC, ISO 7388-2 (JIS B 6339)
2. Easy exchange of tools by setting of hex-key. Maintenance free.
3. Collet with special coating.
4. System-Runout-Accuracy 3µm at 2.5×D.



APC 14

BT30 2 - 14 mm

Code No.	A	L1	L2	L3	L4	D1	D2	D3	Balanced	kg	Stock
BT30-APC14-82	82	11	28	43	56	30	50	53	20.000 G=2.5	0.9	•
BT40											
BT40-APC14-70	70	11	28		43	30	50		20.000 G=2.5	1.2	•

APC 20

BT30 2 - 20 mm

Code No.	A	L1	L2	L3	L4	D1	D2	D3	Balanced	kg	Stock
BT30-APC20-82	82	20	31		56	40	53		20.000 G=2.5	0.9	•
BT40											
BT40-APC20-70	70	18	38			40	63		20.000 G=2.5	1.4	•
BT50											
BT50-APC20-81	81	18	38		43	40	63		20.000 G=2.5	4.2	•

APC 20

BT40 2 - 20 mm

Code No.	A	L1	L2	L3	L4	D1	D2	D3	Balanced	kg	Stock
BT40-APC20-120	120	48	68			40	63		20.000 G=2.5	1.8	•
BT50											
BT50-APC20-131	131	48	68		93	40	63		20.000 G=2.5	4.6	•

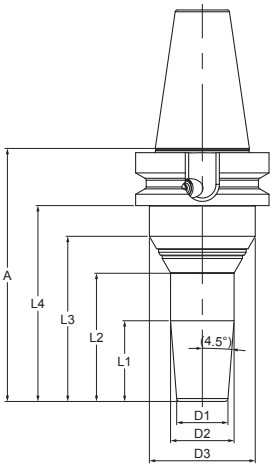
APC 25

BT50 16 - 32 mm

Code No.	A	L1	L2	L3	L4	D1	D2	D3	Balanced	kg	Stock
BT50-APC25-121	121				83	70			20.000 G=2.5	4.6	•

BT AXIS-5

1. Precision Chuck APC, ISO 7388-2 (JIS B 6339)
2. Slim line with 4.5° especially for 5-axis operations. Easy exchange of tools by setting of hex-key. Maintenance free.
3. Collet with special coating.
4. System-Runout-Accuracy 3µm at 2.5×D.



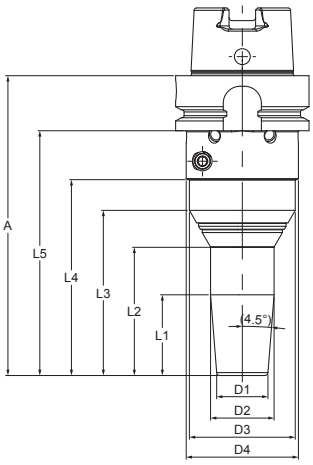
APC 20 Slim5

BT40 Slim5 2 - 20mm

Code No.	A	L1	L2	L3	L4	D1	D2	D3	Balanced	kg	Stock
BT40-APC20S-98	98		44	54	71	32	39	50	20.000 G=2.5	1.5	•
BT40-APC20S-120	120	51	69	78	93	32	40	50	20.000 G=2.5	1.6	•
BT40-APC20S-157	157	51	94	103	129	32	40	50	20.000 G=2.5	2.0	•

HSK AXIS-5

1. Precision Chuck APC, DIN 69893 (ISO 12164) with fine balancing holes 6×M6
2. Slim line with 4.5° especially for 5-axis operations. Easy exchange of tools by setting of hex-key.Maintenance free.
3. Collet with special coating.
4. System-Runout-Accuracy 3µm at 2.5×D.



APC 20 Slim5

HSK63 A Slim5 2 - 20mm

Code No.	A	L1	L2	L3	L4	L5	D1	D2	D3	D4	Balanced	kg	Stock
HSK63-APC20S-120	120		44	54	71	94	32	39	50	53	20.000 G=2.5	1.5	•
HSK63-APC20S-142	142	51	69	78	93	116	32	40	50	53	20.000 G=2.5	1.6	•
HSK63-APC20S-178	178	51	94	103	129	152	32	40	50	53	20.000 G=2.5	2.1	•

Collets APC14

1. Special Coating. Maintenance free. Integrated, fine adjustable length stop.
2. Clamping of tool shanks corresponding to DIN 1835 A, B and DIN 6535 HB, HA.

Peripheral Coolant

d	Code No.	Stock
3.0	APC14-03	●
4.0	APC14-04	●
5.0	APC14-05	●
6.0	APC14-06	●
8.0	APC14-08	●
10.0	APC14-10	●
12.0	APC14-12	●

Coolant 2.0

d	Code No.	Stock
3.0		
4.0		
5.0		
6.0	APC14-06X	○
8.0	APC14-08X	○
10.0	APC14-10X	○
12.0	APC14-12X	○

Pin-Lock for Weldon shanks

d	Code No.	Stock
3.0		
4.0		
5.0		
6.0		
8.0		
10.0		
12.0		

Central Coolant

d	Code No.	Stock
3.0	APC14-03T	○
4.0	APC14-04T	○
5.0	APC14-05T	○
6.0	APC14-06T	○
8.0	APC14-08T	○
10.0	APC14-10T	○
12.0	APC14-12T	○

Collets APC20

1. Special Coating. Maintenance free. Integrated, fine adjustable length stop.
2. Clamping of tool shanks corresponding to DIN 1835 A, B and DIN 6535 HB, HA.

Peripheral Coolant

d	Code No.	Stock
3.0	APC20-03	●
4.0	APC20-04	●
5.0	APC20-05	●
6.0	APC20-06	●
7.0	APC20-07	○
8.0	APC20-08	●
9.0	APC20-09	○
10.0	APC20-10	●
11.0	APC20-11	○
12.0	APC20-12	●
13.0	APC20-13	○
14.0	APC20-14	●
15.0	APC20-15	○
16.0	APC20-16	●
17.0	APC20-17	○
18.0	APC20-18	●
20.0	APC20-20	●

Coolant 2.0

d	Code No.	Stock
3.0		
4.0		
5.0		
6.0	APC20-06X	○
7.0		
8.0	APC20-08X	○
9.0		
10.0	APC20-10X	○
11.0		
12.0	APC20-12X	○
13.0		
14.0	APC20-14X	○
15.0		
16.0	APC20-16X	○
17.0		
18.0		
20.0		

Pin-Lock for Weldon shanks

d	Code No.	Stock
3.0		
4.0		
5.0		
6.0	APC20-06PL	●
7.0		
8.0	APC20-08PL	●
9.0		
10.0	APC20-10PL	●
11.0		
12.0	APC20-12PL	●
13.0		
14.0	APC20-14PL	●
15.0		
16.0	APC20-16PL	●
17.0		
18.0		
20.0		

Central Coolant

d	Code No.	Stock
3.0	APC20-03T	●
4.0	APC20-04T	●
5.0	APC20-05T	●
6.0	APC20-06T	●
7.0	APC20-07T	●
8.0	APC20-08T	●
9.0	APC20-09T	●
10.0	APC20-10T	●
11.0	APC20-11T	●
12.0	APC20-12T	●
13.0	APC20-13T	●
14.0	APC20-14T	●
15.0	APC20-15T	●
16.0	APC20-16T	●
17.0	APC20-17T	○
18.0	APC20-18T	○
20.0	APC20-20T	○

Collets APC25

1. Special Coating. Maintenance free. Integrated, fine adjustable length stop.
2. Clamping of tool shanks corresponding to DIN 1835 A, B and DIN 6535 HB, HA.

Peripheral Coolant

d	Code No.	Stock
16.0	APC25-16	●
18.0	APC25-18	●
20.0	APC25-20	●
22.0	APC25-22	○
25.0	APC25-25	●
32.0	APC25-32	○

Pin-Lock for Weldon shanks

d	Code No.	Stock
16.0	APC25-16PL	●
18.0	APC25-18PL	●
20.0	APC25-20PL	●
22.0		
25.0		
32.0		

MQL

HSK63A/HSK100A

d	Code No.	Stock
4-6	T-1C/T-2C	○
8	T-1C/T-2C	○
10	T-1C/T-2C	○
12	T-1C/T-2C	○
14	T-1C/T-2C	○
16	T-1C/T-2C	○

Spanner

SP13902S

Code No.	Stock
SP13902S	●

Technical Data - Materials

	Materials Groups		N/mm2	HB	JIS	DIN
P	GR.1	Non-alloyed Steel	≦700	≦210	SS330 SS400 SS490 S10C S15C S20C S25C S30C S35C S40C S45C S50C S55C S58C SUM22 SUM22L SUM24 SUM25 SK3 SUP4	RST37-1 St37-3 St37-2 9SMn28 9SMnPb28 9SMnPb36 Ck15 Ck25 CK30 Ck45 Cf53C10 C15 C20 C22C35 C45 C55 C60 Ck55 Ck60 C105W1 C105W1
	GR.2	<24HRC Low-alloyed Steel	700-1000	210-300	SCR415 SCR420 SCR430 SCR440 SCR445 SCM420 SCM415 SCM430 SCM440 SK1 SK2 SK3 SK5 SK6 SK7	St.44-2 St.52-3 100Cr6 21NiCrMo2 40NiCrMo22 17CrNiMo6 15Cr3 42Cr3 55Cr3 15CrMo5 36NiCr6 14NiCr10 34Cr4 41Cr4 16MnCr5 25CrMo4 34CrMo4 41CrMo4 42CrMo4 32CrMo12 50CrV4 41CrAlMo7 100Cr6 105WCr6
	GR.3	<30HRC Hi-alloyed Steel	>1000	>300	SKD1 SKD2 SKD3 SKD4 SKD11 SKD12 SKD61 P20 P21 P30 SUP3 SUP4 SUP6 SUP3 SUP6 SUP7 SUP9 SUP10 SKH2 SKH3 SKH52 SKH55	X210Cr12 X40CrMoV5 1 X100CrMoV5 1 X210CrW12 45WCrV7 X30WCrV9 3 X30WCrV9 3KU X165CrMoV12 X45GrSi93 S6-5-2 S6/5/2 S6/5/2/5 S2/9/2 X210Cr12 G
H	GR.4	30~38HRC Hardened Steel				
	GR.5	38~48HRC Hardened Steel				
	GR.6	48~56HRC Hardened Steel				
	GR.7	56~68HRC Hardened Steel				
M	GR.8	Stainless Steel	500~ 950	250~320	SUS301 SUS302 SUS303 SUS304 SUS316 SUS321 SUS410 SUS416 SUS420 SUS420J2 SUS430 SUS431 SUS440	X12CrNi17-7 X12CrNi18-8 X10CrNiS18-9 X5CrNi18-10 X5CrMo17-12-2 X6CrNiTi18-10 X10Cr13 X12CrS13 X30Cr13 X12CrMoS17 X20CrNi17-2 X65CrMo14
K	GR.9	Cast Iron		180-280	FC100 FC150 FC200 FC250 FC300 FC350 FCD400 FCD500 FCD600 FCD700 FCMB310 FCMW330 FCMW370 FCMP490 FCMP540 FCMP590 FCMP690	GG10 GG15 GG20 GG25 GG30 GG35 GGG40 GGG50 GGG60 GGG70 GTS-35 GTS-45 GTS-55 GTS-65 GTS65-02 GTS-70-02
N	GR.10	Aluminium		Si<10%	A1050 A1080 A2014 A3003 A5052 A6061 A7075 MP1	A199 ,5 A199.8 AlMnCu AlCuSiMn AiMgSiCu AlZnMgCu4.5 MgAl3Zn G-AlSi5Mg
				Si10%>	A1050 A1080 A2014 A3003 A5052 A6061 A7075 MP1	GD-AlSi12 GD-AlSi10Mg G-AlSi10Mg AlSi17C4 AlSi21CuNiMg AlSi25CuNiMg
	GR.11	Copper		<250	C1220P C3710P C2400P C5210P C3602BE C3601BE C3604BE C3771BE C4622BE C4430P C6711P BC3 BC6	CuZn36Pb3 CuZn39Pb2 CuZn39Pb3 CuZn40Pb2 CuZn28Sn1 CuZn38Si1 CuZn15 CuZn36 CuZn40 ZCuZn10Zn2 CuAl5 CuAl8Fe3 CuAl10Ni5Fe4 CuBe2F40 CuSi3Mn G-CuSn5ZnPb G-CuSn10Zn
				>250	C1700P C1720P C5212P C6782BE	CuBe1.7 F55 CuBe1.7 F110 CuBe2 F70 CuBe2 F125 CuZn40A11 CuAl11Ni6Fe5 AMPCO 20
	GR.12	Plastics			PP PS POM PC PA PMMA TFE CTFE	
	GR.13	FRP CFRP Composite Material			GFK KFK AFK	
	GR.14	Graphite				
S	GR.15	Titanium	700~ 1250	210~370	TP(TR)270H© TP(TR)340H© TP(TR)550H(C) TP(TR)480H© TP(TR)270Pd© TP(TR)340Pd TP(TR)550Pd© TP(TR)480Pd© TAP6400	Ti 1 Ti 2 Ti 3 Ti 4 Ti 1 Pd Ti 2 Pd Ti 3 Pd Ti99.7 Ti99.8 TiAl6V4 TiAl6V4ELI TiAl5Sn2.5 TiAl4Mo4Sn4Si0.5 TiCu2
	GR.16	Nickel	900~ 1200	260~350	Incoloy 800 Incoloy825 I Inconel 400 nconel 625 Inconel 600 Inconel 700 Inconel 713 Inconel 718 Haynes 600 Hastelloy C Nimocast PD36 Nimonic PE13 Nimonic 901 Nimonic 75 Rene 95 ,Monet400, Mar-M432, Waspaloy ,Jessop G64 AirResist213 Jetalloy209	
	GR.17	High Temp Alloys	900- 1400	210-400	SUH309 SUH310 SUH330 SUH1 SUH31 SUH35 SUH321 SUH430 SUH420J1	X15CrNiSi20-12 X15CrNiSi25-20 X45CrSi9-3 X45CrNiW18-9 X53CrMnNiN21-9 X10CrNiTi18-9 X6Cr17 X20Cr13

AISI/SAE	BS	GB
1010 1015 1020 1025 1030 1035 1040 1045 1050 1055 1060 W1 W210 1213 12L13 12L14	230M07 080M15 060A35 080M46 060A35 080M46 060A52 070M55 080A62 070M55 080 A 62 060A 96 BW 1A BW2	Q215AF Q235A~D 10 15 20 25 30 35 40 45 50 55 60 Y12 Y15pb
9840 4340 5132 5140 5115 4130 4137, 4135 4140, 4142 4140 L3 L6 ASTM A350LF5 8620 8740 5010 5140 5155 9262 52100	708M40 708M40 722M24 735A50 805M20 311-TYPE7 820A16 523M15 527A60 534 A99 4360 43C 4360 50B	15Cr 20Cr 30Cr 40Cr 45Cr 20CrMo 15CrMo 30CrMo 42CrMo
D3 H13 A2 S1 H21 HW3 D3 M2 M35 M7 HNV3	BD3 BH13 BA2 BS1 BH21 401S45 4959BA2 BM2 BM35	Cr12 C12MoV Cr12MoV1 CrMo1v 4Cr5MoSiV1 W18Cr4V W18Cr4V5Co5 W6Mo5Cr4V2Co5 W6MoCr4V3 55CrMnA 85 60Si2Mn 50CrVa
AISI301 AISI302 AISI303 AISI304 AISI316 AISI321 AISI410 AISI416 AISI420 AISI430 AISI431 AISI440	430S15 410S21 420S45 431S29 430S17 304S11 303S21 304C12 321S12 316S16 317S12 403S17	1Cr17Ni7 1Cr18Ni9 Y1Cr18Ni9 0Cr18Ni9 0Cr17Ni12Mo2 0Cr18Ni11Ti 1Cr13 Y1Cr13 3Cr13 1Cr17 7Cr17 2Cr13 Y3Cr13
No20B No25B No30B No35B No45B No50B 60-40-18 80-55-06 A43D2 100-70-03 32510 40010 50005 70003 A220-70003 A220- 80002	Grade150 Grade220 Grade260 Grade300 Grade350 Grade400 SNG420/12 SNG500/7 SNG600/3 SNG700/2 8290/6 B340/12 P440/7 P510/4 P570/3 P690/2	HT-100 HT-150 HT-200 HT-250 HT-300 HT350 QT400-15 QT450-10 QT500-7 QT600-3 QT700-2 KTH-330-08 KTZ-450-06 KTZ-550-04 KTZ-700- 02
2014 3003 5052 6061 7075 AZ31C A296.0 A331.1	LM4 LM12 LM16 LM21 LM22 LM24 LM25 LM27	L1 L3 LD10 LF2 LF21 LD2 LC4 LC9
S12A SC84A SC102A AA336 A332 B26M520.0	LM5 LM6 LM9 LM13 LM28 LM29 LM30	ZL104 Y104 Y102 ZL102 ZL301
C36000 C37700 C44300 C46200 C83600 C90500 CT-00 10-N 75Cu-5Al 77CU-15Pb-7Sn-1Fe 1C Am CDA544 CDA65600	CA104 CZ121 CZ122 CZ108 CZ114 CDA544 CDA65600 CDA656	ZCuSn5Pb5Zn5 G-CuSn10Z HPb 61-1 HPb 59-1 HSn 62-1
C17000 C17200		QBe1.7 QBe2 HAl 60-1-1
AMS R54520 AMS R56400 AMS R56401 Gr.1 Gr.2 Gr.3 Gr.4 Gr.11 Gr.7 Gr.5	TA14/17 TA10-13 TA28 TA11	TA0 TA1 TA2 TA3 TA9 TC4
AISI309 AISA310 HNV3 EV9 AISI321 AISI430 AISI420	330C11 Hr5.203-4 3146-3 HR8 3072-76 Hr401.601	2Cr23Ni13 2Cr25Ni20 4Cr9Si2 5Cr21Mn9Ni4N 0Cr18Ni11Ti 1Cr17 2Cr13

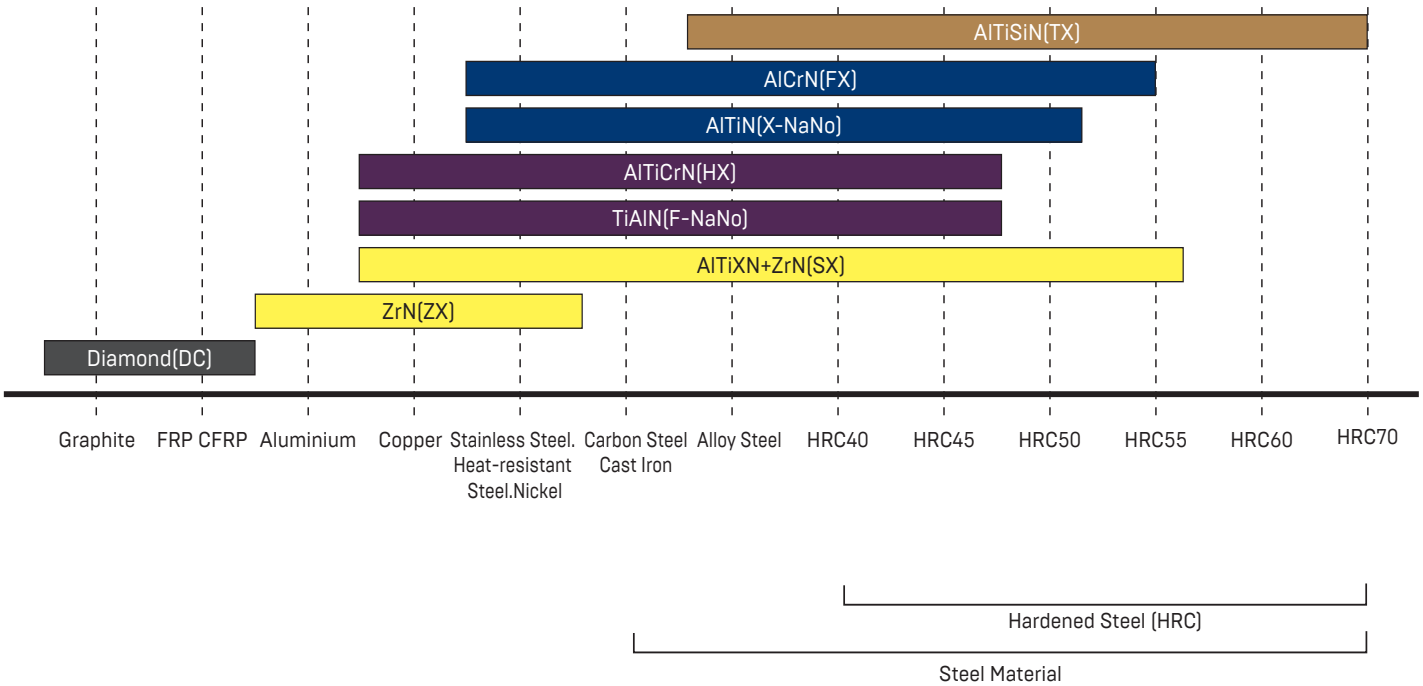
Features of Coating

7leaders® The Art of Cutting

Type	Color	(HV) Hardness	(μm) Thickness	Coefficient of Friction	(°C) Heat resistance	Cutting Tools Material	Application
AlTiSiN (TX)	Tan	4300	1~3	0.3	1200	Solid Carbide	Hardened steel HRC<70
AlCrN (FX)	Blue black	3800	1~3	0.3	1100	Solid Carbide	Carbon steel, Alloyed steel, Hardened steel, Cast iron HRC<55
AlTiXN+ZrN (SX)	Yellow brown	3800	1~4	0.4	800	Solid Carbide	Carbon steel, Alloyed steel, Stainless steel, Cast iron HRC<56
AlTiCrN (HX)	Purple black	3800	1~4	0.25	800	Solid Carbide	Carbon steel, Alloyed steel, Stainless steel, Cast iron HRC<48
ZrN (ZX)	Yellow brown	2800	1~4	0.5	550	Solid Carbide	Aluminium, Copper, Stainless steel, Titanium, Hard-cut material
Diamond (DC)	Black	9000	6~13	0.15	600	Solid Carbide	Graphite
TiN (N)	Golden	2400	1~7	0.35	600	HSS	General steel, Wear parts
TiCN (C)	Blue gray	2800	1~4	0.2	400	HSS	General steel, Wear parts

Usage of each coating for Milling Steel

Cutting Tools Material:Solid Carbide



ϕ mm	<3	3-6	6-10	10-18	18-30	30-50	50-65	65-80
e7	- 14 - 24	- 20 - 32	- 25 - 40	- 32 - 50	- 40 - 61	- 50 - 75	- 60 - 90	- 60 - 90
e8	- 14 - 28	- 20 - 38	- 25 - 47	- 32 - 59	- 40 - 73	- 50 - 89	- 60 - 106	- 60 - 106
e9	- 14 - 39	- 20 - 50	- 25 - 61	- 32 - 75	- 40 - 92	- 50 - 112	- 60 - 134	- 60 - 134
h5	0 - 4	0 - 5	0 - 6	0 - 8	0 - 9	0 - 11	0 - 13	0 - 13
h6	0 - 6	0 - 8	0 - 9	0 - 11	0 - 13	0 - 16	0 - 19	0 - 19
h7	0 - 10	0 - 12	0 - 15	0 - 18	0 - 21	0 - 25	0 - 30	0 - 30
h8	0 - 14	0 - 18	0 - 22	0 - 27	0 - 33	0 - 39	0 - 46	0 - 46
h9	0 - 25	0 - 30	0 - 36	0 - 43	0 - 52	0 - 62	0 - 74	0 - 74
h10	0 - 40	0 - 48	0 - 58	0 - 70	0 - 84	0 - 100	0 - 120	0 - 120
h11	0 - 60	0 - 75	0 - 90	0 - 110	0 - 130	0 - 160	0 - 190	0 - 190
h16	0 - 600	0 - 750	0 - 900	0 - 1100	0 - 1300	0 - 1600	0 - 1900	0 - 1900
js14	+ 125 - 125	+ 150 - 150	+ 180 - 180	+ 215 - 215	+ 260 - 260	+ 310 - 310	+ 370 - 370	+ 370 - 370
js16	+ 300 - 300	+ 375 - 375	+ 450 - 450	+ 550 - 550	+ 650 - 650	+ 800 - 800	+ 950 - 950	+ 950 - 950
k11	+ 60 0	+ 75 0	+ 90 0	+ 110 0	+ 130 0	+ 160 0	+ 190 0	+ 190 0
k12	+ 100 0	+ 120 0	+ 150 0	+ 180 0	+ 210 0	+ 250 0	+ 300 0	+ 300 0
m6	+ 8 + 2	+ 12 + 4	+ 15 + 6	+ 18 + 7	+ 21 + 8	+ 25 + 9	+ 30 + 11	+ 30 + 11
m7	+ 12 + 2	+ 16 + 4	+ 21 + 6	+ 25 + 7	+ 29 + 8	+ 34 + 9	+ 41 + 11	+ 41 + 11
z9	+ 51 + 26	+ 65 + 35	+ 78 + 42	+ 103 + 60	+ 140 + 88	+ 198 + 136	+ 246 + 172	+ 284 + 210
H5	+ 4 0	+ 5 0	+ 6 0	+ 8 0	+ 9 0	+ 11 0	+ 13 0	+ 13 0
H6	+ 6 0	+ 8 0	+ 9 0	+ 11 0	+ 13 0	+ 16 0	+ 19 0	+ 19 0
H7	+ 10 0	+ 12 0	+ 15 0	+ 18 0	+ 21 0	+ 25 0	+ 30 0	+ 30 0
H8	+ 14 0	+ 18 0	+ 22 0	+ 27 0	+ 33 0	+ 39 0	+ 46 0	+ 46 0
H9	+ 25 0	+ 30 0	+ 36 0	+ 43 0	+ 52 0	+ 62 0	+ 74 0	+ 74 0
H10	+ 40 0	+ 48 0	+ 58 0	+ 70 0	+ 84 0	+ 100 0	+ 120 0	+ 120 0
H11	+ 60 0	+ 75 0	+ 90 0	+ 110 0	+ 130 0	+ 160 0	+ 190 0	+ 190 0
P6	- 6 - 12	- 9 - 17	- 12 - 21	- 15 - 26	- 18 - 31	- 21 - 37	- 26 - 45	- 26 - 45
P7	- 6 - 16	- 8 - 20	- 9 - 24	- 11 - 29	- 14 - 35	- 17 - 42	- 21 - 51	- 21 - 51
P9	- 6 - 31	- 12 - 42	- 15 - 51	- 18 - 61	- 22 - 74	- 26 - 88	- 32 - 106	- 32 - 106

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