Tooling News No.557

SUMITOMO

CARBIDE - CBN - DIAMOND

Global Support, Global Solutions.

Endmills for Aerospace Parts

Diamond Coated Endmills for CFRP AVIX series

Rev. 2

The ultimate in CFRP machining

Realizes high-efficiency, high-quality CFRP machining through
a complex cross-nicked edge shape and radical diamond coating.

For High-efficiency Milling

AVIX series

For Milling of Thin Plates

Expansion **AVIX-F type**

P M K N S H

SUMITOMO ELECTRIC GROUP

AVIX series

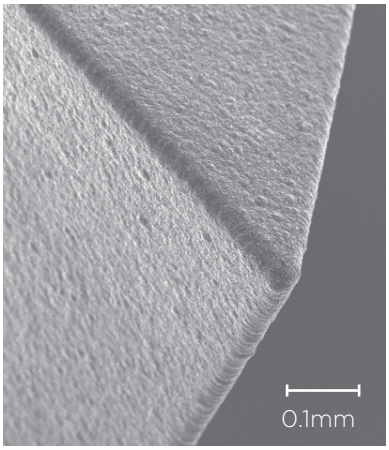
■ Features

- The use of a complex cross-nicked edge shape reduces cutting force and realizes stability in high-efficiency machining
- Sharp cutting edge and uniform coating thickness along the cutting edge length realize high quality and long tool life

■ Complex Cross-nicked Shape

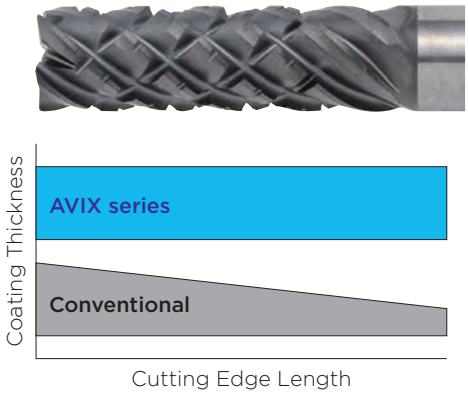
Variably sized nicked cutting edge shape realizes stable machining with low resistance

■ Sharp Cutting Edge



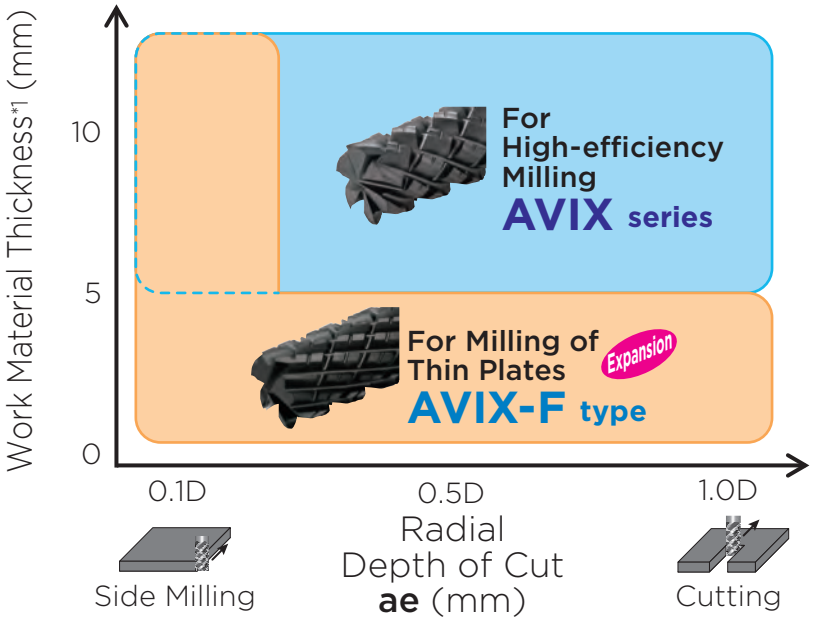
New coating process provides high quality sharp cutting edges

■ Diamond Coating with Uniform Thickness



Uniform coating thickness realizes stable tool life

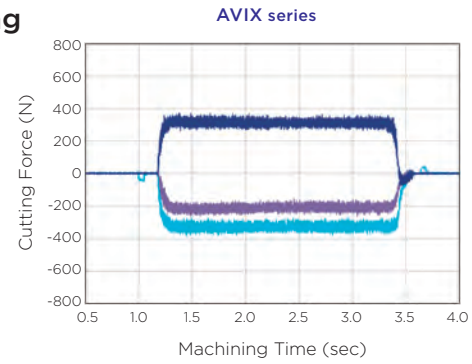
■ Application Range

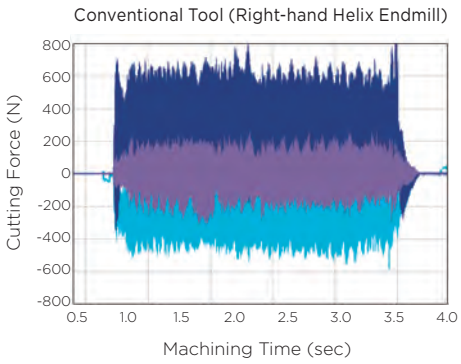


*1: Recommended work material thickness at cutting is 1.0D or below for AVIX series and 0.5D or below for AVIX-F type

■ Cutting Performance

For High-efficiency Milling
AVIX series





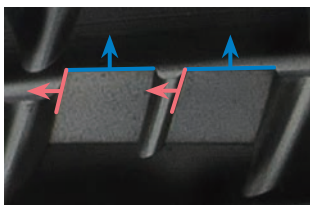
Work Material: CFRP (Thickness 9.5mm)
Tool: AVIX510000-R03 (Tool Diameter ø10, 5 flutes)
Cutting Conditions: vc = 200m/min, vf = 2,000mm/min, Dry, Cutting

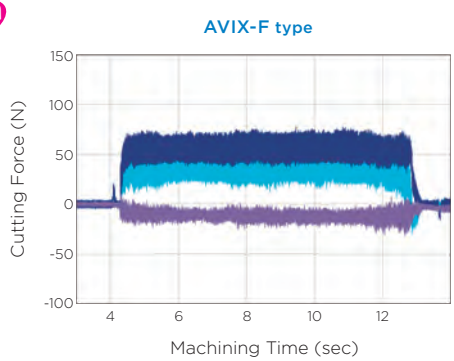
Suppresses chatter to realize stable machining

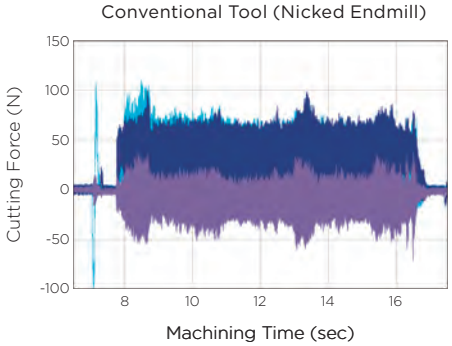
For Milling of Thin Plates
AVIX-F type

Expansion

Main cutting edge (upward force) and sub-cutting edge (downward force) form a complex cutting edge shape which suppresses work material vibration







Work Material: CFRP (Thickness 2mm)
Tool: AVIX1210000F (Tool Diameter ø10, 12 flutes)
Cutting Conditions: vc = 250m/min, vf = 1,000mm/min, ap = 2.0mm, Dry, Cutting

Suppresses work material vibration to realize stable machining even with thin plates

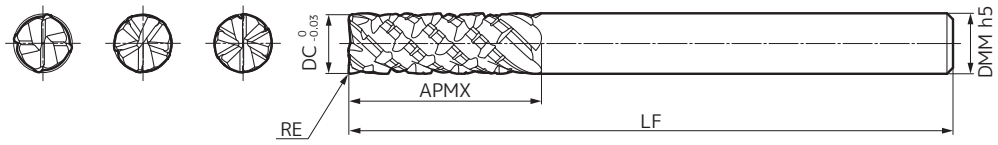
AVIX series

Graphite CFRP

SUMIDIA Coat | Sharp Corner | 45° Helix Angle | Shoulder Milling | Groove Milling | Groove Finishing | Cut Through | Face Milling | Spot Facing | Helical Milling | Ramping

*For h5 tolerance, refer to Chapter N "References" in the General Catalogue.

Fig 1 Fig 2 Fig 3



■ Body

Dimensions (mm)

	Cat. No.	Stock	Dia. DC	Corner Radius RE	Cutting Edge Length APMX	Overall Length LF	Shank Dia. DMM	No. of Flutes	Bottom Cutting Edge	Fig
Metric	**AVIX 404000-R03**	●	4.0	0.3	12	60	4.0	4	4	1
	506000-R03	●	6.0	0.3	18	70	6.0	5	5	2
	508000-R03	●	8.0	0.3	24	80	8.0	5	5	2
	510000-R03	●	10.0	0.3	30	80	10.0	5	5	2
	612000-R03	●	12.0	0.3	36	90	12.0	6	6	3
Inch	**AVIX 403175-R03**	●	3.175	0.3	10	60	3.175	4	4	1
	506350-R03	●	6.35	0.3	19	70	6.35	5	5	2
	509525-R03	●	9.525	0.3	28	80	9.525	5	5	2
	612700-R03	●	12.7	0.3	38	90	12.7	6	6	3

Grade: DCT30X

■ Identification Code

AVIX **6** **12000** - **R03**

Series Code	No. of Flutes	Dia.	Corner Radius

■ Recommended Cutting Conditions

Work Material	CFRP		
Cutting Conditions	Dry		
DC(mm)	Spindle Speed (min^{-1})	Cutting Speed vc (m/min)	Feed Rate f (mm/rev)
4.0	12,000	150	0.08 to 0.17
6.0	10,600	200	0.09 to 0.19
8.0	8,000	200	0.13 to 0.25
10.0	6,400	200	0.16 to 0.31
12.0	5,300	200	0.19 to 0.38
3.175	12,000	120	0.08 to 0.17
6.35	10,000	200	0.10 to 0.20
9.525	6,700	200	0.15 to 0.30
12.7	5,000	200	0.20 to 0.40
Depth of Cut ap	For cutting, 1.0D or below		

1. If cutting noise and vibration occur, please reduce the cutting conditions accordingly.
2. If the machine cannot achieve the recommended spindle speed, please use the maximum spindle speed available.

● mark: Standard stocked item

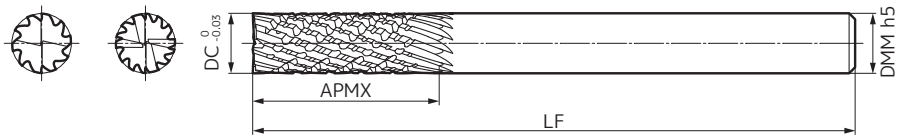
AVIX-F type Expansion

Graphite CFRP

SUMIDIA Coat | Sharp Corner | 20° Helix Angle | Shoulder Milling | Groove Milling | Groove Finishing | Cut Through | Face Milling | Spot Facing | Helical Milling | Ramping

*For h5 tolerance, refer to Chapter N "References" in the General Catalogue.

Fig 1 Fig 2



■ Body

Dimensions (mm)

	Cat. No.	Stock	Dia. DC	Cutting Edge Length APMX	Overall Length LF	Shank Dia. DMM	No. of Flutes	Bottom Cutting Edge	Fig
Metric	**AVIX 604000F**	●	4.0	12	60	4.0	6	2	1
	806000F	●	6.0	18	70	6.0	8	2	1
	1008000F	●	8.0	24	80	8.0	10	2	1
	1210000F	●	10.0	30	80	10.0	12	4	2
	1412000F	●	12.0	36	90	12.0	14	4	2
Inch	**AVIX 603175F**	●	3.175	10	60	3.175	6	2	1
	806350F	●	6.35	19	70	6.35	8	2	1
	1209525F	●	9.525	28	80	9.525	12	4	2
	1412700F	●	12.7	38	90	12.7	14	4	2

Grade: DCT30X

■ Identification Code

AVIX Series Code | **14** No. of Flutes | **12000F** Dia.

■ Recommended Cutting Conditions

Work Material	CFRP		
Cutting Conditions	Dry		
DC(mm)	Spindle Speed (min⁻¹)	Cutting Speed vc (m/min)	Feed Rate f (mm/rev)
4.0	12,000	150	0.08 to 0.17
6.0	10,600	200	0.09 to 0.19
8.0	8,000	200	0.13 to 0.25
10.0	6,400	200	0.16 to 0.31
12.0	5,300	200	0.19 to 0.38
3.175	12,000	120	0.08 to 0.17
6.35	10,000	200	0.10 to 0.20
9.525	6,700	200	0.15 to 0.30
12.7	5,000	200	0.20 to 0.40
Depth of Cut ap	For cutting, 0.5D or below		

1. If cutting noise and vibration occur, please reduce the cutting conditions accordingly.
2. If the machine cannot achieve the recommended spindle speed, please use the maximum spindle speed available.

● mark: Standard stocked item (new product/expanded item)

■ Application Examples

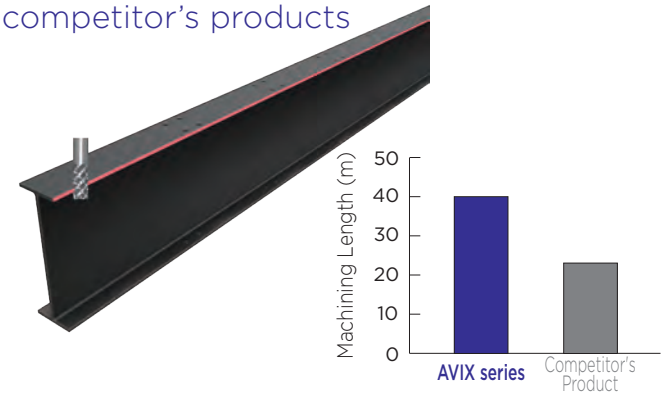
CFRP Aerospace Component (Cutting)

Achieves 3 times higher machining efficiency than conventional tools

Tool: AVIX510000-R03 (ø10, 5 flutes)
Work Material: CFRP (Thickness 12.7mm)
Cutting Conditions: vc = 200m/min, vf = 2,000mm/min (Conventional Tool: 600mm/min), ap = 12.7mm, Dry

CFRP Aerospace Component (Trimming)

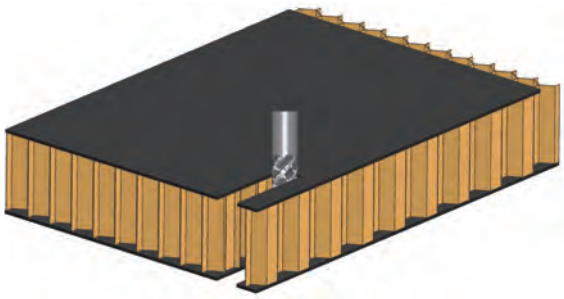
Achieves 1.7 times higher tool life than competitor's products



Tool: AVIX506000-R03 (ø6, 5 flutes)
Work Material: CFRP (Thickness 6.35mm)
Cutting Conditions: vc = 200m/min, vf = 2,000mm/min, ap = 6.35mm, ae = 1mm, Dry, Up Cutting

CFRP Honeycomb Aerospace Component (Cutting)

Achieves 4 times higher machining efficiency than conventional tools



Tool: AVIX506000-R03 (ø6, 5 flutes)
Work Material: CFRP/Honeycomb
Cutting Conditions: vf = 1,000mm/min (Conventional Tool: 250mm/min), Cutting

AVIX-F type Expansion

■ Application Examples

CFRP Aerospace Component (Cutting)

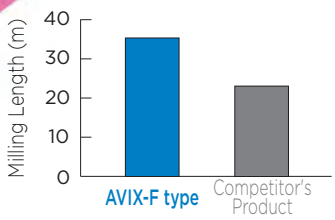
Achieves 4 times higher machining efficiency with high-efficiency conditions against conventional tools and reduced milling passes

	AVIX-F type	Conventional Tool
No. of Passes	Cutting x 1 pass	Cutting x 1 pass Side Milling x 1 pass

Tool: AVIX806000F (ø6, 8 flutes)
Work Material: CFRP (Thickness 2mm)
Cutting Conditions: vc = 170m/min, vf = 1,000mm/min (Conventional Tool: 500mm/min)
Cutting

CFRP Aerospace Component (Side Milling)

Achieves 1.5 times higher tool life than competitor's products



Tool: AVIX806000F (ø6, 8 flutes)
Work Material: CFRP (Thickness 6.35mm)
Cutting Conditions: vc = 150m/min, vf = 500mm/min (Conventional Tool: 200mm/min)
Side Milling

< SAFETY NOTES >

- Very hot or lengthy chips may be discharged while the machine is in operation. Therefore, machine guards, safety goggles or other protective covers must be used. Fire safety precautions must also be considered.
- Please handle with care as this product has sharp edges.
- Improper cutting conditions or mis-handling of the tool may result in breakages or projectiles. Therefore, please use the tool within its recommended conditions.
- When using non-water soluble cutting oil, precautions against fire must be taken and please ensure that a fire extinguisher is placed near the machine.

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