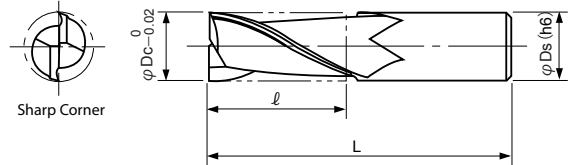


## Solid Carbide End Mill for Aluminium

## AL-SEES2TYPE

- 2 flutes, Helix angle 45°
- Regular flute length



Cat.No.	Stock	Dimensions (mm)			
		$\varphi Dc$	$\ell$	L	$\varphi Ds$
AL-SEES2010	●	1	2.8	40	3
AL-SEES2015	●	1.5	4.4	40	4
AL-SEES2020	●	2	7	40	4
AL-SEES2025	●	2.5	9	40	4
AL-SEES2030	●	3	11	50	6
AL-SEES2035	□	3.5	12	50	6
AL-SEES2040	●	4	14	50	6
AL-SEES2045	●	4.5	16	50	6
AL-SEES2050	●	5	17	55	6
AL-SEES2060	●	6	17	55	6
AL-SEES2070	●	7	22	65	8
AL-SEES2080	●	8	22	65	8
AL-SEES2090	●	9	22	70	10
AL-SEES2100	●	10	28	75	10

Cat.No.	Stock	Dimensions (mm)			
		$\varphi Dc$	$\ell$	L	$\varphi Ds$
AL-SEES2120	●	12	28	80	12
AL-SEES2130	□	13	35	85	12
AL-SEES2140	●	14	40	95	16
AL-SEES2150	●	15	40	95	16
AL-SEES2160	●	16	40	95	16
AL-SEES2180	●	18	45	115	20
AL-SEES2200	●	20	45	115	20
AL-SEES2250	●	25	55	130	25

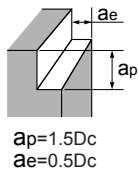
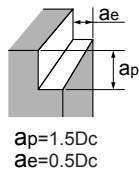
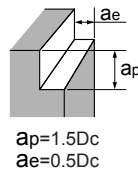
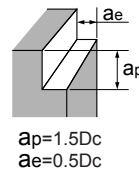
Note) Please refer to page D015-D018 for recommended cutting conditions.

## Solid Carbide End Mill for Aluminium

## AL-SEES2TYPE

## RECOMMENDED CUTTING CONDITIONS FOR AL-SEES2 TYPE

## (1) Shoulder Milling

Work Materials	Aluminium alloy (A5052)		Aluminium alloy (A7075)		Cast aluminium alloy (Up to 13% Si)		Copper alloy (C1100)	
Type of Machining								
Tool dia. $\varphi Dc$ (mm)	Spindle speed n (min <sup>-1</sup> )	Feed speed Vf (mm/min)	Spindle speed n (min <sup>-1</sup> )	Feed speed Vf (mm/min)	Spindle speed n (min <sup>-1</sup> )	Feed speed Vf (mm/min)	Spindle speed n (min <sup>-1</sup> )	Feed speed Vf (mm/min)
0.4	32,000	380	32,000	380	32,000	380	32,000	380
0.5	32,000	480	32,000	480	32,000	480	32,000	480
0.75	32,000	700	32,000	700	32,000	700	32,000	700
1	32,000	900	32,000	900	32,000	900	32,000	900
1.5	32,000	1,400	32,000	1,400	32,000	1,400	32,000	1,400
2	32,000	1,900	32,000	1,900	32,000	1,900	25,000	1,500
3	24,000	2,200	22,000	2,000	24,000	2,200	17,000	1,500
4	18,000	2,200	16,000	2,000	18,000	2,200	13,000	1,500
5	15,000	2,200	13,000	2,000	15,000	2,200	10,000	1,500
6	12,000	2,200	10,000	2,000	12,000	2,200	8,500	1,500
8	9,000	1,800	8,000	1,600	9,000	1,800	6,500	1,300
10	7,300	1,800	6,000	1,600	7,300	1,800	5,000	1,300
12	6,000	1,800	5,000	1,600	6,000	1,800	4,000	1,300
16	4,500	1,500	4,000	1,400	4,500	1,500	3,000	1,000
20	3,600	1,500	3,000	1,400	3,600	1,500	2,500	1,000
25	3,000	1,500	2,500	1,400	3,000	1,500	2,000	1,000
30	2,500	1,250	2,100	1,050	2,500	1,250	1,700	850

## NOTE

- 1) Use water soluble oil.
- 2) It is important to hold the tool shank at least up to 50-60 mm into any tool holder for rigid holding of the tool.
- 3) In case of ramping, please reduce the cutting parameters by 30%-60% on above table.
- 4) If machine does not have enough spindle speed (RPM), it is recommended to reduce feed speed into same proportion.

## Solid Carbide End Mill for Aluminium

## AL-SEES2TYPE

## RECOMMENDED CUTTING CONDITIONS FOR AL-SEES2 TYPE

## (2) Slotting

Work Materials	Aluminium alloy (A5052)		Aluminium alloy (A7075)		Cast aluminium alloy (Up to 13% Si)		Copper alloy (C1100)	
Type of Machining	 $ap=Dc$ $ae=Dc$		 $ap=Dc$ $ae=Dc$		 $ap=Dc$ $ae=Dc$		 $ap=Dc$ $ae=Dc$	
Tool dia. $\varnothing Dc(mm)$	Spindle speed $n (min^{-1})$	Feed speed $V_f (mm/min)$	Spindle speed $n (min^{-1})$	Feed speed $V_f (mm/min)$	Spindle speed $n (min^{-1})$	Feed speed $V_f (mm/min)$	Spindle speed $n (min^{-1})$	Feed speed $V_f (mm/min)$
0.4	32,000	230	32,000	230	32,000	230	32,000	230
0.5	32,000	290	32,000	290	32,000	290	32,000	290
0.75	32,000	430	32,000	430	32,000	430	32,000	430
1	32,000	570	32,000	570	32,000	570	32,000	570
1.5	32,000	860	32,000	860	32,000	860	29,000	780
2	32,000	1,100	27,000	1,000	32,000	1,100	22,000	800
3	21,000	1,100	18,000	1,000	21,000	1,100	14,000	800
4	16,000	1,100	13,000	1,000	16,000	1,100	11,000	800
5	12,000	1,100	10,000	1,000	12,000	1,100	8,900	800
6	10,000	1,100	9,000	1,000	10,000	1,100	7,400	800
8	8,000	1,100	7,000	1,000	8,000	1,100	5,500	800
10	6,000	1,100	5,500	1,000	6,000	1,100	4,500	800
12	5,000	1,100	4,500	1,000	5,000	1,100	3,700	800
16	4,000	1,000	3,300	800	4,000	1,000	2,700	700
20	3,000	900	2,700	800	3,000	900	2,200	650
25	2,500	900	2,000	700	2,500	900	1,800	650
30	2,000	800	1,800	700	2,000	800	1,500	600

## NOTE

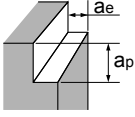
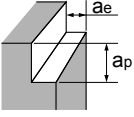
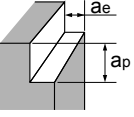
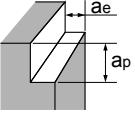
- 1) Use water soluble oil.
- 2) It is important to hold the tool shank at least up to 50-60 mm into any tool holder for rigid holding of the tool.
- 3) In case of ramping, please reduce the cutting parameters by 30%-60% on above table.
- 4) If machine does not have enough spindle speed (RPM), it is recommended to reduce feed speed into same proportion.

## Solid Carbide End Mill for Aluminium

## AL-SEES2TYPE

## RECOMMENDED CUTTING CONDITIONS FOR AL-SEES2 TYPE

## (1) Shoulder Milling / High Speed Machining

Work Materials	Aluminium alloy (A5052)		Aluminium alloy (A7075)		Cast aluminium alloy (Up to 13% Si)		Copper alloy (C1100)	
Type of Machining	 $a_p=1.5D_c$ $a_e=0.3D_c$		 $a_p=1.5D_c$ $a_e=0.3D_c$		 $a_p=1.5D_c$ $a_e=0.3D_c$		 $a_p=1.5D_c$ $a_e=0.3D_c$	
Tool dia. $\varnothing D_c$ (mm)	Spindle speed $n$ (min <sup>-1</sup> )	Feed speed $V_f$ (mm/min)	Spindle speed $n$ (min <sup>-1</sup> )	Feed speed $V_f$ (mm/min)	Spindle speed $n$ (min <sup>-1</sup> )	Feed speed $V_f$ (mm/min)	Spindle speed $n$ (min <sup>-1</sup> )	Feed speed $V_f$ (mm/min)
<b>0.4</b>	50,000	600	50,000	600	50,000	600	50,000	600
<b>0.5</b>	50,000	750	50,000	750	50,000	750	50,000	750
<b>0.75</b>	50,000	1,100	50,000	1,100	50,000	1,100	50,000	1,100
<b>1</b>	50,000	1,500	50,000	1,500	50,000	1,500	50,000	1,500
<b>1.5</b>	50,000	2,200	50,000	2,200	50,000	2,200	50,000	2,200
<b>2</b>	50,000	3,000	50,000	3,000	50,000	3,000	50,000	3,000
<b>3</b>	50,000	4,500	45,000	4,000	50,000	4,500	37,000	3,300
<b>4</b>	40,000	4,500	34,000	4,000	40,000	4,500	27,000	3,300
<b>5</b>	32,000	4,500	27,000	4,000	32,000	4,500	22,000	3,300
<b>6</b>	27,000	4,500	22,000	4,000	27,000	4,500	18,000	3,300
<b>8</b>	20,000	4,000	17,000	3,400	20,000	4,000	14,000	2,800
<b>10</b>	16,000	4,000	13,000	3,200	16,000	4,000	11,000	2,800
<b>12</b>	13,000	3,200	11,000	2,800	13,000	3,200	9,000	2,200
<b>16</b>	10,000	3,000	8,500	2,500	10,000	3,000	7,000	2,100
<b>20</b>	8,000	2,400	7,000	2,100	8,000	2,400	5,500	1,700
<b>25</b>	6,500	2,200	5,500	2,000	6,500	2,200	4,500	1,600
<b>30</b>	5,000	1,800	4,500	1,600	5,000	1,800	3,700	1,300

## NOTE

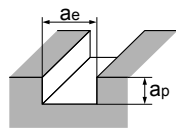
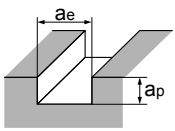
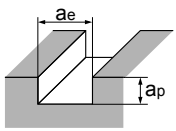
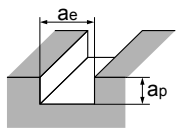
- 1) Use water soluble oil.
- 2) It is important to hold the tool shank at least up to 50-60 mm into any tool holder for rigid holding of the tool.
- 3) In case of ramping, please reduce the cutting parameters by 30%-60% on above table.
- 4) If machine does not have enough spindle speed (RPM), it is recommended to reduce feed speed into same proportion.

## Solid Carbide End Mill for Aluminium

## AL-SEES2TYPE

## RECOMMENDED CUTTING CONDITIONS FOR AL-SEES2 TYPE

## (2) Slotting/ High Speed Machining

Work Materials	Aluminium alloy (A5052)		Aluminium alloy (A7075)		Cast aluminium alloy (Up to 13% Si)		Copper alloy (C1100)	
Type of Machining	 $a_p=0.5D_c$ $a_e=D_c$		 $a_p=0.5D_c$ $a_e=D_c$		 $a_p=0.5D_c$ $a_e=D_c$		 $a_p=0.5D_c$ $a_e=D_c$	
Tool dia. $\varnothing D_c$ (mm)	Spindle speed $n$ (min <sup>-1</sup> )	Feed speed $V_f$ (mm/min)	Spindle speed $n$ (min <sup>-1</sup> )	Feed speed $V_f$ (mm/min)	Spindle speed $n$ (min <sup>-1</sup> )	Feed speed $V_f$ (mm/min)	Spindle speed $n$ (min <sup>-1</sup> )	Feed speed $V_f$ (mm/min)
0.4	50,000	360	50,000	360	50,000	360	50,000	360
0.5	50,000	450	50,000	450	50,000	450	50,000	450
0.75	50,000	670	50,000	670	50,000	670	50,000	670
1	50,000	900	50,000	900	50,000	900	50,000	900
1.5	50,000	1,350	50,000	1,350	50,000	1,350	50,000	1,350
2	50,000	1,800	50,000	1,800	50,000	1,800	48,000	1,700
3	48,000	2,500	40,000	2,100	48,000	2,500	32,000	1,700
4	36,000	2,500	30,000	2,100	36,000	2,500	23,000	1,700
5	28,000	2,500	24,000	2,100	28,000	2,500	19,000	1,700
6	23,000	2,500	20,000	2,100	23,000	2,500	16,000	1,700
8	18,000	2,500	15,000	2,100	18,000	2,500	12,000	1,700
10	14,000	2,500	12,000	2,100	14,000	2,500	9,500	1,700
12	12,000	2,500	10,000	2,100	12,000	2,500	8,000	1,700
16	9,000	2,500	8,000	2,100	9,000	2,500	6,000	1,700
20	7,000	2,100	6,000	1,800	7,000	2,100	4,800	1,400
25	5,700	2,000	4,800	1,700	5,700	2,000	3,800	1,300
30	4,700	1,600	4,000	1,400	4,700	1,600	3,200	1,100

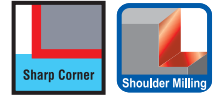
## NOTE

- 1) Use water soluble oil.
- 2) It is important to hold the tool shank at least up to 50-60 mm into any tool holder for rigid holding of the tool.
- 3) In case of ramping, please reduce the cutting parameters by 30%-60% on above table.
- 4) If machine does not have enough spindle speed (RPM), it is recommended to reduce feed speed into same proportion.

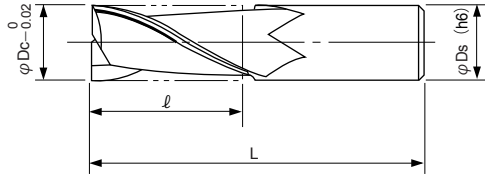
## Solid Carbide End Mill for Aluminium

## AL-SEEL2TYPE

- 2 flutes, Helix angle 45°
- Long flute length



Sharp corner



Cat. No.	Stock	Dimensions (mm)			
		$\varphi D_c$	$\ell$	L	$\varphi D_s$
AL-SEEL2030	●	3	22	65	6
AL-SEEL2040	●	4	26	65	6
AL-SEEL2050	●	5	32	75	6
AL-SEEL2060	●	6	32	75	6
AL-SEEL2070	●	7	42	95	8
AL-SEEL2080	●	8	42	95	8
AL-SEEL2090	●	9	42	110	10
AL-SEEL2100	●	10	53	120	10
AL-SEEL2120	●	12	53	120	12
AL-SEEL2130	●	13	65	130	12
AL-SEEL2140	●	14	75	140	16
AL-SEEL2150	●	15	75	140	16
AL-SEEL2160	●	16	75	140	16
AL-SEEL2180	●	18	75	150	20
AL-SEEL2200	●	20	75	150	20
AL-SEEL2220	□	22	85	160	25
AL-SEEL2250	●	25	85	160	25

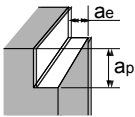
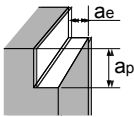
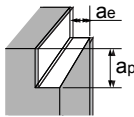
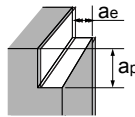
Note) Please refer page D020 for recommended cutting conditions

## Solid Carbide End Mill for Aluminium

## AL-SEEL2TYPE

## RECOMMENDED CUTTING CONDITIONS FOR AL-SEEL2 TYPE

## (1) Shoulder Milling

Work Materials	Aluminium alloy (A5052)		Aluminium alloy (A7075)		Cast Aluminium alloy (Up to 13%Si)		Copper alloy (C1100)	
Type of Machining								
Tool dia. $\phi D_c$ (mm)	Spindle speed $n$ (min <sup>-1</sup> )	Feed speed $V_f$ (mm/min)	Spindle speed $n$ (min <sup>-1</sup> )	Feed speed $V_f$ (mm/min)	Spindle speed $n$ (min <sup>-1</sup> )	Feed speed $V_f$ (mm/min)	Spindle speed $n$ (min <sup>-1</sup> )	Feed speed $V_f$ (mm/min)
1	32,000	700	32,000	700	32,000	700	30,000	660
1.5	32,000	1,000	32,000	1,000	32,000	1,000	20,000	660
2	28,000	1,200	23,000	1,000	28,000	1,200	16,000	660
3	19,000	1,200	16,000	1,000	19,000	1,200	10,000	660
4	14,000	1,200	12,000	1,000	14,000	1,200	8,000	660
5	11,000	1,200	9,500	1,000	11,000	1,200	6,000	660
6	9,500	1,200	8,000	1,000	9,500	1,200	5,000	660
8	7,000	1,200	6,000	1,000	7,000	1,200	4,000	660
10	5,700	1,200	4,800	1,000	5,700	1,200	3,200	660
12	4,700	1,200	4,000	1,000	4,700	1,200	2,600	660
16	3,500	1,000	3,000	900	3,500	1,000	2,000	600
20	2,800	800	2,400	700	2,800	800	1,600	500
25	2,300	800	1,900	650	2,300	800	1,300	500

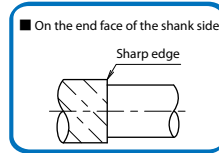
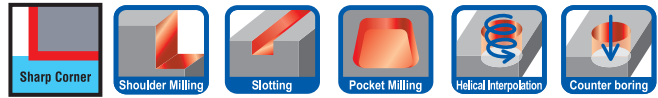
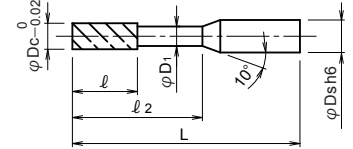
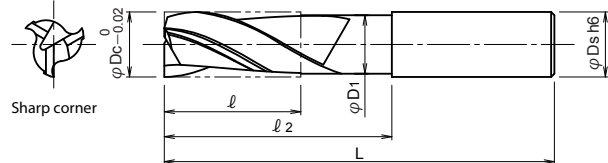
## NOTE

- 1) Use water soluble oil.
- 2) It is important to hold the tool shank at least up to 50-60 mm into any tool holder for rigid holding of the tool.
- 3) In case of ramping, please reduce the cutting parameters by 30-60% on above table. (Not recommended to use)
- 4) If machine does not have enough spindle speed (RPM), it is recommended to reduce feed speed into same proportion.
- 5) In case of slotting, please use depth of cut below 0.2D and reduce feed speed by 30-60% on above cutting parameters. (Please try to avoid using this tool for full slotting)

## Solid Carbide End Mill for Aluminium

## AL-SEEZ3TYPE

- 3 flutes, Helix angle 45°
- Flute length 1.5Dc


 $\varphi Dc = \varphi 3, \varphi 4, \varphi 5$ 

 $\varphi Dc \geq \varphi 6$ 


Cat. No.	Stock	Dimensions (mm)					
		$\varphi Dc$	$\ell$	$\ell_2$	L	$\varphi D1$	$\varphi Ds$
AL-SEEZ3030	●	3	5	9	55	2.8	6
AL-SEEZ3050	●	4	6	12	55	3.8	6
AL-SEEZ3040	●	5	8	15	55	4.8	6
AL-SEEZ3060	●	6	9	18	60	5.8	6
AL-SEEZ3080	●	8	12	24	70	7.8	8
AL-SEEZ3100	●	10	15	30	75	9.8	10
AL-SEEZ3120	●	12	18	36	80	11.7	12
AL-SEEZ3160	●	16	24	48	95	15.7	16
AL-SEEZ3200	●	20	30	60	115	19.7	20
AL-SEEZ3250	●	25	38	75	130	24.7	25

Note) Please refer page D023-D024 for recommended cutting conditions.



## Solid Carbide End Mill for Aluminium

## AL-SEEZ3TYPE

## RECOMMENDED CUTTING CONDITIONS FOR AL-SEEZ3 TYPE

## (1) Shoulder Milling

Work Materials	Aluminium alloy (A5052)		Aluminium alloy (A7075)		Cast aluminium alloy (Up to 13%Si)		Copper alloy (C1100)	
Type of Machining	 $ap=1.5Dc$ $ae=0.3Dc$		 $ap=1.5Dc$ $ae=0.3Dc$		 $ap=1.5Dc$ $ae=0.3Dc$		 $ap=1.5Dc$ $ae=0.3Dc$	
Tool dia. $\varnothing Dc(mm)$	Spindle speed $n (min^{-1})$	Feed speed $Vf (mm/min)$	Spindle speed $n (min^{-1})$	Feed speed $Vf (mm/min)$	Spindle speed $n (min^{-1})$	Feed speed $Vf (mm/min)$	Spindle speed $n (min^{-1})$	Feed speed $Vf (mm/min)$
3	24,000	4,800	22,800	4,400	24,000	4,800	17,000	3,400
4	18,000	4,500	16,000	4,000	18,000	4,500	13,000	3,200
5	15,000	4,500	13,000	4,000	15,000	4,500	10,000	3,200
6	12,000	4,200	10,000	3,500	12,000	4,200	8,500	3,000
8	9,000	3,600	8,000	3,200	9,000	3,600	6,500	2,600
10	7,300	3,200	6,000	2,700	7,300	3,200	5,000	2,200
12	6,000	3,000	5,000	2,500	6,000	3,000	4,000	2,000
16	4,500	2,500	4,000	2,200	4,500	2,500	3,000	1,600
20	3,600	2,100	3,000	1,800	3,600	2,100	2,500	1,500
25	3,000	1,800	2,500	1,500	3,000	1,800	2,000	1,200

## (2) Slotting

Work Materials	Aluminium alloy (A5052)		Aluminium alloy (A7075)		Cast aluminium alloy (Up to 13%Si)		Copper alloy (C1100)	
Type of Machining	 $ap=Dc$ $ae=Dc$		 $ap=Dc$ $ae=Dc$		 $ap=Dc$ $ae=Dc$		 $ap=Dc$ $ae=Dc$	
Tool dia. $\varnothing Dc(mm)$	Spindle speed $n (min^{-1})$	Feed speed $Vf (mm/min)$	Spindle speed $n (min^{-1})$	Feed speed $Vf (mm/min)$	Spindle speed $n (min^{-1})$	Feed speed $Vf (mm/min)$	Spindle speed $n (min^{-1})$	Feed speed $Vf (mm/min)$
3	21,000	3,100	18,000	2,700	21,000	3,100	14,000	2,100
4	16,000	2,500	13,000	2,000	16,000	2,500	11,000	1,700
5	12,000	2,100	10,000	1,800	12,000	2,100	8,900	1,600
6	10,000	2,000	9,000	1,800	10,000	2,000	7,400	1,500
8	8,000	2,000	7,000	1,750	8,000	2,000	5,500	1,400
10	6,000	1,800	5,500	1,650	6,000	1,800	4,500	1,350
12	5,000	1,800	4,500	1,600	5,000	1,800	3,700	1,300
16	4,000	1,600	3,300	1,300	4,000	1,600	2,700	1,000
20	3,000	1,350	2,700	1,200	3,000	1,350	2,200	1,000
25	2,500	1,100	2,000	900	2,500	1,100	1,800	800

## NOTE

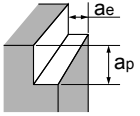
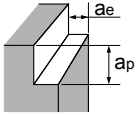
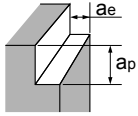
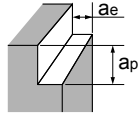
- 1) Use water soluble oil.
- 2) It is important to hold the tool shank at least up to 50-60 mm into any tool holder for rigid holding of the tool.
- 3) In case of ramping, please reduce the cutting parameters by 30%-60% on above table.
- 4) If machine does not have enough spindle speed (RPM), it is recommended to reduce feed speed into same proportion.

## Solid Carbide End Mill for Aluminium

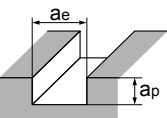
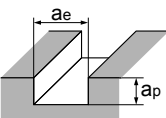
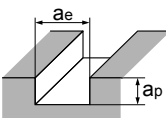
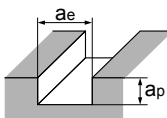
## AL-SEEZ3TYPE

## RECOMMENDED CUTTING CONDITIONS FOR AL-SEEZ3 TYPE

## (1) Shoulder Milling / High Speed Machining

Work Materials	Aluminium alloy (A5052)		Aluminium alloy (A7075)		Cast aluminium alloy (Up to 13%Si)		Copper alloy (C1100)	
Type of Machining	 $a_p=1.5D_c$ $a_e=0.2D_c$		 $a_p=1.5D_c$ $a_e=0.2D_c$		 $a_p=1.5D_c$ $a_e=0.2D_c$		 $a_p=1.5D_c$ $a_e=0.2D_c$	
Tool dia. $\phi D_C$ (mm)	Spindle speed $n$ (min <sup>-1</sup> )	Feed speed $V_f$ (mm/min)	Spindle speed $n$ (min <sup>-1</sup> )	Feed speed $V_f$ (mm/min)	Spindle speed $n$ (min <sup>-1</sup> )	Feed speed $V_f$ (mm/min)	Spindle speed $n$ (min <sup>-1</sup> )	Feed speed $V_f$ (mm/min)
3	50,000	9,000	45,000	8,100	50,000	9,000	37,000	6,600
4	40,000	8,000	34,000	6,800	40,000	8,000	27,000	5,400
5	32,000	8,000	27,000	6,800	32,000	8,000	22,000	5,400
6	27,000	6,800	22,000	5,500	27,000	6,800	18,000	4,500
8	20,000	6,000	17,000	5,000	20,000	6,000	14,000	4,200
10	16,000	5,600	13,000	4,500	16,000	5,600	11,000	3,900
12	13,000	5,200	11,000	4,400	13,000	5,200	9,000	3,600
16	10,000	4,500	8,500	3,800	10,000	4,500	7,000	3,100
20	8,000	4,000	7,000	3,500	8,000	4,000	5,500	2,800
25	6,500	3,200	5,500	2,800	6,500	3,200	4,500	2,200

## (2) Slotting / High Speed Machining

Work Materials	Aluminium alloy (A5052)		Aluminium alloy (A7075)		Cast aluminium alloy (Up to 13%Si)		Copper alloy (C1100)	
Type of Machining	 $a_p=0.5D_c$ $a_e=D_c$		 $a_p=0.5D_c$ $a_e=D_c$		 $a_p=0.5D_c$ $a_e=D_c$		 $a_p=0.5D_c$ $a_e=D_c$	
Tool dia. $\phi D_C$ (mm)	Spindle speed $n$ (min <sup>-1</sup> )	Feed speed $V_f$ (mm/min)	Spindle speed $n$ (min <sup>-1</sup> )	Feed speed $V_f$ (mm/min)	Spindle speed $n$ (min <sup>-1</sup> )	Feed speed $V_f$ (mm/min)	Spindle speed $n$ (min <sup>-1</sup> )	Feed speed $V_f$ (mm/min)
3	48,000	5,600	40,000	4,800	48,000	5,600	32,000	3,800
4	36,000	5,600	30,000	4,800	36,000	5,600	23,000	3,800
5	28,000	5,600	24,000	4,800	28,000	5,600	19,000	3,800
6	23,000	5,600	20,000	4,800	23,000	5,600	16,000	3,800
8	18,000	5,000	15,000	4,200	18,000	5,000	12,000	3,300
10	14,000	4,200	12,000	3,600	14,000	4,200	9,500	2,800
12	12,000	3,800	10,000	3,200	12,000	3,800	8,000	2,600
16	9,000	3,100	8,000	2,800	9,000	3,100	6,000	2,100
20	7,000	2,800	6,000	2,400	7,000	2,800	4,800	1,900
25	5,700	2,200	4,800	1,900	5,700	2,200	3,800	1,500

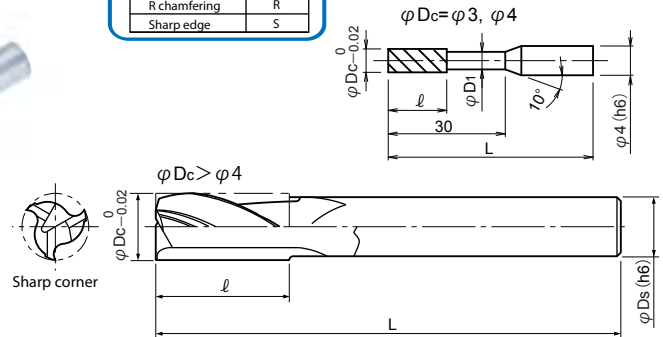
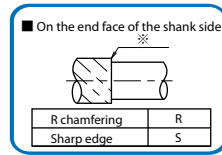
## NOTE

- 1) Use water soluble oil.
- 2) It is important to hold the tool shank at least up to 50-60 mm into any tool holder for rigid holding of the tool.
- 3) In case of ramping, please reduce the cutting parameters by 30%-60% on above table.
- 4) If machine does not have enough spindle speed (RPM), it is recommended to reduce feed speed into same proportion.

## Solid Carbide End Mill for Aluminium

## AL-SEES3-LS TYPE

- 3 flutes, Helix angle 45°
- Long shank type
- Under size neck



Cat. No.	Stock	Dimensions (mm)					※
		φDc	ℓ	L	φD1	φDs	
AL-SEES3030-LS	●	3	5	70	2.8	4	S
AL-SEES3040-LS	●	4	6	70	3.8	4	S
AL-SEES3050-LS	●	5	8	80	-	4	S
AL-SEES3060-LS	●	6	9	80	-	4	R
AL-SEES3060-LS-S5.8	●	6	9	80	-	5.8	S
AL-SEES3070-LS	●	7	10	100	-	6	R
AL-SEES3070-LS-S6.8	●	7	10	100	-	6.8	S
AL-SEES3080-LS	●	8	12	100	-	6	R
AL-SEES3080-LS-S7.8	●	8	12	100	-	7.8	S
AL-SEES3090-LS	□	9	14	120	-	8	R
AL-SEES3090-LS-S8.8	□	9	14	120	-	8.8	S
AL-SEES3100-LS	●	10	15	130	-	8	R
AL-SEES3100-LS-S9.8	●	10	15	130	-	9.8	S
AL-SEES3120-LS	●	12	18	150	-	10	R
AL-SEES3140-LS	●	14	21	160	-	12	R
AL-SEES3160-LS	●	16	24	180	-	14	R
AL-SEES3180-LS	●	18	27	180	-	16	R
AL-SEES3200-LS	●	20	30	200	-	18	R
AL-SEES3220-LS	●	22	33	200	-	20	R

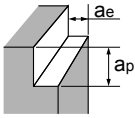
(Note) Please refer page D026 for recommended cutting conditions.

## Solid Carbide End Mill for Aluminium

AL-SEES3-LS<sub>TYPE</sub>

## RECOMMENDED CUTTING CONDITIONS FOR AL-SEES3-LS TYPE

## (1) Shoulder Milling

Work Materials	Aluminium alloy (A5052)		Aluminium alloy (A7075)		Cast aluminium alloy (Up to 13% Si)		Copper alloy (C1100)	
Type of Machining	 $a_p=1.5D_c$ $a_e=0.05D_c$		 $a_p=1.5D_c$ $a_e=0.05D_c$		 $a_p=1.5D_c$ $a_e=0.05D_c$		 $a_p=1.5D_c$ $a_e=0.05D_c$	
Tool dia. $\phi D_c$ (mm)	Spindle speed n (min <sup>-1</sup> )	Feed speed Vf (mm/min)	Spindle speed n (min <sup>-1</sup> )	Feed speed Vf (mm/min)	Spindle speed n (min <sup>-1</sup> )	Feed speed Vf (mm/min)	Spindle speed n (min <sup>-1</sup> )	Feed speed Vf (mm/min)
3	19,000	2,200	16,000	1,800	19,000	2,200	10,600	950
4	14,300	1,800	11,900	1,600	14,300	1,800	8,000	880
5	11,400	1,600	10,000	1,400	11,400	1,600	6,400	830
6	9,500	1,400	8,000	1,200	9,500	1,400	5,000	750
8	7,000	1,100	6,000	1,000	7,000	1,100	4,000	650
10	5,700	1,000	4,800	850	5,700	1,000	3,200	570
12	4,700	940	4,000	800	4,700	940	2,600	520
14	4,000	880	3,400	750	4,000	880	2,200	500
16	3,500	800	3,000	700	3,500	800	2,000	450
18	3,200	800	2,600	650	3,200	800	1,800	450
20	2,800	700	2,400	600	2,800	700	1,600	400
22	2,600	650	2,100	520	2,600	650	1,400	350

## NOTE

- 1) Use water soluble oil.
- 2) It is important to hold the tool shank at least up to 50-60 mm into any tool holder for rigid holding of the tool.
- 3) In case of ramping, please reduce the cutting parameters by 30-60% on above table. (Not recommended to use)
- 4) If machine does not have enough spindle speed (RPM), it is recommended to reduce feed speed into same proportion.
- 5) In case of slotting, please use depth of cut below 0.2D and reduce feed speed by 30-60% on above cutting parameters. (Please try to avoid using this tool for full slotting)

## REDUCTION RATE FOR AL-SEES3-LS TYPE

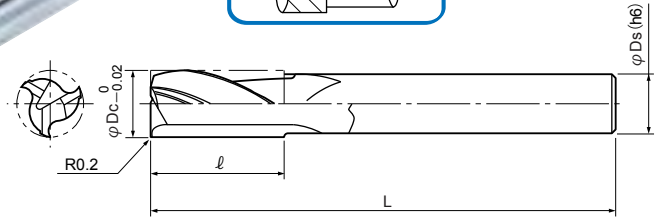
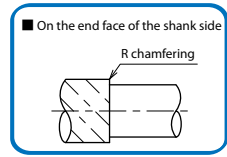
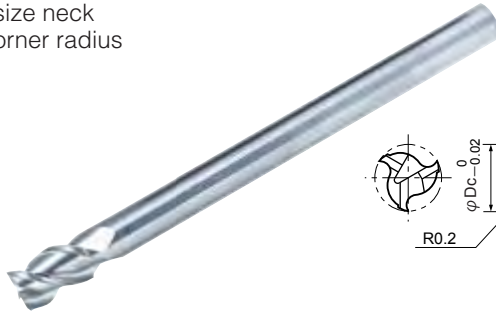
※ In case of lengthening overhung length, the cutting parameters to be adjusted according to the reduction rate.

L / Dc	n (min <sup>-1</sup> )	Vf (mm/min)	$a_p$	$a_e$
Below 4 Dc	0%	0%	1.5 Dc	0.05 Dc
5~6 Dc	25%	30%	1.2 Dc	0.05 Dc
7~8 Dc	40%	50%	1.0 Dc	0.05 Dc

## Solid Carbide End Mill for Aluminium

## AL-SEES3-LS-R02TYPE

- 3 flutes, Helix angle 45°
- Long shank type
- Under size neck
- R0.2 Corner radius



Cat. No.	Stock	Dimensions (mm)			
		$\phi Dc$	$\ell$	L	$\phi Ds$
AL-SEES3060-LS-R02	□	6	9	80	4
AL-SEES3080-LS-R02	●	8	12	100	6
AL-SEES3100-LS-R02	●	10	15	130	8
AL-SEES3120-LS-R02	●	12	18	150	10
AL-SEES3140-LS-R02	●	14	21	160	12
AL-SEES3160-LS-R02	□	16	24	180	14
AL-SEES3180-LS-R02	□	18	27	180	16
AL-SEES3200-LS-R02	●	20	30	200	18
AL-SEES3220-LS-R02	□	22	33	200	20

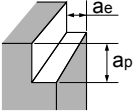
Note) Please refer page D028-D029 for recommended cutting conditions.

## Solid Carbide End Mill for Aluminium

## AL-SEES3-LS-R02TYPE

## RECOMMENDED CUTTING CONDITIONS FOR AL-SEES3-LS-R02 TYPE

## (1) Shoulder Milling

Work Materials	Aluminium alloy (A5052)		Aluminium alloy (A7075)		Cast aluminium alloy (Up to 13% Si)		Copper alloy (C1100)	
Type of Machining	 $a_p=1.5D_c$ $a_e=0.05D_c$		 $a_p=1.5D_c$ $a_e=0.05D_c$		 $a_p=1.5D_c$ $a_e=0.05D_c$		 $a_p=1.5D_c$ $a_e=0.05D_c$	
Tool dia. $\varnothing D_c$ (mm)	Spindle speed $n$ (min <sup>-1</sup> )	Feed speed $V_f$ (mm/min)	Spindle speed $n$ (min <sup>-1</sup> )	Feed speed $V_f$ (mm/min)	Spindle speed $n$ (min <sup>-1</sup> )	Feed speed $V_f$ (mm/min)	Spindle speed $n$ (min <sup>-1</sup> )	Feed speed $V_f$ (mm/min)
6	10,000	1,500	9,000	1,350	10,000	1,500	7,400	1,100
8	8,000	1,400	7,000	1,250	8,000	1,400	5,500	1,000
10	6,000	1,200	5,500	1,100	6,000	1,200	4,500	900
12	5,000	1,100	4,500	1,000	5,000	1,100	3,700	800
14	4,500	1,000	3,900	900	4,500	1,000	3,200	750
16	4,000	1,000	3,300	800	4,000	1,000	2,700	670
18	3,500	950	3,000	800	3,500	950	2,500	670
20	3,000	900	2,700	800	3,000	900	2,200	670
22	2,900	900	2,500	750	2,900	900	2,000	600

## NOTE

- 1) Use water soluble oil.
- 2) It is important to hold the tool shank at least up to 50-60 mm into any tool holder for rigid holding of the tool.
- 3) In case of ramping, please reduce the cutting parameters by 30-60% on above table. (Not recommended to use)
- 4) If machine does not have enough spindle speed (RPM), it is recommended to reduce feed speed into same proportion.
- 5) In case of slotting, please use depth of cut below 0.2D and reduce feed speed by 30-60% on above cutting parameters. (Please try to avoid using this tool for full slotting)

## REDUCTION RATE FOR AL-SEES3-LS TYPE

※ In case of lengthening overhung length, the cutting parameters to be adjusted according to the reduction rate.

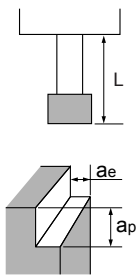
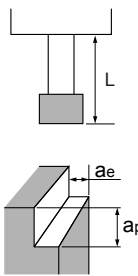
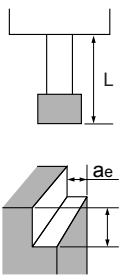
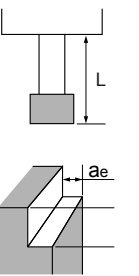
L / Dc	$n$ (min <sup>-1</sup> )	$V_f$ (mm/min)	$a_p$	$a_e$
Below 4 Dc	0%	0%	1.5 Dc	0.05 Dc
5-6 Dc	25%	30%	1.2 Dc	0.05 Dc
7-8 Dc	40%	50%	1.0 Dc	0.05 Dc

## Solid Carbide End Mill for Aluminium

## AL-SEES3-LS-R02TYPE

## RECOMMENDED CUTTING CONDITIONS FOR AL-SEES3-LS-R02 TYPE

## (1) Shoulder Milling / High Speed Machining

Work Materials	Aluminium alloy (A5052)		Aluminium alloy (A7075)		Cast aluminium alloy (Up to 13% Si)		Copper alloy (C1100)	
Type of Machining	 $a_p=1.5D_c$ $a_e=0.04D_c$ $L \leq D_c \times 4$		 $a_p=1.5D_c$ $a_e=0.04D_c$ $L \leq D_c \times 4$		 $a_p=1.5D_c$ $a_e=0.04D_c$ $L \leq D_c \times 4$		 $a_p=1.5D_c$ $a_e=0.04D_c$ $L \leq D_c \times 4$	
Tool dia. $\varphi D_c$ (mm)	Spindle speed n (min <sup>-1</sup> )	Feed speed Vf (mm/min)	Spindle speed n (min <sup>-1</sup> )	Feed speed Vf (mm/min)	Spindle speed n (min <sup>-1</sup> )	Feed speed Vf (mm/min)	Spindle speed n (min <sup>-1</sup> )	Feed speed Vf (mm/min)
6	20,000	2,600	17,000	2,200	20,000	2,600	12,000	1,600
8	15,000	2,100	13,000	1,800	15,000	2,100	9,000	1,300
10	12,000	2,000	10,000	1,800	12,000	2,000	7,300	1,200
12	10,000	2,000	9,000	1,800	10,000	2,000	6,000	1,200
14	8,500	1,850	7,500	1,600	8,500	1,850	5,000	1,100
16	7,500	1,650	6,500	1,400	7,500	1,650	4,500	1,000
18	6,500	1,500	6,000	1,400	6,500	1,500	4,000	1,000
20	6,000	1,500	5,000	1,250	6,000	1,500	3,600	900
22	5,500	1,400	4,800	1,200	5,500	1,400	3,300	800

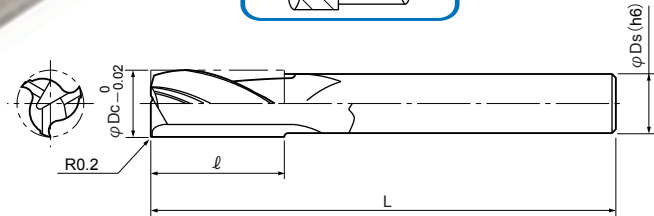
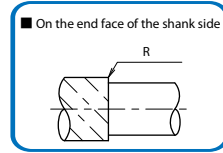
## NOTE

- 1) Use water soluble oil.
- 2) It is important to hold the tool shank at least up to 50-60 mm into any tool holder for rigid holding of the tool.
- 3) In case of ramping, please reduce the cutting parameters by 30-60% on above table. (Not recommended to use)
- 4) If machine does not have enough spindle speed (RPM), it is recommended to reduce feed speed into same proportion.
- 5) In case of slotting, please use depth of cut below 0.2D and reduce feed speed by 30-60% on above cutting parameters. (Please try to avoid using this tool for full slotting)

## Solid Carbide End Mill for Aluminium

## AL-SEES3-XLS-R02TYPE

- 3 flutes, Helix angle 45°
- Extra long shank type
- Under size neck
- R0.2 Corner radius



Cat. No.	Stock	Dimensions (mm)			
		$\varphi Dc$	$\ell$	L	$\varphi Ds$
AL-SEES3060-XLS-R02	●	6	9	100	5
AL-SEES3080-XLS-R02	●	8	12	140	7
AL-SEES3100-XLS-R02	●	10	15	160	9
AL-SEES3120-XLS-R02	●	12	18	180	11
AL-SEES3140-XLS-R02	●	14	21	200	13
AL-SEES3160-XLS-R02	●	16	24	220	15
AL-SEES3180-XLS-R02	□	18	27	240	17
AL-SEES3200-XLS-R02	●	20	30	250	18
AL-SEES3220-XLS-R02	●	22	33	250	20

Note) Please refer page D031-D032 for recommended cutting conditions

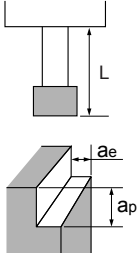
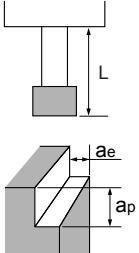
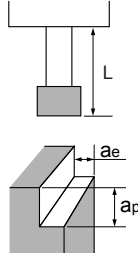
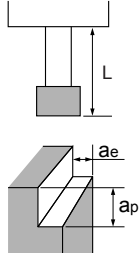


## Solid Carbide End Mill for Aluminium

## AL-SEES3-XLS-R02TYPE

## RECOMMENDED CUTTING CONDITIONS FOR AL-SEES3-XLS-R02 TYPE

## (1) Shoulder Milling

Work Materials	Aluminium alloy (A5052)		Aluminium alloy (A7075)		Cast aluminium alloy (Up to 13% Si)		Copper alloy (C1100)	
Type of Machining								
	$L = Dc \times 4$ $ae = Dc \times 0.25$ $ap = Dc \times 1.5$		$L = Dc \times 4$ $ae = Dc \times 0.25$ $ap = Dc \times 1.5$		$L = Dc \times 4$ $ae = Dc \times 0.25$ $ap = Dc \times 1.5$		$L = Dc \times 4$ $ae = Dc \times 0.25$ $ap = Dc \times 1.5$	
Tool dia. $\varnothing Dc$ (mm)	Spindle speed n (min <sup>-1</sup> )	Feed speed Vf (mm/min)	Spindle speed n (min <sup>-1</sup> )	Feed speed Vf (mm/min)	Spindle speed n (min <sup>-1</sup> )	Feed speed Vf (mm/min)	Spindle speed n (min <sup>-1</sup> )	Feed speed Vf (mm/min)
6	20,000	3,600	20,000	3,400	20,000	3,600	13,500	2,100
8	18,000	3,600	18,000	3,300	18,000	3,600	12,000	2,100
10	14,000	4,200	14,000	4,000	14,000	4,200	9,500	2,400
12	12,000	4,800	10,500	3,800	12,000	4,800	8,000	2,800
14	10,000	4,200	9,000	3,400	10,000	4,200	7,000	2,600
16	9,000	4,000	8,000	3,200	9,000	4,000	6,000	2,400
18	8,000	3,800	7,200	3,100	8,000	3,800	5,400	2,200
20	7,200	3,600	6,500	3,000	7,200	3,600	5,000	2,100
22	6,500	3,400	6,000	2,800	6,500	3,400	4,800	2,100

## NOTE

- 1) Use water soluble oil.
- 2) It is important to hold the tool shank at least up to 50-60 mm into any tool holder for rigid holding of the tool.
- 3) In case of ramping, please reduce the cutting parameters by 30-60% on above table. (Not recommended to use)
- 4) If machine does not have enough spindle speed (RPM), it is recommended to reduce feed speed into same proportion.

## REDUCTION RATE FOR AL-SEES3-XLS-R02 TYPE

※ In case of lengthening overhung length, the cutting parameters to be adjusted according to the reduction rate.

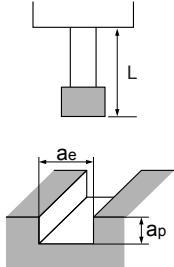
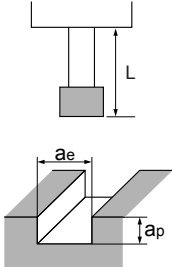
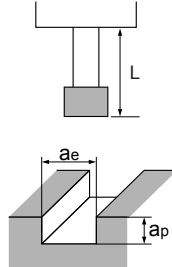
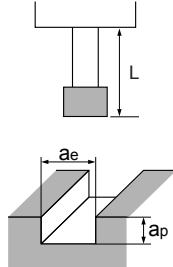
L / Dc	n (min <sup>-1</sup> ) Vf (mm/min)	ae
4~5Dc	0%	0.2Dc
5~6Dc	10~20%	0.15Dc
6~7Dc	30~40%	0.1Dc
7~8Dc	40~50%	0.075Dc
8~9Dc	50~60%	0.05Dc
9~10Dc	60~70%	0.025Dc

## Solid Carbide End Mill for Aluminium

## AL-SEES3-XLS-R02TYPE

## RECOMMENDED CUTTING CONDITIONS FOR AL-SEES3-XLS-R02 TYPE

## (2) Slotting

Work Materials	Aluminium alloy (A5052)		Aluminium alloy (A7075)		Cast aluminium alloy (Up to 13% Si)		Copper alloy (C1100)	
Type of Machining	 $L = Dc \times 4$ $ae = Dc$ $ap = Dc \times 0.25$		 $L = Dc \times 4$ $ae = Dc$ $ap = Dc \times 0.25$		 $L = Dc \times 4$ $ae = Dc$ $ap = Dc \times 0.25$		 $L = Dc \times 4$ $ae = Dc$ $ap = Dc \times 0.25$	
Tool dia. $\varnothing Dc$ (mm)	Spindle speed n (min <sup>-1</sup> )	Feed speed Vf (mm/min)	Spindle speed n (min <sup>-1</sup> )	Feed speed Vf (mm/min)	Spindle speed n (min <sup>-1</sup> )	Feed speed Vf (mm/min)	Spindle speed n (min <sup>-1</sup> )	Feed speed Vf (mm/min)
6	15,000	5,250	14,000	4,600	15,000	5,250	11,000	3,500
8	12,500	4,150	12,000	3,800	12,500	4,150	9,000	2,700
10	11,000	3,500	10,500	3,500	11,000	3,500	8,000	2,300
12	9,600	3,100	9,000	2,800	9,600	3,100	7,000	2,000
14	8,600	2,750	8,200	2,500	8,600	2,750	6,200	1,800
16	7,800	2,650	7,400	2,400	7,800	2,650	5,600	1,700
18	7,000	2,520	6,700	2,300	7,000	2,520	5,000	1,600
20	6,400	2,560	6,000	2,300	6,400	2,560	4,600	1,600
22	6,000	2,520	5,800	2,300	6,000	2,520	4,400	1,700

## NOTE

- 1) Use water soluble oil.
- 2) It is important to hold the tool shank at least up to 50-60 mm into any tool holder for rigid holding of the tool.
- 3) In case of ramping, please reduce the cutting parameters by 30-60% on above table.(Not recommended to use)
- 4) If machine does not have enough spindle speed (RPM), it is recommended to reduce feed speed into same proportion.

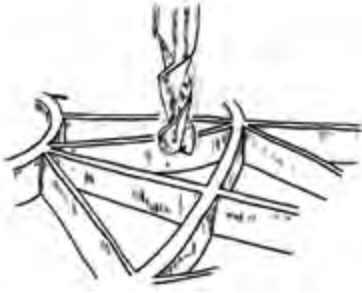
## REDUCTION RATE FOR AL-SEES3-XLS-R02 TYPE


※ In case of lengthening overhung length, the cutting parameters to be adjusted according to the reduction rate.


L / Dc	n (min <sup>-1</sup> ) Vf (mm/min)		ap
	Below $\varnothing 10$	Over $\varnothing 10$	
4~5Dc	0%	0%	0.2Dc
5~6Dc	40~50%	10~20%	0.1Dc
6~7Dc	50~60%	20~30%	0.05Dc
7~8Dc	60~70%	30~50%	0.05Dc
8~9Dc	70~80%	40~60%	0.025Dc
9~10Dc	70~80%	50~70%	0.025Dc

## Solid Carbide End Mill for Aluminium

### ■ CASE STUDIES

	<b>Work</b>	Part name	Under plate
		Material	A6061 Aluminium alloy
		Hardness	–
	<b>Tool</b>	Tool No.	AL-SEES2100
		Grade	KT9
	<b>Cutting conditions</b>	Vc,(n)	25,000 (min <sup>-1</sup> )
		Vf, (f z)	8,000 (mm/min)
		a <sub>p</sub> (mm)	3 (mm)
		a <sub>e</sub> (mm)	10 (mm)
		Coolant	Wet cut
<b>Result</b>	No chattering. Very smooth machining observed on low rigid work piece.		
<b>Machine</b>	H.S.C. Vertical MC		

	<b>Work</b>	Part name	Aircraft part
		Material	Aluminium alloy
		Hardness	–
	<b>Tool</b>	Tool No.	AL-SEES3120-LS
		Grade	KT9
	<b>Cutting conditions</b>	Vc,(n)	9,000 (min <sup>-1</sup> )
		Vf, (f z)	4,000 (mm/min)
		a <sub>p</sub> (mm)	0.5 (mm)
		a <sub>e</sub> (mm)	12 (mm)
		Coolant	Wet cut
<b>Result</b>	Excellent surface roughness. Less chattering than competitor's.		
<b>Machine</b>	H.S.C. Vertical MC		

	<b>Work</b>	Part name	Cylinder head
		Material	Aluminium alloy
		Hardness	–
	<b>Tool</b>	Tool No.	AL-SEES2160
		Grade	KT9
	<b>Cutting conditions</b>	Vc,(n)	7,500 (min <sup>-1</sup> )
		Vf, (f z)	3,500 (mm/min)
		a <sub>p</sub> (mm)	32 (mm)
		a <sub>e</sub> (mm)	0.5!0.8 (mm)
		Coolant	Wet cut
<b>Result</b>	Could finish job by one process integrated roughing and finishing process. Achieved 10 time longer tool life and better surface roughness than the existing.		
<b>Machine</b>	H.S.C. Vertical MC		