



ALUPro

76090 | 77090

High performance milling
for aluminum alloys



Cutters

- Excellent multi functional milling tool for non-ferrous materials.
- High speed milling can be achieved due to double screw clamping & anti-fly system.
- High accuracy cutters to prevent vibrations at high speeds.

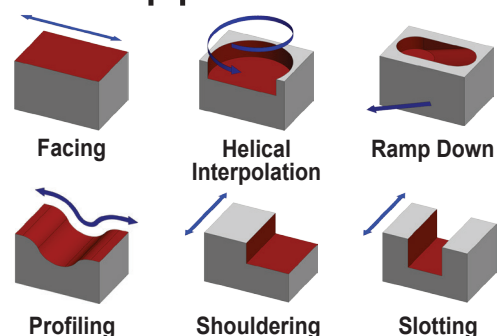
Inserts

- High rake angle geometry that provides a good surface finish and low cutting forces.
- Sharp cutting edge to produce good chip flow and reduce build up edge.
- High helical angle offers cutting edge strength.
- Excellent 90° wall accuracy.

Specifications

- Geometry: 90° milling operations.
- Cutter diameters:
 - Cylindrical (E): Ø20 till Ø40.
 - Arbor Mounting (A): Ø40 till Ø125.
- Workpiece materials: Aluminums & Non-ferrous alloys.

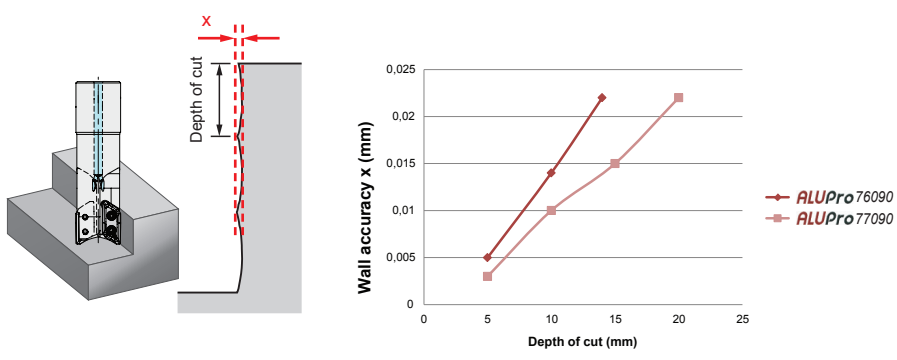
Applications



Main Features

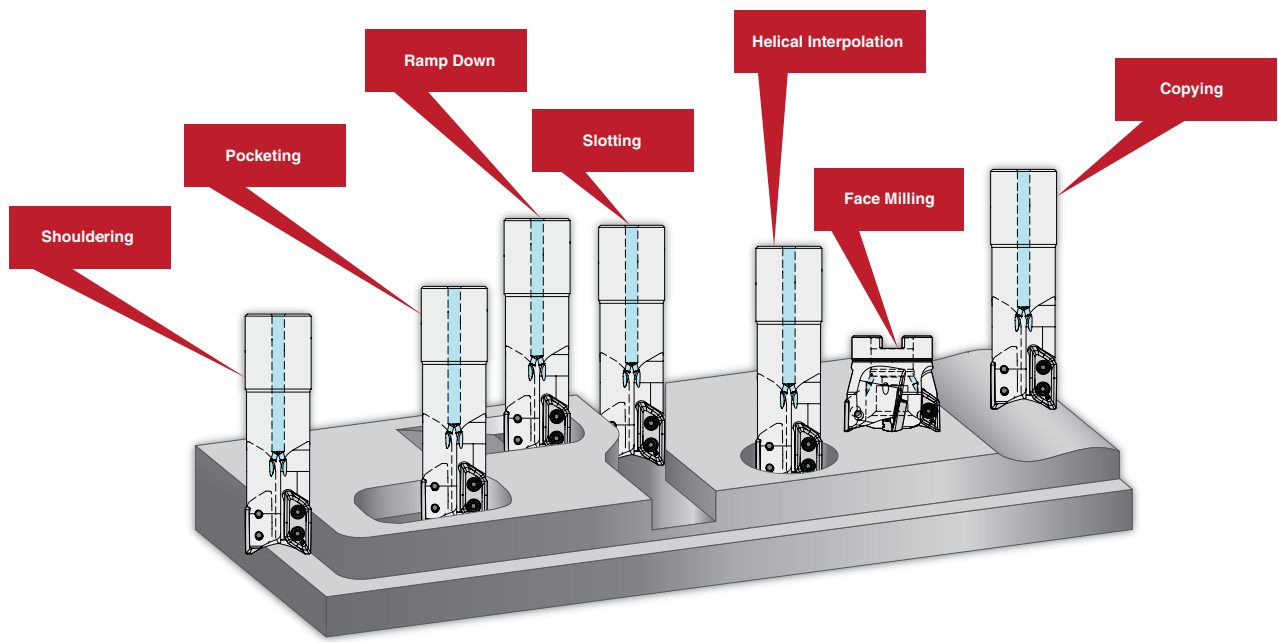


Wall Accuracy



Multi Functional Tool

• The new AluPro 76090 & 77090 are excellent multi functional tools solutions.

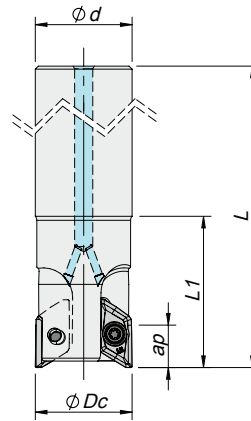


76090 Cutters

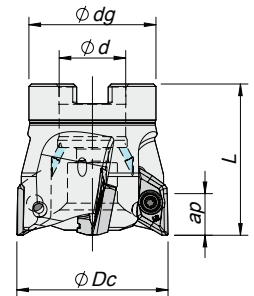


$K_r = 90^\circ$ $\gamma_p = +7^\circ \sim +12^\circ$

Cylindrical Shank



Arbor Mounting



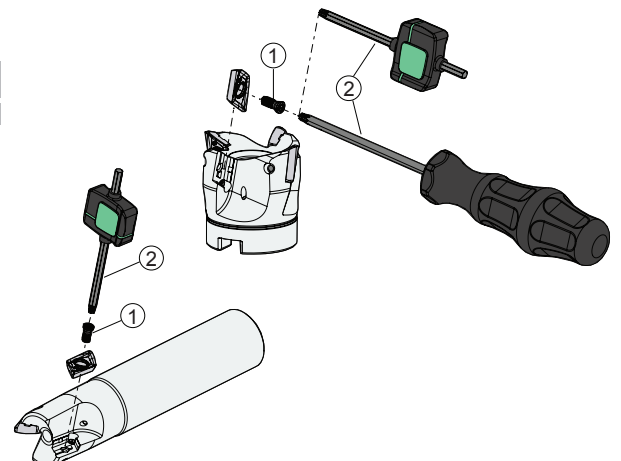
	Order Code	Reference		Dimensions (mm)					Kg	Specifications			Insert Radius	Stock
				Ø Dc	Ø d	Ø Dg	L	L1		Holder Type	Max. ap (mm)	rpm (max)		
Cylindrical	181095000	020E76090-02-09-020120-A	2	20	20	-	120	50	0,2	A	15,0	40.000	0,4 ~ 3,2	
	181095100	025E76090-02-09-025130-A	2	25	25	-	130	50	0,4	A		38.000		
	181095200	032E76090-02-09-032150-A	2	32	32	-	150	50	0,7	A	33.000			
	181095300	040E76090-03-09-040170-A	3	40	40	-	170	80	1,4	A	29.000			
	181095400	020E76090-02-09-020120-B	2	20	20	-	120	50	0,2	B	15,0	40.000	4,0 ~ 5,0	
	181095500	025E76090-02-09-025130-B	2	25	25	-	130	50	0,4	B		38.000		
	181095600	032E76090-02-09-032150-B	2	32	32	-	150	50	0,7	B	33.000			
181095700	040E76090-03-09-040170-B	3	40	40	-	170	80	1,4	B	29.000				
Arbor	181094200	040A76090-03-11-016050-A	3	40	16	32	50	-	0,3	A	15,0	29.000	0,4 ~ 3,2	
	181083400	050A76090-04-11-022050-A	4	50	22	42	50	-	0,4	A		24.000		
	181085300	063A76090-05-11-022050-A	5	63	22	48	50	-	0,7	A	21.000			
	181094300	080A76090-05-11-027050-A	5	80	27	60	50	-	1,1	A	19.000			
	181094400	100A76090-06-11-032063-A	6	100	32	73	63	-	2,0	A	16.000			
	181094500	040A76090-03-11-016050-B	3	40	16	32	50	-	0,3	B	15,0	29.000	4,0 ~ 5,0	
	181094600	050A76090-04-11-022050-B	4	50	22	42	50	-	0,4	B		24.000		
	181094700	063A76090-05-11-022050-B	5	63	22	48	50	-	0,7	B	21.000			
	181094800	080A76090-05-11-027050-B	5	80	27	60	50	-	1,0	B	19.000			
	181094900	100A76090-06-11-032063-B	6	100	32	73	63	-	2,0	B	16.000			

Stock items / Itens de stock Available under request / Disponibilidade sob consulta / Disponible bajo consulta

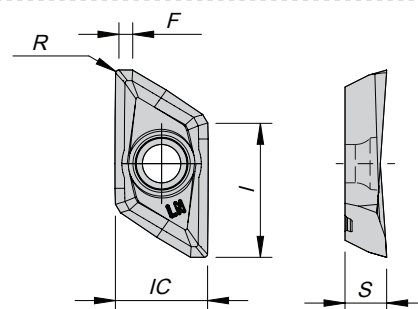
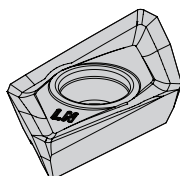
Note: This solution is available from January of 2014.

Screws & Keys

Item	1		2		Order Separately	
	Cutter ØDc	Insert Screw	Key (Torx)	Torque Value	Screw	DIN 6368 Wrench
E76090 – 20 - 40	P0401200	XT15	3,0	-	-	-
A76090 – 40 - 80	P0401200	XT15	3,0	-	-	-
A76090 – 100	P0401200	PT15	3,0	J0164110	SD6368-16	-



XDGX 15M5.. Inserts



(1) Geometry Code	(2) Grade Code	N PH0910	Dimensions (mm)					Holder Type*
			IC	S	I	R	F	
1111624	XDGX 15M504	⊗	11,20	5,0	16,0	0,4	1,5	A
1111625	XDGX 15M508	⊗	11,20	5,0	16,0	0,8	1,1	A
1111626	XDGX 15M512	⊗	11,20	5,0	16,0	1,2	0,7	A
1111627	XDGX 15M516	⊗	11,20	5,0	16,0	1,6	0,4	A
1111628	XDGX 15M520	⊗	11,20	5,0	16,0	2,0	0,2	A
1111629	XDGX 15M532	⊗	11,20	5,0	16,0	3,2	0,6	A
1111630	XDGX 15M540	○	11,20	5,0	16,0	4,0	0,5	B
1111631	XDGX 15M550	○	11,20	5,0	16,0	5,0	0,4	B

⊗ First choice / 1ª escolha / 1ª opción ⊗ Stock items / Itens de stock ○ Available under request / Disponibilidade sob consulta / Disponible bajo consulta
 Order code = (1) Geometry Code + (2) Grade Code

* Please take into consideration the holder type (A or B) and the insert corner radius, when choosing the insert.

Note: This solution is available from January of 2014.

Chip Breaker

Chip Breaker	Cutting Edge	Features
Geometry LN Aluminum alloys and non-ferrous		High positive chip-breaker, polished for applications of non ferrous (aluminum, cooper and cooper alloys).

Rec. Cutting Conditions for Shouldering

ISO	HB (Brinell)	Vc (m/min)	Width of Cut a_e (mm)	Depth of Cut a_p (mm)	Feed f_z (mm/t)
		PH0910			
N	Alum. Alloys and Non-ferrous	350 - 1200	$\leq 25\% \varnothing D_c$	$\leq 5,0$	0,35 - 0,40
				5,0 - 10,0	0,30 - 0,35
				10,0 - 15,0	0,25 - 0,30
			$< 50\% \varnothing D_c$	$\leq 5,0$	0,35 - 0,40
				5,0 - 10,0	0,30 - 0,35
				10,0 - 15,0	0,25 - 0,30
			$\leq 75\% \varnothing D_c$	$\leq 5,0$	0,30 - 0,35
				5,0 - 10,0	0,25 - 0,30
				10,0 - 15,0	0,20 - 0,25

Rec. Cutting Conditions for Slotting

ISO	HB (Brinell)	Vc (m/min)	Width of Cut a _e (mm)	Depth of Cut a _p (mm)	Feed f _z (mm/t)	
		PH0910				
N	Alum. Alloys and Non-ferrous	30 - 130	350 - 1200	100% Ø Dc	≤ 5,0	0,25 - 0,35
					5,0 - 10,0	0,20 - 0,30
					10,0 - 15,0	0,15 - 0,25

(1) Cutting conditions should be adjusted according to the machine and work rigidity.

(2) It's possible to occur vibrations in certain cases. Please reduce depth of cut and/or reduce cutting conditions in following cases:

- Using long shank;
- Using long overhang with arbor type;
- Application with poor clamping rigidity or using a low rigidity machine;

(3) Use internal coolant supply.

Operational Guide

• The maximum allowable revolutions are shown in Table 1. Ensure that the cutter operates under the maximum allowable revolutions. The maximum allowable revolutions for safety purposes are determined in accordance with ISO 15641 (Milling Cutters for high speed machining – Safety requirements).

Table 1 - Maximum allowable revolutions:

Ø Dc	Ø 20	Ø 25	Ø 32	Ø 40	Ø 50	Ø 63	Ø 80	Ø 100
RPM (min ⁻¹)	40.000	38.000	33.000	29.000	24.000	21.000	19.000	16.000

• Even when operating under the maximum allowable spindle speed, if the spindle speed is equal or higher than the values shown in Table 2. It's recommended the balance quality (with the arbor or chuck) according ISO 1940.

Table 2 - Maximum revolutions when balancing with the arbor or chuck has not been achieved:

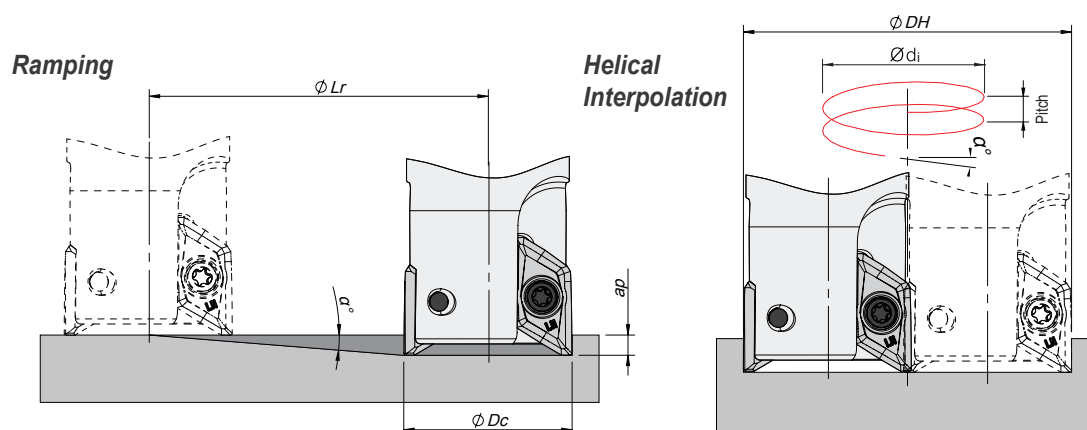
Ø Dc	Ø 20	Ø 25	Ø 32	Ø 40	Ø 50	Ø 63	Ø 80	Ø 100
RPM (min ⁻¹)	15.000	12.000	9.500	8.500	7.600	6.800	6.000	5.400

- When setting the spindle speed, take into consideration the maximum allowable revolutions of the arbor or chuck.
- Use the specified set bolt when using the arbor type with internal coolant supply.

Grades

Grades	Information
PH0910	Uncoated carbide grade suitable for milling of aluminium alloys combined with high positive geometries.

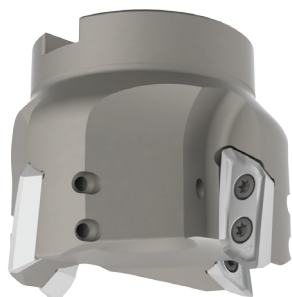
Ramping and helical Interpolation



Holder Type	ϕ_{Dc}	Ramping			Helical Interpolation		
		Max. Ramp α°	Max. a_p	Min. Lr	ϕ_{DH} (min)	ϕ_{DH} (max)	Max. Pitch/Rev.
A	20	23	15,0	35,3	36,6		22,1
						40	26,7
	25	21	15,0	39,1	46,6	-	26,0
					-	50	30,1
	32	15	15,0	56,0	60,6	-	24,1
					-	64	26,9
	40	10	15,0	85,1	76,6	-	20,3
					-	80	22,2
50	8	15,0	106,7	96,6	-	20,6	
				-	100	22,1	
63	6	15,0	142,7	122,6	-	19,7	
					126	20,8	
80	4	15,0	214,5	156,6	-	16,8	
					160	17,6	
100	2,5	15,0	343,6	196,6	-	13,3	
					200	13,7	
B	20	20	13,5	37,1	36,6		19,0
						40	22,9
	25	18,5	13,5	40,3	46,6	-	22,7
						50	26,3
	32	13,5	13,5	56,2	60,6	-	21,6
						64	24,1
	40	8,5	13,5	90,3	76,6	-	17,2
						80	18,8
50	7	13,5	109,9	96,6	-	18,0	
					100	19,3	
63	5,5	13,5	140,2	122,6	-	18,0	
					126	19,1	
80	3,5	13,5	220,7	156,6	-	14,7	
					160	15,4	
100	2,5	13,5	309,2	196,6	-	13,3	
					200	13,7	

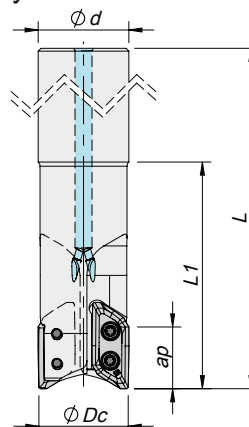
* During helical interpolation do not exceed maximum pitch.

77090 Cutters

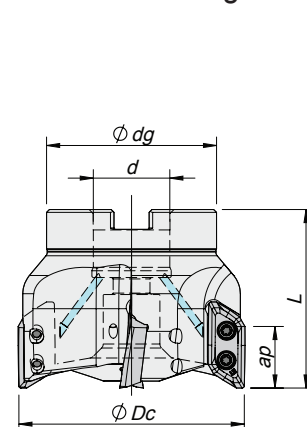


$K_r = 90^\circ$ $\gamma_p = +7^\circ \sim +12^\circ$

Cylindrical Shank



Arbor Mounting



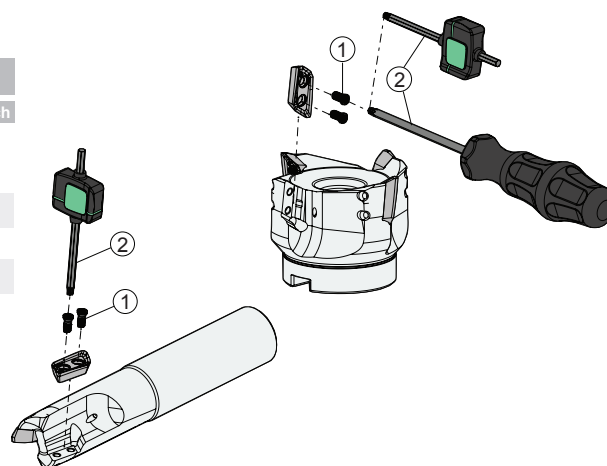
	Order Code	Reference		Dimensions (mm)						Specifications			Insert Radius	Stock
				ϕDc	ϕd	ϕDg	L	L1		Holder Type	a_p (mm)	rpm (max)		
Cylindrical	181069800	032E77090-02-06-032170-A	2	32	32	-	170	80	0,8	A	21,5	41.000	0,8 ~ 3,2	
	181093900	040E77090-02-06-040170-A	2	40	40	-	170	80	0,9	A		36.000		
	181094000	032E77090-02-06-032170-B	2	32	32	-	170	80	0,8	B	21,0	41.000	4,0 ~ 5,0	
	181094100	040E77090-02-06-040170-B	2	40	40	-	170	80	0,9	B		36.000		
Arbor	181093000	050A77090-03-07-022050-A	3	50	22	42	50	-	0,4	A		30.000		
	181093100	063A77090-03-07-022050-A	3	63	22	42	50	-	0,5	A		25.000		
	181071600	080A77090-04-07-027063-A	4	80	27	60	63	-	1,2	A	21,5	23.000	0,8 ~ 3,2	
	181093200	100A77090-05-07-032063-A	5	100	32	70	63	-	1,8	A		19.000		
	181093300	125A77090-06-07-040063-A	6	125	40	100	63	-	2,7	A		16.000		
	181093400	050A77090-03-07-022050-B	3	50	22	42	50	-	0,4	B		30.000		
	181093500	063A77090-03-07-022050-B	3	63	22	42	50	-	0,5	B		25.000		
	181093600	080A77090-04-07-027063-B	4	80	27	60	63	-	1,2	B	21,0	23.000	4,0 ~ 5,0	
	181093700	100A77090-05-07-032063-B	5	100	32	70	63	-	1,8	B		19.000		
	181093800	125A77090-06-07-040063-B	6	125	40	100	63	-	2,7	B		16.000		

Stock items / Itens de stock Available under request / Disponibilidade sob consulta / Disponible bajo consulta

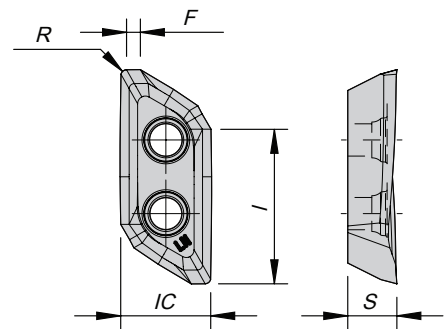
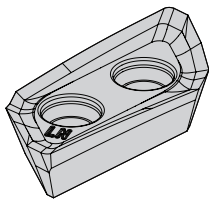
Note: This solution is available from January of 2014.

Screws & Keys

Item	1	2	Torque Value	Order Separately	
				Screw	DIN 6368 Wrench
E77090 - 32 - 40	P0401200	XT15	3,0		
A77090 - 50 - 80	P0401200	XT15	3,0	-	-
A77090 - 100	P0401200	PT15	3,0	J0164110	SD6368-16
A77090 - 125	P0401200	PT15	3,0	J0204610	SD6368-20



XDGX 22M7.. Inserts



(1) Geometry Code	(2) Grade Code	PH0910	Dimensions (mm)					Holder* Type
			IC	S	I	R	F	
1111618	XDGX 22M708		13,00	7,0	22,0	0,8	2,0	A
1111619	XDGX 22M716		13,00	7,0	22,0	1,6	1,2	A
1111620	XDGX 22M720		13,00	7,0	22,0	2,0	0,8	A
1111621	XDGX 22M732		13,00	7,0	22,0	3,2	0,6	A
1111622	XDGX 22M740		13,00	7,0	22,0	4,0	0,9	B
1111623	XDGX 22M750		13,00	7,0	22,0	5,0	0,4	B

First choice / 1ª escolha / 1ª opción Stock items / Itens de stock Available under request / Disponibilidade sob consulta / Disponible bajo consulta

Order code = (1) Geometry Code + (2) Grade Code

* Please take into consideration the holder type (A or B) and the insert corner radius, when choosing the insert.

Note: This solution is available from January of 2014.

Chip Breaker

Chip Breaker	Cutting Edge	Features
Geometry LN Aluminum alloys and non-ferrous		High positive chip-breaker, polished for applications of non ferrous (aluminums, coopers and cooper alloys).

Rec. Cutting Conditions for Shouldering

ISO	HB (Brinell)	Vc (m/min)	Width of Cut a_e (mm)	Depth of Cut a_p (mm)	Feed f_z (mm/t)
		PH0910			
N	Alum. Alloys and Non-ferrous	350 - 1200	$\leq 25\% \varnothing Dc$	$\leq 5,0$	0,35 - 0,40
				5,0 - 10,0	0,30 - 0,35
				10,0 - 15,0	0,25 - 0,30
				15,0 - 20,0	0,20 - 0,25
			$< 50\% \varnothing Dc$	$\leq 5,0$	0,35 - 0,40
				5,0 - 10,0	0,30 - 0,35
				10,0 - 15,0	0,25 - 0,30
				15,0 - 20,0	0,20 - 0,25
			$\leq 75\% \varnothing Dc$	$\leq 5,0$	0,30 - 0,35
				5,0 - 10,0	0,25 - 0,30
				10,0 - 15,0	0,20 - 0,25
				15,0 - 20,0	0,15 - 0,20

Rec. Cutting Conditions for Slotting

ISO	HB (Brinell)	Vc (m/min)	Width of Cut a_e (mm)	Depth of Cut a_p (mm)	Feed f_z (mm/t)	
		PH0910				
N	Alum. Alloys and Non-ferrous	30 - 130	350 - 1200	100% $\varnothing Dc$	$\leq 5,0$	0,25 - 0,35
					5,0 - 10,0	0,20 - 0,30
					10,0 - 15,0	0,15 - 0,25
					15,0 - 20,0	0,10 - 0,20

(1) Cutting conditions should be adjusted according to the machine and work rigidity.

(2) It's possible to occur vibrations in certain cases. Please reduce depth of cut and/or reduce cutting conditions in following cases:

- Using long shank;
- Using long overhang with arbor type;
- Application with poor clamping rigidity or using a low rigidity machine;

(3) Use internal coolant supply.

Operational Guide

- Only use the inserts and parts provided by Palbit with this tool.

Use of the correct insert clamp screws is especially important to ensure overall tool safety.

Do not use damaged or worn clamp screws.

- When tightening the clamp screws, follow the order in Figure 1.

The recommended torque value is 3,0 Nm.

- The maximum allowable revolutions are shown in Table 1.

Ensure that the cutter operates under the maximum allowable revolutions.

The maximum allowable revolutions for safety purposes are determined in accordance with ISO 15641

(Milling Cutters for high speed machining – Safety requirements).

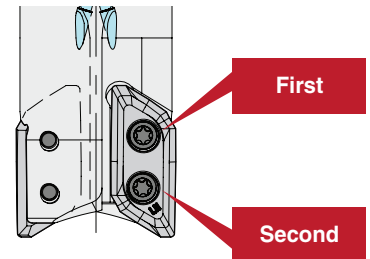


Figure 1

Table 1 - Maximum allowable revolutions:

$\varnothing Dc$	$\varnothing 32$	$\varnothing 40$	$\varnothing 50$	$\varnothing 63$	$\varnothing 80$	$\varnothing 100$	$\varnothing 125$
RPM (min^{-1})	41.000	36.000	30.000	25.000	23.000	19.000	16.000

- Even when operating under the maximum allowable spindle speed, if the spindle speed is equal or higher than the values shown in Table 2.

It's recommended the balance quality (with the arbor or chuck) according ISO 1940.

Table 2 - Maximum revolutions when balancing with the arbor or chuck has not been achieved:

$\varnothing Dc$	$\varnothing 32$	$\varnothing 40$	$\varnothing 50$	$\varnothing 63$	$\varnothing 80$	$\varnothing 100$	$\varnothing 125$
RPM (min^{-1})	9.500	7.600	6.000	4.800	3.800	3.000	2.400

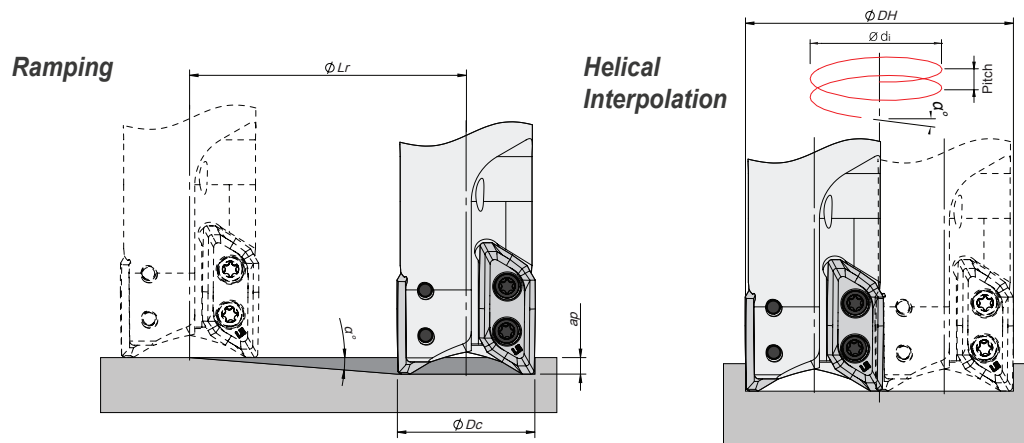
- When setting the spindle speed, take into consideration the maximum allowable revolutions of the arbor or chuck.

- Use the specified set bolt when using the arbor type with internal coolant supply.

Grades

Grades	Information
PH0910	Uncoated carbide grade suitable for milling of aluminium alloys combined with high positive geometries.

Ramping and helical Interpolation



Holder Type	ϕDc	Ramping			Helical Interpolation		
		Max. Ramp α°	Max. a_p	Min. Lr	ϕDH (min)	ϕDH (max)	Max. Pitch/Rev.
A	32	19	21,5	62,4	59,0	-	29
					-	64	34
	40	13	21,5	93,1	75,0	-	25
					-	80	29
	50	9	21,5	135,7	95,0	-	22
					-	100	24
	63	7	21,5	175,1	121,0	-	22
					-	126	24
80	5	21,5	245,7	155,0	-	20	
				-	160	21	
100	4	21,5	307,5	200,0	-	21	
				-	200	21	
125	3	21,5	410,2	248,4	-	20	
				-	248	20	
B	32	18	21,0	64,6	59,0	-	27
					-	64	32
	40	11	21,0	108,0	75,0	-	21
					-	80	24
	50	8	21,0	149,4	95,0	-	19
					-	100	22
	63	6	21,0	199,8	121,0	-	19
					-	126	20
80	4	21,0	300,3	155,0	-	16	
				-	160	17	
100	3	21,0	400,7	200,0	-	16	
				-	200	16	
125	2	21,0	601,4	248,4	-	13	
				-	250	13	

* During helical interpolation do not exceed maximum pitch.

Case Studies - Improved productivity and Tool Life / Shortened Machining Time

ALUPro 76090

G-AlSi5Mg (3.2341)	
<p>Pocketing</p> <p>$D_c = 20$ 2 Flutes</p> <p>$V_c = 900$ m/min ($n=14300$ min⁻¹)</p> <p>$f_z = 0,20$ mm/t ($V_f=5720$ mm/min)</p> <p>$a_p \times a_e = 8,0 \times 20$ mm</p> <p>Wet</p> <p>XDGX 15M508 PDFR-LN PH0910</p>	
ALUPro 76090	<p>9 workpieces done</p>
Competitor A	<p>4 workpieces done</p>
<p>[Competitor A]</p> <p>$D_c = 20$ 2 Flutes</p> <p>$V_c = 750$ m/min ($n=11900$ min⁻¹)</p> <p>$f_z = 0,2$ mm/t ($V_f=4764$mm/min)</p> <p>$a_p \times a_e = 5 \times 15$ mm</p>	<p>[User Comments]</p> <p>Compared with conventional products, tool rigidity is high, obtaining an excellent surface finish as well as cutting performance.</p>

ALUPro 77090

AlMg4.5Mn (3.3547)	
<p>Shouldering</p> <p>$D_c = 32$ 2 Flutes</p> <p>$V_c = 1000$ m/min ($n=9950$ min⁻¹)</p> <p>$f_z = 0,20$ mm/t ($V_f=5970$ mm/min)</p> <p>$a_p \times a_e = 15 \times 8$ mm</p> <p>Wet</p> <p>XDGX 22M708 PDFR-LN PH0910</p>	
	<p>[User Comments]</p> <p>With this solution we achieved excellent results in wall accuracy, that was under 0,007 mm.</p>

