

AL INTEG

HPAS

Aluminium specialized end mills

MILLING
Solid Carbide



CHALLENGES OF MACHINING ALUMINIUM

Nowadays, aluminium alloys dominate many industries, from aerospace to automotive, thanks to their workable properties, such as being lightweight and corrosion-resistant, as well as having excellent thermal and electrical conductivity.

Machining aluminium alloys is generally easier than machining metals such as steel or stainless steel, thanks to aluminium's lower density and excellent machinability. However, several challenges can arise that require attention to ensure a productive solution.

Here are some common difficulties in machining aluminium alloys:

- **Built-up edge (BUE):** Aluminium tends to stick to the cutting tool, resulting in material building up on the tool edge. This has a negative effect on tool life, cutting performance, and surface finish.
- **Chip control:** Aluminium produces long, stringy chips that can wrap around the tool or interfere with the machining process.
- **Thermal expansion:** Aluminium has a high coefficient of thermal expansion, which can cause part distortion during machining and affect dimensional accuracy.
- **Tool wear:** Some high-strength aluminium alloys contain abrasive elements that cause rapid tool wear.

Overcoming these challenges requires selecting the right tools and optimising cutting conditions. With proper planning and refined machining techniques, productivity can be increased, tool life extended and surface quality improved.

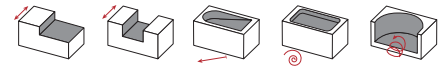
Palbit's new HPAS end mill line is the ideal solution to these challenges.

- **HR35HPAS** Corner radius
- **HF45HPAS** Flat top
- **HB50HPAS** Ball nose



The HPAS range of specialised aluminium end mills has been meticulously developed to meet the demanding requirements of modern aluminium milling. Its wide range of geometries supports a broad spectrum of operations, delivering the high precision, efficiency and performance required to solve several challenges in the aerospace or automotive industries.

HR35HPAS Corner Radius End Mill

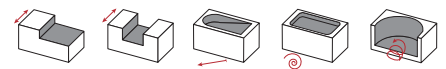


This corner radius end mill provides enhanced tool strength and reduced chipping, making it ideal for roughing and finishing aluminium aerospace components.

- 3 Flutes
- Unequal pitch to minimize vibrations
- Robust cutting edge for high material removal rates



HF45HPAS Flat Top End Mill

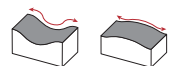


Featuring a flat cutting profile, this end mill is optimized for high material removal rates and excellent flatness in aluminium machining. It's ideal for roughing, pocket milling, and precision flat surface machining in automotive and general engineering applications.

- 3 flutes
- Precision-ground cylindrical edge to minimize chatter and vibration
- Polished w flute shape for efficient chip evacuation

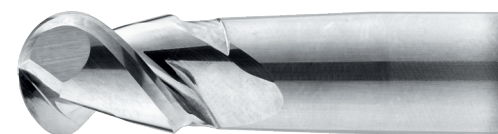


HB50HPAS Ball Nose End Mill



This long-reach ball nose end mill is engineered for demanding applications, combining durability and high material removal rates with an improved finish. Its geometry makes it ideal for 3D contouring and finishing, producing smooth cuts and high-quality surface finishes on curved surfaces, molds, dies, and complex components such as those found in aerospace turbines.

- 2 Flutes
- Reduced neck strengthens deep and long-reach cuts
- High helix geometry enables high-performance shearing



PHT GRADE

The new PHT coating, a TiB_2 -based solution, is specifically engineered for high-performance machining of non-ferrous materials such as aluminium, where conventional coatings often fail due to material adhesion and built-up edge (BUE) formation. Thanks to its unique chemical composition, PHT exhibits virtually no affinity to aluminium and other soft metals, effectively eliminating material sticking and reducing tool wear.

The coating's nanocrystalline, ultra-dense, and exceptionally smooth PVD-deposited structure ensures optimized adhesion to the substrate, combining superior hardness with excellent thermal stability. This powerful combination not only extends tool life but also enables higher cutting speeds and feeds, resulting in improved process reliability, reduced downtime, and maximum productivity.

Moreover, PHT's resistance to oxidation and wear makes it ideal for applications involving elevated temperatures and challenging machining conditions, guaranteeing consistent, high-quality surface finishes and cost-efficient manufacturing.

PHT910 FEATURES

- Low affinity to non-ferrous materials, especially aluminium
- Excellent protection against built-up edges
- Provides maximum lubricity and tool life
- Top performance on aluminium applications

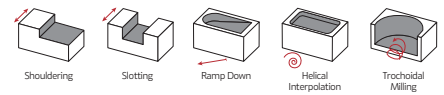
PH0910
 TiB_2 coating

MAIN FEATURES OF HPAS LINE

- Optimized geometry design delivering exceptional performance and setting industry benchmarks in aluminium machining
- Polished flutes ensure efficient chip evacuation with minimal friction
- PHT coating prevents adhesion due to its low affinity for aluminium
- Long tool life with excellent surface finish and low energy consumption



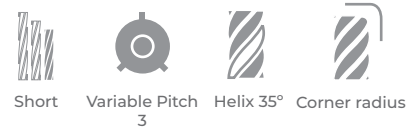
Where innovation meets aluminium machining excellence



HR35HPAS Corner radius



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		⁽²⁾ Grade code		H3	Dimensions Dimensões Dimensiones (mm)				
⁽¹⁾ Order code		Reference Referência Referencia	NOF	PHT910					
HA (Cylindrical)	HB (Weldon)				DC	APMX	RE	DCONMS	OAL
1182443	-	HR35HPAS 3 020 04 R050	3	○	2	4	0,5	6	57
1182444	-	HR35HPAS 3 030 06 R050	3	⊗	3	6	0,5	6	57
1182445	-	HR35HPAS 3 040 08 R050	3	⊗	4	8	0,5	6	57
1182446	-	HR35HPAS 3 050 10 R050	3	○	5	10	0,5	6	57
1182182	-	HR35HPAS 3 060 13 R050	3	⊗	6	13	0,5	6	57
1181710	-	HR35HPAS 3 080 19 R050	3	⊗	8	19	0,5	8	63
1182183	-	HR35HPAS 3 100 22 R050	3	⊗	10	22	0,5	10	72
1182184	-	HR35HPAS 3 120 26 R050	3	⊗	12	26	0,5	12	83
1182447	-	HR35HPAS 3 140 28 R050	3	○	14	28	0,5	14	83
1182292	-	HR35HPAS 3 160 32 R050	3	⊗	16	32	0,5	16	92
1182448	-	HR35HPAS 3 180 36 R050	3	○	18	36	0,5	18	92
1182449	-	HR35HPAS 3 200 40 R050	3	⊗	20	40	0,5	20	104

⊗ Stock item | Produto de stock | Itens de stock

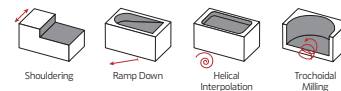
○ Available under request | Disponível sobre consulta | Disponible bajo consulta

End mill order code = (1) Geometry Code + (2) Grade Code

RECOMMENDED CUTTING CONDITIONS Condições de corte recomendadas | Condiciones de corte recomendables

ISO	Material	Vc (m/min)	APMX	Ae	Feed fz (mm/t)												Coolant
					DC (mm)												
					2	3	4	5	6	8	10	12	14	16	18	20	
N	Aluminium <6%Si	400-900	1,5xDC	0,4xDC	0,021	0,029	0,038	0,048	0,057	0,076	0,095	0,114	0,133	0,147	0,161	0,175	Air Emulsion/MQL
	Aluminium <12%Si	300-650	1,5xDC	0,4xDC	0,016	0,023	0,030	0,038	0,046	0,060	0,076	0,091	0,105	0,115	0,128	0,141	
	Aluminium >12%Si	200-350	1,5xDC	0,4xDC	0,014	0,021	0,027	0,034	0,040	0,053	0,067	0,081	0,091	0,101	0,112	0,123	

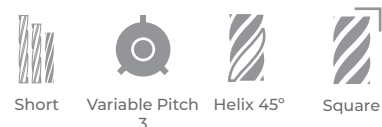
Note: For slotting, reduce the fz by 20% and the APMX to a maximum of 1xDC.



HF45HPAS Flat top



N



		⁽²⁾ Grade code		H3	Dimensions Dimensões Dimensiones (mm)			
⁽¹⁾ Order code		Reference Referência Referencia	NOF	PHT910				
HA (Cylindrical)	HB (Weldon)				DC	APMX	DCONMS	OAL
1182450	-	HF45HPAS 3 020 04	3	⊗	2	4	6	57
1182451	-	HF45HPAS 3 030 06	3	⊗	3	6	6	57
1182333	-	HF45HPAS 3 040 08	3	⊗	4	8	6	57
1182452	-	HF45HPAS 3 050 08	3	⊗	5	10	6	57
1182334	-	HF45HPAS 3 060 13	3	⊗	6	13	6	57
1182335	-	HF45HPAS 3 080 19	3	⊗	8	19	8	63
1182336	-	HF45HPAS 3 100 22	3	⊗	10	22	10	72
1182337	-	HF45HPAS 3 120 26	3	⊗	12	26	12	83
1182453	-	HF45HPAS 3 140 28	3	○	14	28	14	83
1182338	-	HF45HPAS 3 160 32	3	⊗	16	32	16	92
1182454	-	HF45HPAS 3 180 36	3	○	18	36	18	92
1182455	-	HF45HPAS 3 200 40	3	⊗	20	40	20	104

⊗ Stock item | Produto de stock | Itens de stock

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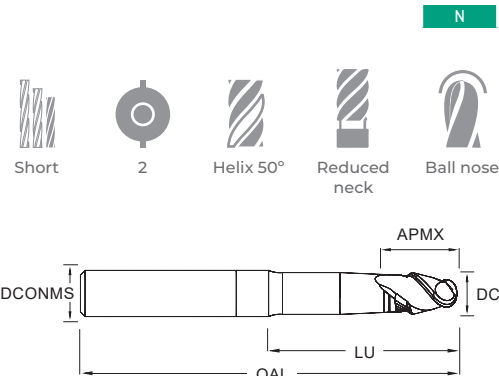
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RECOMMENDED CUTTING CONDITIONS Condições de corte recomendadas | Condiciones de corte recomendables

ISO	Material	Vc (m/min)	APMX	Ae	Feed fz (mm/t)												Coolant
					DC (mm)												
					2	3	4	5	6	8	10	12	14	16	18	20	
N	Aluminium <6%Si	400-900	1,5xDC	0,4xDC	0,021	0,029	0,038	0,048	0,057	0,076	0,095	0,114	0,133	0,147	0,161	0,175	Air Emulsion/MQL
	Aluminium <12%Si	300-650	1,5xDC	0,4xDC	0,016	0,023	0,030	0,038	0,046	0,060	0,076	0,091	0,105	0,115	0,128	0,141	
	Aluminium >12%Si	200-350	1,5xDC	0,4xDC	0,014	0,021	0,027	0,034	0,040	0,053	0,067	0,081	0,091	0,101	0,112	0,123	

Note: For slotting, reduce the fz by 20% and the APMX to a maximum of 1xDC.

HB50HPAS Ball nose



		⁽²⁾ Grade code		H3	Dimensions Dimensões Dimensiones (mm)				
⁽¹⁾ Order code		Reference Referência Referencia	NOF	PHT910					
HA (Cylindrical)	HB (Weldon)				DC	APMX	DCONMS	LU	OAL
1182456	-	HB50HPAS 2 020 02	2	⊗	2	2	6	10	57
1182457	-	HB50HPAS 2 030 03	2	○	3	3	6	12	57
1182339	-	HB50HPAS 2 040 04	2	⊗	4	4	6	20	57
1182458	-	HB50HPAS 2 050 05	2	○	5	5	6	25	57
1182340	-	HB50HPAS 2 060 06	2	⊗	6	6	6	25	57
1182341	-	HB50HPAS 2 080 08	2	⊗	8	8	8	30	63
1182342	-	HB50HPAS 2 100 10	2	⊗	10	10	10	35	72
1182343	-	HB50HPAS 2 120 12	2	⊗	12	12	12	40	83
1182459	-	HB50HPAS 2 140 14	2	○	14	14	14	40	83
1182460	-	HB50HPAS 2 160 16	2	○	16	16	16	50	92
1182461	-	HB50HPAS 2 180 18	2	○	18	18	18	50	92
1182462	-	HB50HPAS 2 200 20	2	○	20	20	20	50	104

⊗ Stock item | Produto de stock | Itens de stock

○ Available under request | Disponível sobre consulta | Disponible bajo consulta

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RECOMMENDED CUTTING CONDITIONS Condições de corte recomendadas | Condiciones de corte recomendables

ISO	Material	Vc (m/min)	APMX	Ae	Feed fz (mm/t)												Coolant
					DC (mm)												
					2	3	4	5	6	8	10	12	14	16	18	20	
N	Aluminium <6%Si	650-1000	0,25xDC	0,3xDC	0,044	0,065	0,090	0,110	0,130	0,180	0,220	0,260	0,029	0,320	0,350	0,380	Emulsion/MQL
	Aluminium <12%Si	400-700	0,25xDC	0,3xDC	0,037	0,057	0,072	0,093	0,113	0,144	0,185	0,227	0,247	0,268	0,288	0,309	
	Aluminium >12%Si	250-500	0,25xDC	0,3xDC	0,035	0,053	0,068	0,087	0,107	0,136	0,175	0,213	0,233	0,252	0,272	0,291	

Note: For slotting, reduce the fz by 20% and the APMX to a maximum of 1xDC.

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Check the QrCode for more information



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