

1 Material group		2 Application	3 High-performance application	4 Cutting speed	5 Universal application	4 Cutting speed			
Steel, cast steel	Steels up to 1,200 N/mm <sup>2</sup> (up to 38 HRC)	Coarse stock removal Construction steels, carbon steels, tool steels, non-alloyed steels, case-hardened steels, cast steel, alloyed steels	STEEL	450–750 m/min	1	600–900 m/min			
			STEEL HC-FEP	450–900 m/min					
			ALLROUND	450–750 m/min					
			Hardened, heat-treated steels over 1,200 N/mm <sup>2</sup> (over 38 HRC)	Tool steels, tempering steels, alloyed steels, cast steel	ALLROUND HC-FEP	450–900 m/min	3 PLUS	450–600 m/min	
					3 PLUS HC-FEP	450–750 m/min			
					TOUGH/TOUGH-S	250–600 m/min			
	-	-			MICRO	600–750 m/min	-	-	
					EDGE	600–900 m/min			
					3 PLUS	450–600 m/min			
			-	-	STEEL	450–750 m/min	3	250–350 m/min	
					STEEL HC-FEP	450–900 m/min			
					ALLROUND	250–450 m/min			
-	-	ALLROUND HC-FEP			250–600 m/min	4	-		
		3 PLUS HC-FEP			250–450 m/min				
		TOUGH/TOUGH-S			250–350 m/min				
		-	-	MICRO	450–600 m/min	5	350–450 m/min		
				EDGE	600–750 m/min				
				3 PLUS	250–350 m/min				
Stainless steel (INOX)	Rust and acid-resistant steels			Austenitic and ferritic stainless steels	INOX	450–600 m/min	1	250–450 m/min	
					INOX HC-FEP	450–750 m/min			
					ALLROUND	450–600 m/min			
		-	-		MICRO	450–600 m/min	3	250–350 m/min	
					EDGE	600–900 m/min			
					3 PLUS	450–600 m/min			
	-			-	ALU	600–1,100 m/min	1	600–900 m/min	
					ALU HC-NFE	600–1,300 m/min			
					ALLROUND	900–1,100 m/min			
		-	-		EDGE ALU	900–1,100 m/min	3	600–900 m/min	
					NON-FERROUS	600–900 m/min			
					3 PLUS	450–600 m/min			
Soft non-ferrous metals	Aluminium alloys			-	ALU	600–1,100 m/min	-	-	
					ALU HC-NFE	900–1,100 m/min			
					ALLROUND	900–1,300 m/min			
		Brass, copper, zinc	-		EDGE ALU	900–1,100 m/min	3	600–900 m/min	
					NON-FERROUS	600–900 m/min			
					3 PLUS	450–600 m/min			
	Non-ferrous metals			Hard aluminium alloys (high Si content)	-	ALU	600–1,100 m/min	1	600–900 m/min
						ALU HC-NFE	600–1,300 m/min		
						ALLROUND	450–750 m/min		
		Bronze	-			ALLROUND HC-FEP	450–900 m/min	3	450–600 m/min
						ALU	900–1,100 m/min		
						ALU HC-NFE	900–1,300 m/min		
Hard non-ferrous metals				Hard aluminium alloys (high Si content)	-	ALU	600–900 m/min	-	-
						ALU HC-NFE	600–1,100 m/min		
						NON-FERROUS	600–900 m/min		
		Bronze, titanium/titanium alloys, hard aluminium alloys (high Si content)	-			ALU	600–1,100 m/min	3	250–350 m/min
						ALU HC-NFE	600–1,300 m/min		
						ALLROUND	250–450 m/min		
	Titanium alloys			-	ALLROUND HC-FEP	450–600 m/min	4	250–350 m/min	
					MICRO	450–600 m/min			
					EDGE ALU	900–1,100 m/min			
		High-temperature-resistant materials	-		-	EDGE ALU	900–1,100 m/min	3	250–450 m/min
						EDGE	250–450 m/min		
						3 PLUS	250–450 m/min		
-	-			INOX		250–450 m/min	-	-	
				INOX HC-FEP		250–600 m/min			
				3 PLUS		250–450 m/min			
			Cast iron	Grey cast iron, white cast iron	Cast iron with flake graphite EN-GJL (GG), with nodular graphite/nodular cast iron EN-GJS (GGG), white annealed cast iron EN-GJM (GTW), black cast iron EN-GJMB (GTS)	CAST	450–750 m/min	1	600–900 m/min
						ALLROUND	450–900 m/min		
						3 PLUS	450–600 m/min		
-	-					TOUGH/TOUGH-S	250–600 m/min	-	-
						MICRO	600–750 m/min		
						3	450–600 m/min		
		Plastics, other materials		Thermoplastics, fibre-reinforced plastics (GRP/CRP)	-	ALU	600–1,100 m/min	-	-
						ALU HC-NFE	600–1,300 m/min		
						NON-FERROUS	600–1,100 m/min		
Thermoplastics, fibre-reinforced plastics (GRP/CRP) with a fibre content up to 40 % Thermoplastics, fibre-reinforced plastics (GRP/CRP) with a fibre content over 40 %	-					ALU	600–1,100 m/min	-	-
						ALU HC-NFE	600–1,300 m/min		
						EDGE ALU	750–1,100 m/min		
			-	-	PLAST	450–900 m/min	-	-	
					FVK/FVKS	450–900 m/min			
					3 PLUS	450–600 m/min			

**Recommended rotational speed range [RPM]**

To determine the recommended cutting speed range [m/min], please proceed as follows:

- Select the material group to be machined.
- Determine the type of application.
- Select the cut.
- Establish the cutting speed range.

To determine the recommended rotational speed range [RPM], please proceed as follows:

- Select the required burr diameter.
- The cutting speed range and the burr diameter determine the recommended rotational speed range.

Burr dia. [mm]	Cutting speed [m/min]							
	250	350	450	600	750	900	1.100	1.300
1.5	53,000	74,000	95,000	127,000	159,000	191,000	233,000	275,000
2	40,000	56,000	72,000	95,000	119,000	143,000	175,000	206,000
3	27,000	37,000	48,000	64,000	80,000	95,000	117,000	138,000
4	20,000	28,000	36,000	48,000	60,000	72,000	88,000	104,000
6	13,000	19,000	24,000	32,000	40,000	48,000	59,000	70,000
8	10,000	14,000	18,000	24,000	30,000	36,000	44,000	52,000
10	8,000	11,000	14,000	19,000	24,000	29,000	35,000	42,000
12	7,000	9,000	12,000	16,000	20,000	24,000	30,000	35,000
13	6,000	9,000	11,000	15,000	22,500	22,000	27,000	32,000
16	5,000	7,000	9,000	12,000	15,000	18,000	22,000	26,000
20	4,000	6,000	7,000	10,000	12,000	14,000	17,000	20,000
25	3,000	4,000	6,000	8,000	10,000	11,000	13,000	16,000

**Example:**  
TC burr, 3 PLUS HC-FEP cut, burr dia. 12 mm.  
Coarse stock removal on steels up to 1,200 N/mm<sup>2</sup>.  
Cutting speed: 450–750 m/min  
**Rotational speed range: 12,000–20,000 RPM**

**Maximum rotational speed [RPM] for burrs with long shanks**

When working with long-shank burrs, it is crucial that the burr is in contact with the workpiece (or inserted in the bore or slot to be machined) before the drive system is turned on. As a rule, the tool must remain in contact with the workpiece for as long as the machine is running. Failure to observe this procedure may result in shank failure (bending) and hence an increased risk of accidents. If continuous contact between the tool and the workpiece is not guaranteed, the **maximum idling speed** stated in the table **must not be exceeded**.

For safety reasons, the maximum application speeds **with contact with the workpiece** require a reduction in the recommended speed of tungsten carbide burrs with standard shanks. The reduced speeds are stated in the table below.

To determine the recommended rotational speed range [RPM], please proceed as follows:

- Select the required burr diameter.
- For the maximum application speed [RPM] with contact with the workpiece, please refer to the right-hand side of the table.

Burr dia. [mm]	Maximum idling speed [RPM] without contact with the workpiece		Maximum application speed [RPM] with contact with the workpiece	
	Shank length [mm]			
	75	150	75	150
3	10,000	-	31,000	-
6	6,000	8,000	15,000	15,000
8	-	6,000	-	11,000
10	-	4,000	-	9,000
12	-	3,000	-	7,000

**Safety notes:**

Not suitable for robotic or stationary applications. **Risk of bending.** Use only rigid clamping systems/drives.



**PFERD cuts for universal applications**



- 1 cut** (C according to DIN 8033)
- Universal cut coarse.
  - Machining of non-ferrous metals, steel and cast iron.
  - High stock removal.



- 3 cut** (MY according to DIN 8033)
- Universal cut medium.
  - Machining of steel, cast iron, stainless steel (INOX), nickel-based alloys and titanium alloys.
  - High stock removal.
  - Good surface.



- 3 PLUS cut** (MX according to DIN 8033)
- Universal cut medium, cross cut.
  - Similar to 3 cut, but with cross cut.
  - Machining of steel, cast iron, stainless steel (INOX), nickel-based alloys and titanium alloys.
  - High stock removal.



- 4 cut** (MX according to DIN 8033)
- Universal cut medium-fine, cross cut.
  - Machining of stainless steel (INOX), steel and high-temperature-resistant materials such as nickel-based and cobalt-based alloys.
  - High stock removal with short chips.
  - Good surface.



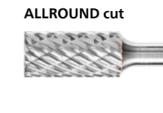
- 5 cut** (F according to DIN 8033)
- Universal cut fine.
  - Fine machining of steel, cast iron, stainless steel (INOX) and high-temperature-resistant materials such as nickel-based and cobalt-based alloys.
  - Good surface.

**HICOAT coatings**



- In general, all PFERD tungsten carbide burrs are also available with HICOAT coatings.
- Improved anti-adhesion characteristics.
- Effective chip discharge.
- Lower thermal loads.
- Increased service life.
- Also suitable for use at higher cutting speeds when compared with uncoated burrs.
- Following cuts are available on stock:
  - 3 PLUS HC-FEP
  - ALLROUND
  - STEEL
  - INOX
  - ALU

**PFERD cuts for high-performance applications**



- ALLROUND cut**
- High stock removal rate on key materials such as steel, cast steel, stainless steel (INOX), non-ferrous metals and cast iron.
  - Similar to the 3 PLUS cut but with a significantly higher stock removal rate.



- STEEL cut**
- Extremely high stock removal rate on steel and cast steel.
  - Smooth milling.
  - Reduced vibration and less noise.



- INOX cut**
- Extremely high stock removal rate on all austenitic, rust and acid-resistant steels, stainless steel (INOX) and soft titanium alloys.
  - Significantly reduced vibration and less noise.



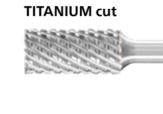
- ALU cut**
- High stock removal rate on aluminium and aluminium alloys, non-ferrous metals and plastics.
  - Smooth milling.



- NON-FERROUS cut**
- High stock removal rate on non-ferrous metals, brass, copper, plastics and fibre-reinforced plastics.
  - Suitable for universal use.



- CAST cut**
- Extremely high stock removal rate on cast iron.
  - Smooth milling.
  - Reduced vibration and less noise.



- TITANIUM cut**
- Outstanding stock removal rate and service life on hard titanium alloys.
  - Significantly increased aggressiveness, large chips and very good chip removal.
  - Reduced vibration and less noise.



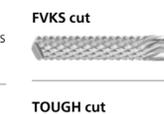
- EDGE cut**
- Creates exact edge shapes – with either 30° or 45° chamfering or a defined radius of 3.0 mm.
  - Safe and comfortable to guide.



- PLAST cut**
- Trimming and contour milling of workpieces made from less hard glass and carbon-fibre-reinforced duroplastics (GRP and CRP with ≤ 40 % fibre content) and fibre-reinforced thermoplastics.
  - Minimized delamination and fraying through straight cut.
  - Highly suitable for use on machines and on robots.
  - Reduced vibration and less noise.



- FVK cut**
- Trimming and contour milling of workpieces made from hard glass and carbon-fibre-reinforced duroplastics (also GRP and CRP > 40 %).



- FVKS cut**
- Similar to the FVK cut.
  - Smooth milling.



- TOUGH cut**
- High stock removal rate on cast iron, steel < 54 HRC.
  - Extremely resistant to impacts.
  - Also suitable for use with high surface contact angles > 1/3 and under impact loads.



- TOUGH-S cut**
- High stock removal rate on cast iron, steel < 54 HRC.
  - Similar to the TOUGH cut, but with smoother milling and shorter chips.
  - Extremely resistant to impacts.
  - Also suitable for use with high surface contact angles > 1/3 and under impact loads.



- MICRO cut**
- Good stock removal on almost all materials < 68 HRC.
  - High surface quality.
  - Reduced vibration and less noise.

**Products made to order**



If you cannot find the solution for your particular application in our extensive catalogue range, we produce PFERD premium-quality burrs, tailor-made to meet the requirements of your job. Further information on PFERD products made to order can be found in our Tool Manual 23, catalogue section 2 on page 100.