



## Machining Values for MAPAL HX Twin-Bladed Reamers

The machining values given are guidelines. The optimum data for the particular machining operation should be calculated from trials or during the operation.

Various factors are decisive in calculating the values exactly:

- rigidity of the whole system: machine, tool and holder
- rigidity of the component part and workpiece clamping, especially at high feed rates

- the quality specifications for the finished workpiece
- the type of guide pads: carbide, Cermet or PCD.

Under optimum conditions, feed rates of up to 1,0 mm can be achieved in steel and grey cast iron. In principle lower feed rates produce a better surface finish, while higher feed rates reduce any vibrations which may occur. By varying the cutting speed, the surface can be improved by an increase, while a reduction produces a positive effect on chip form and wear.

A change in the chip fracturing can be produced by a variation in the cutting depth.

The allowance for reaming should be selected so that the cutting depth in the reaming operation is greater than the rough depth for the pre-machining operation. The most favourable value is a cutting depth of approximately 0,15 mm, in other words 0,3 mm allowance in the diameter.

Material	R <sub>m</sub> N/mm <sup>2</sup>	Feed f* (mm/rev)	Top rake			HX blades for series with internal Cutting lead form R 0,8 and R 1,5 /					
			0°	3°	6°	1		2		3	
			H	A	W	YE	CT3				
Unalloyed steel: structural-, cast-, free cutting-, case hardened steel	< 500	0,2 - 0,6	○	●		40 - 60	40 - 60			60 - 100	110 - 160
Unalloyed/low alloyed steel: structural-, cast-, heat treat-, tool steel, case hardened steel	500 - 900	0,2 - 0,6	○	●		40 - 60	40 - 60			60 - 100	110 - 160
Lead alloyed free cutting steel		0,2 - 0,6	○	●		40 - 60	40 - 60			60 - 100	110 - 160
Unalloyed/low alloyed steel: temp. resisting structural-, heat treat-, nitride-, tool steel	> 900	0,2 - 0,6	○	●		40 - 60	40 - 60			60 - 100	110 - 160
High alloyed steel: Tool steel		0,2 - 0,45	○	●		20 - 40	20 - 40			< 60	< 60
Special alloyed steel, sintered materials										Please ask	
Stainless steel	< 600	0,2 - 0,6	○	●		20 - 40	20 - 40			60	60
Stainless steel	> 600	0,2 - 0,6	○	●		20 - 40	20 - 40			60	60
Stainless/heat resisting steel	> 750	0,2 - 0,6	●	○		20 - 40	20 - 40			60	60
Grey cast iron		0,3 - 0,75	●	○		40 - 60	40 - 60	60 - 100			
Alloyed grey cast iron		0,25 - 0,6	○	●		40 - 60	40 - 60	60 - 100			
Nodular iron ferritic/pearlitic; Malleable iron: GGG40 - GGG55, GTW35 - GTW55, GTS35 - GTS55	< 600	0,25 - 0,6	●	○		40 - 60	40 - 60	60 - 100			
Nodular iron pearlitic; Malleable iron: GGG60 - GGG80, GTW65, GTS65 - GTS70	> 600	0,25 - 0,6	●	○		40 - 60	40 - 60	60 - 100			
Alloyed nodular iron		0,25 - 0,6	●	○		40 - 60	40 - 60	60 - 100			
Titanium, titanium iron		0,15 - 0,4	○	●		< 30	< 30				< 40
Copper alloy, brass, lead alloyed bronze with long chips		0,2 - 0,5	○	●		80 - 100	80 - 100				
Copper, copper alloy, alu-, manganese-, phosphorus bronze with short chips		0,15 - 0,6	●	○		80 - 100	80 - 100				
Alu wrought alloy, magnesium wrought alloy		0,2 - 0,5	○	●		160 - 180	160 - 180				
Alu-casting alloy Si-content < 10 %, magnesium alloy		0,25 - 0,6	○	●		160 - 180	160 - 180				
Alu-casting alloy Si-content > 10 %, magnesium alloy		0,25 - 0,6	○	●		180 - 230	180 - 230				
Plastics										Please ask	
Reinforced plastics										Please ask	

Central supply of lubricant through the tool is advisable in every case. The use of minimal lubrication should only be applied with PCD guide pads. When using the MN 6225 and MN 6227 versions, attention should be particularly paid to good concentricity on the tool head. A value of < 5 µm is recommended.

### Cutting lead form

The HX blades can be supplied with radius cutting leads of R 0,8 and R 1,5. For details on the cutting lead forms, see Page 79.

### Cutting materials

MAPAL offers a broad-based selection of cutting materials so that the right cutting material can be used for every material.

When machining steel with HX reamers, it is advisable to use Cermet and coated Cermet. This will produce excellent surfaces at high cutting speeds.

- 1 Carbide
- 2 coated Carbide
- 3 Cermet
- 4 coated Cermet
- 5 PCD polycrystalline diamond
- 6 PCBN polycrystalline cubic boron nitride

- Preferred radial rake
- Alternative radial rake for special cases
- \* For high cutting speeds and large cutting depth, select small feed rates
- \*\*\* 1 = for steel and long-chip materials  
2 = for cast iron and short-chip materials

without chip groove coolant supply Cutting depth 0,05 - 0,25 mm				HX blades with chip groove for series with internal coolant supply Cutting lead form R 0,8 / Cutting depth 0,05 - 0,25 mm												
Cutting speed for cutting material				Feed f* (mm/rev)	Chip form geometry ***		Cutting speed for cutting material									
4	5	6			2	1	1		2		3	4	5	6		
YL	D	FT01	FT02			H	A	W	YE	CT4	YG	D	FT01	FT02		
110 - 160				0,2 - 0,6		• 60 - 80	60 - 80		80 - 120	130 - 180	130 - 180					
110 - 160				0,2 - 0,6		• 60 - 80	60 - 80		80 - 120	130 - 180	130 - 180					
110 - 160				0,2 - 0,6		• 60 - 80	60 - 80		80 - 120	130 - 180	130 - 180					
110 - 160				0,2 - 0,6		• 60 - 80	60 - 80		80 - 120	130 - 180	130 - 180					
< 60				0,2 - 0,45		• 40 - 60	40 - 60		< 80	< 80	< 80					
									Please ask							
60				0,2 - 0,6		• 40 - 60	40 - 60		80	80	80					
60				0,2 - 0,6		• 40 - 60	40 - 60		80	80	80					
60				0,2 - 0,6		• 40 - 60	40 - 60		80	80	80					
				0,3 - 0,75		• 60 - 80	60 - 80	80 - 120								
				0,25 - 0,6		• 60 - 80	60 - 80	80 - 120								
				0,25 - 0,6		• 60 - 80	60 - 80	80 - 120								
				0,25 - 0,6		• 60 - 80	60 - 80	80 - 120								
				0,25 - 0,6		• 60 - 80	60 - 80	80 - 120								
				0,15 - 0,4		• < 50	< 50			< 60						
				0,2 - 0,5		• 100 - 120	100 - 120									
				0,15 - 0,6		• 100 - 120	100 - 120									
				0,2 - 0,5		• 180 - 200	180 - 200									
				0,25 - 0,6		• 180 - 200	180 - 200									
				0,25 - 0,6		• 200 - 250	200 - 250									
									Please ask							
									Please ask							