SEP0272 – USINAGEM DOS METAIS

AULA-4: Geometria da Cunha Cortante

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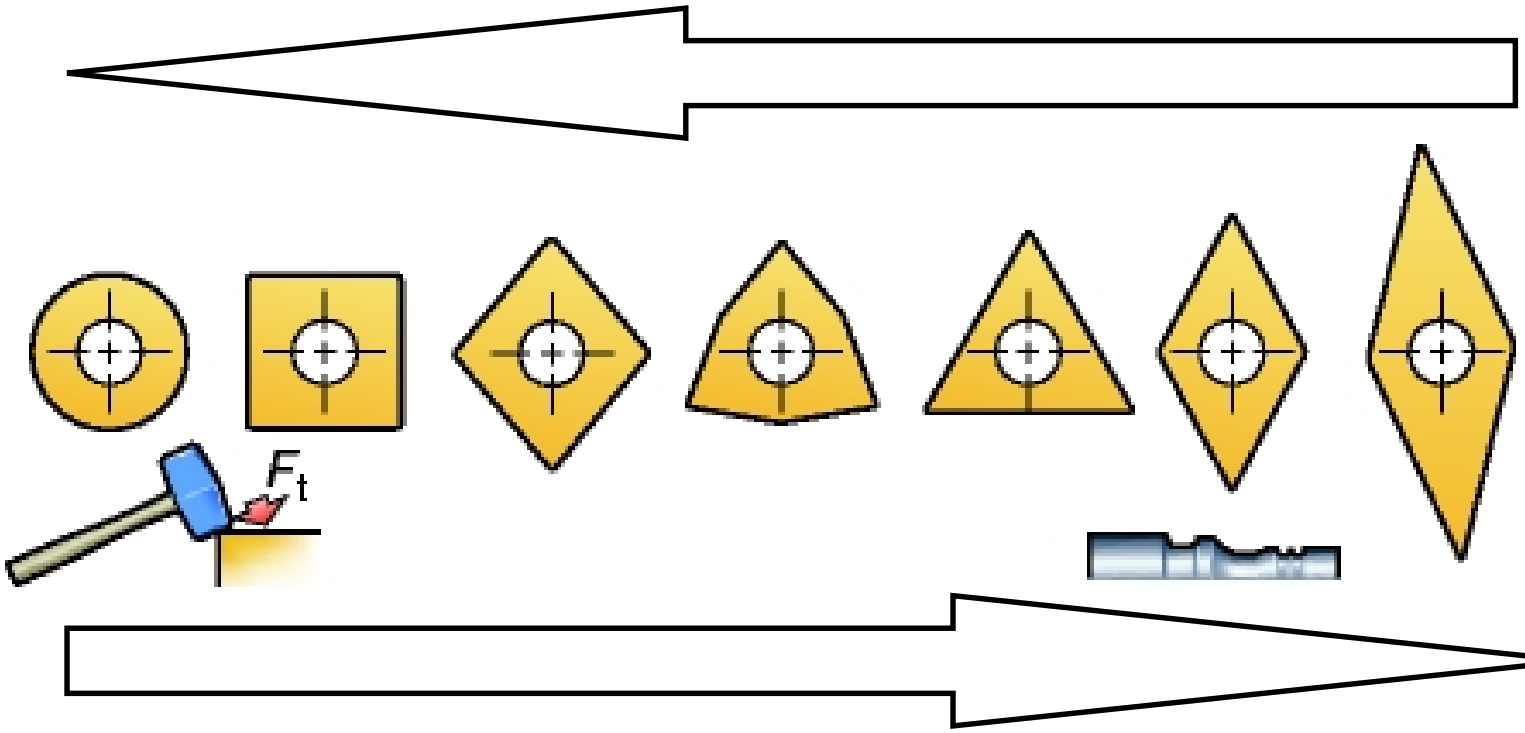
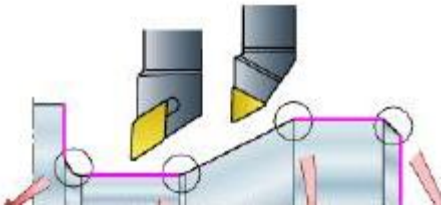
GEOMETRIA DA CUNHA CORTANTE

GEOMETRIA EXTERNA – Resistência mecânica

Aumento de resistência mecânica



Aumento de acessibilidade



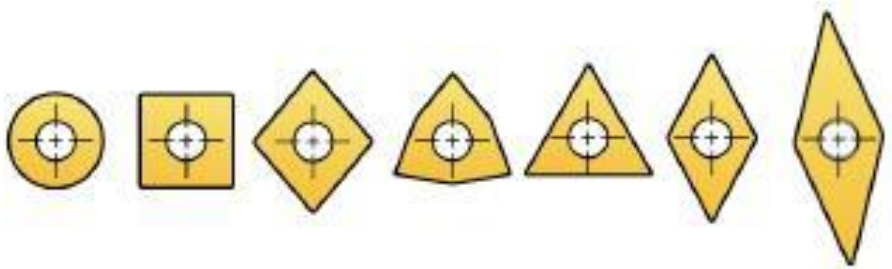
GEOMETRIA DA CUNHA CORTANTE

GEOMETRIA EXTERNA **Aumento de produtividade**

GEOMETRIA DA CUNHA CORTANTE

GEOMETRIA EXTERNA

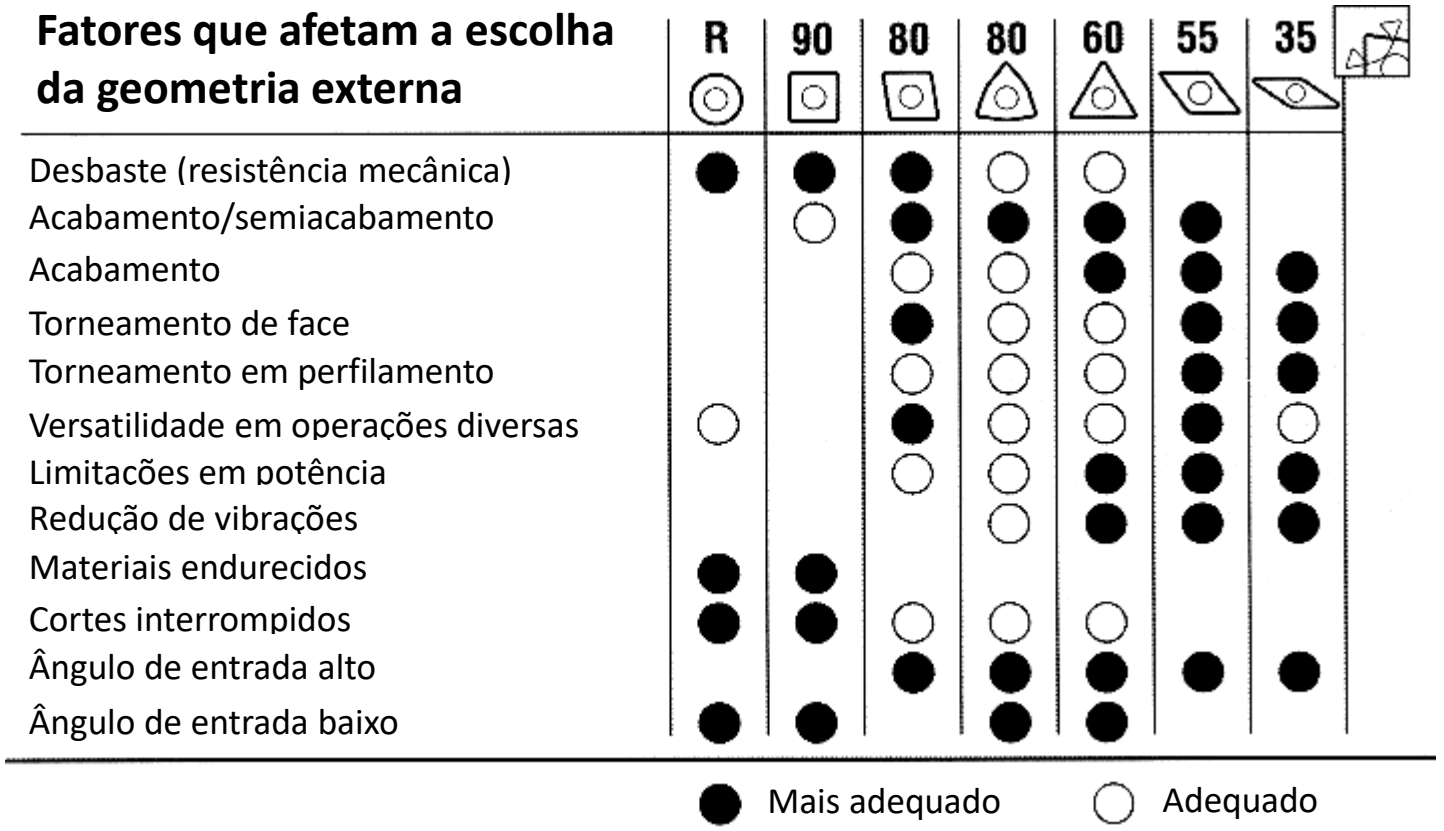
Número de arestas utilizáveis



Forma básica	R	S	C	W	T	D	V
Duas faces	*) ∞	8	4	6	6	4	4
Uma face	∞	4	2	3	3	2	-
Positivo	∞	4	2	3	3	2	2

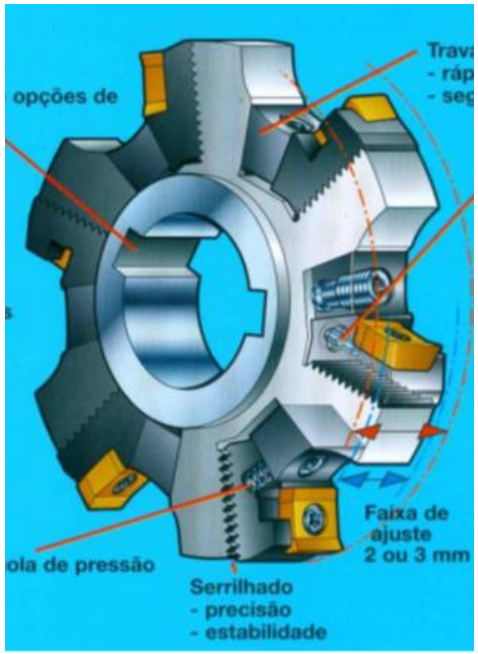
GEOMETRIA DA CUNHA CORTANTE

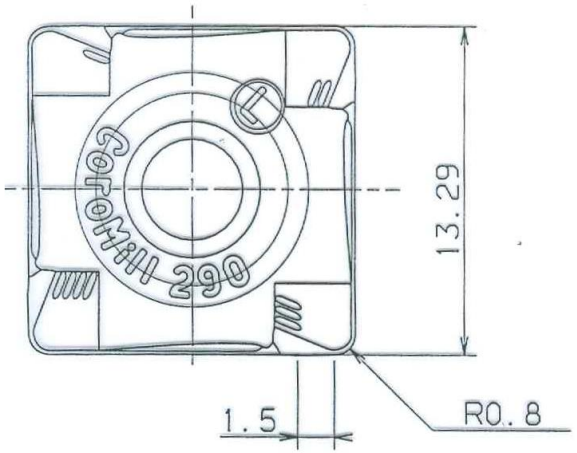
GEOMETRIA EXTERNA - Aplicações

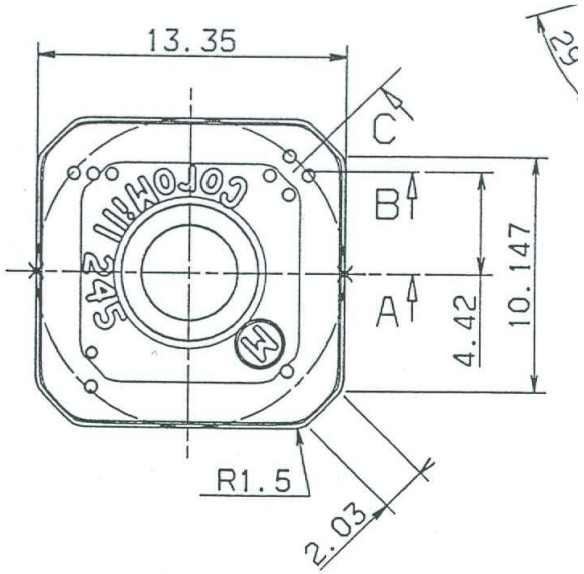


GEOMETRIA DA CUNHA CORTANTE

GEOMETRIA EXTERNA - exemplos

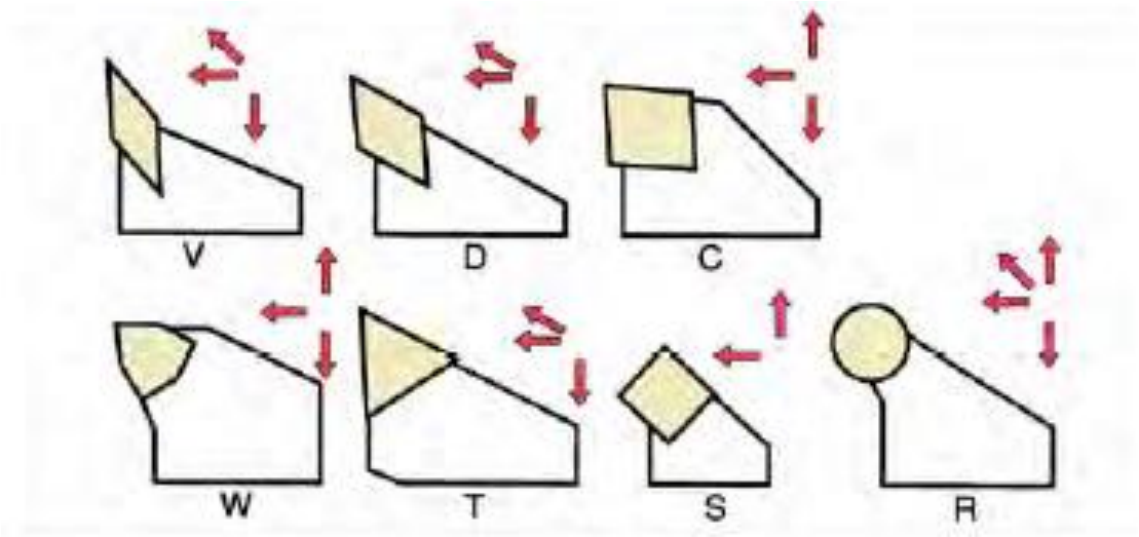


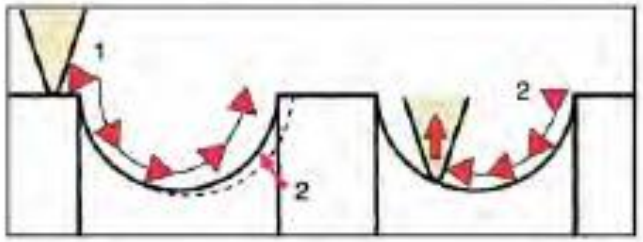


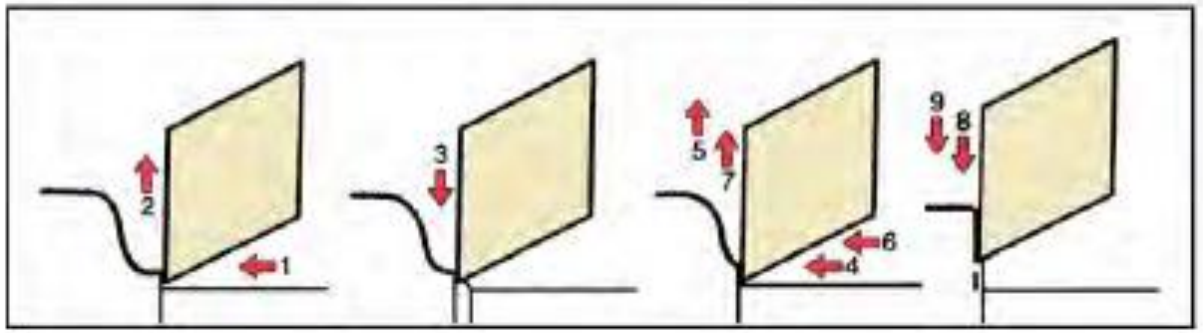


GEOMETRIA DA CUNHA CORTANTE

Acessibilidade - torneamento



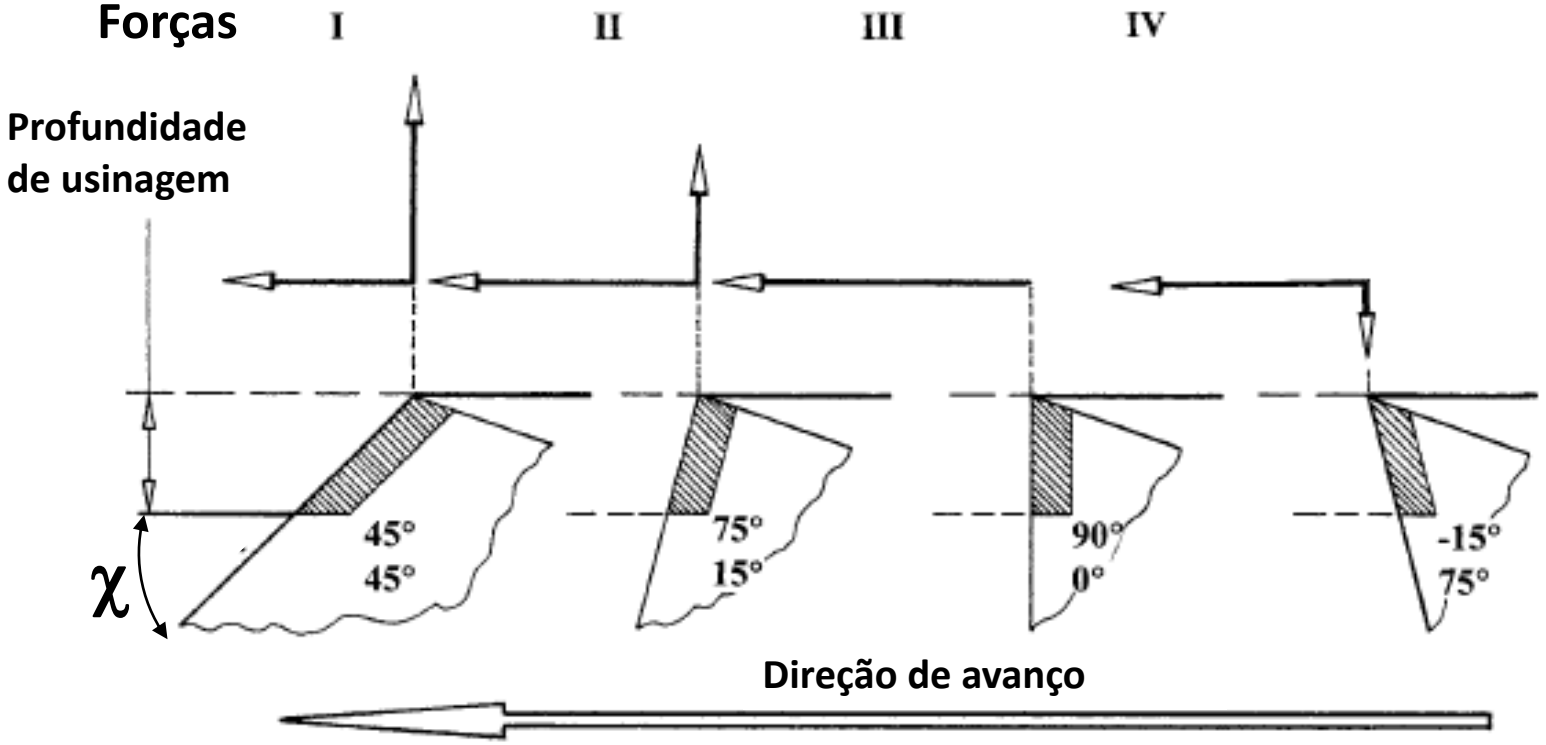




GEOMETRIA DA CUNHA CORTANTE

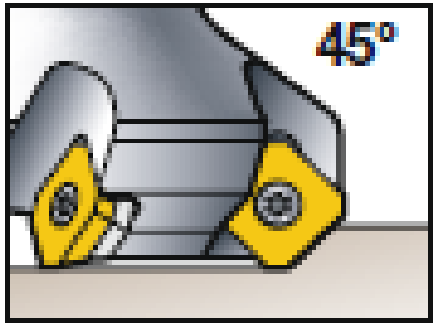
Ângulo de Posição- Torneamento

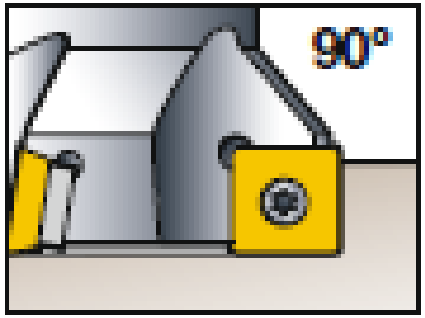
Forças de reação

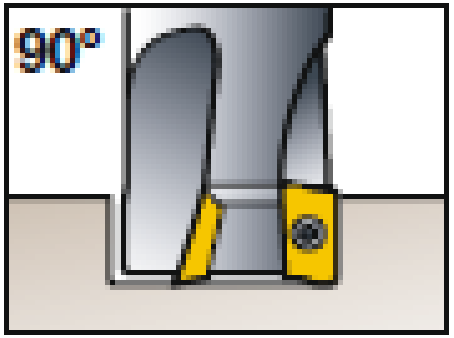


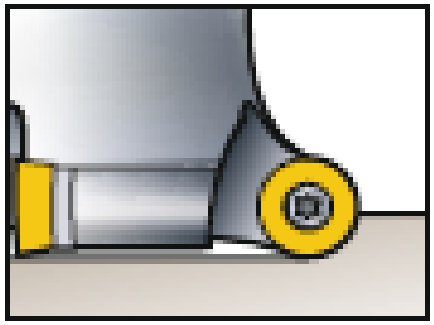
GEOMETRIA DA CUNHA CORTANTE

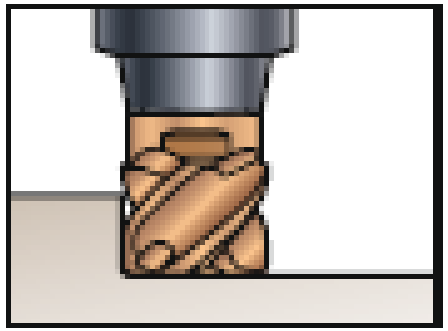
Ângulo de Posição - Fresamento





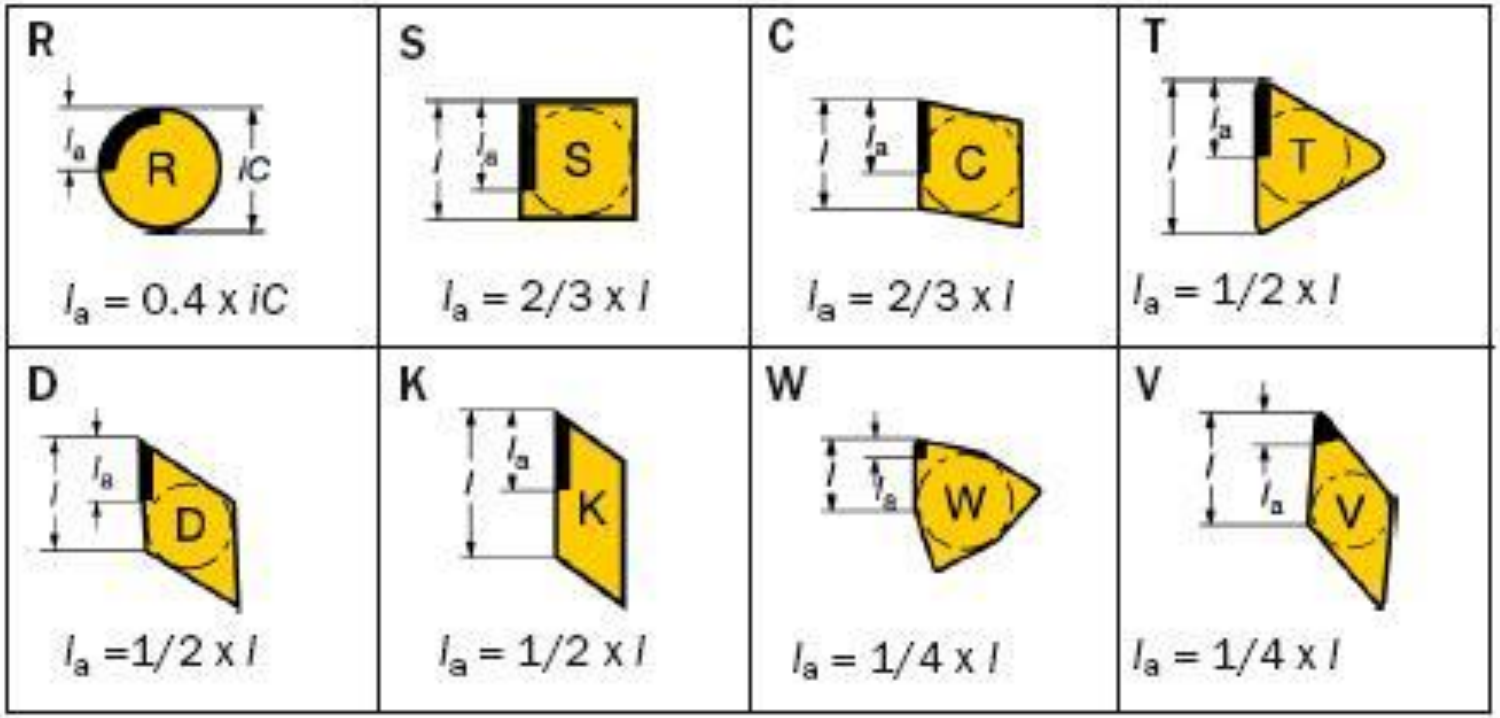






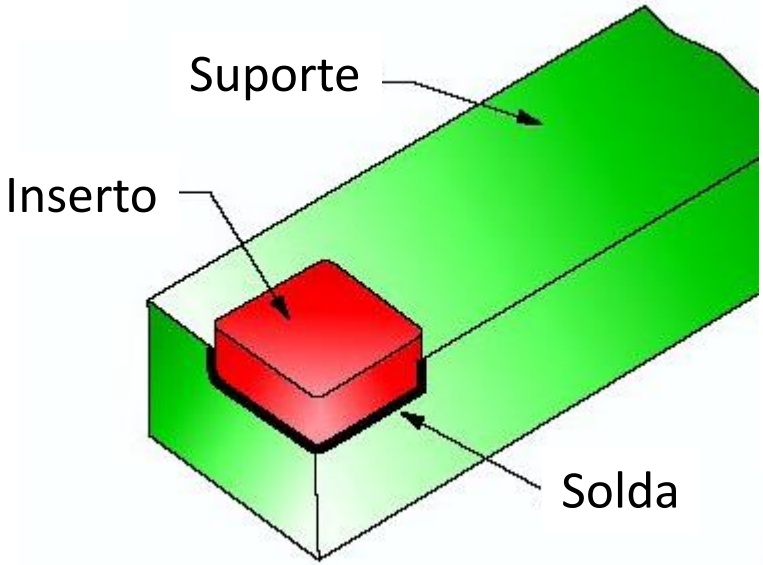
GEOMETRIA DA CUNHA CORTANTE

Máxima Profundidade de Usinagem

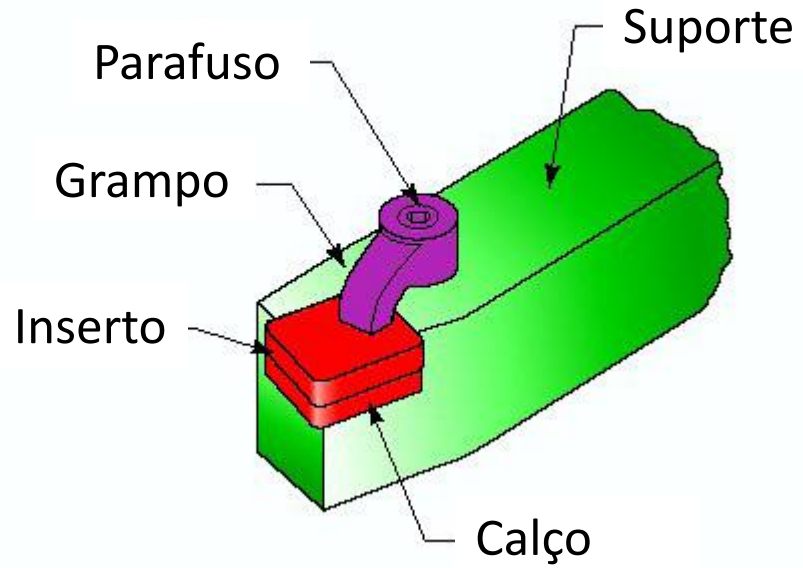


GEOMETRIA DA CUNHA CORTANTE

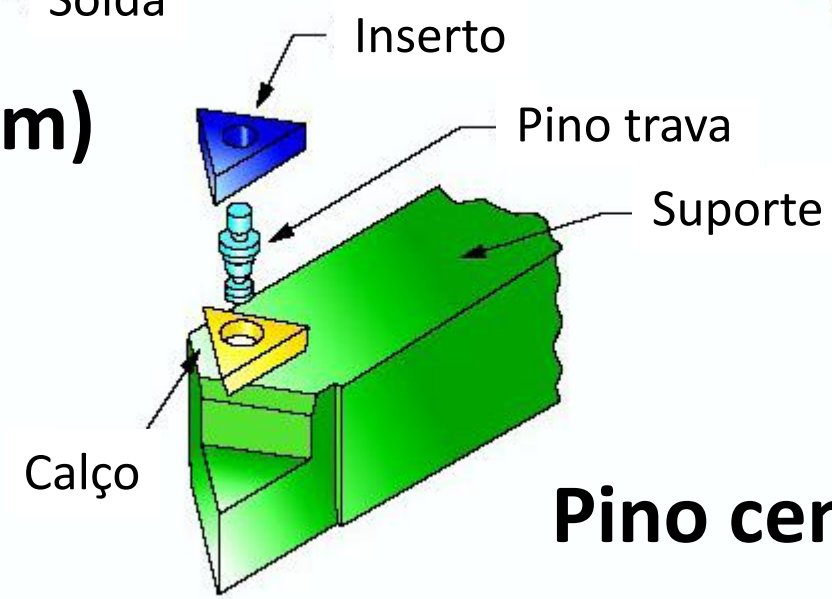
Fixação dos insertos - Torneamento



Solda (brasagem)



Grampo

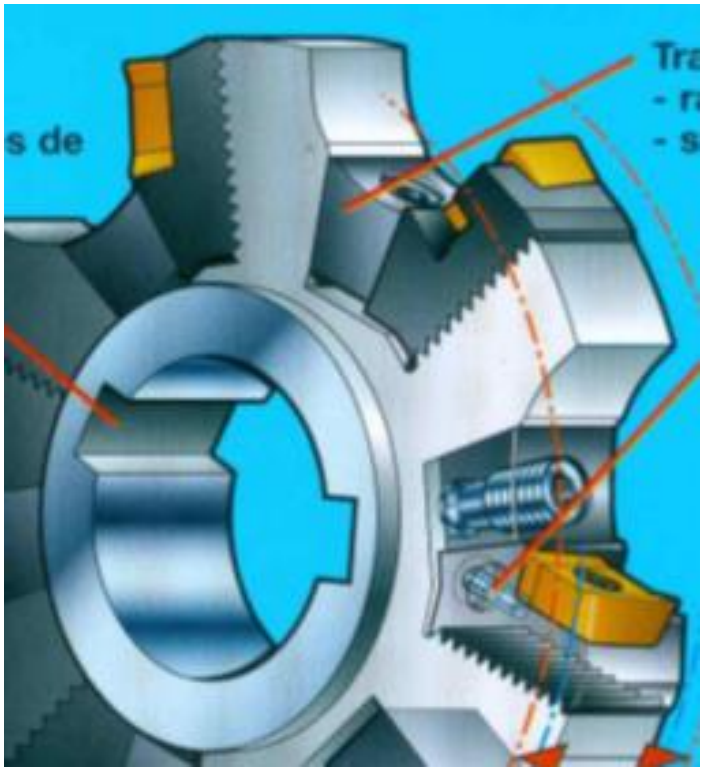


Pino central

GEOMETRIA DA CUNHA CORTANTE

Fixação dos insertos - Fresamento

Parafuso central



Pino central + cunha

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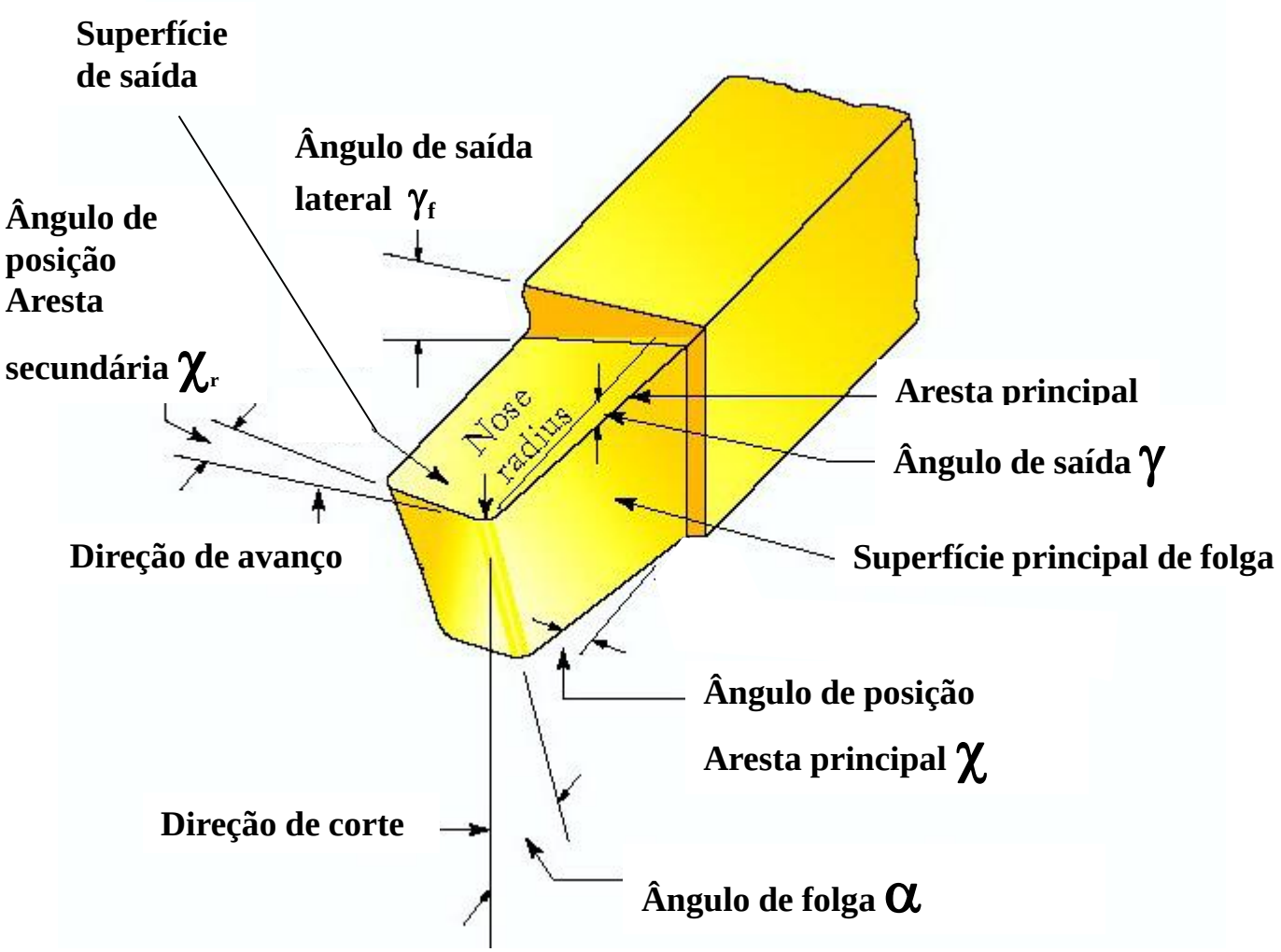
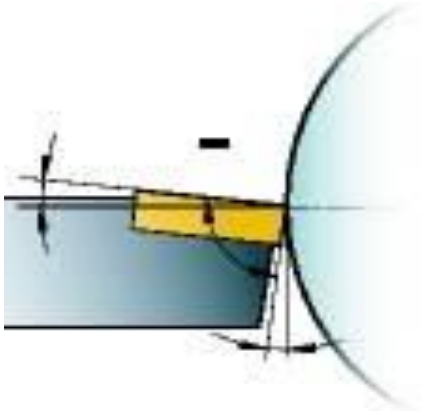
Ângulos e superficies de uma ferramenta

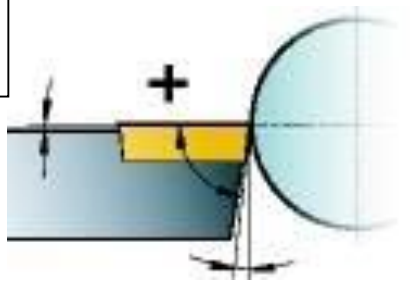


GEOMETRIA DA CUNHA CORTANTE

ÂNGULO DE SAÍDA - Torneamento



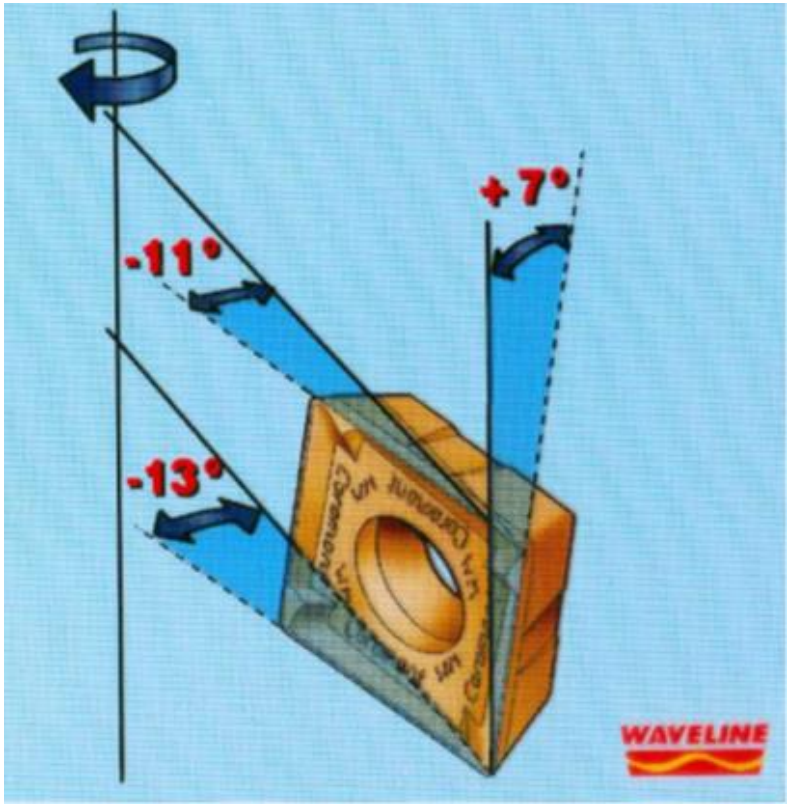
Insertos com dois lados
Alta resistência da cunha
Inserto sem ângulo de folga
Desbastes pesados

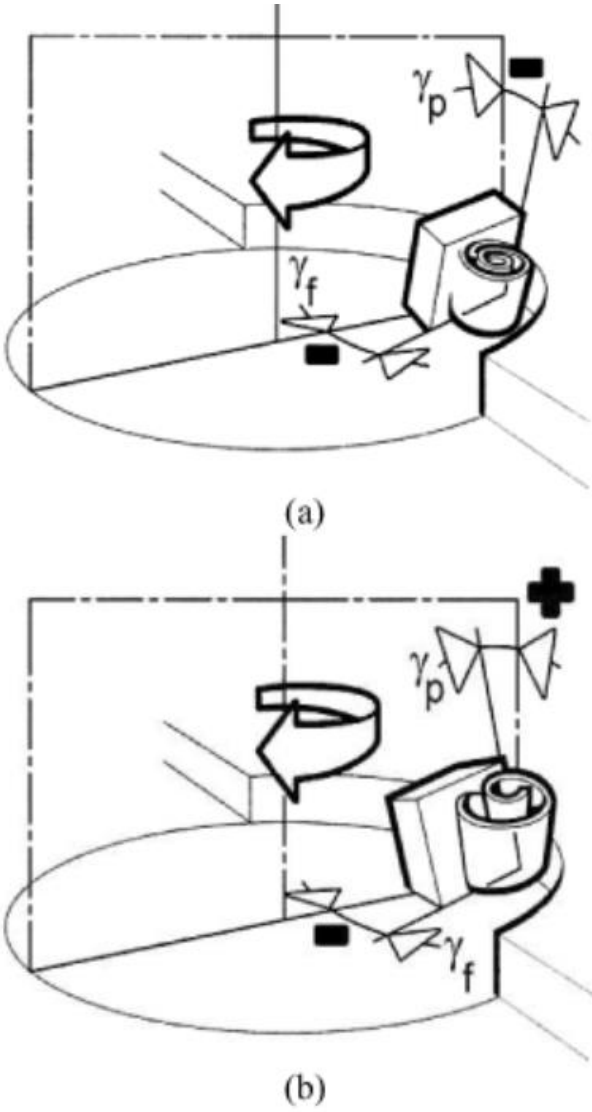


Insertos com um lado
Baixas forças e potência
Cortes de acabamento.

GEOMETRIA DA CUNHA CORTANTE

ÂNGULO DE SAÍDA - Fresamento

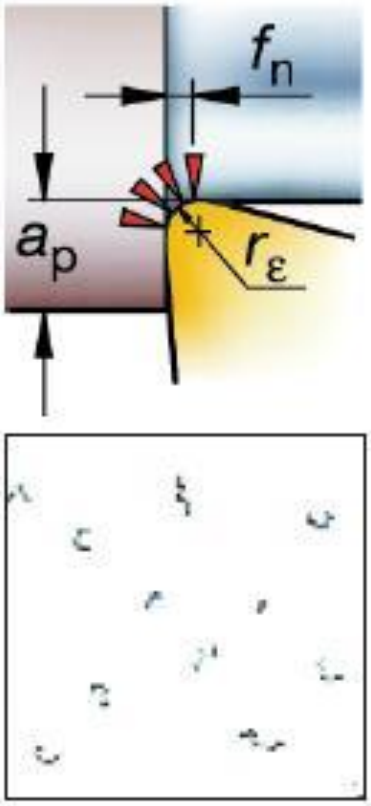




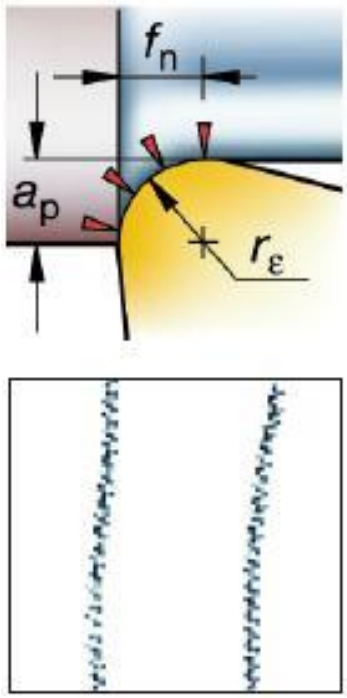
Fresamento:
Ângulo de saída radial
Ângulo de saída axial

GEOMETRIA DA CUNHA CORTANTE

Raio de ponta - Torneamento



- Pequenas profundidades
- Reduz vibrações
- Insertos com menor resistência



- Grandes profundidades
- Grandes avanços
- Arestas robustas
- Aumenta forças radiais

GEOMETRIA DA CUNHA CORTANTE

Raio de ponta

Insertos negativos

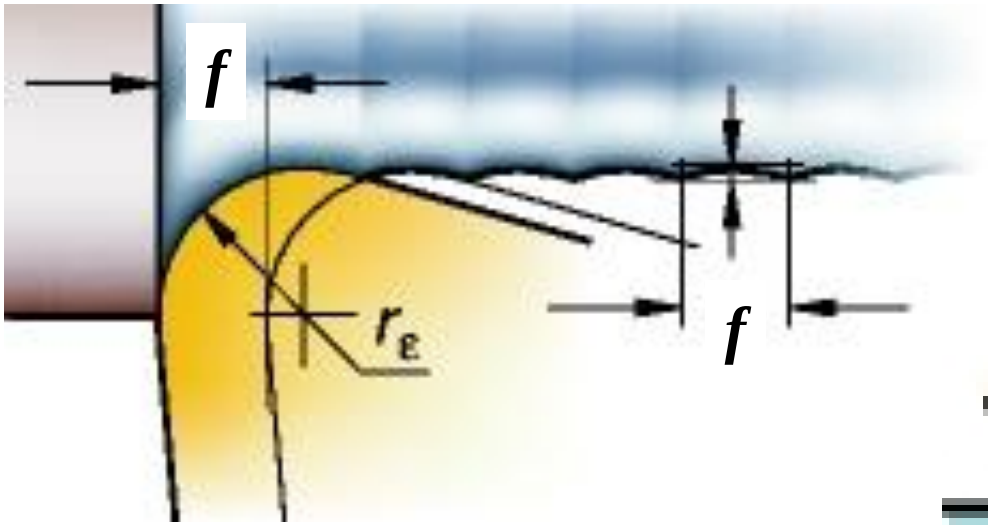
Raio de ponta, mm	0.4	0.8	1.2	1.6	2.4
Max. recomendado mm/rev					
Acabamento	0.25	0.4	0.5	0.7	
Médio	0.3	0.5	0.6	0.8	(1.0)
Desbaste	0.3	0.6	0.8	1.0	1.5

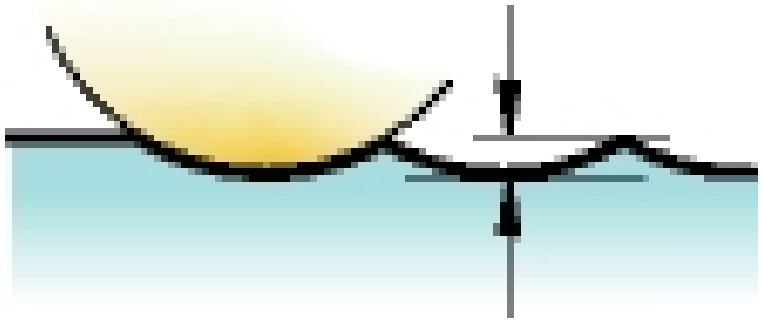
Insertos positivos

Raio de ponta, mm	0.2	0.4	0.8	1.2
Max. recomendado mm/rev				
Acabamento	0.10	0.2	0.3	0.4
Médio	0.15	0.3	0.4	0.5

GEOMETRIA DA CUNHA CORTANTE

Raio de ponta e rugosidade

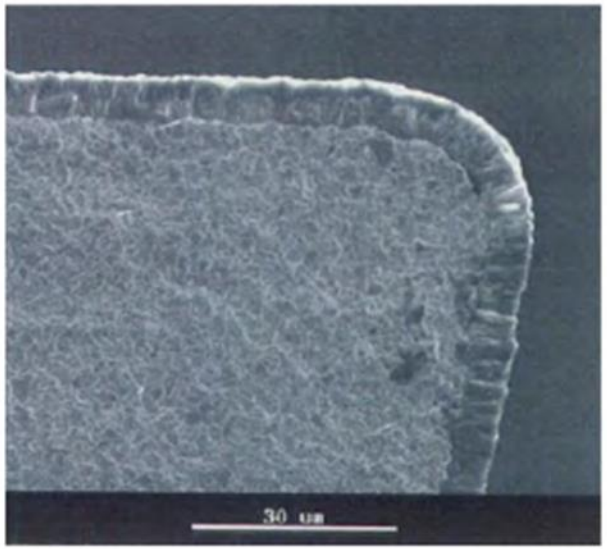


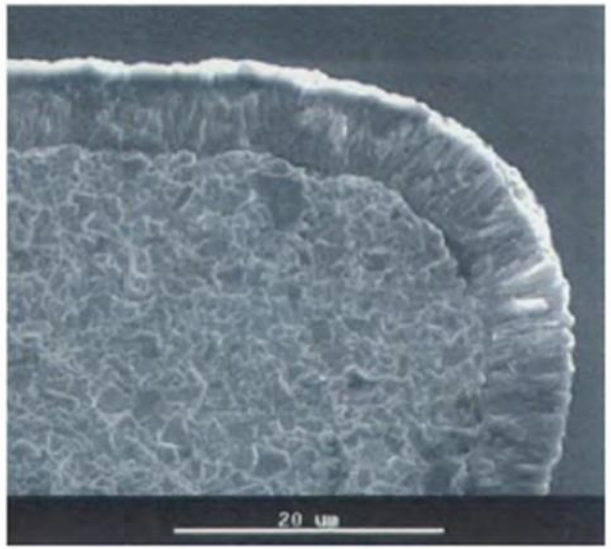


$$R_{max} = \frac{f_n^2}{8 \times r_\varepsilon} \times 1000$$

GEOMETRIA DA CUNHA CORTANTE

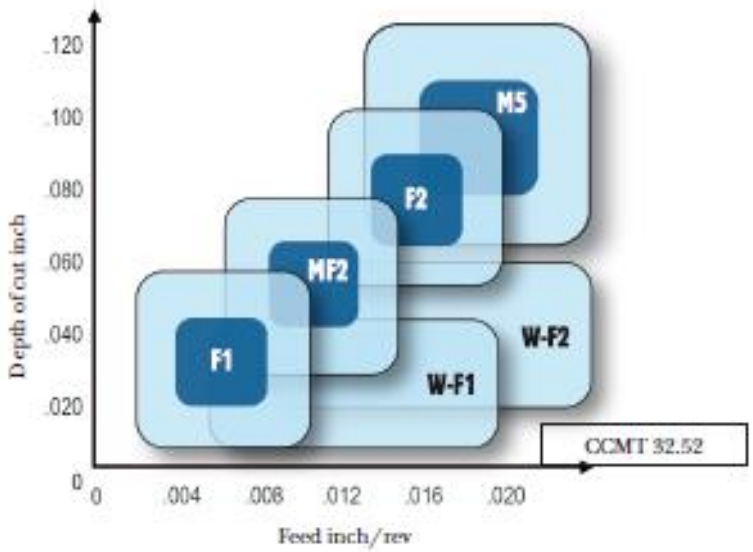
Quebra-cavacos e coberturas

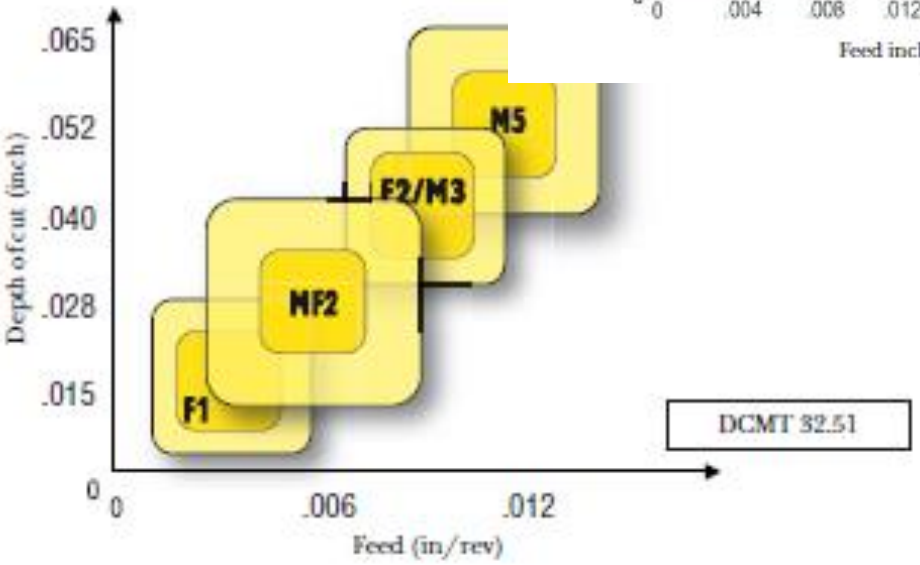


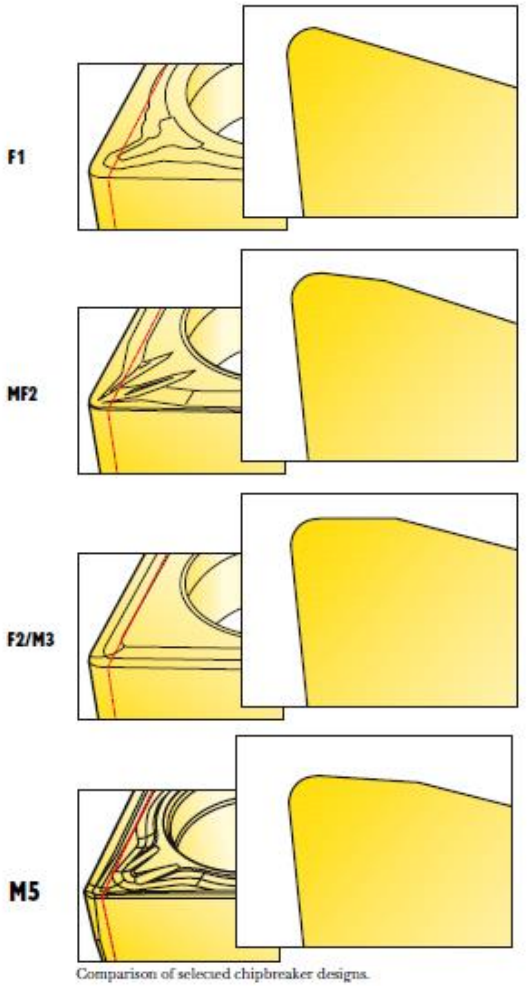


GEOMETRIA DA CUNHA CORTANTE

Quebra-cavacos - Exemplos



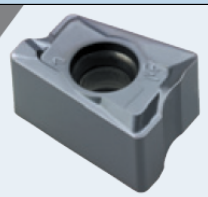
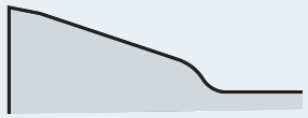




Comparison of selected chipbreaker designs.

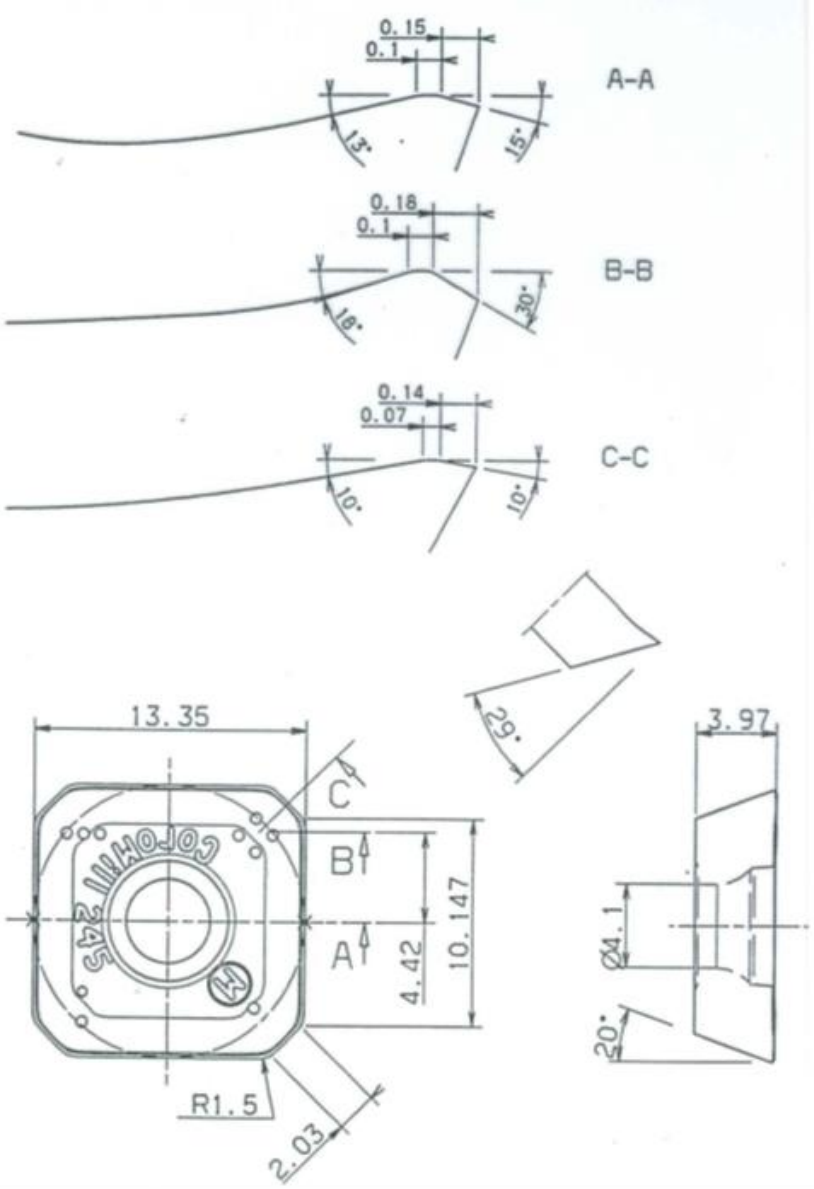
GEOMETRIA DA CUNHA CORTANTE

Quebra-cavacos - Exemplos

Geometry	Cutting edge	Application range
		feed rate (mm/t): 0.04 · 0.063 · 0.10 · 0.16 · 0.25 · 0.4 · 0.63 · 1.0 · 1.6 · 2.5 · 4.0 · 6.3
		depth of cut (mm): 0.1 · 0.16 · 0.25 · 0.4 · 0.63 · 1.0 · 1.6 · 2.5 · 4.0 · 6.3 · 10.0 · 11.6 · 13
MF 		0.05~0.3 ; 1.0~14.0
MM 		0.05~0.3 ; 0.5~14.0
MF 		0.05~0.2 ; 0.5~5.0
MM 		0.05~0.3 ; 0.5~8.0

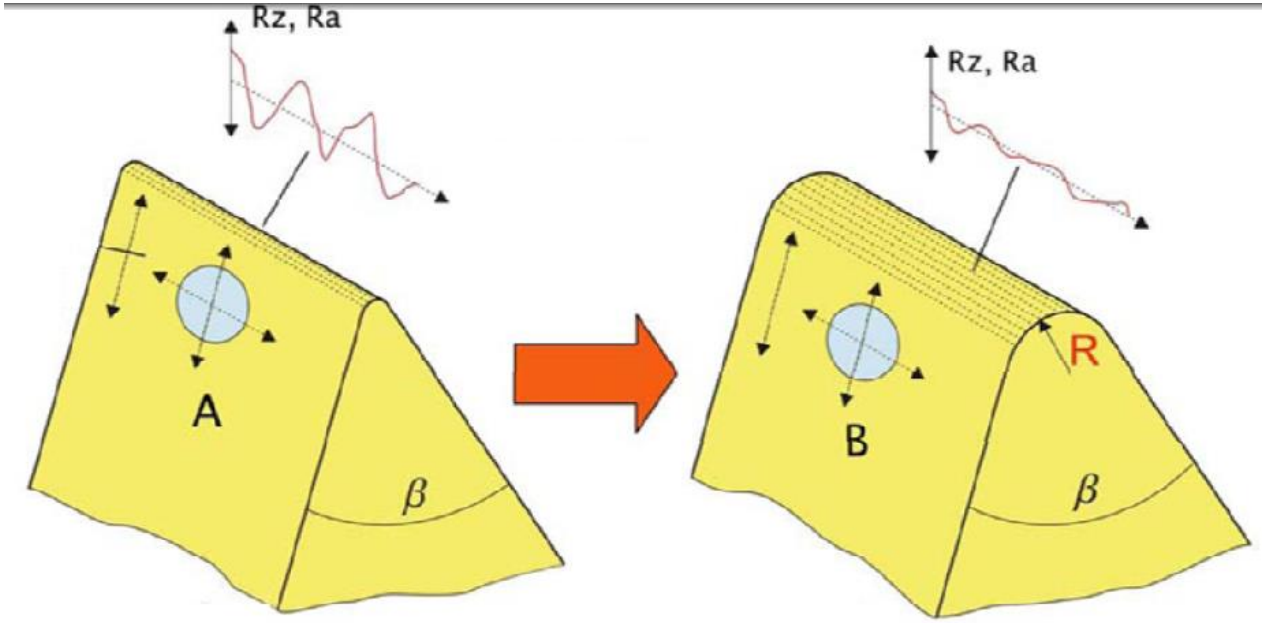
GEOMETRIA DA CUNHA CORTANTE

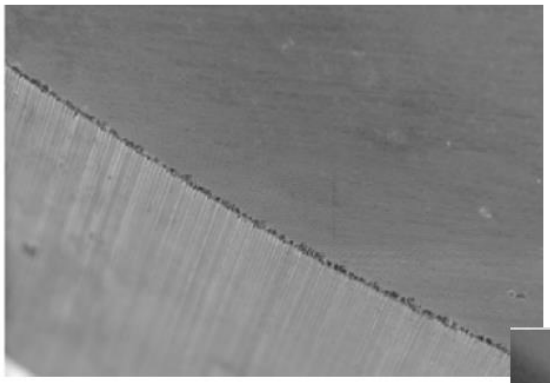
Quebra-cavacos - Exemplos

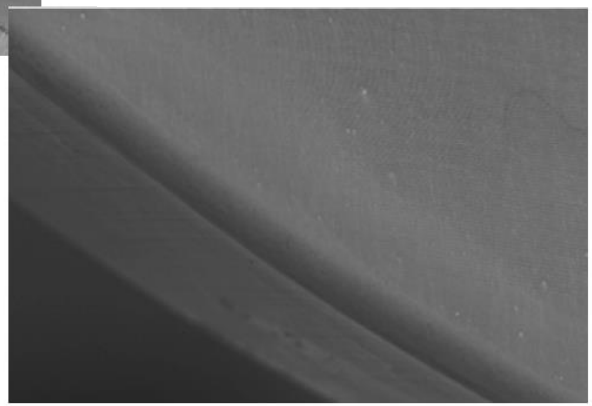


GEOMETRIA DA CUNHA CORTANTE

Raio/chanfro de aresta

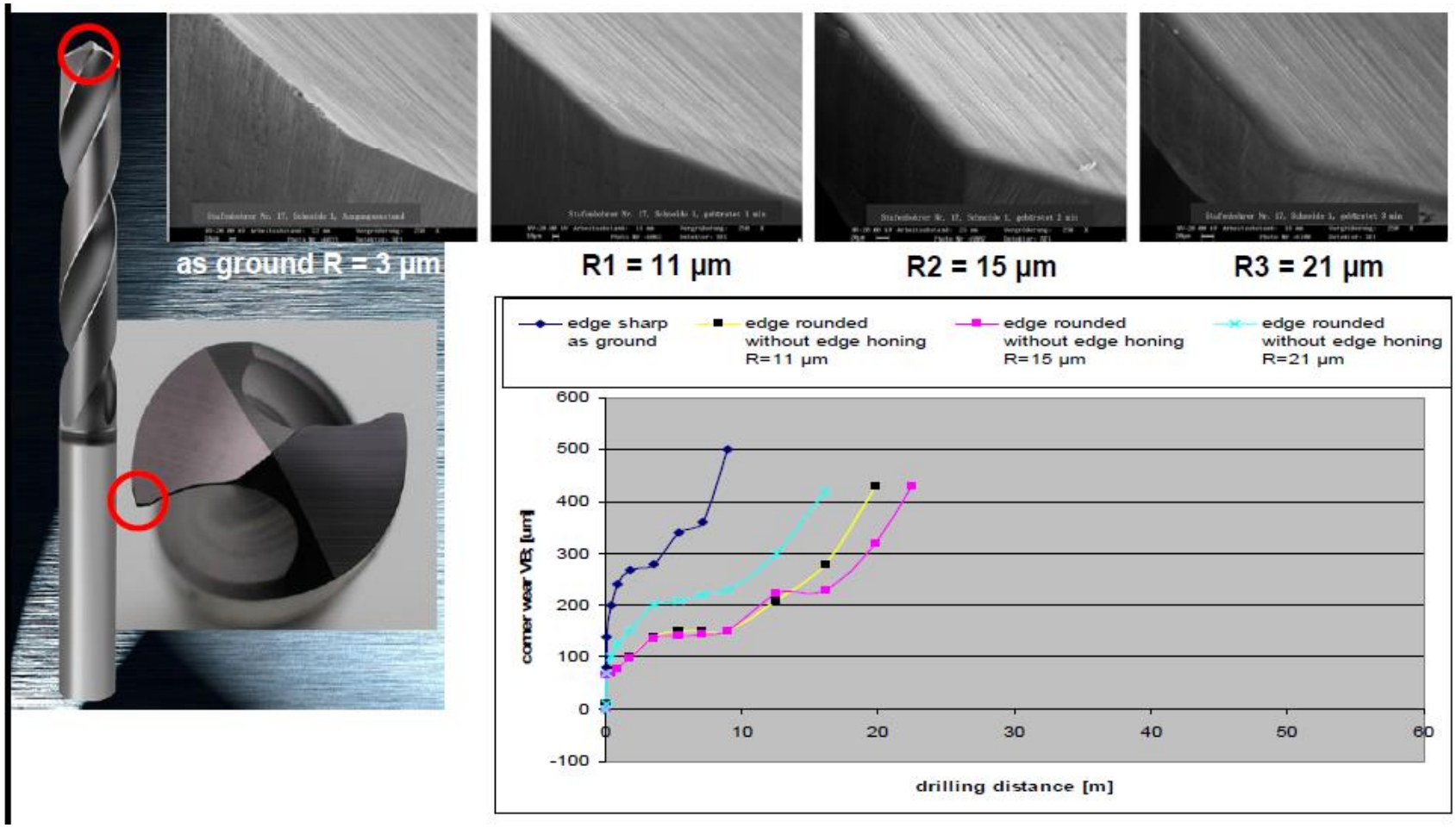






GEOMETRIA DA CUNHA CORTANTE

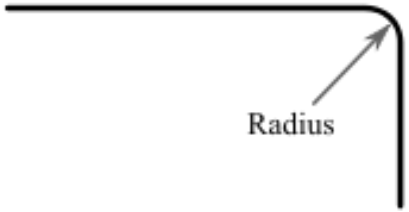
Raio/chanfro de aresta



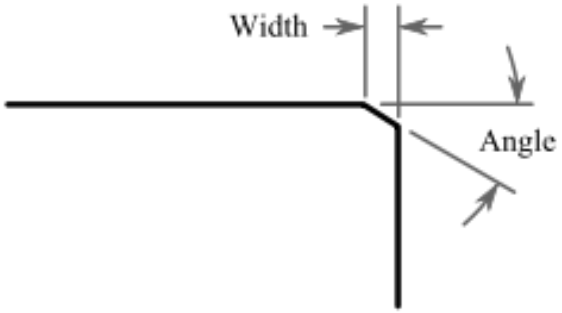
GEOMETRIA DA CUNHA CORTANTE

Raio/chanfro de aresta

Operation	Rake angle	Chamfer
General purpose	Negative	0.20 mm × 20° (0.008 in. × 20°)
Finishing	Negative or positive	0.075 mm × 25° (0.003 in. × 25°)
General purpose and milling	Negative	0.15 mm × 30° (0.006 in. × 30°)
Heavy roughing	Negative	0.38 mm × 25° (0.015 in. × 25°)
Special	Negative or positive	Special



Special applications, fine finishing



General-purpose grades,
higher forces, negative rake angles