TEORIA DE USINAGEM DOS MATERIAS

SEP0284 – Fundamentos dos Processos de Produção II
USINGEM DOS METAIS

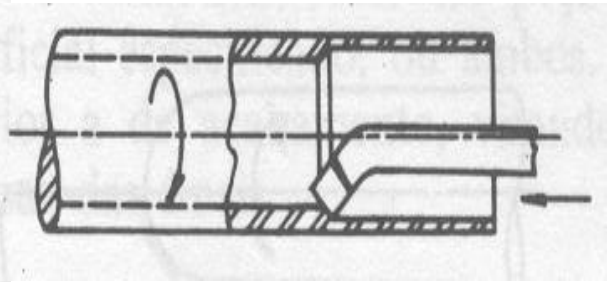
AULA-2: Grandezas Físicas no Processo de Usinagem

Reginaldo T. Coelho
rtcoelho@sc.usp.br

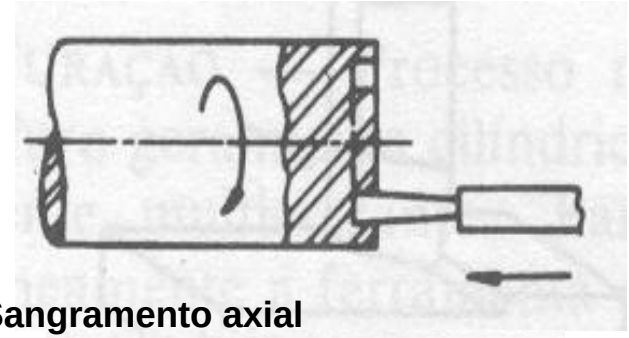
TEORIA DE USINAGEM DOS MATERIAS



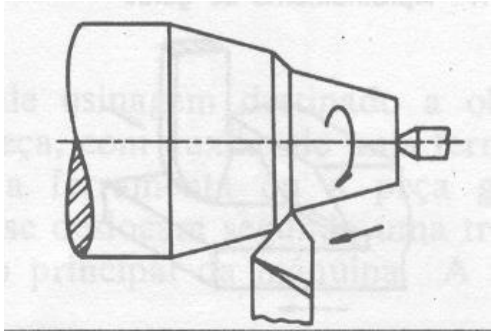
(a) Torneamento cilíndrico externo



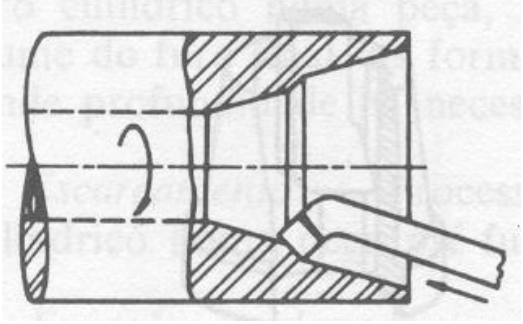
(b)Torneamento cilíndrico interno



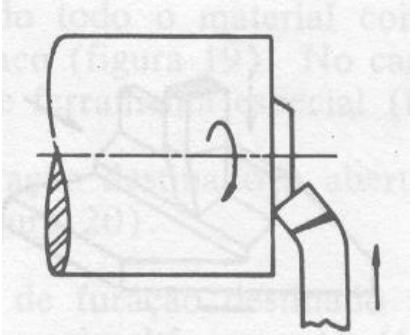
(c) Sangramento axial



(d) Torneamento cônico externo

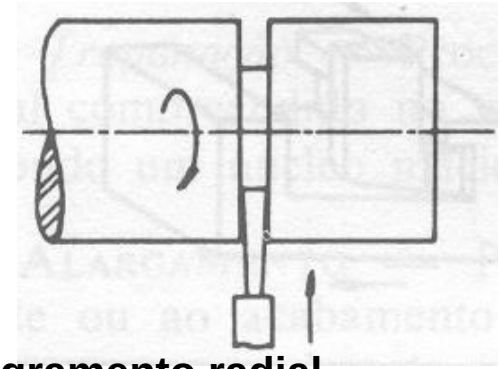


(e) Torneamento cônico interno

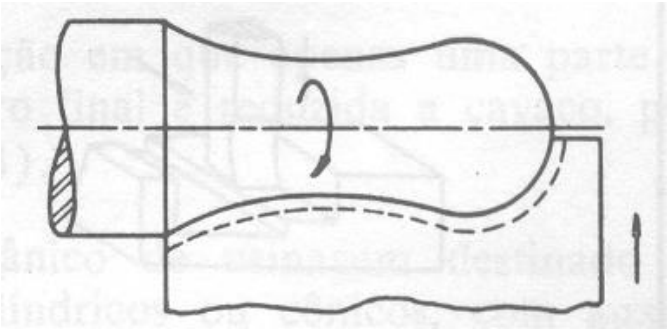


(f) Torneamento de faceamento

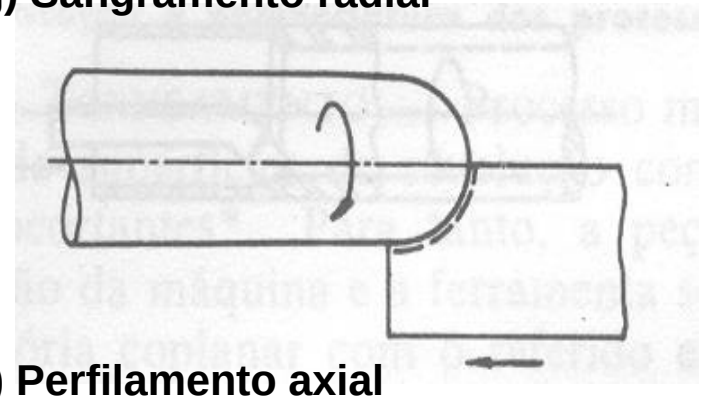
TEORIA DE USINAGEM DOS MATERIAS



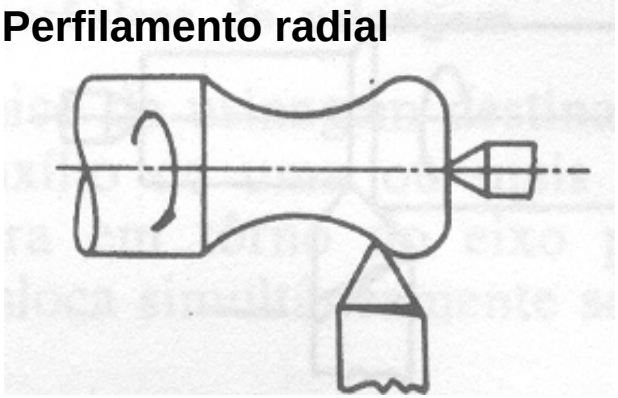
(g) Sangramento radial



(h) Perfilamento radial

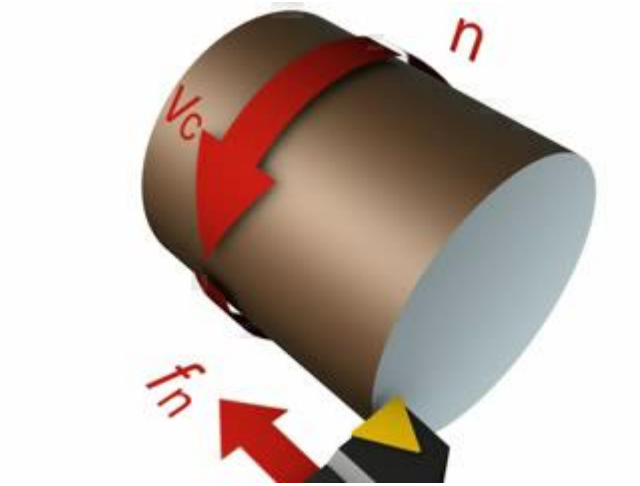


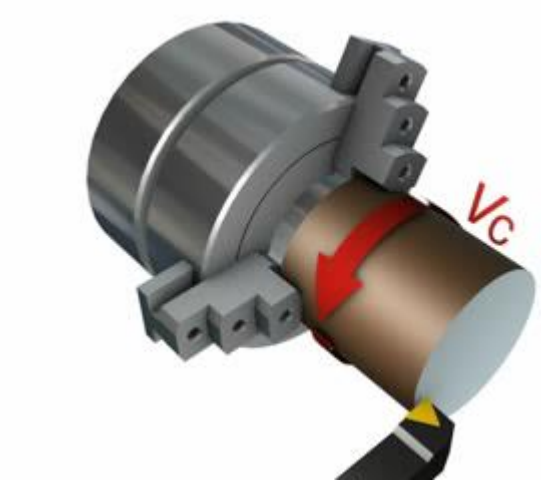
(i) Perfilamento axial



(j) Torneamento curvilíneo

TEORIA DE USINAGEM DOS MATERIAS

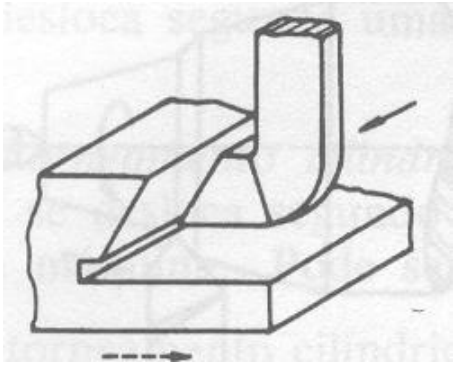




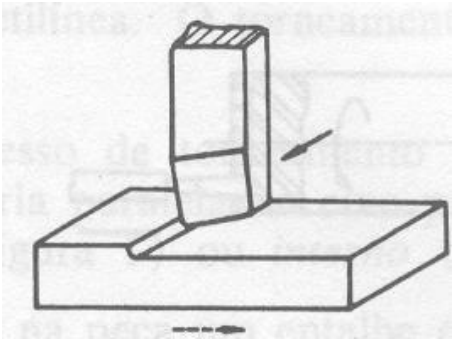




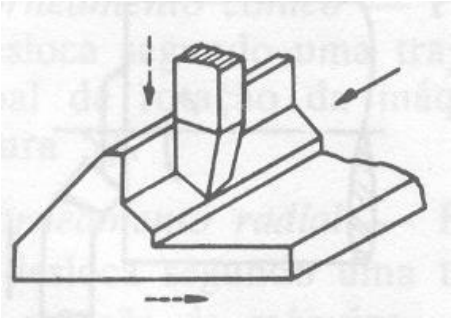
TEORIA DE USINAGEM DOS MATERIAS



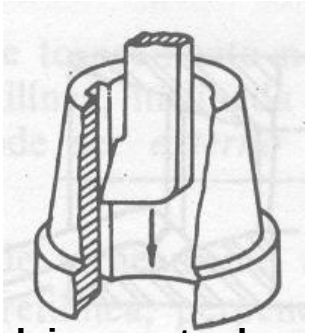
(a) Aplainamento de guias



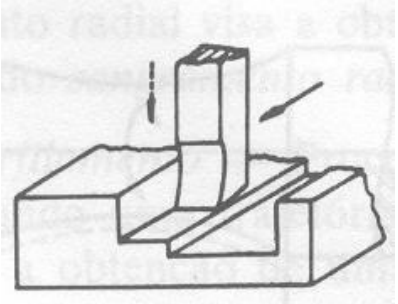
(b) Aplainamento de superfícies



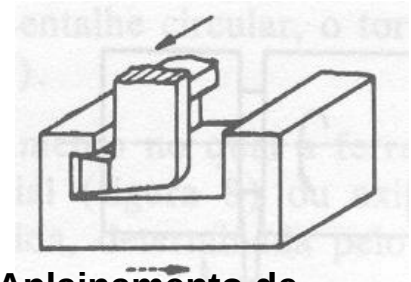
(c) Aplainamento de perfis



(d) Aplainamento de rasgos de chaveta

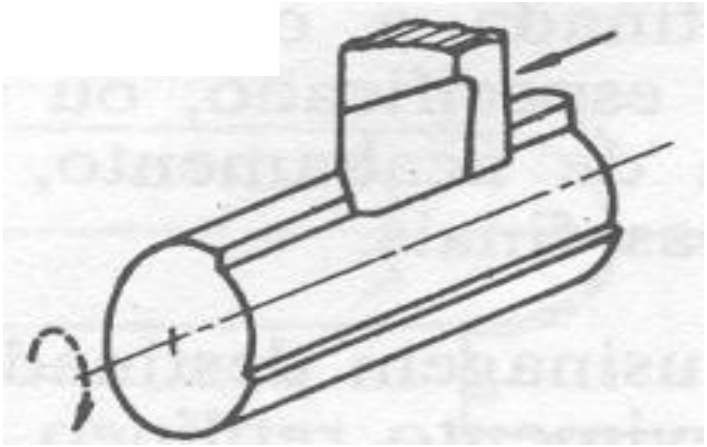


(e) Aplainamento de rasgos

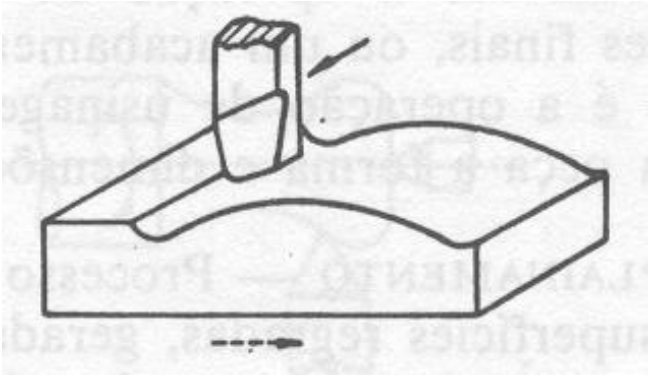


(f) Aplainamento de ranhuras em “T”

TEORIA DE USINAGEM DOS MATERIAS

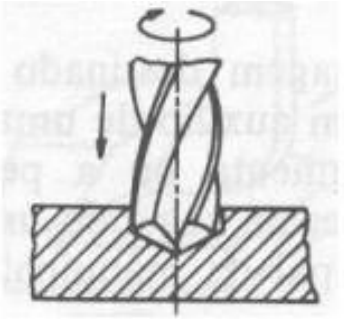


(g) Aplainamento de superfícies de revolução

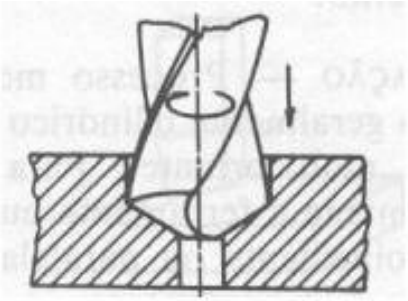


(h) Aplainamento de superfícies curvilíneas

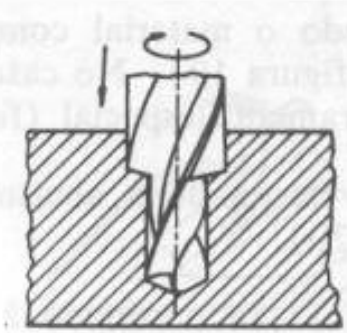
TEORIA DE USINAGEM DOS MATERIAS



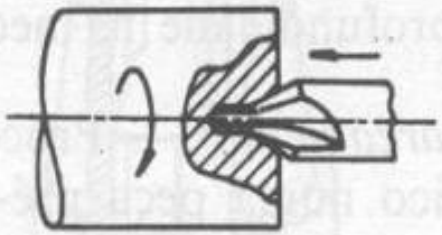
(a) Furação em cheio



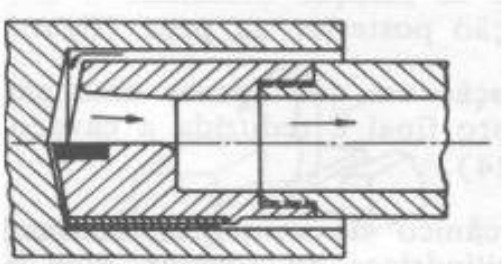
(b) Furação com pré-furo



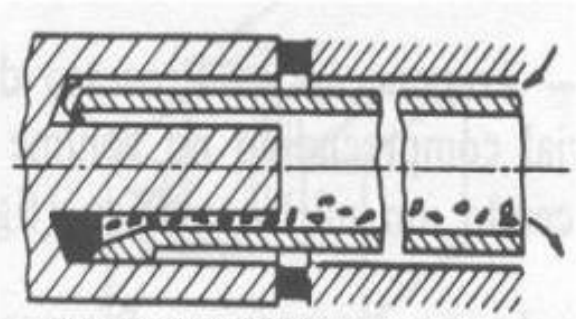
(c) Furação escalonada



(d) Furação de centros

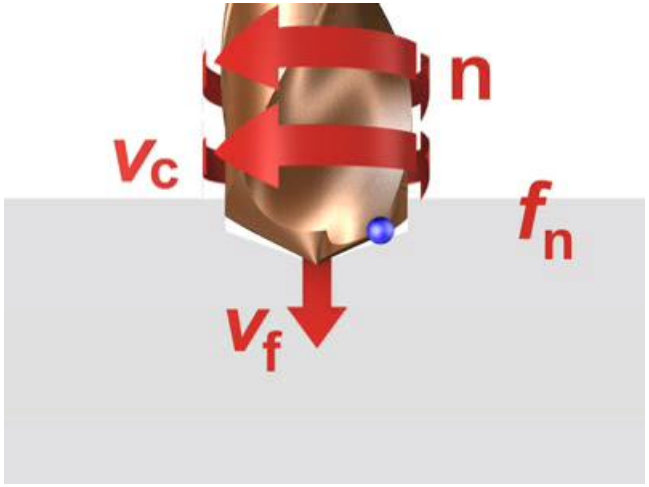


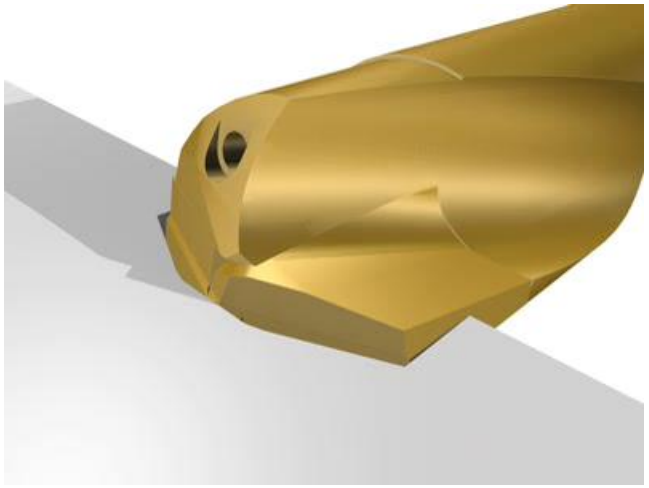
(e) Furação profunda em cheio



(f) Trepanação

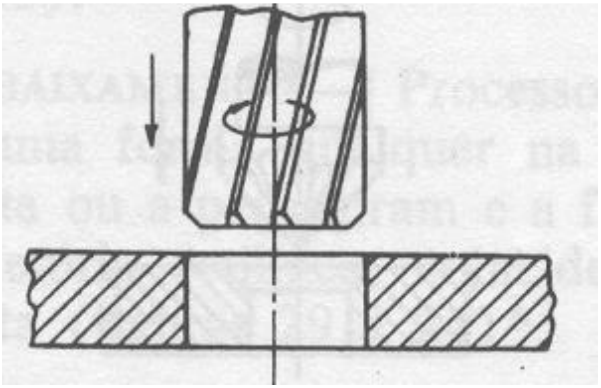
TEORIA DE USINAGEM DOS MATERIAS



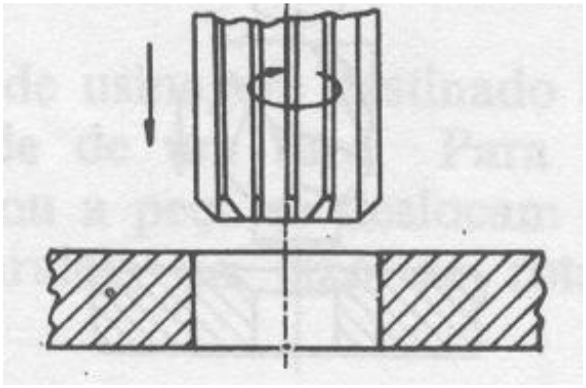




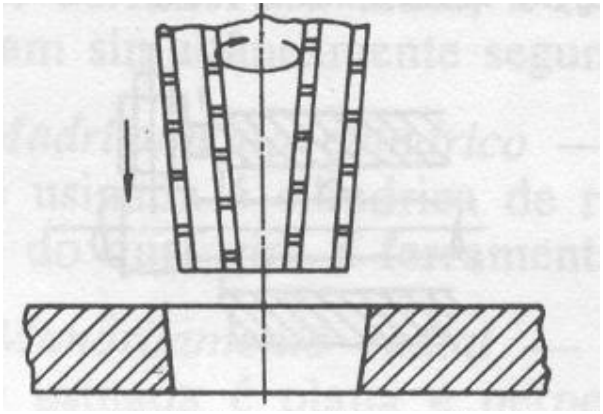
TEORIA DE USINAGEM DOS MATERIAS



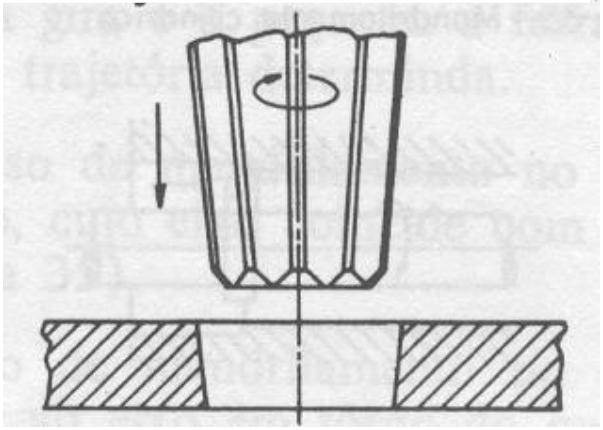
(a) Alargamento cilíndrico de pré-acabamento



(b) Alargamento cilíndrico de acabamento

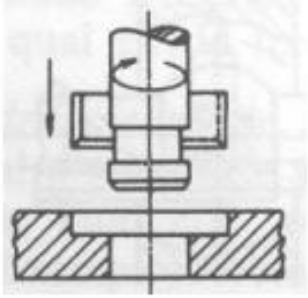


(c) Alargamento cônico de pré-acabamento

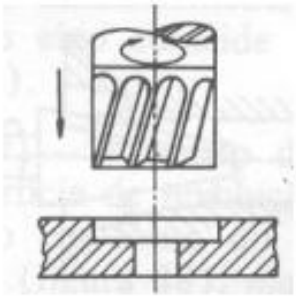


(d) Alargamento cônico de acabamento

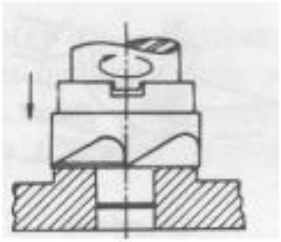
TEORIA DE USINAGEM DOS MATERIAS



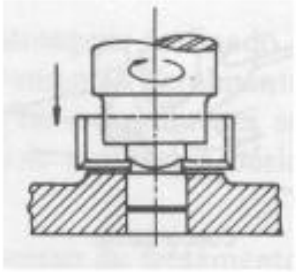
(a) Rebaixamento guiado



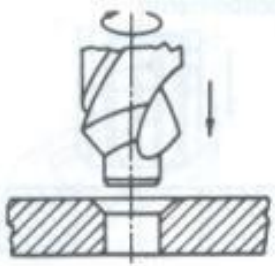
(b) Rebaixamento



(c) Rebaixamento guiado



(d) Rebaixamento guiado

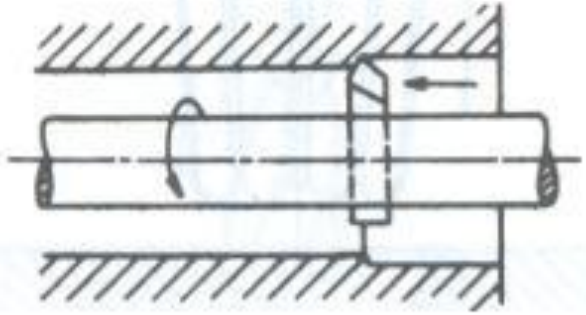


(e) Rebaixamento guiado
(escareado)

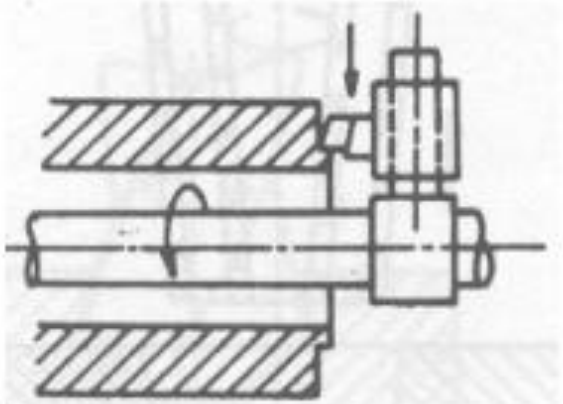


(f) Rebaixamento
(escareado)

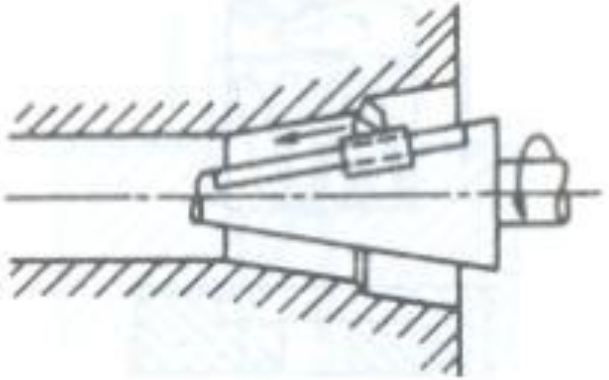
TEORIA DE USINAGEM DOS MATERIAS



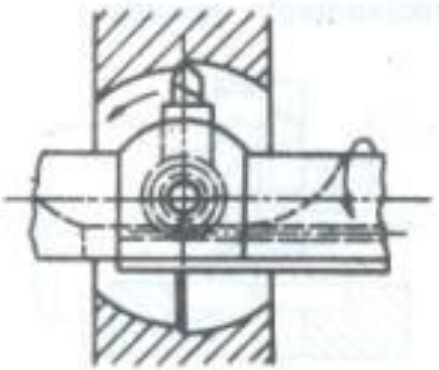
(a) Mandrilamento cilíndrico



(b) Mandrilamento radial

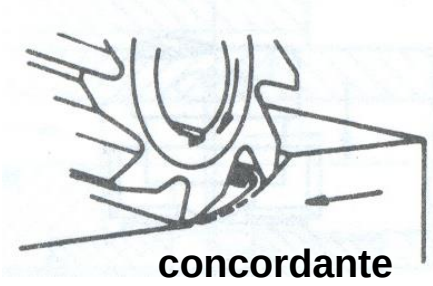


(c) Mandrilamento cônico



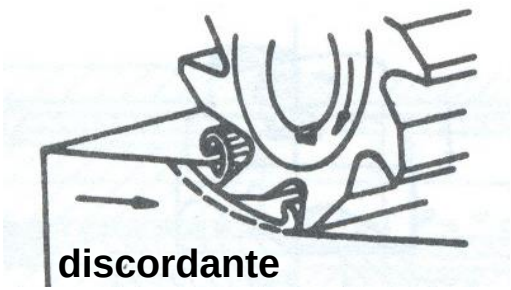
(d) Mandrilamento esférico

TEORIA DE USINAGEM DOS MATERIAS



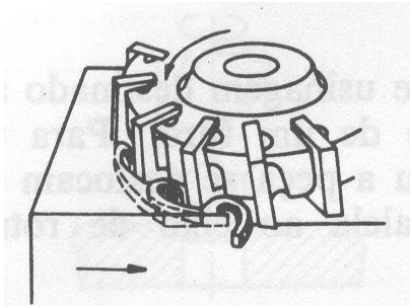
concordante

(a) Fresamento cilíndrico tangencial

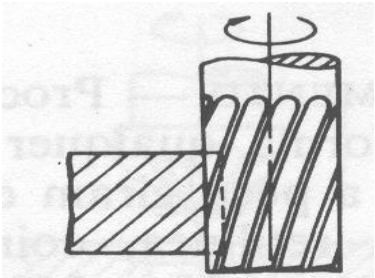


discordante

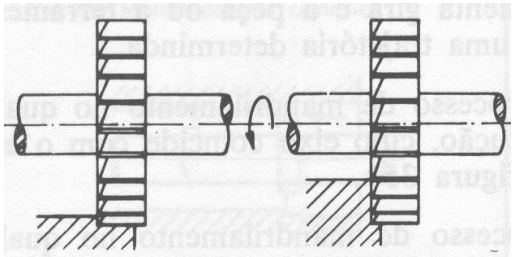
(b) Fresamento cilíndrico tangencial



(c) Fresaemnto Frontal

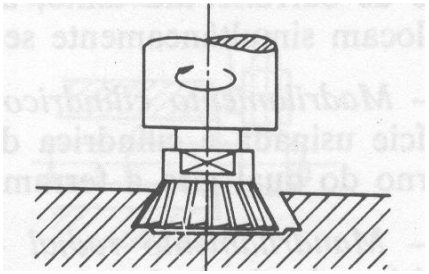


(d) Fresamento cilíndrico tangencial



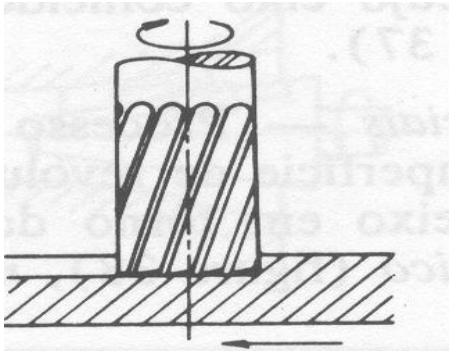
tangencial frontal

(e) Fresamento de superfícies ortogonais

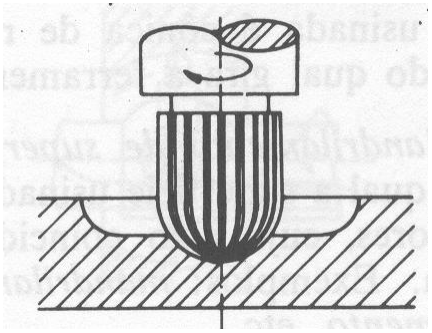


(f) Fresamento tangencial de rasgo “rabo de andorinha”

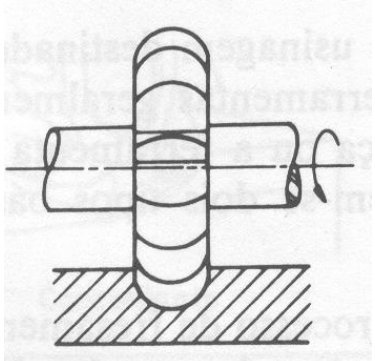
TEORIA DE USINAGEM DOS MATERIAS



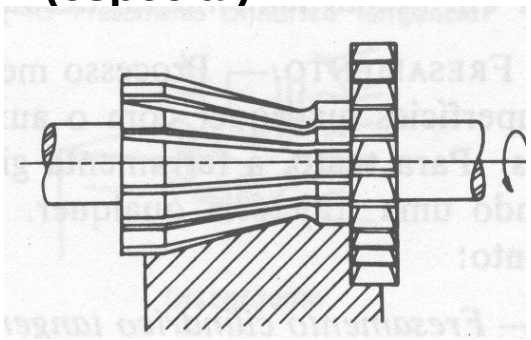
(g) Fresamento frontal com fresa de topo



(h) Fresamento frontal (especial)

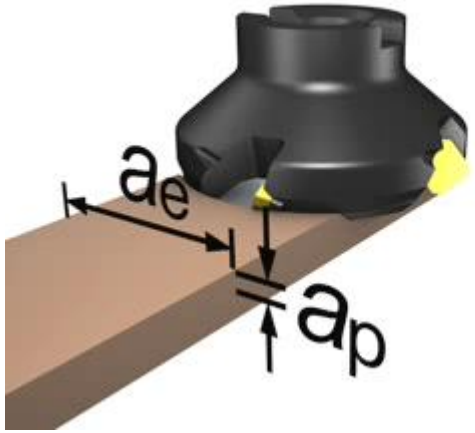


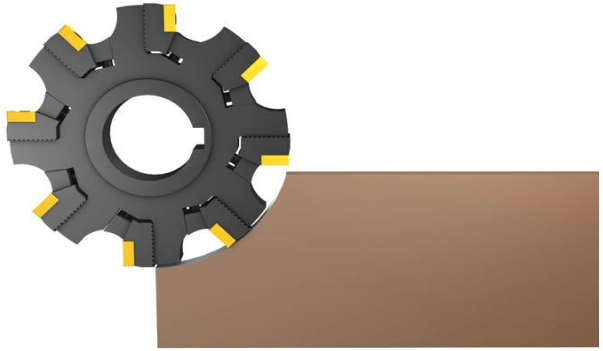
(i) Fresamento tangencial de perfil

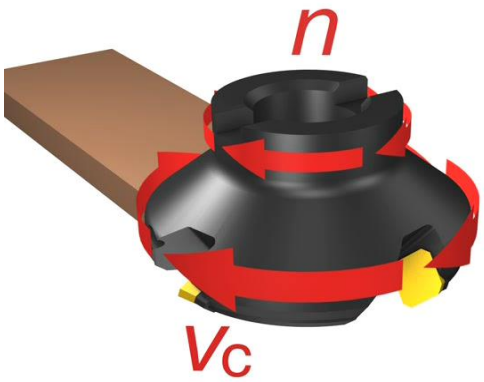


(j) Fresamento composto

TEORIA DE USINAGEM DOS MATERIAS

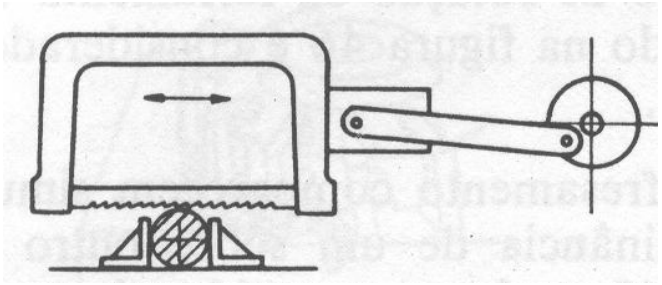




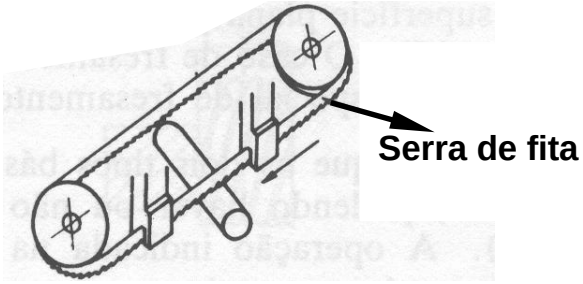




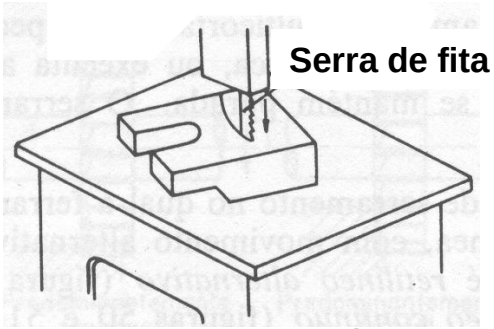
TEORIA DE USINAGEM DOS MATERIAS



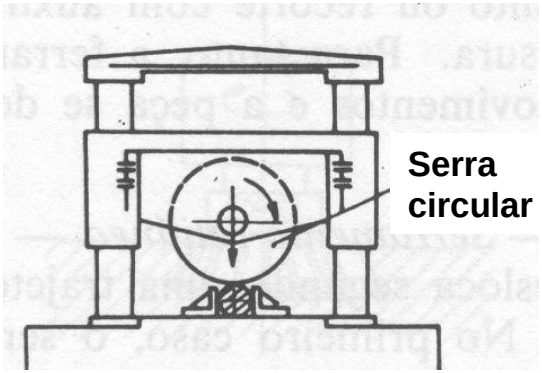
(a) Serramento alternativo



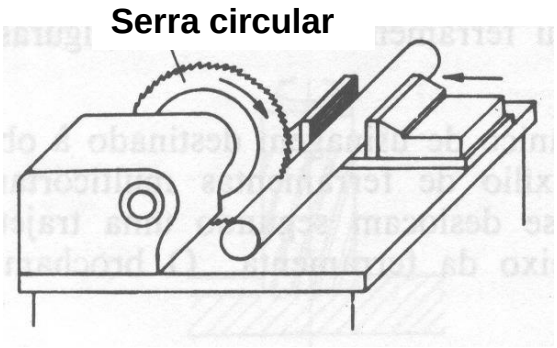
(b) Serramento contínuo



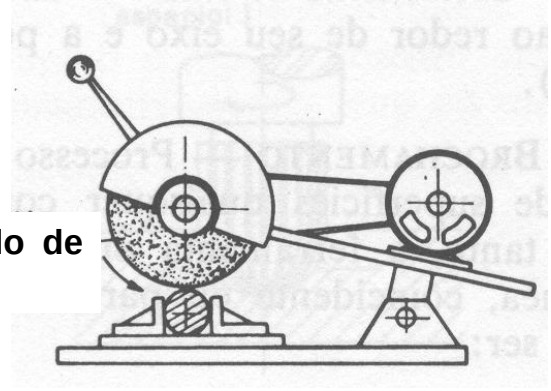
(c) Serramento contínuo (Recorte)



(d) Serramento Circular

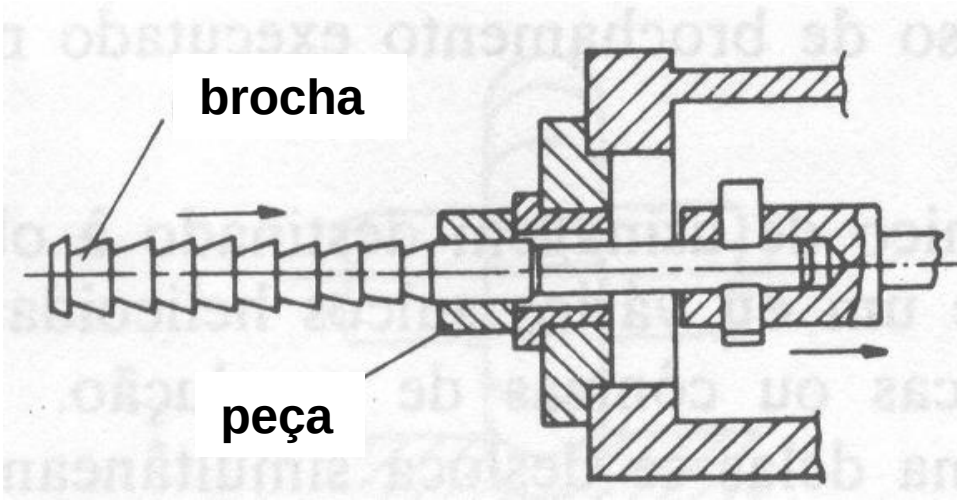


(e) Serramento circular

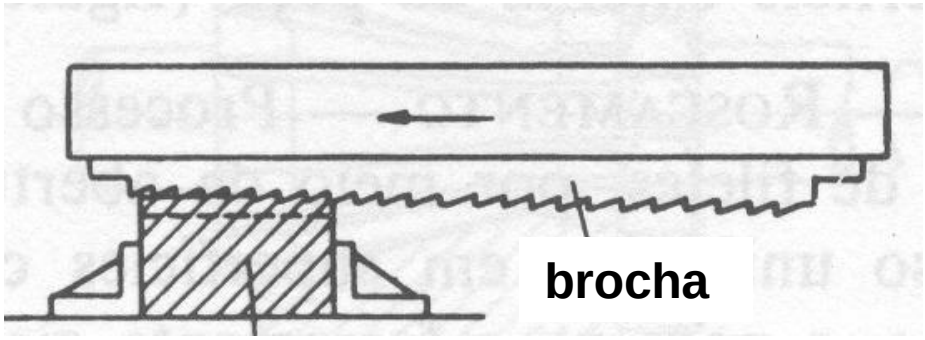


(f) Serramento circular abrasivo

TEORIA DE USINAGEM DOS MATERIAS

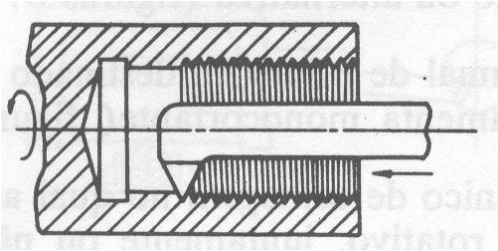


(a) Brochamento interno

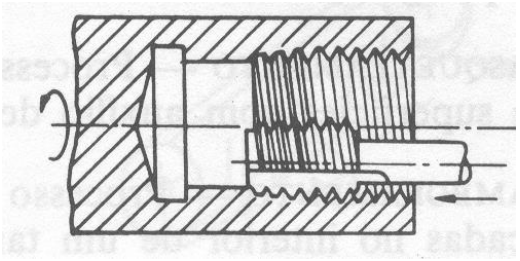


(b) Brochamento externo

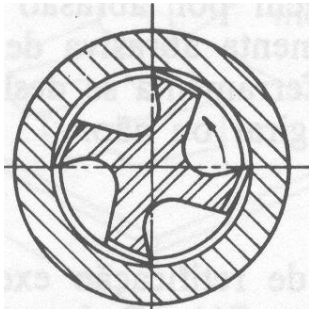
TEORIA DE USINAGEM DOS MATERIAS



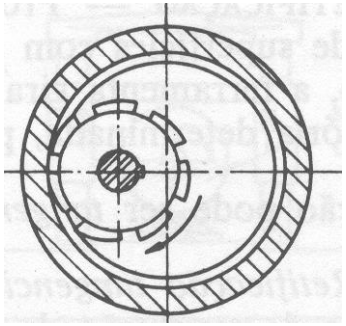
(a)Roscamento interno ferramenta de perfil único



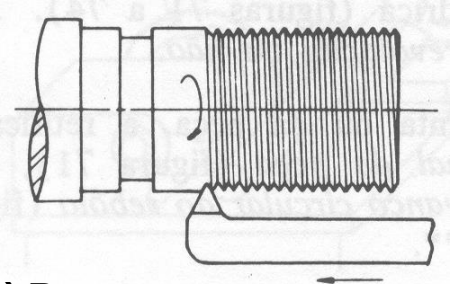
(b) Roscamento interno ferramenta de perfil múltiplo



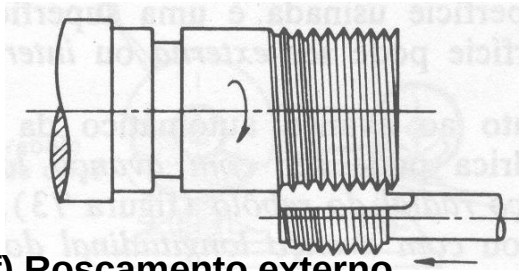
(c) Roscamento interno com macho



(d) Roscamento interno com fresa

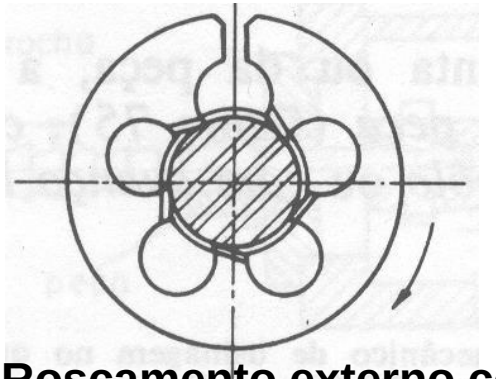


(e) Roscamento externo- ferramenta de perfil único

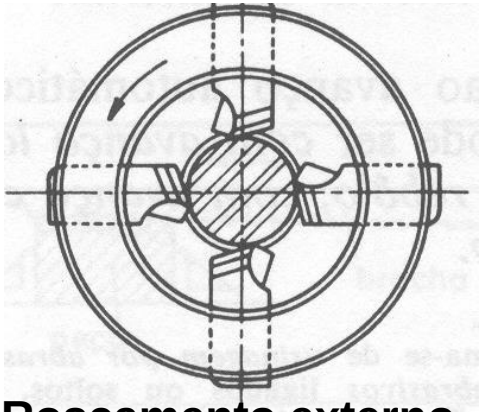


(f) Roscamento externo ferramenta de perfil múltiplo

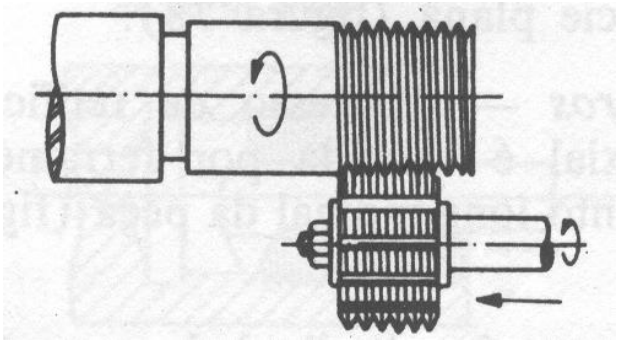
TEORIA DE USINAGEM DOS MATERIAS



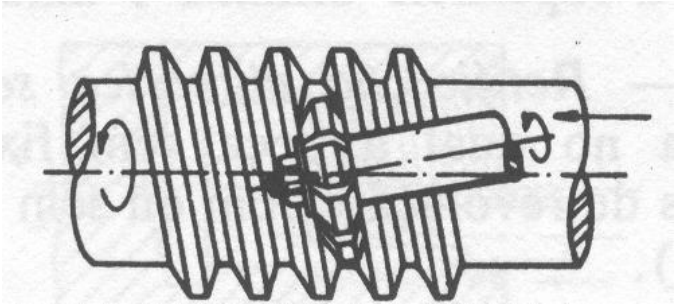
(g) Roscamento externo com cossinete



(h) Roscamento externo com jogo de pentes

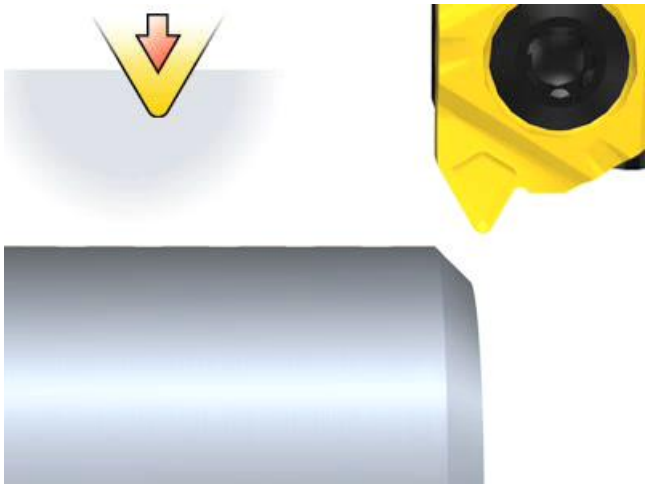


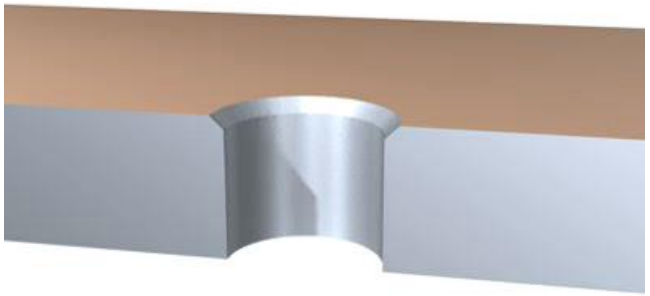
(i) Roscamento externo com fresa de perfil múltiplo



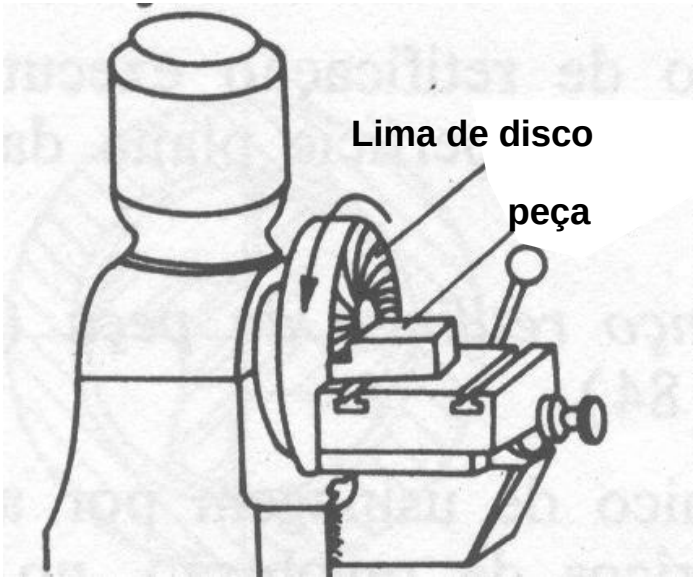
(j) Rosacamento externo com fresa de perfil único

TEORIA DE USINAGEM DOS MATERIAS

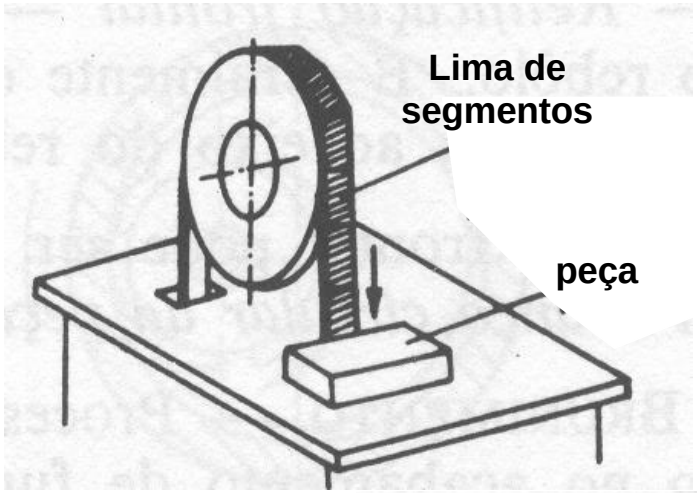




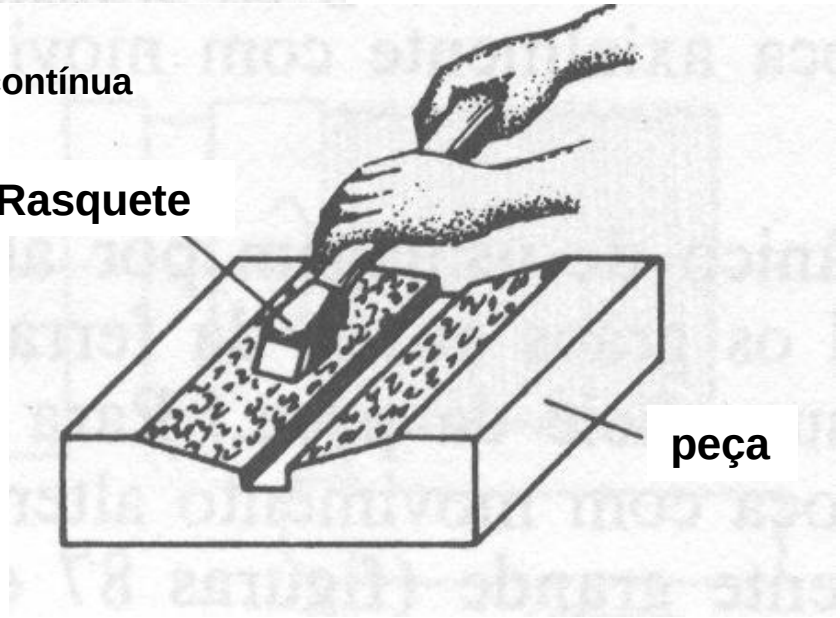
TEORIA DE USINAGEM DOS MATERIAS



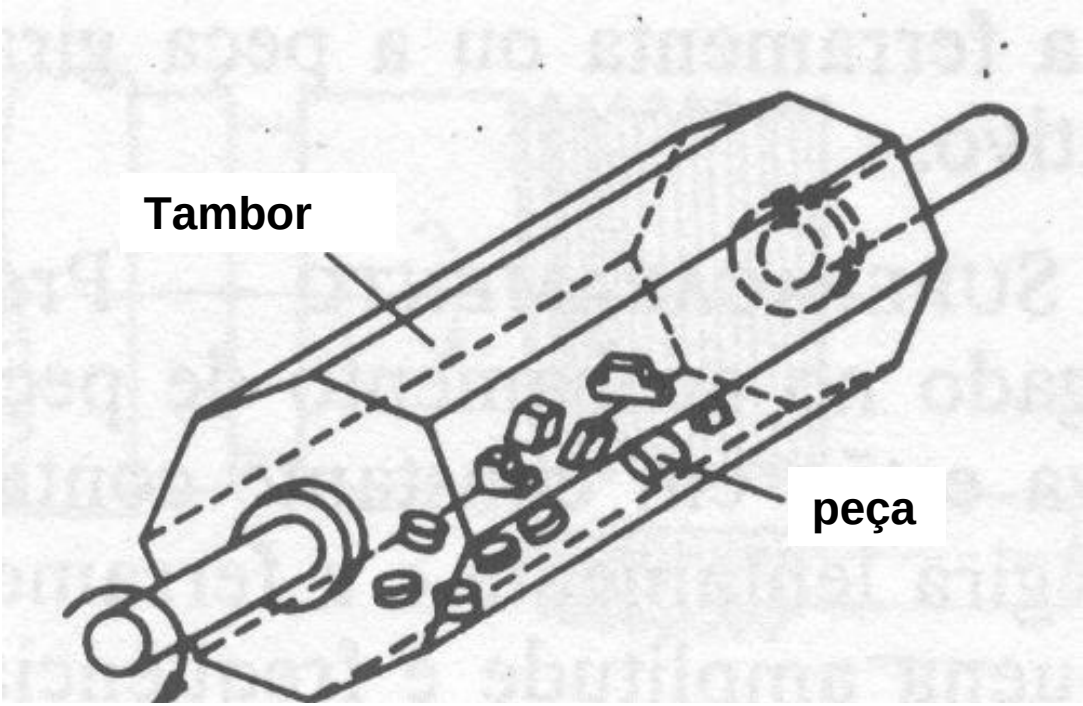
(a) Limagem contínua



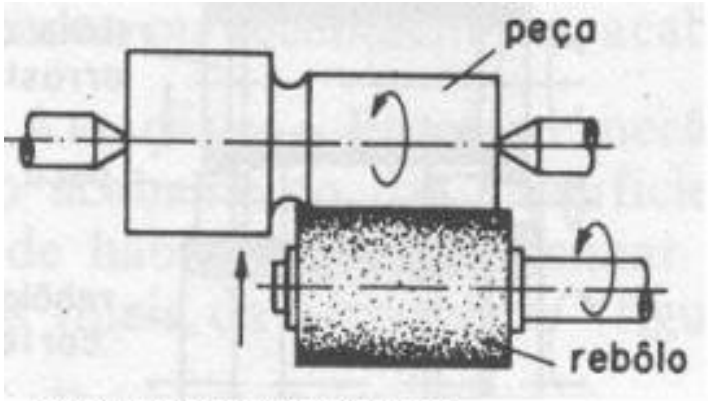
(b) Limagem contínua



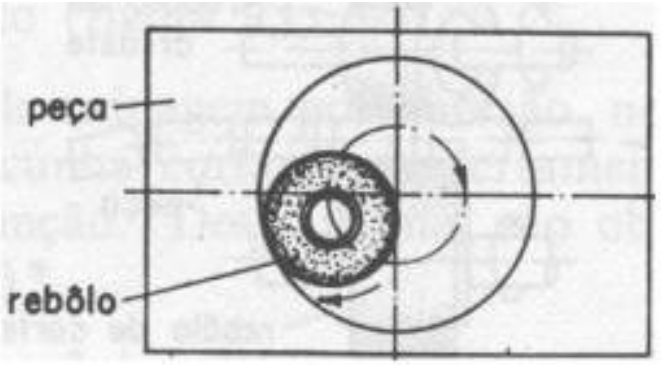
TEORIA DE USINAGEM DOS MATERIAS



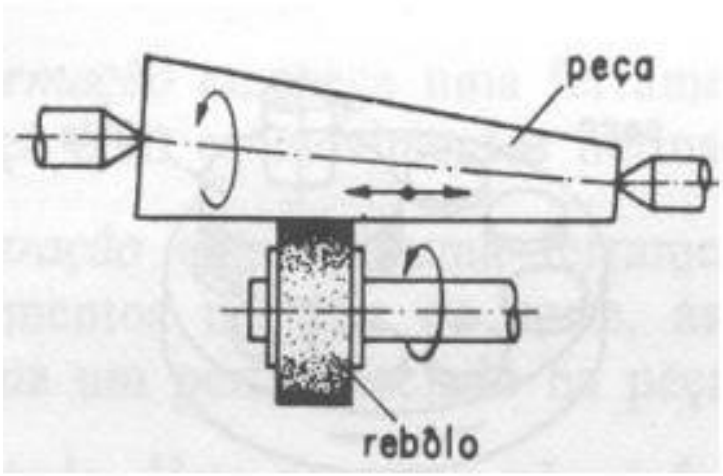
TEORIA DE USINAGEM DOS MATERIAS



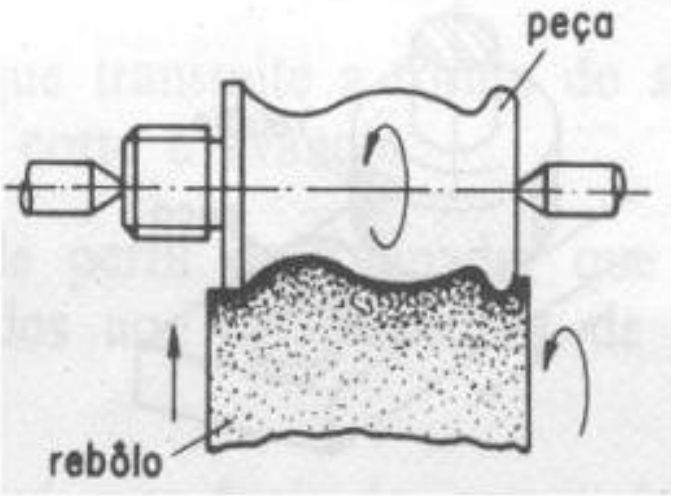
(a) Retificação cilíndrica externa com avanço radial



(b) Retificação cilíndrica interna com avanço circular

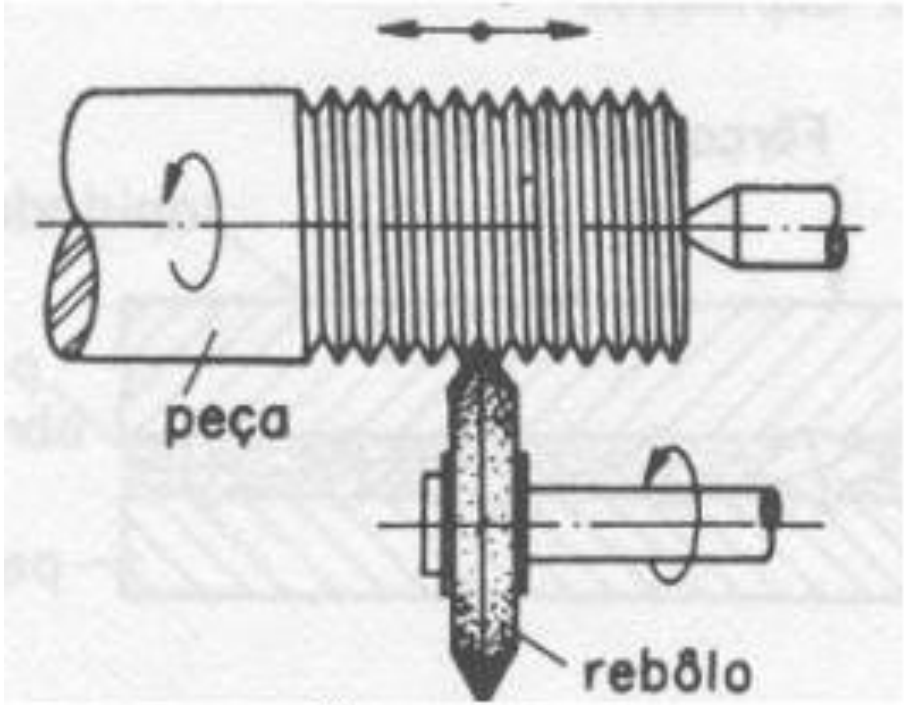


(c) Retificação cônica externa com avanço longitudinal

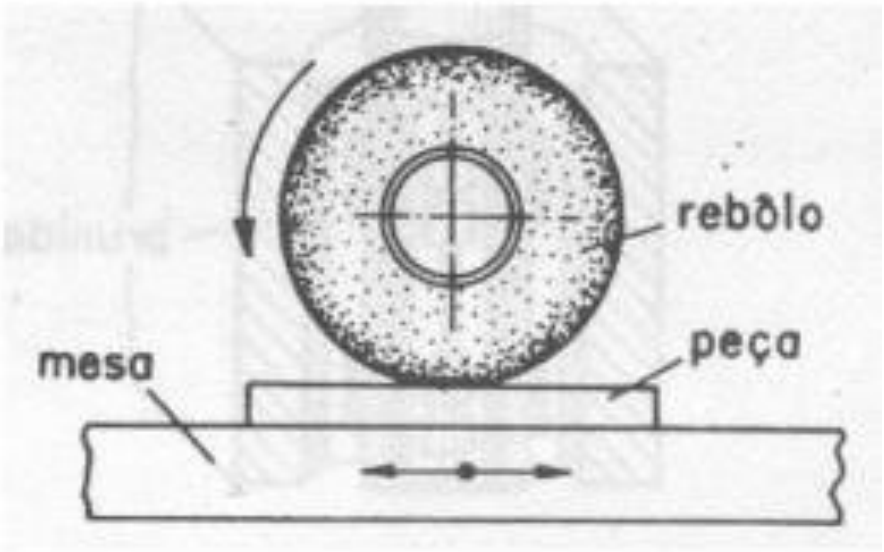


(d) Retificação de perfil com avanço radial

TEORIA DE USINAGEM DOS MATERIAS

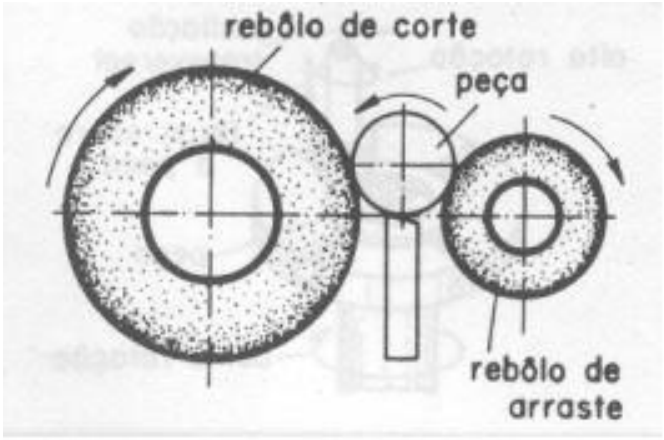


(e) Retificação de perfil com avanço longitudinal

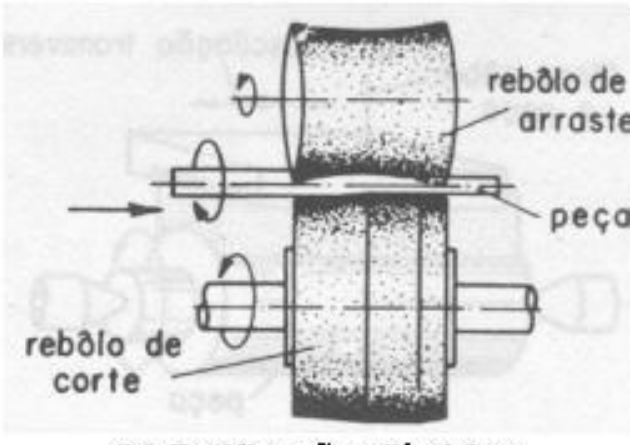


(f) Retificação plana com movimento retilíneo da peça

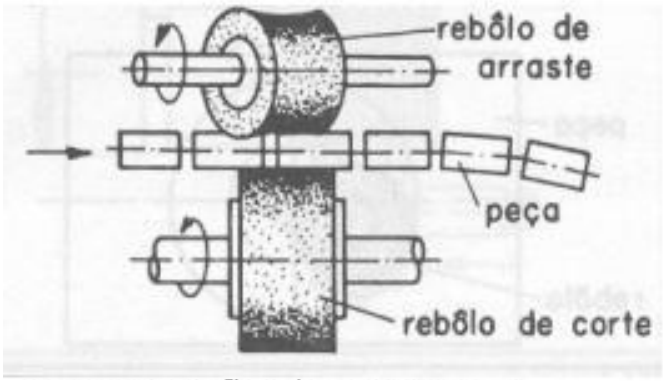
TEORIA DE USINAGEM DOS MATERIAS



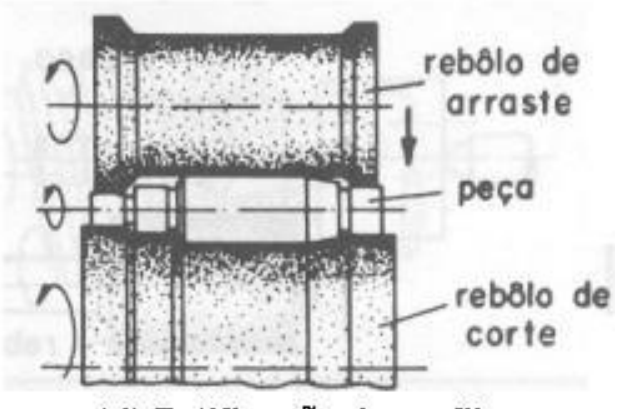
(a) Retificação sem centros (centerless) com avanço radial



(b) Retificação sem centros (centerless) com avanço axial

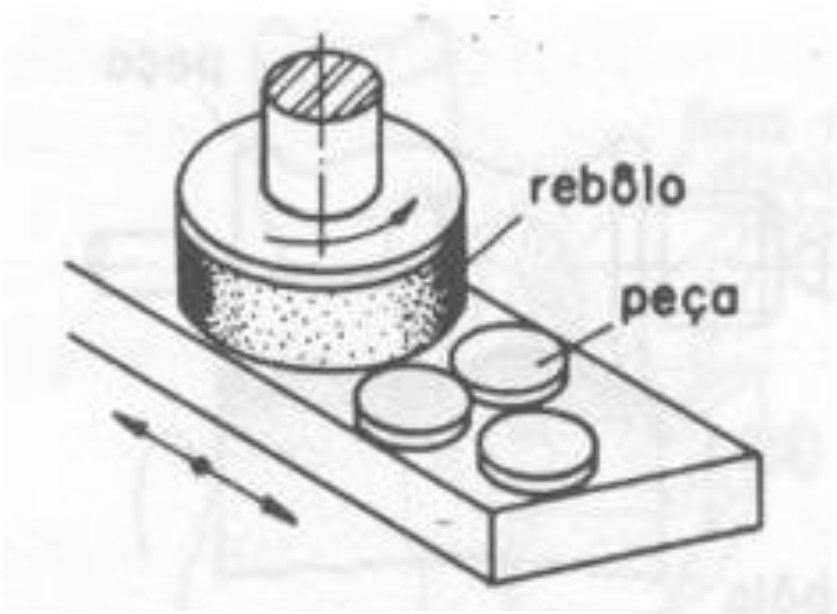


(c) Retificação sem centros (centerless) com avanço axial

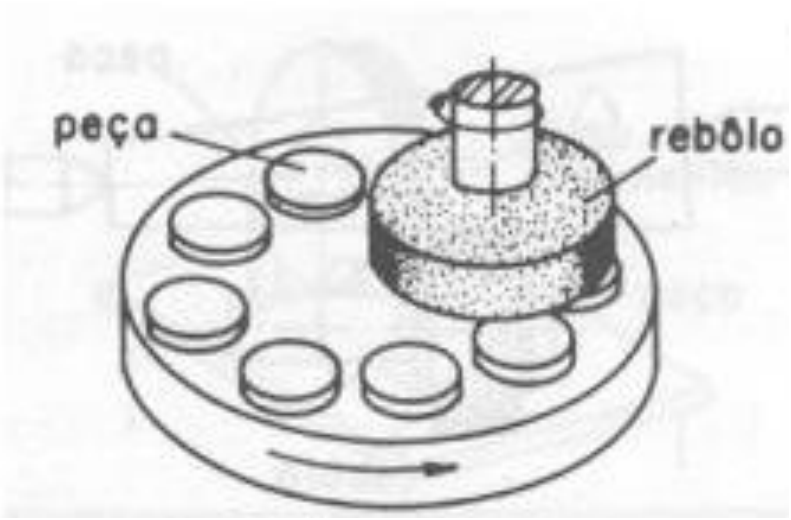


(d) Retificação sem centros (centerless) de perfil com avanço radial

TEORIA DE USINAGEM DOS MATERIAS

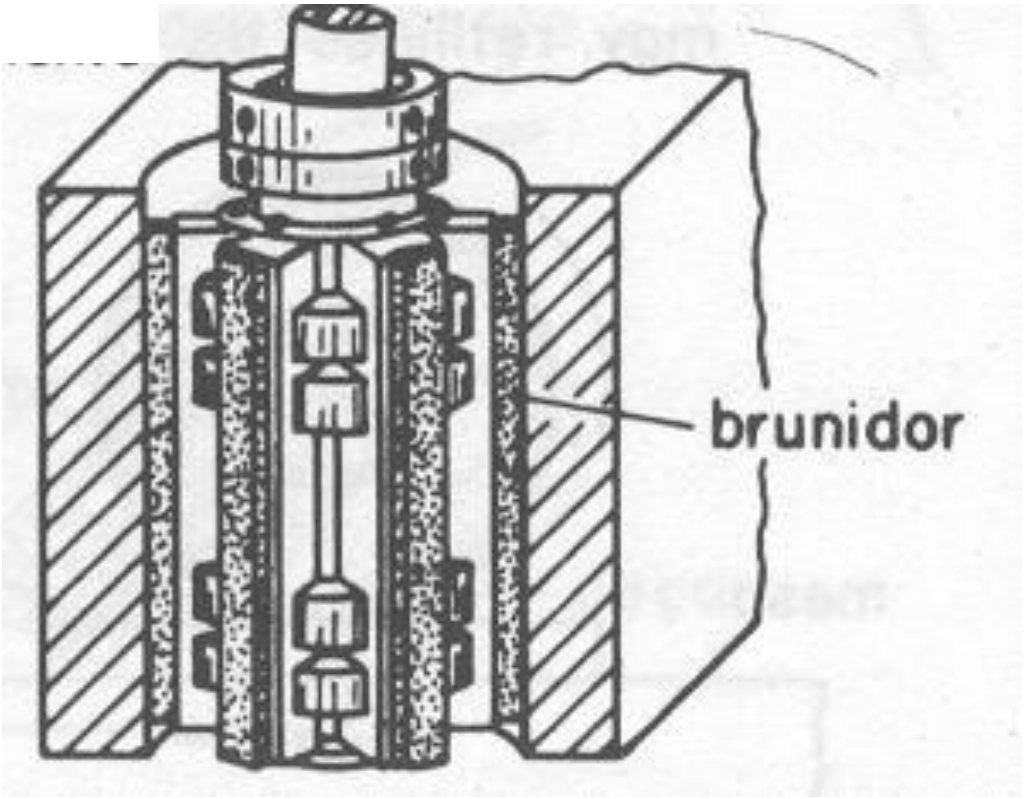


(e) Retificação de face com rebolo copo (blanchard) movimento linear



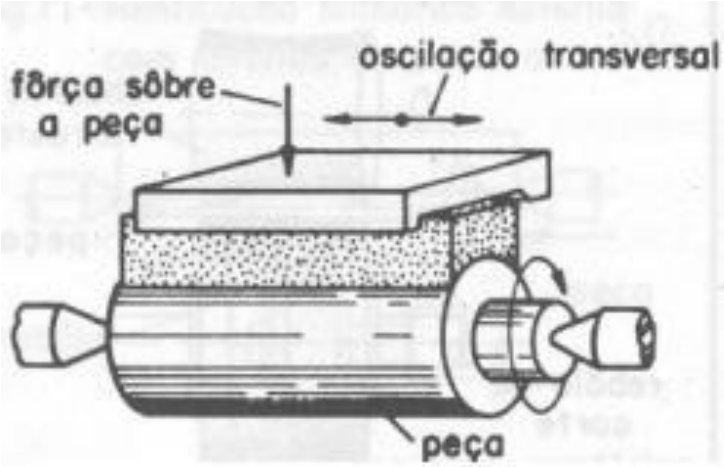
(f) Retificação de face com rebolo copo (blanchard) movimento circular

TEORIA DE USINAGEM DOS MATERIAS

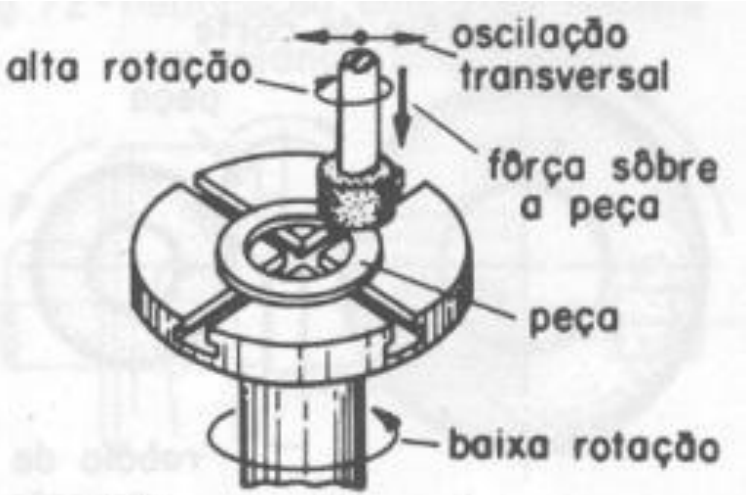


Brunimento

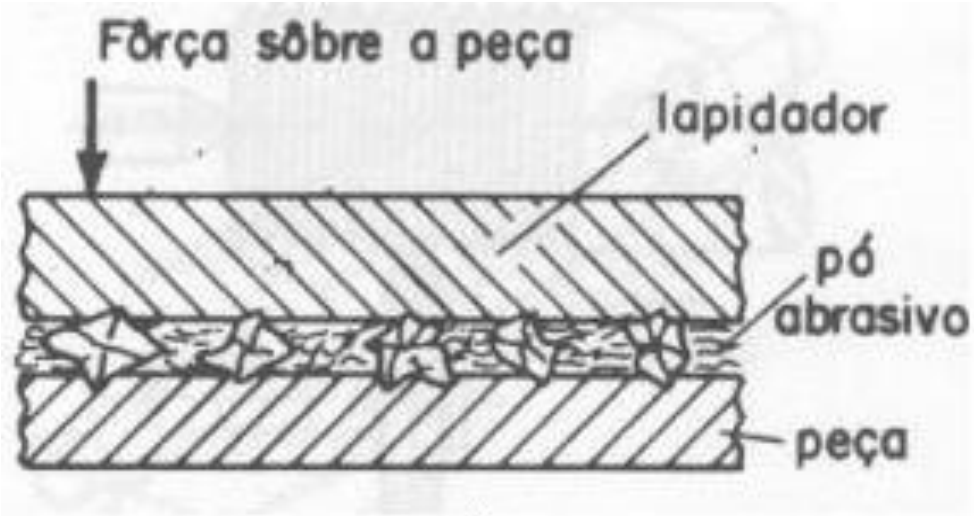
TEORIA DE USINAGEM DOS MATERIAS



(a) Superacabamento cilíndrico

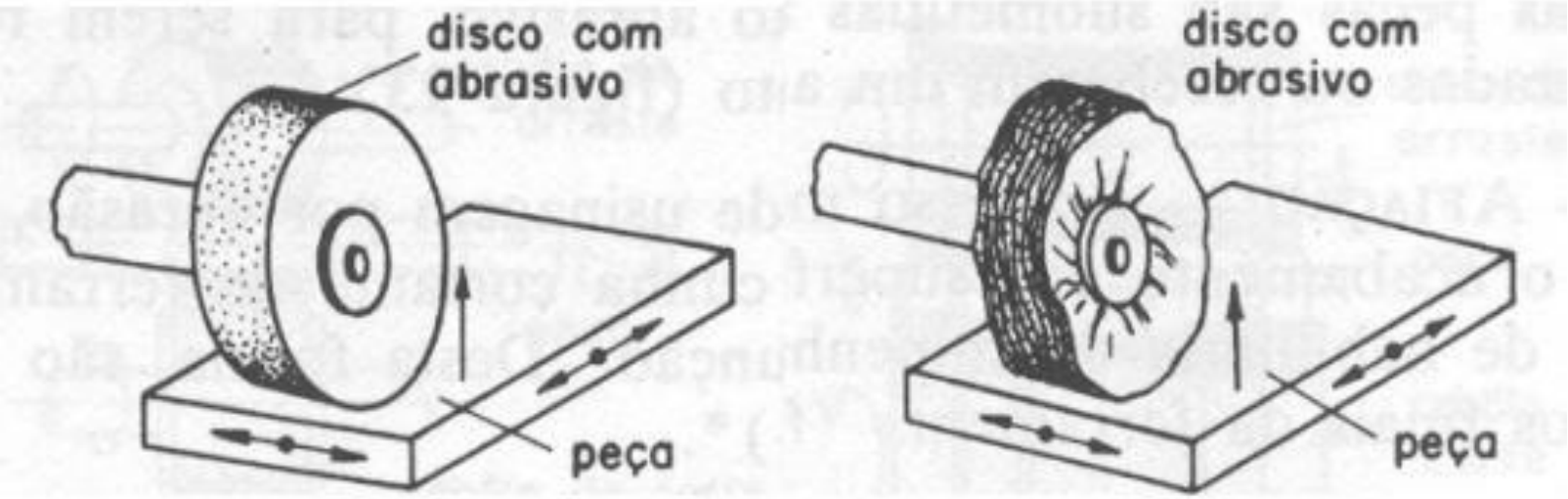


(b) Superacabamento plano

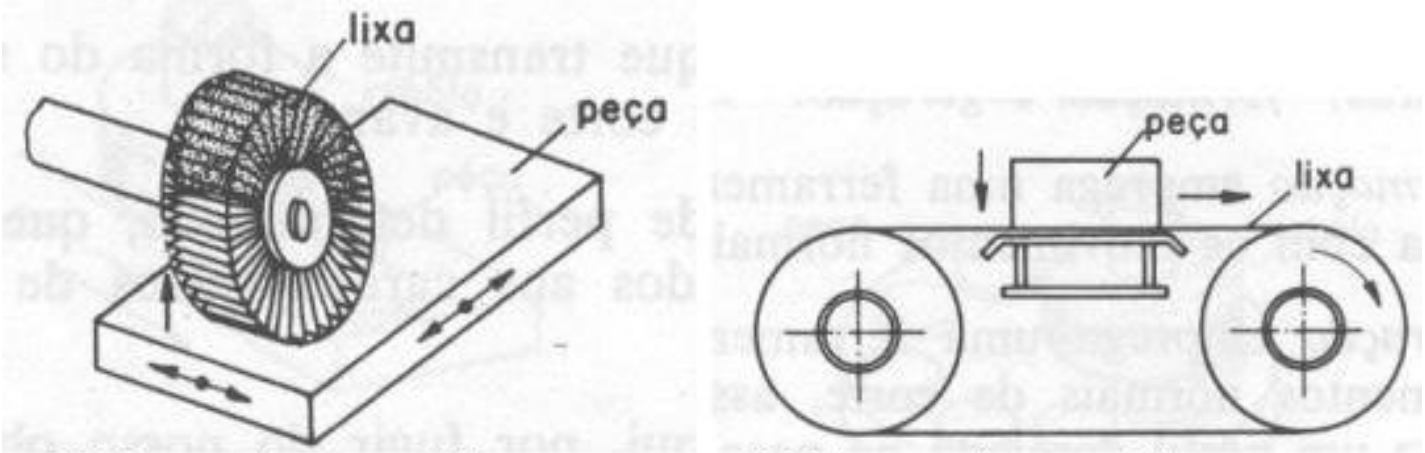


Lapidação

TEORIA DE USINAGEM DOS MATERIAS



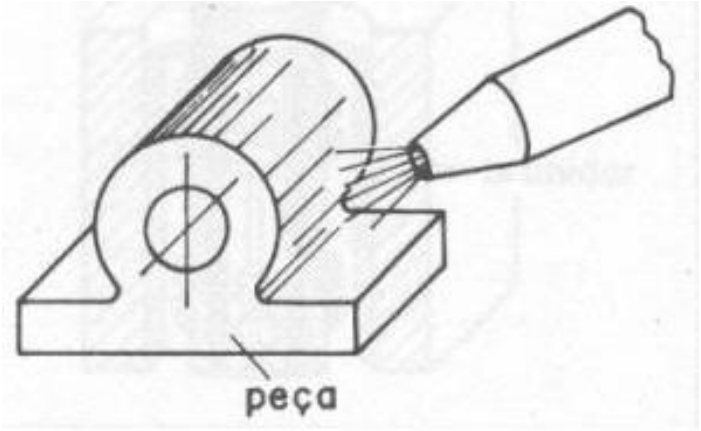
Polimento



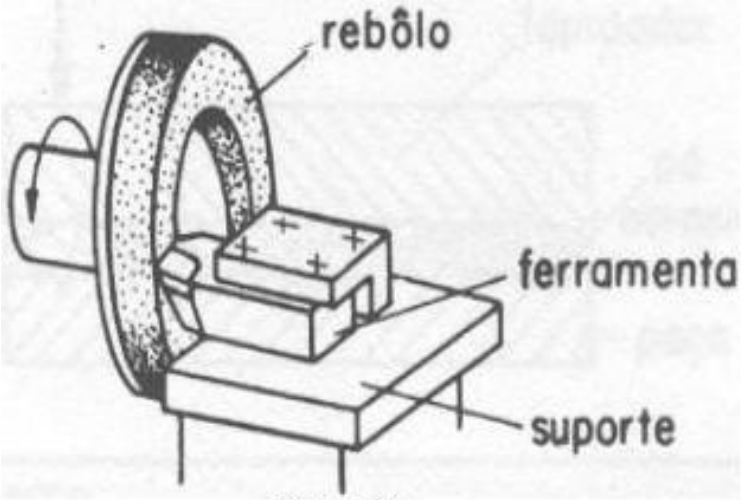
(a) Lixamento com folhas de abrasivos

(b) Lixamento com fita abrasiva

TEORIA DE USINAGEM DOS MATERIAS

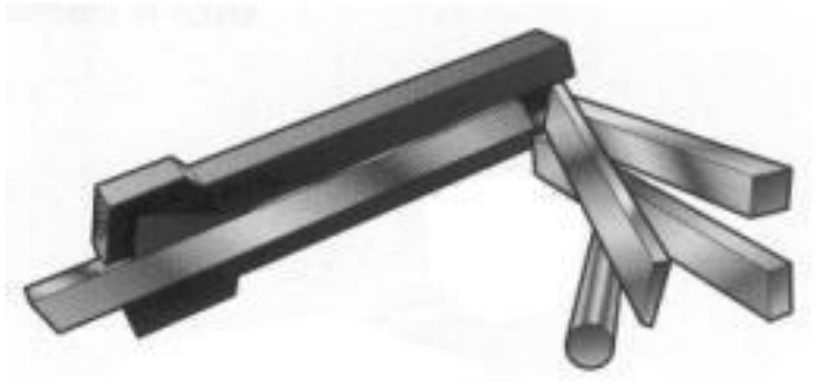


Jateamento



Afiação

TEORIA DE USINAGEM DOS MATERIAS



(a) Ferramentas de aço rápido



(b) Ferramentas de carbeto soldada



(c) Ferramentas de carbeto com inserto intercambiável

TEORIA DE USINAGEM DOS MATERIAS



(a) Broca helicoidal haste cilíndrica

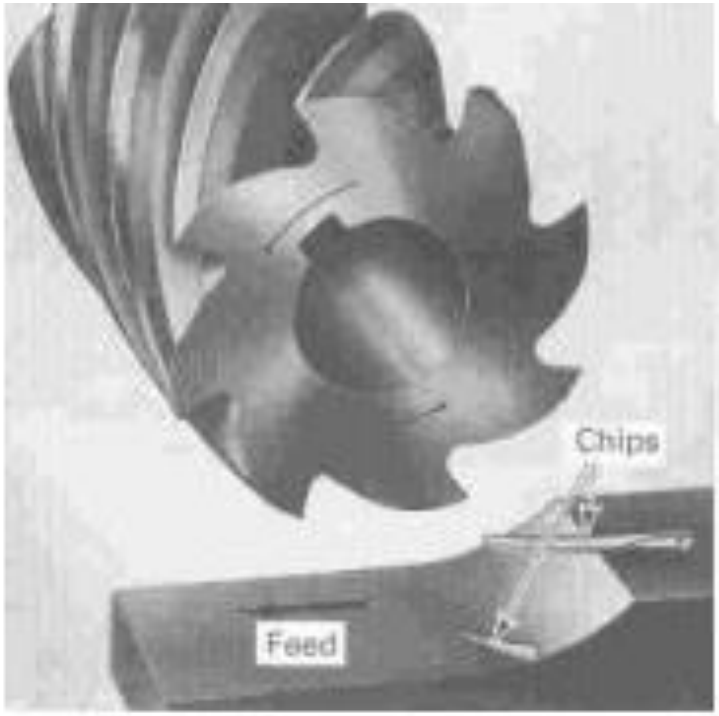


(b) Broca com insertos intercambiáveis



(c) Broca de centro

TEORIA DE USINAGEM DOS MATERIAS



(a) Fresa corpo maciço de aço rápido



(b) Fresas corpo maciço de aço-liga com insertos intercambiáveis

TEORIA DE USINAGEM DOS MATERIAS



(a) Fresa de topo de aço rápido



(b) Fresas de topo com insertos intercambiáveis



(c) Fresas de topo corpo maciço de carbeto