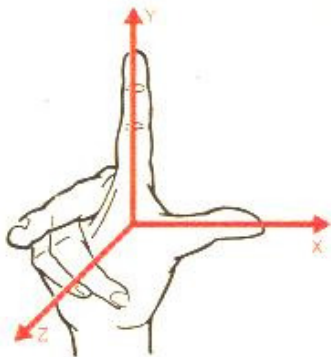
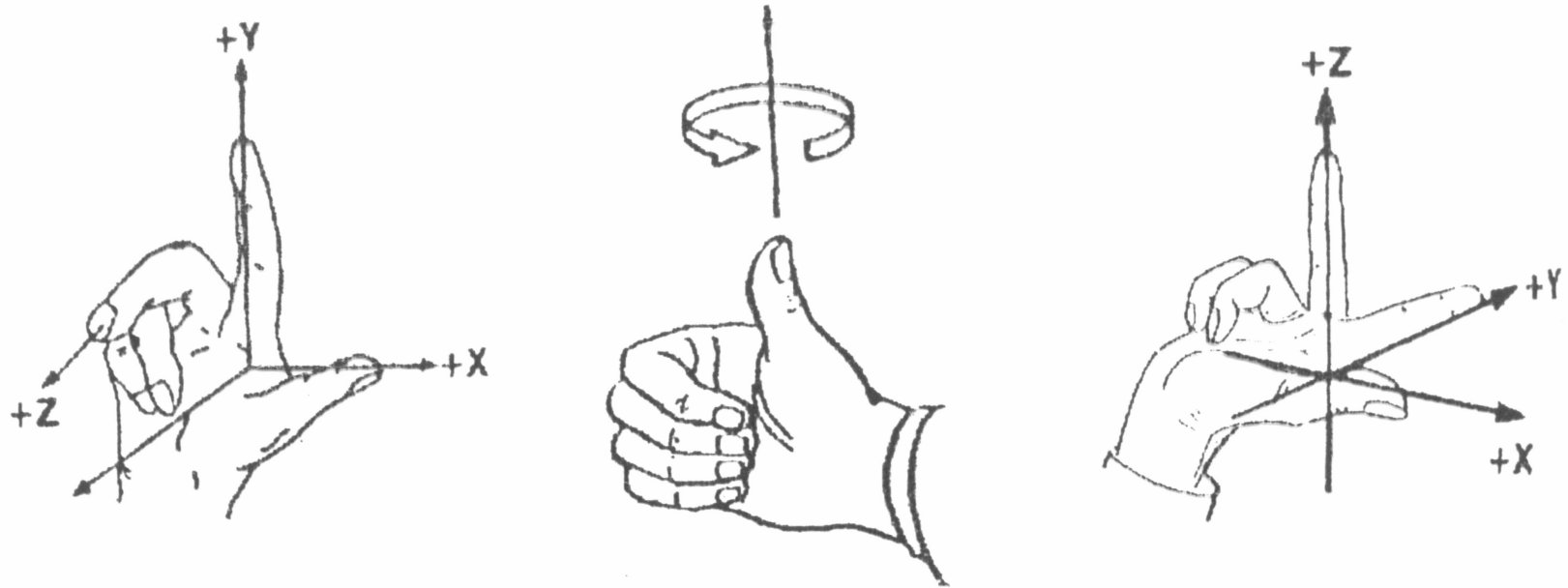


TECNOLOGIA DE CONTROLE NUMÉRICO

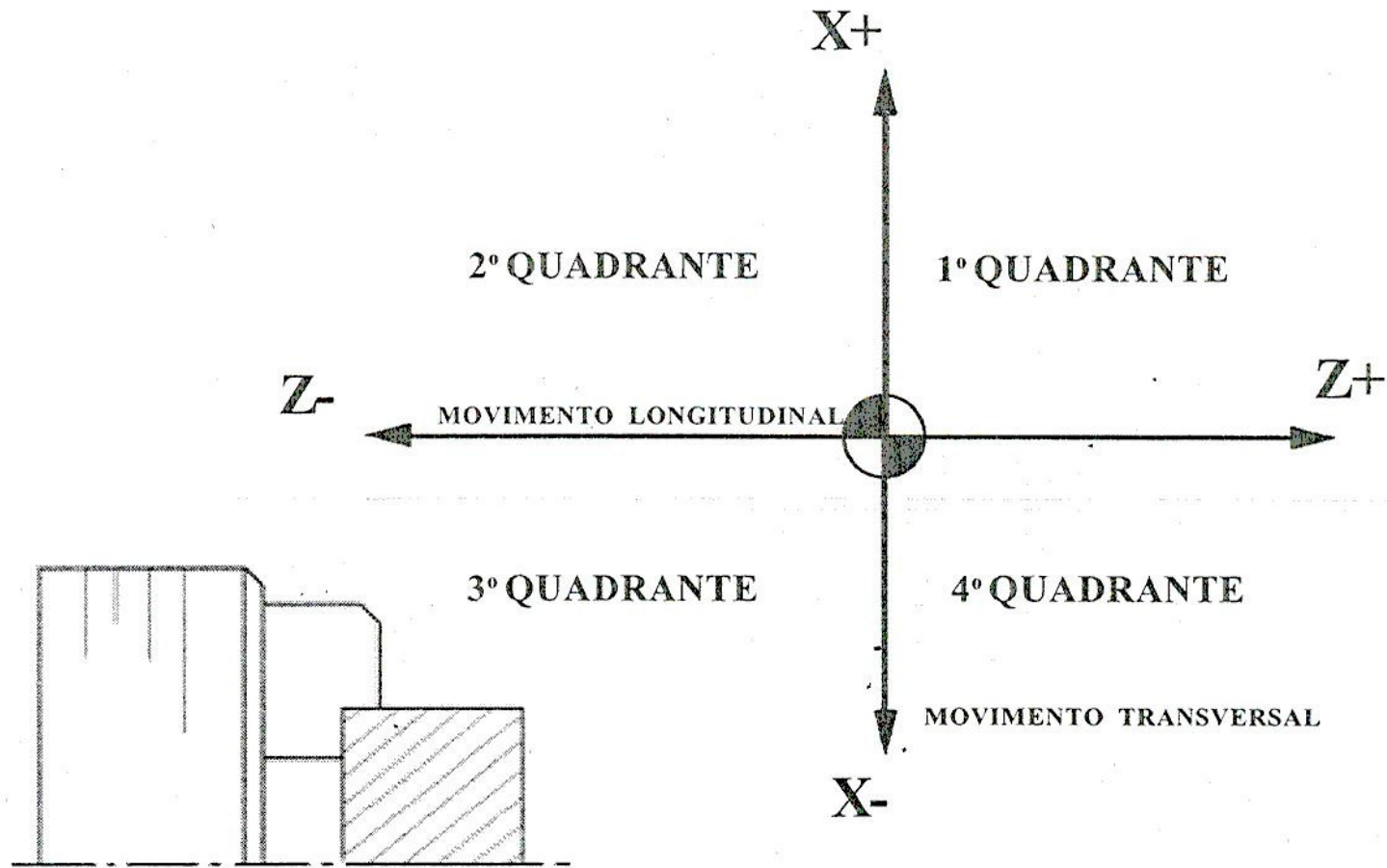
OPERAÇÃO E
CARACTERÍSTICAS DE
UM EQUIPAMENTO CNC:
EIXOS EM MÁQUINAS
CNC

Eixos de Máquinas CNC

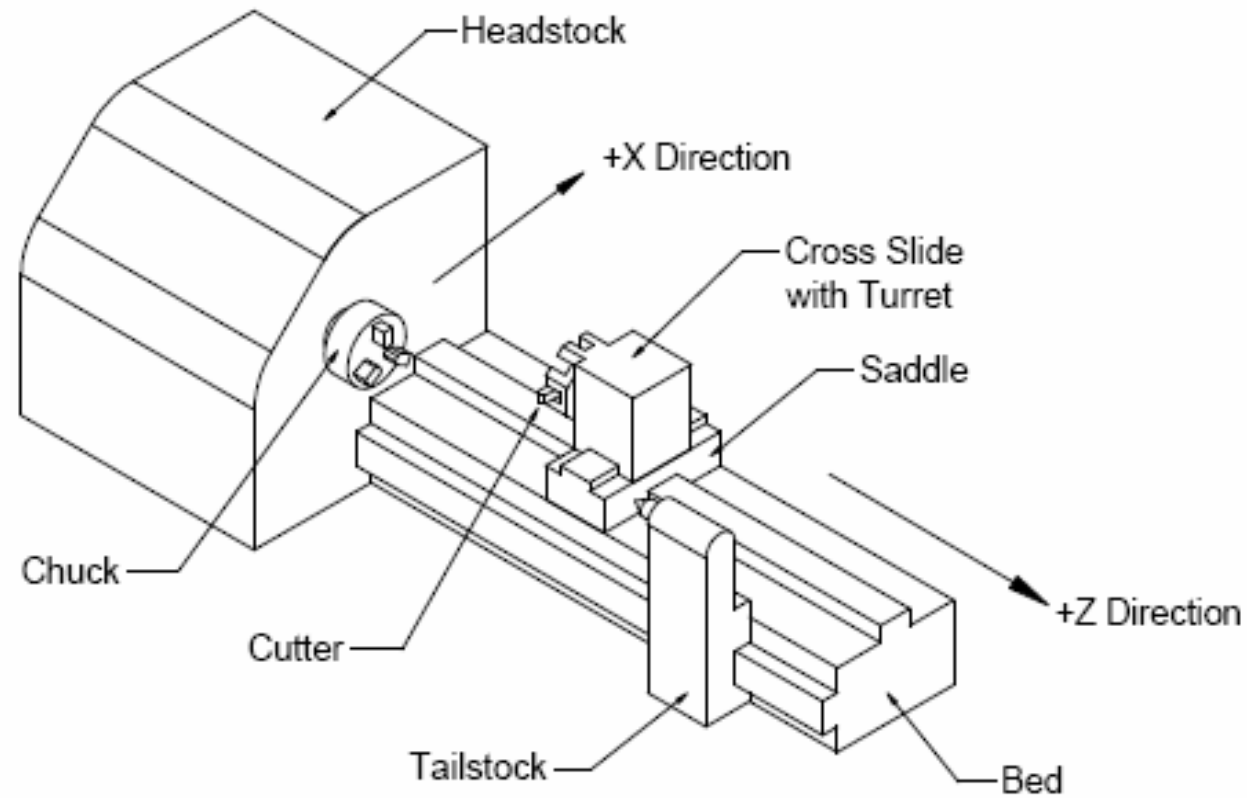


Eixos coordenados: regra da mão direita





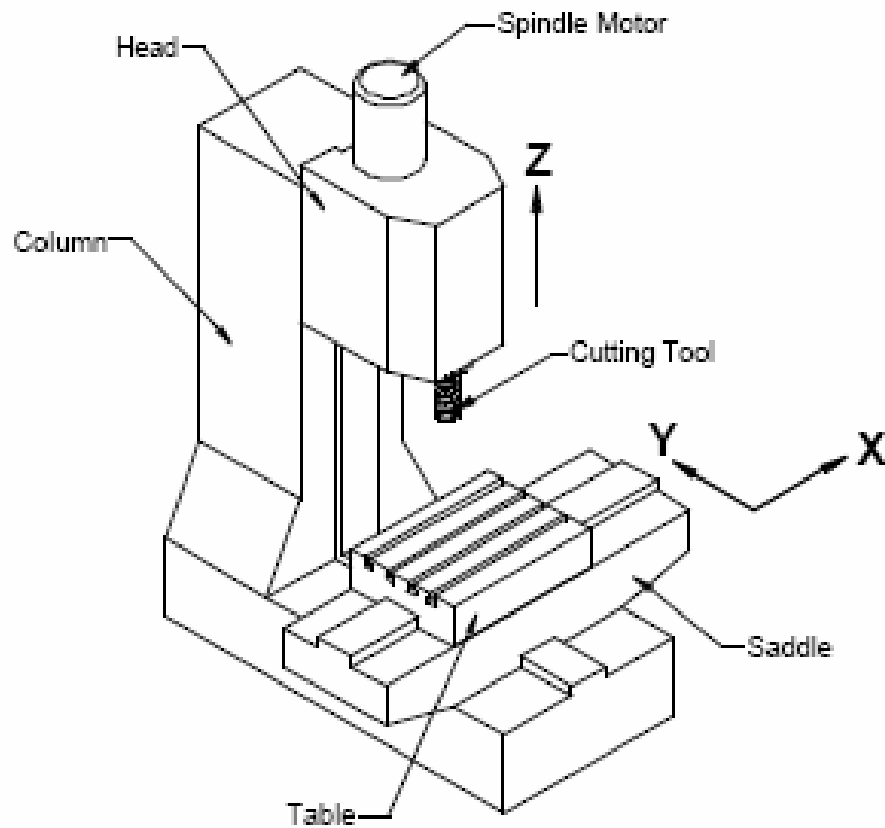
Eixos de um Torno CNC



Eixos de um Torno CNC



Outro Torno CNC

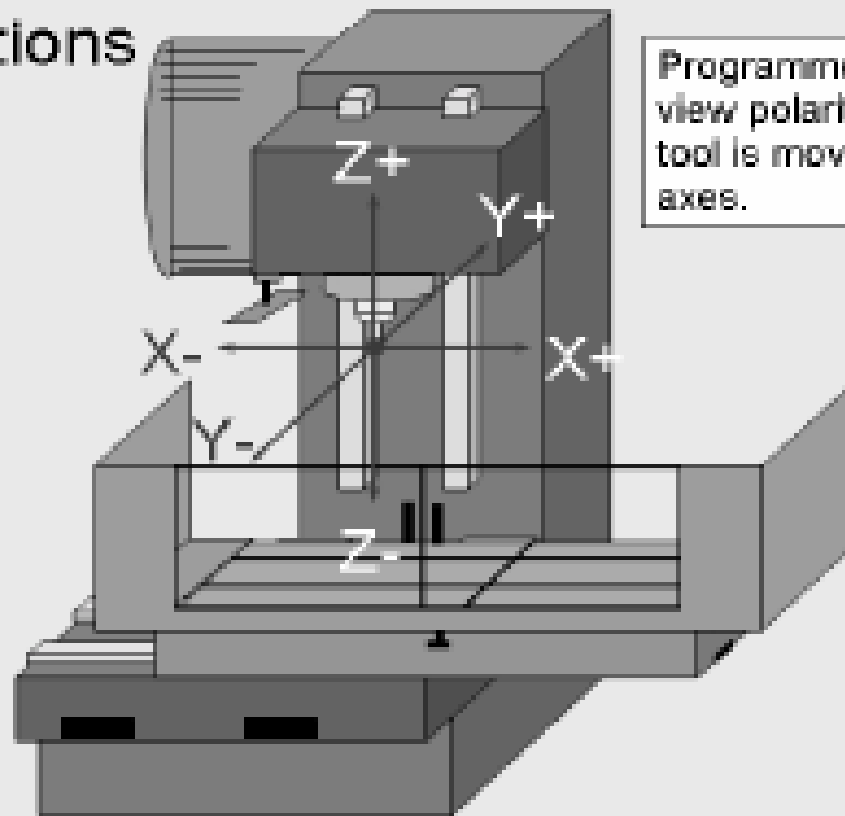


Eixos de um Centro de Usinagem Vertical



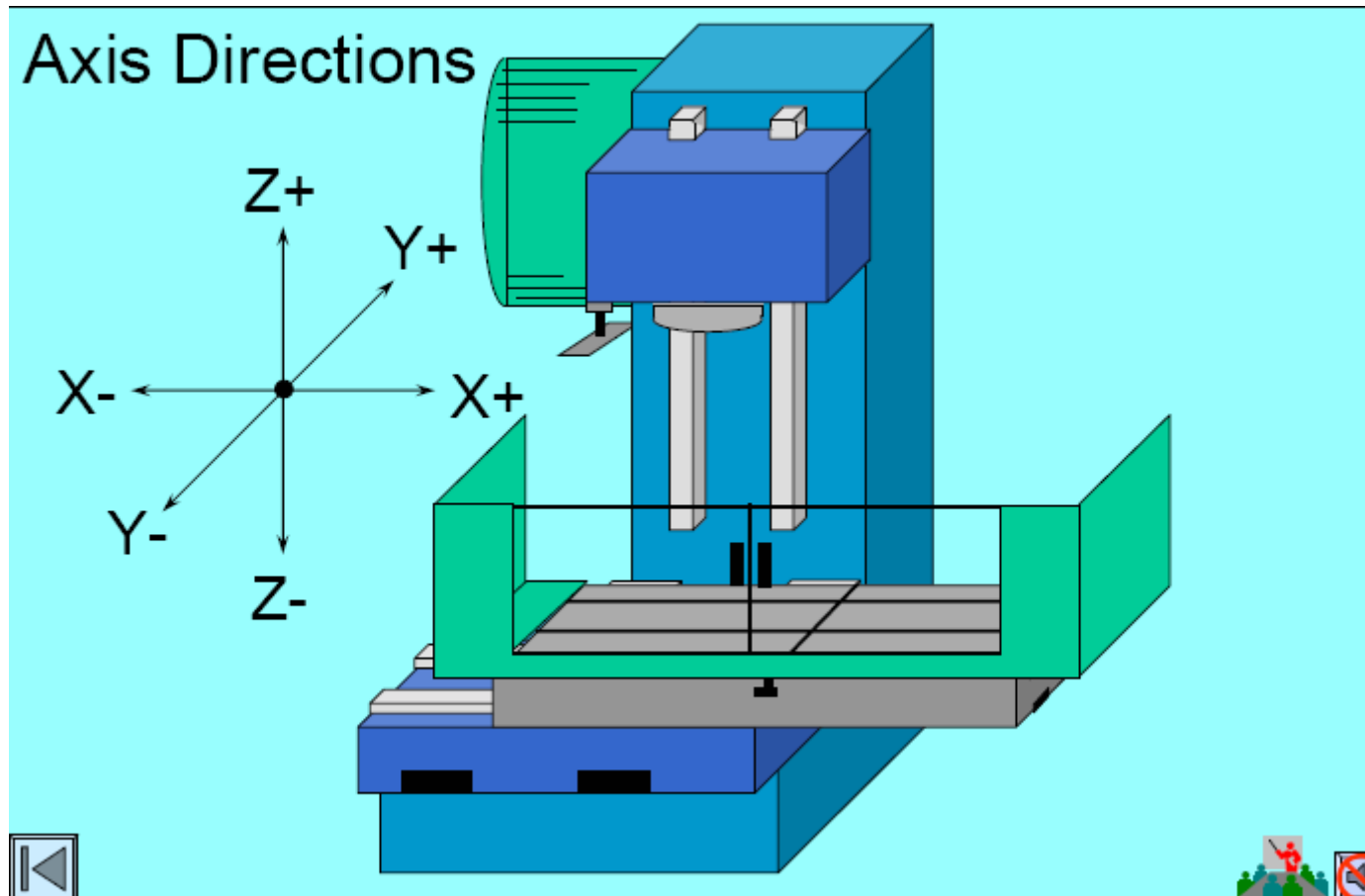
**Eixos de um
Centro de
Usinagem
Vertical**

Axis Directions

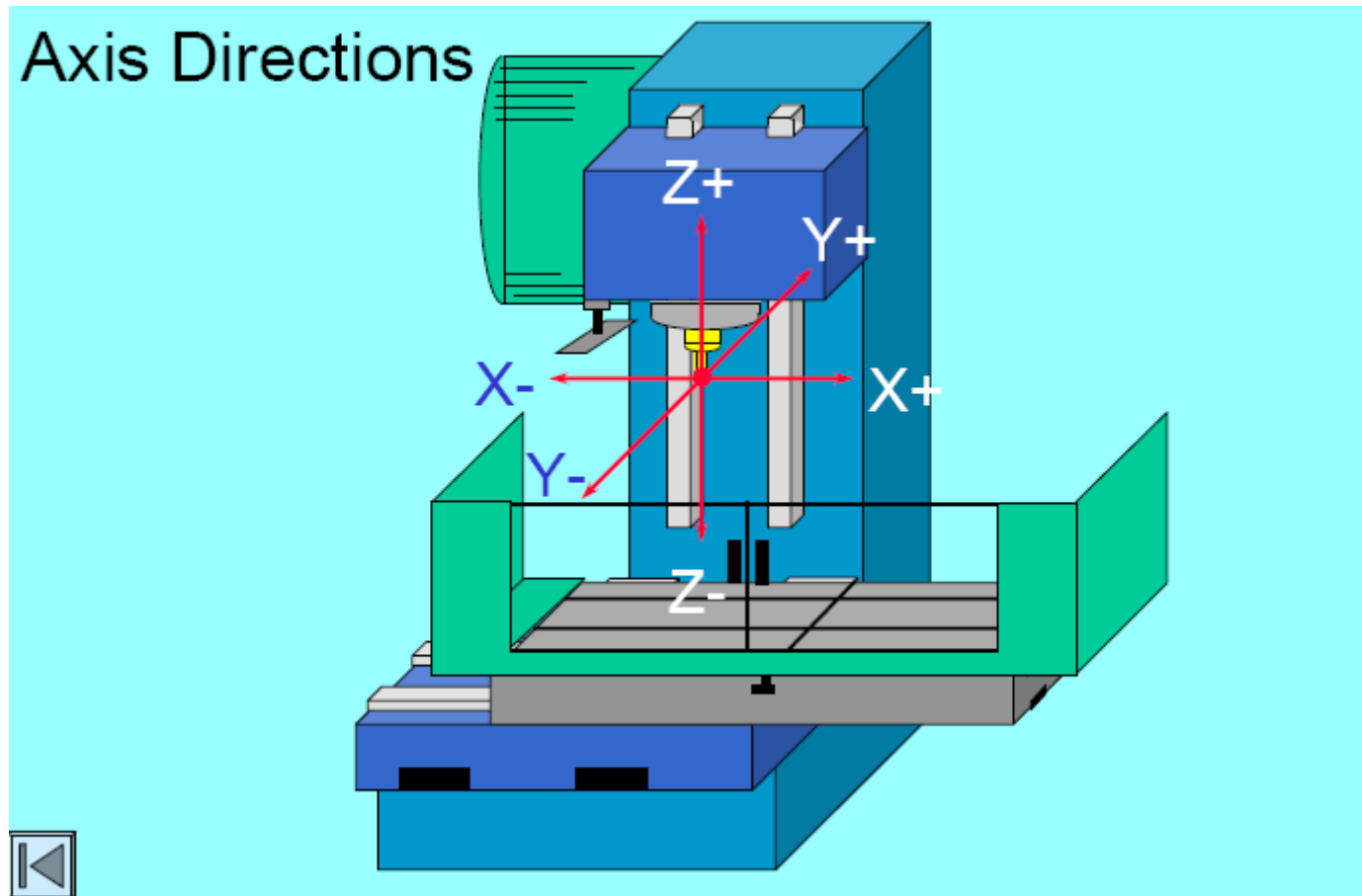


Programmers should view polarity as if the tool is moving in all axes.

Eixos de um Centro de Usinagem Vertical

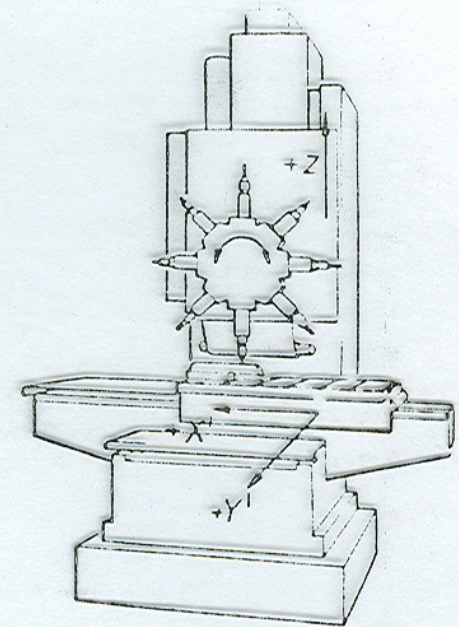
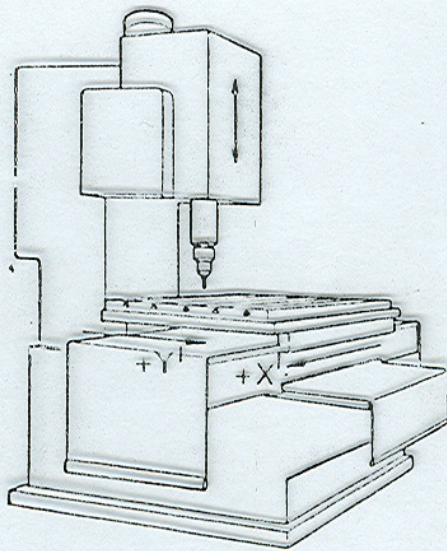


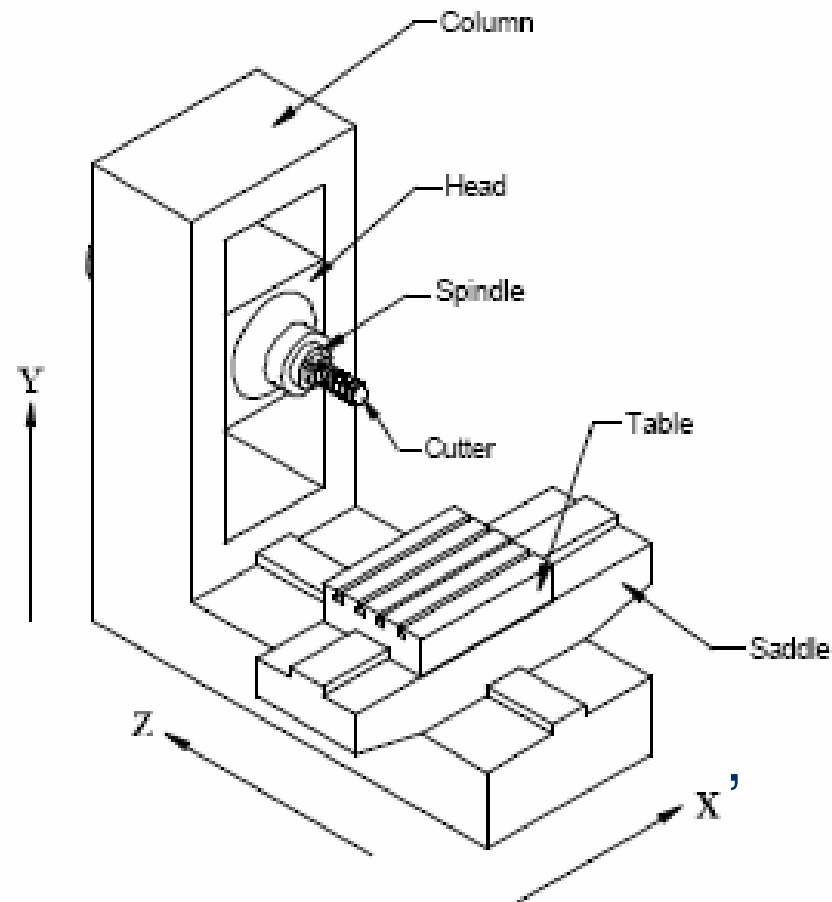
**Eixos de um Centro
de Usinagem Vertical**



**Eixos de um Centro
de Usinagem Vertical**

Furadeiras

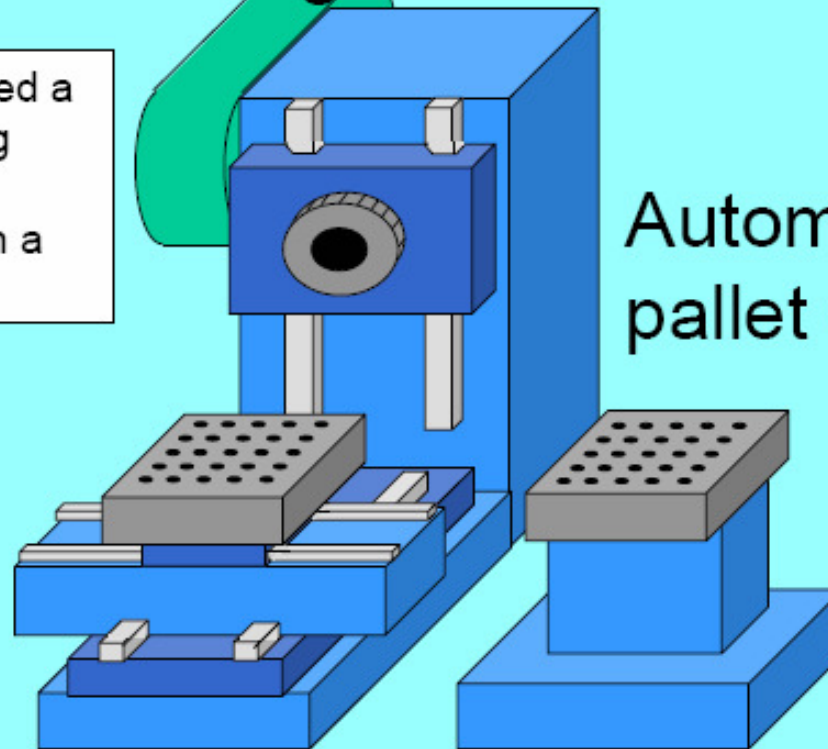




Eixos de um Centro de Usinagem Horizontal

Horizontal Machining Center

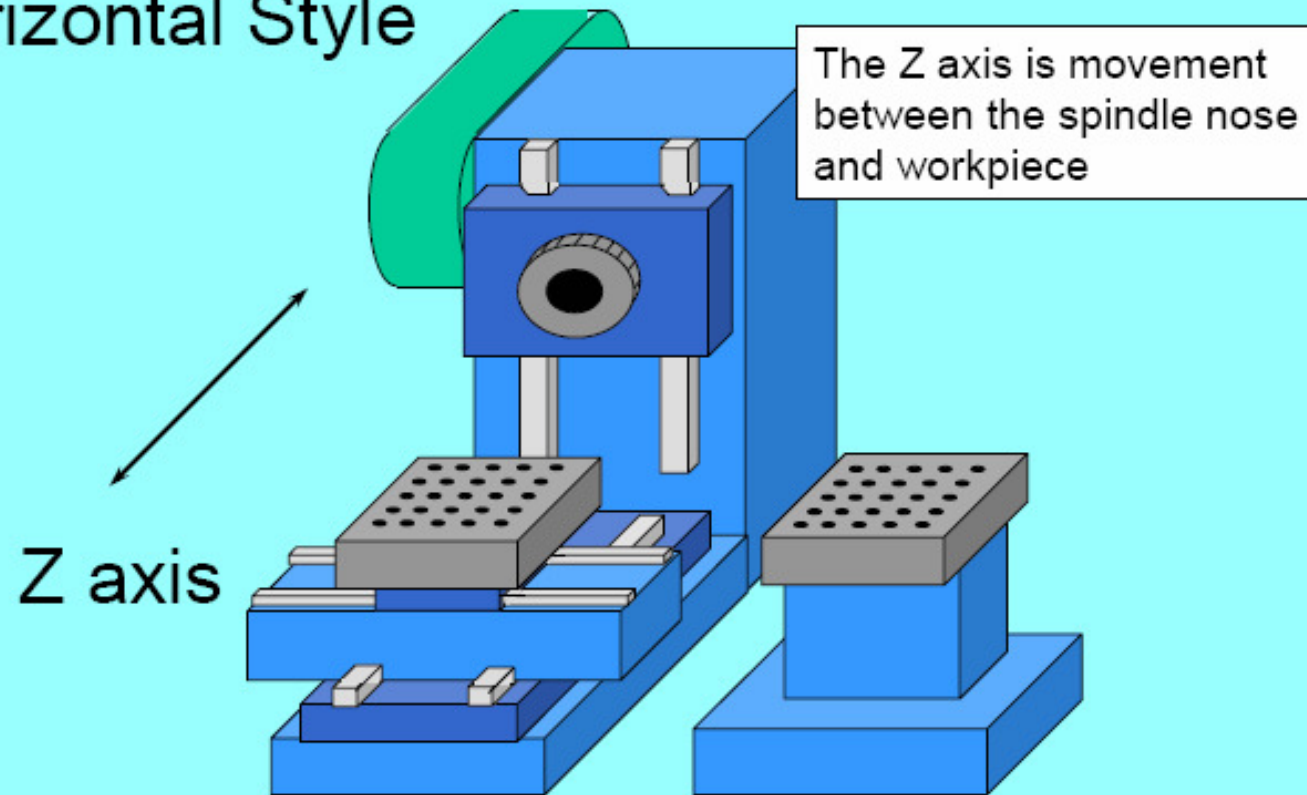
This machine is called a horizontal machining center because the spindle is oriented in a horizontal fashion.



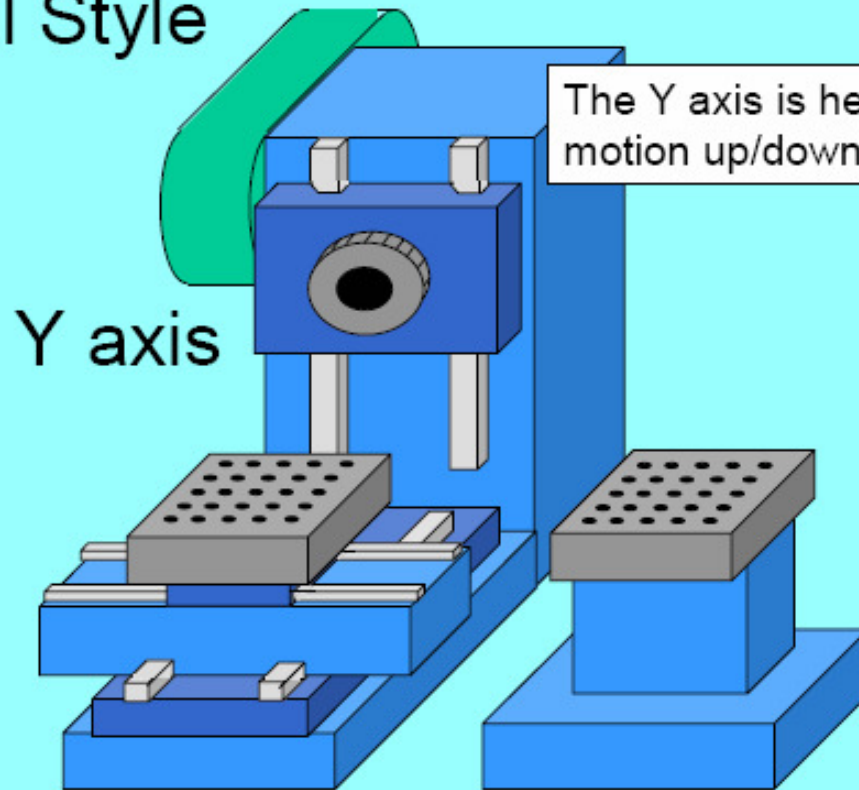
Automatic
pallet changer



Horizontal Style



Horizontal Style



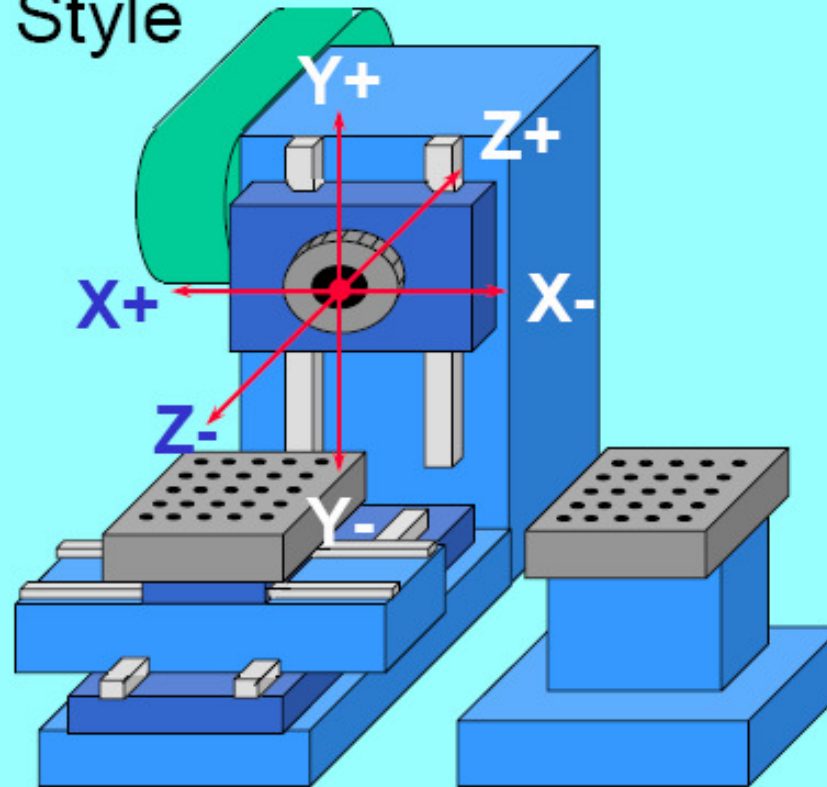
Horizontal Style

Here are the axes for a horizontal machining center

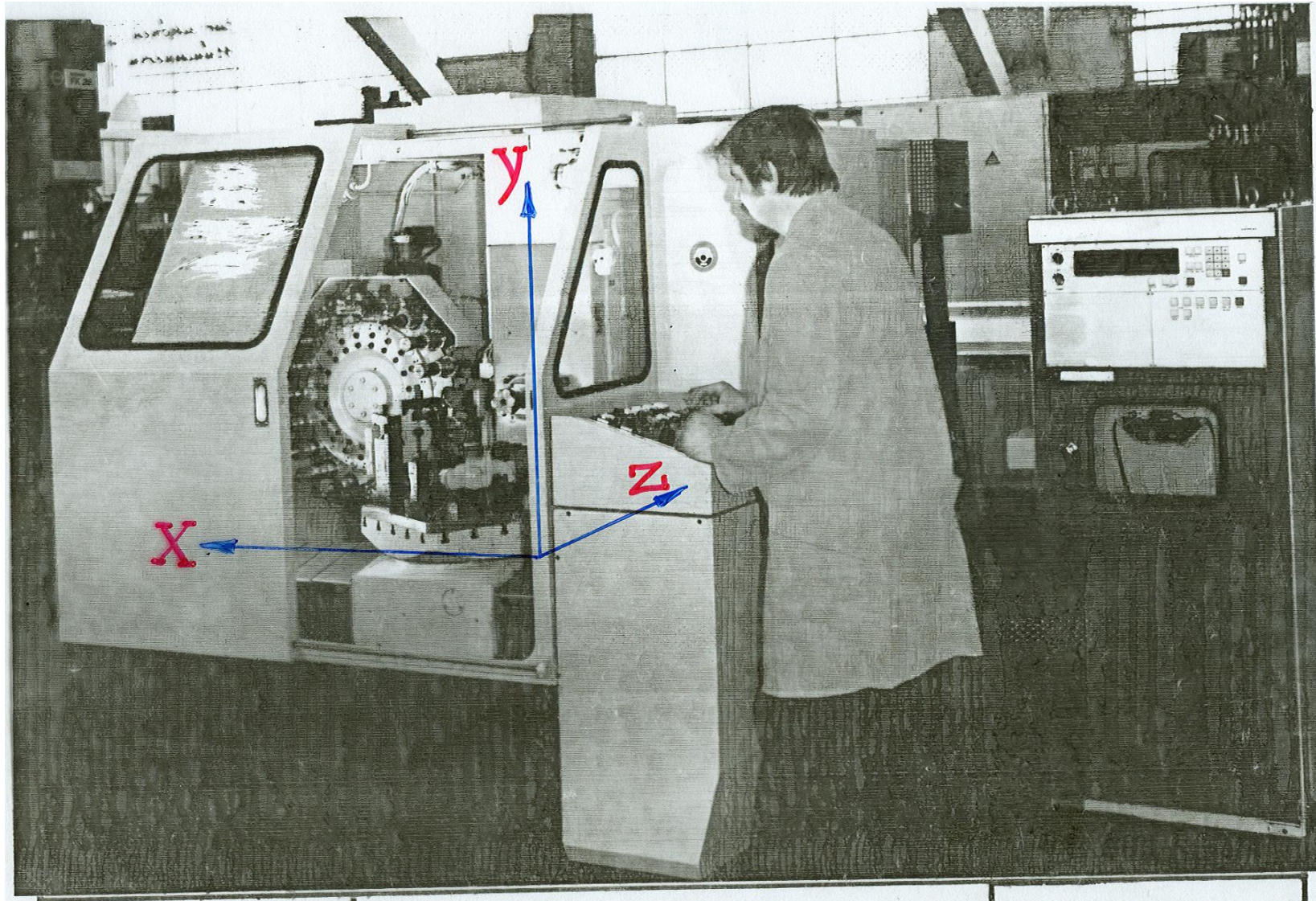
X axis

A 3D schematic diagram of a horizontal machining center. The machine is primarily blue. It features a vertical column on the right side. A horizontal spindle assembly is mounted on the column, with a green curved arrow indicating its rotation. Below the spindle is a table with two T-slots, each containing a grey workpiece with a grid of holes. A horizontal double-headed arrow labeled 'X axis' is positioned to the left of the table, indicating the direction of table travel. The entire machine is supported by a base.

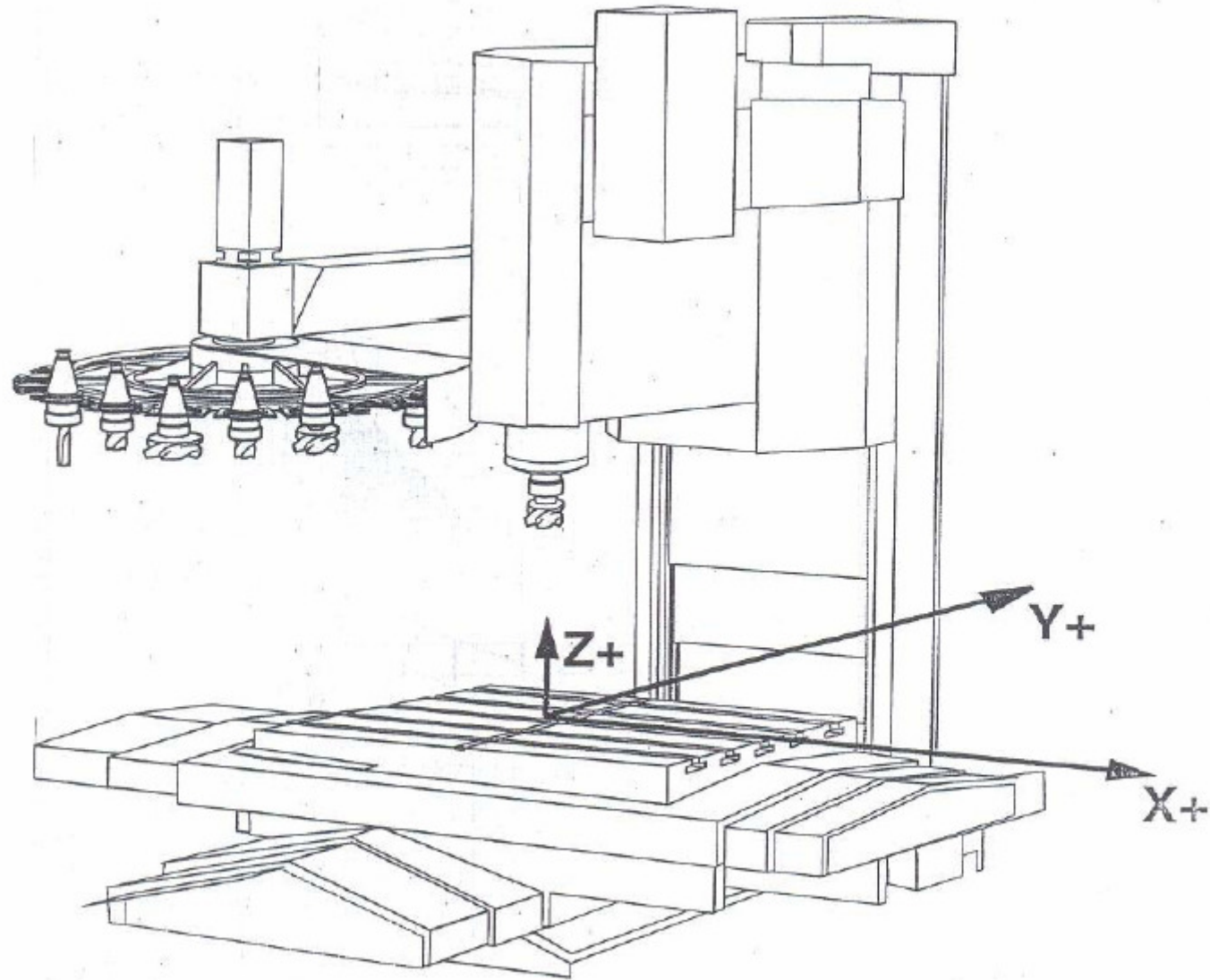
Horizontal Style

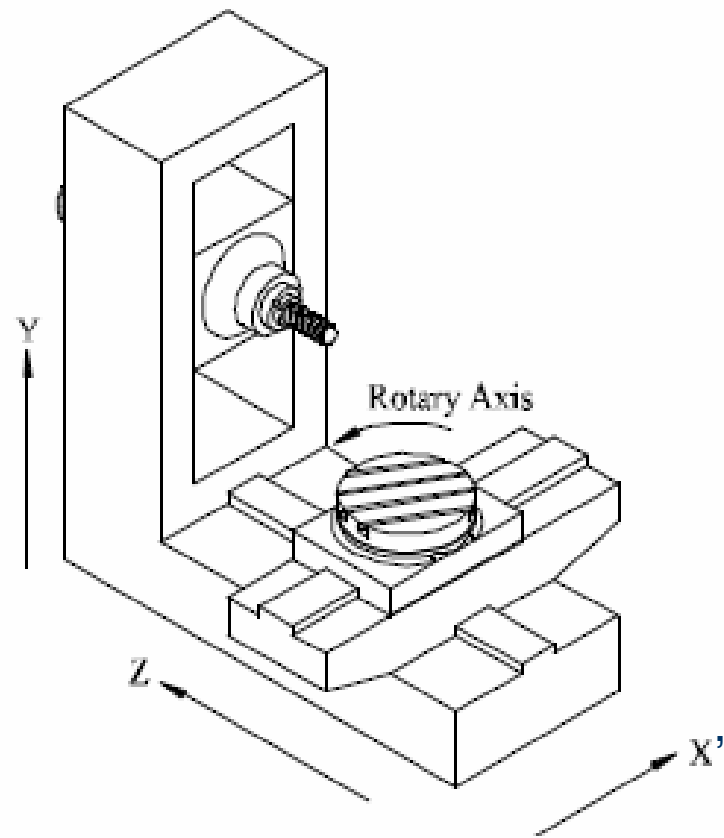


Centro de Usinagem de 3 Eixos

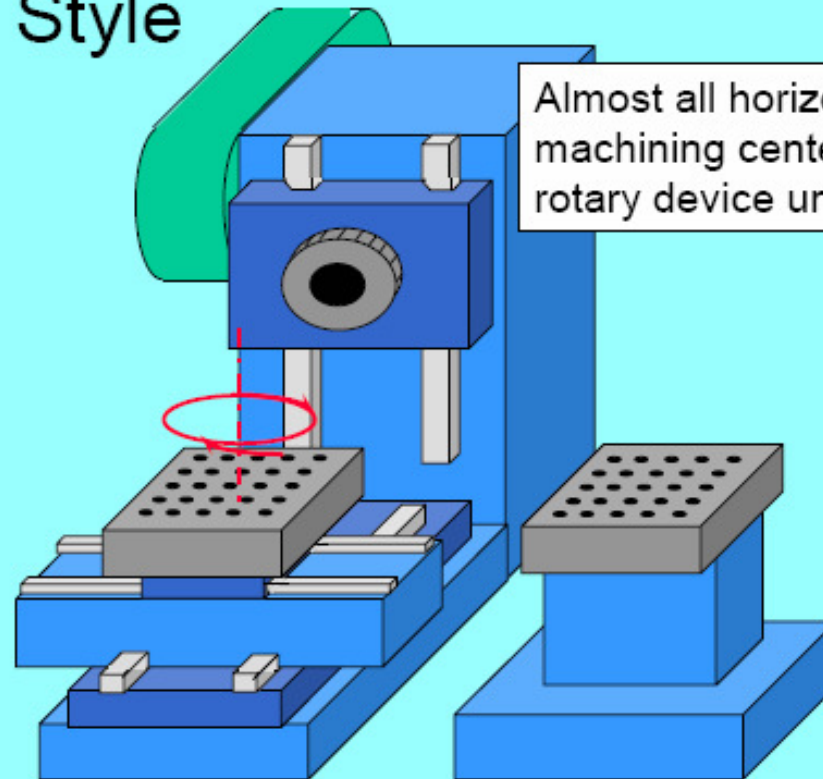


Centro de Usinagem de 3 Eixos



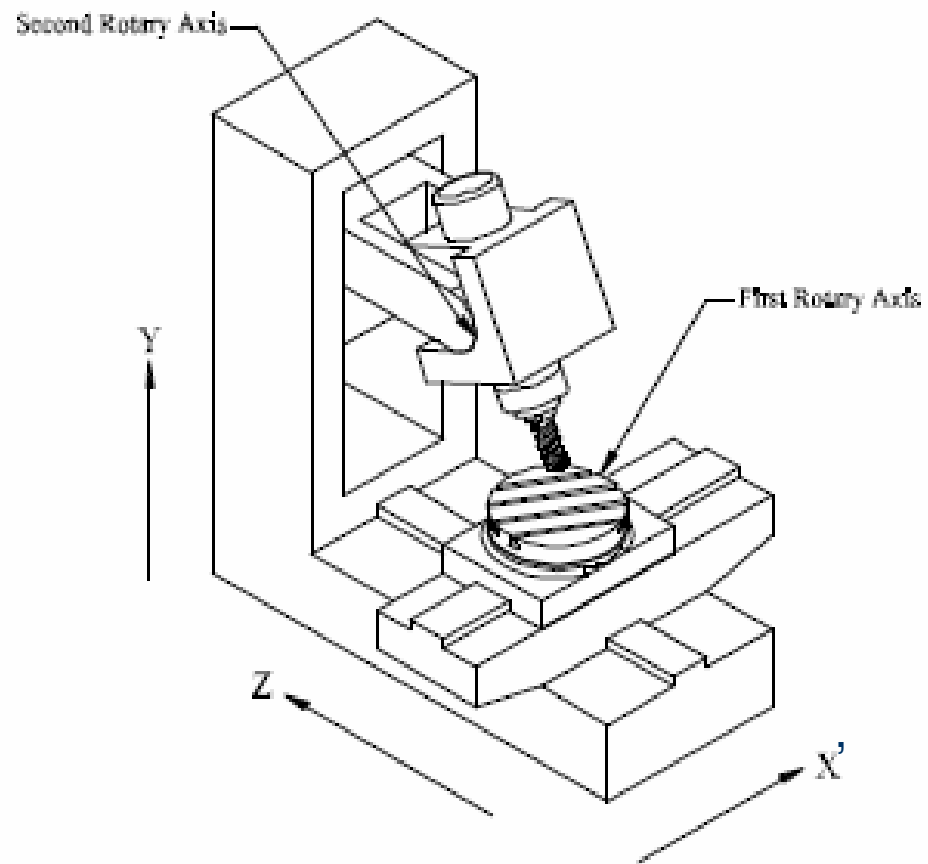


Horizontal Style

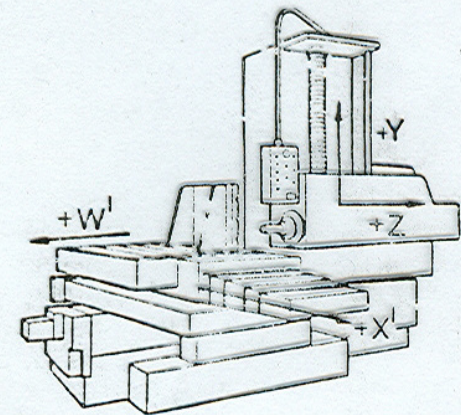
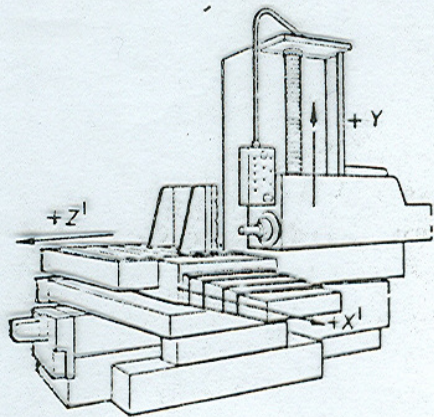


Almost all horizontal machining centers have a rotary device under the table

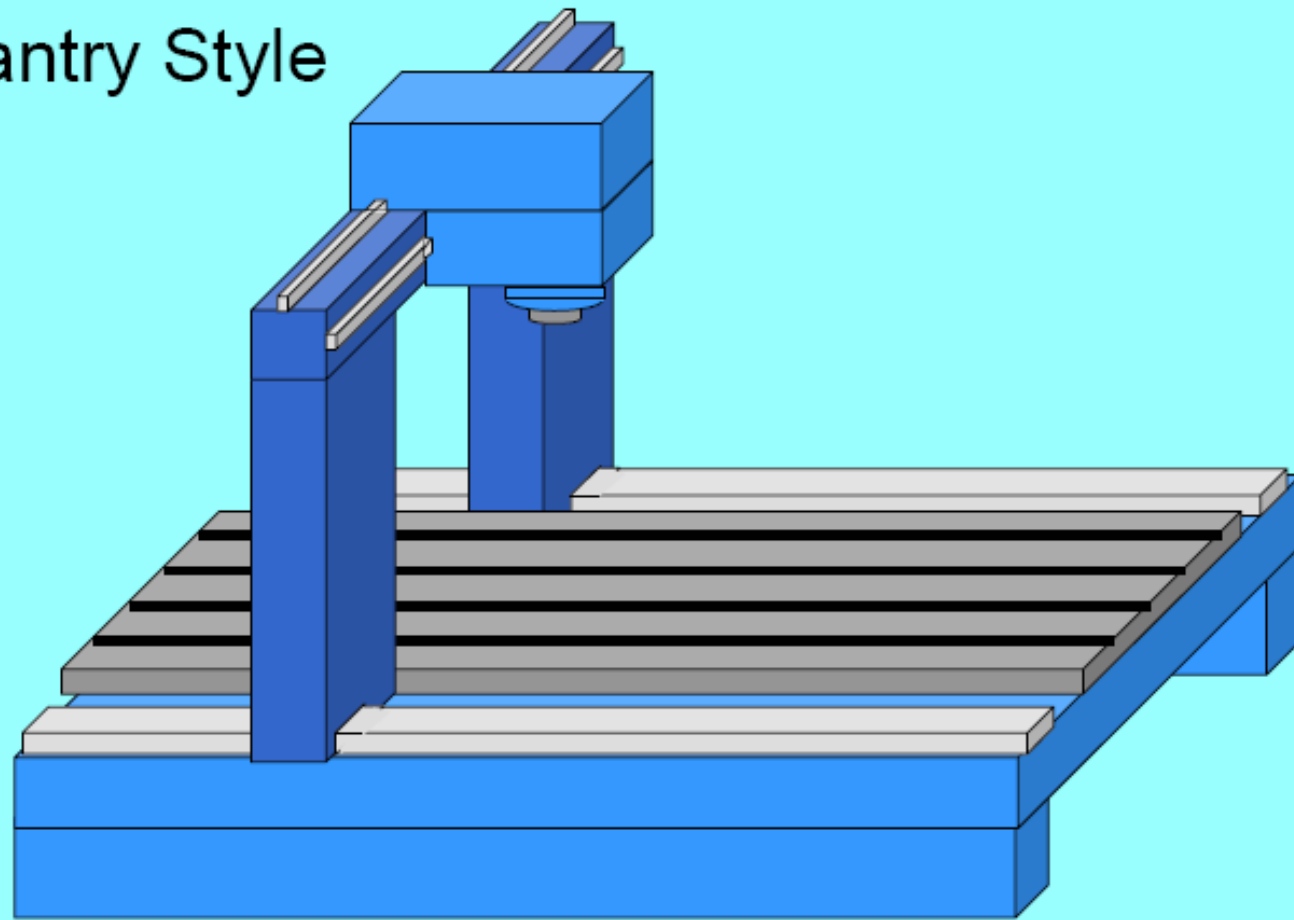




Mandriladoras

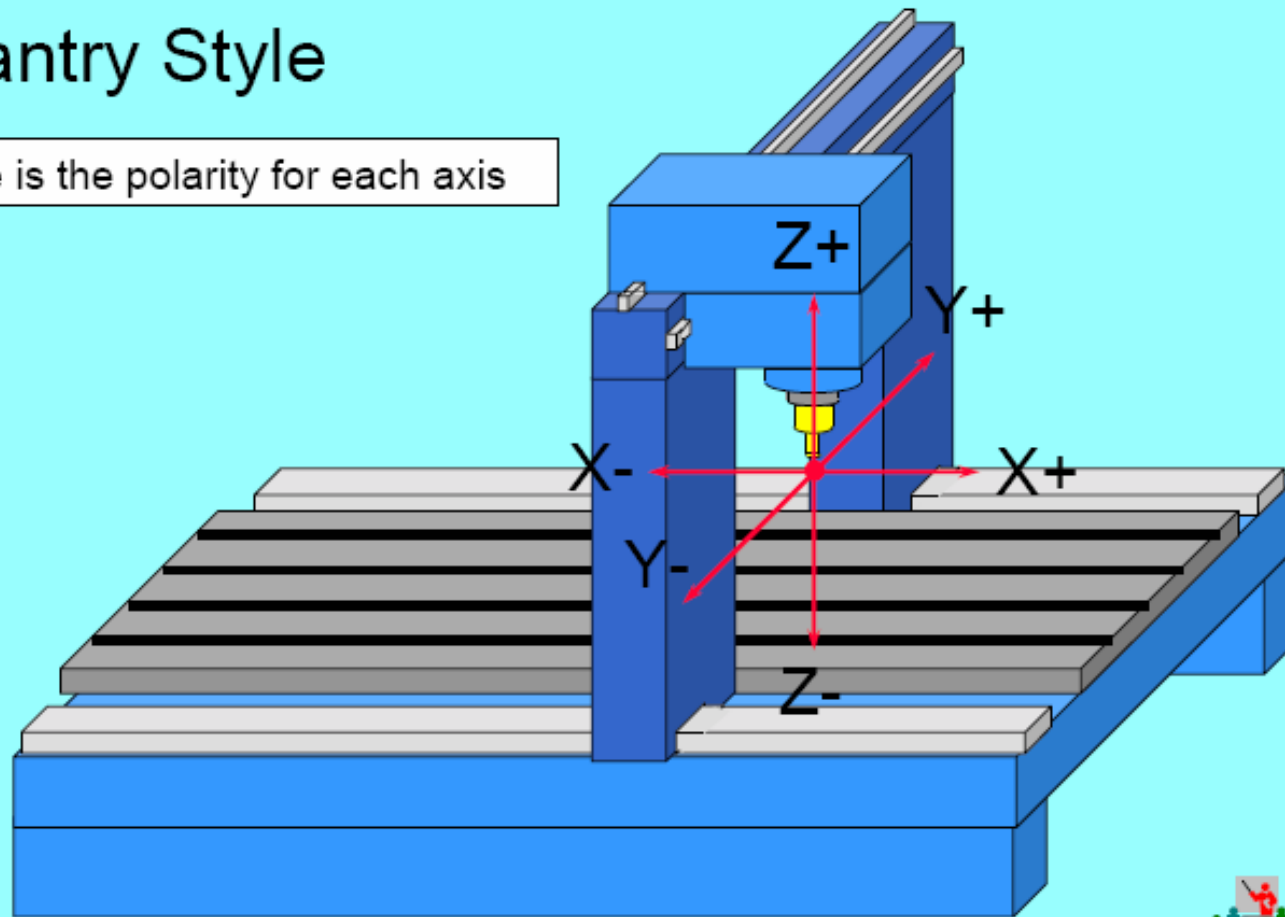


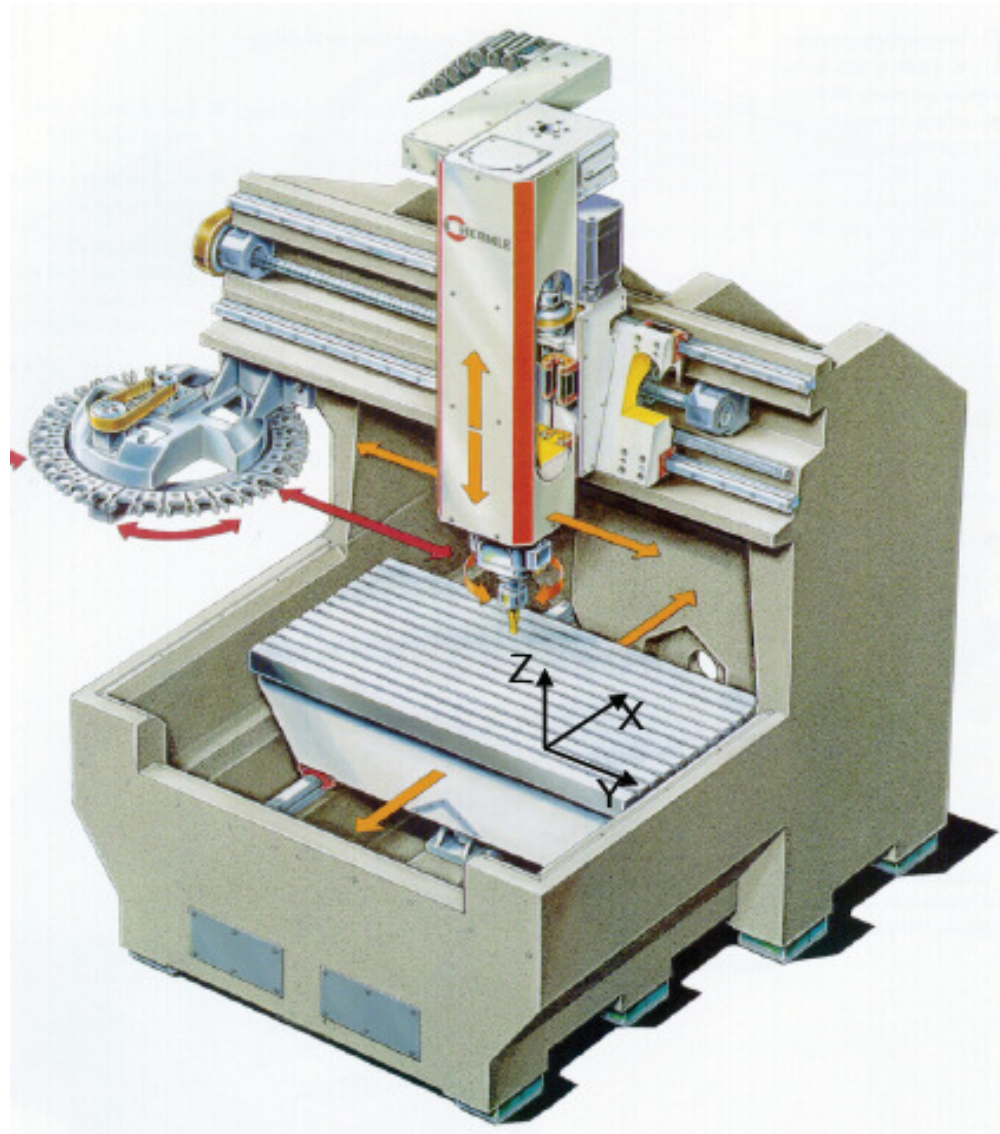
Gantry Style

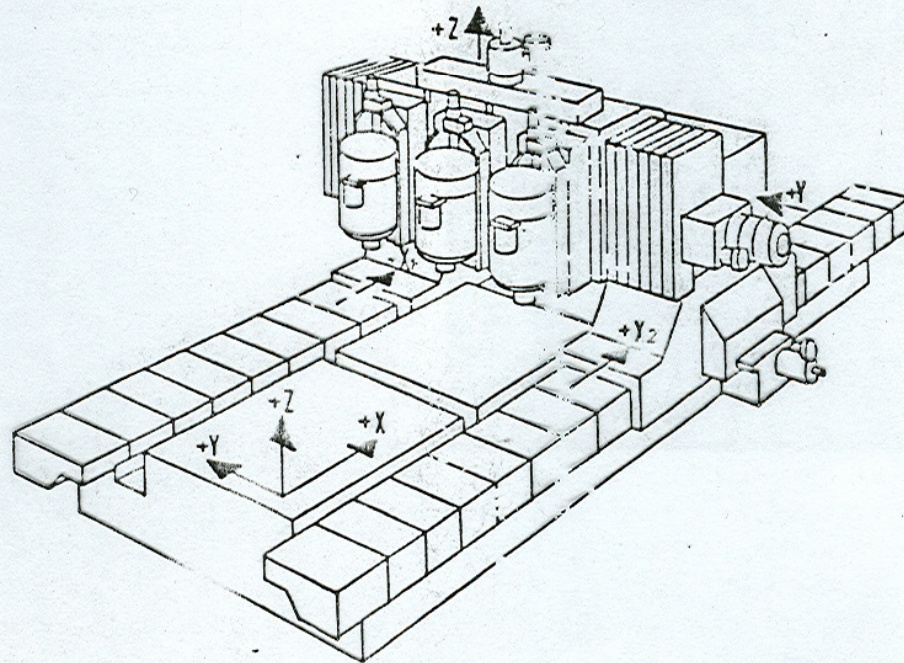
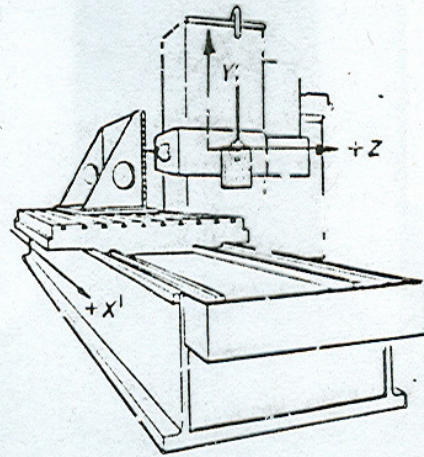
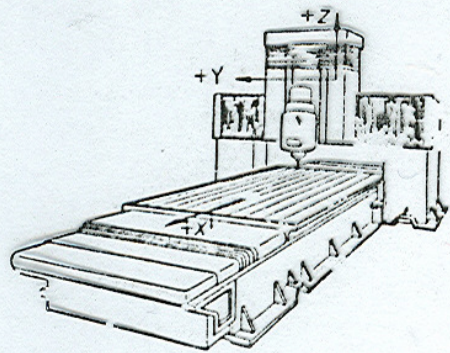


Gantry Style

Here is the polarity for each axis

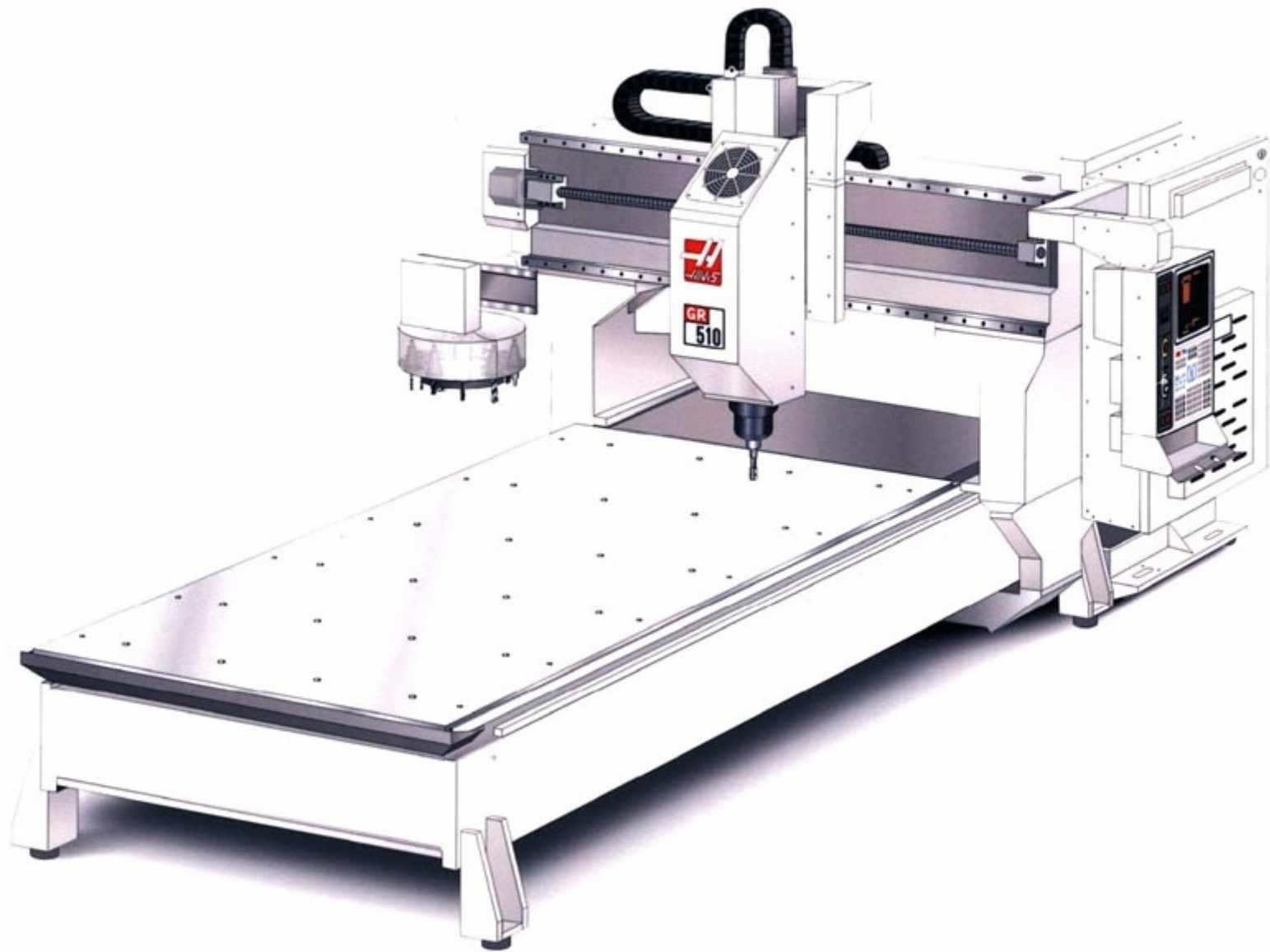






Fresadoras





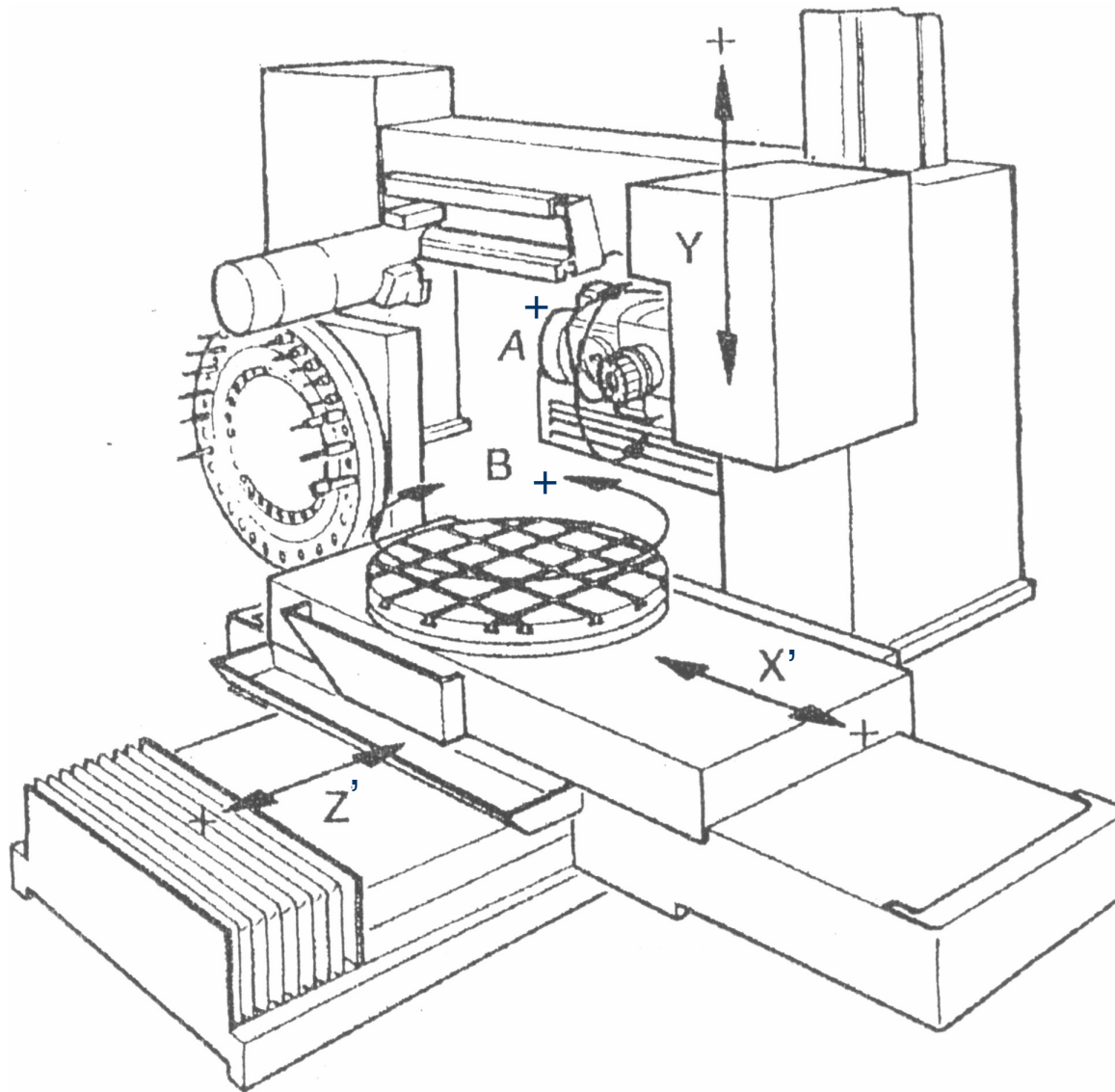


[Video 1](#)

[Video 2](#)

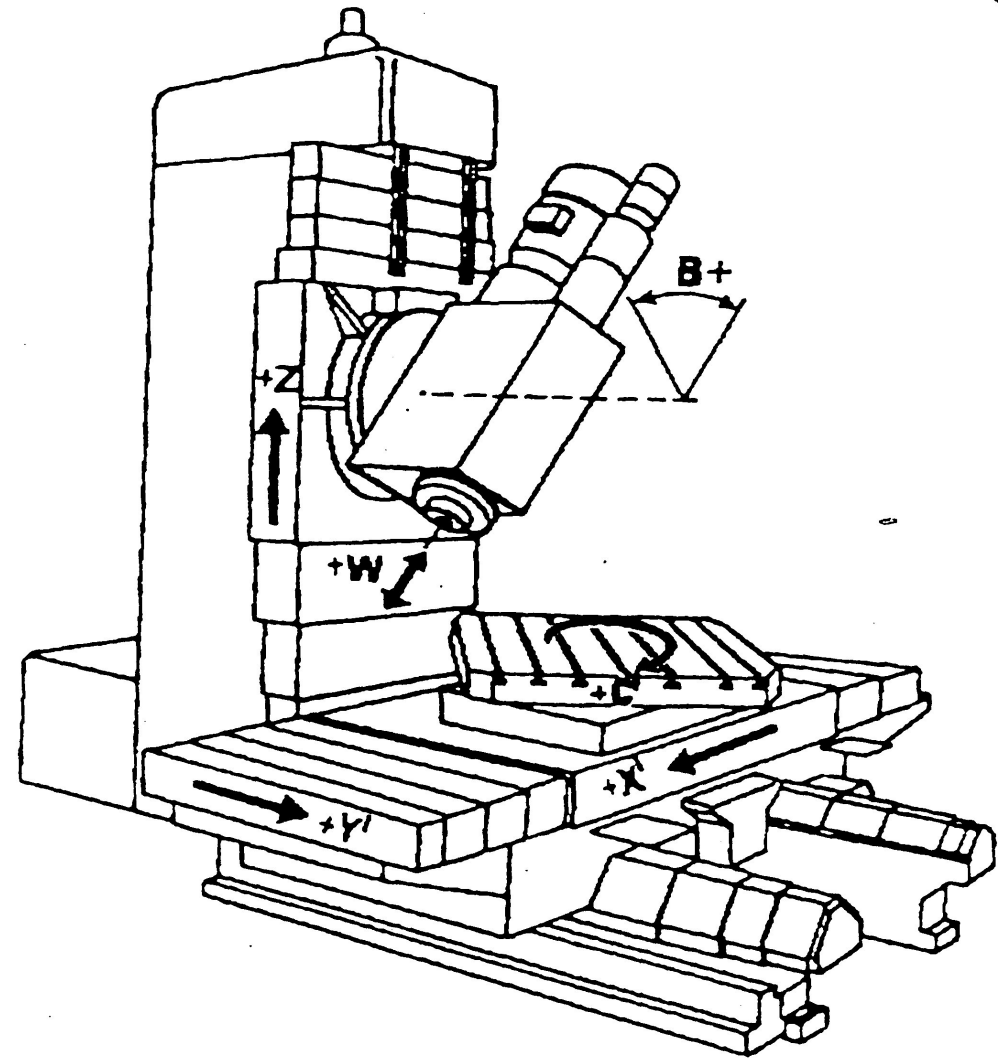
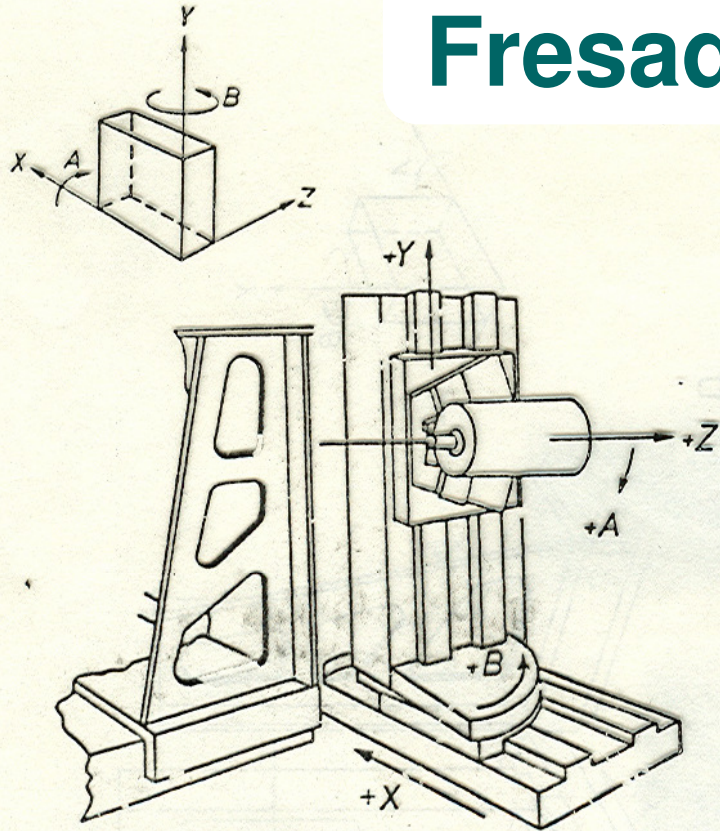
[Video 3](#)

Eixos de um Centro de Usinagem

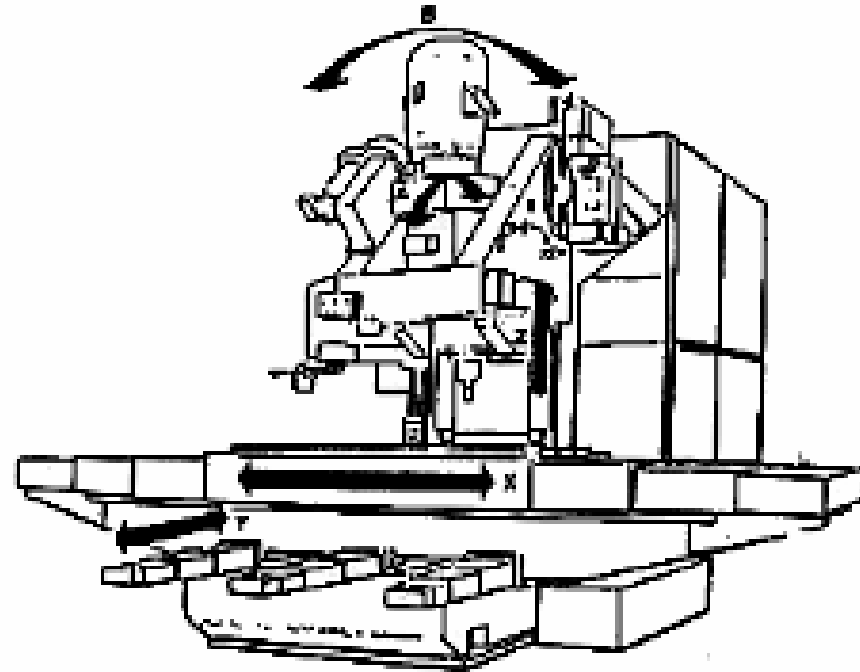
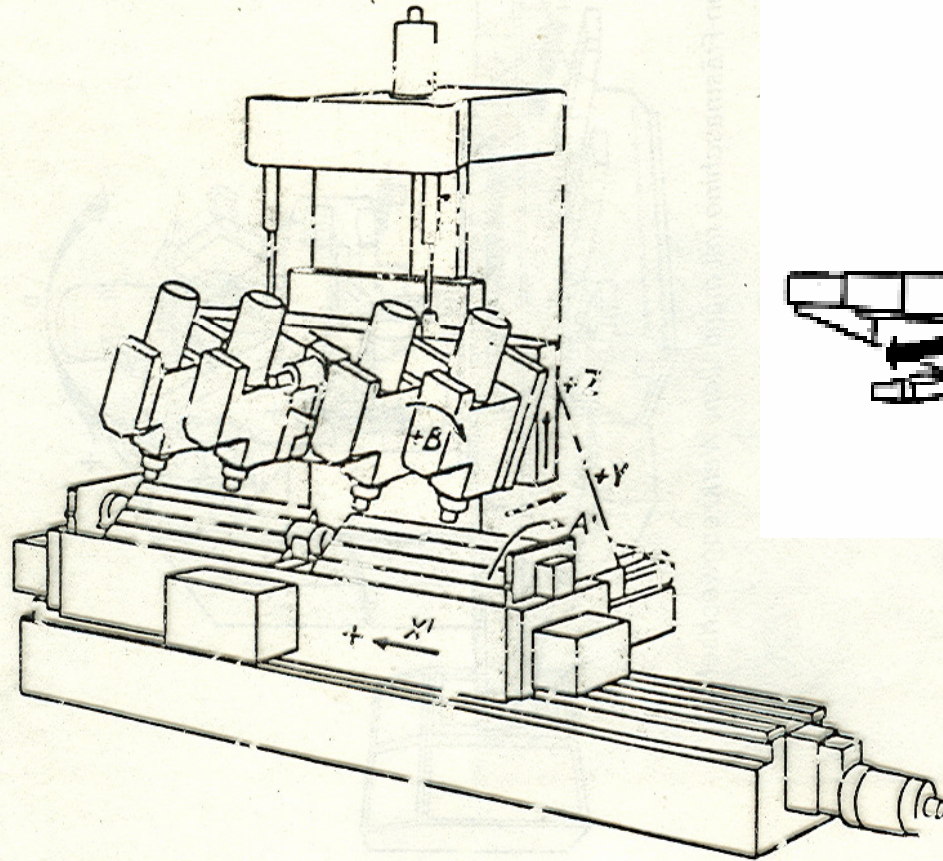


Representação dos eixos em um centro de usinagem com 3 eixos lineares e 2 rotacionais

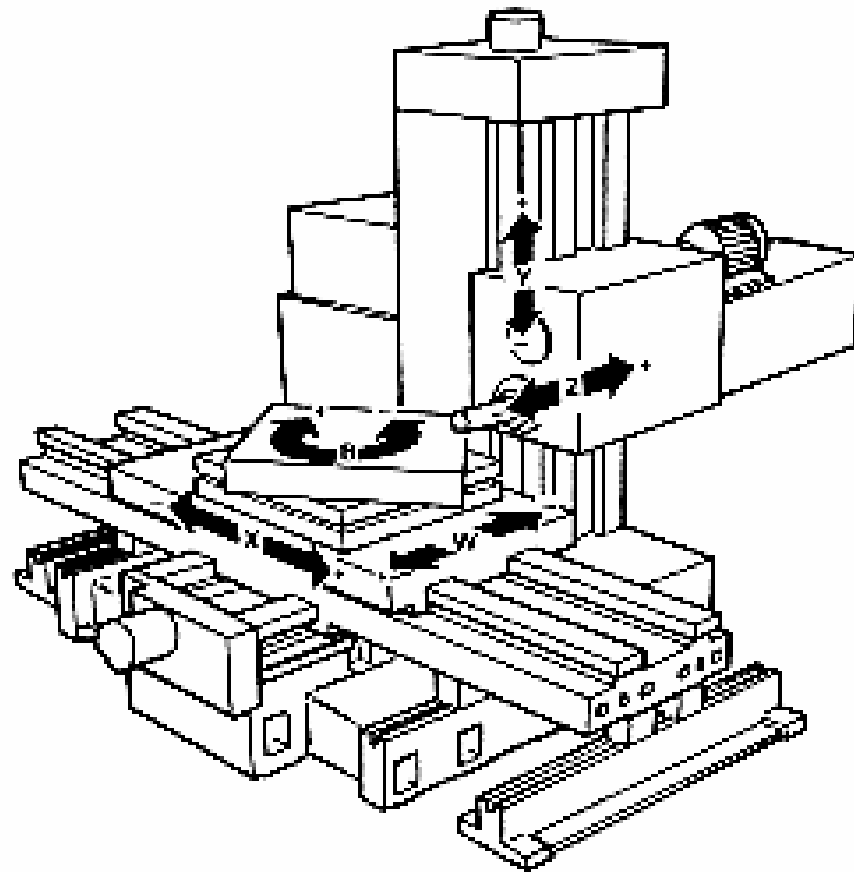
Fresadoras de 5 Eixos



Fresadoras de 5 Eixos



Fresadora de 5 Eixos

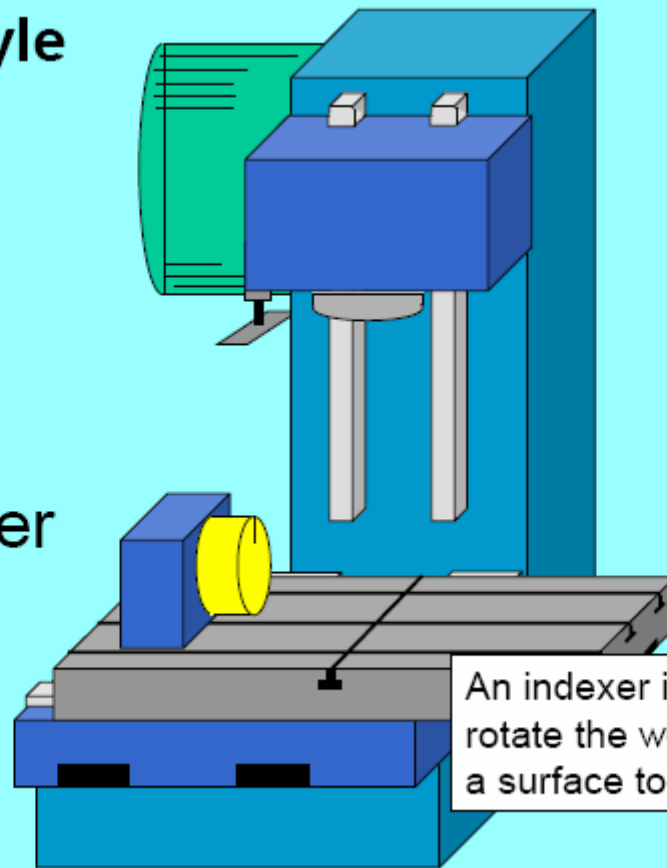




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C-frame style

Indexer

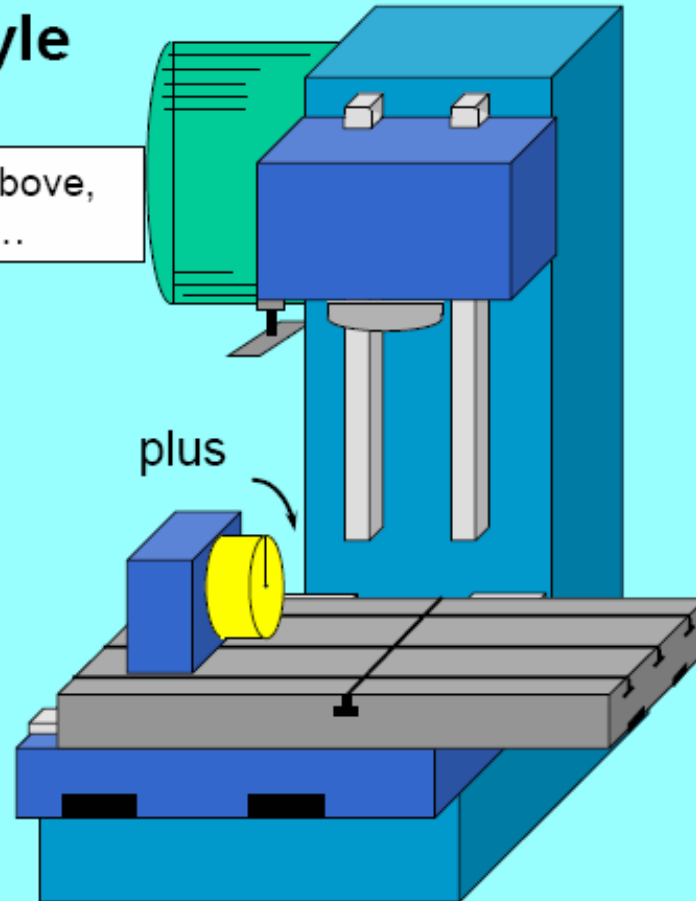


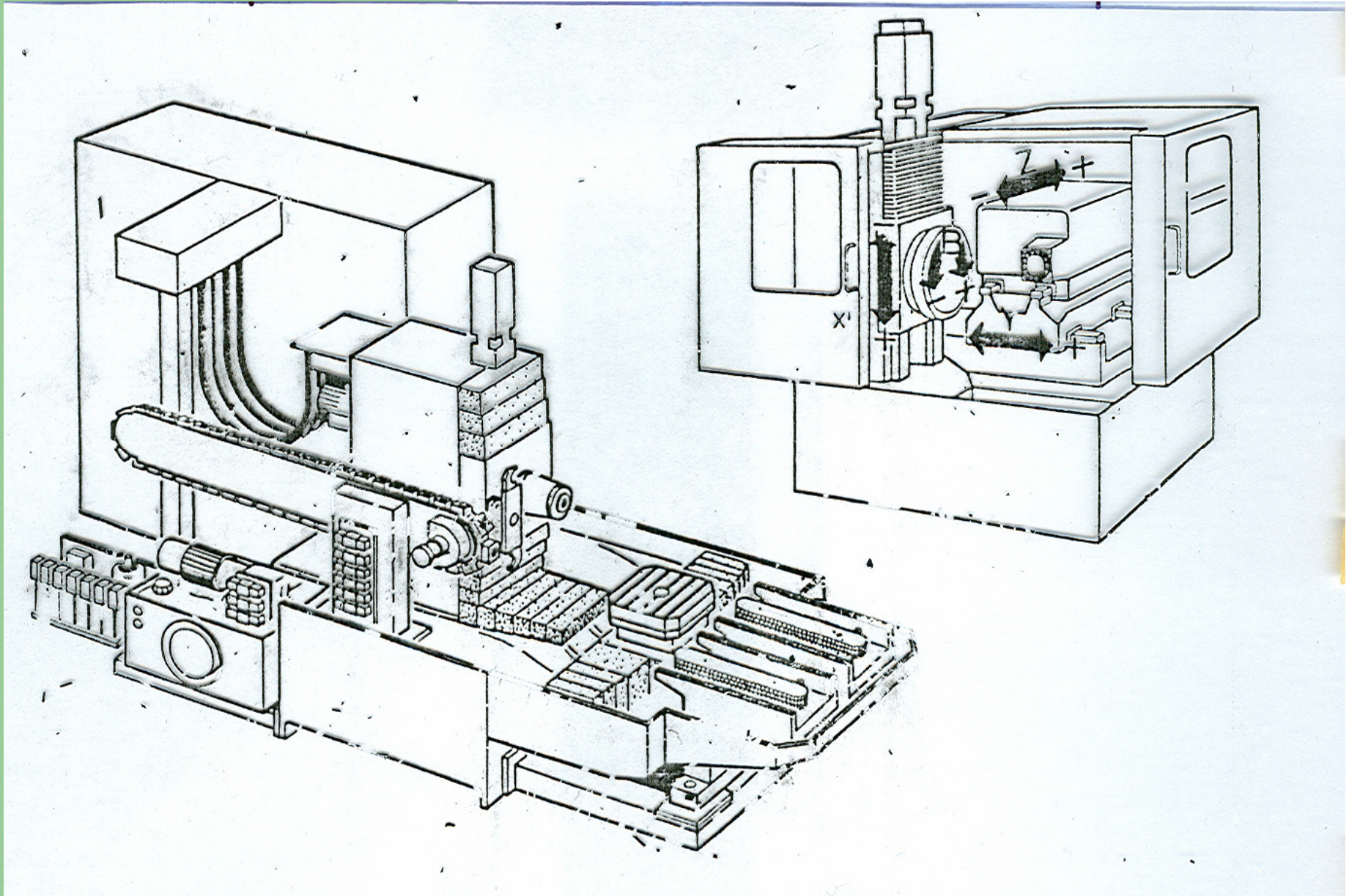
An indexer is used to quickly rotate the workpiece to expose a surface to the spindle



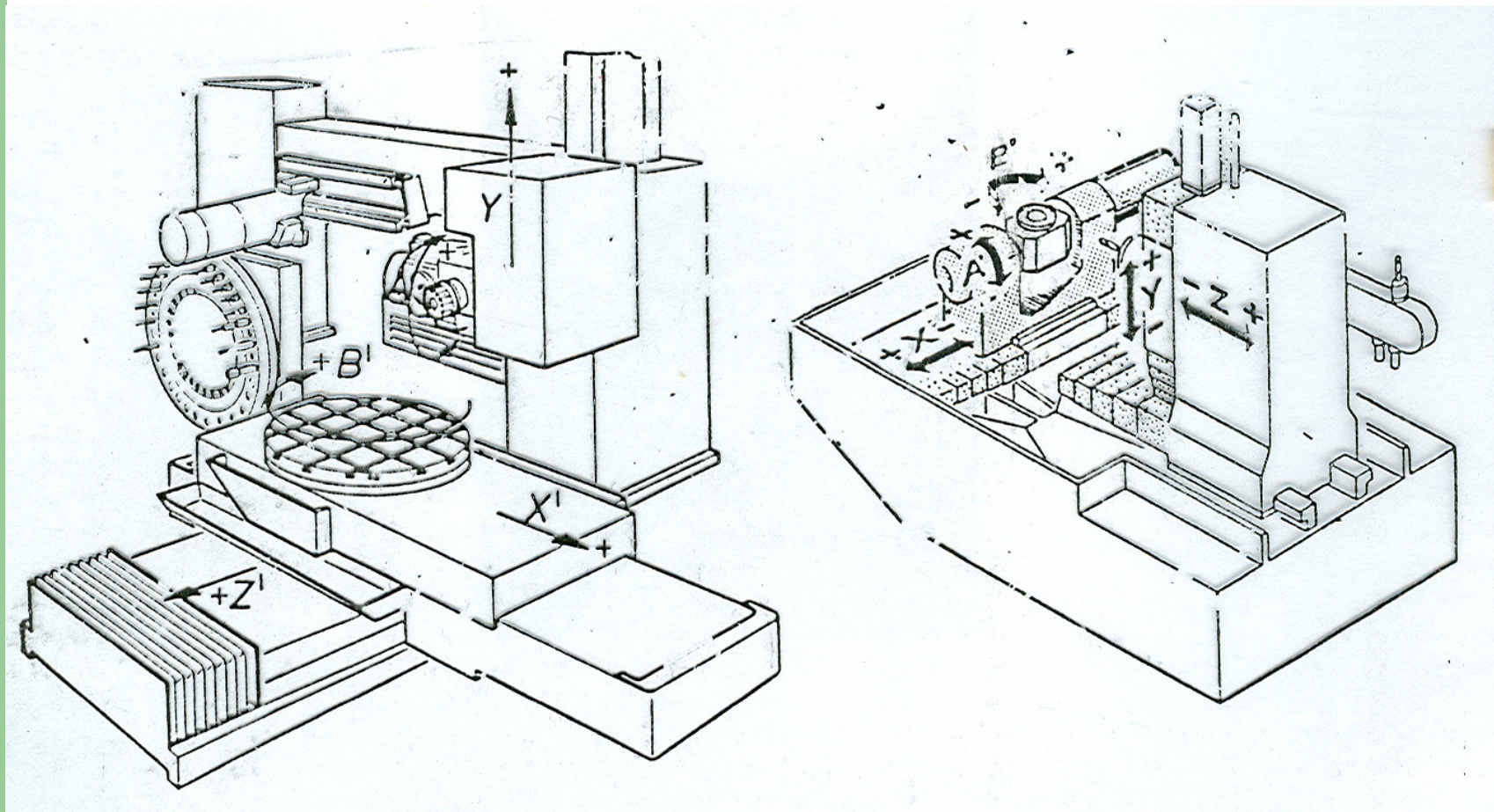
C-frame style

As viewed from above,
plus is clockwise...

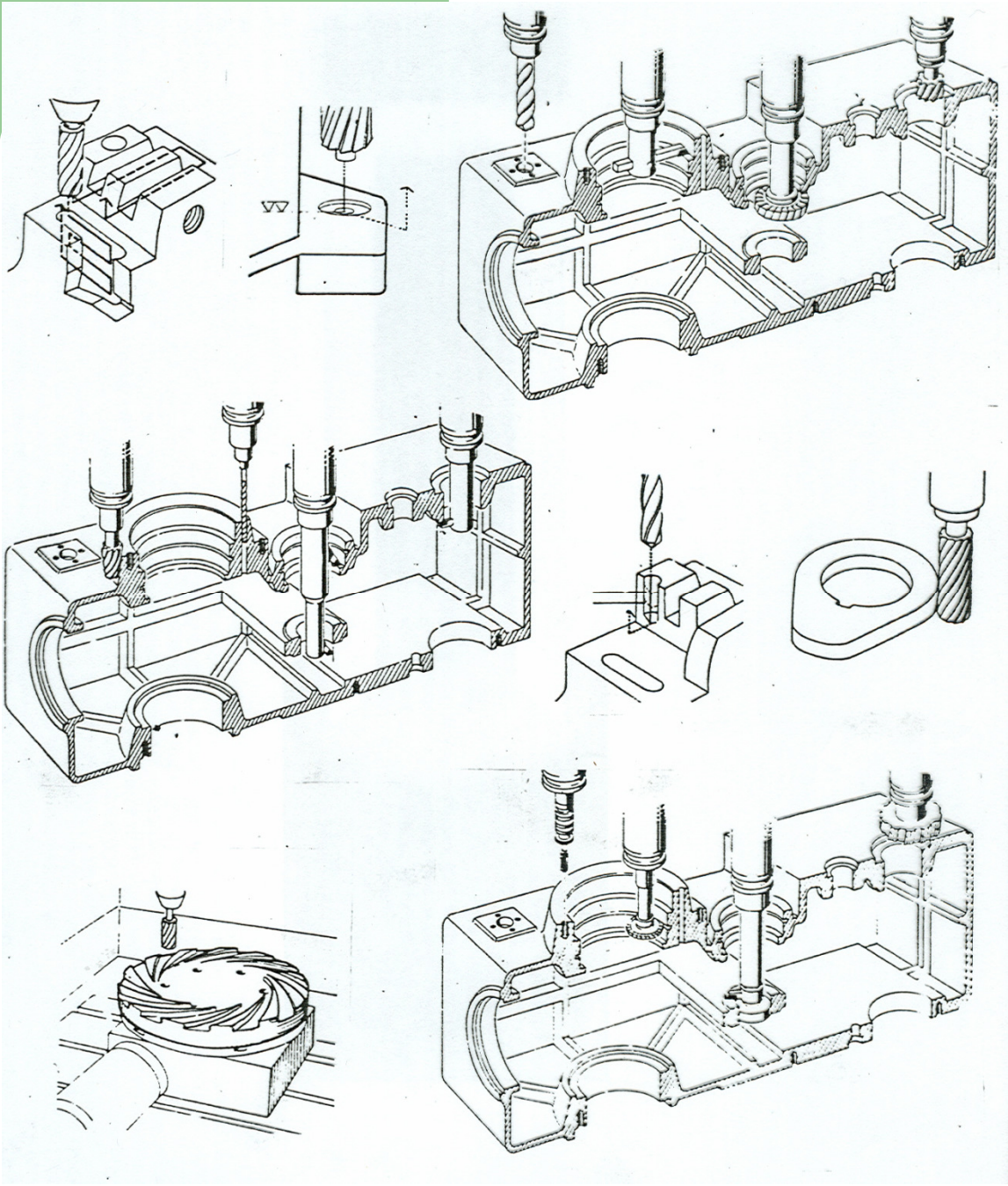




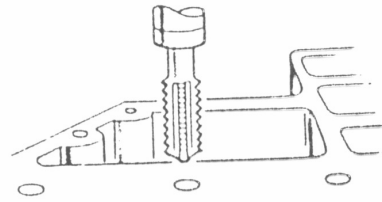
Centros de usinagem



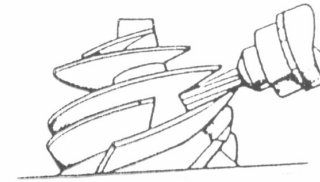
Centros de usinagem



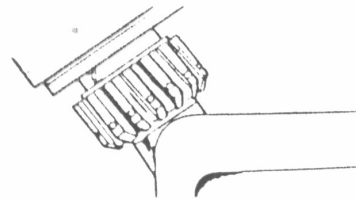
Exemplos de operações com centro de usinagem



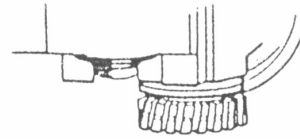
Rosqueamiento
(Cualquier ángulo)



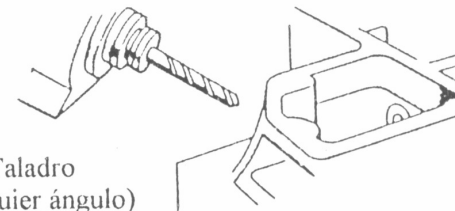
Fresado complejo



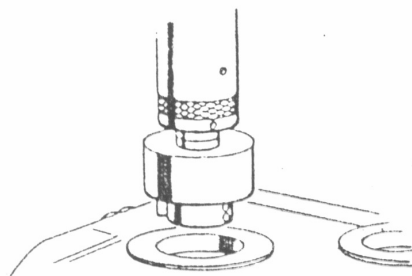
Fresado angular



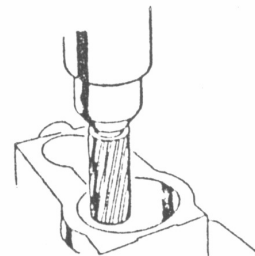
Fresado pesado



Taladro
(cualquier ángulo)

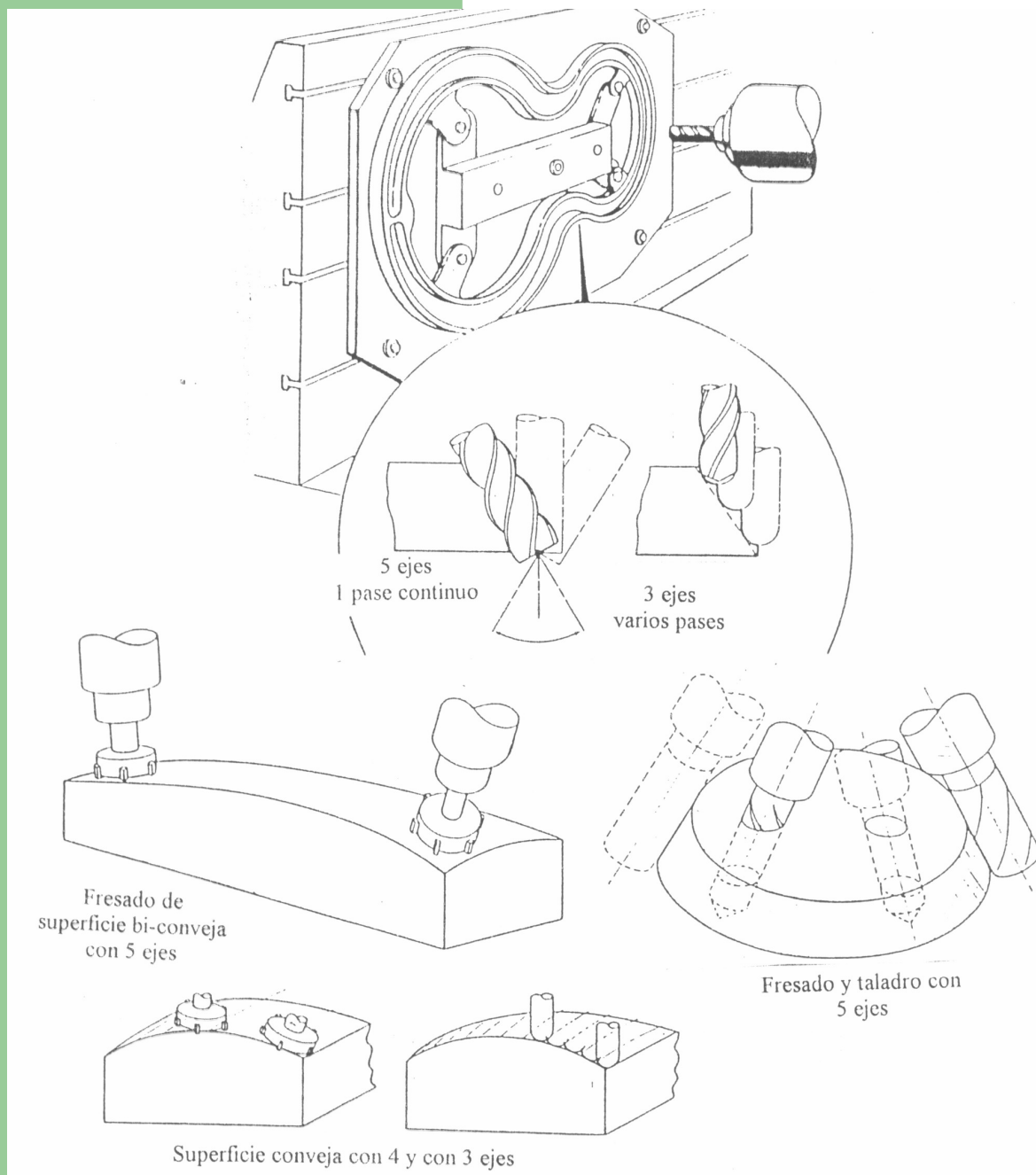


Mandrinado

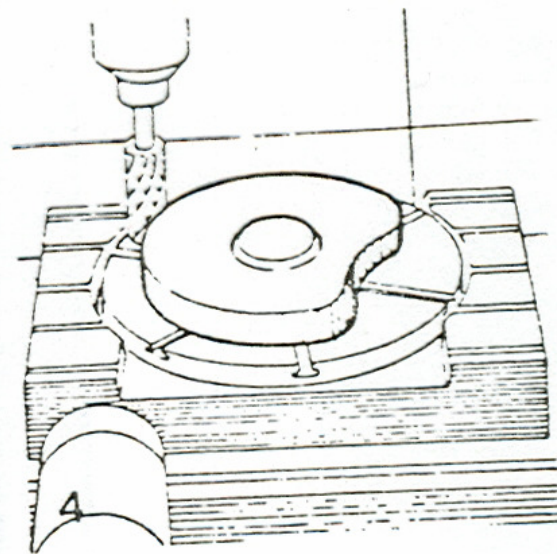
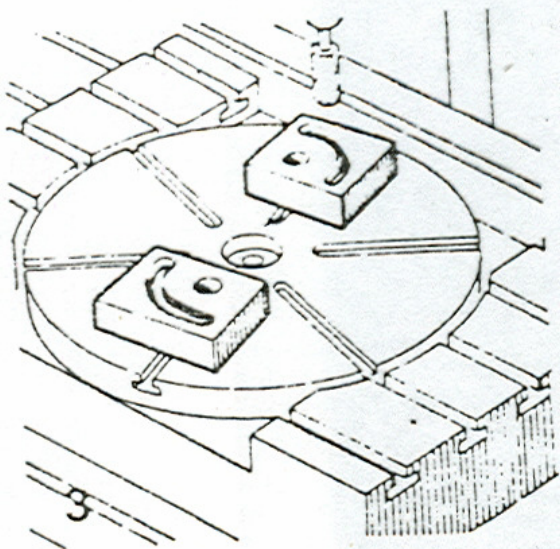
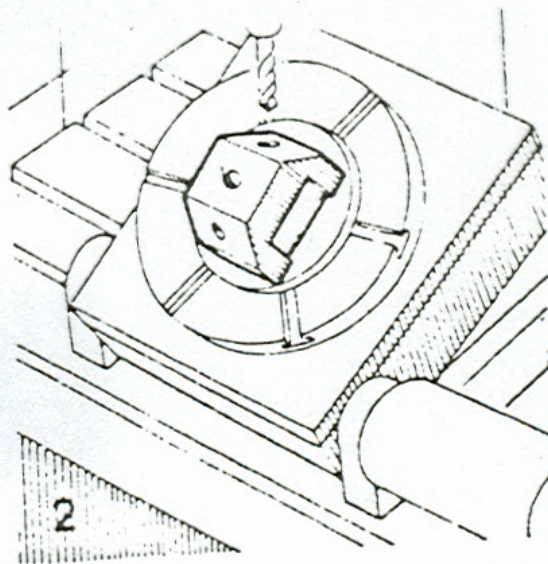
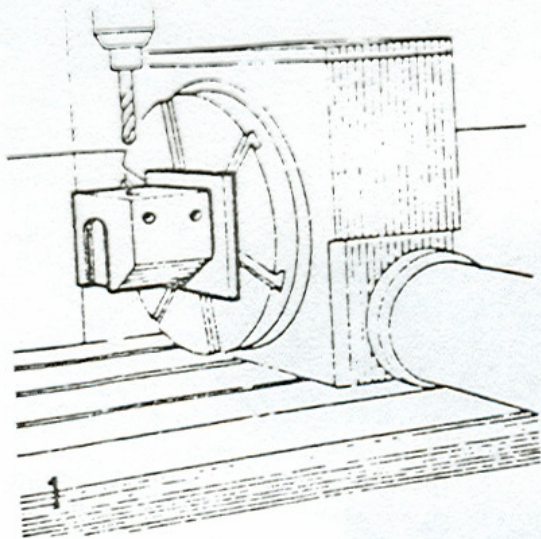


Fresado de topo

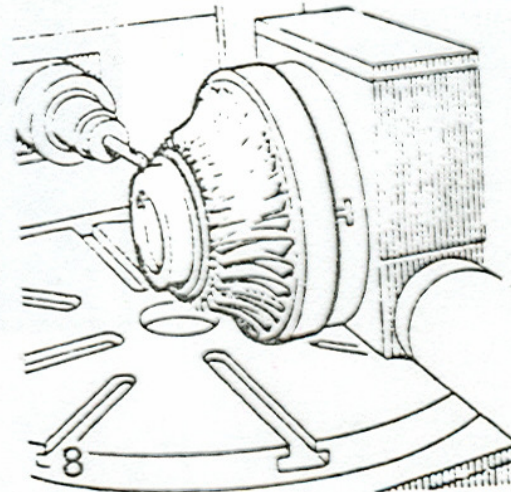
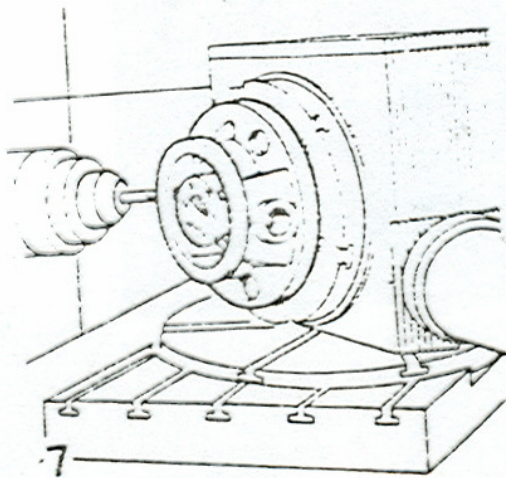
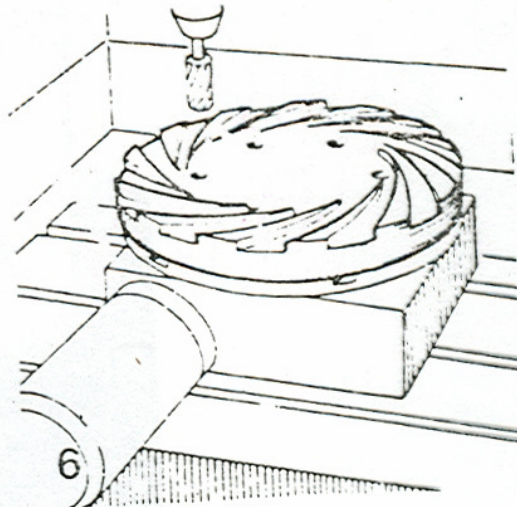
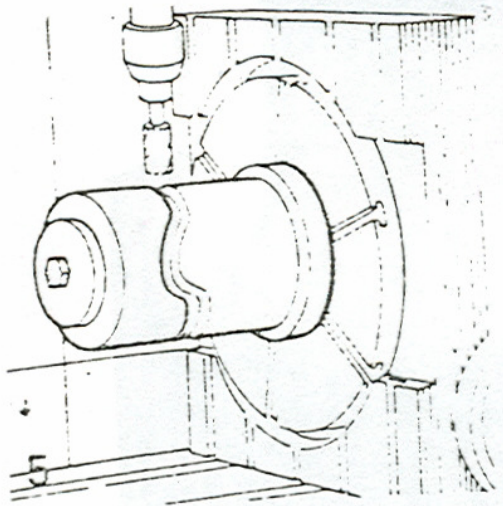
Recursos de um centro
de usinagem de 5
eixos



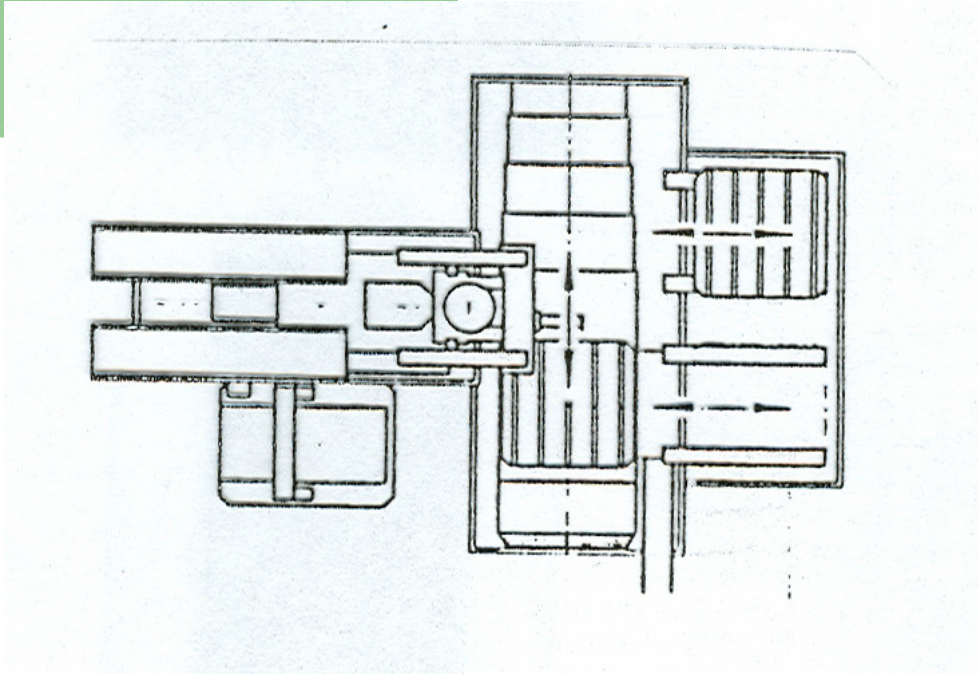
Usinagem de formas complexas em centros de usinagem com 3, 4 e 5 eixos



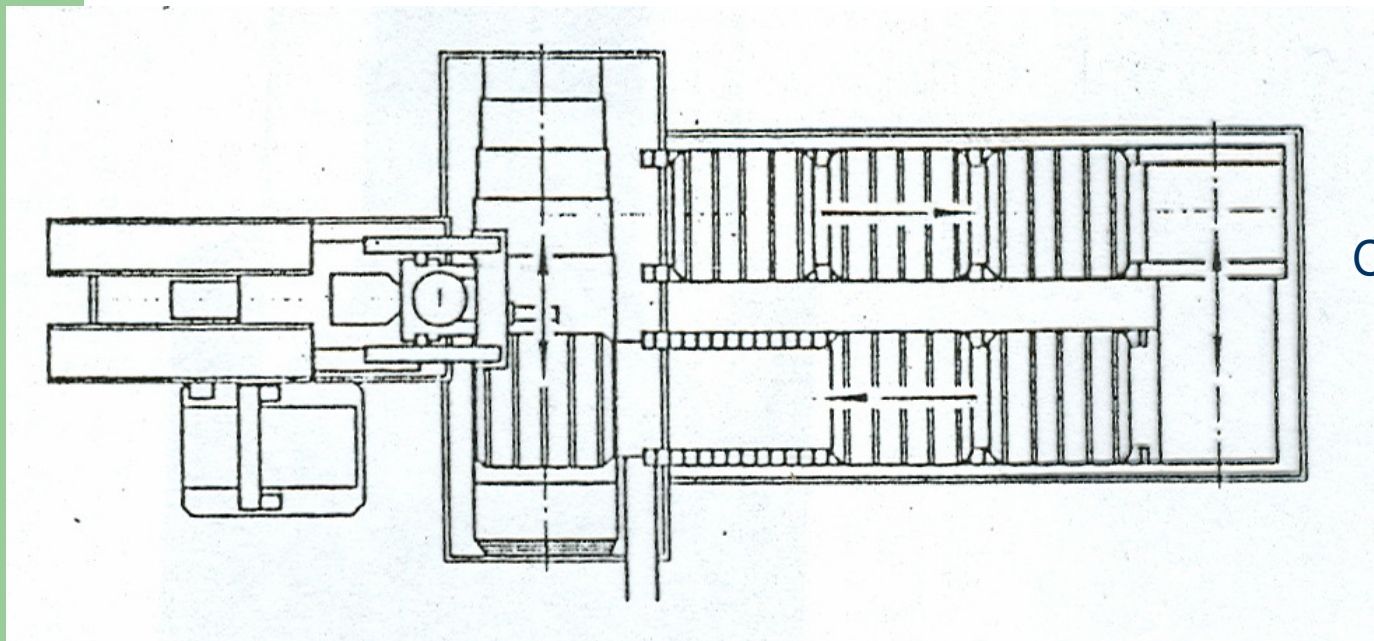
Exemplos de
operações com
centro de usinagem



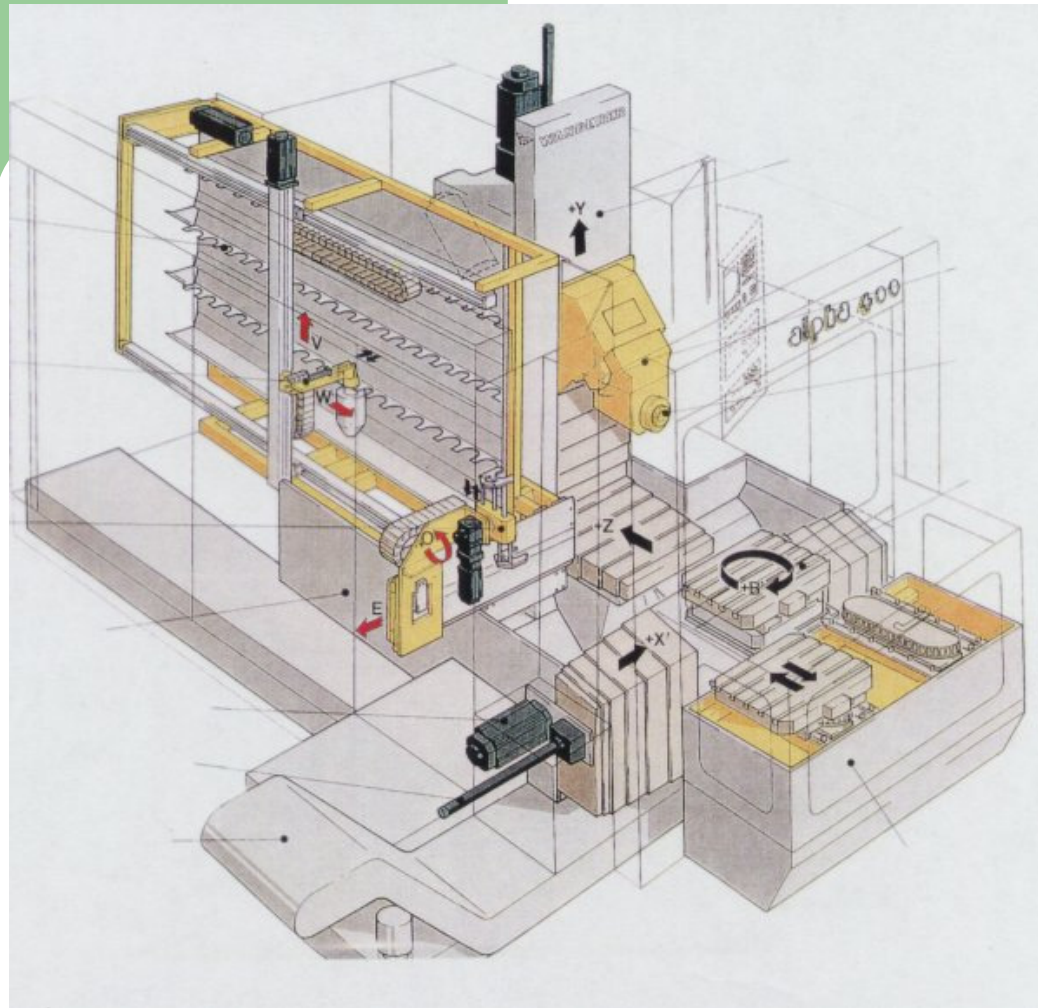
Exemplos de
operações com
centro de usinagem



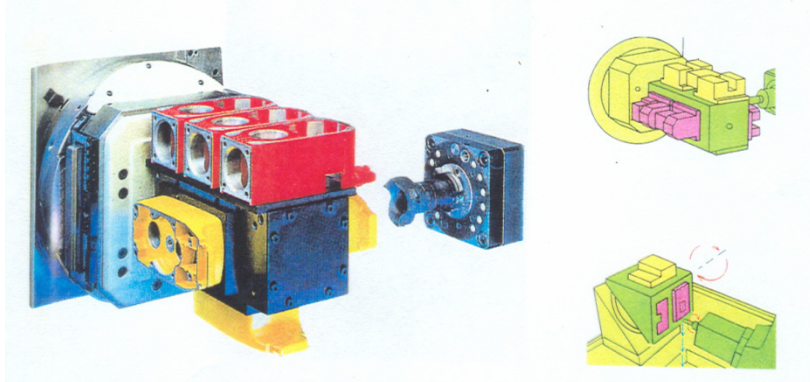
Centro de usinagem
com 2 pallets

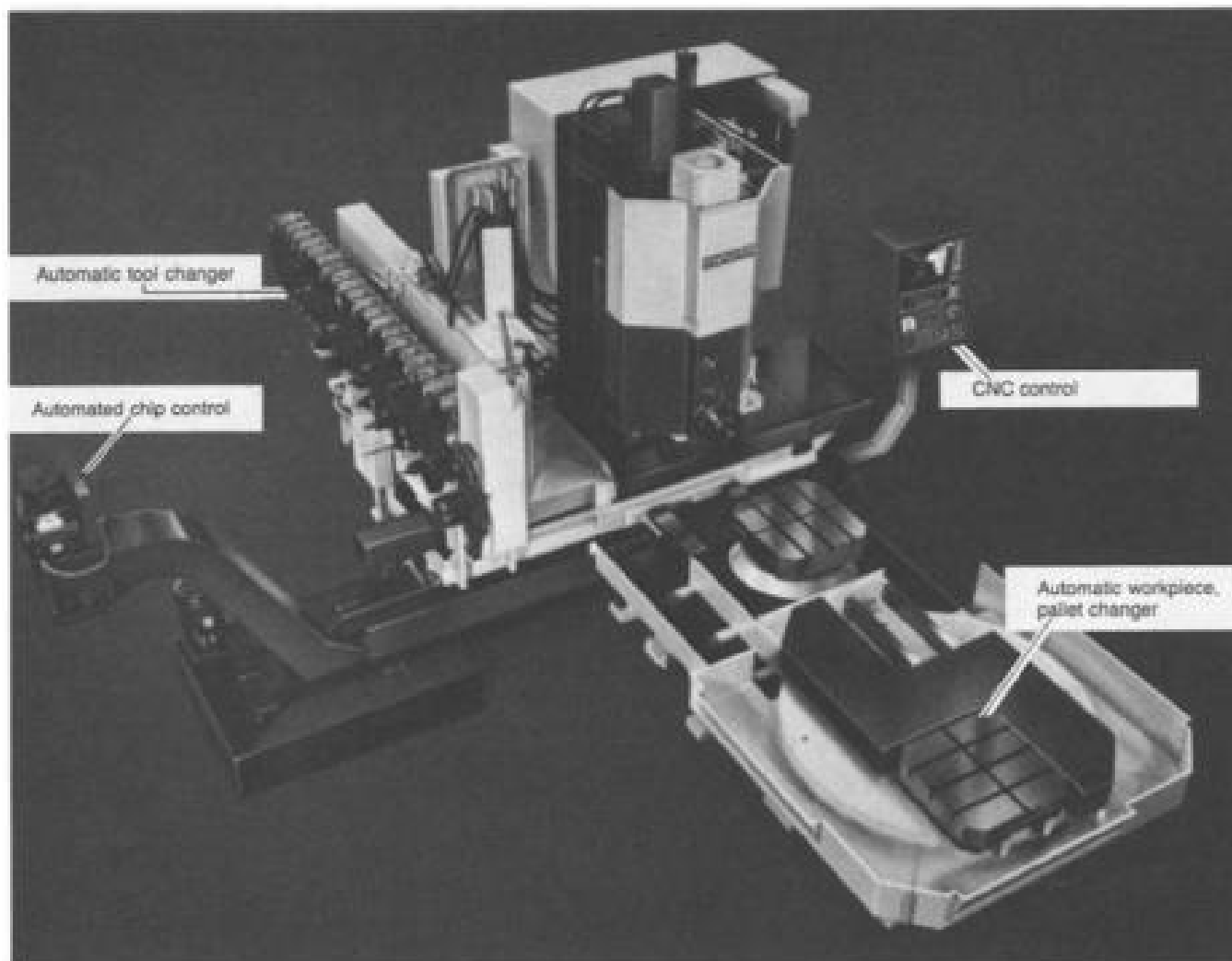


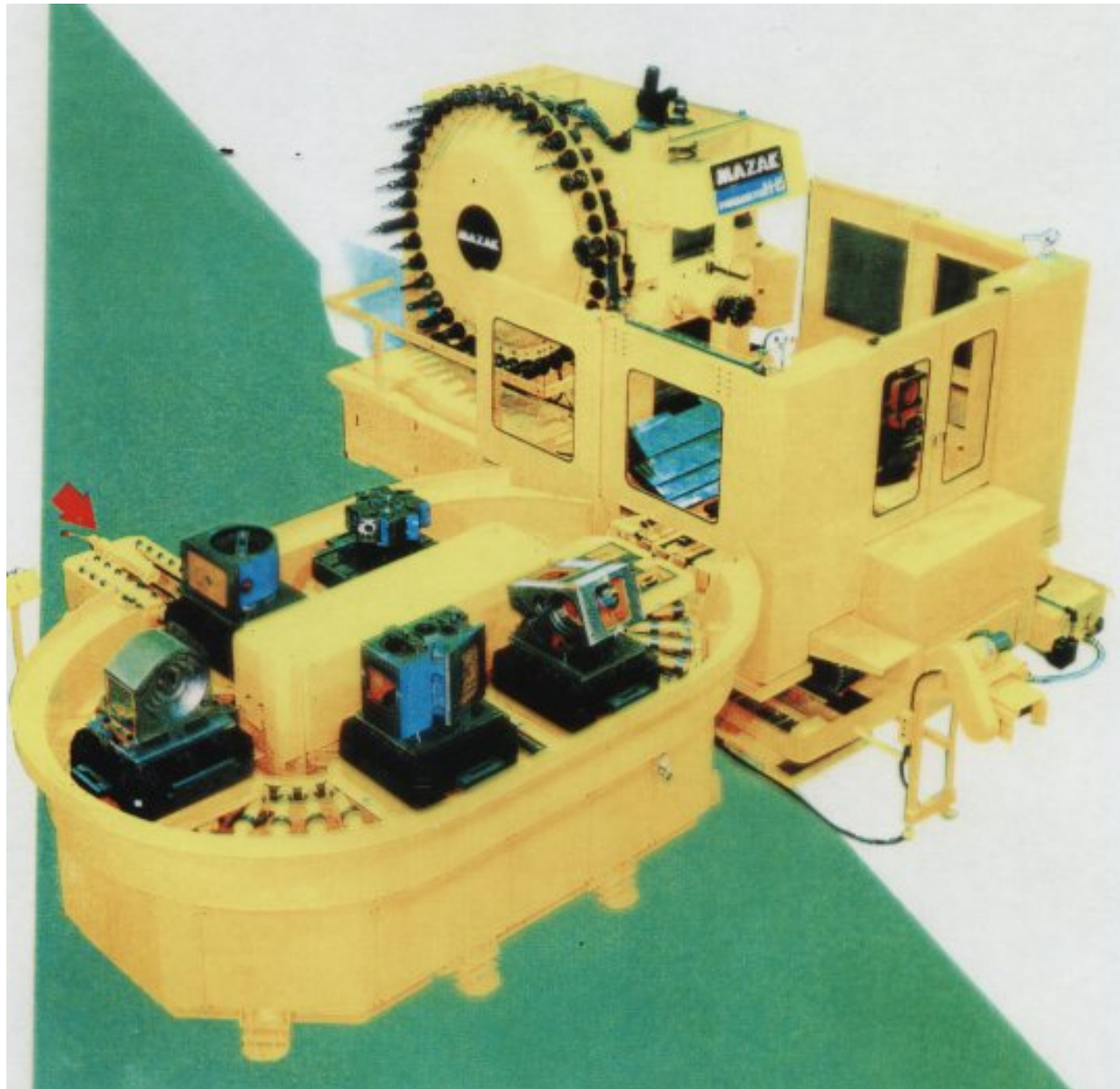
Centro de usinagem
com 6 pallets



Centro de usinagem
de 4 eixos –
Recursos de fixação



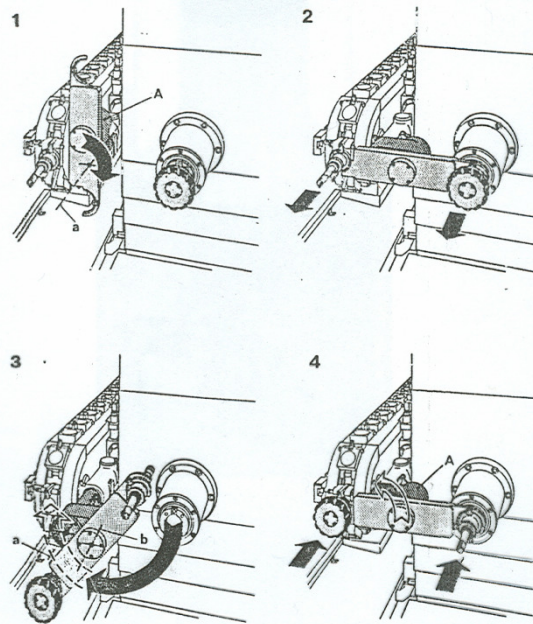
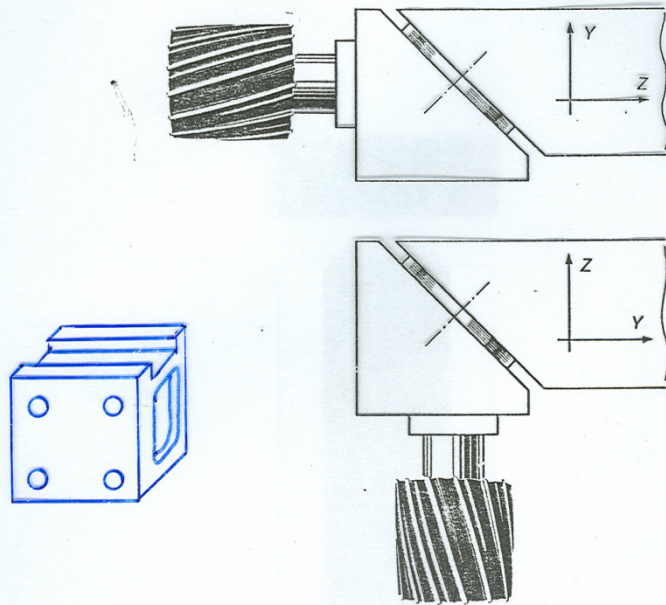




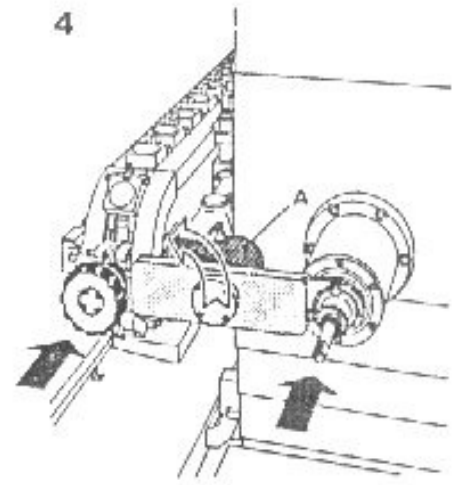
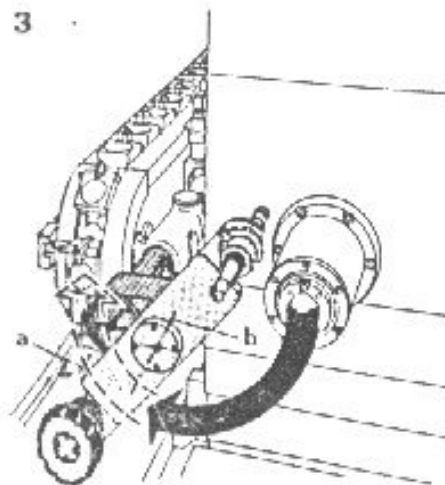
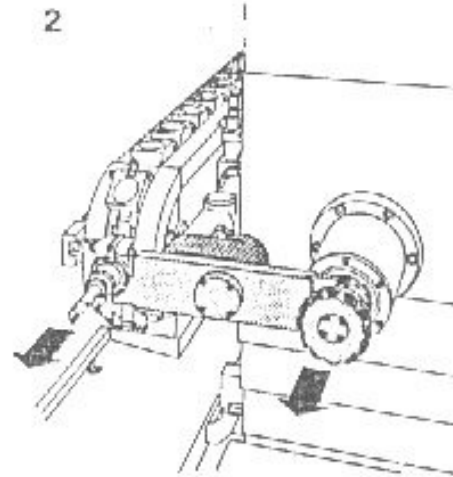
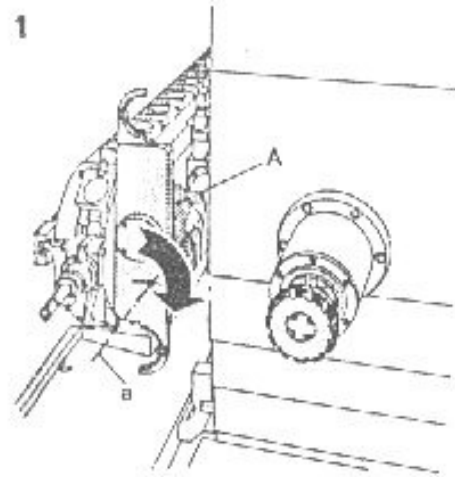
Alimentação
de pallets



Troca de
ferramentas



Troca de
ferramentas



Troca de
ferramentas