

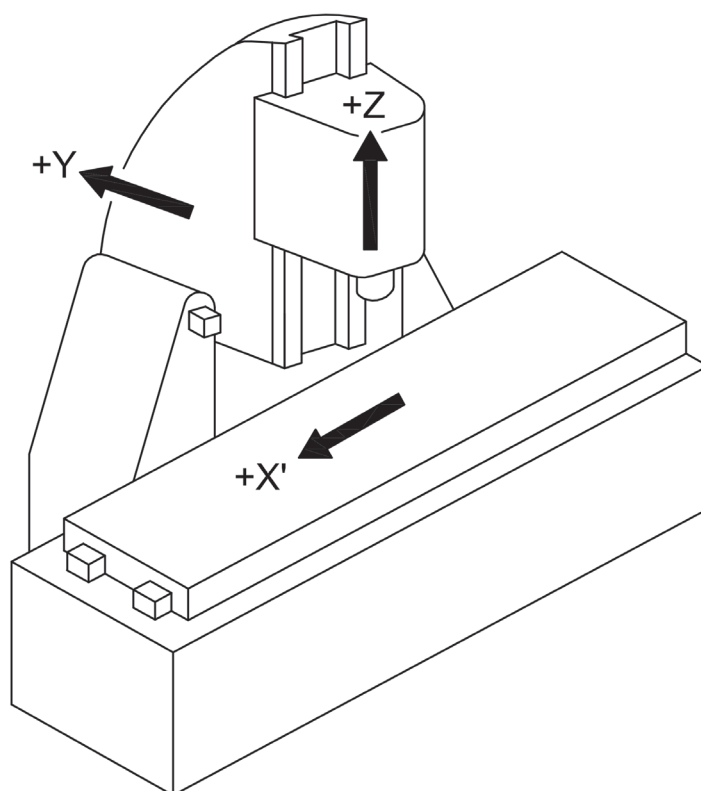


Figure C.3 — Example of a single column bed-type milling machine with vertical spindle

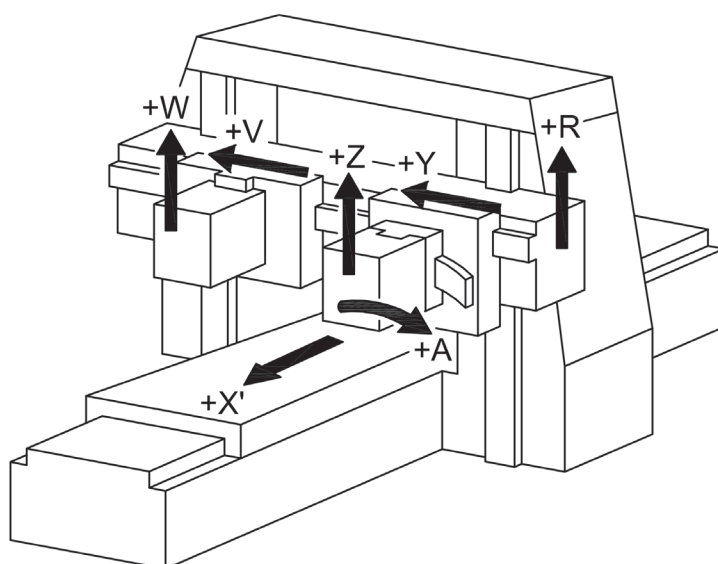


Figure C.4 — Example of a double column bed-type milling machine (portal milling machine)

C.3 Group 3 machines

See [Figures C.5, C.6](#) and [C.7](#).

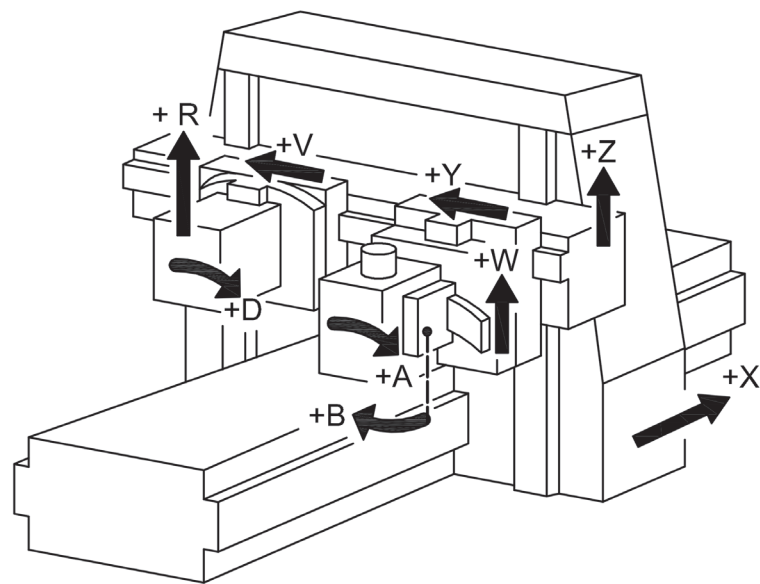


Figure C.5 — Example of a double column bed-type milling machine with moveable portal (gantry milling machine)

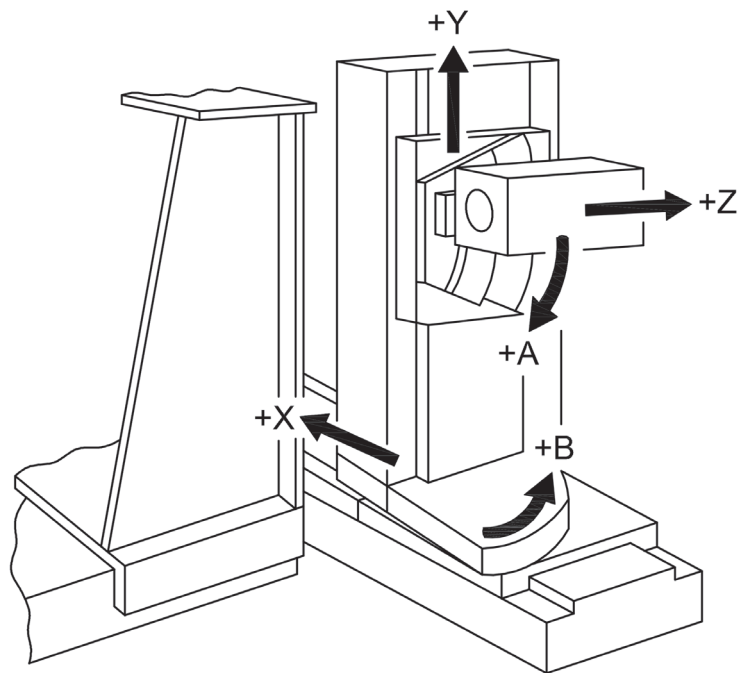


Figure C.6 — Example of a horizontal boring and milling machine

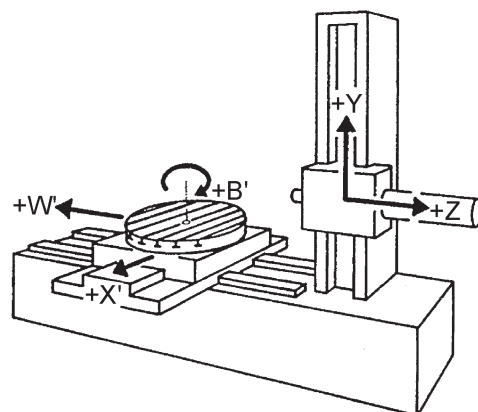
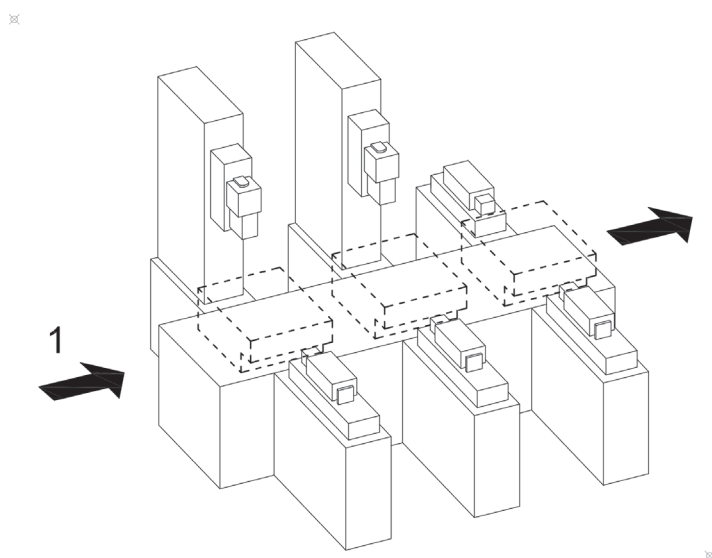


Figure C.7 — Example of a horizontal boring and milling machine

C.4 Group 4 machines

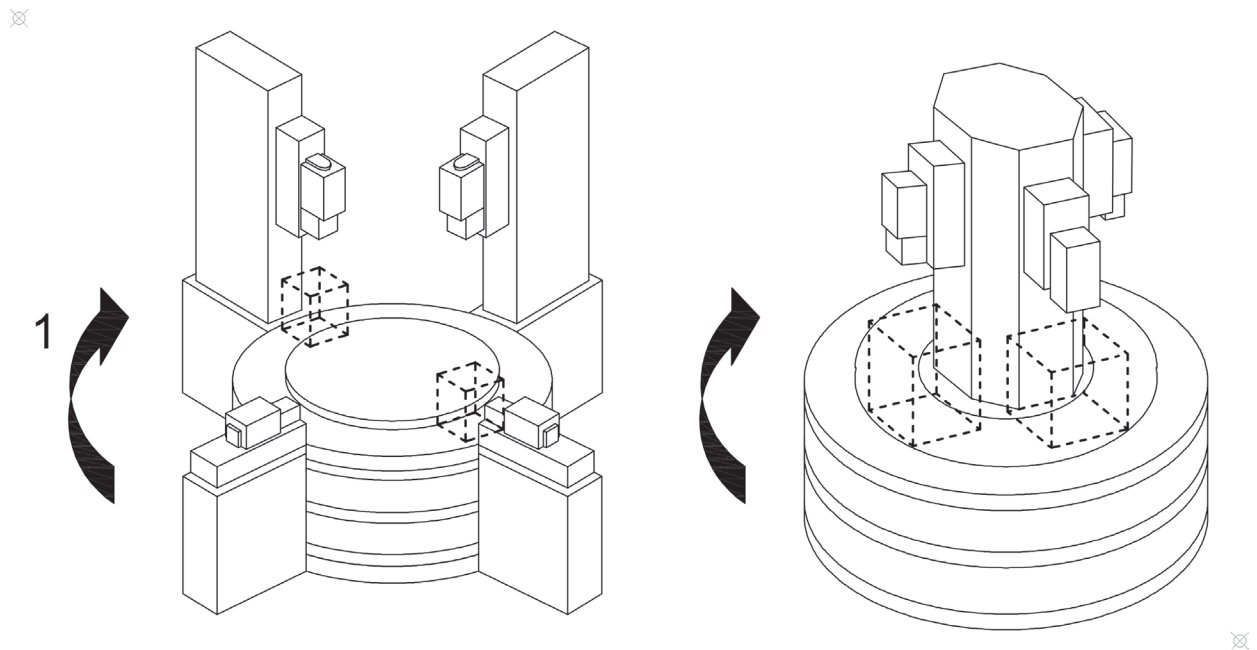
See [Figures C.8 to C.13](#).



Key

1 traverse direction of the workpiece

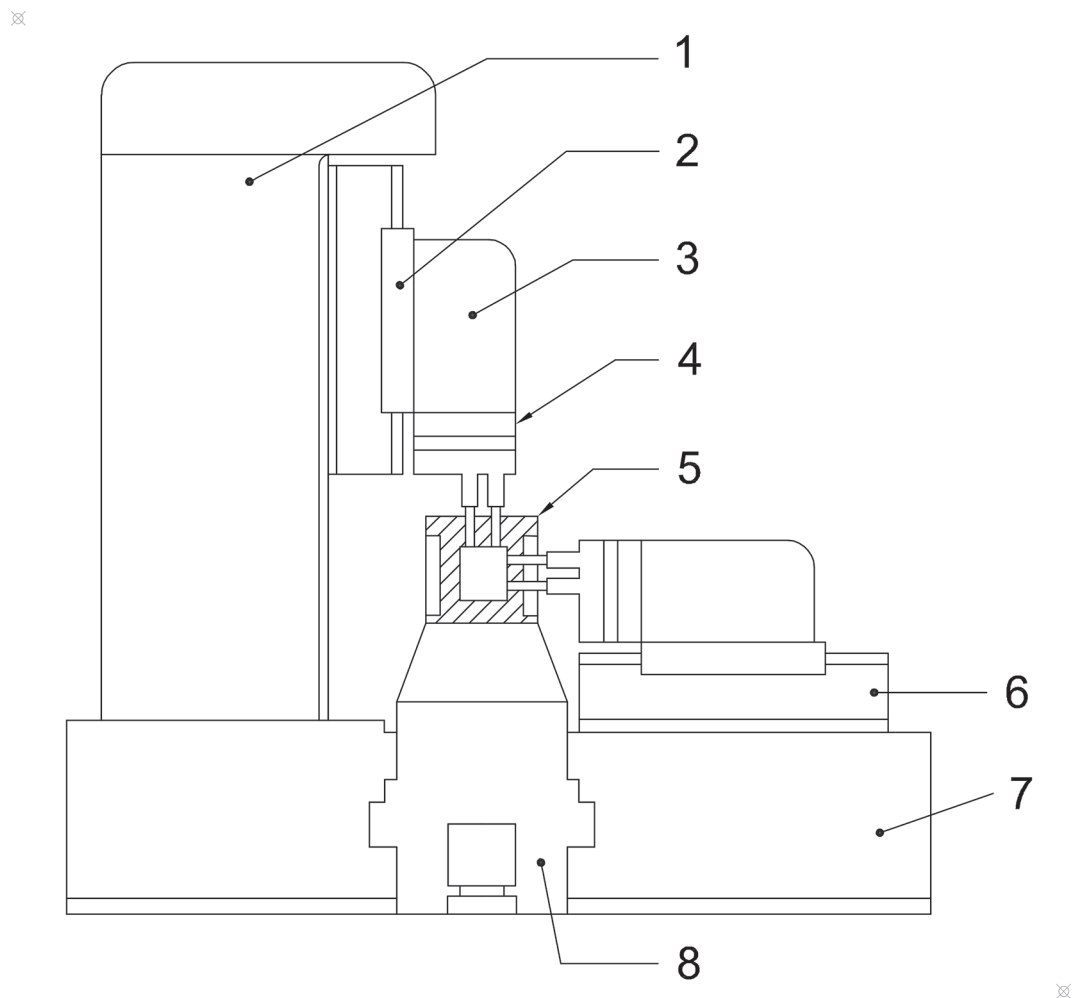
Figure C.8 — Transfer line (illustrated without guard)



Key

- 1 traverse direction of the workpiece

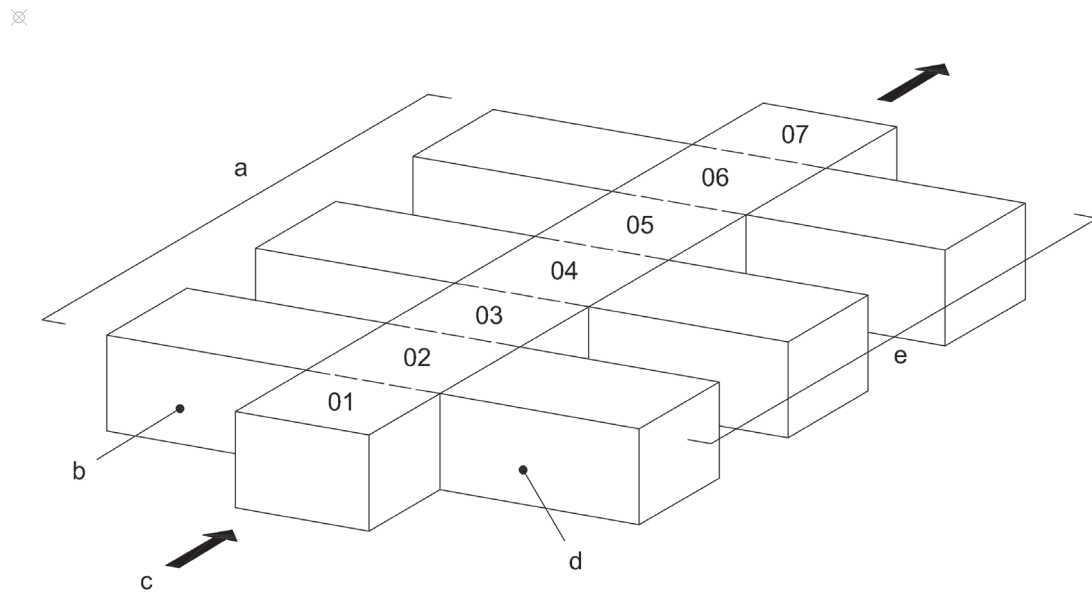
Figure C.9 — Rotary transfer machine (illustrated without guard)



Key

- | | | | |
|---|-----------------------|---|---------------------------|
| 1 | column | 5 | workpiece clamping device |
| 2 | slide unit | 6 | slide unit |
| 3 | carrier unit | 7 | side unit |
| 4 | multiple spindle head | 8 | middle unit |

Figure C.10 — Side view of a processing unit of a transfer machine



Key

- 01 loading unit
- 02 processing unit
- 03 idle station
- 04 processing unit
- 05 idle station
- 06 measuring unit
- 07 unloading station

- a side "B" or "left hand" (LH)
- b station "02B" or "02LH"
- c workpiece traverse direction
- d station "02B" or "02RH"
- e side "A" or "right hand" (RH)

Figure C.11 — Substructure of a transfer machine

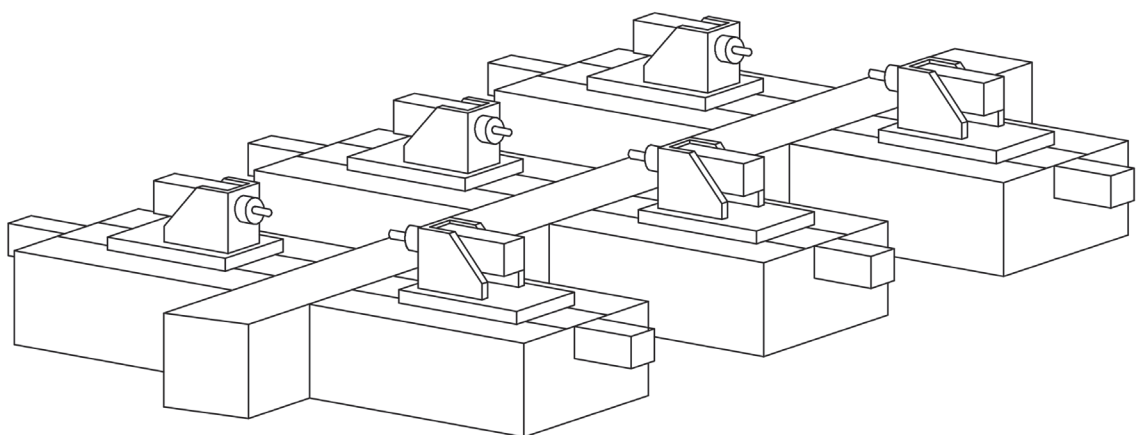
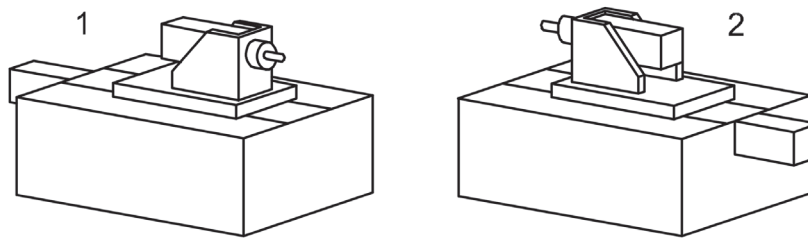


Figure C.12 — Transfer line with three processing units (illustrated without transfer device and guard)



Key

- 1 left unit
- 2 right unit

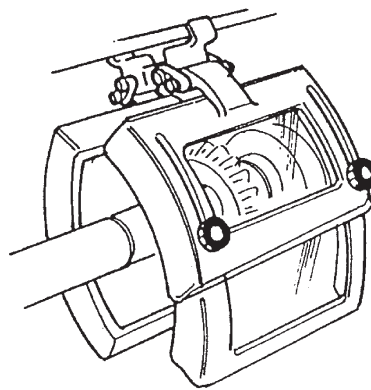
Figure C.13 — Typical units for transfer machines

Annex D (informative)

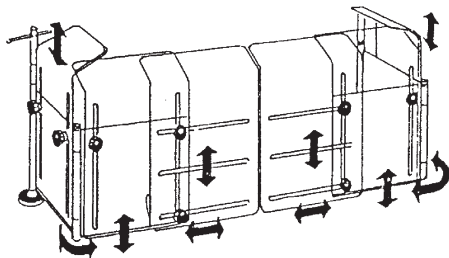
Illustrative figures as examples of guards

D.1 Examples of adjustable guards for milling machines; Group 1 (manual machines)

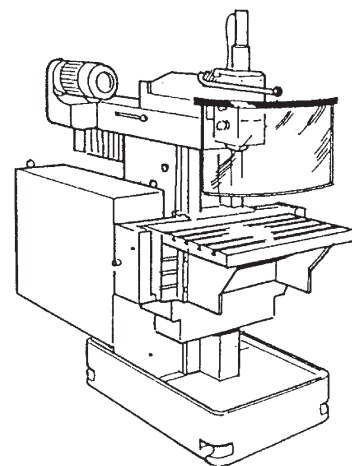
See [Figure D.1](#).



a) Guard for horizontal milling machine



b) Guard for vertical milling machine

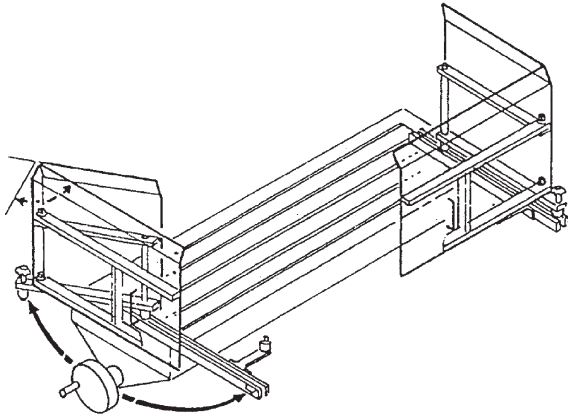


c) Guard for vertical milling machine

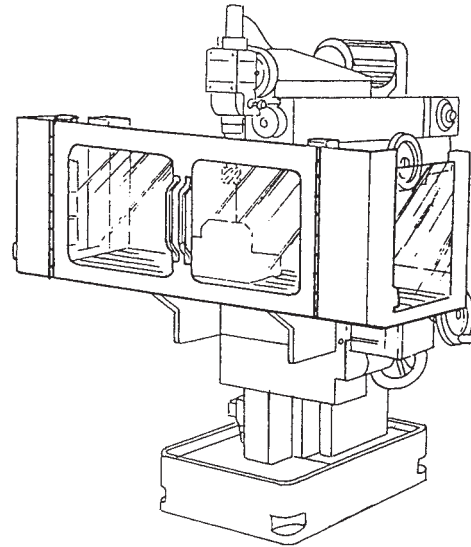
Figure D.1 — Examples of adjustable guards for manually controlled milling machines

D.2 Examples of guards for Group 2 machines (machines with limited NC capability)

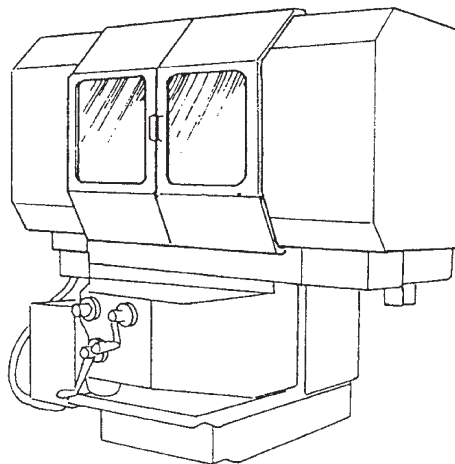
See [Figure D.2](#).



a) Fully opening hinged guards
(NOTE Rear guard not shown)



b) Hinged door type guard

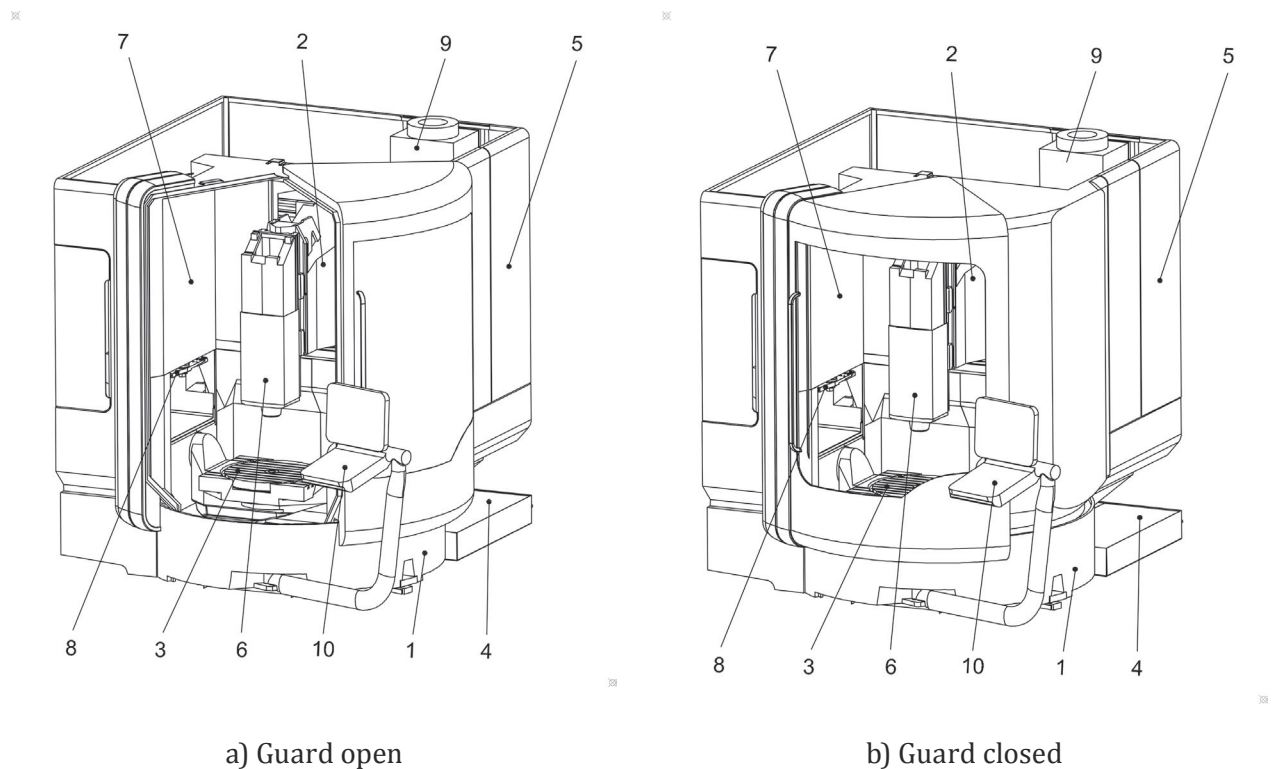


c) Sliding of guards for Group 2 milling machines

Figure D.2 — Examples of guards for Group 2 milling machines

D.3 Examples of guards for Group 3 machines (automatic machines)

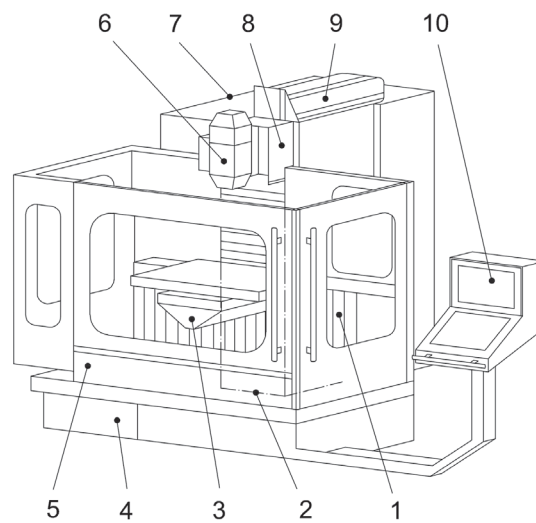
See [Figure D.3](#) to [D.6](#).



Key

- 1 machine column (Y axis)
- 2 Y slide X slide (X axis)
- 3 slewing rotary table (SRT)/rigid table
- 4 cutting fluid system
- 5 machine enclosure
- 6 spindle head with motor spindle (Z axis)
- 7 electrical cubicle
- 8 tool change
- 9 cooling unit
- 10 control panel

Figure D.3 — Examples of guards for Group 3 machines (automatic machines)



Key

- 1 machine column and feed drive, Y axis
- 2 cross slide with vertical table and feed drive, X axis
- 3 worktable; rigid table or rotary table
- 4 cutting fluid system
- 5 machine enclosure
- 6 milling head with vertical spindle
- 7 electrical cubicle
- 8 spindle head with horizontal spindle and feed drive, Z axis
- 9 main drive
- 10 NC panel

Figure D.4 — Example of interlocking guard(s) for automatic milling machines