

GLOSSARY

- 1** rough shaping
- 2** frames erected on side supports as to span an area
- 3** the way in which a design help people work better

Horizontal vs vertical milling machines

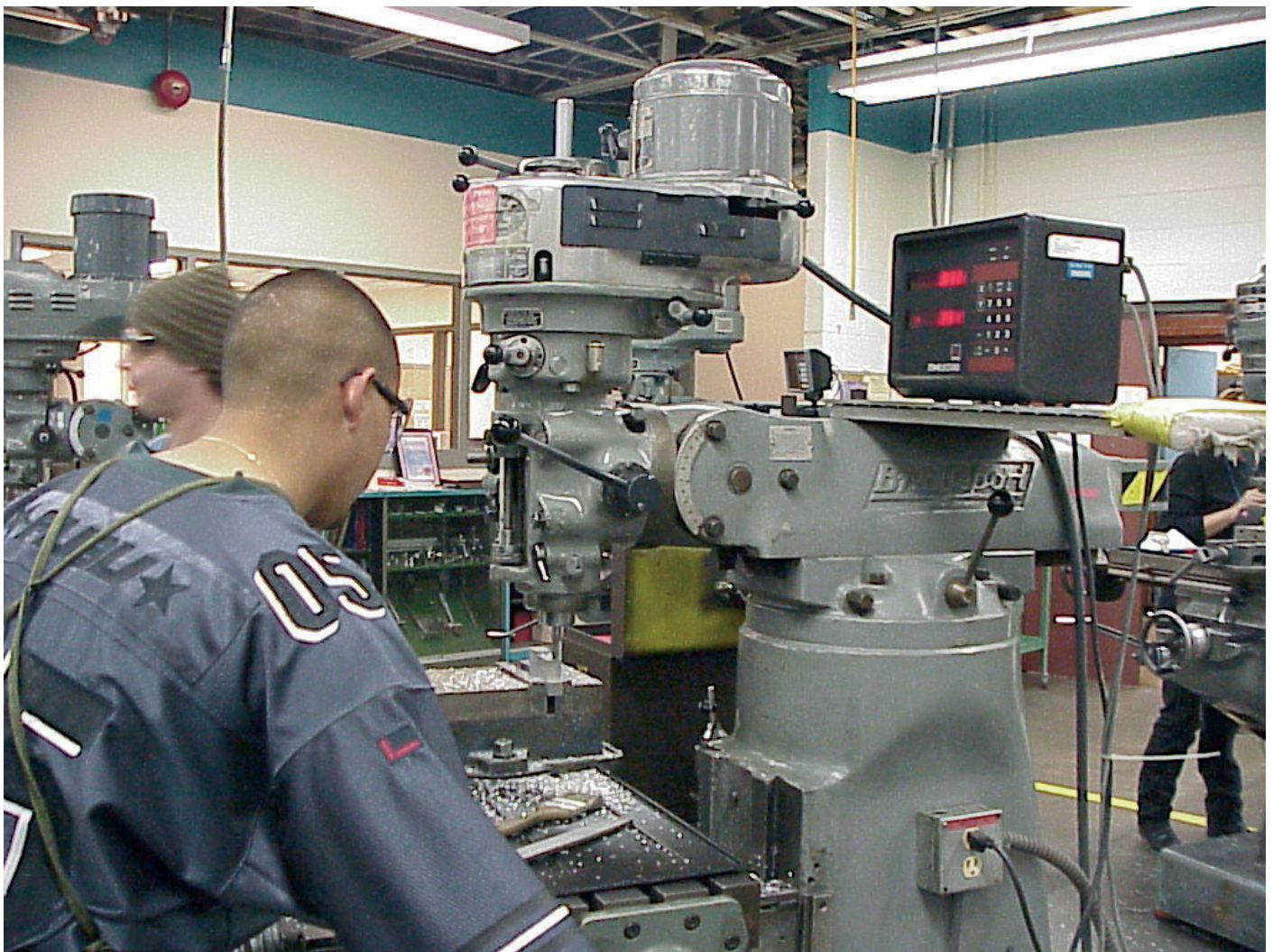
Milling machines are used for roughing,¹ semi-finishing, finishing and high-finishing operations, mould and die machining.

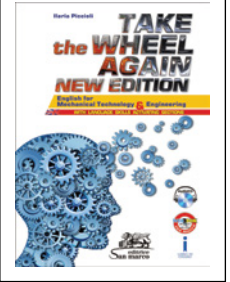
The workpiece is fixed to a carriage and a rotating tool with multiple cutting edges is moved slowly relative to the material to create a smooth surface. There is a wide range of milling machines used to machine different types of workpieces made of such materials as alloy steel, light alloys and composites.

Among the main types of milling machines are linear motor milling machines, high-speed and high-power milling machines. Besides, in the last few years a new type of milling centre has been developed as well. High-speed milling centres are used in general precision mechanics and in the machining of dies, and of large titanium structural parts. Thanks to the combination between linear motors and rigid overhead gantries,² today milling machines have the following characteristics:

- maximum performance in speed and acceleration;
- high accuracy and finish quality;
- flexibility thanks to the use of various types of materials such as steel, cast iron, titanium, composites and aluminium;
- silent functioning;
- good ergonomics³ and maximum safety for the operators.

But what are the main fields of application of the high-speed milling centre? Besides rough milling operations on tough materials, high-speed milling centres are used for car design and prototyping, for machining of models, tools, moulds and dies and for aeronautic structures





and high-precision mechanical components. The following options can be adopted in order to maximise versatility:

- intelligent motorspindles;
- balancing sensors;
- torque⁴ sensors;
- automatic pallet⁵ changers;
- on-board tool presetting.

Vertical milling machines consist of a vertical spindle and three axes: a longitudinal axis used as a worktable; a cross axis consisting in a moving column; and a vertical axis as a spindle slide. Even the basic version of these machines is equipped with a considerable feed⁶ range thanks to a DC drive motor offering an infinitely adjustable speed rate. Besides, they can be equipped with numerical control. Vertical bed type milling machines consist of a bed and a column which are rigidly connected to each other, thus forming a compact L-shape. These two elements are welded to the carrying and guiding sheet-metal bodies anchored to each other by a continuous welding seam. The carriage and the machine table are made of high-quality cast iron. The best and most innovative milling machines perfectly match high levels of productivity, flexibility, ergonomics and sustainable environmental impact with solutions which guarantee drastic reduction in production time, accuracy and high surface finishing quality. In particular, the matching of linear motors with high rigidity moving overhead gantry allows a reduction in production time, greater accuracy and finishing quality. The most advanced types of milling machines can be supplied with a large number of accessories such as automatic head change system (BUSS) and pallet change system.



GLOSSARY

- 4** twisting force causing rotation
5 a lever that regulates or drives a ratchet wheel
6 the process of supplying material to a processing unit for treatment

ACTIVITIES

1 Answer the following questions.

- 1 What are milling machines used for?
- 2 How does a milling machine work?
- 3 What are the main types of milling machines?
- 4 What is the function of high-speed milling centres?
- 5 What are the main features of modern milling machines?
- 6 What can you do to improve the versatility of milling centres?

2 Read the text again and find the English equivalents of the following Italian terms and expressions.

- 1 Operazione di sgrossatura
- 2 Leghe leggere
- 3 Regolabile
- 4 Stampi
- 5 Carroponte
- 6 Mandrino
- 7 Controllo numerico
- 8 Saldato

3 Describe the structure and the main features of a vertical milling machine.