

1. TURNING TOOLS (CUTTING TOOLS)

When we speak about the type of tool used for turning operations, we use the term “**tool bit**”. The term ‘tool bit’ generally refers to a non-rotary cutting tool used in metalworking machines such as lathes, shapers and planers. Cutters used in this type of machine tool are often referred as “**single point cutting tools**”. Such cutting tools are normally composed of a prismatic part to be fastened in the tool holder and one cutting edge, mostly wedge-shaped. The **cutting edge** could be made from hardened and tempered high carbon tool steel (monolithic cutting tools) or could be mechanically fastened as an insert mostly made from sintered carbide, ceramics or similar very hard materials, generally of material much more harder than the workpiece material is.

The working procedure using this type of cutting tool involves holding the tool bit rigidly with a tool holder and the workpiece rotates while it is cutting. During this procedure a small part of the workpiece material is removed and this removed material creates chip. The formation of chip is a common feature for all types of metalworking, not only for turning, but also for milling and drilling.

Connected to the cutting edge, the tool has two surfaces – the **rake face** and the **flank**. The rake face, which directs the flow of newly formed chip, is oriented at a certain angle – the **rake angle**. It is measured relative to the plane perpendicular to the work surface. The rake angle can be positive or negative. The flank of the tool provides a clearance between the tool and the newly formed work surface, protecting the surface from abrasion which would degrade the finish. This angle between the work surface and the flank surface is called **clearance angle**.

During machining, the point of the cutting edge is penetrated below the original surface of the workpiece. This point is usually rounded to a certain radius, called **nose radius**.

Notes

Dialogue

The dialogue between a visitor and a salesman of tool producing company on a stall during a trade fair:

Visitor: So, what kind of tools do you offer?

Salesman: Well, our company offers a wide spectrum of tools with indexable inserts – for turning, boring and milling.

Visitor: Well, I’m interested in turning only. Which of these tools can be used for turning?

Salesman: Well, I’ll show you. So, here’s our catalogue. As you can see, for turning operations we offer this range of products. Here are tools for external and internal turning, copying, axial and radial grooving, parting off, internal and external threading and boring.

Visitor: How can I select the optimal inserts for our particular machining operations?

Salesman: Actually, it’s quite easy. First of all, you have to define the ma-