THEORY OF METAL CUTTING AND SURFACES GENERATED ON MACHINE TOOLS

Summary

This book presents knowledge relating to metal cutting and surfaces generation theory on machine-tools. It is primarily aimed at the engineering-oriented reader, who can expand their knowledge with appropriate theoretical basics and practical implementations.

In terms of the structure the book contains 19 laboratory exercises, which support the disciplines "Fundamentals of Metal Cutting" and "Surface Generation Theory on Machine Tools" taught to students majoring in Mechanical Engineering and Mechatronics at the Faculty of Technical and Human Sciences of the Sapientia University.

The first part of the book - which includes the first seven lab exercises - lays the basic foundation, then expands on the knowledge of metal cutting.

The first two lab exercises present conventional machine tools such as lathe, column type drilling machine, planer, milling machine, round- and plane grinding machine. For each machine tool, the movements of the machine tool (main and secondary movements) and the machinable surfaces are detailed. The third lab exercise presents the tool geometry that can be identified on a turning cutter.

The next four lab exercises study the cutting forces, the specific cutting force, the temperature of the cutting edge, and the machinability of materials.

Each laboratory exercise starts by presenting basic theoretical concepts before moving on to the implementation of the measurement exercise.

The second part of the book presents the surface generation theory on machine tools, writing the analytical equations for surfaces generated on different machine tools.

The eighth and ninth exercises describe the generator and directory curves. The tenth lab exercise describes the surfaces generated on the shaping machine. The following three lab exercises describe the generation of revolution surfaces, threads and module threads on lathes. Lab exercise 13 deals with surfaces

generated on the universal milling machine. The following two lab exercises describe relief-turning and give a comprehensive picture of radial, oblique and axial relieving, as well as helical relief-turning.

Lab exercises 17 and 18 deal with the generation of cylindrical gears, among which the generation with the rack cutter and gear shaper is presented. The last lab exercise presents the generation of the involute profile on the computer, which also includes the creation of a 3D solid model of a cylindrical gear.