Part I
Part Surfaces

Design, production, and implementation of parts for products are common practice for most of the mechanical and manufacturing engineers. Any part can be viewed as a solid bounded by a certain number of surfaces. Two kinds of the bounding surfaces are recognized in this text; namely, they can be either "*working surfaces*" of a part, or they can be "not working surfaces" of a part. "*Working part surfaces*" interact either with one another or with the environment (with gas, air, fluids, or substances like sand). "*Not working part surfaces*" do not interact neither with one another, nor with the environment. The consideration below is mostly focused on the geometry of working part surfaces.

All part surfaces are reproduced on a solid. Appropriate manufacturing methods are used for these purposes. Due to that, part surfaces are often referred to as "*engineering surfaces*" in contrast to the surfaces that cannot be reproduced on a solid and which can exist only virtually [1–6].

Interaction with environment is the main purpose of all working part surfaces. Because of that, working part surfaces are also referred to as "*dynamic part surfaces*." Air, gases, fluids, solids, and powders are perfect examples of environments which part surfaces are commonly interacting with. Moreover, part surfaces may interact with light, with electromagnetic fields of other nature, with sound waves, and so forth. Favorable parameters of part surface geometry are usually an output of a solution to complex problems in aerodynamics, hydrodynamics, contact interaction of solids with other solids, or solids with powder, as well as others.

In order to design and producing products with favorable performance, designing and manufacturing of part surfaces having favorable geometry are of critical importance. An appropriate analytical description of part surfaces is the first step to a better understanding of what do we need to design and how a desired part surface can be reproduced on a solid or, in other words, how a desired part surface can be manufactured.

Part I of the book is comprised of two chapters.

Chapter 1 is titled "Geometry of a Part Surface."

Chapter 2 is titled "On a Possibility of Classification of Part Surfaces."

References

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