Book Review

Stephen P. Radzevich: *Generation of surfaces: kinematic geometry of surface machining.* CRC Press, Taylor & Francis Group, Boca Raton, FL, 2014, 698 p., ISBN 978-1-4822-2211-1.

The central topic of this book is the machining of sculptured part surfaces on a multiaxis numerical control machine. It is a book for engineers, written by an outstanding expert: the author is a professor of mechanical and manufacturing engineering with an extensive industrial experience. He is owner of more than 220 patents and author of about 10 books and more than 250 scientific papers.

The book comprises three sections called 'Basics', 'Fundamentals' and 'Applications'. The first section focuses on the differential geometry of surfaces, on the related principles of spatial kinematics and on coordinate transformations and their practical use. Kinematics concentrates on the relative motion of the cutting tool relative to the surface patch. Concerning differential geometry, the author likes to emphasize the difference to what he calls the 'engineering geometry of surfaces': while surfaces in differential geometry are to imagine as a film with zero thickness, engineers have to cope with surfaces which appear as boundaries of solids; they have, e.g., a unique unit normal vector. Furthermore, the practising engineer has to live with permanent deviations of the actual part surface from the ideal shape.

The core of this monograph is the geometry of contact of two surfaces, included in the section 'Fundamentals'. In the engineering geometry of surfaces, the local conditions for a first order contact between two solids include, e.g., that there is sufficient space for coming together, which needs to be formulated with the aid of Dupin indicatrices. This section deals with the problem of profiling optimal form-cutting tools and with the geometry of the active parts of this tool. There is a list of six necessary and sufficient conditions for the proper part surface generation. Finally, also the accuracy of the surface generation is studied.

The third section 'Applications' includes on more than 100 pages numerous practical examples. They confirm the effectiveness of the methods, which have been presented in the sections before.

The explanations in the book are very clear and supported by more than 250 excellent illustrations. As a mathematician, rev. would sometimes like to see more of the elegant formalism developed in mathematics, e.g., the Frenet equations or an appropriate representation of twists in spatial kinematics. But these are only peanuts in view of this impressive and really comprehensive monography.

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