Assessment of Complex Free Form Surfaces with Surface Profile Deviation

Miroslav Dovica[1], Ján Buša[2], Emil Spišák[1], Michal Fabian[1], Peter Ižol[1], Jana Fabianová[3]
[1]Faculty of Mechanical Engineering, Technical University of Košice, Letná 9, Košice, 040 01, Slovakia. E-mail: miroslav.dovica@tuke.sk, emil.spisk@tuke.sk, michal.fabian@tuke.sk, peter.ižol@tuke.sk
[2]Faculty of Electrical Engineering and Informatics, Technical University of Košice, Letná 9, Košice, 040 01, Slovakia. E-mail: jan.busa@tuke.sk
[3]Faculty of Mining, Ecology, Process Control and Geotechnology, Technical University of Košice, Letná 9, Košice, 040 01, Slovakia. jana.fabianova@tuke.sk

Accuracy of work-pieces of complex free form surfaces is achieved by tolerancing, producing and metrology of workpieces. The tolerance zone is defined by form tolerances, their orientation and location on the work-pieces. Tolerances for complex form surfaces are specified by line profile tolerance or surface profile tolerance. These tolerances control form or combination of size, form, orientation and location. In a machining process the impact of machining parameter settings on the final surface quality will be researched. The influence of toolpaths in connection with the SH (Scallop Height) parameter setting on production accuracy and quality of machined surface will be compared. For geometry verification of the complex form surfaces are coordinate measurements used. The measurement area is modeled with the equations in CATIA V5. The data of machined surface obtained through the contact coordinate measurement are processed using the coordinate system adjustment via the RSS minimization by the Newton method in Matlab/Octave. Calculated values of surface profile deviations at individual machining strategies are used to achieve the required quality of machined surface through optimization of the machining parameters.

Keywords: coordinate measurement, form tolerances, complex surfaces, Newton method, orthogonal deviation

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