

**Distribution of scanning lines on free-form surfaces based on results of simulations of machining processes**

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The accuracy of contact coordinate measurements depends, among others, on an applied measurement strategy, which may include different methods of a distribution of measured points on measured surfaces of workpieces. The paper presents a new algorithm and a computer program created in order to support a user of a coordinate measuring machine (CMM) when defining the localization of scanning lines, along which coordinate measurements should be conducted. A simple and efficient program prepared using the Matlab software analyzes deviation maps, which are calculated based on the results of simulations of machining processes. Simulations can be realized with the use of computer aided manufacturing software. Deviation maps depend on complexity of machined surfaces, geometries of milling tools and applied machining strategies.

The purpose of the developed computer program is the automatic determination of areas of curvilinear surfaces of measured products, which are characterized by large values of form deviations. Based on the identified form deviations locations of scanning lines are proposed. Measured points should be located in the parts of surfaces where the quality of manufacturing is the worst. The computer program can be used by e.g. technologists at the stage of developing technological processes of products. Planning a measuring strategy during technological preparation of production of a workpiece may shorten the time needed to create a measurement program that controls the work of a CMM and make coordinate measurements more efficient. The proposed algorithm of a distribution of scanning lines consists of two main stages:

- the selection of a direction ( $u$  or  $v$ ) of a curvilinear surface along which a scanning process should be carried out. The first step is performed based on the automated analysis of values of form deviations,
- the determination of locations of scanning lines on a free-form surface. Scanning lines should be oriented in the direction selected in the previous stage. Measurements conducted along chosen scanning lines aim to shorten the time of a measurement process and increase the accuracy of coordinate measurements.