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A Study Concerning the Workpiece Profile after Grinding Process of Precessional Gear Wheels

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Abstract

In this paper we present a study of issues related for determination the real profile and the theoretical one of the precessional gear wheels. In the research process of the precessional gears profile appeared the problem of finding the geometrical error between fabricated profile and the ideal one after grinding process. The cause of the errors has technological and constructive nature. Processing technology of these specific gear wheels is one that still has many unknowns, therefore will be researched the part that is related to the occurrence of deviations from the ideal profile. The manufacturing of processing device and its elements also lead to geometric deviation of the profile, which will lead to adverse effects during operation. Measurement of manufactured profile using special equipment would involve high costs of time and money, therefore will be used computational methods and the statistic-mathematical method. The computational method is to find a better methodology to transform a file obtained from 3D scan (precessional gear wheel), which can be used only as a copy, into a file with functional extension. Such a conversion is very important to make especially for objects



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with complicated geometry such as precessional wheel profile.

Transformation will result in surfaces and geometric objects that can be manipulated and compared to each other, with the aim of find deviations between ideal 3D models and the real ones. The methodology is relative simple: the triangular surfaces which form the shell of object should be approximated by flat, cylindrical, conical, etc. surfaces interlinked and filling the empty space between them with material. Once the scanned real object is transformed into a functional virtual file, it can not only be compared with the ideal model but also modified at the discretion of the user. Also we can find the coordinates of points which form the wheel contour line, which can be analyze and interpolate to obtain a mean value of scanned profile. Following the analysis of a profile obtaining was observed a small error of inclination of the gear teeth, due to the technological process. This methodology can be used to finding geometric errors also for other objects, gears etc.