The complementary graphical method used for profiling side mill for generation of helical surface

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This research concerns about a method developed in CATIA design environment, for profiling tools bounded by revolution peripheral surfaces — side mill tool. The graphical method is based on a complementary theorem of surface enveloping.

They are presented specific algorithms and an example for profiling generating tools of helical flutes of compressors rotors with three lobes. The obtained results with graphical method are compared with those obtained by a classical method — the Nikolaev theorem.

The graphical method is very intuitive and, at the same time, very rigorous. It is characterized by the simplicity of application and avoids the ambiguity case of solutions, which are frequently met in numerical methods, as profiles overlapping, generating of revolving surfaces or rotating a spatial curve around the tool's axis.

Other advantage of using graphical methods is that CNC machines tools, used for generating profiled tools, allows importing the files, which directly result from graphical modeling.

This issue was one of the main objectives of the Project PN-II-RU-TE-2014-4, The synthesis of new algorithms for CAD design for profiling cutting tools that generate complex surfaces, with non analytical means, 2015-2017, Project manager: assoc. prof. dr. eng. Virgil Gabriel TEODOR.

The research project propose the synthesis of graphical design algorithms, based on complementary theorems of surface enveloping, which have the advantage to combine rigor with rapid results. On the other hand, the results obtained by graphical methods are very intuitive, obtaining directly a graphical representation of profile, simultaneous with their expression in numerical form. By this, the results can be exported in order to be used for tools manufacturing in CAD/CAM system.

The issue of profiling tools based on complementary theorems in a graphical expression leads to the simplification of methodology for tools profiling, also, to analysis of gears, pumps and helical compressors.