Graphical solution in CATIA, using the generating trajectories method applied for end mill tool's profiling

Project manager: assoc. prof. Virgil TEODOR, virgil.teodor@ugal.ro

The helical cylindrical surface, with constant pitch, generation (screws with multiple starts; helical flutes of the cutting tools or some worms from gears) may be made using end mill tools. These tools' types may be profiled based on the theory of reciprocally enwrapping surfaces.

A method based on a complementary theorem from the domain of surface enveloping — the method of generating relative trajectories — is proposed in this research. This method proposes a solution for the profiling of the end mill, a tool bounded by a primary peripheral revolution surface, based on the knowledge of trajectories described in the relative motion between the surface to be generated and the peripheral surface of the future tool, both in analytical and graphical expressions.

The method is developed as application in CATIA design environment. Application examples of the graphical algorithm are presented and the results are compared with those obtained by analytical solutions in order to validate the proposed method quality.

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.

In present, for profiling of this type of tools are mainly used analytical design methods, but, they make their way, graphical methods, as result of the capability development of graphical design environment. Based on recent experiences regarding obtaining results by graphical means, based on the complementary theorems of the surface windings, it can finds that graphical methods are faster and the present development of CAD environments made them usable for applications related to profiling of cutting tools that generate by enveloping.

This project proposes the synthesis of graphic design algorithms with the advantage to combine the rigor with the rapid results. On the other hand, the results obtained by these methods are intuitive, allowing a graphical representation of the profiles, simultaneously with the numerical form.