Development of Industrial Software for the Simulation of Bearing Dynamics CABA3D

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Nowadays CABA3D (Computer Aided Bearing Analyzer 3D) is one of the most powerful industrial software for the simulation of dynamic processes in rolling bearings [1, 3]. In this article we discuss the challenges in the development of CABA3D.

The important criteria of the development process is the improvement of the software usability and quality assurance [2]. Because of the increasing interest to the bearing dynamics the more and more features should be implemented. Every year the complexity of systems increases, more system parameters should be analyzed, new dynamical effects are investigated. On the other hand the complete dynamic analysis process is a time-consuming procedure, which should be optimized. The dynamic analysis process involves three main steps: preprocessing (definition of mechanical elements, setting of load and contact parameters, etc.), simulation and postprocessing (analysis of results, generation of reports, animation). The criteria of usability of pre- and postprocessors significantly differs from the criteria of the solver's usability. Many pre- and postprocessors features (user interface, integration with CAE tools and productivity software, learnability, etc.) are irrelevant for the simulator.

The second requirement of the development process is the high speed and low costs. The improvement of the usability of CABA3D needs the constant further development of all parts of the software (pre- and postprocessor, kernel, interfaces with other applications, interaction between modules) is needed. This requires the strong collaboration of the CABA3D developers, regulation of development process, organization of test, coordination of the work with developers from other teams.

The third challenge of the development is the support of old models. The models developed in previous versions of CABA3D should be also available in the newest versions of the software without additional redesign. The same should be true for the old simulation results. This requirements lead sometimes to the significant additional effort for the software developers.

To overcome the CABA3D development challenges and assure the quality of the simulation results we need a deep understanding of simulation algorithms as well as profound knowledge

of software and hardware technologies. The consistent, reproducible approach to software development reduces the risk associated with shortcuts and mistakes.

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