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## RD171MV LIQUID ROCKET ENGINE - TRANSITION TO DIGITAL DESIGN

### Abstract

Currently, creation of modern engineering is impossible without use of life cycle management systems. This trend has not bypassed the rocket engine industry. Due to number of objective and subjective circumstances, Russian rocket engine companies started implementing such systems somewhat later than their foreign competitors. The first project of Russian rocket engine industry, which is realized in full-scale implementation of PLM system, is creation of RD171MV engine of “Soyuz-5” launch vehicle. Key indicator of success of product life cycle management system is its ability to implement a modern MBE (Model Based Enterprise) concept, which involves use of fully annotated 3D models, giving not only access to 3D view, but also providing support for manufacturing processes, testing, metrological support, etc., with gradual elimination of duplication in form of 2D drawings. As part of RD171MV engine development program, it’s assumed that all design processes should provide a representation of part/assembly unit/unit/product, including 3D model (geometry, topology, special views, layers, etc.) and necessary annotations - PMI for manufacturing, testing and inspection. The use of this representation eliminates need to use 2D drawings in design system (CAD), as well as in systems of computational analysis (SAE), systems of technological preparation of production (CAPP) and systems for forming control programs for CNC machines (CAM). Statistics on use of such concept in aircraft industry show a reduction in costs of up to 40As part of RD171MV engine design, following tasks of implementation of modern design systems, development of design and technological documentation are solved: • creating a system of inter-related contextual development of design and technological documentation based on modern high-level CAD / PLM software, including when working together with specialists of Kamskiy and Privolzhskiy branches of JSC “NPO Energomash”; • unification of software for design, including calculations and release of design documentation and manufacturing processes; • introduction of management of requirements and product configuration; • generalization and integration with PLM-system of tools for engineering calculations, simulation, collection, processing and storage of results of real tests and operation of product; • preserving the experience accumulated at enterprise and in industry, systematizing it and generalizing it in system, creating a knowledge base