

Expert system of operational control and improvement of special processes in aircraft engine critical parts investment casting

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Abstract

The paper shows the example of an expert system support processes of jet engines critical parts investment casting in the process line.

The system contains tracking of production unit, process parameters acquisition, operational production control and the expert chaining. The chaining refers to corrective action and process improvement.

Artificial intelligence methods are used, based on neural networks. The system also contains the design and support technology tests module and knowledge database. The need to build such system lies in the fact that all processes in-line are special processes - the result is known only on the basis complex quality control of blades and vanes clusters.

Presently don't exist effective, cause-and-effect, that would allow to predict casting result, based on the wax assembly and ceramic mould manufacturing parameters.

The system allow to process data acquisition, and the complete production monitoring also with tracking the position of a single mould and location of its elements in each device included in the technological line.

Thanks to this it is possible to identify the variation stemming from the state of each device in the drying step, the melting wax, firing and annealing form, or etching of ceramic cores.

With full and reliable information about the parameters of performance and demerits of the final products, it will be possible - first build the appropriate function describing the dependence and then predicting defects of the products in real time, based on the analysis of process parameters and operational decision-making early to withdraw the defective blank.