First Laureate
Research & Development

Project Title: Development of directional solidification technology for manufacturing turbine blades
Executive Organization: Manufacturing Turbine Blade MAPNA – PARTO
Representative: Majid Bahmani (Ph. D.)
Collaborators: 98 of Eng. & Manufacturing Turbine Blade MAPNA – PARTO collaborators & Others Executive Organizations
Collaborators Organization: Vice president of research and development Mapna group, led a studious Innovative Materials Co., School of Materials Science and Engineering, University of Technology, Faculty of Metallurgy and Materials Engineering, Tehran University.

Abstract:

An advanced method of increasing turbine inlet temperature (TIT) and consequently the efficiency, in recent generations of gas turbines is using Directionally Solidified (DS) blades which are produced by Directional Solidification technology.

In Directional Solidification (DS) method by changing the solidification process, equiax structure changes to columnar and consequently high temperature mechanical properties of blades improves significantly in new generation of advanced gas turbine. Knowledge of chemical composition and casting of advanced superalloys and high-tech ceramic molds and cores as well as designing and manufacturing robotic ceramic shell lines and VIM furnaces are the key points for implementation of this technology.

The program–Development of DS technology for manufacturing turbine blades- which consists of 10 projects started in 2011. The project has been carried out by MAPNA Turbine Blade Engineering and Manufacturing Co.-(PARTO) in collaboration with R&D department of MAPNA Group and several other universities. In 32 months, this mega project resulted in mass production of the first stage blades of MS5002D gas turbine for oil and gas industries. Design and development of special machinery, mass production process of DS blades, providing the foundation for manufacturing and mass production capability of F and higher class advanced gas turbines in MAPNA Group could be mentioned as some of the most important achievements of this program.