

# Development of laser powder cladding technology for the restoration of heat-resistant nickel alloys turbine blades

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Maintenance and repair of gas turbine engines is an integral part of increasing the period of their operation. First, this applies to the blades, which are the main costly and most widely used element of the turbine. Vibration, shock, abrasive wear out, high temperatures operation and other negative factors are the main causes of blades breakage.

Complex theoretical, technological, metallographic studies and mechanical tests are carried out. Technological studies were carried out on an automated laser cladding machine, which was designed directly for the task of project. The main components of machine that directly effect on the process are: ytterbium fiber laser LK-700, IRE-Polus, robot LR Mate 200 iD/7L, Fanuc, laser cladding head D30, IPG, cladding nozzle Coax 40, ILT, powder feeder PF 2/1LC, GTV.

Because of the research, the regularities of process technological parameters influence on geometry and structure formation of deposited elements were established. Based on obtained regularities, the laser cladding technology of nickel and cobalt alloys powders has been developed to restore the geometry and operational properties of turbine blades. The economic effect of developed technology introduction into production sector is achieved due to high material utilization rate and the short cladding time spent on one blade.

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