

# **Development of LMD – technology of repair a gas-turbine engines with using national equipment**

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Today the technology of laser cladding is the most common technology of repair parts in engineering. The «United Engine Corporation» (UEC) have a wide experience of use the national laser equipment produced by ILWT, ESTO and others. This equipment is using in production of parts and repair technology.

The LMD-technology is that the product is formed from metallic powder supplied by compressed gas-powder jet to the laser action zone. This provides heating, partial melting of the powder and heating of the substrate. LMD process allows to build complex parts basing on their 3D model.

The research works has given a good result in the repair of compressor and turbine blades. Defects were not detected. Mechanical properties of the obtained product at a level of hot rolled metal and higher than cast metal.

The SLM-technology is the main additive technology, which is actively using in a gas-turbine engines. However, it has special limitations. The main limitation is the maximum size of the manufactured products. Engineering industry in general has other different problems. There are details become more complex, equipment is rising in price and manufacturing cycle increases. LMD-technology can solves this problem. Large-scale parts for gas-turbine engines (diameter of 1000 mm or more) can be produced by using LMD-technology.

Today UEC and Peter the Great St. Petersburg Polytechnic University (SPbPU) produce a hybrid machine. Hybrid is an Additive Manufacturing and Milling in one machine. It will be the first machine of this type produced in Russia. The using of LMD-technology together with milling will reduce the number of technological operations, remove intermediate operations, increase production capacity, and reduce cost.

Features:

- Working zone size: 1100x1100x750 mm.
- Max. table load: 200 kg.
- High productivity

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