Neural network for 3D printing of metal products developed in SPbPU

The mathematical modeling for 3D printing requires a lot of machine time, in some cases calculations for manufacturing even a simple structure can take a week. In order to accelerate this process, the researchers of the Laboratory of Lightweight Materials and Structures of Peter the Great St. Petersburg Polytechnic University (SPbPU) developed the neural network.

It allows not only to build structures faster, but also to manufacture new parts, with parameters established by the neural network during learning on previous data, thus there is no need to have full modeling process for each structure. The researchers used this method to obtain 3D printing process parameters and ensure the stability of the process.

Neural networks are computing systems used for large data sets processing. The network was built in the MATLAB® environment and data sets were inputed manually.

"The next step is to create an online system based on the neural network with automatical input of data sets and output of parameters, thus such system will be learning continuously. We believe that the new system will improve the quality of the parts and increase the speed of parameters development for further manufacturing," said Oleg Panchenko, Head of the Laboratory of Lightweight Materials and Structures SPbPU.

The developed neural network is already used to assess the quality parameters of manufactured

parts, for instance, whether the welding process is stable, whether the metal is being melted and transferred correctly. Moreover, researchers also used this network to develop stable printing modes for manufacturing mastheads. They have already applied for a patent.

In future, use of similar approaches will provide an opportunity to create fully automated self-learning systems able to continuously improve the quality of manufactured parts without human supervision.