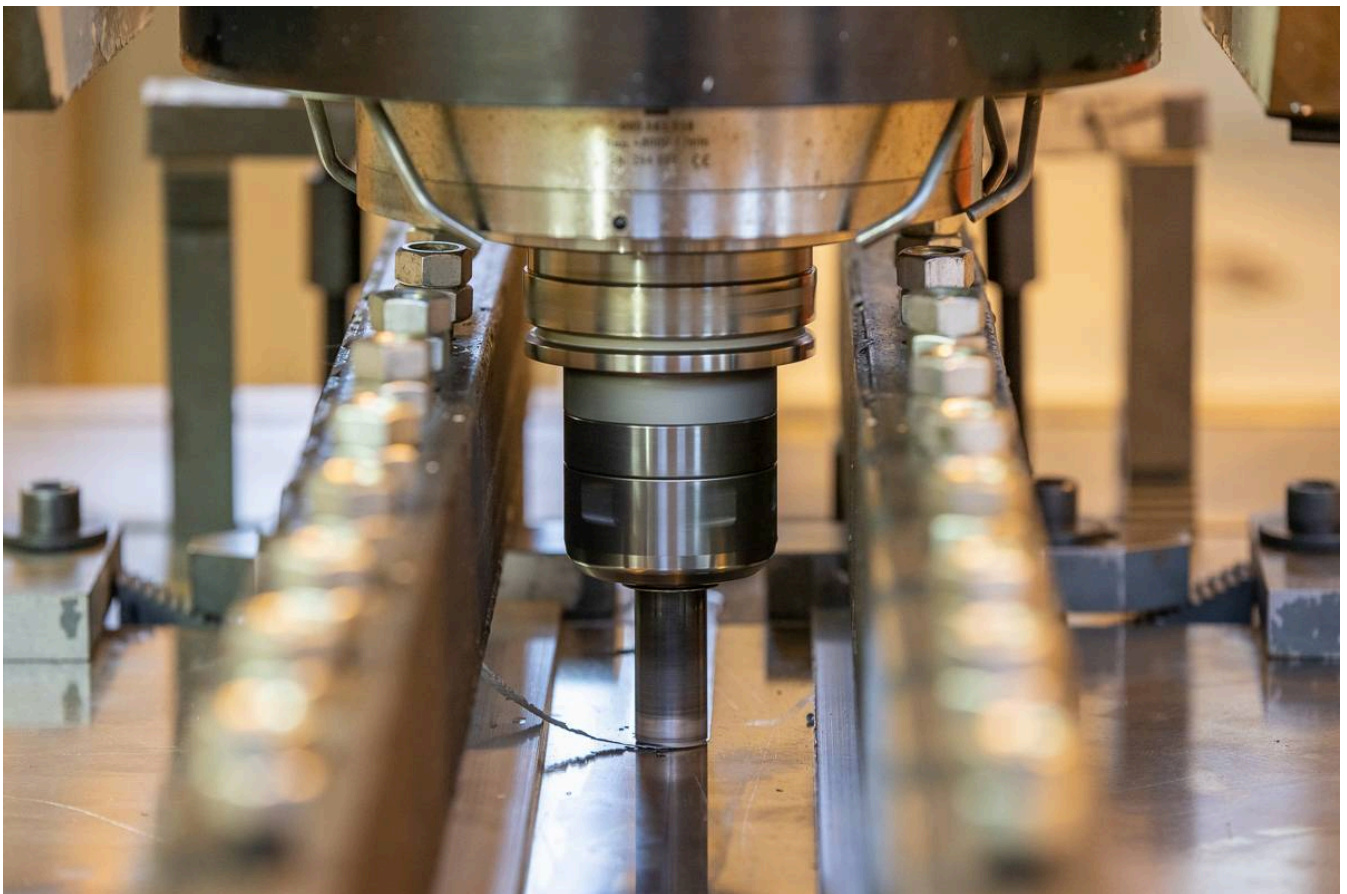


Scientists applied an innovative welding method in bridge construction

Researchers from Peter the Great St. Petersburg Polytechnic University (SPbPU) were the first in Russia to develop a friction stir welding technology of a new aluminum alloy for a lightweight pedestrian bridge. The engineers intend to implement an innovative approach at the university: they plan to weld the elements, and then connect them into a bridge at the construction site.

The aluminum pedestrian bridge will be located in the town Bor in the Nizhny Novgorod region (Russian Federation). This will be the tenth aluminum pedestrian bridge in Russia, but the new alloy and friction stir welding technology will be used in bridge construction for the first time. Scientists work in collaboration with the SGR aluminum structures plant in St. Petersburg. The project is supervised by the Aluminum Association of Russia.



In the laboratory of Lightweight Materials and Structures of SPbPU, the engineers will connect about 20 parts of 8 meters long and 16 mm thick made of an aluminum-magnesium alloy. According to scientists, this new alloy has just recently become available for widespread use.

“The bridge is large and has many types of connections,” explained Anton Naumov, associate professor of the Institute of mechanical engineering, materials and transport of SPbPU, adding that the scientific group is developing a technology of friction stir welding for butt joints of aluminum plates on both sides of the plates. The researcher added that this type of joint will surpass the arc welding in quality.

The scientist also noted it’s more economically profitable to weld a thick aluminum sheets in this way since the arc welding is using a number of additional manipulations (for example, arc welding is carried out in several passes to fill the entire thickness of the seam with the filler wire). In addition, friction stir welding is a green technology because there is no evaporation of material, or luminescence. “The new high-strength aluminum alloys successfully compete with the structural steels in terms of mechanical properties, also, in terms of weight, the aluminum structure will be much lighter than the steel ones. Therefore, the implementation of the aluminum bridges is increasing worldwide,” says Anton Naumov.

The experts of the Laboratory of the Lightweight Materials and Structures SPbPU are developing a welding technology. Then the quality control of the welded joints will be carried out to ensure the safety of the structure.



Innovative technology of friction stir welding is already used in the bridge construction: the plant “Sespeľ” uses it for the components of orthotropic plates from the well-known aluminum alloy 6082 T6. But the new bridge will be the first bridge in Russia manufactured using a friction stir welding technology for the new

Al-Mg alloy, mentioned Evgeny Vasiliev, the Head of the transport infrastructure of the Aluminum Association of Russia. According to him, this is a serious task and a real technological breakthrough.

The researchers plan to complete their part of the project by the end of September. The 121-meter length bridge is planned to be commissioned by 2022.

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