

Airport City Belgrade Membrane Structure : design, production and installation process

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In 2018, the Airport City in Belgrade, Serbia has commissioned an unusual membrane structure in the office park. The project has been designed, produced and installed by ArTech inženjering, Belgrade, Serbia.

This paper presents the comprehensive process and workflow from the design phase to the structural analysis, to the production and to the installation of the membrane tensile structure. A tensioned membrane structure in conventional hyper shape has been proposed. The cover spans about 28 meters and covers a footprint of about 487 m². As materials, PVC-PES membrane of type 3 and steel for other structural members has been selected. The project contains several unusual points, challenging for design, detailing, analysis and installation. Therefore, it serves as a good example and case study for future developments in this field of lightweight structures. Even though ArTech inženjering looks back on more than 15 years of experience in the field, each step in the project process documents and carries specific features that make this project a significant milestone among others performed by ArTech, in last few years.



The unusual membrane structure at the Airport City office park, by ArTech inženjering.

The structure is located in between existing office buildings in purpose to cover and protect a pedestrian area and to create a plaza for stay. The overall layout and shape of the structure has been inspired by client's logo. Even though, the conventional shape of the hyper served as the basic geometry in the design phase, novel solutions have been developed and realized for example for corner details and boundary edges. Simultaneously, their unusual shape implied new problems, and provided new solutions and advantages. As an innovative approach and visually most striking feature a novel, curved corner solution has been developed. The curved truss girder is using principles of bending active structures. The static analysis has been combining FEM, MPanel and Tower software program tools. Due to above-mentioned detailing, the production process included specific internal technology adjustments. As a result, the used material has been PVC-PES membrane of type 3, an architectural membrane, produced by the company Sattler. The installation process turned out to be of a great challenge. Different kinds of site-specific limitations and conditions required specific planning and logistics. So, this project serves as unique case study, highlighting the interdependence of design, limitations, requirement for novel detailing and installation-processes.

By the comprehensive monitoring and observation of this membrane structure a whole quantity of information has been documented since its completion. This can be seen as a significant aspect, which will be beneficial for the future development of advanced projects in the opus of ArTech company.