

УДК 725.826

Shimanovitch M., Slesarenok E.

## **Stadium Construction**

Belarusian National Technical University  
Minsk, Belarus

The construction of the stadium is a complex process, consisting of several stages, from the development of the conceptual framework to the solemn opening of the sports ground and its subsequent exploitation.

*Concept development.* Concept development is a long process that requires a thorough approach, in which designers and stakeholders must find a solution, which will satisfy requirements and interests of all project participants. The end goal of this designer stage is the creation of sketches and layouts, which will reflect individual features of the stadium.

*Construction design.* The stadium shell is the way it is, due to geometry of stands and the concept of the building. The facade is constructed of steel and concrete (the material chosen depends on the project). Competitions that will be held at the stadium, as well as its capacity – are the factors that determine the optimal geometry and the form of the stands. Most often, the stands are designed in the form of the following geometric figures: 1) *Rectangle*. Due to the geometric shape in corner locations, visibility is far from ideal, that's why during design stage these seats are not even envisaged. On one hand, this shape gives viewers the opportunity to be closer to the field, on the other, reduces the capacity of the stadium; 2) *Oval*. Oval stadium design allows not only to hold football tournaments, but to also host other sport events, such as athletic and cricket competitions. This form is the most widely used shape in construction of stadiums, which host track and field

competitions; 3) *Rectangle with rounded corners*. This form attracts attention with its absence of sharp corners, which provide a good visibility of the field and a better view from the angular sectors.

*Construction*. As a rule, the construction of the stadium is carried out on the following principles: Construction of the supporting infrastructure involves a detailed analysis of the location; besides, the project may require access to roads, water supply systems, power grids, drainage and sewage systems, and other infrastructural facilities.

*Foundation work* includes the following: in the soil, a pile system is required to be installed in order to provide the necessary deep foundation reinforcement; the foundation is laid on the pile system to distribute the stadium load from the columns through the foundation and on the piles.

*Concrete*. The main elements of the building are foundation, columns, load bearing beams, floor slabs, elevator shafts and stairs. It should be stressed that the concrete structure of the stadium is the foundation that forms the overall shape of the stadium.

*Pre-manufactured elements*. The largest of the pre-manufactured elements in the construction of the stadium are the stand tiers. After the columns and the supporting beams have been installed, the ready-made elements of the stands are installed next. The lower tier is mounted first. At the same time, the construction of the stadium structure continues. When the columns and supporting beams are mounted to the upper levels of the stadium, the upper tiers of the stands can then be installed.

The following step involves installation of individual structures such as: machinery, electrical and plumbing equipment. Then comes roof construction and façade. For the construction of the roof and the facade of the stadium, it is necessary to install vertical support elements. In most cases,

steel columns are used in order to support the facade and the roof. Elements along the perimeter of the roof, such as cables or parts of steel cables, are mounted on to vertical supports. When the main parts of the stadium structure are ready, facade and roof facing elements can be installed. Furniture, fittings and equipment are installed closer to the end of the construction.

In comparison to other facilities, stadium requires a large number of furniture elements, such as: large number of seats, large number of restrooms and many more.