

Abstract

The doctoral dissertation entitled “*Selected Methodological and Implementation Aspects of the Intelligent Protective Tunnel Project on the Inrun of a Ski Jump*” is devoted to the analysis and interpretation of the ski jumping hill as a sporting, engineering, and architectural facility, as well as to the search for innovative solutions that may influence its further development.

The starting point of this work is the conviction that the contemporary life of a 21st-century athlete constitutes a dynamic coexistence of advanced training techniques and modern technologies that support the process of optimizing and transcending human capabilities. In this context, the ski jumping hill cannot be considered solely in structural or engineering terms; rather, it emerges as a fully-fledged architectural object that combines sporting, educational, touristic, and culture-forming functions.

The dissertation consists of a theoretical section and an analytical-design section. The theoretical part presents the evolution of ski jumping hills, from monofunctional sports facilities to contemporary complexes with high innovative potential. The role of technology in shaping sports infrastructure has been analyzed—from the design phase, through construction and use, to new ways of adapting facilities to changing conditions arising both from dynamic technological progress and the growing need to implement innovative solutions based on scientific research, which open the perspective for further breakthroughs in the field of sports architecture. Particular attention is paid to the phenomenon of integrating technological solutions, such as monitoring systems, biomechanical analysis, or composite materials, which contribute to the transformation of sports architecture in the 21st century.

The design section discusses the author’s original concept of an intelligent protective tunnel on the inrun of a ski jumping hill, treated not only as an innovative element of technical infrastructure but also as the beginning of a new dimension of architecture. The tunnel has been approached from methodological and implementation perspectives, and its analysis has made it possible to indicate potential directions for the development of sports facilities in the context of changing environmental, economic, and social requirements.

The results of the conducted research and analyses confirm the theses formulated in the dissertation: the ski jumping hill, hitherto primarily a manifestation of engineering expertise, is evolving into a fully-fledged architectural object; as a sports facility, it holds the potential to host events of sporting, business, and touristic character beyond the competitive season; and ski jumping complexes should be regarded as complex spatial-functional organisms with particularly high innovative potential in both technological and aesthetic-formal dimensions.

The dissertation thus attempts to define a new model for the development of ski jumping hills, in which the integration of technology and architecture becomes the foundation of their functional, economic, and social sustainability.