

PHD DISSERTATION SUMMARY OF
„SHAPING OF BIONIC STRUCTURAL SURFACES IN ARCHITECTURE
OF CONTEMPORARY FACADES”

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This dissertation discusses the issues of shaping "organic" structural surfaces as one of the more original currents emerging in the search of contemporary free form facades. Particular attention has been paid to the issues of imitation and appeal to nature, as observed in the case of bionic architecture. The genesis and development of facade shaping, as well as its historical conditions, have been broadly taken into account in this dissertation. The development of structural thinking coupled with an analysis of these transformations' characteristics, tendencies and directions of modern external wall shaping have been also outlined in this work. This work concerns selected architectural and urban problems affecting facade design with a focus on the creation of structural surfaces in terms of modern functional-spatial and technical-functional requirements. An attempt for a certain systematic design of structural and material solutions has been presented in the dissertation. In addition, the topic of facade shaping is being discussed in some important aspects of the integrated design process, which results in more efficient, synergistic design solutions. Based on architectural and construction examples, the topics related to the design of bionic architecture, including modern facades, with particular emphasis on formative processes, functional systems and biological aspects of materials technologies have been presented. Such design contains important elements combining various aspects of an interdisciplinary design process, in line with the idea of sustainable development. Much of the work was devoted to preliminary static-strength analyses to study models of bionic load-bearing structures as compared to classical geometric surfaces constructed from rod structures. Based on the accepted baseline assumption of making topological transformations, possible comparisons of selected forms have been made to examine the structural efficiency of symmetrical rotary rod structures created on radial grids.

Key words: bionic, architecture, structural forms, elevation, structural surfaces

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