

Preface

The role of the building envelope is primarily to act as a barrier between inside and outside and, in this way, provide privacy and protection for its inhabitants from external environmental factors (sun, wind, and rain), while retaining thermal comfort, a healthy living environment and the ability to see outside. One may, moreover, argue that the building envelope serves as a mediator, reconciling inside and outside, so that the building's relationship to its nearby surroundings is established.

Indeed, one may observe throughout history the manner and degree to which such functions have been changed and upgraded in response to emerging technologies and materials. Alongside newly defined needs, building envelopes have to answer to changing demands for comfort and occupants' relation to their environment.

This book was motivated by the worrying realization that often, architects overlook some of the original functions of the building skin, passing very late in the design process the responsibility of its performance to mechanical and building envelope engineers. It is vital to understand the significance of design decisions made from the very beginning of the process about building form and envelope in order to achieve intelligent envelopes for high-performance buildings. Understanding their constituent layers and materials, and how the entire building relates to its outside, signals the hallmark of sustainable architectural solutions.

Under such context, this book lays out basic principles of climatic design for high-performance building envelopes, followed by practical examples and design tools that can be used to analyze and obtain a series of adequate high-performance solutions. The book condenses an ample body of knowledge based on years of research and presents useful guidance for designers that want to apply novel technologies for the design of intelligent envelopes in a suitable and practical way. It also addresses new challenges for the twenty-first century, encouraging energy conservation and emission reduction in the construction of new buildings, as well as renovation of existing ones toward sustainable reuse.

It is paramount that architects take on again the responsibility for envelope design as part of the whole architectural design process, as an integral part of the

interactive space between building and its environment. As we show in our book, the introduction of new technologies and materials presents a unique opportunity. It calls for an innovative rethinking of the role played by the building envelope, so as to create healthy building environments that relate well to the outside and succeed in making better use of natural resources, such as sun, light, and air.

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Design and Strategy

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