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Spray Polyurethane Foams in External Envelopes of Buildings presents, for the first time, a book focused on both the theoretical and practical design and applications of spray polyurethane foam (SPF) use. To review the moisture performance of SPF, this book focuses on the design of an assembly where moisture is kept from accumulating and causing deterioration (flow through approach). In this approach, Spray Polyurethane Foam presents two unique parts of theory and practice of various SPF products. FROM THE PREFACE Part 1 of this monograph analyzes SPF performance as the material (product). Being field fabricated, installation of SPF products must include a quality assurance program . . . Laboratory evaluation of foams and their coverings, quality management issues, and quantification of the technical support provided to the SPF contractor are also reviewed. Part 2 presents a systems approach to construction. Starting with principles of environmental control of buildings, different aspects of design and performance of roofing and wall systems are reviewed. Details and design recommendations . . . as well as case studies . . . are included. " As a result of changes in the composition of the population, society changes continuously with respect to various factors including age-structure, family composition and the availability of energy. Changes lead to situations that are reflected in the commissioning of buildings, which is gradually shifted from new construction to the reuse and renovation of existing buildings. The adaptation of buildings often requires the modification of facades and the construction behind. The scope of this action within the COST Transport and Urban Development Domain is to improve techniques and methods for envelopes of buildings constructed during the last half of the 20th century in the COST countries. In other words it is directed on the building envelopes of the so-called non-traditional buildings. This publication is based on a support by COST, an intergovernmental European framework for international cooperation between nationally funded research activities. COST creates scientific networks and enables scientists to collaborate in a wide spectrum of activities in research and technology. " Energy security is one of the most significant challenges facing Jordan. Addressing this will reduce the country's burdens and ensure its sustainable development, especially in the face of the country’s sudden unplanned population growth. Jordan imports 96% of its energy re-sources, and its existing building stock is a high energy consumer with a performance level far below the standard of new constructions. Therefore, it has the potential to reduce energy demand on a large scale. This study focuses on optimising energy consumption in mixed-use buildings in Amman through retrofitting the building envelope using passive design solutions, with a special focus on improving thermal performance. It investigates the potential of achieving the requirements of the Jordanian Energy Efficient Building Code (JEEBC) for new buildings and the Passive House Standard (EnerPHit). The methodology of the study is divided into three main parts: i) Literature review. ii) Interview activity with local experts. iii) Development of

a retrofit guideline. The interviews are qualitatively analysed to understand the current situation, issues and practices, possible obstacles and opportunities. The original contribution of this study is achieved by assessing the current situation of these buildings from the point of view of thermal performance, calculating thermal transmittance (U-Value) of different building envelope technologies for external walls, roofs, ground floors, internal partitions and windows. The proposed solutions, which are internal or external insulation, are presented in tables with suggested additional insulation thicknesses, achieved U-values, and the thermal performance improvement required for each building envelope component to achieve the study targets. Upgrading the thermal performance of the building envelope results in significant energy savings in buildings and improves the quality of the indoor environment. Post-retrofit calculations that meet the JEEBC requirements resulted in thermal performance improvements of up to 80% in external walls, 50% in cavity walls, 47% in insulated walls, 78% in external roofs, 48% in ground floors, 50% in internal partitions, and 46% in windows. Achieving Passive House U-value standards would mean these figures doubled for internal partitions and increased about 10% for other components. Keywords: Amman buildings, building envelope, energy-efficient buildings, energy retrofit, passive design strategies, thermal insulation. Advanced Building Envelope Components: Comparative Experiments focuses on the latest research in innovative materials, systems and components, also providing a detailed technical explanation on what this breakthrough means for building exteriors and sustainability. Topics include a discussion of transparent envelope components, including intelligent kinetic skins, such as low-e coatings, high vs. low silver content in glass, solar control coatings, such as silver vs. niobium vs. tin, and more. In addition, opaque envelope components are also presented, including opaque dynamic facades, clay lining vs. plasterboard and nano clayed foams. Includes real case studies that explore, in detail, the behavior of different envelopes Presents laboratory tests on existing insulation (if any, through samples extracted on-site) to quantify actual performances Provides the tools and methods for comparing, selecting and testing materials and components for designing effective building envelopes Covers both transparent and opaque envelope components, as well as opaque dynamic facades In this essential book Bill Allen imparts his experience gained over many years into the investigation and remedy of the numerous misfortunes which have afflicted buildings here and elsewhere. He provides not only a very substantial new body of reliable back-up for good modern design but also useful material for conservation, and for surveyors who have to evaluate premises or who become specification writers. This book is divided into two parts, the first dealing with external and internal climates and the second with the ways in which the main categories of basements, walls and roof systems operation to mediate between them. The external climate is a character-forming part of the book because our climate, though technically temperate, is powerfully intemperate with buildings. The text of the book becomes markedly relevant to climates of the UK kind, but designers can also see what to look for as risk factors in other climates and how to evaluate them; the global

nature of modern practice makes this important. When it comes to the envelope itself, the author works his way up from below ground to the roof. After a chapter on basement design, be begins with cavity structures; these now fall into several sub-categories and because they exploit the cavity in different ways, he looks at what goes on in a cavity and then handles the sub-categories around this. Cavities now have two main functions, the traditional one of being a rain barrier and the new one of being the repository for much increased insulation, and it is the latter that has greatly changed behaviour patterns because it results in sharp increases of the temperature range for the outer cladding, causing a lot of damage, and by the same token stabilises the inner leaf, opening the way for heating economies. There have been some disastrous fires in cavities, causing several deaths, and this risk is dealt with too. Curtain walls have a chapter to themselves and so do timber walls, and so many problems have developed in applied finishes and in doors and windows that these, too, have their own chapters. Finally roofs, flat and pitched, in two separate chapters. Flat roofs have a bad press and people are still suspicious about them, but we now know how to make them long-lasting and handsome, while pitched roofs have had a good press but sometimes don't deserve it. The corrosion of metal finishes especially lead, has be-devilled pitched roofs and given some terrible shocks; on one roof lead that was heavy enough to give 100 years protection failed in 10 months following official recommendations. The author is a well known consultant and is an authority in the field of 'oddities in buildings' Book provides a good thinking base for design decisions about new buildings Vital for architects, engineers, surveyors and clients By presenting the basics of building science along with a prescribed set of details, Designing the Exterior Wall helps you understand why buildings fail and how they can be made more durable through design. Author Linda Brock connects the science and aesthetics of building envelopes through the examination of a variety of construction and cladding types. She features details from real world projects in a variety of climates, successful and unsuccessful case studies, and checklists you can use on your own projects. Helps you reduce your liability by showing why building envelopes fail and how they can be designed to endure. Moves from theory to actual construction by including hundreds of building envelope details from a broad array of projects and climates. Integrates numerous contemporary case studies, including Frank Gehry's Experiential Music Center in Seattle (thin skins), Renzo Piano's Rue de Meaux housing in Paris (terra cotta cladding), and Mario Botta's San Francisco Museum of Modern Art (prefabricated brick panels). Designing the Exterior Wall is a must-have book, whether you're an architect or a student. Order your copy today. This book focuses on the implementation of Quality Function Deployment (QFD) in the construction industry as a tool to help building designers arrive at optimal decisions for external envelope systems with sustainable and buildable design goals. In particular, the book integrates special features into the conventional QFD tool to enhance its performance. These features include a fuzzy multi-criteria decision-making method, fuzzy consensus scheme, and Knowledge Management System (KMS). This integration results in a more robust

decision support tool, known as the Knowledge-based Decision Support System QFD (KBDSS-QFD) tool. As an example, the KBDSS-QFD tool is used for the assessment of building envelope materials and designs for high-rise residential buildings in Singapore in the early design stage. The book provides the reader with a conceptual framework for understanding the development of the KBDSS-QFD tool. The framework is presented in a generalized form in order to benefit building professionals, decision makers, analysts, academics and researchers, who can use the findings as guiding principles to achieve optimal solutions and boost efficiency. Since many buildings in Canada were built prior to the advent of national and provincial energy codes and standards, quantifying building envelope thermal performance in existing buildings is an important step in identifying retrofit opportunities. Due to the lack of building codes or standards for existing buildings in Canada, development of a rapid and robust quantitative approach to evaluate and rank buildings for vertical envelope retrofits is required. Hence, this dissertation sought to develop quantitative approaches to evaluate existing building envelope thermal performance in Canada and beyond. Following current professional practices, in Chapter 1, a comprehensive study was conducted on 49 campus buildings at the University of Victoria (UVic) to evaluate potential energy savings from vertical envelope retrofits, and to further validate those savings through more detailed energy models and parametric analyses for a subset of buildings. To this end, the thermal performance of a building envelope was quantified based on its heat loss coefficient (UA), obtained from multiplying its surface area (A) by its thermal transmittance (U-value). Heat loss calculations were used as a metric to inform envelope rehabilitation prioritization, while considering other data such as age and physical condition in parallel. Archetype energy models for selected buildings were used to evaluate the impacts of envelope retrofits on energy and GHG savings. The outcomes of this study allowed the University to weigh the benefits of improved energy performance from envelope retrofits against associated capital cost expenditures. Also, the implemented methodology and studied parameters unveiled a new horizon in evaluating the thermal performance of existing building envelopes in Canada, where a building code for existing buildings has not yet been established. Considering the economic findings of the envelope retrofits studied, it was concluded that in the absence of an existing building energy code, the University would likely require additional incentives, such as higher utility costs, higher carbon taxes, or qualifying for utility incentive programs to justify improving existing building envelope performance on the basis of energy only. The strength of the proposed methodology in Chapter 1 was in its balance of effort and ultimate decision-making utility, where reasonable thermal bridging approximations based on simulation models for existing buildings can yield data accurate enough to inform a ranking exercise on a large breadth of subject buildings. However, since numerical models do not consider degradation of building materials, real moisture content, and errors associated with manufacturing and installation, actual building envelope thermal performance differs from 3D simulation models. To study this limitation, in-situ thermal assessments of

building envelopes were performed to quantify their actual thermal performances. To this end, Chapters 2 to 4 of this dissertation attempted to determine the viability of an external infrared thermography (IRT) survey technique for quantification of heat losses through the opaque building envelope, and also explores its potential application in identifying and comparing sources of air leakage. The experiments were performed on wood-framed wall assemblies commonly used in Canada due to growing interest among designers, builders, and governments to encourage the use of wood as a building material. In these studies, (Chapter 2 to Chapter 4), thermal transmittances (U-values) of wall assemblies were estimated with external IRT and compared with 3D computer simulations. Furthermore, the impact of the accuracy of U-values estimated with IRT on the deviation of energy simulation outputs with metered data was examined. Finally, a novel relative quantitative infrared index (IRI) was proposed as a means to facilitate rapid evaluation and subsequent ranking of building envelope thermal performance. From the experiments in Chapters 2 & 3, it was found that the U-values obtained with IRT were comparable with simulated values suggesting IRT can be a reliable tool for estimating the thermal performance of wood-framed wall assemblies. Results also demonstrated that thermal imaging artefacts including nonlinear characteristics of infrared (IR) camera focal array, a.k.a. non-uniformity corrections (NUC) and vignetting could have a substantial influence on the accuracy of results, in particular energy model outputs. This limitation was resolved by introducing a practical approach where thermal images were taken from different incident angle. Overall, IRI was found to be a reliable metric for relative quantitative comparison of building envelope thermal performance regardless of boundary conditions. Moreover, outcomes of the IRT air leakage study in Chapter 4 indicated that combined qualitative and quantitative IRT approaches could potentially be implemented by practitioners to identify sources of air leakage and thermal bridges in buildings and compare their relative severity. Since blower door testing is gradually being introduced as a building code requirement to measure building envelope airtightness in an increasing number of Canadian jurisdictions, performing IRT simultaneously is potentially valuable exercise in this context. Ultimately, the methodologies outlined in Chapters 2 to 4 can help decision-makers to characterize building envelope retrofits from a performance perspective, and potentially serve as a basis for governments to develop policies to improve existing building energy performance. The methodologies in Chapters 2 to 4 prompted opportunities to utilize the emergent technology of small unmanned aerial vehicles (UAVs) equipped with an infrared camera for quick thermal assessments of building envelopes. The last chapter of this dissertation, Chapter 5, outlines advantages and limitations of aerial IRT (UAV-IRT) surveys compared to conventional stationary IRT. Furthermore, a set of best practices for UAV-IRT were presented to minimize dynamic measurement uncertainty. It was concluded that with the current IR camera technology, aerial surveys for quantitative thermal assessment of building envelope are not as accurate as with conventional infrared thermography; further investigations by manufacturers and researchers are recommended. The design and construction of the

appropriate building envelope is one of the most effective ways for improving a building’s thermal performance. Thermal Inertia in Energy Efficient Building Envelopes provides the optimal solutions, tools and methods for designing the energy efficient envelopes that will reduce energy consumption and achieve thermal comfort and low environmental impact. Thermal Inertia in Energy Efficient Building Envelopes provides experimental data, technical solutions and methods for quantifying energy consumption and comfort levels, also considering dynamic strategies such as thermal inertia and natural ventilation. Several type of envelopes and their optimal solutions are covered, including retrofit of existing envelopes, new solutions, passive systems such as ventilated facades and solar walls. The discussion also considers various climates (mild or extreme) and seasons, building typology, mode of use of the internal environment, heating profiles and cross-ventilation Experimental investigations on real case studies, to explore in detail the behaviour of different envelopes Laboratory tests on existing insulation to quantify the actual performances Analytical simulations in dynamic conditions to extend the boundary conditions to other climates and usage profiles and to consider alternative insulation strategies Evaluation of solutions sustainability through the quantification of environmental and economic impacts with LCA analysis; including global cost comparison between the different scenarios Integrated evaluations between various aspects such as comfort, energy saving, and sustainability The role of the building envelope - related to the energy performance of a building and the comfort of the user - is significant. This title deals with the practical experience and visions of the specialists, from the fields of architecture, engineering and research, for the climate-oriented building envelope. This Digest explains how the external envelope of a building (the windows, walls and roof) affects the level of noise that is transmitted from outside to inside. It depends on a number of factors: the mass of the envelope, its continuity and the extra insulation afforded by double-leaf construction. There are also certain planning measures that will minimise the exposure to outside noise. The proportion of wall area that is occupied by window glazing has an appreciable effect on the overall performance of the window/wall area unless the windows are designed to a standard that matches the wall construction. Open windows greatly reduce the overall performance. It is therefore necessary to consider the ventilation needs of buildings in noisy locations. This Digest replaces Digest 128 and 129 which are now withdrawn. An examination of new developments in the technology of structural and cladding systems of the past decade by means of 33 detailed case studies. The book is aimed at practising architects, engineers and quantity surveyors as well as undergraduate students of architecture and building. The third edition of Barry's Advanced Construction of Buildings expands and deepens your understanding of construction technology. It covers the construction of larger-scale buildings (primarily residential, commercial and industrial) constructed with loadbearing frames, supported by chapters on fit out and second fix, lifts and escalators, prefabrication and off-site construction and a new chapter on building obsolescence and revitalisation. Functional and performance requirements of the main building elements are emphasised

throughout, as is building efficiency and meeting the challenges of limiting the environmental impact of buildings. You will find the text fully up to date with the latest building regulations and construction technologies. This book results from a Special Issue published in Energies, entitled “Building Thermal Envelope". Its intent is to identify emerging research areas within the field of building thermal envelope solutions and contribute to the increased use of more energy-efficient solutions in new and refurbished buildings. Its contents are organized in the following sections: Building envelope materials and systems envisaging indoor comfort and energy efficiency; Building thermal and energy modelling and simulation; Lab test procedures and methods of field measurement to assess the performance of materials and building solutions; Smart materials and renewable energy in building envelope; Adaptive and intelligent building envelope; and Integrated building envelope technologies for high performance buildings and cities. Topics covered include function and requirements of sealant joints, sealant selection, joint design, construction details and installation. This dissertation, "Informing Energy-efficient Envelope Design Decisions for Residential Buildings in Hong Kong" by Xiaoxia, Sang, ???, was obtained from The University of Hong Kong (Pokfulam, Hong Kong) and is being sold pursuant to Creative Commons: Attribution 3.0 Hong Kong License. The content of this dissertation has not been altered in any way. We have altered the formatting in order to facilitate the ease of printing and reading of the dissertation. All rights not granted by the above license are retained by the author. Abstract: Space conditioning and lighting together account for about a third of end-use energy consumption in residential buildings in Hong Kong. Previous research shows that such energy consumption can be significantly reduced by employing energy-efficient building envelope design. However, despite that fact, the envelopes of many residential buildings in Hong Kong are designed in ways that impair building energy performance. For example, most residential buildings in Hong Kong have single-glazed windows and solar-absorbing roofs, many leak airs, and some have no external wall insulation or exterior shading. There are many energy-efficient envelope (EEE) design measures that improve overall building energy efficiency, but their selection has been widely recognized as a difficult task for design decision-makers, as it requires good engineering judgment and substantial building performance data. Apart from the energy considerations in EEE design, the reasons why professionals do or do not incorporate EEE design measures voluntarily into building design have not been thoroughly investigated. The majority of previous studies have focused on evaluating design alternatives after the design decision is made, but largely overlook the issue of informing the design before the decision-making process. The aim of this research is to inform design decision-making for selecting appropriate EEE measures for residential buildings in Hong Kong. The research included three major interrelated steps. Firstly, a comprehensive literature review was conducted of the energy-related parameters and non-energy-related factors critical to the selection of EEE design measures in the Hong Kong context. Secondly, the influential design parameters identified from the literature review were used for detailed parametric

simulation and analysis. Their effects on building energy performance were evaluated, and their relationships with selected outputs were analysed. Thirdly, a survey was set up to investigate the perceptions of building professionals about EEE design decision-making criteria and factors affecting the adoption of EEE designs. Taken together, these three study components contribute to the development of a decision support framework that buttresses the effective selection of appropriate EEE design measures for low-energy residential buildings in Hong Kong. The framework shortlists the critical parameters in EEE design, highlights their effects on building energy performance, points out the drivers and barriers to adoption, and suggests strategies to expedite the adoption of those measures. The findings should support the effective comparison and selection of EEE design measures for delivering low-energy residential buildings in Hong Kong. They should also help to achieve the targets of relevant industry and government programmes in Hong Kong for expediting the adoption of EEE design measures. DOI: 10.5353/th_b5317066 Subjects: Dwellings - China - Hong Kong - Design and construction This book presents a series of significant methods and examples for the design of sustainable intelligent facades in a variety of contexts. Emphasis is placed on how intelligence has been applied for successful energy-saving efforts in the planning of building envelopes. Readers will find essential information on the core principles involved in designing, calculating and organizing intelligent facades according to the need for a new or retrofitted building. Not only are different materials and technologies considered, but also efficient ways to combine them according to user needs and other project-specific constraints. Illustrations, tables and graphs accompany the text, clarifying the concepts discussed. Architects, facade consultants and all those interested in and energy-saving measures and improved indoor comfort will find this book useful not only as an introduction to the subject but also as a guide to achieving more responsive building methods. As a result of changes in the composition of the population, society changes continuously with respect to various factors including age-structure, family composition and the availability of energy. Changes lead to situations that are reflected in the commissioning of buildings, which is gradually shifted from new construction to the reuse and renovation of existing buildings. The adaptation of buildings often requires the modification of facades and the construction behind. The scope of this action within the COST Transport and Urban Development Domain is to improve techniques and methods for envelopes of buildings constructed during the last half of the 20th century in the COST countries. In other words it is directed on the building envelopes of the so-called non-traditional buildings. This publication is based on a support by COST, an intergovernmental European framework for international cooperation between nationally funded research activities. COST creates scientific networks and enables scientists to collaborate in a wide spectrum of activities in research and technology. Sustainable Steel Buildings reviews steel and its potential as a sustainable building material and shows how steel can be used to deliver buildings and structures with a high level of sustainability. The book's main focus is on the advantages and disadvantages of steel and how those characteristics can be used under

a range of international certification systems (DGNB, LEED, BREEAM, openhouse etc). External works, for the purposes of this Note, comprises all hard and soft landscape works outside the external envelopes of the principal buildings on a health-building site, together with all courtyards. It includes external drainage, engineering services directly serving the works here described, such as lighting to roads, footpaths and other external facilities, and builders' work for engineering services outside buildings. This Note also draws attention to the importance of careful consideration and control of the location and integration into the landscape of all auxiliary buildings and other external building work, and of drainage and engineering services external to the principal buildings. Few parts of a building work harder than its envelope (also known as its facade). The envelope is the part of the building most visible from the outside--so it should be visually appealing--but it can also have the biggest effect on the well-being and safety of its occupants--so the envelope should be help heat and cool the building, allow light into it, and provide necessary structure. Too often, a building's envelope is more aesthetically striking than functional, or vice versa. A great building envelope, though, architecturally integrates all of its elements. " As a result of changes in the composition of the population, society changes continuously with respect to various factors including age-structure, family composition and the availability of energy. Changes lead to situations that are reflected in the commissioning of buildings, which is gradually shifted from new construction to the reuse and renovation of existing buildings. The adaptation of buildings often requires the modification of facades and the construction behind. The scope of this action within the COST Transport and Urban Development Domain is to improve techniques and methods for envelopes of buildings constructed during the last half of the 20th century in the COST countries. In other words it is directed on the building envelopes of the so-called non-traditional buildings. This publication is based on a support by COST, an intergovernmental European framework for international cooperation between nationally funded research activities. COST creates scientific networks and enables scientists to collaborate in a wide spectrum of activities in research and technology. " This book is about the optimization of the characterization of the thermal properties of building envelopes, through experimental tests and the use of artificial intelligence. It analyses periodic and stationary thermal properties using measurement approaches based on the heat flow meter method and the thermometric method. These measurements are then analysed using advanced artificial intelligence algorithms. The book is structured in four parts, beginning with a discussion of the importance of thermal properties in the energy performance of buildings. Secondly, theoretical and experimental methods for characterizing thermal properties are analysed. Then, the methodology is developed, and the characteristics and properties of the algorithms used are explored. Finally, the results obtained with the algorithms are analysed and the most appropriate approaches are determined. This book is of interest to researchers, civil and industrial engineers, energy auditors and architects, by providing a resource which improves energy audit tasks in existing buildings. This book introduces a maintenance model that will assist

decision-makers in their choice of building maintenance policies. The model is stochastic and condition-based that analyses the impact of different maintenance strategies on the durability and performance of different buildings envelope elements (facades, windows, and roofs). As non-structural elements, the maintenance of buildings envelope can be disregarded stakeholders. However, as first barrier to the external environment, these elements are critical to buildings' overall performance and are expected to meet aesthetic, comfort, safety, and durability requirements. The methodology presented is innovative. The maintenance model is based on a Petri net formalism and includes degradation, inspection, maintenance, and renewal processes. The model provides key information, such as: i) the impact of different maintenance strategies on the service life and durability of the building components; ii) the impact of maintenance on their performance over time; iii) the life cycle costs; and iv) the impact of maintenance on the buildings' use. The book will be of use to a variety of professionals in the construction sector. " As a result of changes in the composition of the population, society changes continuously with respect to various factors including age-structure, family composition and the availability of energy. Changes lead to situations that are reflected in the commissioning of buildings, which is gradually shifted from new construction to the reuse and renovation of existing buildings. The adaptation of buildings often requires the modification of facades and the construction behind. The scope of this action within the COST Transport and Urban Development Domain is to improve techniques and methods for envelopes of buildings constructed during the last half of the 20th century in the COST countries. In other words it is directed on the building envelopes of the so-called non-traditional buildings. This publication is based on a support by COST, an intergovernmental European framework for international cooperation between nationally funded research activities. COST creates scientific networks and enables scientists to collaborate in a wide spectrum of activities in research and technology. " The great 18th century French philosopher, Voltaire said "Men Argue, Nature Acts". Since 1970s, when global warming and climate change phenomena were identified to be impacting the Earth, almost three decades have been spent conducting scientific debates and talks. The general population at large is still ignorant towards implementing prevention strategies due to trivial reasons like expensive installation and maintenance. Meanwhile, the Earth's atmosphere is quickly reaching towards a point-of-noreturn. A predicted increase in global temperature by even 8°C may not affect the comfort with which humans can exist. The problem lies deeper, global warming would trigger extreme catastrophic events that would change the world as we know it. The common impacts discussed range from extinction of wildlife and climate change to decrease in habitable land and threat to human existence. The architectural profession can actively contribute by providing sustainable design innovations. The prevailing conditions demand all buildings- new and existing, to have low energy consumption. However, it is impossible to re- construct all existing buildings, yet possible to renovate their exteriors such that they perform better. This paper researches the integrated double skin

envelope as an appropriate sustainable solution, and its impact if implemented on existing structures. The thesis begins with exploring the relation between a sustainable envelope design, especially the twin skin system, and global warming. The literature section investigates the various classifications and designs of advanced building external skins that can be added onto existing envelopes. To understand the importance given to designing sustainable envelopes in actual practice, the literature investigates various Green building rating systems. The parameters derived from here are further elucidated with design methods. Case-studies from around the world have been presented to understand the performance of integrated double envelope systems. The last section aims to implement design solutions derived from literature and case-study analysis on existing Auckland region buildings. The objective is to demonstrate the actual impact of constructing a second skin over the existing envelope. The result is a model that is not only sustainable but can withstand the test of time and climate change. Spray Polyurethane Foams in External Envelopes of Buildings presents, for the first time, a book focused on both the theoretical and practical design and applications of spray polyurethane foam (SPF) use. To review the moisture performance of SPF, this book focuses on the design of an assembly where moisture is kept from accumulating and causing deterioration (flow through approach). In this approach, Spray Polyurethane Foam presents two unique parts of theory and practice of various SPF products. FROM THE PREFACE Part 1 of this monograph analyzes SPF performance as the material (product). Being field fabricated, installation of SPF products must include a quality assurance program . . . Laboratory evaluation of foams and their coverings, quality management issues, and quantification of the technical support provided to the SPF contractor are also reviewed. Part 2 presents a systems approach to construction. Starting with principles of environmental control of buildings, different aspects of design and performance of roofing and wall systems are reviewed. Details and design recommendations . . . as well as case studies . . . are included.