Tensioned Fabric Structures - A practical Introduction
Shaeffer
American Society of Civil Engineers (ASCE Press)
English
Pages: 122
Published: 1996
$ 25.00

This committee report describes the basic design principles, behaviour, materials, and construction process of tensioned fabric structures. Beginning with an overview of the history of the technology, the book examines the role of each participant in the project from inspection through completion. The advantages and disadvantages of various methods for shape determination and analysis are addressed.

Widespan Roof Structures
Michael Barnes
Thomas Telford
English
ISBN: 0-7277-2877-6
Pages: 324
Published: 2000
£ 70.00

This book presents current world thinking on the design and construction of large covered spaces. Drawing on contributions from internationally renowned projects and directly from the designers, architects, and engineers responsible, it offers insights into many of the most innovative construction design projects of recent years.
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Proceedings: The Design of Membrane and Lightweight Structures
Marijke Mollaert
VUB Brussels, University Press
English
Pages: 315
Published: 2002
€ 65.00 (incl. shipping & VAT)

The aim of the symposium 'The Design of Membrane and Lightweight Structures', held in Brussels in September 2000, was to increase interest in and appreciation of membrane and lightweight buildings. The proceedings illustrate the wide range of applications: the Planet M pavilion (IPL) and the cycle bowl (Foiltec) at EXPO 2000, the Millennium Dome (Buro Happold), the Eden project (Mero) and many more.
These proceedings can be ordered directly by Marijke.Mollaert@vub.ac.be

Soft Canopies
Maritz Vandenberg
Academy Editions
English
ISBN: 185490 440 X
Pages: 64
Published: 1996
£ 16.99

Soft Canopies highlights examples of textile canopies from the recent work of leading international architects. A variety of buildings are used to illustrate the current technology being employed in this field, including the temporary ticket office for Buckingham palace by Michael Hopkins and Partners, and their earlier Mound Stand at Lord's Cricket Ground, London; the extension to the Prophet's Holy Mosque in Saudi Arabia by Bodo Rasch and Buro Happold; and the Carlos Moseley Pavilion in New York by FTL Associates and Buro Happold. (80 figures)
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## Information of the Institute for Lightweight Structures (IL)

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### Examples of IL Books

**IL 18 Forming Bubbles**
Experiments with liquid films in science, architecture and technics. Minimal ways, minimal surfaces, formfinding models for tents, nets, air halls.
1988, 400 p., 750 pictures

**IL 35 Pneu and Bone**
The structural system pneu in living nature: soft pneus, solid pneus, Crustaceans, bones.
1995, 262 p., 900 pictures
Werner Sobek's buildings located in places like Lima, Chicago, Bangkok and Shanghai, show what state-of-the-art engineering is capable of: structures of fabric, glass, titanium, steel, timbre or concrete which appear ethereal and virtually devoid of mass, pioneer new methods of building construction and impart astonishing aesthetic qualities to architecture. This book (filled with beautiful photos and illustrations) introduces the reader to Werner Sobek's work and professional career while showing the buildings which result from a close cooperation between architects and engineers.

This book by Kazuo Ishii features 64 built and planned projects from around the world. Its more than 300 pages are generously filled with hundreds of colour photos and architectural drawings. The projects include Shanghai Stadium, Osaka Pool, Millennium Dome, Passenger Terminal, Denver International Airport and many others. Several articles are also included as well as a Data List by Roof Structures.
Space Grid Structures
John Chilton
Architectural Press
English
Published: 2000

An up-to-date assessment of the use of space grid structures in buildings by reviewing methods of construction, various systems available and detailed case studies. The technical level is aimed at professional and student architects and engineers worldwide and also serves as a useful constructional manual.
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Proceedings: Designing Tensile Architecture
Marijke Mollaert
VUB Brussels
English
Pages: 276
Published: 2003
€ 60.00

The TensiNet Symposium has been organised after two and a half years of activities of the TensiNet Thematic Network. It has been an event, which allowed architects, engineers, constructors, material suppliers and building owners to keep up to date with the technological evolutions in this field. Besides basic information on form finding and structural behaviour the symposium brought together relevant points of view related to current fields of research like wind loading estimation and effect, risks of failure, new materials, patterning, detailing, environmental aspects and the ultimate integration of all these aspects in a single or layered membrane skin. Some presentations were related to topics, which will be considered in the first specific Design Guide for Europe, to be printed by TensiNet in 2004.

The proceedings prove that Tensile Architecture is a field in full expansion, and that further applications on earth as well as in the air and in space will evolve. The proceedings can be ordered at marijke.mollaert@vub.ac.be

IL 15 - Air Hall Handbook / Lufthallenhandbuch IL
English / German
ISBN: 3-7828-2015-0
Pages: 400
Published: 1982
€ 31.00

As with all other building structures, pneumatically prestressed membrane structures (air halls) can be built with a high level of safety and a long service life. The art of building lies in the correct allocation and dimensioning of material and form, depending on the task, location and the anticipated period of operation. The air hall handbook is made up of four parts 'Architectural and Structural Design', 'Engineering', 'Manufacturing' and 'Annex'. The handbook does not state how air halls can be turned into objects of architecture, it is intended to provide craftsmanlike and technical principles. Because skillful handicraft together with extensive knowledge has always been the basis of architecture. The air hall handbook can be ordered at daniela.mayr@ilek.uni-stuttgart.de
The Tensioned Fabric Roof
Craig Huntington
American Society of Civil Engineers (ASCE Press)
ISBN: 0-7844-0428-3
Pages: 176, soft cover
Published: 2004
List $ 89.00
International List $ 106.80

The Tensioned Fabric Roof describes the state-of-the-art design of fabric tension structures. The fundamentals of a fabric structure’s design and construction as required by engineers, contractors, and architects are presented. The book discusses the unusual character of the fabric structure industry and its implications for how structures are marketed, designed, and constructed. Included are chapters on the fundamentals of membrane behavior, the possibilities and limitations in roof form, fabric materials, analytical techniques, structural details, fabrication and erection, and non-structural design parameters that include day lighting, energy use, acoustics, and fire safety. Written by an experienced practitioner of fabric structure design, this book methodically addresses all aspects of the design and construction process. Structural engineers will gain an understanding of shaping, analysis, and design of members and connections; architects will learn the possibilities and limitations in fabric roof form, as well as the means of achieving successful energy, lighting, acoustical, and fire safety performance; and contractors will receive invaluable information related to their fabrication and erection.
European Design Guide for Tensile Surface Structures
Brian Forster, Marijke Mollaert
ISBN: 9 789080 868717
Pages: 354, soft cover
Published: 2004
€ 100.00

The European Design Guide for Tensile Surface Structures is a product of over three years work by the members of TensiNet - A Thematic Network for Upgrading the Built Environment in Europe through Tensile Structures, which was initiated on 1 March 2001. This guide and the other activities of TensiNet were funded by the European Commission, under the Competitive and Sustainable Growth (Growth) Programme of Framework Programme 5.

The tensile surface structure business has grown considerably in the last 15 years and is predicted to grow further. Such structures are becoming bigger and more sophisticated. More clients are interested in using them but they are still considered to be special – a new technology.

If tensile surface structures do not figure widely in the design vocabulary of European architects, engineers, urban planners, building owners and national authorities, their application will continue to be constrained. Therefore, there is a need for people to be better informed about the general behaviour and the advantages and disadvantages of using tensile surface structures in relation to more conventional buildings. For instance, the internal environment is seen as a key issue - how do such enclosures behave and to what functions are they suited? There is also the question of maintenance. How do these structures differ from 'normal' buildings? These issues are covered in the design guide.

It is a generally held view that Europe needs a code for Tensile Surface structures and this design guide is a valuable and necessary step to a pan-European Normative document. Once an EN is available the industry becomes respectable and clients' confidence should increase. In turn, that should lead to more business for constructors and designers.

Nevertheless, this European Design Guide for Tensile Surface Structures is not intended to be a European standard. However, as a 'state-of-the-art' report it is a step in that direction.
Membrane Structures. Innovative Building with Film and Fabric
Klaus-Michael Koch with Karl J. Habermann
Prestel
ISBN: 3-7913-3049-7
Pages: 224
Published: 2004
$ 136.80

This book provides information about numerous innovations in the field of materials development, technology and design applications including the history, materials and use of membrane structures. There are contributions from Brian Forster, Knut Göppert, Thomas Herzog, John Pudenz, Bill Taylor, and David Wakefield.
Architextiles explores the contemporary intersections between architectural and textile design. Focusing on the possibilities for architectural and urban design, this issue examines the most generative set of concepts, forms, patterns, materials, processes, technologies, and practices that are driving the proliferation of this multi-disciplinary design hybrid.

Architextiles represents a transition stage in spatial design's re-orientation towards a more networked, dynamic, interactive, multi-functional, and communicative state. The paradigms of fashion and textile design, with their unique, accelerated aesthetics, and ability to embody a burgeoning, composite, and complex range of properties such as lightness, flow, flexibility, surface complexity, and movement, have a natural affinity with architecture's shifts towards a more liquid state. The emergence of Architextiles to architectural prominence challenges traditional perceptions and practices of interiors, architectural, urban, landscape, and fashion and textiles. Interweaving new designs and speculative projects on the future, Architextiles brings together architects, designers, engineers, technologists, theorists, and material researchers to unravel these new methodologies of fabricating space.

Each of the contributors offers a unique insight into the dimensions of Architextiles. This title includes the work of Nigel Coates, Dagmar Richter, Lars Spuybroek, Frederic Migayrou, Peter Testa, Dominique Perrault, Kennedy & Violich, David Wakefield, Bradley Quinn, Robert Kronenburg, Will Alsop, Matilda McQuaid, Ushida Findlay, Marie O'Mahoney, SHoP, Arup, Tensys, Massimiliano Fuksas, and new projects and writings from young and emerging designers and theorists.
The aim of the book is to give an up to date and general presentation on the subject for students, architects, engineers, designers and builders, so that they can get to know the possibilities of this constructive technology. It is neither a deep study nor a detailed one in each of the subjects treated. It is not addressed to those people who have a vast experience in the subject since it would lead to a more complex work and so it would lose the mentioned target and the global focus intended.

The book is conceived to respond to a large number of questions that architecture students or colleagues have while designing tensile structures.

There are two parts: one which deals with general basic aspects, and the other which presents a brief description of different projects, in order to make them known and improve the understanding of the subject.

The book is designed in a way to be studied and understood methodologically but obviously the real process of designing and building is more dynamic and interactive and requires a process of synthesis when making a decision.

The book mainly concentrates on membranes applied to architecture as covering or enclosure. Tensile structures can be used for a wide range of architectural programs, with special characteristics depending on the system and the material used fulfilling the brief with its own formal vocabulary.
The tension structures discussed in this book are predominantly roofing forms created from pre-stressed cable nets, cable trusses, and continuous membranes (fabric structures). A unique feature of their design process, which provides a focus for the book, is ‘form-finding’ - an iterative process of defining the shape of a structure under tension. The book discusses the role of stable minimal surfaces (minimum energy forms occurring in natural objects, such as soap-films) in finding optimal shapes of membrane and cable structures. The discussion of form-finding is extended to structural forms the shapes of which are supposedly known, such as suspension bridge cables.

The book presents numerical modelling of the structural form and behaviour of tension structures, but also addresses certain misconceptions related to their design. It provides unique insights into the most commonly used computational methods, emphasising their main strengths and limitations. Mathematical expositions do not go beyond the level of undergraduate engineering mathematics and, wherever possible, non-mathematical language is used to aid understanding of the fundamental concepts. The intention of the book is to provide a balance between analytical and pictorial aspects of the subject. Examples presented demonstrate the potential of tension structures as an art form.
The main theme of the TensiNet Symposium 2007 was Ephemeral Architecture and in particular, the relationship between membrane architecture and the concept of time. Ephemeral Architecture describes tensile structures built with lightweight membranes, which respond to the principles of firmness, commodity and delight, distancing them from the classical interpretation embodied by everlasting, monumental architecture.

The objective of the Symposium is to emphasise how the relationship between membrane architecture and the concept of time is constantly evolving, giving new life to all ephemeral architectural expressions.

Ephemeral Textile Architecture not only responds to the needs of contemporary society for flexible and lightweight building, but is also the result of an ecological design strategy, where temporary constructions can be disassembled after use, leaving future generations free to decide how to use those spaces again.
The aim of the journal is to provide an international forum for the interchange of information on all aspects of analysis, design and construction of space structures.

The scope of the journal encompasses structures such as single-, double- and multi-layer grids, barrel vaults, domes, towers, folded plates, radar dishes, tensegrity structures, stressed skin assemblies, foldable structures, pneumatic systems and cable arrangements. No limitation on the type of material is imposed and the scope includes structures constructed in steel, aluminium, timber, concrete, plastics, paperboard and fabric.

The journal aims at striking a balance between theory and practice and creating a platform for exchange of information between structural engineers, architects, civil engineering contractors, system manufacturers and research workers in academic and non-academic establishments.

The journal includes regular reviews of technical publications, books and trade literature. Also included is information on recently built important space structures, recently held conferences and forthcoming events of interest.

The Journal also publishes Special editions. One of the forthcoming Special editions will be “Tensioned membrane construction”. Papers in this Special Edition were selected from over 40 presented at the TensiNet Association Symposium “Ephemeral Architecture: Time and Textiles” held at the Politecnico di Milano, in 16-18 April 2007. They cover a wide range of topics, from Campioli, Mangiarotti and Zanelli’s historical review of textile architecture in the Italian context, and Hennicke’s inspirational account of relationships between lightweight and natural structures and tensile architecture, to the more mathematically analytical approach in Gosling and Bridgens’ presentation of a new concept for materials testing of architectural fabrics and Wagner’s paper describing simple analytical design/checking tools for single/double-curved membranes and inflated cushions. To complement these, Adriaenssens examines the feasibility of spliced-spine stressed medium-span membranes and, as a practical case study, Stimpfle describes the redesign and installation of the Velodrome roof in Abuja, Nigeria.

For more info see [http://www.multi-science.co.uk/space.htm](http://www.multi-science.co.uk/space.htm)
The aim of the book is to give an up to date and general presentation on the subject for students, architects, engineers, designers and builders, so that they can get to know the possibilities of this constructive technology. It is neither a deep study nor a detailed one in each of the subjects treated. It is not addressed to those people who have a vast experience in the subject since it would lead to a more complex work and so it would lose the mentioned target and the global focus intended. The book is conceived to respond to a large number of questions that architecture students or colleagues have while designing tensile structures. There are two parts: one which deals with general basic aspects, and the other which presents a brief description of different projects, in order to make them known and improve the understanding of the subject. The book is designed in a way to be studied and understood methodologically but obviously the real process of designing and building is more dynamic and interactive and requires a process of synthesis when making a decision. The book mainly concentrates on membranes applied to architecture as covering or enclosure. Tensile structures can be used for a wide range of architectural programs, with special characteristics depending on the system and the material used fulfilling the brief with its own formal vocabulary.

Internet sale  www.sobresaliente.com
Interest in tensile structures is fast growing thanks to ecological concerns and the new possibilities offered by cutting-edge materials and technologies.

Tents have been prized for centuries for their lightness, mobility, small footprint and structural elegance. New tents offer innovative and significant solutions to age-old problems. With the demand on architects to touch the earth lightly, together with a cross-disciplinary interest in technotextiles, membrane structures are assuming new prominence and pleasing forms.

This wide-ranging international survey looks at the exciting possibilities of contemporary tensile building and the most interesting membrane structures created in recent years.

Includes:
• Architectural and cultural history of the tent
• Thirty recent projects grouped by theme, such as atrium covers and fabric walls, ring roofs and convertibles, small peaks, large waves
• Accessible text descriptions, photographs and line drawings.

Internet sale: www.thameshudson.co.uk
ETFE foil has recently become an important material for the cladding of technologically sophisticated and innovative buildings. This material is very thin and lightweight and, when used in air-filled cushion assemblies, has enormous strength and a range of adaptive environmental attributes. ETFE cushion enclosures became widely known primarily through Grimshaw Architects’ Eden Project and Herzog & de Meuron’s Allianz Arena, and they are being used on the spectacular swimming stadium for the 2008 Olympic Games in Beijing, the largest ETFE building envelope in the world so far.

This book is conceived as an in-depth introduction to the characteristics of ETFE and its applications in construction. Project examples explore in detail the specific characteristics of ETFE building skins in the areas of structural behavior, light transmission, insulation, acoustics, fire engineering and environmental modification.

Internet sale:  [www.springer.com/birkhauser](http://www.springer.com/birkhauser)
Kengo Kuma's Teahouse is a masterly reinterpretation of a classical Japanese building type. Delivered in August 2007 for the Park of the Frankfurt Museum of Applied Arts (a Richard Meier Building), Kuma's innovative structure in flexible, semi-transparent, 'breathing' Tenara-Membrane - inflated by means of a pneumatic system to a blossom like form - houses in the interior the classical elements for Japanese tea ceremony. Integrated LED technology allows the use of the teahouse at night; the interior can be heated by way of the membrane.

The monograph, including an original text by Kuma himself, gives an in-depth documentation of this lyrical temporary structure – an outstanding example of ephemeral architecture, combining poetry and technology - with many unpublished sketches, technical plans and with splendid colour photographs.

Internet sale: www.birkhauser.com
Fabric Architecture
Creative Resources for Shade, Signage and Shelter

Samuel J. Armijos
W. W. Norton & Co.
English
ISBN-10: 0393732363
Pages: 304 pages (hardcover), 476 colour photographs
Published: 1 edition (16 Nov 2008)

Fabric Architecture is a resource catalogue devoted to celebrating membrane structures. With over 300 examples of awnings, tents, umbrellas, and tensioned membrane structures from around the world, it is the reference book for ideas and inspiration.

As an added feature, there are six fabric samples included in the book: PTFE from Saint Gobain, Coated PVC and PVC mesh from Ferrari, HDPE from Multiknit, Silicone coated fiberglass from Atex and Gore’s Tenara.

The book can be used as a reference guide, course book, a selling tool or as a gift for your employees, clients, family and friends.

Internet sale: www.wwnorton.com
Philippe Samyn Constructions
Architect and Engineer

Pierre Puttemans and Pierre Spehl
Fonds mercator
English, French, Dutch
ISBN: 978 90 6153 840 0 (English edition)
ISBN: 978 90 6153 843 1 (Dutch edition)
ISBN: 978 90 6153 841 7 (French edition)
Pages: 480 pages (hardcover with jacket)
Published: December 2008

The book presents a vast panorama of the prolific and imaginative work of Philippe Samyn and Partners, placing it in context among the architectural movements of the last forty years. Their great achievement is the balance they have struck between architecture and engineering in a remarkable synthesis of spatial and structural concepts and the physical laws of construction. In the history of contemporary architecture, this position relates to that of rare innovators like Victor Horta, Frank Lloyd Wright, Auguste Perret or Jean Prouvé. It also links to the premises of the Modern Movement concerning the necessity of symbiosis between form, function and technique. Notable in this respect has been their continuous research into sustainable development with a strong emphasis on integration into the urban or rural environment. Though sometimes spectacular, their work never indulges in gratuitous exhibitionism, courting fashion and notoriety. Rather it cultivates its own sense of harmony through the correctness of its proportions and the logic of its design.

Internet sale: www.fondsmercator.be
In 2004 TENSINET (initially the European Network of Tensile Structures, later re-named the Tensinet Association) completed a project in which its members had engaged for over two years: the formulation of the first design guide for this type of structures, published that same year. The guide immediately became an international reference for the design and engineering of tensioned membrane structures, particularly any involving woven fabric. It contains a full description of the options available in this type of structures, as well as the aspects relevant to both architectural design and structural and service engineering. It is, in short, a complete guide for designers involved in this type of construction.

Shortly after the international association was founded, the establishment of regional chapters was seen to be a desirable corollary. That idea materialized with the creation of the Iberian Section (TensiNet Ibérica), which groups the Tensinet members headquartered in Spain or Portugal, and possibly in the future, in Latin America.

The Iberian Section was instituted at a meeting of its members held at Guimarães, Portugal, in October 2006.

One of the Section’s first tasks was to translate the Tensinet design guide, both as an aid for its present and future members and as a contribution to the construction industry’s expertise. The aim was to furnish more complete information on tensioned membrane technology and tensile architecture in general, making such formally and operationally attractive solutions more readily accessible to designers. The contributions of many Tensinet Ibérica members were instrumental to its publication.

Brian Forster, Marijke Mollaert
China Machine Press
ISBN: 7-111-20143-4
Pages: 292 pages, soft cover
Published: 2010
The focus of the Tensinet Symposium 2010 was the adaptability of structural systems with tensioned surfaces for various service conditions and their ability to impart a new appearance to existing buildings or to enclose them in a common volume.

Internet sale: www.tensinet.com

Die Besonderheiten des mechanischen Verhaltens der beim Bau von Textilen Hüllen verwendeten Werkstoffe werfen allerdings zwingend die Frage nach der "Baubarkeit" auf. Im vorliegenden Buch wird daher der grundsätzliche Einfluss von Fragen der Materialherstellung und Montage auf die Festlegung des bestgeeigneten Bau- oder Tragwerkstypus und dessen Detaillierung im Entwurfs- und Planungsprozess besprochen.


Internet sale: www.ernst-und-sohn.de
Tensile Surface Structures. A Practical Guide to Cable and Membrane Construction

Materials, Design, Assembly and Erection

Michael Seidel
Ernst und Sohn, Berlin
English
ISBN-10: 3-433-02922-9
Pages: 234 pages (hard cover), 368 fig. (196 colored fig.)
Published: 2009

Tensile surface structures are the visual expression of an intensive rethinking of the topic of building envelopes by designers. Advances in design methods, materials, construction elements and assembly and erection planning in the field of lightweight construction are enabling ever more exacting applications of tensile structures with envelope and structural functions, especially in roofing over large clear spans without internal support. However, the particular mechanical characteristics of the materials used in the construction of textile structures demand consideration of the question of ‘buildability’. This book provides answers by discussing the fundamental influence of material manufacture and assembly in deciding the most suitable type of building or structure and its detailing in the design process. The fundamentals of material composition, manufacturing process, patterning and the behaviour of flexible structural systems are all explained here, as well as their use as structural and connection elements, and special attention is given to the erection of wide-span lightweight structures. The erection equipment is described, as well as the lifting and tensioning process and the construction methods used to erect the characteristic types of tensile structures, illustrated with a selection of example projects.

Internet sale: www.ernst-und-sohn.de
Oberammergau in Oberbayern is renowned for its woodcarving, for its trompe-l’oeil painted façades, and for the Passion Play performed every ten years, which attracts hundreds of thousands of tourists. In fulfillment of a vow, Christ’s Passion has been enacted on an open-air stage ever since 1634; the auditorium has been roofed over since 1900. From the 2010 season on there has been a travelling canopy for the open-air stage: a lightweight shell reminiscent of the pavilion roofs of the Olympics stadium in Munich, and a fitting enhancement for the tradition of cultural innovation in the “most famous village in the world”.

The chapter "34t intermittent covering for stage" gives full details of the complex engineering structure of the design developed by Karlheinz Wagner. Michael Seidel presents the travelling canopy in word and by means of sketches, bringing out the aesthetics resulting from engineering expertise.

Other chapters in this richly illustrated work of reference cast light on the dimension of cultural history. The authors present the exciting story of the people of Oberammergau’s craftsmanship in performing and building free from artifice, but full of passion.

Internet sale: www.projektfabrik.at
Edition DETAIL publishes a series of “Construction Manuals” devoted to materials used in architecture, including load-bearing structures, building envelopes and interior fitting-out. So far they have dealt with the main innovative aspects of building technology, such as glazing, interiors, timber, construction materials, roofs, façades, energy, steel, concrete, masonry, refurbishment, components, systems, acoustics, sound insulation and more. Now, it is the turn of polymers and membranes, a new class of modern synthetic materials that are widely used in everyday life and in buildings. These materials can be found in technical applications in seals, insulation, pipes, cables, paints, adhesives, coatings and paving, and more visible uses such as façades and roofs.

To introduce polymers in architecture, a historical overview considers the dream of the polymer house and the development of tensile surface structures and translucent envelopes, including their potential, the challenges they involve and current trends. The basic materials (polymers, fibres, adhesives, coatings and natural fibre-reinforced polymers) are described, together with their production system and processes. Whereas most of the literature deals with these materials separately, here they are all covered in the same volume.

Following this review of basic materials, some semi-finished products are examined. They comprise reinforced and unreinforced polymers, foils, and coated and uncoated textiles. Physical properties of buildings (including thermal insulation, light and heat radiation, moisture, sound and acoustics, fire, soiling behaviour and durability) are explored in detail. The controversial environmental issues are also introduced and the contributions of these materials to ecologically efficient building design are highlighted, despite the obvious disadvantages such as high energy consumption during production, extensive use of fossil fuels and unsatisfactory recycling.

The most educational section of the manual relates load-bearing structures to forms in both tensile membrane and rigid polymer designs, drawing attention to the formation of active or funicular structures with reference to calculations, testing, quality control and industrial safety.

For practitioners, the section “Building with polymers and membranes” is a valuable complement of M. Seidel’s Tensile Surface Structures. A Practical Guide to Cable and Membrane Construction, because it considers building with semi-finished polymer products,
free-form polymers, foils, textile membranes and complex building envelopes, including design solutions for roofs, envelopes and details.
Finally, a selection of examples is presented, including the applications that contribute significantly to appearance and form. Although previously published in the Detail magazine, these examples are now presented together, illustrating aspects of building technology, the influence of polymers in construction and the future of polymers in architecture.

Internet sale:  www.springer.com/birkhauser
La actual monografía de Tectónica plantea un recorrido por la arquitectura textil contemporánea que arranca con el artículo de Javier Tejera, arquitecto especializado en arquitectura tensada, que examina las prestaciones y posibilidades de diseño ofrecidas por los tejidos técnicos en la realización de envolventes arquitectónicas tensadas o neumáticas. La monografía se completa con el análisis constructivo de dos proyectos caracterizados por el empleo de soluciones textiles. La piscina flotante en el río Spree, en Berlín, proyectada por AMP, Susanne Lorenz y Wilk-Salinas Architekten y construida sobre una antigua barcaza, está provista de una cubierta textil desmontable, rigidizada mediante costillas elípticas de madera, que permite cubrir la piscina en invierno. El Campus BBVA en La Moraleja (Alcobendas, Madrid), obra de Luis Enguita, Paloma Lasso de la Vega y Enrique Azpilicueta, es un edificio de fachadas enteramente acristaladas protegidas del soleamiento mediante una envolvente de paneles textiles deslizantes.

Internet sale: www.tectonica.es
Textile architecture has been captivating humanity for many centuries. In recent years and decades, the emergence of innovative materials has created new opportunities to utilize this fascinating material in the fields of architecture, construction, and interiors. Textiles derive their fascination from the special forms these fabric structures make possible and from their unusual character as soft materials. Together with their functional and structural properties, they possess a range of capabilities equally suitable for spectacular and everyday building tasks.

This book deals with technical textiles in three sections: in the first chapter, the material is introduced with its specific properties; the second chapter deals with its uses in the areas of architecture, textile facades, solar protection, and interior design, with special attention to finishing techniques and construction principles. The third chapter illustrates the various fields of application with a selection of 20 international built projects.

Internet sale:  www.springer.com/birkhauser
The proceedings contain the full papers presented at the TensiNet Symposium 2013 in Istanbul. Contributions are clustered around several topics under the general theme [RE]THINKING lightweight structures. Papers on ETFE show that this material is becoming increasingly important for tensioned surface structures. Several papers report on recently built STIMULATING and EYE-CATCHING PROJECTS and are oriented towards architects, designers and decision makers. Papers on ADVANCED CONCEPTS inspire visions for daring applications in the future, while contributions on PNEUMATIC STRUCTURES illustrate how to apply air as a lightweight building material. Papers on [RE]THINKING ANALYSIS & MATERIALS address design methods as well as material characterization and properties. Finally the papers in the field of LIFE CYCLE ASSESSMENT for Membrane Materials and Structures indicate that building with textiles can from the point of view of sustainability compete with more conventional materials. The papers give an up to date report of know-how and examples in the field of tensioned surface structures.

Internet sale: www.tensinet.com
The Design Recommendations for ETFE foil Structures are a product of over 4 years work by TensiNet ETFE Working group. TensiNet is an association or platform for all parties interested in tensioned membrane structures. It is a multi-disciplinary association, conforming to the initial objectives of the EU-funded thematic network (2001-2004). The Design recommendations for ETFE foil structures have been established as a separate Annex of the European Design Guide for Tensile Surface Structures, published by the TensiNet Association in 2004.

Although ETFE is a widely used material, it is still a young material compared to other materials as steel, wood and concrete. A European standard is not available nor is extensive research on mechanical properties. These design recommendations present current knowledge and compare different design concepts. Therewith it is a 'state-of-the-art' report, not intending to be comprehensive. However, as TensiNet is involved in the preparation of a Eurocode on Membrane Structures (CEN/TC250 WG5), these recommendations will be used as input for the Eurocode on Membrane Structures. This Guide recommends safety requirements which need to be considered for the design, calculation, manufacture, installation, maintenance, operation, examination and testing of ETFE foil structures. This can be applied to double- and multi-layer ETFE cushion structures or single layer tensioned ETFE membrane structures. The field of application of this Guide includes all kinds of ETFE covered structures. The content of this Guide brings together the different existing concepts as far as possible.

Internet sale: www.tensinet.com
On the twentieth anniversary of the International Symposium on “Architecture and lightness”, held in Naples in 1993, this book aims to appraise the innovative archetype of structural lightness: membrane tensile structures - a technology that Frei Otto has pioneered since the ‘50s leading to the birth of contemporary textile architecture. Textile architecture is read through the "sign and signs" of the designers: sketches, drawings, graphics and photos that run through the pages of this publication. A rich thread of images and words connects the prologue to the epilogue recording the ideas and achievements within the "visions" of the designers, modelling space with the "bearable lightness" of textiles.

Designers and researchers from different disciplines analyze textile architecture defined as "atopic" by Renato De Fusco - an architectural language that confirms the ideas of Eduardo Vittoria, highlighting how a technology goes beyond its own specificity to represent "... one of the inventive components of design thinking."

Internet sale: www.cleanedizioni.com
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Shell structures for architecture. Form finding and optimization.

Publisher: Routledge
Edited by S. Adriaenssens, Ph. Block, D. Veenendaal & C. Williams
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This collective work uses contributions from the fields of research and practice to present current methods for designing shells and gridshells, including form finding and structural optimization. In addition to presenting the structures, the book also deals with analytical methods, computer algorithms and examples of development of complex surfaces, which have been misnamed “free surfaces”.

In the Prologue, Jörg Schlaich and Shigeru Ban explain that these structures require a symbiosis between architecture and engineering. Part I introduces sheets and membranes, highlighting the relationship between form and structural behaviour. It also outlines how form finding methods and optimization techniques have evolved.
Part II familiarizes the reader with current form finding techniques, i.e. the force density method, thrust network analysis, dynamic relaxation and particle-spring systems. The section ends with a comparison and discussion of the advantages of each one.
Part III deals with optimization methods and Part IV presents the roofs of the Mannheim Garden Pavilion and the courtyard of the British Museum in London, the work of Félix Candela and Heinz Isler, and the reinforced concrete shells of the 21st century.
This book offers a well-structured, critical review of current design practice for tensioned membrane structures, including a detailed analysis of the experimental data required and critical issues relating to the lack of a set of design codes and testing procedures. The technical requirements for biaxial testing equipment are analyzed in detail, and aspects that need to be considered when developing biaxial testing procedures are emphasized. The analysis is supported by the results of a round-robin exercise comparing biaxial testing machines that involved four of the main research laboratories in the field. The biaxial testing devices and procedures presently used in Europe are extensively discussed, and information is provided on the design and implementation of a biaxial testing rig for architectural fabrics at Politecnico di Milano, which represents a benchmark in the field. The significance of the most recent developments in biaxial testing is also explored.
Membranes are increasingly being incorporated into buildings, and understanding the behaviour of the materials used is essential in developing fabric architecture. Fabric Structures in Architecture is an essential text that covers various aspects of how textiles and foils and their properties are used in building construction, with particular focus on tensile structures.

The book begins with an historical overview of the development of membrane structures in architecture. Part One covers their fundamental principles and explores fibres, coatings, foils, and multi-layered tensile architectural structures from their origins to contemporary types. Part Two discusses a range of design considerations, with chapters on lighting, acoustics, and thermal behaviour in architectural fabric structures. In this part, installation and failure modes are presented. Part Three examines the applications of membranes in architecture, presenting a series of unique case-studies from around the world that examine works in North America, Latin America, Europe, China, and Japan.

Fabric Structures in Architecture is a unique and important reference text for textile manufacturers, architects, engineers, postgraduate students, and academic researchers in structural membrane science.

Professor Josep Llorens teaches Architectural Technology at the Barcelona School of Architecture. His research focuses mainly on experimental designs and works, particularly in the field of tensile structures and textile architecture. The results have been presented in international conferences and received global recognition with exhibitions and publications: http://orcid.org/0000-0001-5566-3037
Examines the merits of lightweight materials and membrane structures in terms of design and the environment

This book explains how lightweight materials and structures can be deployed in buildings to meet high environmental and aesthetic standards and emphasizes how the concept of lightness in building technology and design dovetails with the desire to enhance landscape. The first part of the book, on lightweight construction, aims to foster the use of membranes within the specific climatic context and in particular considers how lightweight materials and innovative technologies can enrich the quality of temporary spaces. The second part focuses exclusively on landscape, presenting novel approaches in the search for visual lightness and the quest to improve urban spaces. Particular attention is paid to the Italian experience, where the traditional appreciation of brick and stone has limited the scope for use of lightweight structures and membrane materials, often relegating them to a secondary or inappropriate role. The reader will come to appreciate how this attitude demeans a very advanced productive sector and neglects the ancient tradition of temporary architecture.

Alessandra Zanelli - POLIMI
This textbook is the work of scientists of the Institute of Textile Machinery and High Performance Material Technology (ITM) at the Technische Universität Dresden as well as other experts from research and teaching. Textile materials and semi-finished products have an extremely diverse property potential and are often carriers and drivers for innovative, resource-efficient lightweight construction and high-tech applications.

In this book, experts on textile technologies convey both general and specific information on various aspects of textile engineering, ready-made technologies, and textile chemistry. They describe the entire process chain from fiber materials to various yarn constructions, 2D and 3D textile constructions, preforming, and interface layer design. In addition, the authors introduce testing methods, modeling and simulation techniques for the characterization and structural mechanics calculations of anisotropic, pliable high-performance textiles, including specific examples from the fields of fiber-reinforced polymers, textile-reinforced concrete and textile membranes.

Readers will also be familiarized with the potential offered by increasingly employed textile structures, for instance in the fields of composite technology, construction technology, security technology and membrane technology.