

REPORT

STRUCTURAL MEMBRANES 2023

PROJECTS

Three umbrellas

The 'Visit Mallorca Estadi' Stadium

Lili Pavilion

ARTICLE

Numerical wind simulation



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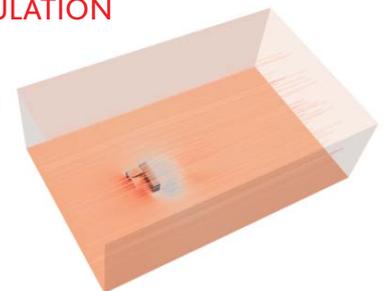


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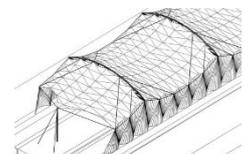
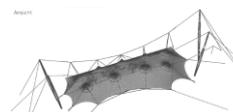
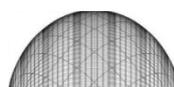
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SURVEY WE NEED YOUR FEEDBACK

TensinetnewsINFO

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Edito

Dear Reader

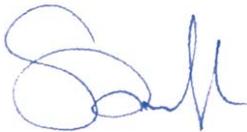
While writing these words, many of us meet in Frankfurt/Main or Berlin at *Techtextil* or *Textile Roofs*. We all gain very much of our regular meetings during these events, where we can exchange with partners, as well as with competitors.

There will be more opportunities like this during summer and autumn, in Zurich, Dessau, Essen as well as in Buenos Aires.

This *TensiNews* is again full of interesting contributions. As usual, we find the excellent summary of *Structural Membranes in Valencia* prepared by Josep Llorens. The results of a PhD thesis on the global warming of membrane structures are presented, a contribution about *Tensile Architecture in the today's design environment*, and how CFD is implemented in recent software packages. You find also many interesting projects, such as a series of umbrellas in Luxembourg, a stadium in Mallorca and a temporary structure for seasonal use in public places.

In order to focus our future activities best to the needs of our members, we have prepared a survey. We would be glad if many of you take the time to answer the questions, so that we get a broad feedback from you.

Please enjoy this issue of *TensiNews*. I hope to meet you soon in one of the upcoming events, or in one of our working groups.



Yours sincerely,
Bernd Stimpfle

Working towards better marketing.

In the coming year, the TensiNet Association intends to make efforts to improve communication and information exchange with its members and a wider audience interested in tensile architecture. Among other things, short texts on tensile architecture will be mentioned more regularly on LinkedIn and uploaded to the News/Inspiring section of www.tensinet.com.

The database is an important tool for the exchange of information. TensiNet members are invited to upload new projects (login first).

There is a survey on the back cover. Fill it in and send it to info@tensinet.com. In this way, the Tensinet Association can better respond to the wishes and comments of its members!

Forthcoming Events

Techtextil and Texprocess 2024

| 23-26/04/2024 | Frankfurt, Germany |

<https://techtextil.messefrankfurt.com>

Textile Roofs Workshop 2024 |

28-30/04/2024 | Berlin, Germany |

<https://www.textile-roofs.com/>

IASS 2024 Redefining the Art of Structural Design |

26-30/08/2024 | ETH Zürich,

Switzerland | www.iass2024.org

6 Essener Membranbau Symposium 2024

| 20/09/2024 | University of Duisburg-Essen,

Germany | www.uni-due.de/iml

IMS BAUHAUS® Symposium 2024

| 27-29/09/2024 | Anhalt University of Applied

Sciences in Dessau-Rosslau, Germany |

<https://www.ims-institute.org/symposium/>

VIII Latin American Tensile structure

Symposium | 14-16/10/2024 | Buenos Aires,

Argentina | <https://www.latensored.org/>

TensiNet General Assembly 2024

The General Assembly will take place on

Tuesday 30th April from 08.00 till 09.00.

It will be organised at the AMERON Hotel Abion Spreebogen Berlin, located in front of the pier where Textile Roofs 2024 on the Seminarship Berlin boat "ORCA ten BROKE" will be held.

TensiNet Symposium 2026

Shaping the pathway to future –
tensioned membrane design

The 8th TensiNet symposium 2026 will be hosted by the **Institute for Metal and Lightweight Structures, University of Duisburg Essen, campus Essen.**

Initiators are Natalie Stränghoner and Jörg Uhlemann, supported by their team and TensiNet.

The main topics are
Design, Modelling and simulation of structural membranes;

Materials and executions;

Sustainability and building physics.

A final date is not yet fixed but it will probably go ahead mid-September 2026!

STRUCTURAL MEMBRANES 2023

XI International Conference on Textile Composites and Inflatable Structures

The "Eleventh International Conference on Textile Composites and Inflatable Structures" was held in October 2023 at the Universitat Politècnica de València, organized by the International Centre for Numerical Methods in Engineering (CIMNE) and was chaired by C. Lázaro (UPV), R. Rossi (CIMNE/UPC), and R. Wüchner (TUB). It was the eleventh of a series of symposiums that originated in Barcelona in 2003. <https://structuralmembranes2023.cimne.com/>

PLENARY LECTURES

In the first plenary session Girma Bitsuamlak, from the WindEEE Research Facility, delved into the difficulties of estimating wind action. He mentioned the influence of the local climate, terrain, aerodynamic effects, surroundings, orientation and building porosity. He showed the capabilities of the WindEEE Research Centre which has a specialized suite of infrastructure to carry out experimentation in areas of wind engineering, energy and environment. He highlighted the full scale testing of solar panels (Fig. 2), the use of aero elastic models and the smoke (for flow visualization). Some other applications presented were the CN Tower, Toronto, the Burj Khalifa, Dubai and the Confederation Bridge, Canada.

Professor Kai-Uwe Bletzinger, from the Technical University of Munich, dedicated his talk to "50 Years of form finding by the force density method", which he described as an ingenious invention of great methodological impact. The experience of the German Pavilion in Montreal (8.000m², 1967) allowed to launch the idea of the 1972 Munich Olympic Games cable net roof (74.000m²) that went much further. A team had to be set up consisting of Schlaich, Otto, Leonhardt, Argyris, Isler, Behnisch, with Klaus Linkwitz and Hans-Jörg Schek, the inventors of the force density

method. It was a revolutionary new computer-aided technique for determining the shape of pre-stressed spatial cable nets that is today a well-established method for form finding. Advances in theory were also commented together with the resulting practical benefits and the implementation of generalized linear and nonlinear versions considering consistent extensions for the 2D stress state, the shape finding of textile membranes, lattice shells or hybrid structures in tension and compression.

Carol Monticelli, from the Politecnico di Milano, was concerned with "Thinking to close the loop in membrane architecture". She stated that designing for longevity ensures the long-term durability, utilization and value of assets. Durable materials and robust construction standards can reduce maintenance costs and extend the economic viability of a building or structure. On the other hand, thinking about circularity in the built environment means to ensure maximum end-of-life material reuse or recycling by separation of components, especially if the life span is short, as happened for the textile temporary architectures. And the use of repurposed materials, components and structures supports their circulation within the industry and minimizes the need for virgin materials. Keeping resources in cycles and waste as material

At the three-day conference, 6 plenary lectures and 66 presentations were given to 110 participants from 20 countries (Fig. 1). The programme was completed with the welcome reception, banquet dinner, historical site visit and technical visit.

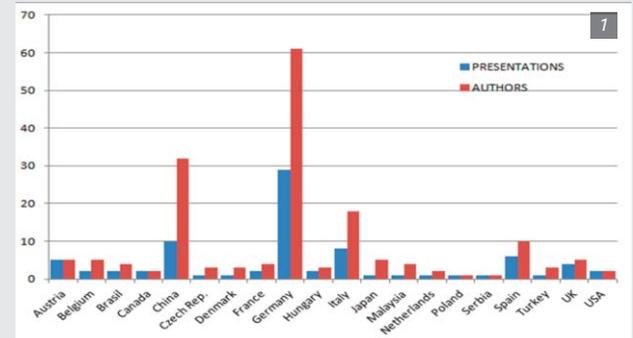


Figure 1: Presentations and authors by country.

bank, create new uses for materials together with considering recoverable materials as a resource. She also pointed out that there are temporary functions that require temporary constructions that have to be designed for disassembly with reusable materials. They need more attention to materials, because their impact is distributed in a short time, and in return, more attention has to be paid to the operational phase because of the environmental costs. Regarding their end of life, composite materials create an additional obstacle to circular processes. She outlined some cases and examples such as the ETFE recycling chain, that is active, the PTFE coated fiberglass, that lasts 50 years but is not reusable because the fibers break. Other examples of waste were the Cycle Bowl Pavilion (Expo 2000, Hanover, Fig. 3), that went to landfill. On the list of best practices are the circus tents (Fig. 4) re-used at each site and the Kengo Kuma Modern Tea House (Fig. 5) that has been demounted and re-used. Other possibility is the return of the product to the manufacturer to disassemble and re-manufacture it. Or the material could be considered rental equipment which the customer and the manufacturer share ownership.

Figure 2: Solar panels full scale wind test. / Figure 3: Cycle Bowl Pavilion, Expo Hanover 2000. / Figure 4: The circus tent is constantly being set up and dismantled. / Figure 5: Kengo Kuma, 2007: Modern Tea House.

