

STRUCTURAL VISIONS

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RESEARCHES

An (Im)possible Interview with Sergio Musmeci, a Visionary

Tullia Iori

Sergio Musmeci passed away on March 5, 1981, at the age of 55. Eight months earlier, a CT scan had diagnosed a brain tumor, leaving no hope on the prognosis. In that short, uncertain and distressing time, Musmeci, aided by Bruno Zevi as well as his family members, planned a book, titled *Sergio Musmeci: Structures and Architecture*. For this book, he wrote an essay and gave a long interview, which were to accompany pictures of the projects and their descriptions. Musmeci's words, more than 40 years after his death, are surprising in their ability to capture the contemporary and predict the future of the world of structures.

This new impossibile interview has been reworked from his "testament interview" that has remained unpublished until now, mixed with another interview conducted in 1977, the audio of which is preserved.

The literary genre of the "posthumous interview" was a passion of Sergio Poretti, to whom this issue is dedicated.

From a Mistreated Myth to a Joyful Parody. Criticism and Apology of Eero Saarinen's TWA Flight Center (1956-2022)

Gabriele Neri

This essay traces the history of Eero Saarinen's TWA Flight Center, from its conception to the recent transformation into a "TWA Hotel." Such a diachronic perspective sheds light on the outstanding features of the reinforced concrete structure of the terminal, as well as on the functional, symbolic and historiographic evolution of the building. Its reception has been, in fact, controversial: on the one hand, it was an extraordinary media event; on the other, the building became the target of many architectural critics worldwide (Reyner Banham, Alan Colquhoun, Vincent Scully, Manfredo Tafuri, Nikolaus Pevsner, Pier Luigi Nervi, etc.), while the precocious inadequacy of the terminal brought close to its demolition. Thanks to a multiplicity of references and meanings, both conscious and accidental, Saarinen's work also anticipated some trends of the architectural scene of the late 20th century. Finally, the designation of the building as city landmark and its following transformation into a hotel, show a semantic evolution which denotes our current idea of architecture and infrastructure. Born as a mistreated myth, the former TWA Flight Center is now a joyful parody of itself.

The Sail Plant for the Sydney Opera House

Paolo Stracchi, Luciano Cardellicchio, Paolo Tombesi

The history of the design decisions directly related to the construction of the Sydney Opera House remains

largely anecdotal. A rich group of items recently discovered in Australia may now start filling this gap, as documents brought to light include the drawings issued by the general contractor to build the concrete formwork for the shells, drawings of the temporary structures and falsework, site images, and contractor's notes. All in all, the drawings display sophisticated combinatory solutions for attaining the structural form required whilst introducing repetition and flexibility in the making of the discrete pieces. While suggesting a remarkable combination of manufacturing and structural shrewdness, these blueprints call into question the canonical history of the building roof's famous "sails" and the rhetoric of the "spherical solution" used to arrive at them.

Between Utopia and Futurism. Italian Visions Abroad in the Second Half of the 20th Century

Gianluca Capurso, Francesca Martire

The essay is dedicated to the most beautiful structural visions of some Italian designers abroad in the second half of the 20th century. Impossible projects drawn up in these years by Riccardo Morandi, Silvano Zorzi and Sergio Musmeci are analysed. Also examined are the projects of several Italian architects who, at the same time, tried to export an artistic version of the "Italian Style" structure, such as Paolo Soleri, Vittorio Giorgini and Dante Bini, who often attracted curiosity and critical interest in Europe and the United States, and were more successful there than the engineers.

The activities of these designers are set in the broader framework of the history of Italian structural engineering, as reconstructed from 2012 to the present day by SIXXI research (www.sixxi.eu). The analysis was conducted as part of the studies carried out by the authors on the characteristics of Italian engineering abroad in the second half of the 20th century.

Building Characteristics, Formalisms and Compositional Implications of Binishell

Alberto Bologna, Alberto Pugnale

This essay reflects on a very characteristic chapter in the design culture and construction history of the past century, which was written by Dante Bini starting from the 60s through the invention of the Binishell patent and its application for conceiving and building thin concrete domes.

Dante Bini is the inventor of an original construction method that allows erecting concrete shells through a pneumatic membrane by placing reinforcing rods and pouring concrete on the ground, on a flat surface. The membrane inflation process gives the shape of a dome to the concrete and its reinforcement. The final structure is then compacted by means of surface vibrators, insulation and waterproofing are added; finally, the surface is finished and smoothed.

Since the early experiments and prototypes built around Bologna, Italy, in 1964, the Binishell system has been used to erect more than 1,600 buildings in more than 20 different countries, including Italy and Australia.

Although the design possibilities of a single Binishell are somewhat limited by the construction method, the formal solutions increase dramatically as more shells are added to articulate a larger building. In pure composition terms, there are essentially four parameters that affect the design and geometric configuration of a Binishell project. First, the size of the dome. Second, its connection to the ground. Third, the type and number of cuts made on the structure to generate openings, doors and windows of different size and shape. Fourth, the modular use of the Binishell system to create geometric intersections and repetitions of shells.

The essay discusses a number of exemplary projects realised through the Binishell system, including the famous villa that Dante Bini designed and built for Michelangelo Antonioni and Monica Vitti in Costa Paradiso di Gallura, in Sardinia, which Rem Koolhaas defined as: "one of the best architectures of the last hundred years."

Shapes of Air and Plaster: How Heinz Isler Developed His Extraordinary Thin Shells

Giulia Boller

In September 1959, at the founding conference of the International Association for Shell Structures in Madrid, a 33-year-old Swiss engineer presented an innovative method for the conceptual design of shells based on the use of small-scale physical models. His name was Heinz Isler (1926-2009). He would have spent his entire career refining such an extraordinary vision, with the help of his experimental technique.

The article looks at Isler's experimental approach to shell design by focusing on the multiple models that were fabricated in his office. The physical models enabled Isler to control architectural as well as structural features while obtaining "elegant forms" with minimal use of material. In particular, his two most famous form-finding approaches are explored in the text: the pneumatic membrane method and the hanging membrane method. Through them, he opened up endless possibilities of shape by controlling the relation between form and forces at a time when digital tools were not available. His unconventional structures in reinforced concrete still represent an important source of inspiration for today's structural engineers.

Building Process and Homothetic Function: Smithson's Projects for the Dallas Fort Worth Regional Airport

Anna Rosellini

The essay investigates, from archival documents, the role of grandiose engineering infrastructures, and

their aerial and satellite visions, in those works by Robert Smithson that aim to conquer a planetary scale and become devices capable of documenting all the mineral components of a fantastic "Crystal Land" of a geological epoch marked by a fundamental change in the relationship between human beings and the Earth system. Particular attention is given to Smithson's collaboration with the professional firm of Engineers and Architects of New York, consisting of Ernest F. Tippetts, Robert W. Abbett, Gerald T. McCarthy and James H. Stratton, for the construction of the Dallas Fort Worth Regional Airport. It is this collaboration that allows Smithson to experiment with the application of geometric criteria, homothetic function, and investigations of geology and prehistoric catastrophes to the study of a complex engineering infrastructure, understood as a "man-made geological network." The designs for the various works (imagined in collaboration with Andre, Morris, LeWitt and coordinated by Smithson) and the crystallized geometry that Smithson proposes for the Dallas Fort Worth Regional Airport, find a logical justification in its theoretical construction in the contemporary spatial investigations conducted in the United States thanks to the Secor satellite of the Cubic Corporation of San Diego. It is these satellite visions that allow Smithson to interpret an infrastructure, such as the airport, as an "Artificial Universe," to be observed at the spatial and planetary scales.

Additive and Digital Building: the Future of Architecture and Engineering?

Gianluca Capurso, Giulio Paparella

In recent years, digitally-assisted construction has attracted research from universities, public and private institutions and multinational companies. After revolutionising the world of design, computerisation is preparing to transform, in a radical way, the construction site itself.

This is not an entirely new phenomenon: it has its roots in the process of mechanisation and automation of construction sites that affected Western Europe and the most technologically advanced countries in the second half of the 20th century. It is now nourished by the contribution of digitalisation spreading across all industrial sectors and, slowly, in the construction sector.

Numerical control machines – milling machines, drilling machines, lathes, and laser cutting equipment, successfully introduced in workshops – can now be considered consolidated in the production of building components. Therefore, considerable curiosity is today aroused by three-dimensional additive printing techniques and those connected with using robots on construction sites. If file-to-factory processes are a reality, is the time ripe for file-to-construction?