HEINZ ISLER – 50 YEARS OF "NEW SHAPES FOR SHELLS": PREFACE

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Guest Editors

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1. INTRODUCTION

The Swiss engineer Heinz Isler is considered to be the last of the great shell builders of the 20th century. He is set apart by the fact that his shells were constructed over a period spanning more than 50 years, from the first in 1954, to the last four constructed under licence by Willi Bösiger AG and completed in 2008/9. Although most were built in his native Switzerland, there are also examples in southern Germany, France, the United Kingdom and even in Saudi Arabia. He is best known for his innovative form-finding methods – by expansion, inflation and hanging of thin membranes – which resulted in shells such as the Wyss Garden Centre, Solothurn (1962); COOP Warehouse Wangen bei Olten (1960) and Deitingen Süd Service Station (1968), respectively, and led to him being acclaimed by David Billington as a structural artist.

This special issue of the *Journal of the IASS* marks (slightly belatedly) the 50th anniversary of Heinz Isler's presentation of his paper "New Shapes for Shells" [1] at the first Congress of the, then, International Association for Shell Structures, held in Madrid from the 16th to 20th September 1959, at which he first introduced his methods to the IASS.

2. ISLER AND THE IASS

At the time of his death, 20th June 2009, Heinz Isler was one of the last surviving participants in the first Congress of IASS. From that auspicious beginning he went on to become an Honorary Member (1994) and member of the Advisory Board, following many years as an active member of the IASS Executive Council. He received the Torroja Medal (1996) and a Tsuboi Award (1993). Keen to encourage the study of form-finding, he strongly supported the establishment of the new Structural Morphology Group (SMG), IASS Working Group 15. He attended its first meeting in a bar in Copenhagen during the symposium organized by Ib Mogensen and Ture Wester in 1991 and was one of two keynote speakers at the third SMG colloquium (SMG3) held in Nottingham in 1997.

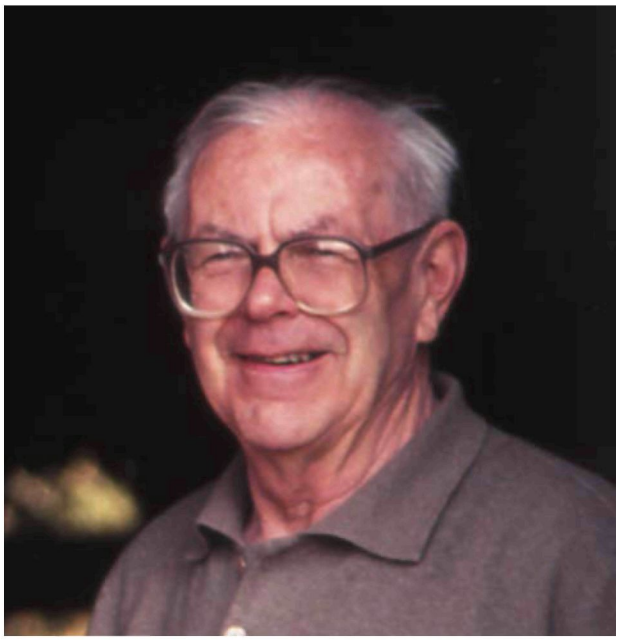

Figure 1: *Heinz Isler, 26th July 1926 – 20th June 2009 at his office in Lyssachschachen in 2003 (Photo: John Chilton)*

3. OVERVIEW OF THIS SPECIAL ISSUE

From the outset, Heinz Isler had a profound influence on the IASS, its members and the perception of reinforced concrete shell design internationally, as a result of his landmark paper "New Shapes for Shells" [1] presented in 1959 to a distinguished audience that included Eduardo

Torroja, Ove Arup and Nicolas Esquillan. That influence continued throughout his career as he brought new inspiring concepts and realised projects to the attention of IASS members through journal papers and symposium presentations, including an extensive paper delivered at the 20th anniversary of the IASS in Madrid in 1979 entitled "New shapes for shells – Twenty years after" [2]. As evidence of his continuing technical and aesthetic influence on the Association over the years, photos of Isler shells adorned the cover of multiple issues of the *Bulletin of the IASS* (the earlier name of this journal until 1996).

Fifty years on, this special issue takes a retrospective view of the impact of "New Shapes for Shells" and Heinz Isler's opus that followed from it. And once again, the cover photo is of an Isler shell, the Wyss Garden Centre.

The papers are arranged in a sequence which flows from placing Isler's work in the context of Swiss structural design, through a discussion of his form-finding processes, his long-term collaborations with architect Michael Balz and the contractor Willi Bösiger AG who built most of his shells, a case study of two lesser known projects, a critical review of his work as architecture, and culminating with an assessment of how his works and methods sit in the context of contemporary "non-standard" free-form architecture.

David Billington's paper integrates a very personal description of his long-standing professional association and friendship with Heinz and Maria Isler over nearly fifty years with a discussion of Isler's challenge to educators to encourage engineering students to consider elegance alongside economy and practicality in their designs. It leads us from his first exposure to Isler's shells and form-finding philosophy during a lecture he attended in the Netherlands in 1961, via his reacquaintance with Isler and his shells, in 1978, to the Princeton University exhibition *The Art of Structural Design: A Swiss Legacy*, in 2003, which David Billington curated, and which included the work of Heinz Isler alongside Robert Maillart, Christian Menn and Pierre Lardy [3].

Together with Eberhard Schunk, Ekkehard Ramm was instrumental in bringing Heinz Isler's work to a wider audience though the travelling exhibition they curated in 1986 [4]. His fascination for computational analysis of structures would appear to be in conflict with Heinz Isler's well-documented aversion to the use of computers in form-finding and design. Yet, Ekkehard Ramm describes here Isler's physical form-finding techniques presented in his 1959 paper [1] and subsequently reviewed retrospectively at the IASS Symposium in 1979 [2]. He recounts how, over many years he debated with Heinz Isler the arguments for and against computer versus physical modelling as a means of form-finding for efficient and elegant reinforced concrete shells – the last discussions being together with John Chilton at the Isler office, in August 2003.

Aspects of the architect/engineer relationship are revealed by Michael Balz, who collaborated closely with Heinz Isler from 1967, when they developed "bubble" forms as shells to live in. Although the total number of shells built by them as a design team is relatively small, those shells represent a significant proportion of Isler's non-standard forms. They embrace the complex of shells at Stetten, near Stuttgart, predominantly derived from inverted hanging membranes. Also included is Michael Balz's own house, constructed in 1980 on the same site, and based on inflated forms related to their joint explorations of 1967. Their collaboration resulted in one of the most elegant shells, that of the Naturtheatre, Grötzingen, which benefits from the inclined site and from being completely open.

Realisation techniques for Isler shells are reported by Heinz Bösiger, who together with his brother Max – in the construction company Willi Bösiger AG, Langenthal, established by their father – was responsible for building the majority of Isler's shells from their very first, constructed for Glas Trösch in 1955. He explains the "gentleman's agreement" between contractor and engineer which allowed them to develop practical, efficient and economical methods for the construction of "bubble," expansion and free-form shells until completion of the last contract at Pfäffikon near Zürich in 2008/9.

John Chilton's paper examines two of Isler's lesser known projects, both churches. The first at Lommiswil, constructed in 1967, is, unusually for Isler, based on a hyperbolic paraboloid, a form more generally associated with Félix Candela (1910-1997) [5]. Here, Isler shared the credit for conceptual and architectural design with the architect Roland Hanselmann, whilst taking full

responsibility for the structural engineering. His experience with the "Steinkirche" Cazis was completely different, being asked to realise non-symmetrical spheroidal forms dictated by the architect, Werner Schmidt, and based on the shape of objects found in nature. The paper explains how Isler applied his form-finding and analytical techniques in these very different situations.

The contribution by Toni Kotnik and Joseph Schwarz looks at the Isler legacy from an architectural theory perspective. Although accepting Isler's shells as structures with high aesthetic quality, they suggest that Isler was locked into his physical form-finding methods, and that this inhibited his work when viewed holistically in the context of 20th century architecture.

The final paper by Harald Kloft places Heinz Isler's shells and his understanding of structural design and aesthetics based on the interaction of material, structure and form, in relation to contemporary "non-standard" free-form architecture where apparently no "logic of form" exists, at least in the engineering sense. He concludes that now is the opportune time to look at Heinz Isler's work anew.

As these papers show, there is much to be learned by contemporary architects and engineers from Isler's intuitive and precise design processes. As testified by the diverse range of topics and viewpoints represented in the seven papers included here, the impact and appreciation of Heinz Isler's work continues to inspire and appears to be growing rather than diminishing.

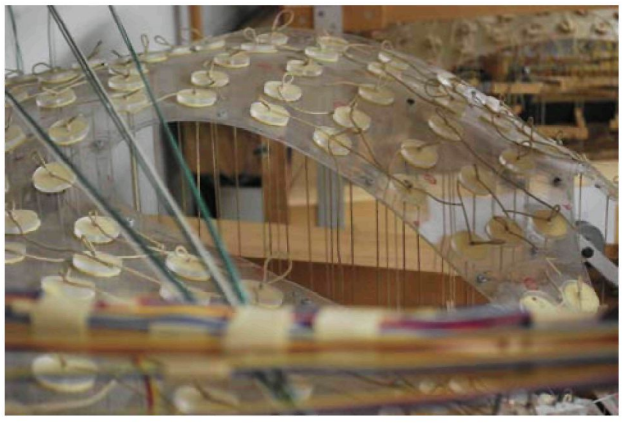

Figure 2: *Detail of experimental model for design of the shell at Sicli, Geneva – Isler office, 2011 (Photo: John Chilton)*

Figure 3: *Archived drawings at the Isler office in Lyssachschachen, 2011 (Photo: John Chilton)*

4. POSTSCRIPT

During 2011, two of the contributors to this issue, Toni Kotnik and Joseph Schwarz, together with their colleague Duks Koschitz, are in the process of organizing and moving the contents of the Isler office in Lyssachschachen, near Burgdorf, to an Isler archive being established at ETH Zürich.

For the many of us who were privileged to visit the Lyssachschachen site and to share the always generous hospitality of Heinz and Maria, the milieu of the Isler property had a remarkable appeal that helped us understand the genius and character of the man[1]. There was a stark contrast between the Swiss precision evident in the basement laboratory (Figure 2) and the exterior of the complex where Isler's love of nature led him to allow it to gradually reassert control. We remember the pond that was allowed to form naturally on the (watertight concrete) roof of the building with its plant and animal life. We recall the outdoor microconcrete models (that will probably be impossible to archive) withstanding the tests of and rigors of the weather and of growing moss and lichen. The model railroad that ran from inside to the outer grounds reminded us of Isler's playfulness also evident in his joyful discovery of forms in concrete, fabric, membranes and ice.

Therefore, it is with considerable regret that the office and laboratory could not be preserved as a

[1] Several authors have written about the experience of visiting the Isler home and laboratory as part of their scholarship on Isler's contributions and inventiveness, e.g., see [3], [4] and [6].

museum or working research center for innovative shell and spatial structure design. This would have allowed Isler's form-finding and analytical models (many of which could be considered to be works of art as well as functional objects) to be displayed within the unique environment in which they were lovingly created by Isler and his team.

Nevertheless, we are fortunate that a substantial portion of the Isler documents and artifacts will be rescued from the deterioration which already started to occur (Figure 3). Once transferred, the archive of models and paper files will, no doubt, supply a plentiful source of inspiration for generations of researchers to come. It is the hope of the editors and authors that this special issue devoted to the accomplishments of Heinz Isler will serve not only to honor his memory but also to help stimulate such further research.

ACKNOWLEDGEMENTS

This issue was timed to coincide with a session on Isler at the joint IABSE-IASS Symposium 2011 held in London, September 20-23. Indeed, some of the papers in this issue are versions of the papers presented at that session and are included in the proceedings of the symposium [7]. In most cases, the papers here are extensions of those in the proceedings, and some of the contributions to this issue do not appear in the London proceedings. The editors are grateful for the coordination with the Scientific Committee of the symposium and for permission for the simultaneous publication of the similar manuscripts.

The assembly and editing of this issue as well as the organization of the Isler session of the London symposium constitute activities of IASS Working Group 5: Concrete Shell Roofs, chaired by J. F. Abel. Several of the authors and contributors are members of that Working Group.

REFERENCES

[1] ***Isler, H.,*** New shapes for shells, *Bulletin of the International Association for Shell Structures*, n. 8, 1961, pp. 123-130.

[2] ***Isler, H.,*** New shapes for shells – Twenty years after, *Bulletin of the International Association for Shell and Spatial Structures*, Vol. 20, No. 3 and Vol. 21, No. 1, n. 71-72, December 1979-April 1980, pp. 9-26.

[3] ***Billington, D.P.,*** *The Art of Structural Design: A Swiss Legacy*, with contributions by DOIG. J. and others, Princeton University Art Museum/Yale University Press, 2003, pp. 112-162.

[4] ***Ramm, E. and Schunk, E.,*** *Heinz Isler Schalen,* Karl Krämer Verlag, Stuttgart, 1986, reprinted by vdf Hochschulverlag AG, Zürich, 2002.

[5] ***Abel, J.F. and Oliva, J.G. (eds.)***, Special Issue for the Centenary of the Birth of Félix Candela, *Journal of the International Association for Shell and Spatial Structures*, Vol. 51, No. 1, n. 163, March 2010.

[6] ***Chilton, J.C.,*** *Heinz Isler – The Engineer's Contribution to Contemporary Architecture*, Thomas Telford Publ., London, 2000.

[7] ***Nethercot, D. and Pellegrino, S. (eds.)***, *"Taller, Longer, Lighter," Proceedings of the IABSE-IASS Symposium 2011*, London, on CD.