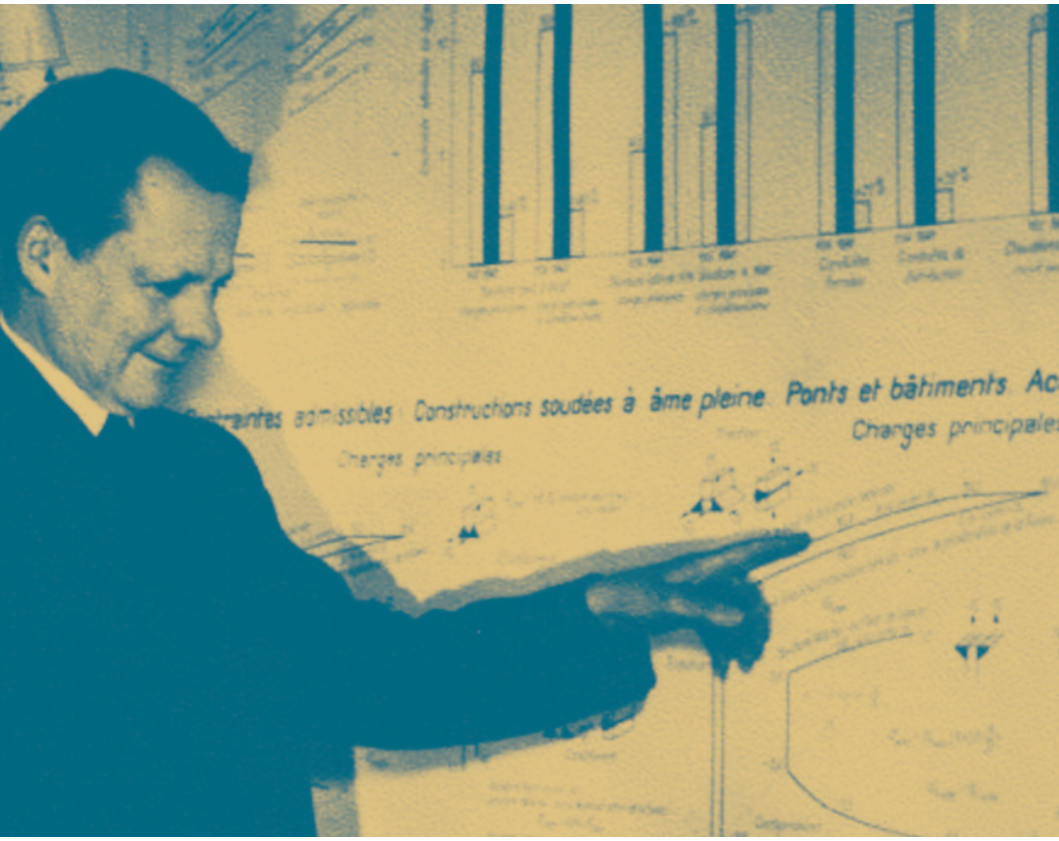


Mirko-Roš-Award 2005

Mirko-Roš-Award 2005

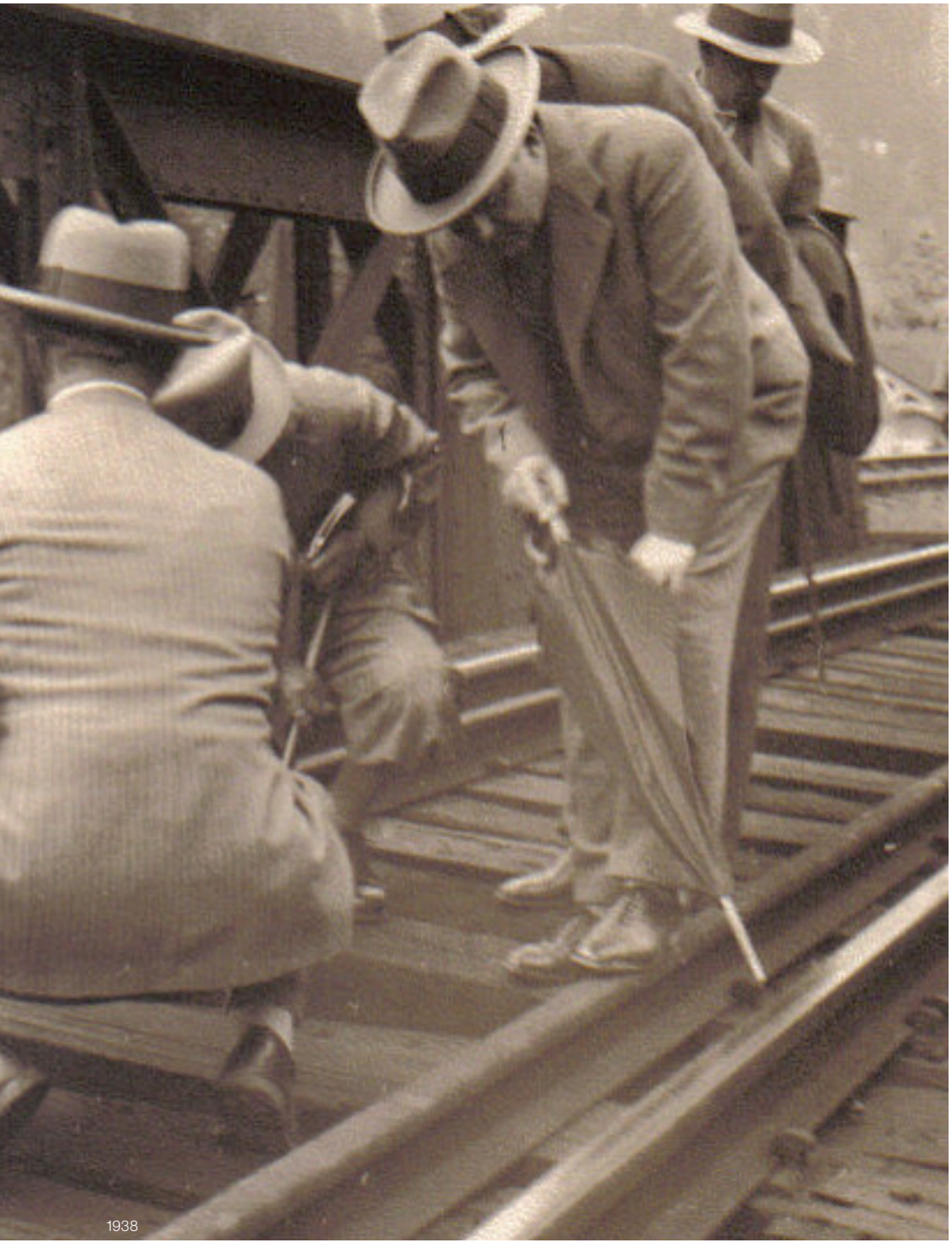
Special thank-you to Empa's friends

The people at Empa are totally committed to sustainable solutions to improve safety and quality of life. The institute's friendly and fruitful partnerships with eminent researchers and engineers, which stretch back over many years, often decades, through good times and bad, have yielded first-rate achievements in the field of materials and engineering science. The ground-breaking work undertaken by gifted undergraduate and doctoral students has likewise made a highly prized contribution to Empa's success.

Empa has long harboured the wish to pay tribute to these individuals and duly recognize their accomplishments. The institute's 125th anniversary celebrations thus present a fitting occasion for the first official expression of its gratitude. The golden Mirko Roš medal serves to honour the life's work of Empa's long-standing friends and partners in the field of materials and engineering science. The silver metal is awarded in recognition of top-class diploma and doctoral theses written at Empa.

The Mirko Roš Award is named in commemoration of Empa's Director and Executive Board President between 1924 and 1949, who placed his stamp on the institute like no-one else in its 125-year history. From the outset, the idea of a medal struck a very positive chord with Ms Cornelia Bodmer-Roš, granddaughter of Mirko Roš and representative of the Roš families.

The medal was designed by world-famous artist Hans Erni. His close ties with Empa date from the research carried out in connection with the restoration of his Landibild painting. When asked by the Bodmer-Roš families to design the Mirko Roš medal, Hans Erni enthusiastically agreed.



1938

Mirko Gottfried Roš

*20 September 1879 Zagreb (Croatia),
+29 May 1962 Baden (Switzerland)

Mirko Roš spent his youth in Belgrade, where his father Sebastian Roš worked as planning officer on bridge and railway schemes. In 1906, he obtained a civil engineering degree with distinction at the Royal College of Technology in Hanover, having majored in bridge engineering. In 1906 and 1907, he proceeded to gain his first practical experience as a bridge engineer working on the Gotthard Railway in Switzerland, the country which from 1914 was to become his adopted home. It was during this time that he first met Adèle Theiler from Lucerne, whom he married in April 1909. They had one child, son Mirko Robin.

In 1910, Mirko Roš was appointed Chief Engineer at AG Conrad Zschokke in Döttingen (Canton of Aargau). During most of his 14 years with this company, he worked on steel buildings and bridges, weirs and reinforced-concrete structures, becoming Senior Engineer at the Design Office of the United Workshops at Nidau-Döttingen and, in 1912, Technical and Commercial Director at the AG Conrad Zschokke Workshops in Döttingen.

His 16 years' experience as structural and steel engineer laid the foundations for an academic career which started in 1923 with a lectureship in selected areas of structural steelwork at the ETH (Swiss Federal Institute of Technology) in Zurich. His appointment as Professor followed later that year. Also in 1923, the Yugoslavian government in Belgrade elected him Professor of Structural Steelwork at the Royal College of Technology in Zagreb. However, the defining moment that was to shape his later career came on 1 April 1924 with his appointment by the Swiss Federal Council as Director of the then "Eidgenössische Materialprüfungsanstalt" (Swiss Federal Laboratories for Materials Testing) at ETH Zurich and as Professor for Materials Science and Testing at ETH.

This marked Mirko Roš's entry into a field tailor-made for his abilities, in which – through prolific activity over more than 25 years – he was to become an established authority among his technical and scientific peers both in Switzerland and in many other European and overseas countries.

Under the stewardship of Mirko Roš, the institute experienced an unprecedented surge in contracts from all sectors of industry, construction, trade and commerce as well as from public bodies to investigate a wide array of materials. This enabled him to finance his pioneering research programmes. From 1937 onwards, Mirko Roš acted as President of the Executive Board of the freshly renamed "Eidgenössische Materialprüfungs- und Versuchsanstalt für Industrie, Bauwesen und Gewerbe" (Swiss Federal Laboratories for Materials Testing and Experimentation for Industry, Construction and Commerce, abbreviated to Empa) and, simultaneously, as Director of the Main Department for the Construction and Mechanical Engineering Sectors, with its principal seat at ETH Zurich. Mirko Roš played a pivotal role in the development of experimental materials research and, overall, in the advancement of technical mechanics and materials research based on construction statics and strength theory. Under his influence, materials research in Switzerland assumed its own distinct profile: it is closely geared to industrial and commercial practice and the direct application of both experimental findings and theoretical advances. The systematic experiment is designed to emulate real-life conditions – though without being an outright imitation – in order to achieve a synthesis between theory and practice. As Mirko Roš saw it, the purpose of materials research and development was to help replace more primitive, massive constructions by more durable, better-quality and more economical lightweight design solutions. The efficiency gains were intended to boost the whole economy and not just individual companies. Mirko Roš was a close friend of Robert Maillart, the world-famous bridge engineer. In all likelihood, many of Maillart's elegant, heavily constructed bridges would not have been feasible without the know-how of Mirko Roš.

Mirko Roš, an engineer of exceptional standing, earned countless accolades, including 11 honorary doctorates from across Europe. He stepped down as Empa's Executive Board President and Ordinary Professor at the ETH Zurich in 1949 to enter retirement.

1938

The following were presented with the Mirko Roš Award on the occasion of Empa's 125th anniversary:

gold medal	**Alfred Rösli** Prof. Dr
gold medal	**Christian Menn** Prof. Dr Dr h.c.
gold medal	**Aftab Mufti** Prof. Dr
silver medal	**Doris Spori** Dipl. Werkstoff-Ing. ETH

Alfred Rösli Prof. Dr

gold medal

The summer of 1960 was doubtless one of busiest times in Alfred Rösli's fascinating career: the new Empa facility at Dübendorf, the Swiss Confederation's largest civil scheme in the post-war years, was on site and demanded his full attention as officer responsible for the large testing hall complex. As chance would have it, this coincided with the "donation" to the institute of a then state-of-the-art road bridge. In 1960, a rigid frame prestressed-concrete bridge with V-shaped legs, built across the River Glatt in 1954 as part of a new link between Opfikon's old village quarter and the new schoolhouse, had to be replaced by a higher-level, longer-span bridge needed for the airport motorway scheme. Prior to demolition, the bridge was presented to Empa for experimental purposes by the Canton of Zurich. Rösli seized this unique opportunity "to investigate, by means of comprehensive and rigorous tests, the actual behaviour and performance measured on a modern structure built on the basis of knowledge and data, accumulated through countless individual experiments on simple material specimens and building elements, using all the available tools and provisions for design, dimensioning and construction" (quote from Prof. E. Amstutz). The ensuing publications earned Prof. Rösli and Empa worldwide acclaim. His Empa Research Report no. 192 featured on the bestseller list for years.

Born on 7 December 1920, Alfred Rösli attended the municipal and cantonal schools in Zurich. Between 1942 and 1947, he read civil engineering at ETH and also studied under Prof. Mirko Roš. After graduating, he worked as an engineer in the Concrete and Binders Section at Empa until 1951. The years between 1952 and 1955 were spent at Lehigh University in Bethlehem (Pennsylvania), where Rösli worked on one of America's first research projects on prestressed concrete and obtained a doctorate before returning to Switzerland.

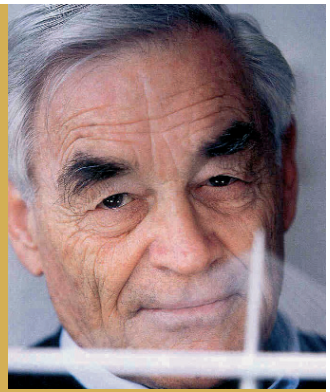
Alfred Rösli resumed his job at Empa in 1955, becoming Head of the Reinforced Concrete and Concrete Structures Section in 1966. Structural dynamics and large-scale testing were a particular focus during those years. Rösli grasped the great potential held by the cutting-edge "tools" provided at the newly restructured Empa, such as the strong floor system conceived by Rösli himself and built by Prof. H. Hauri, and exploited these to great success. In 1969, his innovative ideas even induced Prof. F. Leonhard to commission Empa with a comprehensive programme of basic tests for the world's first cable-stayed bridge with parallel-wire cables in Mannheim, Germany, and the then largest roof in the world, built for the 1972 Olympic Games in Munich.

1970 saw Alfred Rösli appointed Deputy Director of Empa and Head of the Construction Materials Division. In collaboration with Prof. T. Erismann, he proceeded to draw up an ambitious scheme for the expansion of the Polymers Section, which, despite the prevailing financial constraints, was given priority in the succeeding years. Much of the groundwork undertaken by Alfred Rösli at that time brought rich rewards for EMPA during the following decades. The successes achieved with advanced fibre-reinforced composites, for instance, may be traced to this period.

His appointment as Ordinary Professor of Materials Science at ETH Zurich began in the 1973/74 academic year. The newly created chair was intended to spark interest among civil engineering students for materials-related issues while providing them with the appropriate professional grounding at university level. His courses were designed so as to allow the real-life behaviour of materials to be presented and modelled in terms of their structural composition and the basic laws of science, specifically chemistry, physics and mechanics. The skills assimilated by the budding engineers provided them with a framework for the judicious assessment of future innovations and their efficient implementation for new applications. Generations of students who studied under him cherish lasting memories of his exemplary lectures, perfectly organized seminar exercises and legendary demonstrations, which he used to make even complex problems readily comprehensible. In his wholehearted approach to teaching, he spared neither time nor effort in helping his students. Had lectures, seminar exercises and practicals carried any weight at that time, he would certainly have landed one of the very top marks. His graduates – who nowadays ply their trade across the globe, mostly in leading positions – are a testament to the first-class education received at ETH, particularly under the auspices of Alfred Rösli.

Christian Menn Prof. Dr Dr h.c.

gold medal



Some ten years after the end of World War II, Switzerland experienced a surge in development activity. The growing need for mobility among the population led to the birth of the motorway network. It was during this period – in 1957 – that Christian Menn opened his own engineering practice in Chur. Contemporary road-building requirements and the difficult topographic conditions in the Canton of Graubünden afforded him ample opportunity to design exceedingly graceful and efficient bridges. At that time, far-sighted clients entrusted him with very challenging projects for which he delivered outstanding solutions. Menn attended closely not just to the structural calculations, but to every last aspect of detailing and set stringent aesthetic criteria for his bridge designs (quote from H. von Gunten). A considerable development took place between the opening of his practice and his appointment as Professor of Structural Engineering at ETH Zurich in 1971. This led from the work of his great model, Robert Maillart, with loadbearing constructions tailored to structural requirements, from meticulously computed, carefully dimensioned, economical designs, to integral concepts that fully reconcile the various design objectives of structural stability, serviceability, durability, economy and aesthetic appeal (quote from H. Figi).
In teaching the principles of structural and bridge engineering, Christian Menn was a strict master. Students received a key part of their training in passing – most of them, probably, without even noticing: the engineer's mindset, i.e. the ability to make complex problems accessible and predictable through simplifications that encapsulate the essence while eliminating the superfluous. This capacity to analyse a problem, to pare it down to the core from an abundance of information and maintain an exclusive focus in the development of clear-cut concepts and models – that was the skill that Christian Menn conveyed to his students and colleagues as teacher and model (quote from H. Schnetzer).

In 1956, in the preface to his doctoral thesis, Christian Menn wrote: "Understanding the interplay of forces is essential to the correct choice of design solution and the use, where appropriate, of prestressing to improve stress distribution in the structure. When faced with problems not previously dealt with in theory, the structural designer is therefore forced to break new ground to gain a clear grasp of stress conditions in the proposed construction. The appropriateness of the adopted method – which should target the lowest possible margin of error for a minimum of effort – is dictated by the assumptions and simplifications underlying the calculations." On various occasions over the last decades and even today, the need to break new ground has, for Empa and to the great delight of its staff, entailed the privilege of collaborating with the world-famous bridge builder Christian Menn.

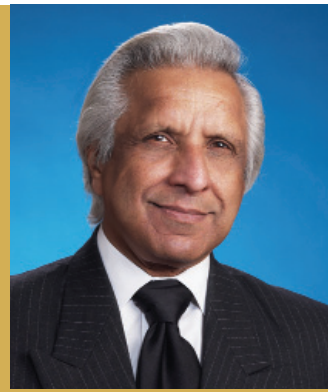
There is unlikely to have been a single major bridge scheme in Switzerland during the last 35 years in which Christian Menn was not closely involved, whether as designer in a team of engineers, jury member or checking engineer. In the capacity of jury member or checking engineer, Christian Menn, with his creative vision, always kept sight of the overall bridge concept and its foremost issues of aesthetic and technical design, efficiency of construction and serviceability (quote from D. J. Bänziger).
Christian Menn's scientific work is unashamedly practice-oriented. Starting from the practicalities of concrete bridge design, he has always sought to deliver solutions which combine a maximum of simplicity, transparency and reliability while addressing the problem in its entirety. His achievements rapidly found their way into practice, in particular through his book on reinforced-concrete bridges and Swiss Standard SIA 162 "Concrete structures" (quote from P. Marti).

Christian Menn's oeuvre currently embraces some 80 major bridges, including the Crestawald Bridge, the Valserrhein Bridge, the Rhine Bridge Tamins, the Nanin and Cascella Bridges, the Felsenau Bridge in Berne, the Biaschina Bridge, the Ganter Bridge on the Simplon Pass, the Chandoline Bridge, the Sunniberg Bridge at Klosters and the Charles River Crossing in Boston, Massachusetts. A scheme for a 3,000 m-span bridge, a hybrid between suspension and cable-stayed bridge, is still to be implemented. The bridge's dynamic stability is guaranteed by a system of cable stays on either side of the roadway deck. The carbon fibre-reinforced polymer cable developed at Empa offers a possible solution for the long-span stay cables.

Christian Menn has received numerous major distinctions and was awarded an honorary doctorate by the University of Stuttgart in 1996.

Aftab Mufti Prof. Dr

gold medal



Dr. Aftab Mufti is Professor of Civil Engineering at the University of Manitoba in Winnipeg, Manitoba, Canada, Program Leader and President of the Network of Centres of Excellence on Intelligent Sensing for Innovative Structures (ISIS Canada), and first President of ISHMII (International Society for SHM of Intelligent Infrastructures). He was one of the key persons to initiate interest in the uses of advanced composite materials (ACM) for civil engineering structures in Canada through his founding work as Chair (1989 to 1993) of the Canadian Society for Civil Engineering (CSCE) Technical Committee on the use of ACM in Bridges and Structures. With support from Industry, Science and Technology Canada and External Affairs Canada, and working through the auspices of the CSCE, Dr. Mufti was the leader of fact-finding missions to Europe in 1990, including visits to Empa, and to Japan in 1992. Since then there has been a close and fruitful cooperation between him and Empa in the domain of advanced composite materials for civil engineering and nowadays also in the field of structural health monitoring.

The work of the two missions led to two state-of-the-art books, which are still cited in technical literature. In July 1993, with support from External Affairs Canada, Dr. Mufti organized and co-chaired a successful Canada-Japan Workshop on ACM in Bridges and Structures. He is the founding Chair of the non-profit Advanced Composite Materials in Bridges and Structures Network of Canada (ACMBSN). In 1995, together with colleagues, he was the founding member of the group that established the NCE for the ISIS Canada Research Network. This network brings together members from industry, government and university, who share a common interest in promoting ISIS Canada.

Dr. Mufti coined the new term “civionics” in response to the need to bring together the brightest minds in the fields of electrical engineering, electronics, and photonics to expand the envelope of civil engineering in the future design of civil infrastructure. His believes that civionics is to civil engineering what avionics is to aerospace. Civionics is the basis for structural health monitoring (SHM) - a rapidly emerging technology that is replacing visual inspection as a means of monitoring bridges and structures for safety and longevity, using sensors and remote readout equipment to monitor stresses inside a structure. Given that this is a new and emerging technology, Dr. Mufti is personally directing the preparation of detailed specifications to be used by sensor suppliers and installers to ensure optimum placement and enhance the efficiency and reliability of the system.

The quality of Dr. Mufti’s research in the emerging area of civionics and SHM is unparalleled. While others have monitored components, few have taken the systems approach championed by Dr. Mufti. To develop international guidelines for the application, use and interpretation of data from SHM installations, Dr. Mufti has spearheaded the formation, and now serves as founding President, of the International Society for SHM Intelligent Infrastructure (ISHMII) with representatives from Asia, Europe, and North America serving on its Board of Directors. This society will be hosting its international conference at the University of Manitoba in Winnipeg in 2007.

Dr. Mufti has been the recipient of many awards. Especially the steel-free bridge concept, of which he is the principal developer, received tremendous recognition, both nationally and internationally. Accolades include the Pratley Award 1994, the CERF Charles Penkow Award 1996, the Association of Consulting Engineers of Canada (ACEC) Award 1996, the Lieutenant Governor of Nova Scotia Award for Excellence in Engineering 1997, the ACI Design Award 1998, the Nova Award 2000, and the Consulting Engineers of Manitoba Award of Merit for Innovation in the Design of the Structural Health Monitoring (SHM) System - Provencher Pedestrian Bridge 2003.

Doris Spori Dipl. Werkstoff-Ing. ETH

silver medal

Doris Spori graduated from the Department of Materials at ETH Zurich in the winter semester of 2004/2005. Her research into fibre-reinforced composites under Christian Huber at Empa's Plastics/Composites Lab, headed by Peter Flüeler, culminated in the forward-looking diploma thesis "Active Fibre Composites: Two Approaches to Optimise the Production Process and an Investigation on the Influence of Storage Temperature".

Active fibre composites (AFC) may serve as actuators and sensors. Piezo fibres are embedded in a polymer matrix between two Kapton sheets printed with electrodes. Doris Spori got to grips with the, for her, new subject matter within a remarkably short time and, with her diploma thesis, made a valuable contribution to the success of Empa's Adaptive Materials Systems programme. With this programme, Empa has redoubled its research efforts in an extremely promising field, widely regarded by experts as a key technology in the coming decades. The use of fibre-reinforced composites for macro-scale mechanical components and the integration of materials with sensor and actuator capabilities interfaced via adaptive controls will pave the way for the development and technological exploitation of "smart" integrated mechanical systems.

The Mirko-Roš-Award Committee comprises:

Cornelia Bodmer-Roš
Zollikon (President)

Martin Deuring
Winterthur

Carlo Galmarini
Zurich

Urs Meier
Schwerzenbach

Masoud Motavalli
Zurich

Hans Erni

Milestones in the artist's life

1909	Born in 1909, spent childhood in Lucerne. Apprenticeship as land survey technician and draughtsman.
1927 – 1928	Attended School of Arts and Crafts in Lucerne.
1928 – 1929	Académie Julian in Paris.
1937	Co-founder of Allianz group of abstract artists in Zurich.
1939	Mural entitled "Die Schweiz, das Ferienland der Völker" (Switzerland, Holiday Land of the Nations) for Swiss Expo in Zurich.
1977	Establishment of Hans Erni Foundation.
1979	Opening of Hans Erni Museum at Swiss Museum of Transport in Lucerne.
1983	Presented with UN Peace Medal in New York.
1989	Honoured on his 80th birthday by UN General Secretary Javier Perez de Cuellar.

Cornelia Bodmer-Roš und Hans Erni begutachten im Atelier des Künstlers am 22. Dezember 2004 das Gipsmodell.

1997	Exhibitions in Villefranche-sur-Mer (F) and Tourettes-Levens (F). Presented with Eco-Prize by Foundation for Environmental Protection, Lucerne. Jubilee medal for UNESCO, Paris.
1998	1998: Painting entitled "St George Defeats the Dragon" for Collegiate Church of Saint Paul de Vence and exhibition in the Penitents' Chapel. Participation in exhibition entitled "13 Rooms for Drawing – the Swiss drawing in the 20th century".
1999	Major retrospective at Fondation Pierre Gianadda Museum in Martigny in celebration of his 90th birthday. "Clean Energy" mural for conference of same name in Geneva. Exhibition at Olympic Museum Lausanne.
2000	Comprehensive retrospective entitled "Work from Seven Decades" at Hans Erni Museum.
2001	Exhibition of bibliophilic work at Bibliothèque Historique de la Ville de Paris.
2002	Retrospective at UN Headquarters in Geneva to mark Switzerland's accession to UN.
2003	Exhibition entitled "Landibild Painting of 1939 – a Rescue Operation" at Swiss National Museum in Zurich.
2004	Opening of special " Work in the Public Realm" exhibition at Hans Erni Museum in celebration of his 95th birthday. Declared Honorary Citizen of the City of Lucerne.
Juni 2005	Opening of "Man and his Hope" exhibition at Payerne Abbey Church with over 120 works including tapestries, sculptures, drawings and originals on canvas, wood and paper.

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Contents
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