

SEWC '98



*Structural
Engineers
World
Congress*

The First International
Congress dedicated
to the *art, science* and
practice of structural
engineering.

July 19-23, 1998

San Francisco Marriott

San Francisco, California



You're Invited

Join us in San Francisco, the breathtakingly beautiful "City by the Bay" whose international flavor, renowned structures, and urban vitality make it the perfect location for the **first Structural Engineers World Congress, SEWC'98**. On behalf of the SEWC Board of Directors, Founding Organizations, Co-Sponsoring Organizations and the Organizing Committee, I look forward to meeting each of you.

SEWC'98 is the first international Congress to cover all aspects of structural engineering, both technical and professional practice issues. The world is fast becoming one large community in engineering. Today, structural engineers are involved in designing facilities of all types in most countries. It is increasingly critical that we understand other countries' cultures and governmental and environmental requirements so that safe, economical buildings and structures are designed and constructed everywhere, both now and in the 21st century.

SEWC'98 is the result of the dedicated efforts of many individuals and organizations. Authors worldwide have carefully prepared their presentations, and I am confident you will find them edifying and interesting. Special acknowledgment should be given to the members of the Technical Program Committee (Dr. Alfredo Ang, Chair), the Professional Practice Issues Program Committee (Dr. Ron Domer, Chair), the SEI/ASCE Technical Program Committee (Dr. Greg Fenves, Chair), the Organizing Committee (which I chair), the Grants and Contributions Committee (Dr. Walter Moore, Chair), the Board of Directors, the Founding Organizations, Co-Sponsoring Organizations, and Cooperating Organizations. My special thanks go to Proceedings Editor, Prof. N.K. Srivastava, and to Marc LeBlanc and Rich Huggins who tirelessly worked to compile all of the presentations into a format suitable for reproduction on CD-Rom.



Roland L. Sharpe, President
SEWC World Headquarters, Sacramento, Calif. USA



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Greetings from the SEWC Founding Organizations



American Concrete Institute International (ACI)

George F. Leyh, Executive Vice President: ACI International is a technical and educational society dedicated to improving the design, construction, manufacture, and maintenance of concrete structures. ACI International prides itself as a consensus organization that gathers, correlates and disseminates information. Our nearly 17,000 members blanket all of North America and reside in more than 100 other countries. By enabling professionals at all levels to expand their knowledge and abilities, we not only enhance their effectiveness but also provide a conduit for sharing innovative ideas and promoting superior concrete technology. We wish SEWC great success in its inaugural meeting.

International Association of Shell and Spatial Structures (IASS)

Dr. Stefan J. Medwadowski, President: I take great personal pleasure in extending to all participants at SEWC greetings from all members of IASS, a worldwide organization of architects, engineers and builders interested in developing and disseminating knowledge about the design and construction of shells and spatial structures. As structural engineers, many IASS members were quick to respond to the call some four years ago from Roland Sharpe to participate in preparations for SEWC. N.K. Srivastava led our Association's effort. I am confident that the Congress will prove a success in its deliberations, proceedings and permanent record. Moreover, I am hopeful that similar conferences will be held periodically in the future.

Japan Structural Consultants Association (JSCA)

Akira Yamaki, Director: Formed in 1981, JSCA addresses the needs of structural engineers within society, and promotes the application of structural engineering technology. JSCA, Japan's only authorized structural engineering organization, acts as a unit to represent structural engineers to the general public, industry and government; to assist in research; and to collect and distribute information based on the expertise of its individual members. Its diverse activities also include contact with overseas engineering associations and the staging of forums on state-of-the-art technology. Japan's extreme geographical conditions, including severe earthquakes, typhoons and heavy snowfall, have compelled its engineers to satisfy the strictest of structural safety requirements. JSCA serves as the link between engineers and society and is committed to enabling structural engineers to practice their art at the highest level possible. JSCA welcomes all delegates to SEWC.

National Council of Structural Engineers Associations (NCSEA)

Craig Barnes, Past President: To engineers from around the world: NCSEA welcomes you, your families and guests to the first Structural Engineers World Congress. The 24 state structural organizations that comprise NCSEA are dedicated to improving the business and practice of structural engineers. We invite you to enjoy associating with professional engineers from around the world in the exhilarating atmosphere of San Francisco. We hope you will return to your home with fond memories of this Congress and with eager anticipation of the next event.

Structural Engineering Institute (SEI)

Dennis L. Tewksbury, Chair: We welcome you to the very first Structural Engineers World Congress, emphasizing the needs of the worldwide structural engineering community in the 21st century. You will find special programs for the practicing structural engineer, as well as for the academic and research community. SEI/ASCE has focused on many issues, including analysis and computation, concrete and masonry, steel and concrete bridges, probability-based limit state design, seismic design, and retrofit guidelines for lifeline systems. We are confident you will find the many presentations enlightening and very beneficial.

Structural Engineers Association of California (SEAOC)

Kenneth A. Luttrell, President: On behalf of SEAOC, I would like to welcome the presenters and participants to this first Structural Engineers World Congress, and extend our heartfelt appreciation to the SEWC founding organizations, as well as the SEWC Board of Directors and staff who have made this event possible. As we approach the new millennium, structural engineers will be facing many new challenges. At this first international Congress of structural engineers, we will all have an opportunity to take a definitive look at what the 21st century holds for design, technologies and materials. In an era of global economies, it is particularly timely for us to reach beyond our traditional national boundaries and explore the world of structural engineering around the globe. I hope that each of you has a stimulating, fruitful and enjoyable experience in the City by the Bay.

Sessions also organized by:

Applied Technology Council (USA)
Asociacion Sudamerica na de Ingenieria Estructural (South America)
Association of Consulting Civil Engineers (India)
Canadian Society for Civil Engineering
Council of American Structural Engineers (USA)
Hong Kong Institute of Engineers
Korean Society of Civil Engineers
Structural Engineers Risk Management Council (USA)
Taiwan Structural Engineers Association
Technology University of Panama
The Institution of Engineers (Australia)



PROGRAM OVERVIEW

This year's Congress brings an international scope to the field of structural engineering from all points of view: technical, professional and practice. SEWC '98 explores the challenges, changes and issues that face structural engineers around the world, to provide opportunities to explore mutual concerns, exchange technical data, find solutions to common problems, and study the future of our profession. A truly international approach has undergirded the planning of SEWC'98.

Prof. Alfredo H.S. Ang of the University of California, Irvine, chairs the technical program, and **Dr. Ronald Domer**, an experienced consulting engineer from Danville, Calif., is in charge of professional and practice issues. Two independent international control groups have developed both directions, with each session planned for a particular subject area, then coordinated and reviewed by an expert from another part of the world.

In addition to **keynotes delivered by four eminent engineers**, there will be **144 sessions** with more than **600 speakers** who will cover all aspects of structural engineering. **Proceedings will culminate in more than 674 papers involving approximately 1,400 authors from around the world.** Subjects covered will include:

- Building and bridge design and construction
- International codes and standards
- Special structures
- Innovative structural materials
- Design consulting business
- Analysis and computation
- Education and research

TECHNICAL SESSIONS

Technical sessions were developed by **major organizations worldwide**, including the American Concrete Institute, the Japan Structural Consultants Association, the Structural Engineers Association of California, the International Association of Shell and Spatial Structures, the Canadian Society for Civil Engineering, and the Korean Society of Civil Engineers. The Structural Engineering Institute (SEI/ASCE) played a major part in developing the technical program under

chairmanship of Prof. Gregory L. Fenves. SEI/ASCE has forgone its annual Structures Congress, and has carefully blended it – along with its 13th Conference on Analysis and Computation and 2nd Concrete and Masonry Symposium – into the SEWC'98 program. India, Taiwan, Hong Kong, Australia, South America, and Panama are among the many countries and regions also represented by major groups that organized sessions for this groundbreaking World Congress.

All in all, **109 technical sessions** will feature more than 580 papers dealing with such major topics as analysis and computation, earthquake and wind engineering, innovative materials and structures, and bridges and hydraulic structures.

PROFESSIONAL/PRACTICE SESSIONS

Six general themes run throughout the professional and practice issues program:

- National and international requirements in structural engineering
- Project planning and execution
- Professional development and education
- Management of the practice and the firm
- Risk management in structural engineering
- General, cultural and social issues

These will be offered in sessions involving about **90 papers and panel discussions.**

Congress Proceedings will be published by Elsevier on CD ROM, with a bound volume of abstracts. We hope you will find these formats efficient and readily usable.

We have shaped the entire program of SEWC'98 with one overarching goal in mind: In an era of rapid, dramatic globalization, to advance the science and practice of structural engineering worldwide.



N.K. Srivastava, Ph.D., P. Eng., FCSCE, FSCME

**Vice President SEWC,
Co-Chair Technical Program
and Proceedings Editor
Moncton, N.B. Canada**



Prof. W.J. Hall
Department of Civil Engineering, University of Illinois, USA

“Structural Engineering Issues at Year 1998, Research and Education as Related to Practice”

As Emeritus Professor of Civil Engineering and former Head of the Department of Civil Engineering at the University of Illinois at Urbana-Champaign, Prof. Hall is widely known for his contributions to and leadership in education and research. His expertise covers fracture mechanics of metallic structures and earthquake engineering. His contributions to professional practice include consultation services on a number of major projects, such as the Alaska Pipeline system and seismic safety of nuclear power plants.



P.R. Head, OBE
Chief Executive, Maunsell Europe, U.K.

“Effective Research and Development for Future Innovations in the Construction Industry”

Mr. Head has worked for much of his career on the design and construction of major bridges. He led the technical development of Maunsell's pioneering work in advanced composite materials, and received the Royal Academy of Engineering's Silver Medal in 1995 for outstanding contribution to British industry in this area. He was project director for the much acclaimed Second Severn Project, a major 5km-long bridge, and was recently awarded the OBE by Queen Elizabeth II for services to bridge engineering. Head serves on the International Board of Maunsell Europe, which employs 800.



Prof. Mamoru Kawaguchi
Hosei University, Japan

“Innovative Structures and Their Expression”

Active in the field of shell, latticed-space, and tension structures, Prof. Kawaguchi has presented numerous papers concerning the philosophy of structural design. His design works include the Olympic Indoor Stadium (Tokyo); National Indoor Stadium (Singapore); Sant Jordi Sports Place (Barcelona Olympics); Natural Stone Bridge “INACHUS” (Beppu, O-ita, Japan); and many others. He has received numerous awards from international organizations, including an IASS Tsuboi Prize.



Leslie E. Robertson, P.E., S.E.
Leslie E. Robertson Associates, R.L.L.P., USA

“Design of Buildings in the World Market – Preparing for the Future”

Mr. Robertson is responsible for the structural design of hundreds of buildings around the world, including the World Trade Center (New York), U.S. Steel Headquarters (Pittsburgh), Bank of China Tower (Hong Kong), Puerta de Europa (Madrid), as well as exceptional museums in Berlin, Seattle and Portland (Maine). Robertson, a member of the National Academy of Engineering and a licensed First Class Architect (Japan), has received the Gengo Matsui Prize and the American Institute of Architects Institute Honor, and has been recognized as ENR's Construction “Man of the Year.”

SEWC '98

Professional, Practice & Business Topics:

- Alternative dispute resolution
- Building codes
- Business development
- Computers and software
- Construction administration
- Construction phase services
- Continuing education
- Contract documents
- Contracts
- Design-Build
- Design phase practices
- Establishing scope of service
- Eurocodes
- Expert witnessing
- Financial operation
- Forensic engineering
- Function analysis
- Insurance, construction works
- International accreditation
- Inter-professional relations
- Liability insurance
- Loss prevention programs
- Office management
- Partnering in education
- Professional conduct
- Professional development
- Professional registration
- Progressive collapse
- Project management
- Project peer review
- Proposals
- Quality assurance
- Responsibilities
- Risk management
- Seismic assessment
- Shop drawings
- Special inspections
- Structural connections
- Structural design audits
- Structural observation
- Technician certification
- Value engineering

SEWC '98

Included Structure Types:

Air-supported structures
Anchors ■ Arch structures
Base-isolated structures
Bridge substructures
Bridge superstructures
Buildings, new and existing
Cable structures
Coastal structures
Composite structures
Cooling towers ■ Culverts
Damped and dissipative structures
Dams ■ Domes
Esthetic structures
Existing bridges
Fabric structures
Foundations ■ Gates
Homes ■ Lattice shells
Lifeline structures
Liners ■ Masts
Offshore structures
Piles ■ Pipes
Power plants
Rack storage structures
Reservoirs ■ Reticulated shells
Retractable structures
Sculptures ■ Shell structures
Sign structures ■ Silos
Space bar structures
Spatial structures
Stadiums and arenas
Suspension structures
Tanks ■ Terminals
Towers ■ Truss structures ■ Tunnels
Underground structures
Underwater structures

Structural Material Topics:

Brick ■ Concrete, lightweight
Concrete, reinforced
Concrete, precast
Concrete, prestressed
Concrete, post-tensioned
Concrete, high performance
Concrete, steel-fiber reinforced
Fabric, structural
Fabric, welded wire
FRC structures
FRP-strengthened structures
Glass, structural
Grids, composite materials
Grids, welded wire
Hybrid structures
Masonry, reinforced
Masonry, unreinforced
Plywood ■ Polyethylene, pile
Steel, high performance
Steel, low alloy
Steel, prestressed
Steel, stainless ■ Steel, structural
Steel-concrete composite structures
Wood ■ Wood, light-framed

Exhibition*

Sunday, July 19 through Wednesday, July 22

An historic event! On display in the Golden Gate Hall, you will find some 75 international exhibits, reflecting all aspects of advance technologies for the analysis, design and construction of structural systems.

For exhibit information, call Jeff Gallagher: 561-659-7731.

Icebreaker Reception*

Sunday, July 19 - 6 to 8 PM

Take this opportunity to mingle with friends in the Exhibit Hall and meet new colleagues from across the globe.

Mid-Congress Reception*

Sponsored by SEAOC

Monday, July 20 - 6 to 7 PM

Offering an informal opportunity to mingle with other Congress attendees in the Exhibit Hall. All registrants welcome!

1st World Congress Awards

Luncheon*

Tuesday, July 21 - 12 Noon to 1:30 PM

SEI and other organizations will recognize leaders in the world of structural engineering.

SEWC Reception & Banquet*

Wednesday, July 22 - Reception 6 PM - Banquet 7 PM

Join us for the SEWC Reception & Banquet. Bring your spouse/companion for a gracious evening (see registration for additional tickets.). Coats & ties suggested.

Breaks*

Complimentary coffee and soda service will be available in the Exhibit Hall between sessions.

Box Lunch

Partially subsidized box lunch will be available in the Exhibit Hall for your convenience Monday and Wednesday, 12 Noon to 1:30 PM.

**This activity is included in all full Congress registration packages.*

Professional Development

A total of 28 Professional Development Hours (PDH) are available for those who attend the entire 5-day program.

Workshops

Thursday, July 16:

Seismic Upgrading of Hazardous Buildings: Sponsored by Allied Technology Council, U.S.A.

Friday, July 17 & Saturday, July 18:
Second U.S.-Japan Workshop on

Performance-Based Engineering: Sponsored by Building Research Institute, Ministry of Construction, Japan and ATC
For further information about Workshops 1&2, contact ATC: 650-595-1542; fax: 650-593-2320; e-mail: atc@atccouncil.org; website: atccouncil.org; or BRI's website: kenken.go.jp

Friday, July 17:

International Structural Engineering: Sponsored by National Science Foundation (*tentative*) for entering academe from various countries.

Saturday, July 18:

Engineering Education for the 21st Century: Sponsored by NSF (*tentative*) for entering academe, recent engineering grads and experienced practicing engineers from various countries.

For further information about Workshops 3&4, call US: 888-895-1872; Outside US: 703-295-6301.

Technical Tours

Saturday, July 18:

Sony Metrono Entertainment/Commercial Complex - 11 AM

Visit a four-story steel moment resisting frame structure with creative design detailing. The project is under construction over the Marriott Ballroom in the Moscone Complex, immediately adjacent to the hotel.

Unreinforced Brick Building Retrofit - 3 PM

The building, which incorporates some of the latest retrofitting techniques for high seismic zones, is within walking distance of the hotel.

Tuesday, July 21:

Stanford's Super Accelerator Laboratory (SLAC) - Time TBA