

BEHAVIOUR OF STEEL STRUCTURES IN SEISMIC AREAS
7th International Conference, Santiago Chile

STE SSA 2012

Held at the

Intercontinental Hotel, Santiago, Chile
January 9-11, 2012

Organized by

University of Naples “Federico II”, Italy
Department of Civil Engineering, Universidad de Chile, Chile

Sponsored by

CChC – Cámara Chilena de la Construcción
Gerdau Aza
Alacero – Latin American Steel Association
ECCS CECM EKS – European Convention for Constructional Steelwork
ACHISINA – Asociación Chilena de Sismología e Ingeniería Antisísmica

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In total 27 members from 13 countries: Belgium, Canada, Chile, China, Ecuador, France, Greece, Italy, Japan, New Zealand, Portugal, Romania and USA.

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In total 26 members from 14 countries: Canada, Colombia, France, Greece, Italy, Japan, Korea, Mexico, Romania, Spain, Taiwan, Turkey, United Kingdom and USA.

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Preface

The International Specialty Conference on Behaviour of Steel Structures in Seismic Areas, called STESSA, has reached its seventh edition.

The seventh edition of STESSA has been organized by the University of Chile (Department of Civil Engineering), in cooperation with the University of Naples "Federico II" (Department of Structural Engineering).

The Conference, as in the past, is devoted to the behaviour of steel structures in seismic areas. Santiago (Chile) was selected for the venue of the Conference. Previous editions of the Conference were held in Timisoara (Romania, 1994), Kyoto (Japan, 1997), Montreal (Canada, 2000), Naples (Italy, 2003), Yokohama (Japan, 2006) and Philadelphia (United States, 2009).

The results of recent research from all over the world in the field of steel structures in seismic areas are represented by over a 150 papers from experts from 23 countries. The papers included in the proceedings are subdivided into chapters with titles corresponding to the names of the Working sessions of the STESSA'12 Conference. The papers are categorized into the following areas:

1. Performance-Based Design: engineering descriptions of performance levels; conceptual design for multiple performance objectives; reliability-based design procedures; methods for analytical prediction of performance.
2. Seismic, Wind and Exceptional Loads: seismic load; wind load; fire; fire after an earthquake; explosions; impact.
3. Material Behaviour: material properties; use of special steel grades; strain rate; welded affected zones; fatigue; brittle fracture.
4. Member Behaviour: rotation capacity; local buckling; overall buckling; classifications of sections; deterioration of strength, stiffness, ductility.
5. Connection Behaviour: cyclic behaviour of joints; analytical models; test results; pros and cons of welded and bolted connections; new innovations; data bank; influence of fully and partially restrained connections; seismic demands and capabilities of frames with welded, bolted, or innovative connections.
6. Global Behaviour: moment resisting frames; braced frames; new and innovative structural systems; collapse mechanisms; redundancy of structures; dynamic influence of P- Δ effects; modeling of deterioration; evaluation of reduction factors; damageability; large span structures, bridges, and space frames; influence of non-structural elements.
7. Analytical and Experimental Methods: dynamic analysis; geometrical nonlinearity and material nonlinearity; optimization; static tests, shaking table tests; online real-time tests; distributed hybrid collaboration tests via the Internet.
8. Mixed and Composite Structures: concrete filled tube (CFT) construction; steel encased in reinforced concrete (SRC) construction; mixed structures with reinforced concrete; mixed structures with timber; steel pile foundation and foundation problems.
9. Passive, Semi-active, and Active Control: behaviour of isolated structures; bridge bearings; energy dissipation; special devices; control algorithms; smart structures; design models; criteria for detailing.
10. Strengthening, Repair, and Monitoring: examination of damage; criteria for retrofitting; structural health monitoring; improvement of structural strength and ductility; ordinary buildings; historical buildings; bridges.
11. Design, Fabrication, and Practice: national practices case studies; cost-benefit ratio; design aids, fabrication and erection; aesthetics and habitability.

SESSION SCHEDULE SUMMARY

Sunday 8th

- 17:00 - 19:00** Registration – Foyer
19:00 - 21:00 Welcome Reception

Monday 9th

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|----------------------|--|--------------------|
| 9:00 - 9:30 | Opening ceremony | Centroamerica Room |
| 9:30 - 10:00 | Keynote Lecture: A. Martelli
Chair: J. Ricles | Norteamerica Room |
| 10:00 - 10:30 | Session 1a: Passive, semi - active and active control
Chair: J. Ricles | Norteamerica Room |
| 10:00 - 10:30 | Session 1b: Performance - Based Design of Structures
Chair: C. Aguirre | Centroamerica Room |
| 10:30 - 11:00 | Coffee break – Foyer | |
| 11:00 - 13:00 | Session 2a: Passive, semi-active and active control
Chair: M. Moroni | Norteamerica Room |
| 11:00 - 13:00 | Session 2b: Performance-Based Design of Structures
Chair: G. Ayala | Centroamerica Room |
| 13:00 - 14:00 | Lunch – Tupungato, Parinacota, Llaima | |
| 14:00 - 16:00 | Session 3a: Strengthening, Repair and Monitoring
Chair: L. Calado, Massone | Norteamerica Room |
| 14:00 - 16:00 | Session 3b: Performance-Based Design of Structures
Chair: M. Iwata, A. Formisano | Centroamerica Room |
| 16:00 - 16:30 | Coffee break – Foyer | |
| 16:30 - 18:30 | Session 4a: Analytical and Experimental Methods
Chair: D. Dubina, M. Sarrazin | Norteamerica Room |
| 16:30 - 18:30 | Session 4b: Connection Behaviour
Chair: J.M. Aribert, B. Faggiano | Centroamerica Room |
| 19:00 - 20:00 | Technical visit
Titanium Tower | |

Tuesday 10th

9:00 - 9:30	Keynote Lecture: K. Kasai Chair: R. Saragoni	Norteamerica Room
9:30 - 10:30	Poster Session Chair: K. Kasai	Centroamerica Room
10:30 - 11:00	Coffee break – Foyer	
11:00 - 12:45	Session 5a: Member Behaviour Chair: B. Stojadinovic, V. Stoian	Norteamerica Room
11:00 - 12:45	Session 5b: Self Centering Seismic Systems Chair: R. Sause, C. Aguirre	Centroamerica Room
12:45 - 13:45	Lunch – Tupungato , Parinacota, Llaima	
13:45 - 14:15	Keynote Lecture: J. Ricles Chair: K. Kasai	Norteamerica Room
14:15 - 16:00	Session 6a: Analytical and Experimental Methods Chair: A. Reinhorn, J.F. Beltran	Norteamerica Room
14:15 - 16:00	Session 6b: Self Centering Seismic Systems/ Member Behaviour Chair: L. Fahnstock, D. Grecea	Centroamerica Room
16:00 - 16:30	Coffee break – Foyer	
16:30 - 18:30	Session 7a: ECCS - TC13 Chair: R. Landolfo, F. Mazzolani	Norteamerica Room
16:30 – 18:30	Session 7b: Connection Behaviour Chair: M. Garlock, G. Rassati	Centroamerica Room
20:00 - 24:00	Banquet - Tupungato-Parinacota-Llaima	

Wednesday 11th

9:00 - 9:30	Keynote Lecture: C. Clifton Chair: F. Mazzolani	Norteamerica Room
9:30 - 11:00	Session 8a: Global Behavior Chair: C. Rogers	Norteamerica Room
9:30 – 11:00	Session 8b: Mixed and Composite Structures Chair: R. Herrera, S. Yamada	Centroamerica Room
11:00 - 11:30	Coffee break - Foyer	
11:30 - 13:00	Session 9a: Global Behavior Chair: R. Tremblay, D. Mistakidis	Norteamerica Room

11:30 - 13:00	Session 9b: Design, Fabrication and Practice Chair: I. Vayas, H. Akiyama	Centroamerica Room
13:00 - 14:00	Lunch – Tupungato , Parinacota, Llaima	
14:00 - 14:30	Keynote Lecture: R. Herrera Chair: C. Clifton	Norteamerica Room
14:30 - 16:00	Session 10a: Global Behavior Chair: V. Piluso, C. Christopoulos	Norteamerica Room
14:30 - 16:00	Session 10b: Seismic, Wind and Exceptional Loads Chair: M. Hjjaj, R. Saragoni	Centroamerica Room
16:00 - 16:30	Coffee break – Foyer	
16:30 – 17:45	Session 11a: Global Behavior Chair: D. Beg, L. Tirca	Norteamerica Room
16:30 - 17:45	Session 11b: Seismic, Wind and Exceptional Loads Chair: A. Mandara	Centroamerica Room
18:00 - 18:30	Closing Ceremony	Norteamerica Room

Thursday 12th

9:00 - 19:00	Technical tour Marga Marga bridge, Federico Santa Maria University, and Viña del Mar
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PRESENTATION SCHEDULE

Sunday 8th

17:00 - 19:00 Registration - Foyer
19:00 - 21:00 Welcome Reception

Monday 9th

9:00 - 9:30 **Opening ceremony**
Centroamerica James McPhee, Chairman Department of Civil Engineering, University of Chile
Room Federico Mazzolani, Chairman STESSA 2012
 Rodolfo Saragoni, Honorary Chairman STESSA 2012
 Ricardo Herrera, Co-chairman STESSA 2012

9:30 - 10:00 **Keynote Lecture**
 Chair: J. Ricles
Norteamerica (KN-01)Recent worldwide application of seismic isolation and energy dissipation to steel and other
Room materials structures and conditions for their correct use
 Alessandro Martelli

10:00 - 10:30 **Session 1a: Passive , semi - active and active control**
 Chair: J. Ricles
Norteamerica (S01a-1) Hysteretic behaviour of dissipative devices for seismic resistant steel frames (FUSEIS 2)
Room Calado, Proenca, Espinha, Castiglioni, Vayas
 (S01a-2) Innovative energy dissipation systems (FUSEIS 1)
 Dimakogianni, Dougka, Karydakis, Vayas, Calado, Castiglioni

10:00 - 10:30 **Session 1b: Performance - Based Design of Structures**
 Chair: C. Aguirre
Centroamerica (S01b-1) A simplified calculation method of the structural response function considering the P- Δ
Room effect
 Liang, Wu, Wang
 (S01b-2) Hysteretic model for steel energy absorbers and evaluation of a seismic design strategy
 using minimal-damage performance objectives
 Karavasilis, Hale, Kerawala

10:30 - 11:00 **Coffee break**

11:00 - 13:00 Session 2a: Passive , semi-active and active control

Chair: M. Moroni

- Norteamerica Room**
- (S02a-1) Seismic resistant composite steel frames with dissipative devices
Castiglioni, Kanyilmaz, Calado, Vayas, Goncalvez, Rauert
 - (S02a-2) Advanced compressed elastomer dampers for earthquake hazard reduction to steel frames
Sause, Ricles, Mahvashmohamamdi, Michael, Sweeney, Ferro
 - (S02a-3) Base isolation mitigating effects
Prodan, Alexa, Ladar
 - (S02a-4) Full-scale testing of the cast steel yielding brace system
Gray, Christopoulos, Packer
 - (S02a-5) Response analysis of a 12 story structural steel building with isolated base subjected to ground motion excitation
Ojeda, Sanchez, Parra, Lluhen
 - (S02a-6) Concurrent design of high-strength TRIP steels and passive damping devices
Fraleay, Olson
 - (S02a-7) Solid State Steel Energy Dissipators for Hybrid Structures and Large Equipment
Stiemer, Tesfamariam, Zhou
 - (S02a-8) Force-displacement behaviour of HF2Vdissipaters and possible applications on steel structures
Chanchí, Chase, Rodgers, MacRae, Clifton

11:00 - 13:00 Session 2b: Performance-Based Design of Structures

Chair: G. Ayala, R. Boroschek

- Centroamerica Room**
- (S02b-1) Performance evaluation of three pre-qualified steel systems in Canada
Yang, Murphy
 - (S02b-2) Influence of scalar frequency content parameters on the inelastic seismic demands of steel structures
Málaga-Chuquitaype, Elghazouli
 - (S02b-3) A unitary approach for the design of concentrically braced frames
Bosco, Marino, Rossi
 - (S02b-4) Seismic response of steel columns in MRFs under multi-axial earthquake components
Di Sarno
 - (S02b-5) Reliability-based record selection for steel frames based on different vector-valued IMs
Bojórquez, Reyes-Salazar, Rivera-Salas, Ruiz Gómez
 - (S02b-6) Hybrid buckling-restrained braced frames
Atlayan, Charney
 - (S02b-7) Seismic assessment of a new steel moment frame designed per ASCE 7 with ASCE 41
Speicher, Harris III
 - (S02b-8) Robustness based design of steel building frames under extreme loads
Dinu, Dubina

13:00 - 14:00 Lunch – Tupungato, Parinacota, Llama

14:00 - 16:00 Session 3a: Strengthening, Repair and Monitoring

Chair: L. Calado, L. Massone

**Norteamerica
Room**

(S03a-1) Shaking table tests of a timber roof truss model equipped with a post-tensioning SMA-based tie-rod system

Cardone, Sofia, Nigro

(S03a-2) Seismic evaluation and retrofit of welded moment connection of early high-rise buildings subjected to long-period ground motions

Suita

(S03a-3) Consecutive vibration characteristics monitoring of high-rise steel building

Hayashi, Sugino, Yamada, Takiyama, Onishi, Akazawa

(S03a-4) FRP composites for seismic retrofitting of steel-concrete shear walls with steel encased profiles

Dan, Nagy Gyorgy, Stoian, Fabian, Demeter

(S03a-5) Estimation of vibration characteristics of steel-structure buildings with damper based on seismic observation records

Goto, Suzuki, Sugimura, Chiba, Dohi

(S03a-6) Strengthening of non-seismic reinforced concrete frames of buckling restrained steel braces

Bordea, Dinu, Dubina

(S03a-8) Seismic strengthening of R/C buildings with soft storey (pilotis) through dissipative steel links

Mistakidis, Stylianidis, Barlas, Georgiadi-Stefanidi

(S03a-9) A suspended steelwork solution for the post-war reconstruction of a building in the historical centre of Naples

Mazzolani, Marzo, Formisano

14:00 - 16:00 Session 3b: Performance-Based Design of Structures

Chair: M. Iwata, A. Formisano

**Centroamerica
Room**

(S03b-1) Hybrid moment resisting steel frames

Charney, Atlayan

(S03b-2) Validation of a design procedure for failure mode control of MRF-CBF dual systems by means of IDA analyses

Piluso, Montuori, Longo, Giugliano

(S03b-3) Influence of the strength in the seismic performance of steel frame buildings

Aguirre, Salas

(S03b-4) Multilevel displacement-robustness based seismic design for ductile steel framed structures

Ayala, López, Hernández

(S03b-5) Direct damage controlled seismic design of steel framed structures

Kamaris, Hatzigeorgiou, Beskos

(S03b-6) Seismic design approach for multi-story frames on the top story of which damage concentrates

Akiyama

(S03b-7) A new balanced design procedure for gusset plate connections in SCBF

Palmer, Roeder, Lehman

(S03b-8) Methodology for quantifying seismic sustainability of steel framed structures

Chanchí, MacRae, Chase, Rodgers, Clifton

16:00 - 16:30 Coffee break - Foyer

16:30 - 18:30 Session 4a: Analytical and Experimental Methods

Chair: D. Dubina, M. Sarrazin

- Norteamerica Room**
- (S04a-1) Seismic failure analysis of a composite girder bridge
Schanack, Reyes, Luco
 - (S04a-2) Hybrid simulation of a 2-story steel MRF retrofitted with HPFRC infill panels
Lignos, Moreno, Billington
 - (S04a-3) Estimation of the risk amplification in steel buildings subject to seismic actions using Monte Carlo simulation
Bermudez Mejia, Barbat Barbat, Pujades Beneit, Hurtado Gomez
 - (S04a-4) Effects of low cycle fatigue on steel moment frames with RBS
Amiri, Rojas, Anderson
 - (S04a-5) Experimental and analytical modelling of seismic behaviour of braced framed structures with “zipper” mechanism
Reinhorn, Schachter-Adaros

 - (S04a-6) Application of endurance time method in seismic assessment of mid-rise and high-rise steel moment and braced frames
Hariri Ardebili, Zarringhalam, Yahyai, Mirtaheeri
 - (S04a-7) Study on concentrically V-braced frames under cyclic loading
Serra, Rebelo, Da Silva, Tenchini, D'aniello, Landolfo
 - (S04a-8) Influence of friction on the constraints with degrees of freedom on the seismic behavior of steel structures
La Tegola, Mera

16:30 - 18:30 Session 4b: Connection Behaviour

Chair: J.M. Aribert, B. Faggiano

- Centroamerica Room**
- (S04b-1) Cyclic behavior of a new mechanical beam-to-column connection for steel structures
Iyama, Fukushima, Araki, Piao, Hirosawa, Sato, Ohata
 - (S04b-2) Beam-to-column connection for built-up column using ultra-high-strength steel
Lin, Chung, Okazaki, Nakashima
 - (S04b-3) Friction T-stub joints under cyclic loads: experimental behavior
Latour, Piluso, Rizzano
 - (S04b-4) Cyclic behavior of welded T shapes for Double Welded T connections
Bravo, Herrera
 - (S04b-5) Experimental study on mechanical behavior of weld-free steel structure with knee brace damper using square tube column
Koetaka, Suita, Inoue, Uno, Fukuchi, Kawai
 - (S04b-7) Control of bolted beam-to-column connections in moment joints by T-stub properties
Grecea, Muntean, Dubina
 - (S04b-8) Study on structural behaviour of weldless joint in beam-to-column connection of interior column with knee brace reinforcement
Honma, Ebato, Harada
 - (S04b-9) Design considerations for braced frames with asymmetrical friction connections – AFC
Chanchí, MacRae, Chase, Rodgers, Mora Muñoz, Clifton

19:00 - 20:00 Technical visit: Titanium Tower

Tuesday 10th**9:00 - 9:30 Keynote Lecture**

Chair: R. Saragoni

Norteamerica Room (KN-02) Responses of tall buildings in Tokyo during the 2011 Great East Japan Earthquake
Kazuhiko Kasai

9:30 - 10:30 Poster Session

Chair: K. Kasai

Centroamerica Room (PS-01) Design of large scale wind turbine towers in seismic areas
Baniotopoulos, Lavassas, Nikolaidis, Zervas

(PS-02) New aspects concerning the ductility of steel members
Anastasiadis, Mosoarca, Gioncu

(PS-03) Influence of connections on the seismic behaviour of hybrid hot-rolled and cold-formed steel frames.
Calderoni, Giubileo, Tarantino

(PS-04) PTED beam-to-column connections for seismic resistant steel frames.
Faggiano, Esposto, Mazzolani

(PS-05) The influence of cyclic loading on flexural response of steel beams
D'aniello, Tortorelli, Landolfo

(PS-06) Seismic behaviour of dual steel concentric braced frames
D'aniello, La Manna Ambrosino, Portioli, Landolfo

(PS-07) Evaluation of nonlinear static procedures for seismic performance assessment of BRBF structures
Ferraioli, Lavino, Avossa, Mandara

(PS-08) Robustness assessment approaches for steel framed structures under catastrophic events
Formisano, Mazzolani

(PS-09) Finite element modelling of the inelastic cyclic response and fracture life of square tubular steel bracing members subjected to seismic inelastic loading
Roufegarinejad, Tremblay

(PS-10) Seismic testing of concentrically braced frame models for the BRACED Project
Hunt, Broderick

(PS-11) Effect of Local Buckling of Core Plates on Cumulative Deformation Capacity in Buckling Restrained Braces
Matsui, Takeuchi

(PS-12) Critical accelerations as descriptors of the vulnerability of steel tanks under seismic actions
Pérez Rocha, Arzola Nuño, Fernández Torres

(PS-13) Restoring force characteristics of non-slip-type & generally exposed column-base subjected to bi-axial bending,
Yamanishi, Takamatsu, Tamai.

(PS-14) Proposal of New Column Support System to Perform Complete Beam Yielding Mechanism
Kimura, Mutsukura, Kaneda, Wada.

10:30 - 11:00 Coffee break - Foyer

11:00 - 12:45 Session 5a: Member Behaviour

Chair: B. Stojadinovic, V. Stoian

- Norteamerica Room** (S05a-1) Lateral buckling of steel I beams with different boundary conditions by numerical simulation
Sanchez Sanchez, Cortes Salas
- (S05a-2) Impact of flange holes on the strength and ductility of steel beams
Sivakumaran, Arasaratnam
- (S05a-3) Experimental study on buckling-restrained steel plate shear walls
Jin, Lu, Liu, Sun, Li
- (S05a-4) Challenges in designing ultra-lightweight buckling restrained brace
Tinker, Dusicka
- (S05a-5) Experimental study on brittle fracture of buckling-restrained braces influences of core plate welding specifications and experimental temperatures
Iwata, Murai, Nakagomi
- (S05a-6) Experimental study on the hysteretic behavior of thin-walled H-shaped steel beam-columns under compression and weak-axis bending
Cheng, Chen, Pan, Wu
- (S05a-7) Evaluation of plastic deformation capacity of H-shaped steel beams with new value of plate slenderness
Ikarashi, Shinohara, Suekuni, Wang

11:00 - 12:45 Session 5b: Self Centering Seismic Systems

Chair: R. Sause, C. Aguirre

- Centroamerica Room** (S05b-1) Self-Centering truss moment frames with replaceable energy-dissipating elements
Darling, Eatherton
- (S05b-2) Behavior of self-centering buckling-restrained braces
Miller, Fahnestock, Eatherton
- (S05b-3) Parametric study of self-centering concentrically-braced frame systems with friction-based energy dissipation
Roke, Jeffers
- (S05b-4) Effects of energy dissipating capacity on seismic performance of self-centering structures
Zhang
- (S05b-5) Seismic energy demands on steel framed structures with rigid and, alternatively, with post-tensioned semi-rigid connections
López-Barraza, Ruiz, Bojórquez, Reyes-Salazar
- (S05b-6) Shake table testing of a rocking steel frame designed to mitigate higher mode effects
Wiebe, Christopoulos, Tremblay, Leclerc
- (S05b-7) Experimental validation of steel post-tensioned connections with web hourglass pins
Vasdravellis, Karavasilis, Uy

12:45 - 13:45 Lunch – Tupungato , Parinacota, Llama

13:45 - 14:15 Keynote Lecture

Chair: K. Kasai

- Norteamerica Room** (KN-03) Research on connections on steel and composite structures.
James Ricles

14:15 - 16:00 Session 6a Analytical and Experimental Methods

Chair: A. Reinhorn, J.F. Beltran

**Norteamerica
Room**

- (S06a-1) Cycling tests of beam-upright connections in racking systems with a new hybrid procedure
Calado, Castiglioni, Drei
- (S06a-2) Development of standard dynamic loading protocol for buckling-restrained braced frames
Dehghani, Tremblay
- (S06a-3) Reliability-based seismic response transformation factors for steel frames using Artificial Neural Network
Bojórquez, Ruiz, Bojórquez
- (S06a-4) A finite element approach for modeling bolted top and seat angle moment connections and components
Ruffley, Rassati, Swanson
- (S06a-5) Computer-based nonlinear analysis method for seismic performance assessment of 3D frameworks
Chiorean, Tarta, Barsan, Gobesz, Nedelcu
- (S06a-6) A fast incremental iterative procedure for ultimate strength analysis and design of composite steel-concrete cross-sections
Chiorean
- (S06a-7) Real-time hybrid simulations of a 3-story steel frame building with magneto-rheological dampers subject to strong ground motions
Chae, Ricles, Sause

14:15 - 16:00 Session 6b: Self Centering Seismic Systems/ Member Behaviour

Chair: L. Fahnestock, D. Grecea

**Centroamerica
Room**

- (S06b-1) Seismic performance of a steel self-centering moment resisting frame: hybrid simulations under DBE and MCE
Lin, Ricles, Sause
- (S06b-2) Evaluation of performance-based design methodology for steel self-centering braced frame
Chancellor, Akbas, Sause, Ricles, Joó, Tahmasebi
- (S06b-3) Collapse performance of steel self-centering braced frame systems
Tahmasebi, Chancellor, Ricles, Sause, Joó, Akbas
- (S06b-4) Comparison of welded and post-tensioned steel moment-resisting frames
Herning, Garlock, Freidenberg
- (S06b-5) Finite element study of the cyclic flexural behavior of hollow structural sections
Fadden, McCormick
- (S06b-6) Seismic shear response of slab with distributed mass(linear-elastic bay model to story shear)
Iihoshi, Minagawa, Hanai, Kiriya
- (S06b-7) Seismic behavior of flanged cruciform columns in moment resisting frame systems
Mirghaderi, Motallebi

16:00 - 16:30 Coffee break – Foyer

16:30 - 18:30 Session 7a: ECCS - TC13

Chair: R. Landolfo, F. Mazzolani

**Norteamerica
Room**

(S07a-1) Numerical study on welded beam-to-column joints in hybrid-steel building frames
Cermelj, Beg

(S07a-2) Seismic design and strengthening of beam-to-column joints with bolted end plates
Aribert

(S07a-3) Validation of a design procedure for failure mode control of irregular moment resisting frames by means of IDA analyses

Piluso, Montuori, Giugliano

(S07a-4) Comparative assessment of the seismic performance of steel building configurations
Málaga-Chuquitaype, Elghazouli

(S07a-5) Efficient formulation for nonlinear dynamics analysis of steel frames

Hjiij, Le, Battini

(S07a-6) Global performance of steel frames of shear walls

Dubina, Dinu, Neagu

(S07a-7) Experimental analysis of partially buckling inhibited pure aluminium shear panels

De Matteis, Brando, D'Agostino, Mazzolani

(S07a-8) Re-centring capability of dual eccentrically braced frames with removable bolted links

Stratan, Ioan, Dubina

16:30 – 18:30 Session 7b: Connection Behaviour

Chair: M. Garlock, G. Rassati

**Centroamerica
Room**

(S07b-1) Prequalification of two beam-to-column welded moment connection with reduced beam section in the beam and with cover plate for steel building applications under the action of dynamic load

Cerón Pino, Areiza Palma, Thomson

(S07b-2) Cumulative damage models for steel moment frame connections

Campbell, Richard

(S07b-3) Finite element simulation of cyclic flexural behavior for braced frame beam-column connections

Stoakes, Fahnestock

(S07b-4) Seismic behaviour of the diagonal through plate moment connection

Torabian, Mirghaderi, Keshavarzi

(S07b-5) Strength capacity of the gusset plate connection with fillet welds

Cui, Asada, Kishiki, Yamada

(S07b-6) Inelastic seismic performance of brace connections in steel tension-only concentrically braced frames

Hartley, Rogers, Castonguay, Tremblay

(S07b-7) Experimental research on hysteretic behavior of non-diaphragm joint connecting cold-formed steel tube and H-shaped beam

Zhang, Chen

(S07b-8) Shim and bolt size effects on the Asymmetric Friction Connection

Khoo, Clifton, Butterworth, MacRae

20:00 - 24:00 Banquet - Tupungato , Parinacota, Llaima

Wednesday 11th**9:00 - 9:30 Keynote Lecture**

Chair: F. Mazzolani

Norteamerica (KN-04) Multistorey steel framed building damage from the Christchurch earthquake
Room series of 2010/2011
 Charles Clifton

9:30 - 11:00 Session 8a Global Behavior

Chair: C. Rogers

Norteamerica (S08a-1) P- Δ effects on the response of steel moment-resisting frame structures
Room Ramos-Zela, Sullivan
 (S08a-2) A comprehensive study on the performance of Submerged Floating Tunnels during severe seismic events.
 Martire, Faggiano, Mazzolani, Zollo, Stabile
 (S08a-3) Seismic assessment of existing steel braced frames designed according to the 1980 Canadian code provisions
 Jiang, Balazadeh-Minouei, Tremblay, Koboevic, Tirca
 (S08a-4) Seismic performance of high strength steel moment-resisting frames
 Silva, Serra, Rebelo, Silva, Lima, Landolfo, D'Aniello
 (S08a-5) Influence of the initial imperfections on the seismic performance of pitched roof portal frames made of welded non-prismatic plated elements
 Cristutiu, Nunes
 (S08a-6) Contribution of shear connections to the lateral stiffness and strength of steel frames
 Barber, Rassati, Swanson

9:30 - 11:00 Session 8b Mixed and Composite Structures

Chair: R. Herrera, S. Yamada

Centroamerica (S08b-1) Study on the shear strength of composite concrete and steel plate shear walls with
Room binding bars
 Zhou, Zhu, Stojadinovic
 (S08b-2) Experimental study on composite steel-concrete shear walls with vertical steel encased profiles
 Dan, Fabian, Stoian
 (S08b-3) Experimental study on mechanical behavior of exposed-type square CFT column base with built-in reinforcing bars
 Matsuo, Qiao, Ninakawa, Kawano
 (S08b-4) Strength of headed studs in composite structural connection with SFRCC
 Yunbiao, Kazuaki, Shuhai, Yao, Masayoshi
 (S08b-5) Strength and ductility of concrete encased composite columns
 Campian, Sav, Chira, Chira
 (S08b-6) Development of Steel-Wood Hybrid Systems for Buildings under Dynamic Loads
 Stiemer, Tesfamariam, Karacabeyli, Propovski

11:00 - 11:30 Coffee break - Foyer

11:30 - 13:00 Session 9a: Global Behavior

Chair: R. Tremblay, D. Mistakidis

- Norteamerica Room** (S09a-1) Interdependence between seismic damage and masonry infill wall topology for steel structures with a bare ground floor
Nanos, Elenas, Tzourmakliotou
- (S09a-2) Seismic behavior of setback and pyramid-shaped steel moment resisting frames designed by an energy-based method
Chegini, Mirghaderi, Vahdani, Keshavarzi
- (S09a-3) Comparison between field measurements and numerical predictions of the dynamic properties of a low-rise steel building with a flexible steel roof deck diaphragm
Proulx, Boulanger, Bakhti, Shrestha, Tremblay, Rogers, Lamarche, Paultre
- (S09a-4) Seismic performance of a high-rack warehouse structure with vertical and horizontal mass asymmetries
Petrovic, Kilar
- (S09a-5) Seismic behavior of steel buildings: perimeter vs spatial moment frames
Reyes-Salazar, Rivera-Leyva, Bojorquez-Mora, Rodriguez-Lozoya, Lopez-Barraza
- (S09a-6) Seismic simulation and design of low-rise CBF buildings with and without dissipative connections using opensees
Tirca, Caprarelli, Danila

11:30 - 13:00 Session 9b: Design, Fabrication and Practice

Chair: I. Vayas, H. Akiyama

- Centroamerica Room** (S09b-1) Design of composite slabs with profiled steel sheeting under concentrated loads
Calado
- (S09b-2) Design of the Linked Column Frame structural system
Lopes, Dusicka, Berman
- (S09b-3) Performance of steel tanks in Chile 2010 and 1985 earthquakes
Pineda, Saragoni
- (S09b-4) Steel structure base shear coefficient comparison among the codes
Zandparsa
- (S09b-5) Earthquake resistant design of eccentric, braced frame, steel buildings for improved inelastic response
Kyrkos, Anagnostopoulos
- (S09b-6) Seismic design and experimental tests of an Italian Cold Formed Steel Structure
Iuorio, Fiorino, Macillo, Landolfo

13:00 - 14:00 Lunch - Tupungato-Parinacota-Llaima**14:00 - 14:30 Keynote Lecture**

Chair: C. Clifton

- Norteamerica Room** (KN-05) Seismic performance of steel structures during the 2010 Maule earthquake
Ricardo Herrera

14:30 - 16:00 Session 10a: Global Behavior

Chair: V. Piluso, C. Christopoulos

- Norteamerica Room** (S10a-1) Control of vibrations by means of independent stiff braces for seismic protection
Tosoni
- (S10a-2) Cyclic full-scale test of a two-story special steel beam-through braced frame for industrialized steel residential house
Wang, Zhou, Chen, Tong
- (S10a-3) Local-buckling analysis of lower chord member in steel truss bridge under seismic loading
Yamaguchi, Yamada
- (S10a-4) Impact of gravity loads on the lateral performance of cold-formed steel frame / steel sheathed shear walls
Dabreo, Shamim, Rogers
- (S10a-5) Seismic performance of steel concentrically braced frames with bracing members intersecting columns between floors
Imanpour, Tremblay, Davaran
- (S10a-6) Damage-based seismic performance evaluation of masonry infilled steel frames
Nanos, Elenas, Tzourmakliotou

14:30 - 16:00 Session 10b: Seismic, Wind and Exceptional Loads

Chair: M. Hiaj, R. Saragoni

- Centroamerica Room** (S10b-1) Impact loading tests of steel portal frames with different types of connections
Komuro, Kishi, Kurihashi
- (S10b-2) Numerical simulation of collapse behavior of tall core-outrigger structures under severe earthquake
Sun, Ge, Xu
- (S10b-3) Seismic - aeolian optimal design for wind turbines steel structures in Mexico
Pérez Rocha, López López, Arzola Nuño
- (S10b-4) Damage mechanism of thick fireproof coatings for steel members subjected to monotonic loading
Chen, Jiang, Li
- (S10b-5) Seismic risk assessment of conventional steel constructions considering three earthquake mechanisms in Southwestern British Columbia
Piña, Ventura

16:00 - 16:30 Coffee break – Foyer

16:30 - 17:45 Session 11a: Global Behavior

Chair: D. Beg, L. Tirca

- Norteamerica Room** (S11a-1) Seismic response of dual eccentrically braced systems designed by Eurocode 8
Bosco, Ghersi, Rossi
- (S11a-2) Seismic behaviour of a large span welded steel structure considering lateral restraints and initial imperfections: a case study
Nagy, Cristutiu, Nunes
- (S11a-3) Residual stress and out-of-plumb effects on steel column seismic behaviour
MacRae, Lu, Masuno, Sadashiva, Ziemian, Wada, Clifton
- (S11a-4) Response behavior of steel buildings under pulsive earthquake ground motion during inland shallow earthquake
Takiyama, Hayashi, Minami
- (S11a-5) Simplified assessment of the seismic collapse capacity of flexible moment-resisting steel frame structures
Adam, Jäger

- 16:30 - 17:45 Session 11b: Seismic, Wind and Exceptional Loads**
Chair: A. Mandara
- Centroamerica Room** (S11b-1) Intensity measure parameters for the evaluation of the seismic behaviour of steel moment resisting frames
Haj Najafi, Tehranizadeh
- (S11b-3) Instability problems due to dynamic loading.
Karatzas, Karatzas, Karidis
- (S11b-4) Assessment of progressive collapse-resisting capacity of steel moment frames.
Ferraioli, Mandara
- (S11b-5) Dynamic response analysis of steel portal frames with semi-rigid connection under impact loading
Kishi, Komuro

- 18:00 - 18:30 Closing Ceremony**
Norteamerica Room

Thursday 12th

- 9:00 - 19:00 Technical tour**
Marga Marga bridge, Federico Santa Maria University, and Viña del Mar

Technical Tour

Titanium – La Portada

Reinforced concrete and steel structure

Monday, January 9, 2012. 19:00 – 20:00

La Portada is the name of an area where the city narrows - between Santiago's Metropolitan Park and San Luis Hill. In this zone, wind and water are joined by the rhythm imposed by nature and urban life. Therefore, the tower facades were conceived as wind-filled sails that rotate on their vertical axes, giving the building the dynamism of a great urban door.

It is one of the most technological and modern engineering works built in Chile and it is part of a select worldwide group of buildings certified as sustainable design projects leading energy and environmental efficiency.

The site was chosen for its strategic location, in an area with great symbolism and connectivity, where the structure can be seen from different points of the city.



The design was formulated with the consultancy of experts with extensive experience in the creation of skyscrapers, and it fully complies with strict international standards.

The tower was built with reinforced concrete and steel, structured with a solid core, perimeter framing, and prestressed concrete floors. At both ends of the tower, metallic diagonals with energy dissipaters are placed to reduce deformation during earthquakes.



Energy dissipaters make these kinds of building structures possible, by offering a high level of security in the event of a severe earthquake or extreme winds. The dissipation of energy is allowed by special devices in the structure that reduce deformations and structural stress.

Torre Titanium La Portada is the first project approved by the U.S. Green Building Council (USGBC) to enter a process of environmental certification according to LEED CS (Leadership in Energy and Environmental Design for Core & Shell), which honors leaders in sustainable design projects in energy and environmental efficiency.

Technical Tour

Marga Marga Bridge

Seismic Isolation System

Thursday, January 12, 2012. 9:00 – 19:00

The Marga Marga bridge, located at the city of Viña del Mar, was the first Chilean bridge designed considering base isolation with high-damping rubber bearings (HDRB).

The bridge consists of a single continuous 383 m superstructure supported on 36 HDRB that rest on two abutments and seven piers. Girder height is 2800 mm; flange thickness and width varies along the length. ASTM A-242-81 steel was used for the girders.



Seven piers support the girders. Pier height varies from 22 to 30 m, the tallest one located near the north abutment. A hollow-box type 2x10 m section, 0.25 m thick, is provided for all piers. Concrete cylindrical strength of 24 MPa was used in all concrete pier elements.



The connections between steel girders and piers, and steel girders and abutments are provided through rectangular, high-damping rubber seismic bearings. All the isolators are 300 mm high, with 204 mm of rubber, 16 reinforcing steel shims of 3 mm thick and two 25 mm steel plates at the top and bottom surfaces.

At the abutments, isolation was provided only in the longitudinal direction. In the transverse direction, steel plate stoppers were provided to restrict motion. Finger joints were

provided at each end to accommodate 225-mm displacements in the longitudinal direction to allow for thermal and seismic deformations. Transverse and longitudinal motions are allowed at piers, although an additional safety concrete stopper was provided in the transverse direction.

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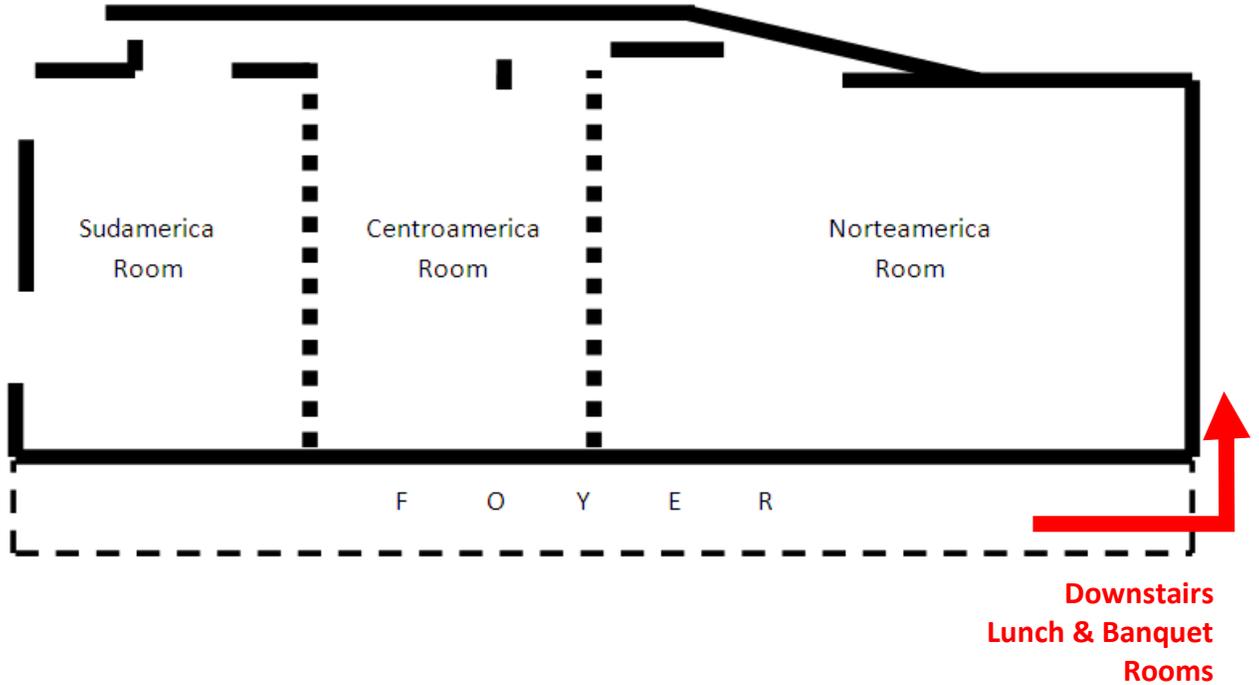
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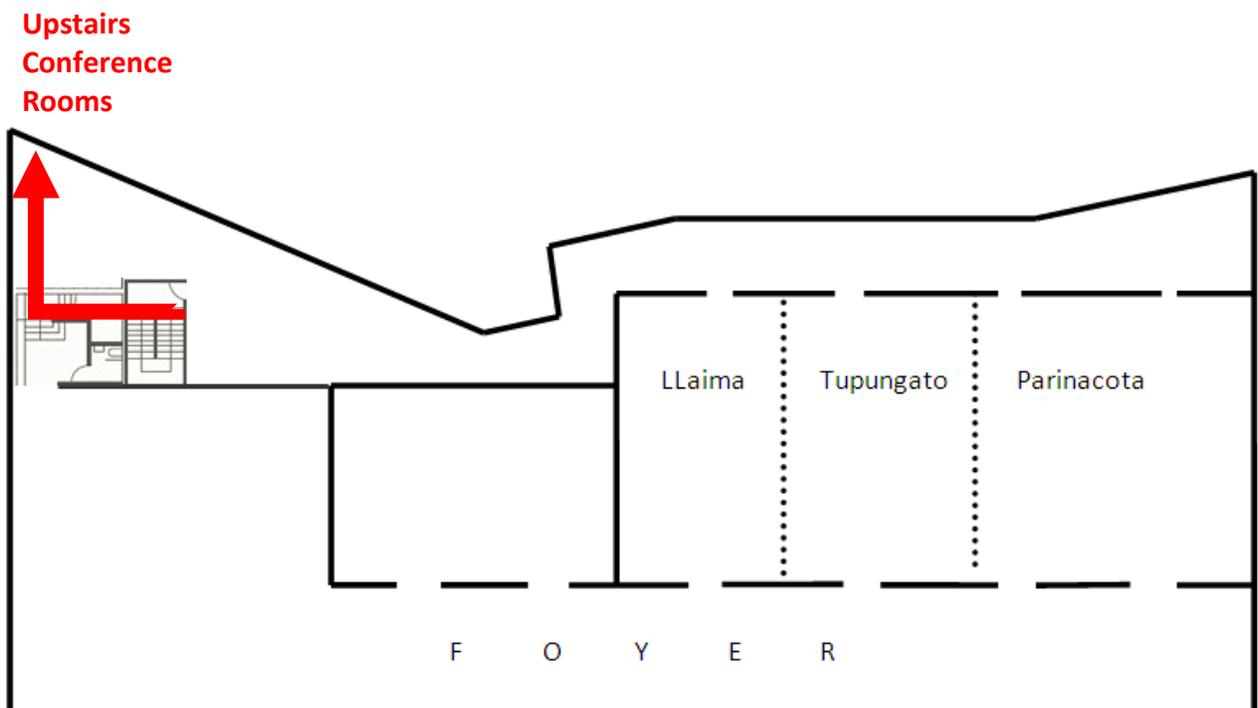
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INFORMATION MAP OF INTERCONTINENTAL HOTEL

Conference Rooms



Lunch & Banquet Rooms



ACCESS TO CONFERENCE VENUE



**Intercontinental Hotel
Subway/Metro** 



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