



**STRUCTURAL
ENGINEERING
INSTITUTE**
Pittsburgh Chapter



**ARCHITECTURAL
ENGINEERING
INSTITUTE**

ASCE SEI and ASCE AEI Joint Meeting

Thin Concrete Shell Roofs: Designing with a Builder's Mentality

Presented By

Edward M. Segal, MSCE

PhD Student, Princeton University



Kingdome, 1976 [photo credit: Jack V. Christiansen]

This presentation will focus on the construction of thin concrete shell roofs and their decline in the 1960s and 1970s. New, more economical structural systems emerged, largely replacing thin concrete shells for long-span roofs. While thin shells were mostly relegated to industrial applications such as cooling towers, nuclear containment vessels, and sludge digestors where they could compete economically, a number of roof structures were still built after the 1970s. Designers like Anton Tedesco, Félix Candela, Heinz Isler, Jack Christiansen, and Pier Luigi Nervi, among others, used and combined construction practices and innovations like formwork repetition, precast concrete, prestressing, and air supported formwork to economically build shell roofs. While some of the works that will be described predate the decline in shell building, they are discussed alongside more recently constructed structures that have been developed using similar construction techniques. (Excerpt from Segal, E. M. and Billington, D. P. Section 7.1: "Concrete Shell Roofs", *Fifty Years of Progress for Shell and Spatial Structures: In Celebration of the 50th Anniversary Jubilee of the IASS (1959-2009)*, International Association for Shell and Spatial Structures: 2011.)

Mr. Segal is currently pursuing a PhD in the Department of Civil and Environmental Engineering at Princeton University under the guidance of Professor Sigrid Adriaenssens and Ted Zoli (HNTB). Previously, he earned a BS from Cornell University (2006) and an MS from Princeton (2008). His Master's thesis, advised by Professor David P. Billington, presented Jack Christiansen's design ideas for thin concrete shells and examined the influence of these ideas on the cost, structural behavior, and aesthetics of his completed structures. From 2008 until 2011, Mr. Segal worked as a staff engineer at Simpson Gumpertz & Heger, Inc. designing glass and metal enclosures in addition to serving as a preceptor and guest lecturer at Princeton.

(1.0 PDH will be given for attendance at this event)

Date: Thursday March 22, 2012

Time: Social Hour 5:30 PM | Dinner 6:30 PM | Presentation 7:30 PM

Location: Penn Brewery Restaurant (Eisenhalle) | 800 Vinial Street, Pittsburgh, PA 15212

Cost: \$40.00 | Payment by Cash or Check at the Door

RSVP: Please contact Linda Kaplan at lkaplan@gfnet.com to register for this event. Please RSVP by March 15, 2012