



# JENSEN HUGHES

Advancing the Science of Safety

## **US Based Codes/Standards in International Design**

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# Acknowledgements/Credits

JENSEN HUGHES would like to thank all our clients worldwide for your trust and confidence in our ability to help realize your project design objectives and to help navigate the often stormy seas of code officials, globally. We greatly value your friendship.



# Opening Thoughts

Practicing internationally can be:

Fun

Rewarding

Challenging

Complex

Risky



# Codes/Standards Globalization

- ❖ Globalization is Being Driven by Product Manufacturers
- ❖ Building Code Development Largely Driven by Product Manufacturers
  - ❖ EN Codes
  - ❖ ICC Codes
- ❖ Performance Standards Driven by Building Code Development
  - ❖ ISO and UL Standards
- ❖ Application of Codes/Std's Still Subject to Local Politics and Traditions



# Global “Acceptance”

## ❖ Function of Level of Economic Development

- ◆ More Economically Developed are Likely to Have Their Own Codes/Std
- ◆ Less Economically Developed Are More Likely To Not Have Up To Date and Welcome The More Current Technologies Embodied Within International Codes/Std

## ❖ Competing Facilities

- ❖ New UL Test Facility in Middle East

## ❖ Multiple Int’l Codes/Std Drive Best Practices



# Code Challenges/Differences

- ❖ Local Code Translations
- ❖ Area Of Refuge Floors
- ❖ Automatic Sprinklers
- ❖ Fire Compartmentation
- ❖ Hazardous Occupancies



# Codes Are Same But Different

- ❖ Construction Materials
- ❖ Compartmentation
- ❖ Egress
- ❖ Firefighting Access
- ❖ Fire Protection Systems



# Case Study No. 1 – So. America Brazilian Semiconductor Fab





# Case Study No. 1

## SEMI-CONDUCTOR FAB - BRAZIL

- ◆ First One in Brazil
- ◆ Ultra High Technology
  - Clean Rooms
  - Exotic Technologies
  - Exotic Processes
- ◆ Hazardous Occupancy
- ◆ Hazardous Materials
  - Pyrophoric Gases
  - Highly Toxic Gases



# Case Study No. 1

## SEMI-CONDUCTOR FAB - BRAZIL

- ◆ US Codes Evolved To Accommodate the Unusual Operations/Hazards
  - Hazardous Materials Criteria - Early 1980's
  - Semi-conductor (H-6) criteria entered UBC in 1985
- ◆ No English Translated Local Codes
- ◆ No Local Requirements For Such Hazards



# Case Study No. 1

## SEMI-CONDUCTOR FAB - BRAZIL

- ◆ Negotiated Use of IBC and NFPA
  - Building Construction Type
  - Operational Considerations
  - Compartmentation/FRRA
  - Egress
  - Fire Protection
- ◆ Late Incorporation of Local Codes
  - 4-hr Fire Rated Exit Stairs



# Case Study No. 1

## SEMI-CONDUCTOR FAB - BRAZIL

- ◆ Multi-National Design Team
  - US Arch, MEP, FPE/Code
  - Brazilian CE, Owners Rep
  - German Process Designer
- ◆ Cultural Differences in Scope
  - CE Work Effort Ends at Property Line
  - US Team Designed all Site Underground



# Case Study No. 2

## Burj Khalifa

- ◆ Fast Changing Regulatory Environment
- ◆ Rigorous Approval Process
- ◆ Communication & Technology Transfer
- ◆ Conflicting Requirements



# Case Study No. 2

160+ Floors

823 Meters

Over 4.7 Million square ft.

35,000 occupants

Occupancies:

- Residential
- Hotel & Service Apartments
- Office
- Observatory (Floors 122-123)
- Retail & Assembly



# Case Study No. 2

- ❖ Comply with Dubai Municipal Building Regulations
- ❖ Use Internationally Recognized Design Standards
  - ◆ IBC 2003
  - ◆ 2003 Life Safety Code – Egress Only
  - ◆ NFPA Standards for:
    - Suppression Systems
    - Detection & Alarm Systems
    - Smoke Management Systems
  - ◆ British Standards
- ❖ Incorporate Life Safety Enhancements



# Case Study No. 2

- ❖ Identifying and Working with the Stakeholders
  - ◆ Owners, Designers, Constructors
  - ◆ Municipalities, Fire Service
  - ◆ Users, The Public
- ❖ Engage Fire Officials Early and Often
- ❖ Establish a “Working Group”





# Case Study No. 2

## BURJ KHALIFA SUCCESS DUE TO:

- ◆ Early involvement and coordination between project team and DCD
- ◆ Open lines of communications throughout process
- ◆ Outside the box thinking and understanding
- ◆ Comprehensive integration program
  - From design to review to implementation



# CONCLUSION

## CONCLUDING THOUGHTS

- ◆ Code Development Collaboration
- ◆ Code Translations
- ◆ Performance Standards Collaboration/Standardization
- ◆ Manufacturer Literature Oversight
- ◆ AHJ Training And Resource Development



# QUESTIONS?

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