

The Masonry Society – Masonry Educators Workshop



Masonry:
Past, Present and Future

AIA Course: **TMSMEW2201**


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THE MASONRY SOCIETY
The Masonry Society
AIA Provider: 505119857



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Questions related to specific materials, methods, and services will be addressed at the conclusion of this presentation.

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Course Description

This presentation provides an overview of the history of masonry construction. While many are familiar with the history of architecture, this presentation will discuss how the masonry industry has been adapting to changes in both design and analysis of masonry structures. The masonry industry has been conducting research in a variety of areas from structural analysis to the sustainability of masonry. With the help of The Masonry Society, this technical knowledge has been transformed into codes and standards used by the design community. Advancements in masonry design and construction will be shown to show where the masonry industry may be headed in the future.

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Learning Objectives

- Attendees will learn how masonry progressed in both architecture and design.
- Attendees will be able to explain how masonry has evolved.
- Attendees will understand the type of research that has been conducted and how that is moving the industry forward.
- Attendees will learn where the masonry industry is headed including BIM, robotics and virtual reality.

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*“Those who cannot remember the past are
condemned to repeat it.”*

George Santayana

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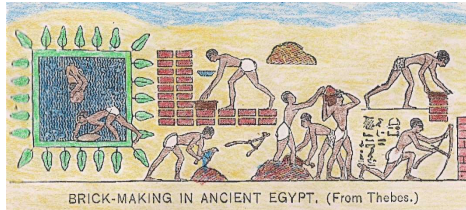
Earliest Civilizations...

- Jericho 7600 – 6600 BC



Photos
courtesy of
iblio.com

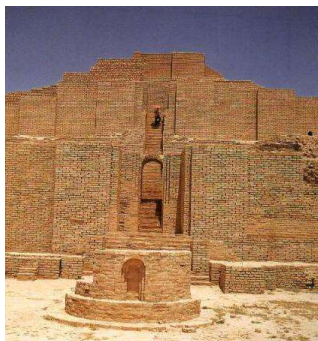
- Egypt 1450 BC



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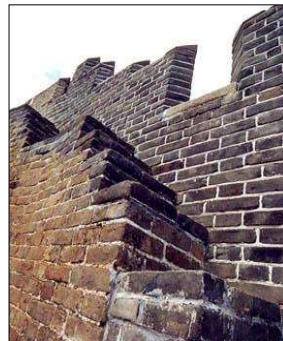
Earliest Civilizations...

- Babylonia 1250 – 1235 BC



Choga Zanbil

- China 500 BC – 1500 AD

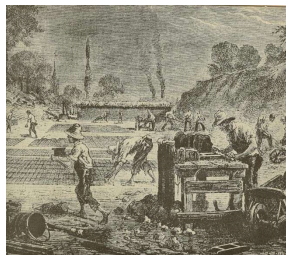
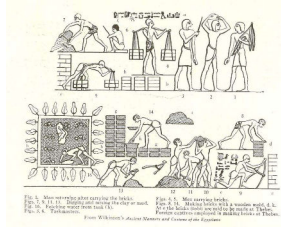


Great Wall of China

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Manufacturing Through the Ages...



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firmitas
utilitas
venustas

Roman architect Vitruvius

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Strength
Function
Beauty

Indiana architect Thomas Gordon Smith

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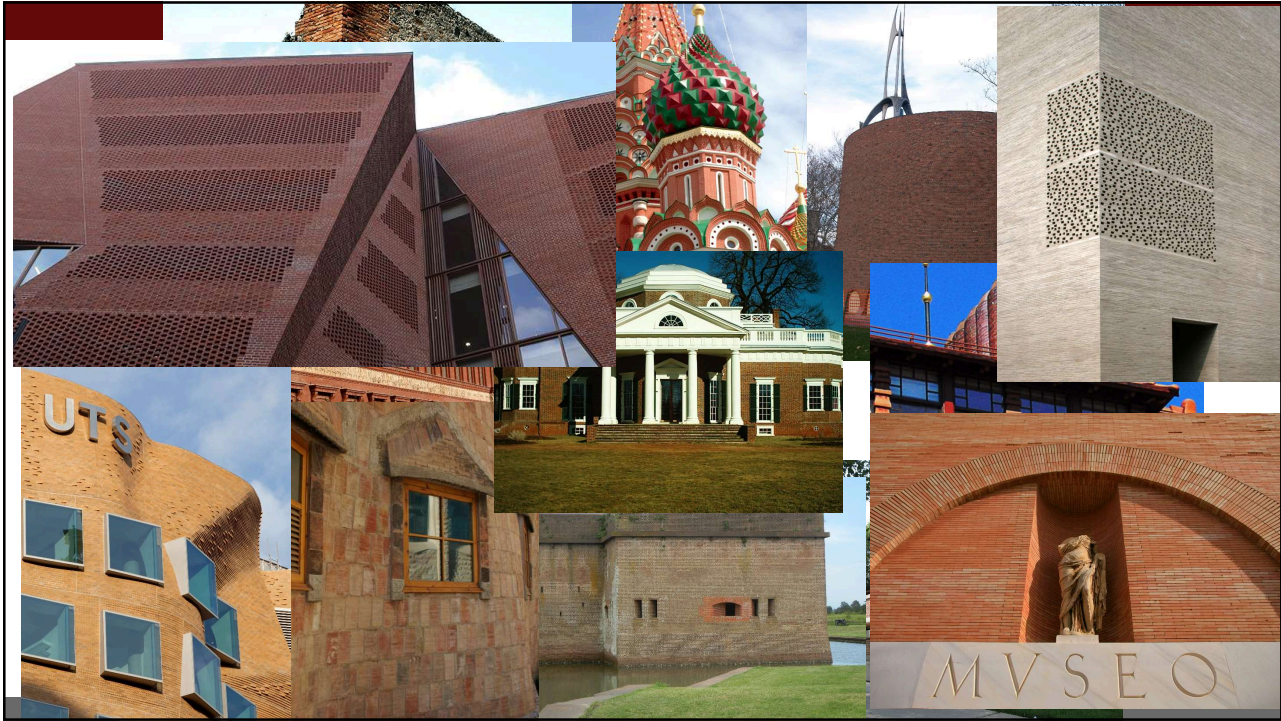


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*We shape our
buildings and then our
buildings shape us.*

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An Impetus for Change...

The Great Fire of 1666 – London



Angliacampus.com

The Great Chicago Fire – 1871



Typepad.com

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Hampton Court, London



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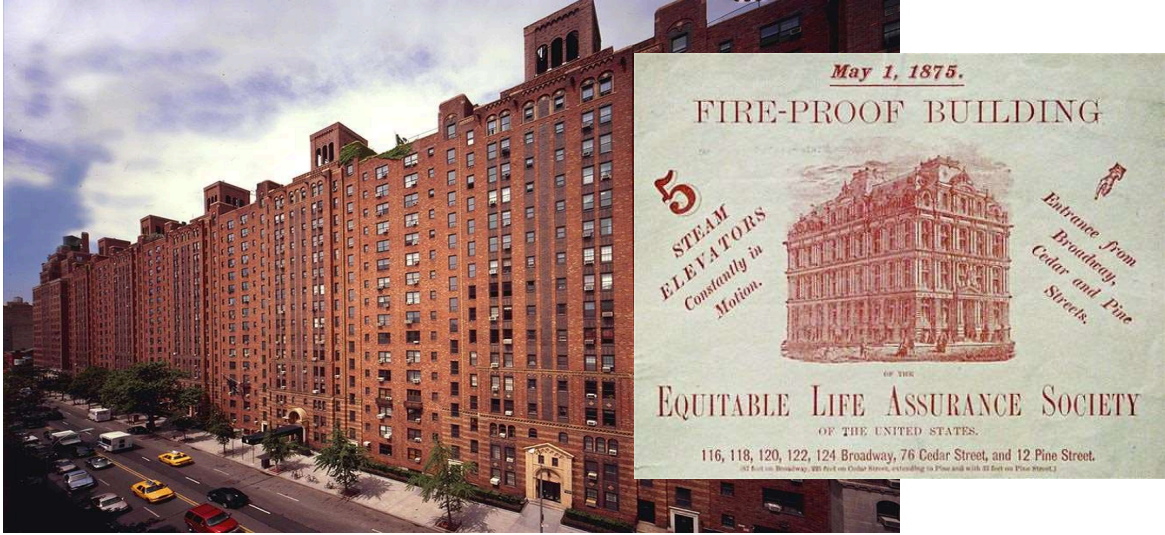
Monadnock Building, Chicago



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London Terrace Apts, New York City



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Compartmentation... Life Saving

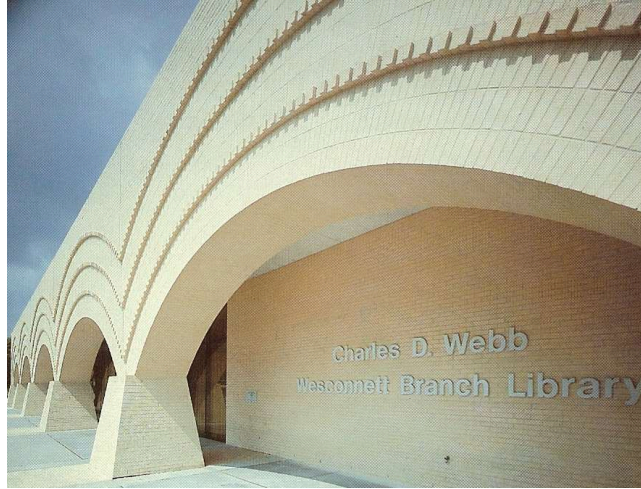


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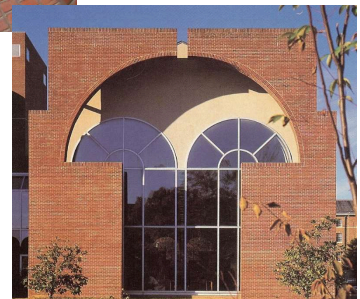
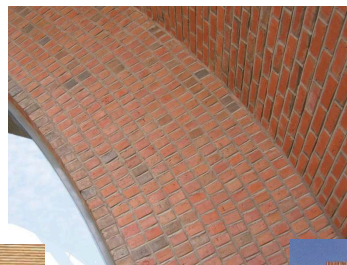
“I asked a brick what it wanted to be...”

Louis Kahn



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Arches...



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An Impetus for Change...

1933 Long Beach Earthquake



1994 Hurricane Andrew



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Reinforced Masonry Development

- 1813 Marc Brunel
- 1851 London Exposition
- 1875 Palace Hotel, SF
- 1923 Tests in India
- 1984 TCCMAR research
- 2009 NSF research



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Excalibur Hotel, Las Vegas, NV

- Tallest masonry structure at 28 floors; completed 1989
- Used high strength block to achieve f'_{m} of 4,000 psi
- One floor per week



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St. Ann's Terrace, New York



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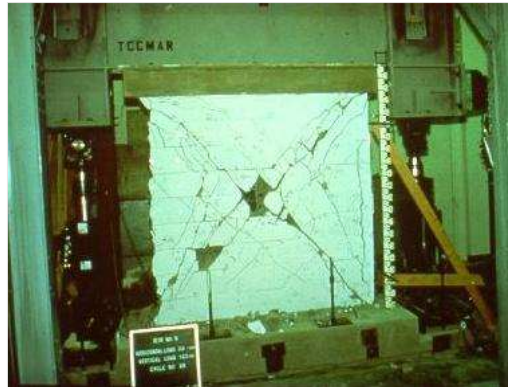
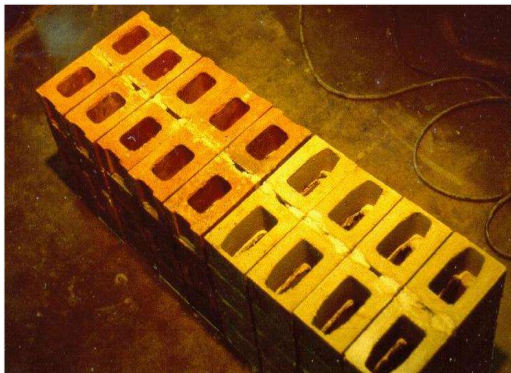
Masonry Research



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Masonry Strength Design

- TCCMAR research – 1980's and 1990's
 - Verified material properties and characteristics



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Industry Research into f'_m



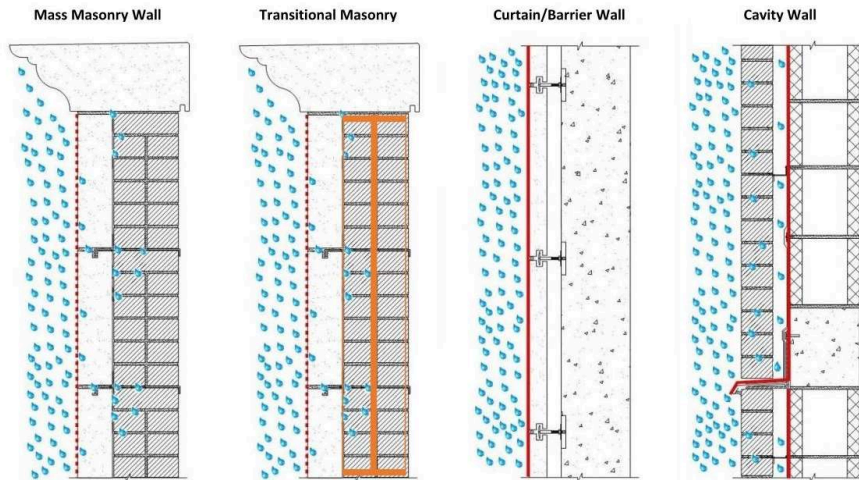
Table 2 — Compressive strength of masonry based on the compressive strength of concrete masonry units and type of mortar used in construction

Net area compressive strength of concrete masonry, psi (MPa)	Net area compressive strength of concrete masonry units, psi (MPa)	
	Type M or S mortar	Type N mortar
1,700 (11.72)	---	1,900 (13.10)
1,900 (13.10)	1,900 (13.10)	2,350 (14.82)
2,000 (13.79)	2,000 (13.79)	2,650 (18.27)
2,250 (15.51)	2,600 (17.93)	3,400 (23.44)
2,500 (17.24)	3,250 (22.41)	4,350 (28.96)
2,750 (18.96)	3,900 (26.89)	-----
3,000 (20.69)	4,500 (31.03)	-----

¹For units of less than 4 in. (102 mm) nominal height, use 85 percent of the values listed.

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Wall Systems – Past to Present

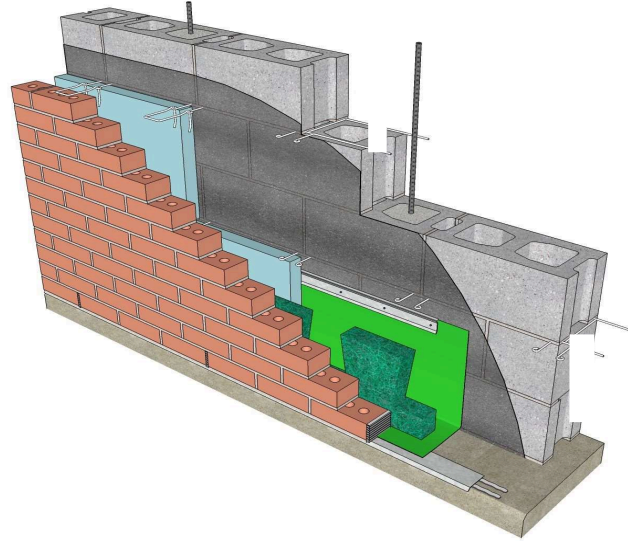


Images by Amy Woods

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Present – Systems Thinking



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The Perfect Wall



rain control layer

air control layer

vapor control layer

thermal control layer

★ **exterior side of the structure** ★

The cladding's principal function is to act as an ultraviolet screen (and rain deflector)

(1) adapted from Joseph W. Lstiburek, Building Science Corporation, buildingscience.com

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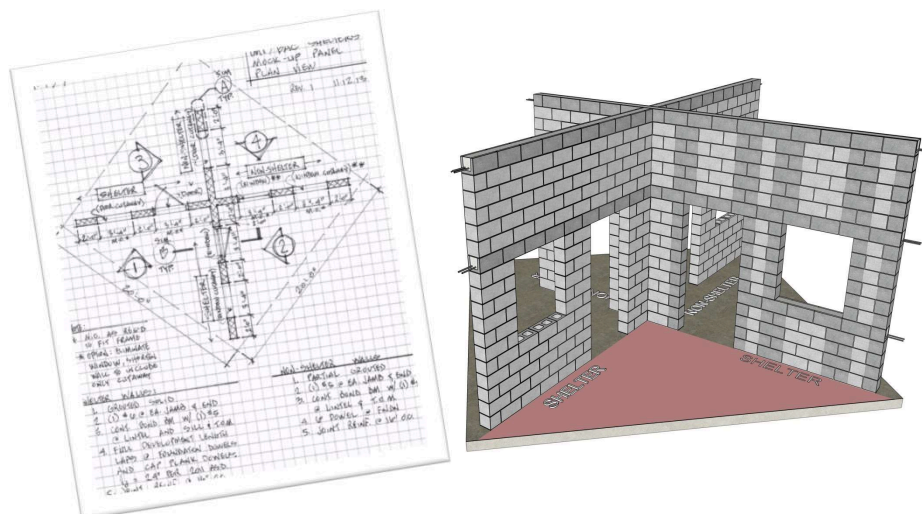
Resiliency

- Building to the minimum level (“code”) isn’t enough



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Storm Shelters



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Structural Masonry Coalitions

- Using masonry for the building's structural support:
 - Bearing walls
 - Shear walls *Combination of bearing & shear walls*
 - Structural cores for stairs, shafts, etc.
 - Hybrid!
- Structural Masonry Coalitions:
 - Provide design tools to engineers
 - Code interpretation and insight
 - Education (in-person or webinars)
 - Work one-on-one with designers

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Single Source Solution

"The contemporary mason needs to be an exterior building enclosure specialist."



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BIM for Masonry

Finally a smart masonry tool inside Revit®.



Be more productive with masonry inside Revit®.



BIM-M Building Information Modeling for Masonry



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Bricklaying...



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Training



team INTERNATIONAL MASONRY INSTITUTE

ABOUT IMI TRAINING DESIGN TOOLS EDUCATION CALENDAR MULTIMEDIA GALLERY

Contractor College

The union masonry difference applies to contractors as well as craftworkers. We offer a constantly updated array of professional and technical courses for union masonry contractors, plus national certification.

Contractor College is based at The Flynn Center, with additional offerings at convenient locations around the nation.

American Subcontractors Association (ASA) has endorsed IMI, praising its diverse curriculum of business and technical courses.

CORE MODULES

- Business
- Finance and Management
- Human Resources
- Project Management
- Technical Electives
- Professional Practice

Contractor College

Contact

Topics

Testimonials

Masonry Camp

Student Campus Programs

Technical Seminars

NATIONAL CERTIFIED MASON CONTRACTOR

MCAA

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Training

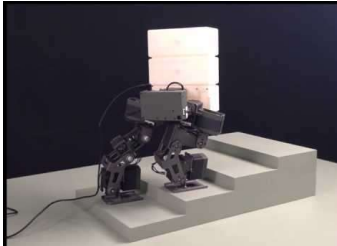
- Upgrades & Certifications
- Cross-Craft Training



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INNOVATION... for the FUTURE



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New Types of Systems...



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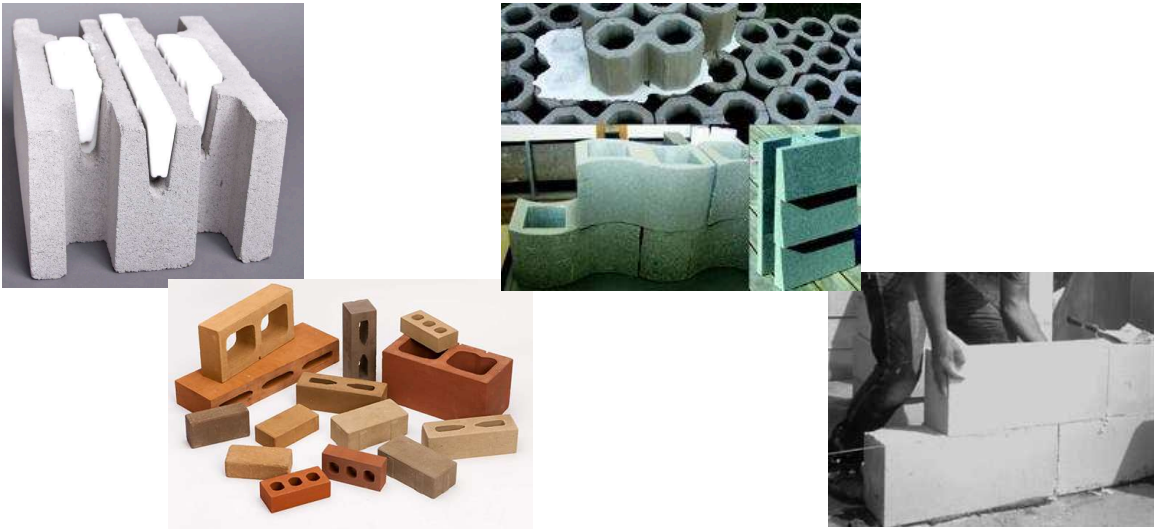
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Pre-Fabricated Masonry (Offsite Constr.)



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New Types (and Sizes) of Units...



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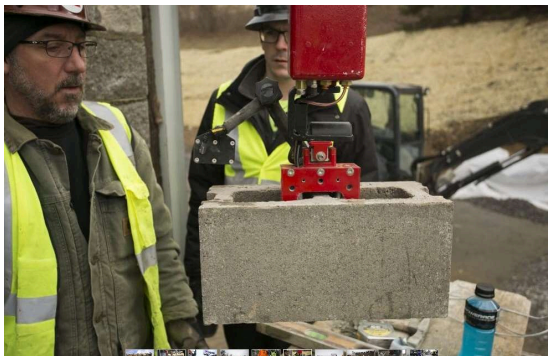
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Robotics – Manufacturing Applications



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Robotics – Jobsite

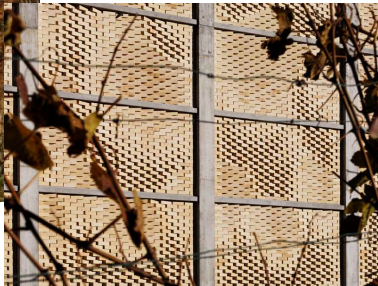


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Digital Fabrication

- Gantenbein Winery, Flasch, Switzerland

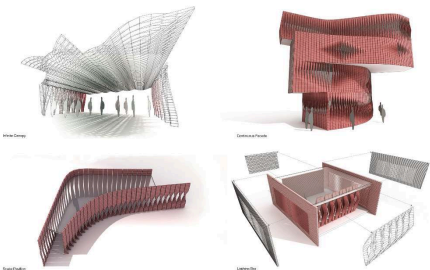


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Innovation in the Masonry Industry

team
JOAN B. CALAMBOKIDIS
Innovation in Masonry Competition
IMAGINE THE FUTURE
OF MASONRY DESIGN AND CONSTRUCTION
\$30,000 IN PRIZES
Open to: Architects, Engineers, A/E Firm
Register by: November 15, 2017
Enter by: November 30, 2017

NCMA
CONCRETE BLOCK
DESIGN
COMPETITION
+ STUDIO PROJECT
CARNEGIE MELLON UNIVERSITY
SCHOOL OF ARCHITECTURE



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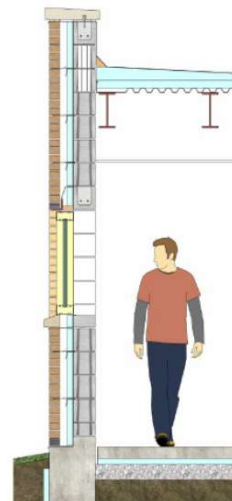
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Masonry Variations exhibit



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*A high performing,
economical building
enclosure delivered
on schedule with high
quality construction.*



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Support



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What do we aspire to?

*"If you don't like change,
you're going to like
irrelevance even less."*

General Shinseki

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Time for a Virtual Tour of a Brick Plant



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Virtual Brick Plant Tour – Triangle Brick

<https://www.youtube.com/watch?v=UwU-6B9HTBc>

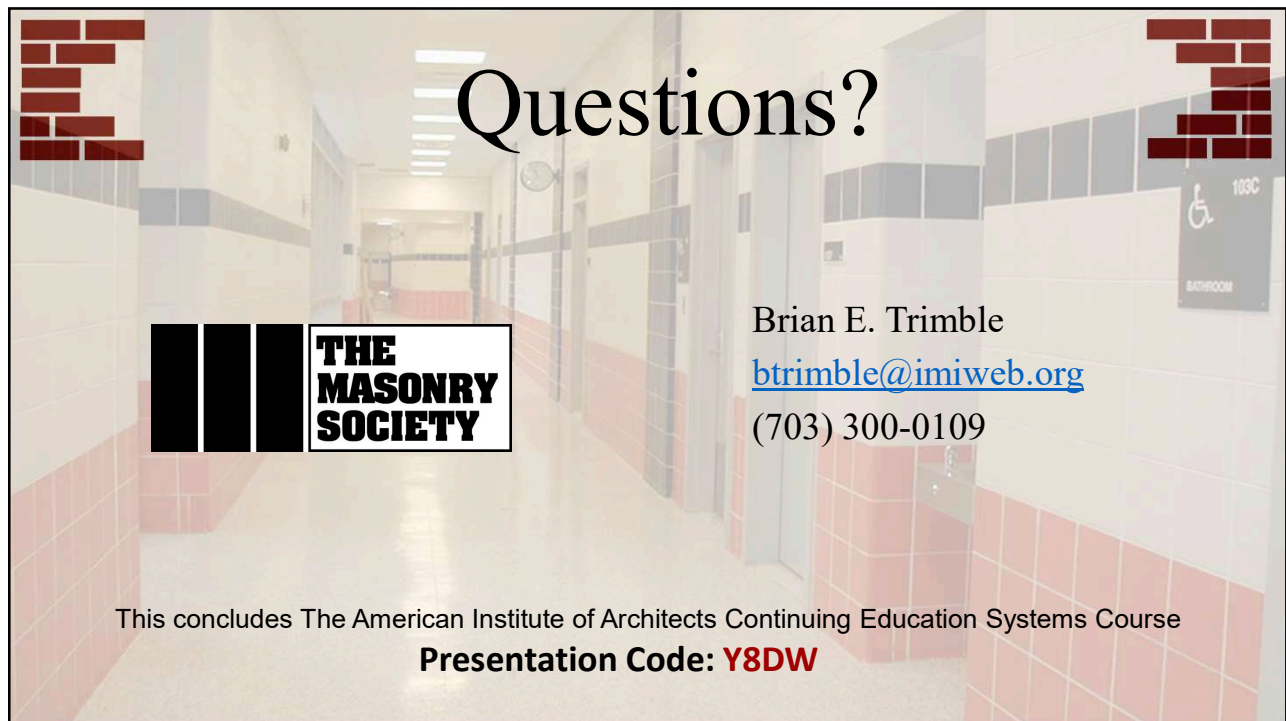
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Virtual Brick Plant Tour – Stiles & Hart

<https://www.youtube.com/watch?v=mtQ5bc-R99I>

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Questions?

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This concludes The American Institute of Architects Continuing Education Systems Course
Presentation Code: Y8DW

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