





Concrete Strength and Sustainability Redefined

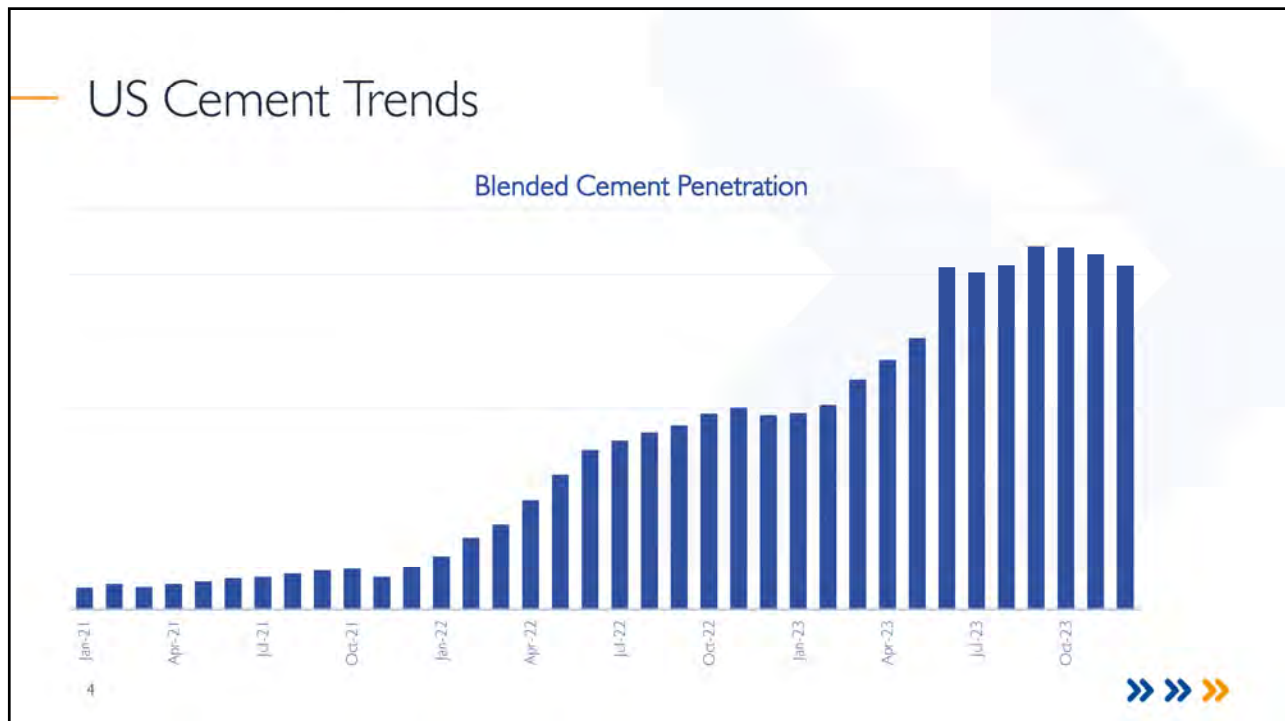
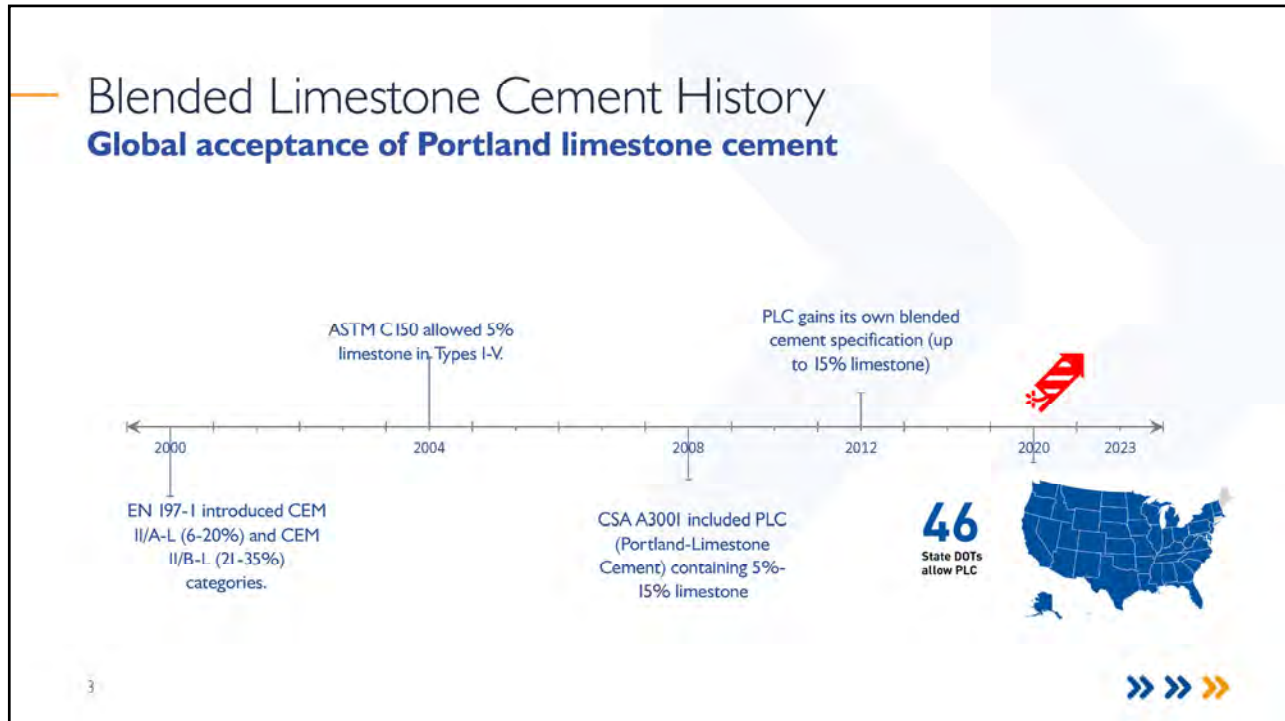
Concrete Innovation - Session 20
May 15, 2024
Tyler Grissom, Master Builders Solutions

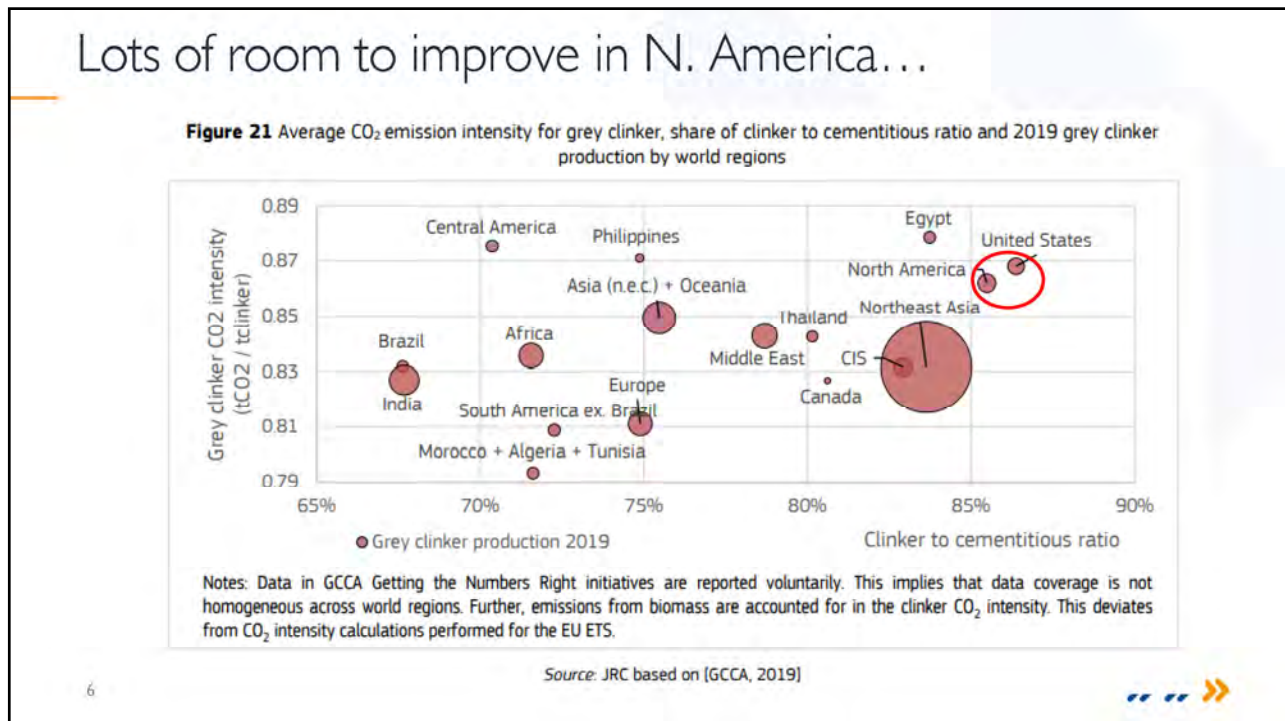


- Blended Cement Trends
- Survey Says...
- Master X-Seed
- Project Spotlight

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The Survey Says... Survey on Portland-Limestone Cement Concrete

Table 8:
 Comparison of survey responses

Issue	ACI-ASCC	NRMCA	TCA	ASCC
	Fall 2023	Summer 2023	June 2023	December 2022
1. Strength, %	45	50	35	50
2. Water demand, %	75/60	60	65	60
3. Set time, %	45	40	60	50

*ACI-ASCC Survey on Portland-Limestone Cement Concrete Summary of responses and comments.
 James Kingler, Kevin A. MacDonald, Jerry A. Holland, Scott M. Tarr, Beverly A. Garnett, and Bruce A. Suprenant

5% ↑ 
Typical Solution
 1/3 ↓ 

Top 2 rated issues pose a major risk to designing Sustainable Concrete

1. Low Strength ➡ More Cement
2. Higher water ➡ Lower Strength (See #1)

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Master X-Seed – Strength Enhancing Admixture Crystalline Calcium Silicate Hydrate (CSH) Nanoparticles



Water Cement CSH



2 × early strength

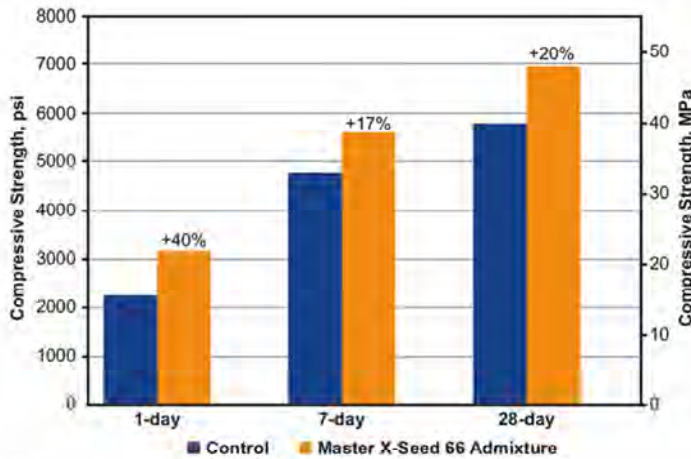
- Improves cement hydration
- Increases strength at ALL ages
- Set time neutral (Issue #3)

Schematic view of CSH crystals in cement and water pore solution

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Master X-Seed – Strength Enhancing Admixture Crystalline Calcium Silicate Hydrate (CSH) Nanoparticles



- Improves cement hydration
- Increases strength at ALL ages
- Set time neutral (Issue #3)



Project Spotlights



Spotlight: Pier 27 “The Tower on the Lake” in Toronto

Completed
June 2019

Owners
Cityzen Development Group and Fernbrook Homes

Contractor
TMG Builders

Designers
architectsAlliance
Entuitive
Verdi Inc.

Concrete Producer
Toronto Redi-Mix Limited

Products
Master X-Seed 55®



Challenges

- Post-tensioned cantilevered decks
- Aggressive schedule

Solutions

- Mix design was optimized for schedule
- Solution: Master X-Seed 55®

Benefits

- Maintained schedule by stressing in 18 hrs
- Lower cement content = Lower GWP
- Greater workability retention

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Spotlight: The Sphere at the Venetian Resort

Owner/s:
MSG Entertainment
Apollo Global Mangement
Vici Properties

Contractor:
AECOM
MSG Entertainment

Designer:
Opulous Holdings, Inc.

Concrete Producer:
Jensen Precast

Market sector:
Commercial

Products used:
Master X-Seed 66®



Challenges

- Timeline Timeline Timeline

Solutions

- Solution: Master X-Seed 66

Benefits

- Increase form utilization, through very early strength development
- Lower cement content = Lower GWP

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Spotlight: Scarborough Subway Extension

Owner/s:
Metrolinx
Infrastructure Ontario

Contractor:
Strabag

Designer:
Hatch

Concrete Producer:
CSITS-FFP LP

Market sector:
Infrastructure

Products used:
Master X-Seed 44®



Challenges

- Labor
- Form utilization
- 100 yr service life

Solutions

- Solution: Master X-Seed 44

Benefits

- Optimize form efficiency based on labor
- Completed ahead of schedule

B



Master X-Seed in Infrastructure



Concrete Producer:
McNeil Brothers

Products used:
Master X-Seed 66®

Challenge:
Tempe, AZ, US 60 Emergency replacement, Master X-Seed provided 19 hr strength of 3500 psi to meet reopening requirement



Concrete Producer:
W W Clyde

Products used:
Master X-Seed 66®

Challenge:
Cheyenne, WY, Runway Replacement. Poor quality locally available aggregate lead to increased water demand and low flexural strength.

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Summary

-  Blended Cements, New Norm
-  Strength Enhancers, Key Enabler of Sustainability
-  Innovation & Collaboration

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