


PNEUMATICALLY APPLIED CONCRETE REPAIRS

for URBAN RECONSTRUCTION



USCP
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ICRI 2016 FALL CONVENTION

J O H N R I N Z E R

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OBJECTIVES

- Establish when to apply concrete repairs pneumatically
- Discuss materials & procedures and the standards which apply
- Differentiate between application methods
 - Dry Process Shotcrete
 - Wet Process Shotcrete
 - Wet Spray Mortar
- Examine each application method through analysis of urban reconstruction projects

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Robotic applied shotcrete: Supersized new construction
Not in the scope of our conversation



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Why Apply Repairs Pneumatically?

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Large continuous vertical and overhead repairs




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Multiple repair areas



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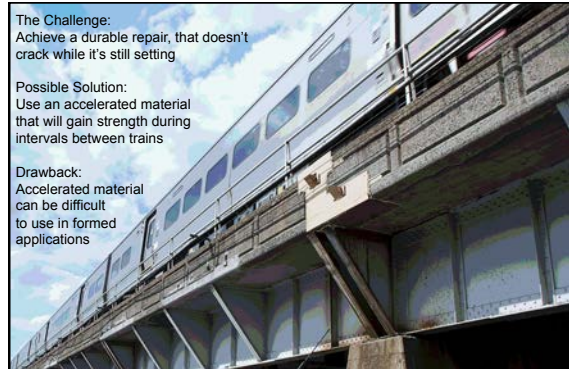
Irregular shapes that are difficult to form

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The Challenge:
Achieve a durable repair, that doesn't crack while it's still setting

Possible Solution:
Use an accelerated material that will gain strength during intervals between trains

Drawback:
Accelerated material can be difficult to use in formed applications



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ACI 506

Comprehensive specification that covers all aspects of applying shotcrete:

- Material standards for field mix and prepackaged products
- Equipment requirements for dry and wet process rigs, air, nozzles, hoses
- Proper execution from surface prep through curing and protection
- Crew composition and qualifications
- Sustainability including repair applications

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ASTM 1480

Material specification for prepackaged shotcrete materials

Categorizes materials by
Performance - flex, permeability
Components – fibers, polymer, etc...

Gives procedures for field sampling that are obtained using regular lab test methods. ACI 506 calls for field samples that are obtained by shooting.

May be more applicable for wet spray mortar.

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Prepacked Aggregate

Manufactured to meet all pertinent specifications

Many enhancements available

- Fiber
- Silica Fume or other pozzolans
- Accelerator
- Polymer
- Specialty cements
- Specialty aggregates

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Dry Shotcrete,

Wet Shotcrete

Wet Spray



Yikes, you've got me so confused

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Pneumatically applied concrete/mortar terminology made easy:

Shotcrete (wet or dry) –

The cement based product is applied using compressed air at **high velocity** so that it achieves compaction upon impact.

Dry – Dry solid materials are transported by one hose to a special nozzle, water through a second. A nozzleman controls the amount of water at the nozzle.

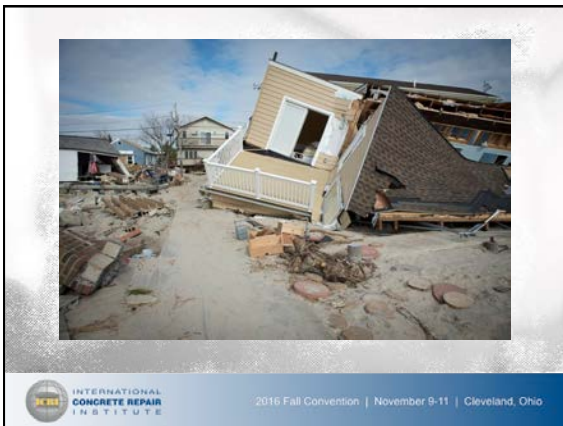
Wet – Material is mixed with water and pumped using a traditional concrete pump. No water is added at the nozzle. Consistency is that of a low slump concrete.

Wet Spray Mortar –

Premixed mortar sprayed at lower volume and lower velocity. Typically smaller equipment



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The Challenge:
Maintain the traditional frame home look of Breezy Point and The Rockaways, while providing structures that are much heartier and resistant to storms like Sandy

Solution:
Steel frames, concrete elements imprinted to resemble wood, or use faux wood architectural pieces



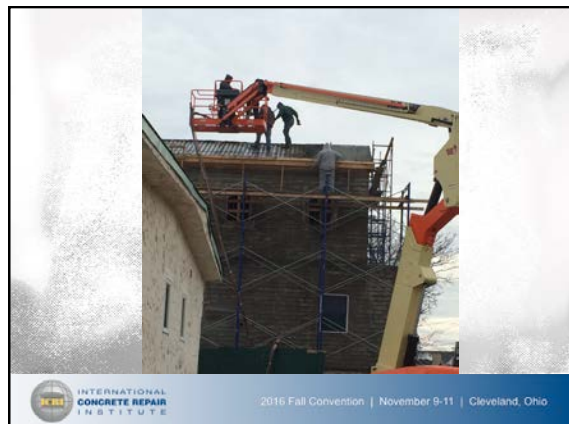
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Easiest way to get concrete to stay on a sloped roof?

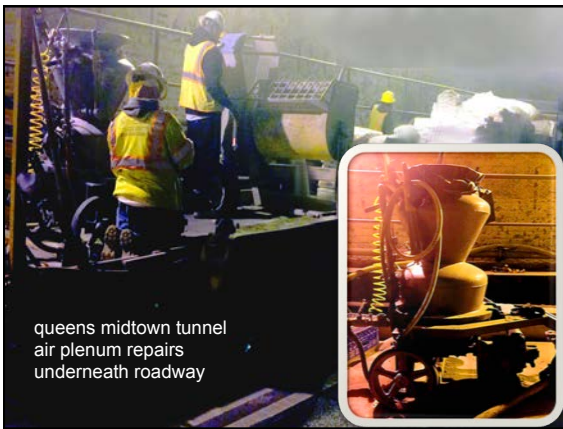
Shotcrete – mixed to a low slump in a barrel mixer



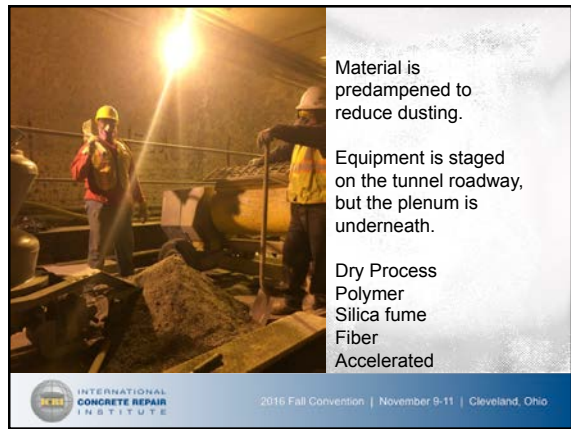
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queens midtown tunnel
air plenum repairs
underneath roadway



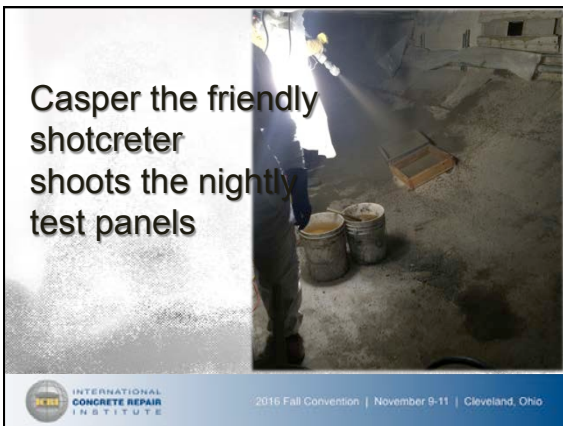
Material is
predampened to
reduce dusting.

Equipment is staged
on the tunnel roadway,
but the plenum is
underneath.

Dry Process
Polymer
Silica fume
Fiber
Accelerated



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Casper the friendly
shotcreter
shoots the nightly
test panels



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