

SHOTCRETE - THE CREATIVE, SUSTAINABLE AND ECONOMICAL SOLUTION


Presented by
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Shotcrete - Definition




"Concrete placed by a high velocity pneumatic projection from a nozzle."

As defined in ACI CT-16 Concrete Terminology


...It is simply a method of placing concrete

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History of Shotcrete



Carl Akeley
Original Shotcrete Gun
1907



Dry-Mix Shotcrete
1920's

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History of Shotcrete



Dual chamber Shotcrete gun 1922

Dry-mix shotcrete 1922



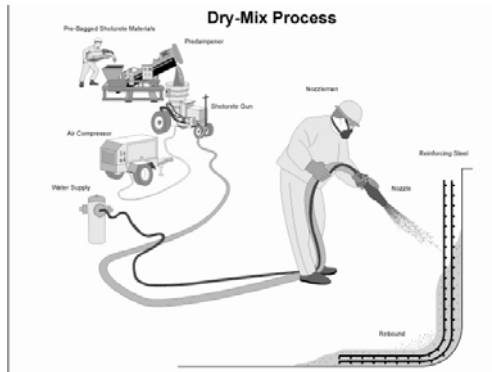
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History of Shotcrete – Dry-Mix Process



Dry-mix shotcrete Today

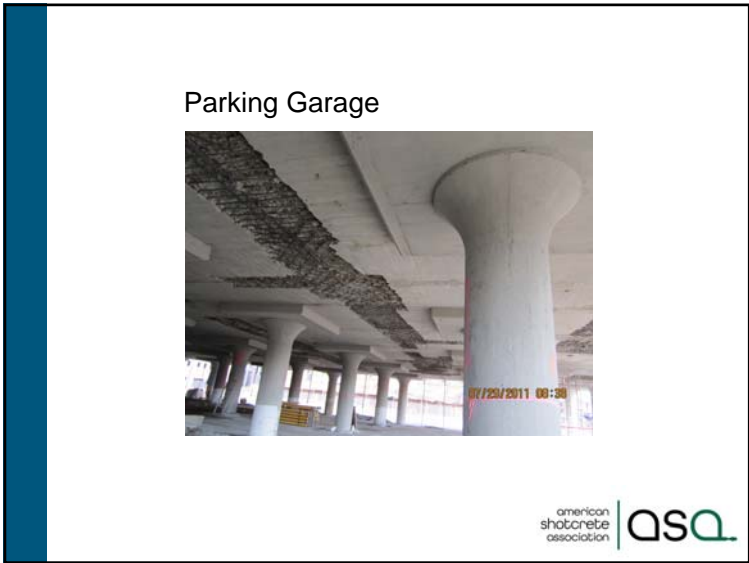
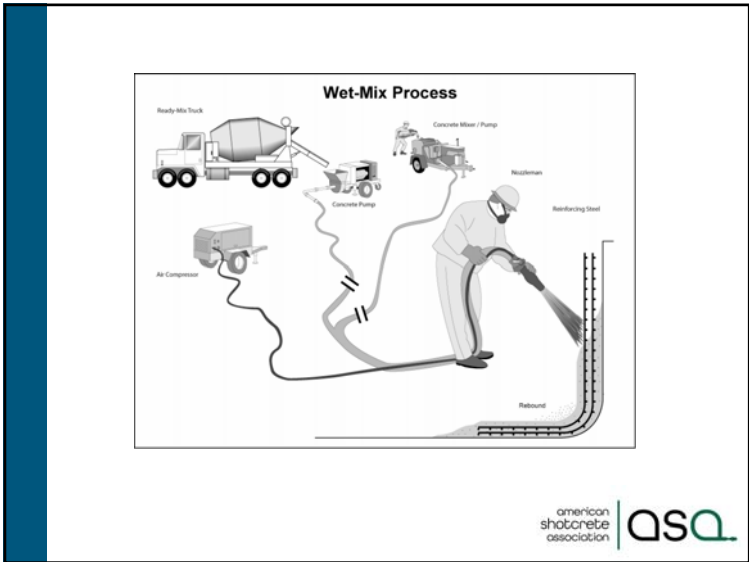
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Bridge Retrofits



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Canals and Aqueducts



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Marine Structures



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Dams



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Soil Nail



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Foundation - Basement Walls



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Structural Walls



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Architectural

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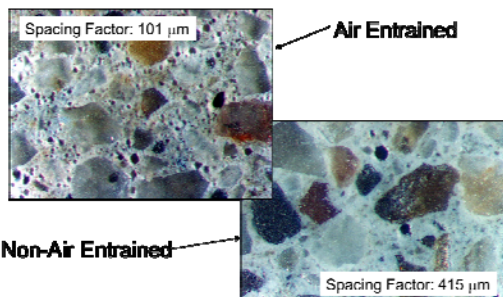
Formwork

- One-sided forms
 - *Lighter*
 - *More than 50% less materials*
 - *No need for carrying high pressure*
- Many projects need no forms
- Curved & tapered sections easily produced

Supplemental Cementitious Materials Silica Fume, Fly Ash, Slag

- Higher compressive & flexural strengths
- Silica fume has better adhesion and cohesion
- Reduced porosity (permeability) - Improves durability
- Improves resistance to sulfate & chemical attack
- Reduces chloride ion penetration
- Class-F fly ash improves resistance against ASR

Air Entraining Admixtures Dry-Mix Shotcrete



Set Accelerators

- Thicker applications in a single pass
- Reduces set time and develops higher, early age compressive strength
- May be needed when retarders are used to initiate the reaction
- Accelerator dosage must be carefully controlled

Fiber Reinforcement

- Micro-Synthetic Fibers
- Macro-Synthetic Fibers
- Steel Fibers



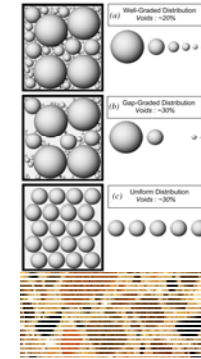
Aggregates

ASTM C 33

ACI Gradations

Gradation No. 1 - Fine aggregate shotcrete
1/4" maximum aggregate size

- Gradation No. 2 - Fine and coarse aggregate
3/8" maximum aggregate size



Modern Admixture Technology for Shotcrete



Curved Sections – No Problem!



Easily Blend to Existing



No formwork!



Rockscapes



Architectural



One-sided Form
Surface finish –
Unlimited!



Sustainability of Shotcrete

- Reduced formwork
- Most efficient sections
- Reduced equipment needs
- Flexible access and schedule
- Time savings
- Better bonding, more durable
- Creative shapes done economically

