Concrete for Kids

K-12 Engineering Education Workshop
ASEE Conference and Exposition
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Concrete for Kids

Presentation Outline

• Program Introduction

• Basic Activities and Mixing Concrete

• Adaptable Learning Modules

• Concrete Properties and Breaking Beams
Is It...

A) Cement
B) Concrete
C) Asphalt
Is it...

A) Cement

B) Concrete

C) Asphalt
Is It...
A) Steel
B) Cement
C) Concrete
Is It...

A) Steel

B) Cement

C) Concrete
Is It...
A) Tile
B) Concrete
C) Stone

Photo from www.stainedbydesign.com
Is It...

A) Tile

B) Concrete

C) Stone
Is It...

A) Concrete

B) Brick

C) Stone
Is It...

A) Concrete
B) Brick
C) Stone
Is It...

A) Granite

B) Marble

C) Concrete

Photo from http://pccpbeach.com
Is It...

A) Granite
B) Marble
C) Concrete
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Program Introduction

• Introduction to Engineering and Concrete
• Thanks to:
  – Dr. Carin Roberts-Wollmann
  – Dr. Richard Weyers
  – Virginia Tech ASCE
  – Titan America
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Program Introduction

• Exciting, Hands-On Learning
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*Program Introduction*

- Applicable to Multiple Age Groups
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Basic Activities

Engineering and Design Discussion
– Design Process
– Scientific Method
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Civil Engineers

“We Build the Quality of Life”
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Discussion of Concrete

- Applications
- Pros/Cons
- Methods

Basic Activities
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Discussion of Concrete

- Strength
- Test Cylinders
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So What is Concrete?

Hands-on Activity!

Coarse Aggregate (Rock)

Fine Aggregate (Sand)

Cement

Water
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Mixing Concrete!

- Pre-mixed Bags
- Student Choice
- Reinforcing
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Mixing Concrete!

Cast Beams
- 1” x 1” x 22”
- Cylinders
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Mixing Concrete!
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Adaptable Learning Modules

• Basic Concrete for Kids
• Chemistry and Environmental Science
• Physics
• Industrial Technology
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Adaptable Learning Modules

Basic Math, Science, and Economics

- Scientific/Design Process
- Arithmetic, Ratios, etc.
- Weight/Mass
- Use of Scales
- Statistics/Variability
- Material Cost Analysis

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Adaptable Learning Modules

Chemistry and Environmental Science

• Cement Production Process
• Hydration Reaction
• Stoichiometry
• Recycled Materials in Concrete
• Environmental Impacts of Concrete
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Adaptable Learning Modules

Industrial Technology

• Innovative Concretes
• Building Formwork
• Concrete Finishing
• Construction Tools and Techniques
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Adaptable Learning Modules

Physics

- Force and Stress, Tension and Compression
- Moments/Force Couples
- Deflection Measurements
- Moment of Inertia
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Breaking Beams!

Break Beams!
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Concrete Properties

• Tension vs. Compression

• Bending Behavior

• Reinforcing Steel
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Concrete Properties

Which one is the stronger material?
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Analysis

Collect and Compare Data

Influence of Water to Cement Ratio

Cost Analysis
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Wrapping Up...

- Hands-On Learning
- Introduction to Engineering
- Any Grade Level
- Applicable to Multiple Topics
- FUN!

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Questions?

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