NASA Education and Eco-Core

Carol Taylor

Math Teacher

Hanes Magnet School

Winston-Salem/Forsyth County Schools

SE Regional Space Grant Meeting

September 10, 2011

Carol Taylor

- Kenan Fellow
- National Board Certified Teacher
- 2009 Edyth Sliffe Award (Mathematical Asssociation of America): Excellence in Mathematics Teaching
- Master's of Applied Statistics – Ohio State University
- B.S. (Mathematics) – Miami University (Ohio)
- Research Intern – Battelle
- Biostatistician – Wake Forest Medical Center
- Math Teacher – Winston-Salem/Forsyth County Schools

Topics

- NASA Education Resources
- Aviation Safety:

  Eco-Core Research
- Kenan Fellows Lesson Plan

NASA Education Resources

- NASA Education Website
- Space Math Booklets
- Algebra Lessons
- Climatograph

Space Math Booklets

- Real-World Math Problems
- Topic by Problem Number Matrix
- Problem-Solving to Calculus
- Space Math I
- Lunar Math
- Image Scale Math

Algebra

- Space Shuttle: Linear Regression
- Orion: Geometry and Algebra
- Weightless Wonder: Quadratic Functions

My NASA Data

- Satellite Data Set
- Location: longitude and latitude
- Create Climatograph
- Modifications: Created data sets
- Social Studies Curriculum: Asia, Africa, Australia
- Science Curriculum: Weather, Climate

Eco-Core Water Absorption Properties

- Eco-Core Properties
  - Lightweight
  - Fire resistant
  - Closed Cell
- Eco-Core Modification
  - Expancel 920 DU 80

Objective

Modify Eco-Core to become closed cell while maintaining its low density and fire resistant properties.

Approach

- Eco-Core/Expancel samples were immersed in water and placed in a vacuum chamber.
- Pressure was reduced to bring water to a boiling point.
- Samples were removed when no more submerged bubbles were evident.

Sample	Percent Expancel (920 DU 80)
A92	100%
B92	50%
B92x	50%
C92	25%
D92	0%

Results

Sample (% Expancel)	Weight (g) Before Immersion	Weight (g) After Immersion	Weight (g) Percent Change
A92 (100%)	1.049	1.109	+5.7%
B92x (50%)	1.045	1.210	+15.8%
B92 (50%)	0.845	1.019	+20.6%
C92 (25%)	2.564	3.878	+51.2%
D92 (0%)	2.085	3.779	+81.2%

Concluding Remarks

Conclusions

- The modified Eco-Core samples are open cell.

Future Research

- The amount of Expancel used.
- Use expanded Expancel.
- Estimate the amount of Expancel needed to become closed cell.

Kenan Fellow Lesson

7th Grade Math Common Core Standards

- Ratios and Proportional Relationships
  - Analyze proportional relationships and use them to solve real-world and mathematical problems.

- Geometry
  - Solve real-life and mathematical problems involving angle measure, area, surface area, and volume.

Kenan Fellow Lesson

- Simulate the *Eco-Core Water Absorption* research using various types of wood.
- Measure dimensions, weight of wood samples.
- Calculate volume, surface area and density.
- Immerse samples in water.
- Measure dimensions, weight of wet wood samples.
- Calculate volume, surface area and density.
- Calculate percent change in measurements.

Kenan Fellow Lesson

Materials

- Wood samples – prisms, cylinders
  – some painted
- Immersion Containers
- Digital Scale
- Caliper

Outreach

- Weekly Learning Team Meetings
  - 7th Grade Math Teachers
- School Wide Faculty Meeting
- District Wide 7th Grade Math Teachers
- Kenan Fellows Teacher Network and Website
- Science/Math Professional Teachers Conference
- My school website

Reflection

- Thinking
- Collaboration
- Lab Experience
- Rejuvenation
- Continue Outreach

Acknowledgements

Dr. Kunigal Shivakumar

Robert Sadler

Matthew Sharpe

John Skujins

Wayne Szafranski

NASA: Center for Aviation Safety

Kenan Fellows Program

Center for Composite Research Materials

Greg Taylor