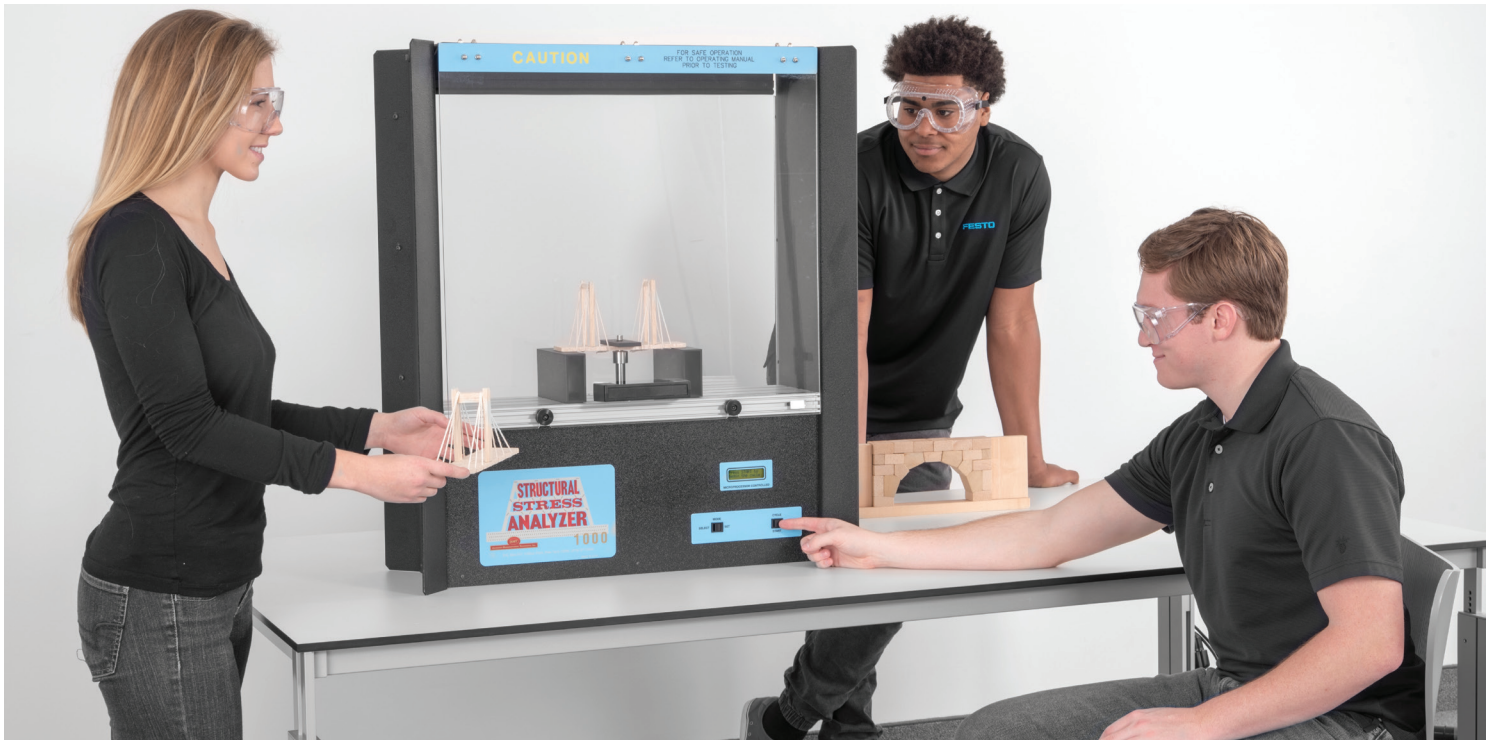


Integrative STEM Education

Engineering and Stress Analysis

FESTO



Highlights

- Design/build/test various beams
- Demonstrate the effect of applied forces
- Observe effects of tensile and compressive forces
- Build/stress-test a sample truss
- Construct and stress-test a simple cable bridge system
- Design innovative solutions to real-world problems, challenges, and needs

STEM Connections

In the STEM Engineering and Stress Analysis course, students discover how the four disciplines connect as they explore and practice the skills needed to work with structural elements.

Once they are familiar with these technologies, they will have the opportunity to design innovative solutions to real-world problems, challenges, and needs.

Science

- Statics
- Force and mass
- Equilibrium
- Hooke's law
- Young's modulus

Technology

- Stress analyzer
- Scale modeling
- Cutting tools and adhesives

Engineering

- Structural design
- Stress and strain
- Truss design
- Arch design

Math

- Angles
- Application of formulas
- Arithmetic calculations
- Units of measurement

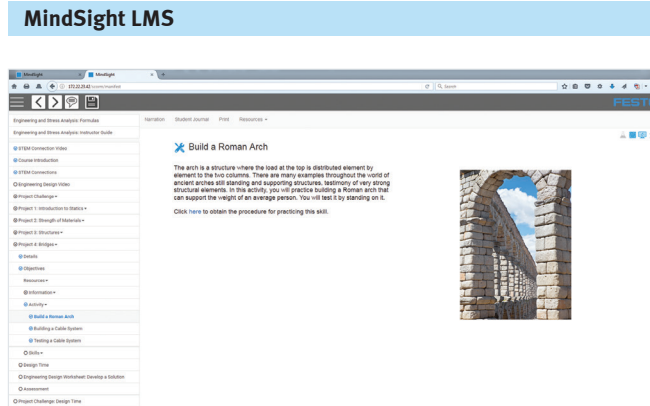
Integrative STEM Education

Engineering and Stress Analysis

STEM Engineering and Stress Analysis

The purpose of the STEM Engineering and Stress Analysis course is to have students learn by doing. They will assume the roles of civil engineers in order to understand the principles of static loads, carrying out the stress analysis involved in the design of structures, such as buildings and bridges.

They will be challenged with the design and construction of the prototype of a new bridge. They will also investigate the considerations engineers take into account before designing structures and apply these considerations and additional information to design and build different structures intended to bear loads, such as vehicular and pedestrian traffic.



Upon completion of the STEM Engineering and Stress Analysis course, students will be able to:

- Fully understand all physics principles of statics, including force and mass, stress and strain, and equilibrium conditions.
- Select the best materials and shapes for the final product, accounting for all their properties.
- Gain understanding of Hooke's law and Young's modulus of elasticity.
- Consider all structural options, accounting for beam stresses as well as deflections and bending.
- Examine all types of bridges and their failure modes.
- Apply the engineering design process.

Equipment and Supplies

- Multimedia presentation
- MindSight installation and user guide
- SSA 1000 stress analyzer
- Glue gun
- Safety glasses
- Protractor
- Twine
- Taper file
- Craft sticks
- Rubber bands
- Rubber mat
- Chopper tool
- Index cards
- Craft cover
- Scissors
- Roman arch kit
- Phillips-head screwdriver
- Ruler
- Spring scale (250 gram and 2000 gram)
- Polyfoam
- Construction paper
- Wood glue
- Wood glue stick

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