

Design Brief

Engineering Energy Efficient Buildings

SCITEC Design Challenge '09-'10

Problem:

Design and construct a functional shed type building that stays as warm as possible when left outside unheated over a 24-hour period.

Design criteria and constraints:

- The technological design process (see supplied graphic) must be used and documented.
- The building must capture and retain as much heat energy as possible
- The only source of energy is the sun
- Incorporates the use of recycled (post consumer) materials as much as possible
- Total volume (calculated from external dimensions) is equal to or greater than 200 ft³
- Your team spends no more than \$500 on materials
- Have a minimum glazing (window) area of 6 ft²
- Have a door through which a judge may enter
- A 6 foot vertical pole should not touch the inside ceiling anywhere
- Must be moved to the Capital Area Technical Center for presentation/judging in the spring

Scoring rubric categories:

- **Process** Clear and complete evidence of using the technological design process; including:
 - Documentation of process steps using appropriate media and artifacts
 - Presentation of the process using relevant documentation
 - Explanation of significant problems and failures experienced and their solutions
 - Recommendations for building redesign, and how design element(s) used might be incorporated in other buildings. Include how your team's structure will be used.
- **Product**
 - How well the design criteria and constraints were met
 - Construction quality (e.g., accuracy, joinery, effective use of materials, durability, use)
 - Maximum heat gain – how well it captures heat relative to the competition
 - Minimum heat loss – how well it retains heat relative to the competition. Both heat gain and heat loss will be determined by the maximum and minimum temperatures over a 24 hour period. Monitoring (using min/max temperature probes and HOBO data loggers placed one foot above the floor) begins after closing your building's door (that has been open one hour).
 - Efficiency – how well your building captures and maintains heat. Efficiency determined by the rate of heat gain compared to the rate of heat loss.

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National Center for
Technological Literacy
Museum of Science, Boston



Capital Area: Capital Area Technical Center • Cony High School • Erskine Academy • Gardiner Area High School • Hall-Dale High School • Maranacook High School • Monmouth Academy
Sanford Area: Sanford Regional Vocational Center • Marshwood High School • Massabesic High School • Noble High School • Sanford High School
Mid Maine: Mid-Maine Technical Center • Lawrence High School • Messalonskee High School • Waterville High School • Winslow High School