EDUCATION & CAMPUS

1994 BRIDGE BUILDING CONTEST

The 4th Annual Light Weight Bridge Building Contest was held in New Jersey in May, 1994. As in past years, the contest was jointly sponsored by the **New Jersey SAMPE Chapter** and the **New Jersey Science Supervisors Association (NJSSA)**. Student teams from high schools throughout the state competed for cash prizes to build the lightest weight, most load efficient structure from composite materials supplied in kit form. As in previous years, kit materials included fibers, fabrics, epoxy resin, braid, honeycomb, and balsa core, and an instructional video.

The conduct and organization of the contest was unchanged from previous years, and has already been reported in the *Journal* [*SAMPE J.*, **27** (5) 102 (1991) and **29** (5) 57 (1993).] However, each year the required structure becomes larger and more demanding (see Table).

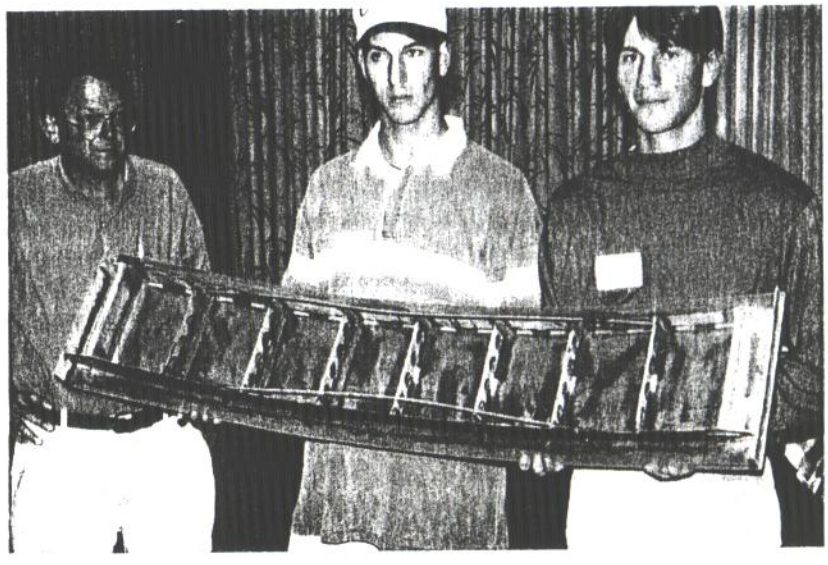
This year the bridge structure had to span 48 inches with an arch in the center. The student, with added weights in a back pack, would then have to walk over the bridge, pausing in the center for a full minute. The bridge with the highest efficiency ratio (student plus added weight divided by bridge weight) was the winner.

The three cash prizes went to **South Brunswick High School** 1,537 grams (227.5 pounds), **Bayonne High School,** and **Hopewell Valley High School.** South Brunswick also won a Prince graphite tennis racquet for the most innovative design. **Prince Sports Product Group** also donated hats and water bottles to many of the students, and provided a second racquet to the advisor of the winning team – an idea that was hoped would induce more schools to participate (each school needed a faculty advisor).

Year	Span x Width cm (in)	Load gr (lbs)
1	56 x 8 (22 x 3)	45,400 (100) distributed
2	102 x 8 (40 x 3)	29,964 (66) distributed
3	61 x 61 (24 x 24) platform	Student + Added Weight
4	122 x 31 (48 x 12)	Student + Added Weight

Load testing the aluminum-carbon sandwich bridge built by Hillsborough Elementary School.

Most of the schools in the contest this year had participated in earlier years. Sixty students representing 14 schools participated in the final judging held on May 19th at the **Johnson & Johnson Surgical Dressing Plant** in South Brunswick, NJ. One very interesting entry came from a 5th grade science class at Hillsborough Elementary School. The group built a graphite fabric-aluminum honeycomb sandwich which worked, but wasn't light enough



South Brunswick High School shows off the substructure of their winning bridge built of wood with strategically located carbon tension strips.

to win. They had a special advisor – an M&P engineer from **Boeing Helicopter** who happened to be the daughter of a Hillsborough science teacher.

An evaluation of the contest has led us to the conclusion that it is becoming too large and complex for high school students. In most cases, the contestants this year participated last year, so there was an experience factor. The complexity hindered the entry of new schools. In future years, we will revert to the smaller bridges in hopes of increasing participation.

Financial support for the contest came from the New Jersey SAMPE Chapter and NJSSA. Companies which graciously donated materials for the contest included: **Airtech International; Allied Signal; Akzo Fortafil Fibers; Atkins & Pearce; Baltek; BASF Structural Materials; Dow Chemical; Hexcel; JPS Glass Fabrics; M&O Engineering; Mutual Industries; Plascore; Radcure;** and **Sunkyong Industries.**

UNIVERSITY OF LEICESTER DISCOVER NOVEL ELECTRO-OPTIC MATERIALS

Researchers in England have discovered novel solid-state electro-optic materials that could herald the introduction of revolutionary types of glass and be used in energy saving systems. The materials are semiconducting organic and organometallic complexes that change their intensities of absorbance in the visible spectrum when an electric potential is applied across them.

The discovery was made by Andrew P. Abbott, Paul R. Jenkins, and Nadia S. Khan at the **University of Leicester.** "The results are unprecedented," says Abbott, a physical chemistry lecturer who is spearheading work on the project. "We now have solid-state materials that visibly darken or lighten when an electric current is passed through them, and we have shown that the effect is caused by a physical change rather than a chemical one."

The researchers suggest that the new materials might be developed of ruse with various types of glass.

The materials discovered by the Leicester group are semiconducting organic complexes derived from tetrathiafulvalene (TTF) and organometallic complexes derived from metal maleonitrile dithiolates such as disodium copper maleonitrile dithiolate (CuMNT) [*J. Chem. Soc., Chem, Commun.* **1994**].

The materials are unique because their electro-optic properties depend upon a physical rather than a chemical change. The researchers hypothesize that the changes in optical absorbance of the materials arise from reorientation of the dipoles of the noncentrosymmetric counterions that sit in a lattice of stacked planar complex ions. They postulate that on application of a potential field, the ion dipoles align within the lattice and this changes the overlap of the molecular orbitals and hence the magnitude of the absorbance.

HUGHES EDUCATIONAL GRANT

An $86 million grant to 62 universities to improve science education was announced by the **Howard Hughes Medical Institute,** an organization founded in 1953 by the secretive billionaire to help advance and improve science education.

The gift is the latest contribution to national science education programs at the collegiate level and in public schools by the Hughes organization and other philanthropic groups.

The institute said its efforts had provided research opportunities to 15,000 undergraduates, attracted more women and minorities and assisted nearly 50,000 science teachers and students at local schools across the country engaged in efforts to improve science curricula.

Under the grants announced, the colleges and universities will each receive $1 million to $2 million over four years to improve science education in several areas, including modernizing teaching equipment and laboratories, improving pre-college science education and outreach to local public schools, and expanding opportunities in the sciences to under represented groups like women and minorities.

EDUCATIONAL TRENDS IN JAPAN

In Japan, the percentage of bachelor's degrees in natural science, engineering, and computer science started falling around 1985 as those in the social and behavioral sciences began rising. The increase in behavioral sciences degrees seems to be especially dramatic. Most dramatic has been the sharp drop in the percentage of graduate science and engineering students that enter jobs in manufacturing – from a peak of about 54 percent in 1987 to 46 percent in 1992.

White papers on science and technology are issued every year by Japan's science and technology agency. They are similar in scope to the **US National Science Foundation's** biennial Science and Technology Indicators.

The 1993 white paper stated "Japan is being forced to solve new problems, such as the rapidly aging society, declining birth rate, and a decrease in the number of [people in] the work force." Japan needs more, not fewer, scientists and engineers to tackle its internal problems – including the environment – but the flow through the educational pipeline, it fears, is beginning to decline.

Japan has always been worried about its vulnerability as an island nation with few natural resources. Throughout the late 1980s, the country's elders murmured worries that young people were gravitating toward Western-style frivolity. It is over the declining popularity of science and technology among Japan's youth, and on comic books, television, and compact discs.

A recent report by the **Science & Technology Agency** attempted to forecast the demand in Japan for scientists and engineers by 2005. Assuming an annual gross national product increase of three percent between now and then, the agency predicted a shortfall of 360,000 by then. A four percent annual average rise would produce a shortfall of 480,000 technical workers.

In addition, the percentage of women who received a bachelor's degree in science in the US in 1992 was 30.4 percent. That figure for Japan was only 12.6 percent.

GEORGIA TECH SUBSTITUTE SATELLITE DISHES

A new type of flat and flexible antenna that resembles a window curtain may offer an aesthetically attractive alternative to the bulky satellite dishes that have sprouted up around homes, shopping areas, and office buildings.