DESIGN BRIEF

by Pat Hutchinson

The engineering that goes into sneakers is nearly mind-boggling, but then, athletic shoes are serious business. Even to the less athletically inclined, the prospect of continued mobility throughout a long life makes the science and technology of footcare important.

In the Mar/Apr '00 issue of *TIES* I described an activity we use to explore both structural principles and aesthetic preferences through the design first of paper sandals, then of sneakers. That activity scratches the surface of these issues. This article suggests some ways to delve more deeply into the real issues of sneaker design.

One of the most critical aspects of sneaker design has to do with gathering information about the foot. As Rosemarie Connelly has pointed out, that is a sophisticated science. Comfortable and efficient movement in sports means that measurements of many kinds must be taken, not just of feet at rest, but of feet in action, and from all angles. Our challenge is to try to simulate some of that measuring in the classroom.

At first I thought that advanced Electronics or Control Technology classes might be able to simulate the pressure pads used by orthotics manufacturers to acquire data about individual feet, but the sheer number of tiny sensors needed seems to be out of reach of the average technology class. Gathering information about pressure exerted by a foot at rest is only the beginning of the kind of diagnostics that lead to good support, as indicated by the information from the Footmaxx company, a maker of advanced orthotics.

So how can a technology class gather information about the pressure a foot exerts? Here's a path of experimentation I decided to follow.

Dust for footprints

I wondered whether a white on black or a black on white print might supply more information. So I put a layer of talc in the bottom of one shoe box, a layer of black powdered poster paint in another.

I tried both, consecutively, with my right foot and then examined the prints. The black print (a) was clearer. I repeated the process to compare the prints, this time remembering to also draw around my foot (b). My aim was to use this information to make a supportive insole, and I needed to know the size and shape of the bottom layer.

I envisioned using the information about my foot to build up an insole from layers—stereolithography-style. Contrary to my expectations, I could tell that the darkest areas of my print were not the areas of greatest pressure. In fact, the areas that got the most pressure were medium gray, because the pressure bonded the powder to my skin and pulled the dry poster paint away with my foot. Areas of contact but little pressure were the darkest. I tested this theory on another print I'd made in which I rocked forward, putting more pressure on my toes. The toes on this print were lighter.

Turning the print into a topographic map was the next step. After considerable thought, I scanned the images, then tried several Photoshop effects, finally using the "cut-out" effect to try to isolate the continuous tones into four levels: black, white and two grays. With a red grease pencil I smoothed the edges of the shapes (c), then used these layers as templates to cut out 1/4" layers of Plastizote™ to build up a contoured insole, and glued the layers together to create the negative of the shape of my foot's imprint (d).

The resulting insole can be attached to a more rigid support. Designing bands of leather or fabric to attach the sole to the foot sets the stage for wear-testing the insoles for comfort and further refining.

Students Compete at 2001 National Technology Student Association (TSA) Conference in Richmond, Virginia.

By Hillary Lee

Top technology education students from thirty states, Puerto Rico, and Germany recently attended the Technology Student Association's 23rd Annual National conference in Richmond, Virginia. The conference, which was held from June 21st through June 25th, 2001 at the Richmond Convention Center, attracted more than 3300 young people, their advisors, and other attendees who participated in national level technology competitions, special interest sessions, general sessions, and TSA national officer candidate campaigns and elections. An awards ceremony at the close of the conference recognized the top ten finalists in each category of competitive events.

TSA is a membership association comprised of approximately 115,000 elementary school, middle school, and high school students who have a strong interest in technology and who are, or who have been, enrolled in technology education courses. Currently, there are 1500 TSA chapters in forty-five states across the nation. TSA's goal is to promote technological leadership and personal growth through student participation in challenging technological competitions that cover problem-solving, decision-making, and critical thinking skills as they relate to communications, power, energy, transportation, engineering, manufacturing, and construction. Students attending the national conference in Richmond competed for awards in more than fifty events; the events ranged from structural engineering and computer-aided drafting to extemporaneous presentation and graphic design.

In addition to the competitions, other highlights of the conference included a keynote address by the nationally recognized speaker, Rolfe Carawan, founder and president of LifeMatters International, as well as a one-day Education Fair that was held on Saturday, June 23rd. The fair featured the sponsors of the 2001 conference and exhibitors who displayed the latest innovations in technology education. Among the growing list of companies that support TSA activities and who came to the conference were DuPont, Pitsco, Inc., DEPCO, Inc., Autodesk, Nortel Networks, and the International Communications Industries Association.

For more information about the Technology Student Association and a complete list of finalists from the conference, visit TSA's homepage at http://www.tsaweb.org/. Or, contact National TSA by mail at 1914 Association Drive, Reston, VA, 20191, by phone at 703/860-9000, or by fax at 703/758-4852.

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