

## Lenox Tells Section about Forensic Engineering Uses Biomechanical Principles to Investigate Childhood Fatality

At a meeting at UTSA on Sept. 30, 2004, Dr. Jack Lenox, a physician and engineer and the founder of Design Excellence, Inc., told a group of about 50 attendees from the SA Section and UTSA and Trinity students about his recent experience in determining whether the death of a one year old boy from a head injury was an accident or the result of child abuse.

The death occurred at a child care facility. Several children said that a one year old boy was taking the favorite toy of two bigger boys out of the toy box when the bigger boys ran over to get the toy from him, tripped, and fell into the little boy, knocking him backwards onto the hard floor, and they said "he went to sleep and didn't get up."

However, the out-of-town medical examiner (the incident occurred in a small east Texas town) who performed the autopsy claimed that the boy's injuries could only have occurred from being slammed onto the floor hard enough to be equivalent to a fall from a two story building or from being hit hard by something like a baseball bat. For that reason, the child care provider, who was a well liked and respected person with no history of child abuse, was indicted for murder. She was assigned a public defender who contacted Lenox to aid in the defense.

Lenox said he reviewed the autopsy and found that the skull fracture was at the back of the head, was a connected single fracture, and there were no bone fragments driven into the skull. He found some old data in the literature (the journal of the Society of Experimental Stress Analysis) from tests on cadavers of older children and adults indicating that at least 33 ft-lb of impact energy would be needed to cause such a fracture. Hence, Lenox thought that if the one year old boy had tumbled over backwards and hit the

hard floor with a sufficiently high impact velocity, the child could have sustained the injuries accidentally.

Further investigation turned up an old literature citation indicating that the skulls of babies (the test used cadavers) could be fractured from falls from a height as low as 2.69 ft, which correlated with kinetic energies of 5 to 15 ft-lb, depending on skull weight.

Now Lenox determined whether 3-year old boys could run fast enough in the short distance available to impart this much energy to the one year old boy. He found they could run as fast as 8 mph. From simple mechanics calculations, Lenox computed that a speed of only 5.8 mph was sufficient to impart the needed kinetic energy.

With these results, and the use of wooden dolls to demonstrate the findings to the jury, along with the eyewitnesses statements, Lenox and the defense attorney convinced the jury that the boy's death was an accident caused by the two bigger boys running, tripping over each other, and knocking the one year old onto the floor. The child care provider was acquitted rather than serving a 30 year sentence.

Lenox stated that many childhood fatalities are in fact the result of abuse. But doctors, nurses, and other first responders are now required to report suspicious injuries and so there are many cases of over-reporting of abuse when the injuries might have been caused by an accident. The use of biomechanical principles, such as Lenox used in this case, he said could help discriminate between accidents and abuse. Lenox said he intended to publish his investigation for the benefit of others.

The lecture elicited many questions. After the lecture, many of those in attendance said that Lenox's presentation was one of the best that they had ever heard.



Lenox meeting SA Section Chair A. C. Rogers before the lecture



Engineering students taking advantage of the free buffet

## **Student Section and Engineering Clubs are Active in San Antonio**

### **UTSA Has Student Section Trinity Has Trinity Engineers**

After several years of relative dormancy, the ASME student section at UTSA has become active again under the leadership of the Student Advisor, Dr. Dauren Daugaard, and the student officers. The students have regular monthly meetings, speakers and tours. At the October meeting, the students discussed their upcoming industry tour and considered various ways to raise funds for their activities.

The students also discussed submitting entries in the ASME and other design competitions. The guest speaker was Dr. Hudson, of the UTSA EE department, who talked about a desalinization project.

The student section officers deserve most of the credit for the revitalization of the section. This year's chair is Bobby Duran. The vice chair is Shea Saur, the secretary is Christina Castilleja, and the treasurer is Jesse Rivera. There are a number of other officers who help out: Jesse Gomez, the Corporate Liaison; Marian Jantea, in charge of membership development; Justin Long, and Gauston Hauptert, and Chris Kinion, the web master, which is something the Senior Section doesn't have yet!

The SA Section supports the UTSA student section in many ways, including supplying funds for sending the officers to training symposia and for paper presentations at the Region X Old Guard competitions.

Trinity doesn't have a separate mechanical engineering program (it has an engineering science degree with an option in mechanical engineering) and so normally is not allowed to have an ASME student section. Instead Trinity has the Trinity Engineers club. Trinity does have chapters of the Society of Women Engineers, the Society of Automotive Engineers, and the IEEE, and a new chapter of Theta Tau, a national engineering fraternity. Trinity Engineers unites these organizations.

Trinity Engineers sponsors a lot of events, including departmental picnics, workshops, intramural sports teams and outings, as well as hosting industry and research speakers. Recently Brad Hunt of eMavericks Training & Consulting spoke on Project Management. Other planned events are workshops on basic technician skills (machining and electronics) and industry field trips.

The officers of Trinity Engineers are President Jeffrey Bennett, Vice-President Elliot Johnson, Social Chair Stephanie Carrara, and Treasurer Kimberly Larson.

## **Upcoming SA Section Meetings**

The section has organized an interesting panel discussion on sustainability and sustainable buildings for its November meeting.

The panelists are Kristin Heinemeier of the Brooks Energy Sustainability Lab, Marc Giaccardo of the UTSA School of Architecture, and Linda Stone of the Metropolitan Partnership for Energy.

The panel discussion will be held at Trinity University in the Science Lecture Hall, starting at 7:20 pm, preceded by a short social time with refreshments at 7:00 pm.

Because of all the holiday activities, there will be no meeting in December. Watch your e-mails for the meetings and tours the section has planned for the new year.

---

### **Engineers Provide Sustainable Solutions Through International Volunteerism**

The national ASME organization has joined a big effort on sustainability, the same topic as the SA Section's November meeting.

ASME members around the world have the chance to get involved in real-world engineering projects and gain exposure and training in responsible and sustainable engineering through ASME's partnership with *Engineers Without Borders*<sup>TM</sup> (EWB-USA). EWB-USA is a non-profit organization established in 2000 to help developing areas worldwide to solve their infrastructure needs.

EWB-USA offers a unique opportunity to active or retired professional engineers and engineering students. EWB-USA sponsors projects that involve the design and construction of water, waste-water, sanitation, energy, and shelter systems. Projects are initiated by, and completed with, contributions and support from the local, host community, who are trained to operate the systems without outside assistance. In this way, the projects are appropriate and self-sustaining. The projects are conducted by groups of students under the supervision of faculty and professional engineers from partnering engineering firms and professional Societies.

EWB-USA projects have received a lot of publicity recently in various national magazines. Several USA universities are very active in supplying students for projects, and the students receive academic credit for their efforts.

ASME members can contact Diedra Hackley ([hackleyd@asme.org](mailto:hackleyd@asme.org)) if they are interested in any of the above projects, or would like to propose a project of their own.