Instron® TechNotes

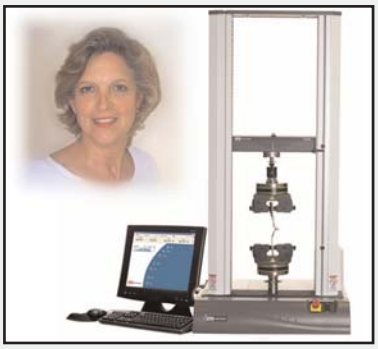
Getting the most up-to-date information on materials testing

In this Issue

JULY ISSUE 2006

Application Story

Materials Testing Explored in High School



When you think of vocational classes in high school, what usually comes to mind? Shop, auto-mechanics or construction classes? Maybe even home economics? That's not the case in Texas. Beginning in September, Skyline High School in Dallas will be teaching materials testing to vocational students in the Plastics Technology Program.

Anne Bernhardt, teacher and engineer, will teach material behavior and quality control testing on plastics to her students, ranging in age from 15 to 19 years old. The lessons are at different levels, with the freshmen running very simple, organized tests and the upper classmen devising more complex testing protocols that will encompass the effects of statistical variations.

"I'd like to expose my students to material properties and how it affects things around them in the consumer world," says Bernhardt. "I'd like for them to explore the world around them and know the difference between failure and yield. This gives them the chance to test and learn why and how materials and designs are selected."

Bernhardt's emphasis is on making this fun and informative by using more sophisticated equipment for discovery in understanding material properties. The students will perform a range of plastic tests using Instron's model 3365 with Bluehill® 2 software. Bernhardt's request for federal funding to set up a materials testing lab is through the Perkins Grant program for vocational education.

"Teaching my students this trade allows them to prep to get into professions that are beyond plant floor work and includes more college bound opportunities. It opens another job opportunity for them. I'm encouraging them to look into engineering," says Bernhardt.

Editor's Note: Look for the follow-up article in the spring issue of TechNotes to see what Anne's students are learning.

Tech Tip

Broken extensometers?
Use Instron's software to set up a pop-up window or audible alert message reminding operators to remove the extensometer at the correct point during a test.

Ask the Expert

Have a question about materials testing?
Submit your question and you may see it featured in a future issue of TechNotes.

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Technologies

Case Study: Volvo Meets the Challenges of High Strain Rate Testing

Remember silly putty? If you pull it slowly, it stretches a lot; pull it quickly and it snaps. Silly putty is a good example of a strain-rate sensitive material – a material that behaves very differently when subjected to different strain rates.

Car crashes produce very high strain rates, or the rate at which the car parts are deformed on impact. Most mechanical tests, on the other hand, are performed at very low (or "quasi-static") strain rates. Vehicle designers are faced with the challenges of understanding the strain rate of materials they use when designing the safest possible environment for drivers and passengers. It is not appropriate to use static testing results to predict what will happen in an impact situation, because static testing will not reveal that many materials exhibit higher energy absorption at higher strain rates. Maximizing energy absorption is critical when determining the "crashworthiness" of a vehicle.

Volvo's Technological Development Corp. (Goteborg, Sweden) turned to an Instron VHS frame for use in its Strength of Materials R&D Laboratory to perform high strain rate testing. These Very High Speed (VHS) systems accelerate from a dead stop to over 50,000 inches per minute (20 m/s) in less than the blink of an eye and allow engineers to simulate actual crash conditions on materials and assemblies. Using specialized hydraulics and super-light titanium grips, VHS systems provide Volvo with new insight on the mechanical behavior of metals, plastics and automotive assemblies used in their vehicles.

This effort is part of a collaborative research program with Volvo LV, the truck manufacturer, which is investigating the properties of steel used in automobiles. Additionally, Volvo uses the system to test joined specimens, providing insight into the strain-rate sensitivity of joints made via welds, rivets, adhesives and multiple combinations. These features help Volvo to accurately characterize the properties of materials it uses and ultimately to produce safer vehicles.

You Asked - We Answered

Q: Why do I see a negative load value when I grip my specimen?

A: The closing action of wedge action grip jaws often applies a compressive load to the specimen. If your indicator is set to auto-zero at the start of the test, you may see lower load values. Remove the auto-zero function for the load channel to correct the low reading. Another way to reduce negative load caused by wedge action grips is to use the specimen protect feature available on most newer Instron control systems.

What do you think? Tell us!

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