INSTRON
The difference is measurable

TechNotes

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

Instron.com | Subscriptions | Newsletter Archive | Testing Solutions | Contact Us

Issue 37

In This Issue

Application Article: Research Institute Partners with Private Steel Company
You Asked – We Answered: Q: Could extensometer slippage be causing the strain values to go backwards when the specimen is yielding?

Research Institute Partners with Private Steel Company

The recently formed Institute of Research of Iron and Steel (IRIS) in Jiangsu province is unique in China. It is the first Chinese research institute that is integrated with a private steel company, Sha-Steel.

Sha-Steel is the largest private steel company in China. It forms part of the Jiangsu Shangang Group, one of the ten largest steel producers in the world. IRIS was co-founded about three years ago by Sha-Steel and the provincial government of Jiangsu province.

Recently, Instron had the opportunity to interview Professor Toshihiko Emi, the inaugural director of IRIS. Dr. Emi, formerly a board member of Kawasaki Steel (now JFE Steel) and professor at Tohoku University, Japan, is an eminent figure in international societies related to iron and steel with major awards from ISIJ, AIST (formerly ISS-AIME), and the Royal Swedish Academy of Engineering Sciences.

Instron: Would you give us a brief overview of the institute?

Prof. Emi: Most major steel industries in China have integrated iron and steel institutes, but this is the first time that a private steel company in China has developed a research institute. IRIS researches mainly on behalf of the Sha-Steel group but with a minor fraction for the other steel companies, both private and state-owned, in Jiangsu province.

Instron: What successes have you had so far?

Prof. Emi: The institute is still in its infancy. We started about three years ago and it's taken two years to build, equip, and recruit for the institute. So we have had just one year in operation, much of which has concentrated on staff training and education. However, we have already developed quite a number of new materials as a result of our research.

IRIS has installed extensive mechanical materials testing facilities; static and dynamic test frames, hardness testers, impact testers, and test accessories. This video clip shows some of their impressive range of materials testing capabilities.

Instron: You have equipped your materials testing facilities with a wide range of Instron, Satec, Wilson, and Dynatup equipment? Why did you make this choice?

Prof. Emi: The equipment supplied from Instron is very integrated and convenient to use. And we particularly appreciate the after sales support.

Instron: Do any of your research goals involve the development of new testing processes?

Prof. Emi: I'm sure you appreciate that much of our research is confidential. But I can say that some research programs require novel test processes and procedures outside of conventional use. For example, we are investigating new techniques in existing areas of mechanical testing such as crack tip opening displacement tests.

IRIS has two stated objectives; to develop advanced steel materials and processes for the sustainable progress of Sha-Steel and the steel industry of Jiangsu Province, and to reduce the emission of pollutants and the consumption of coal and iron ore.

Instron: The central government of China has requested the steel industry to reduce overall steel output and eliminate outdated production facilities. What are your thoughts about this initiative?

Prof. Emi: This is a very positive move. It will help our efforts to reduce global warming and the waste of raw materials. This is the right direction to go.

Instron: One of your stated research goals for IRIS is to actively research ways to reduce energy consumption and emissions of greenhouse gasses. What are you doing toward this goal?

Prof. Emi: A large part of the energy consumption and the emission comes from the upstream operations of the steel industry - sintering, coking and iron making. It is most important that we reduce coal consumption to reduce pollutants in the atmosphere and we have started working specifically in this area.

Instron: Products and materials manufactured in China have a reputation for variable quality standards. Is this being overcome in the iron and steel industry and what role does the institute play in reducing this perception?

Prof. Emi: For the large steel companies in general, the variations in products are still greater than in other industrially advanced countries. Efforts are ongoing for standardization – advanced production and testing equipment, improved maintenance, improved control and automation with sensors, and improved operations. Program control and automation is an important activity of IRIS to improve standardization of the production plant.

Instron: Dr. Emi, thank you very much.

Q. When testing some specimens, the strain values appear to go backwards when the specimen is yielding. Could extensometer slippage be causing this effect?

A. Yes it could be, but if you are aware of it and you have mounted the extensometer correctly it's unlikely. It's more probable that the strain is really going backwards.

Many metal alloys have a non-homogenous structure with grains of different sizes and orientation, and they also contain various impurities. Under loads that are sufficient to cause the material to yield, bands of localized plastic deformation, known as Luder's bands, can form in the otherwise unyielding portion of the material. These bands of dislocations are the main contributor to the discontinuous yielding portion of the stress/strain curve. They can occur both inside and outside of the gauge length of the specimen, moving along the length of the specimen as the load increases.

Your extensometer is probably reacting to yields that are occurring both inside and outside of the gauge length, which can create this phenomenon of backwards strain.

Note from the Editor

I'd like to take this opportunity to direct you to our growing Metals Testing Solutions section - a technical resource rich with content to help answer metals testing questions you may have. Our growing database of 60 metals solutions includes PDFs of available literature, as well as links to related standards.

View Testing Solutions | Email Feedback

Subscribe Today and receive the latest testing news

Tell us about your testing and you could win an iPod Nano!

View upcoming events where Instron will be attending

Submit your questions for future issues of TechNotes!

Instron Worldwide Headquarters
825 University Ave
Norwood, MA 02062
www.instron.com