Instron® TechNotes **Getting the most up-to-date information on materials testing**

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New Resources for You on Our Website

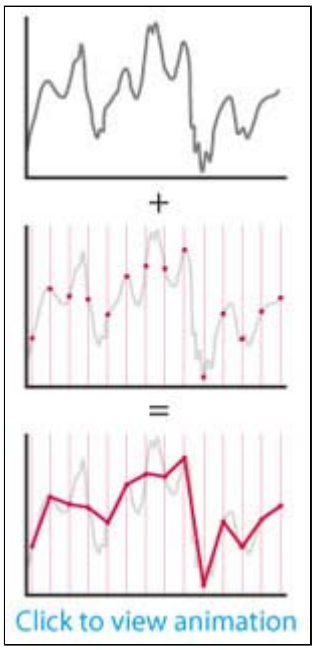
We'd like to take this opportunity to direct you to our new Testing Solutions section – a technical resource rich with content to help answer materials testing questions you may have. Easily searchable by standard, material or industry, our growing database of more than 120 solutions includes PDFs of related literature, as well as links to related standards.

If you are unable to find a solution, contact us and we can work together to answer your question, and potentially post the solution in our new section.

We've created a page that is specific to your testing interests, based on the selections you've made in your profile. In addition, you'll receive periodic notifications about new relevant testing solutions. Please take a moment to ensure your profile and interests are up to date.

Tech Tip

What is Data Rate?



Modern mechanical testing systems allow you to select the data rate for a particular test. This is a brief introduction on some basics associated with data sampling: how to determine the "optimum" sampling rate; what happens if the data rate is too low; and why faster data rates are not always better.

The "data acquisition rate" associated with a testing machine is the frequency at which a data point is taken from the sensors and sent to the data file*. All the test results will be calculated based on this acquired data, so it is critical to ensure that the captured data accurately represents the raw signal. To capture all the meaningful features of load cell or extensometer signals from a test, there is an "optimum" data sampling rate.

This "optimum" sampling rate ideally provides data that is at least within 1% of the raw signal at all times. This means that the captured data would never be different from the actual signal by any more than 1%. ASTM Standard Guide E1942 states that this rate is on the order of 50 times the speed of the event you are trying to capture, such that the error purely from sampling is less than 0.2%. This leaves room for error elsewhere in the system while maintaining an overall accuracy of 1%. Sampling at more than roughly 50 times the speed of the event provides no additional information – just more data points and a larger data file. Sampling at less than the optimum rate, however, can result in severe loss of information due to missed peaks or events.

Let's imagine your eyes are closed, and in front of you is an event. The rate at which you open/close your eyes to see the event would be the sampling rate. For a slow event, like grass growing, it is clear that you would not have to open your eyes very often to get a clear record of progress for this event. On the other hand, if the event was someone doing jumping jacks, you would have to open your eyes often to capture this event. For this example, let's say that each jump lasts 0.5 seconds, or 2 Hz (2 jumps per second). In order to get a clear idea of each jumping jack, the optimum rate would be about 100 Hz, or 50 times the speed of the jumping. Sampling at 500 or 1,000 Hz would provide a smoother image, but would not significantly improve the accuracy of the image, like how high the jumps are.

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It is easy to default to a high data rate and deal with large data files. However, this leads to downstream data management issues and the need for very large memory storage devices. So it is a healthy exercise to think about what events you are trying to record and ensure that the data rate selected is sufficient to capture the event within acceptable tolerances. Higher-end testing systems allow users to adjust not only the data rate, but also the bandwidth of the signal conditioner, which has a large effect on data acquisition. We will touch on bandwidth in a future edition of TechNotes.

Let us know if you are interested in attending a webinar specific to data rate.

*NOTE: The test data rate should not be confused with the internal sampling rate of digital signal processing system – which has nothing to do with the data that is gathered during a test and used to calculate results.

Note From the Editor

We look forward to providing you with the most relevant materials testing information in 2009!

Don't forget to update your testing interests in your profile.

Best regards,

Denise Papa
TechNotes Editor

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