


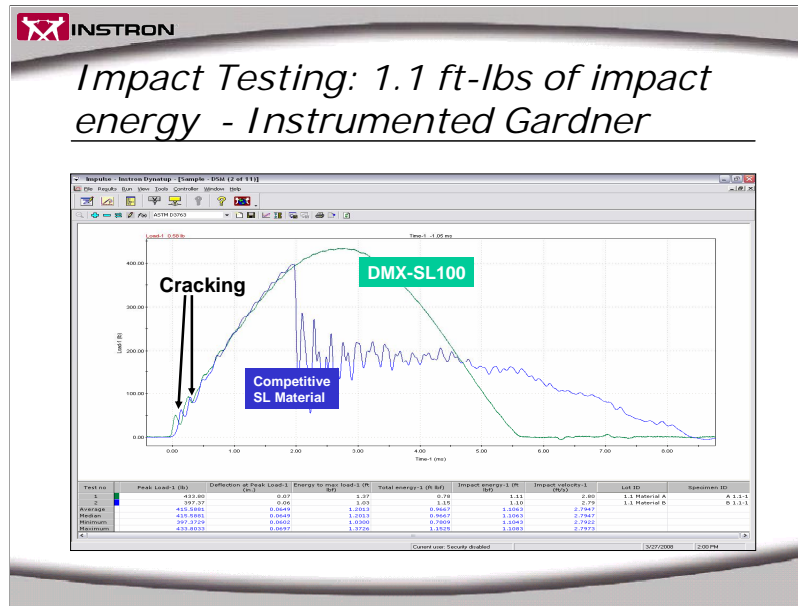
Introduction to Impact Testing Basics

Content Contributed by Instron  INSTRON

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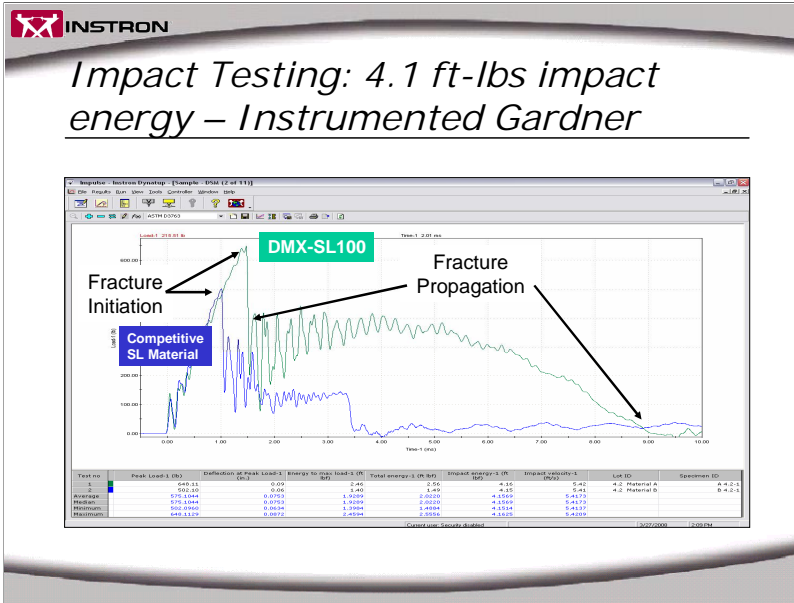
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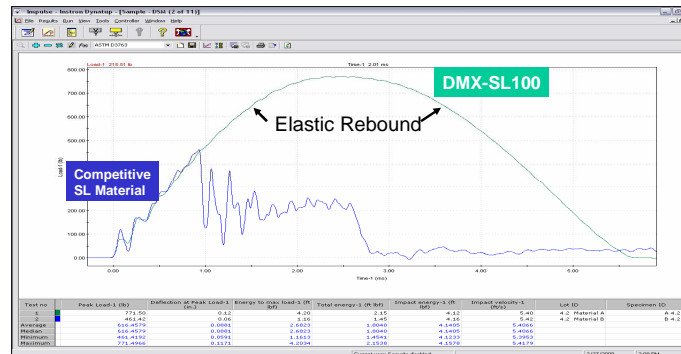
Shown here and in the next X slides are instrumented impact test results from testing conducted on material supplied by DSM to Instron. For Instron this was a blind test – the samples sent in were labeled A & B – each plaque provided was 4 inch x 4 inch – and they were tested under the same conditions – the fixture and tup insert used were in accordance to ASTM D3763 – the fixture had a 3.0 inch unsupported test diameter & the insert was a ½ inch hemispherical.

The test was set up to duplicate testing performed at DSM with an uninstrumented Gardner system – this testing showed that material B reached failure at 1.1 ft-lbs of impact energy. Material A as can be seen in the test results and data did not fail – the curve is a classic rebound curve – meaning that there was minimal – if any – damage to the material at this impact energy. The material was able to “rebound” from this impact and “throw” the crosshead back up off of itself.



This slide shows what happens when each material is subjected to an impact of 4.1 ft-lbs – equivalent energy delivered when a 1kg weight is dropped from a height of 60 cm. At this energy even though both materials fail, material A reaches a higher peak load, absorbs more energy and takes longer to reach full and complete failure than material B.

Impact Testing: 4.1 ft-lbs of Impact Energy: Repeat



Second round of testing was performed at 4.1 ft-lbs to see how the material would react and as with the previous slides material A is a tougher, stronger material then B.

ASTM D 3763-06 Instrumented Drop Test

Sample ID	Failure Type Number	Average Energy at Load	Average Total Energy/ (Standard Deviation) (Joules)
DMX-SL™			25.0 (3.5)
Competitive SL "A"			6.30 (1.4)
Competitive SL "B"	(5)		6.38 (1.6)
Competitive LS "A" (PA)	Brittle (5)	3	9.48 (2.8)

Instrumented Drop Test Shows
Significant Differentiation Between
DMX-SL and Competitive Materials

DMX-SL = 4 X Competitive SL "A"

DMX-SL = 3.9 X Competitive SL "B"

DMX-SL = 2.6 X PolyAmide LS

Samples provided by independent sources.
Samples tested at Plastics Technology Laboratories, Inc (PTLI).
Testing details available upon request.

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Note that these samples are also unnotched, so the variability is also much higher, however, this is more than offset by the continuous data stream that one gets in the actual test results. Further, the value one gets from the shape of the curve is very valuable in completely understanding the failure mode. It is a very expensive test, though, and does not lend itself well to QC purposes.