

Lab Master™ ZDT



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*Testing Machines Inc. • Messmer Instruments Ltd. • Büchel BV •
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Paper Strength

A critical property of paper during manufacture is strength but as paper strength increases so does the manufacturing cost.

Z-Direction — Direction perpendicular to the plane defined by the machine and cross direction and can also be considered the thickness direction



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ZDT Measurements

Why measure ZDT?

Internal bond strength of paper, paperboard, corrugated materials provides an indication of expected performance and the ability to optimize material cost, manufacturing efficiency and control fiber orientation.



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ZDT Measurements

ZDT Applications

- Strength of board in relation to glue bonding at carton side seams
- Delamination on scoring
- Material performance related to high tack coatings
- Paper Mills – In the process of applying coatings and drying paper, the internal fibers of the sheet can be separated causing Z-Direction forces on the sheet. Paper Sheets may also adhere to the surface of a calendar roll causing Z-Directional forces on the sheet
- Converting processes such as corrugating, printing, coating or laminating, substances are applied which can build up on the applicator rolls or drying sections which apply Z-Directional forces on the sheet



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ZDT — Test Factors

1. Papers tested need to have an internal fiber bond strength lower than the adhesive bond strength of the tape to the specimen and/or test platens. Tape should be twice as strong as the paper (Recommended tape: 3M, type 410)
2. The material the platens are made of will affect the adhesive strength between platen and tape.
3. The selection of tape may also affect test results. These effects may be seen as tape failures or in some cases higher test values caused by adhesive migrating into sample.
4. The adhesive bond strength of the tape is critical to reproducible test results. New batches of tape should be tested for consistent bond strength. Bond strength can be tested by performing peel tests off standard test palates, or by testing a stable reference sample.



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ZDT — TAPPI T541 Method

ZDT Test Procedure:

1. Apply double (two-sided) coated, pressure-sensitive tape to both sides of the sample.
2. Place the specimen between two platens and compress uniformly over the entire specimen surface area.
3. Uniform tension is then applied over the entire test area in a direction perpendicular to the plane of the sample (z-direction) to affect a separation.
4. Record the value the maximum force. (Be sure the paper materials has ruptured. Any tape failure is considered an invalid test



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ZDT — TAPPI T541 Method

ZDT Test Specifications:

- Sample size approximately: 50 x 50 mm (2 x 2 in.), free from folds, wrinkles, or other abnormalities.
- Compression Force: 900 ±13.5 N (200 lbf)
- Dwell time: Compress the sample for 6 ± 1 second
- Speed of Test: 66 ±5 mm/min (2.60 in/min)



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ZDT — TAPPI T541 Method

ZDT Test Platens:

- Upper test platen of $6.45 \pm .05$ cm (1 in.) area and a larger lower test platen. This larger platen reduces the potential for edge effect errors caused by small misalignments of upper and lower platens.
- Parallelism of the samples plate: Extremely critical as the true strength in the Z-Direction can only be determined if the plates are parallel (0.5 mm or better). Plates which are not parallel will produce results with lower force values due to a peel/shear action in the sample width.



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Lab Master™ ZDT



- PC-controlled operating on Windows XP
- Small footprint
- Automated operation
- Complies with TAPPI T541
- LCD Touch screen operation
- Traceability certificate of calibration



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Lab Master™ ZDT Software



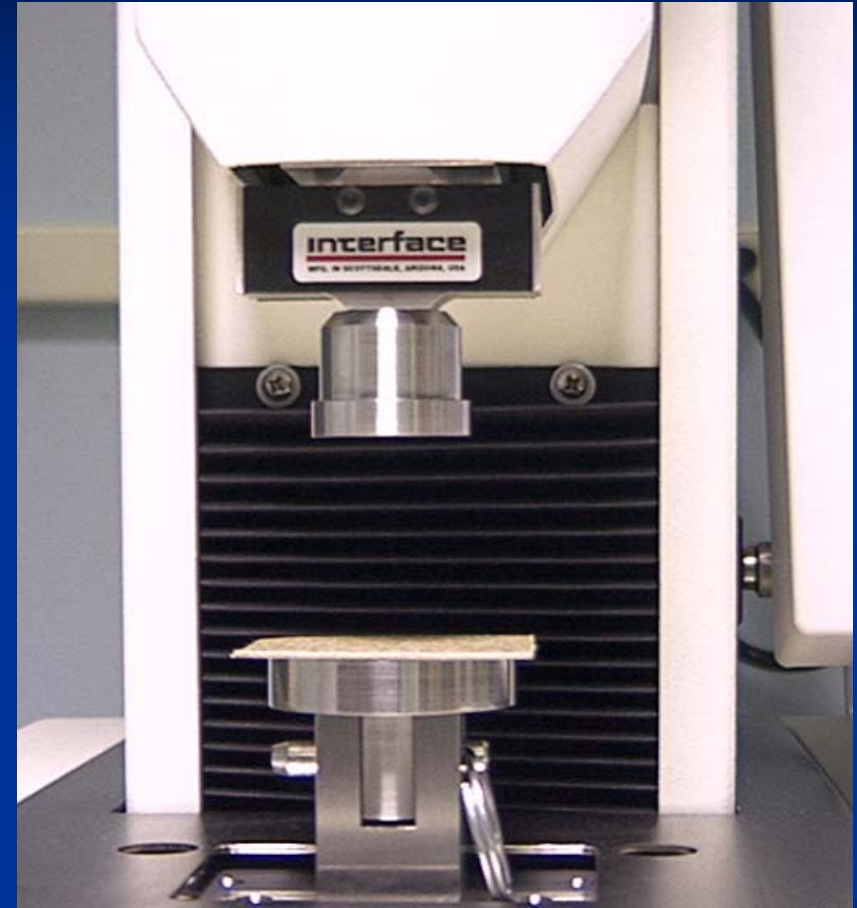
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Lab Master™ ZDT

Self-adjusting lower platen

- Ensures a parallel contact between test platens to produce an equal force across the sample
- Stainless steel platen

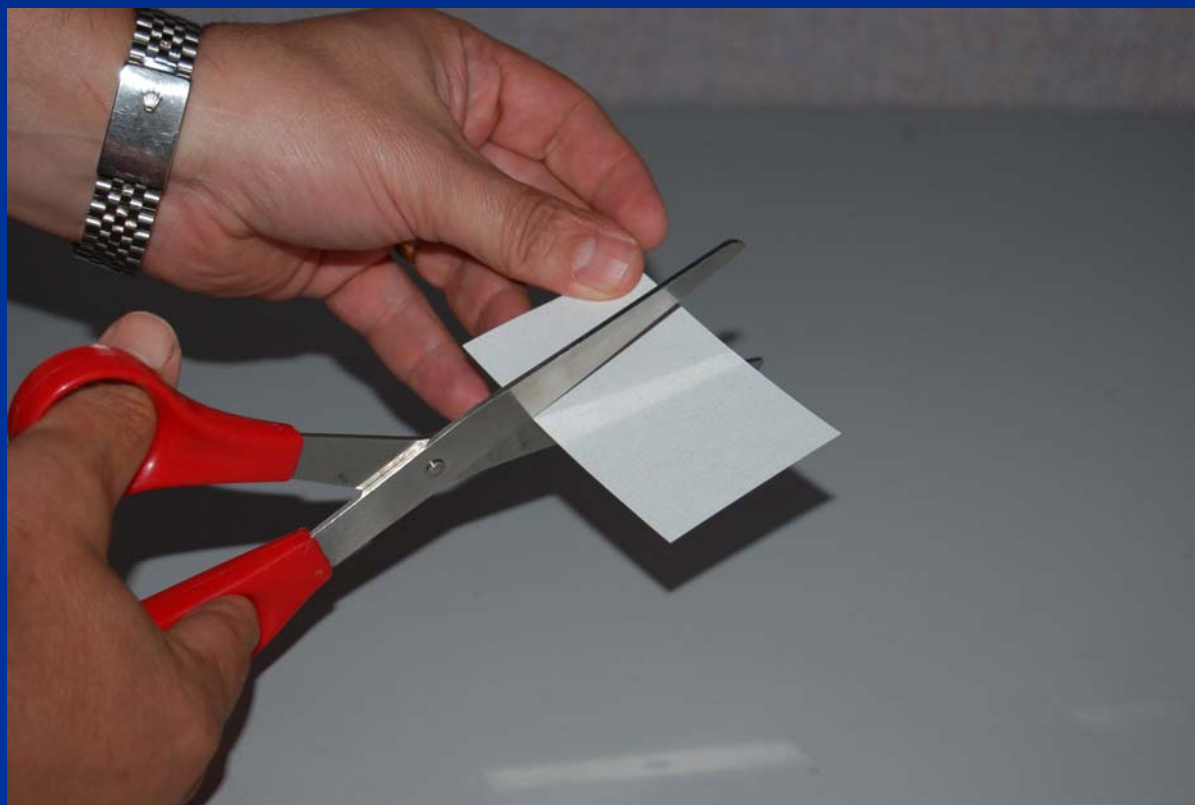


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Test Procedure

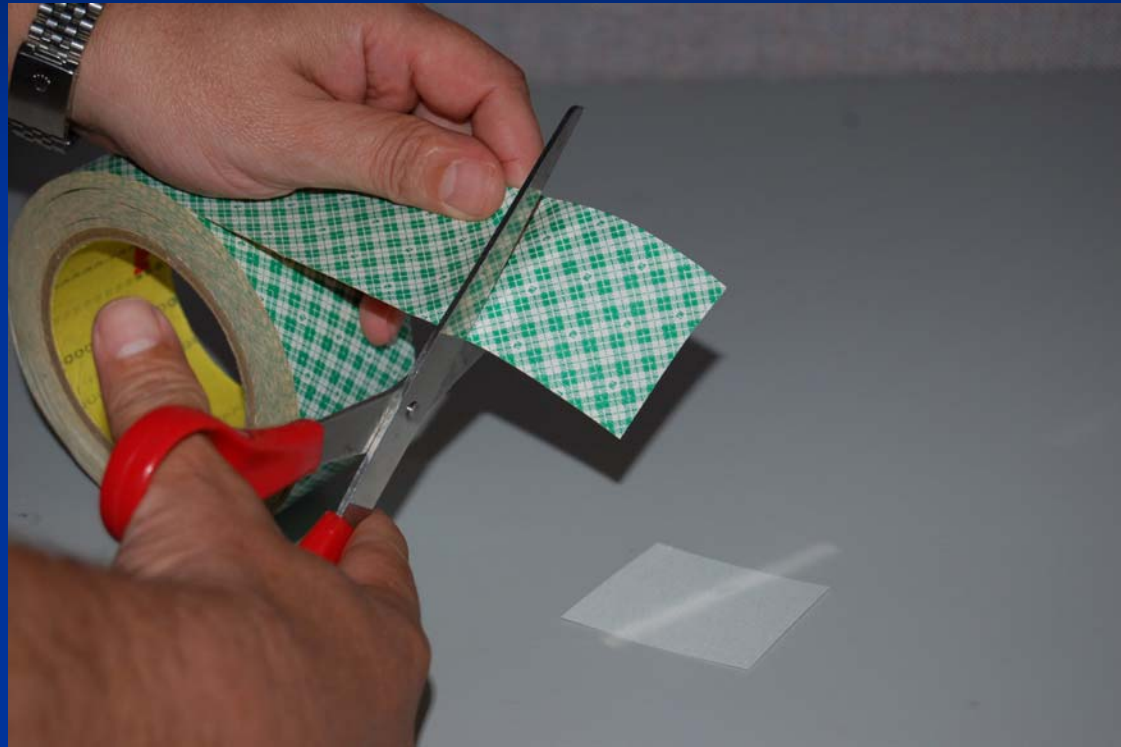
Sample specimen is cut



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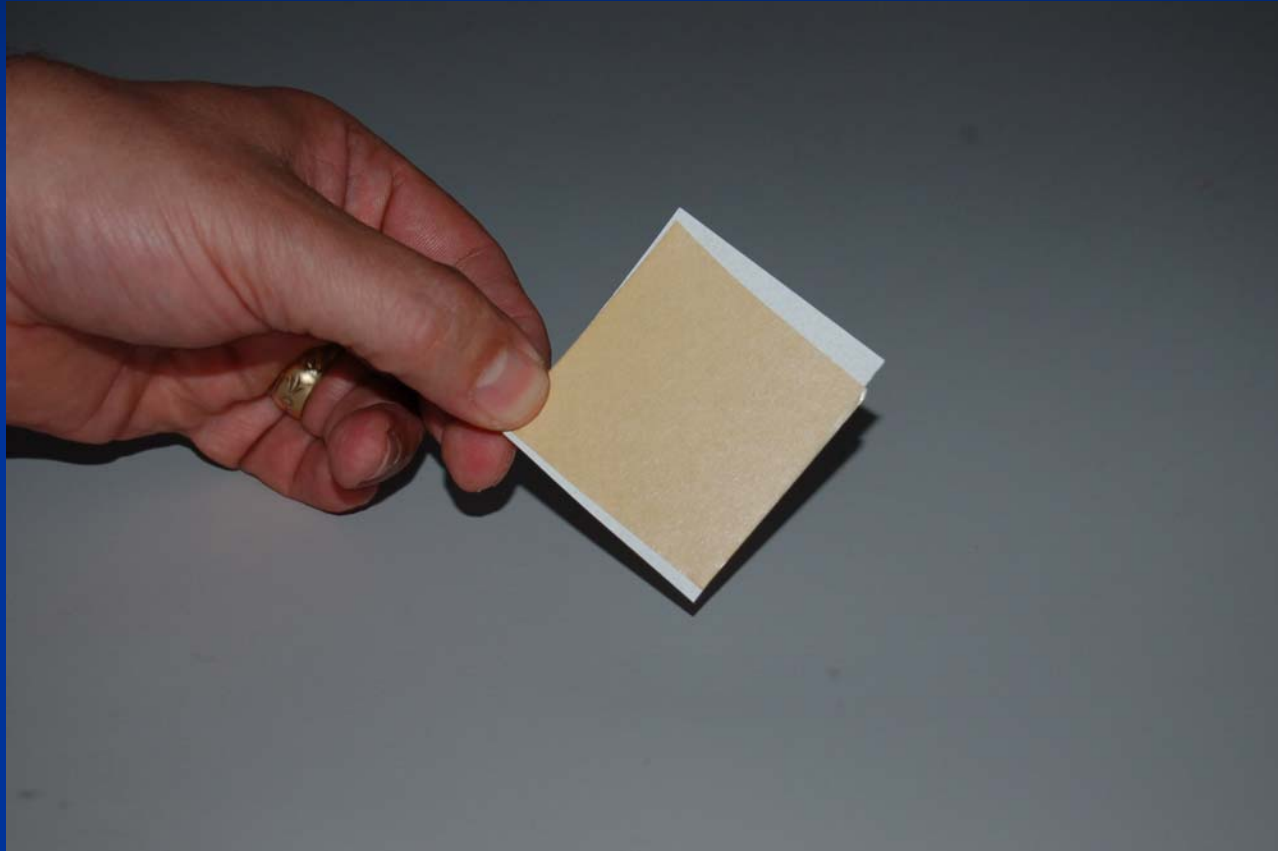
Tape is cut



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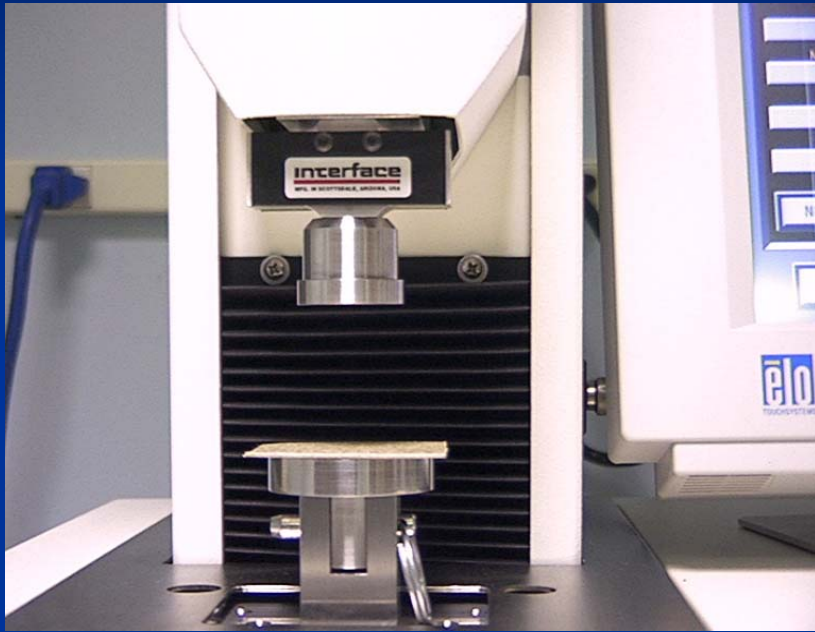
Tape is applied to both sides of sample



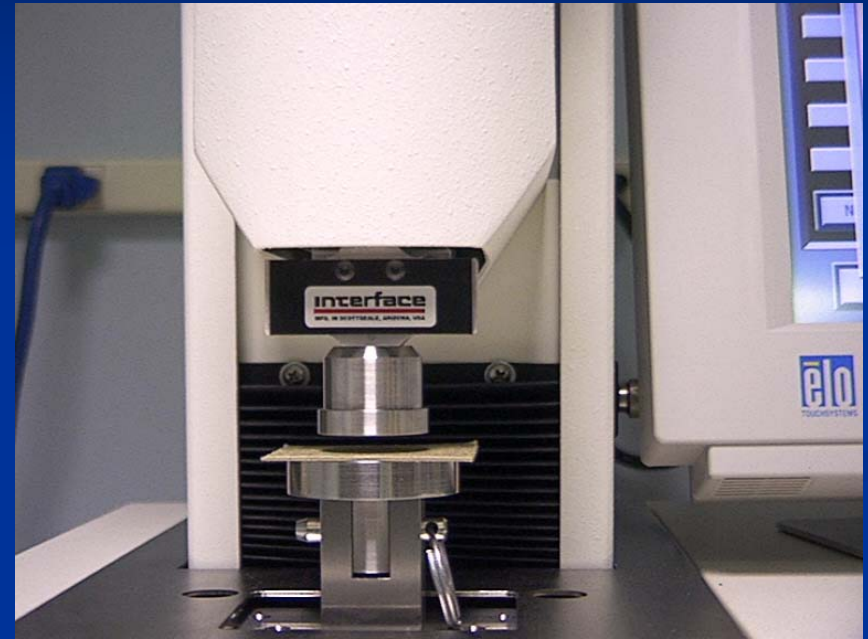
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Sample is placed into machine and testing is performed



Sample on machine

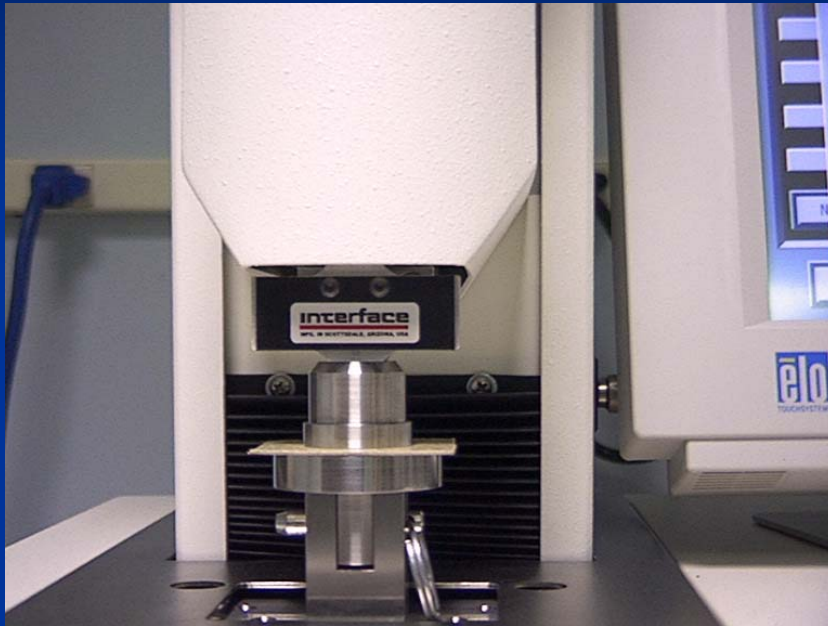


Upper platen closing on sample

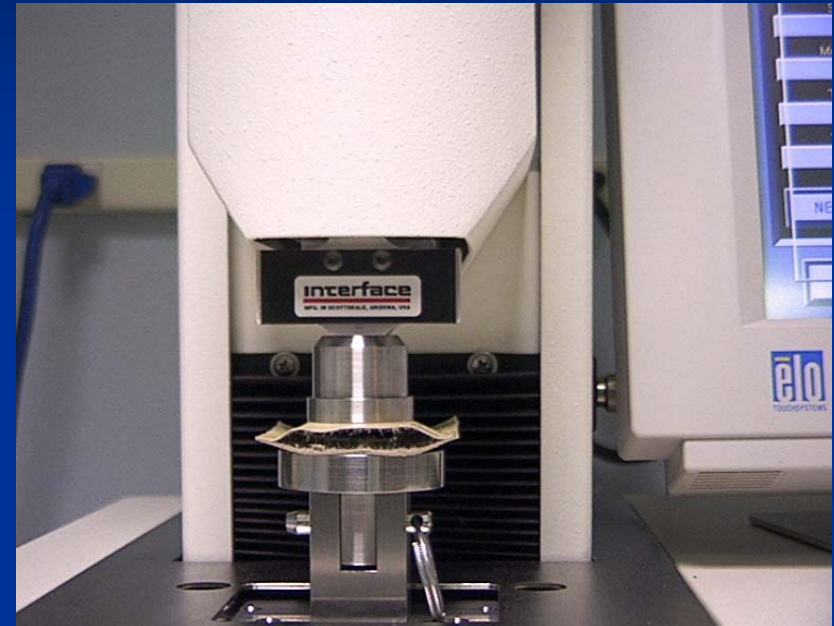


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Pressure being applied

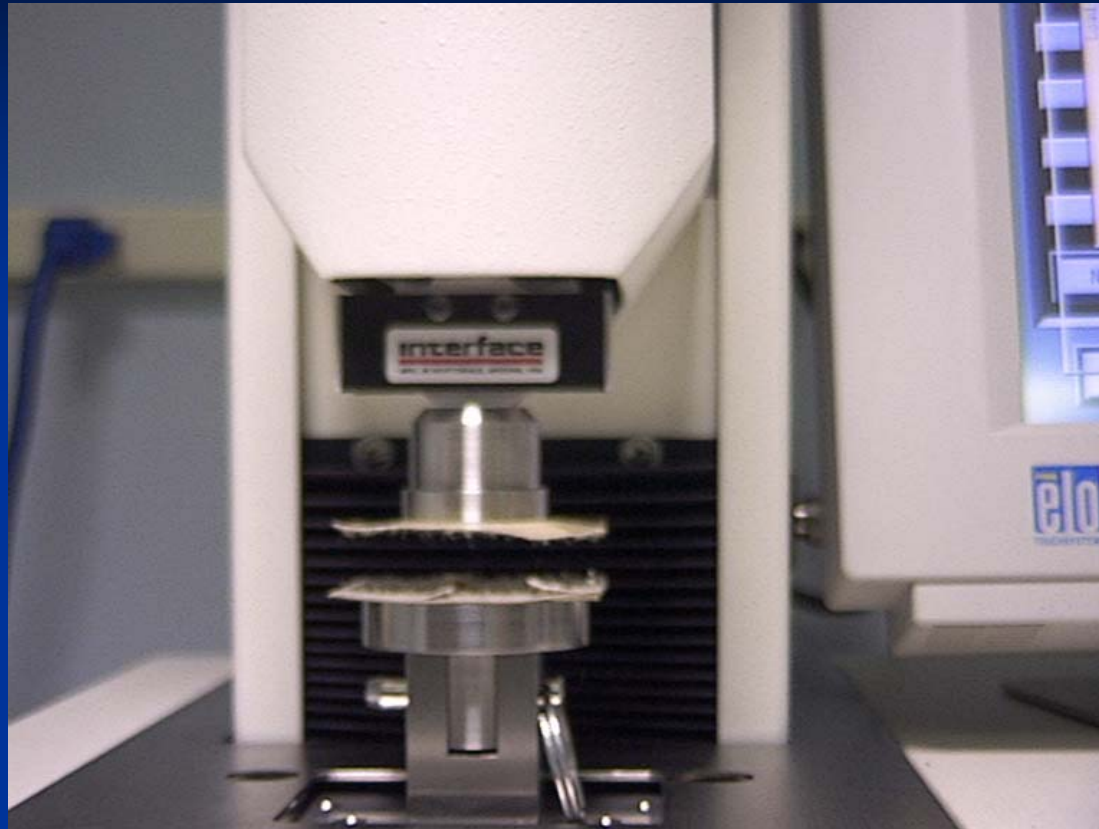


Sample being pulled apart



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Test is complete

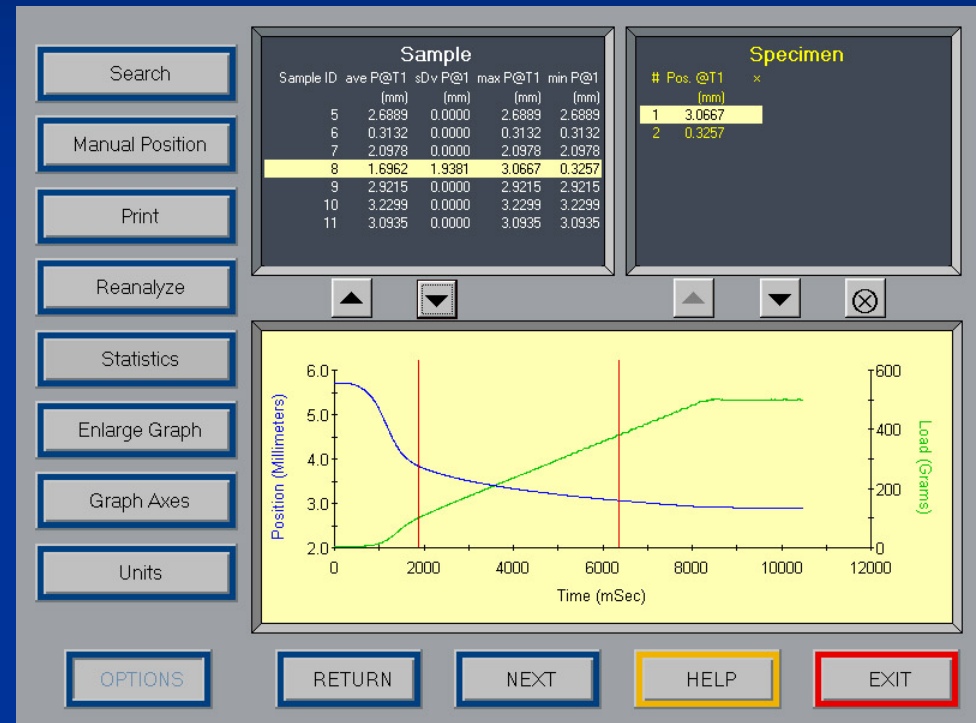


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Lab Master™ ZDT

- Includes a ZDT test method that automates the test process.
- Test speed, compression force, dwell time, tensile speed and result calculations and graphing are accomplished by pressing test.



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Lab Master™ ZDT Software

Lab Master™ allows editing of the following:

- Compression force
- Compression speed
- Dwell time
- Tensile speed
- Length of test



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Lab Master™ ZDT Advantages

- **Windows® Environment** – Extremely simple to operate, it works on Windows XP.
- **Data Storage** — Sample and Test Information is stored for future recall
- **Presentation** – Easy operation of test instrument using Touch Screen, Result and test curve/graph information is displayed on display



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