TA
Instruments

RUBBER TESTING

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Rubber Testing

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TA Instruments introduces a complete line of new instruments for the measurement of rheological and physical properties of polymers, rubber and rubber compounds at all stages of manufacture. The new rubber testing instruments include a Rubber Process Analyzer (RPA), Moving Die Rheometer (MDR), Mooney Viscometer, Automated Density Tester and Automated Hardness Tester.

All TA Instruments rubber testing systems are manufactured to exacting mechanical standards and with the latest measurement technology for the most accurate, reliable, and reproducible data available. Available automation systems allow for maximum unattended laboratory productivity in all test environments. Relevant ASTM, DIN, and ISO standards are easily met, as are demands for advanced testing, making these instruments the ideal choice for quality control, analytical, and research needs.

As the world leader in viscoelastic measurements for over forty years, TA Instruments brings technical expertise in making the most accurate physical property measurements and provides a world-renowned global support network.

ADT
AUTOMATED DENSITY TESTER

Density testing is made simple with the TA Instruments fully Automated Density Tester. This fully programmable, automated system measures the density of cured rubber materials using the finite difference (buoyancy) method. Active measurement of the fluid temperature increases accuracy by accounting for small changes in the density of the immersion fluid with temperature.

Walk-away Automation

Sequential, reliable, and unattended density measurements are made using an automatically fed sample tray with 20 or 30 sample capacity. This true walk-away automation is enhanced with software-driven test set-up, data collection, and pass/fail criteria.

Specifications

Test method	Finite Difference (buoyancy) ISO 2781 ASTM D1817
Sample diameter	30 - 45 mm
Sample thickness	3 - 6 mm
Measurement range	< 1.0 g/cm^3 to 2.5 g/cm^3
Autosampler capacity	20
	30 (optional)
Fluid Temperature Measurements	Standard

The finite difference method for density measurement relies on the measurement of sample weight dry, and immersed in a fluid, usually water. The difference between the dry and immersed weight is used with the known density of the fluid to calculate the volume of the specimen to a high degree of accuracy, irrespective of geometry.

A double gripper and carriage system is used to guarantee that dry weight values are entirely uninfluenced by system moisture or cross-contamination. Each sample is fully wetted by a user-defined number of separate immersions prior to immersed-mass measurement. This prevents error brought about by incomplete wetting and improves both accuracy and precision.

AHT
AUTOMATED HARDNESS TESTER

The AHT Automated Hardness Tester streamlines the measurement of Shore A hardness for cured rubber materials. This fully programmable, automated system measures the hardness of cured rubber materials according to all international standards for Shore A hardness. Each measurement involves the determination of a user-defined number of single point Shore A values. The individual readings, mean and median of this set are reported for each sample.

Reliable Automation

An automatic sample feed with 20-sample capacity provides sequential, reliable, unattended measurements. An optional 30-sample upgrade extends automation to even larger sample sets. Software-driven test set-up, data collection, and pass/fail criteria make the AHT Automated Hardness Tester a truly automated system.

Specifications

Test method	Shore A
	ISO 868
	ASTM D2240
	ISO 7619
	NFT 51-174
	BSI BS 903-A26
Sample diameter	30 – 45 mm
Sample thickness	4 – 6 mm
Indenter	Hardened steel rod
	Truncated 35° cone
	0.79 mm diameter
Measurement range	0 - 100 Shore A
Pressing force	Contact pressure, pressure weight: 12.5 N
	Spring Force: 8.065 N
Resolution	0.1 Shore
Autosampler capacity	20
	30 (optional)
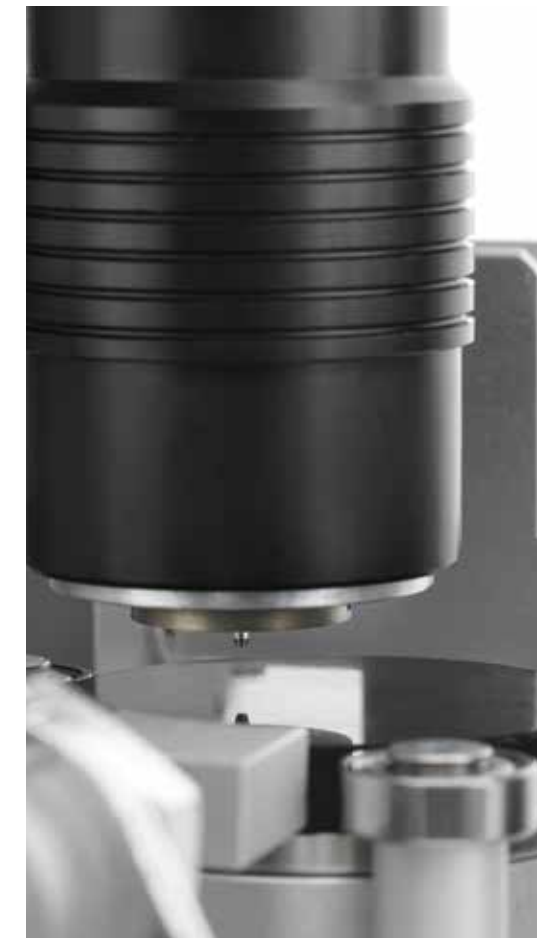
Shore A hardness measurements are based on the precise application of force and the subsequent measurement of probe displacement.
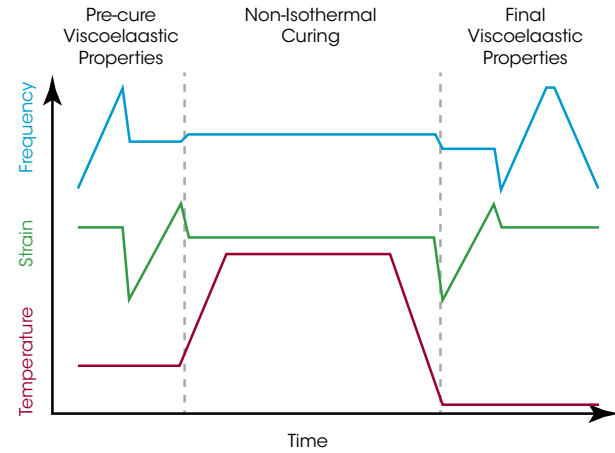
A 12.5 N weight is applied to the measurement device that consists of a hardened steel probe of a prescribed shape. The measurement is performed multiple times, with the sample being rotated automatically between measurements to ensure representative sampling. The individual values, and the mean and median for the specimen are reported for each sample.

scarabaeus software

The Scarabaeus Software for instrument control and data analysis is a powerful and versatile system for programming experiments, providing quick feedback of results, and managing data from all rubber testing instruments. The Scarabaeus Software was developed with customers from the rubber industry and is designed to meet the specific need of production and research.

Simple Instrument Control, Flexible Programming

Instrument control software is preloaded with test programs for the most common experiment types, enabling simple operation by new users. Multi-step tests can be easily programmed to collect many types of data from a single specimen, or to mimic an industrial curing or other processing sequence.

Pre-cure Viscoelaastic Properties | Non-Isothermal Curing | Final Viscoelaastic Properties

Frequency / Strain / Temperature

Time

Quick Operator Feedback

Qualification of multiple lots of similar materials is made easy with quick operator feedback. Predefined test parameters with tolerances can be assigned for a given material. Upon completion of a test, a simple pass/fail indicator shows whether the specimen falls within the acceptable limits for the selected material, allowing meaningful decisions to be made quickly and easily.

Statistical Process Control

Test data is readily converted into actionable information for process control and manufacturing. Automated data analysis can be programmed based on typical performance metrics, such as minimum and maximum torque, scorch times, conversion times, and more. These data are compared against user-defined limits and are used to track processes using histograms, control charts, and summary reports.
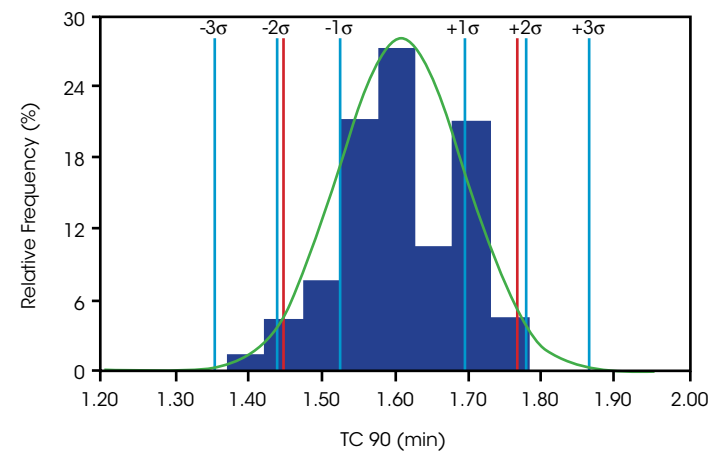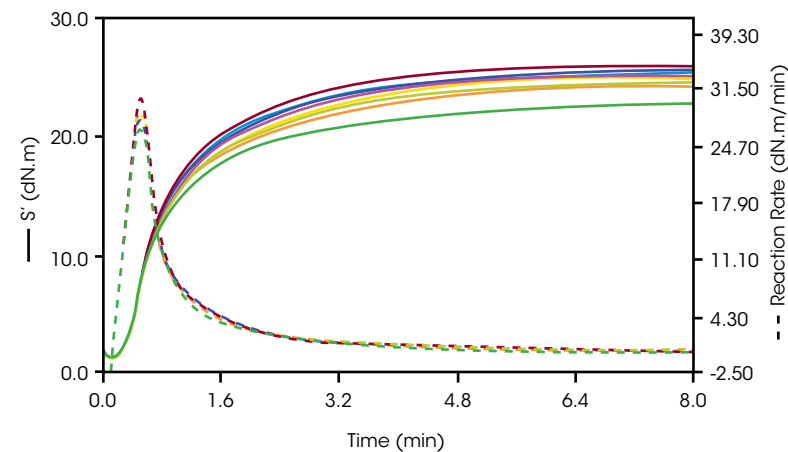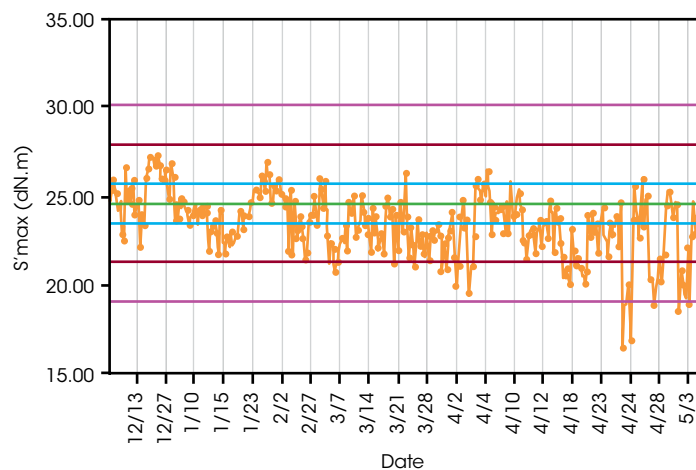
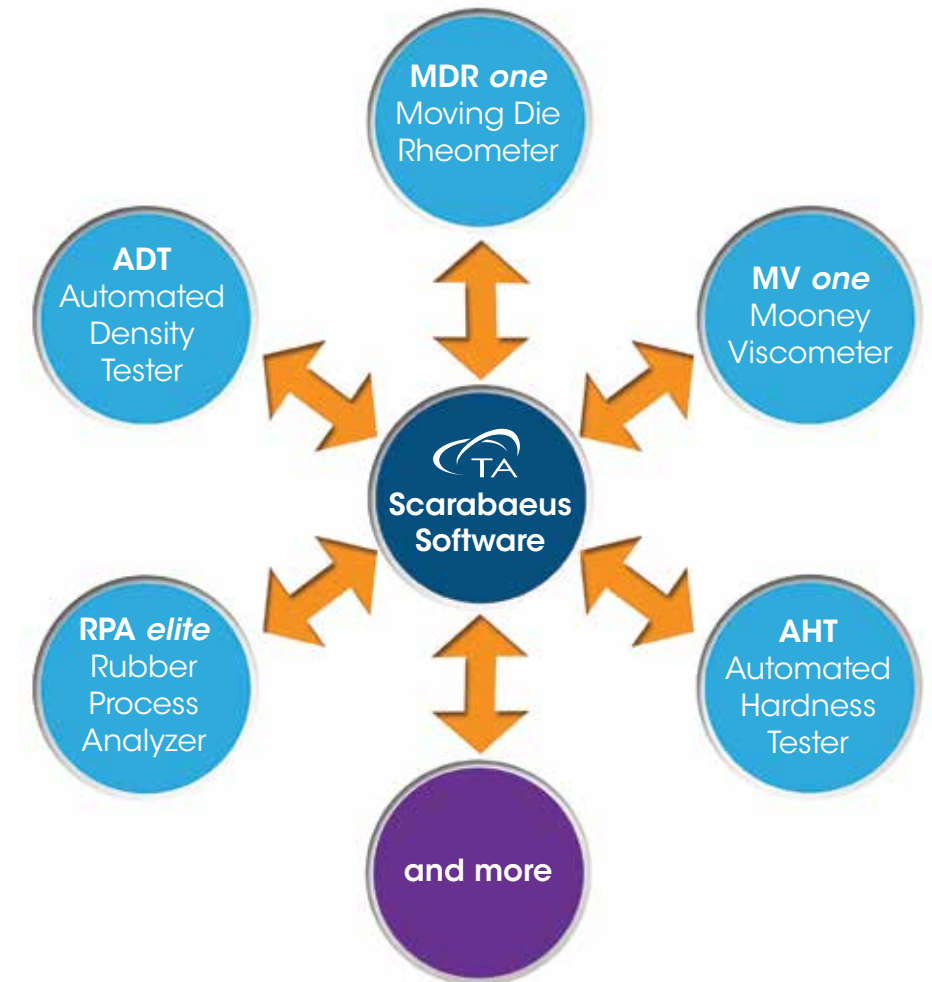## Advanced Data Analysis and Modeling: Curing Kinetics

Isothermal curing data at multiple temperatures can be analyzed according to a rubber-specific methodology to determine curing kinetics parameters. This modeling system can determine:

• Reaction Rate   • Reaction Order, n • Rate Constant, k • Incubation Time, t_i • Arrhenius Activation Energy, E_a
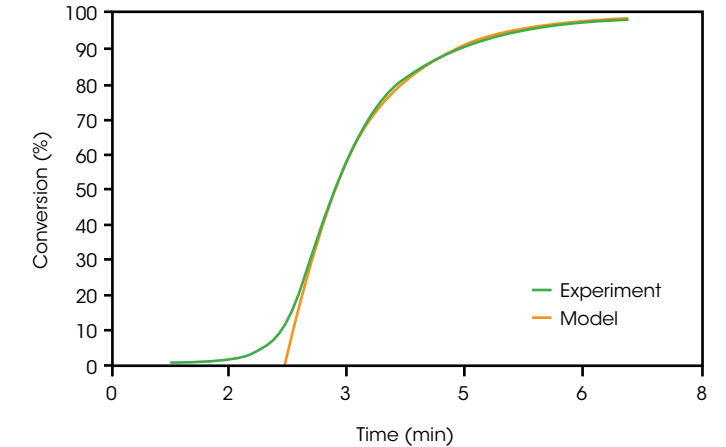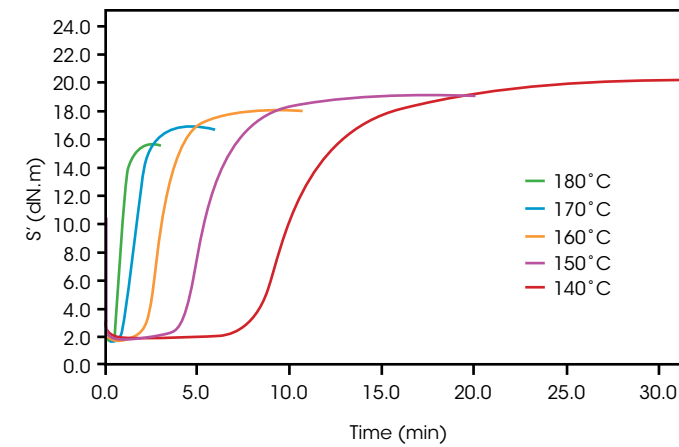
Designed for Integration

The Scarabaeus Software system for instrument control and analysis integrates and organizes data from multiple instruments and historical tests. Data from RPA, MDR, Mooney Viscometer, Hardness, and Density tests can be organized, compared, and analyzed by material type, inventory order, date, and more. Advanced integration with even greater capability is also available.

MDR *one* Moving Die Rheometer

MV *one* Mooney Viscometer

AHT Automated Hardness Tester

and more

RPA *elite* Rubber Process Analyzer

ADT Automated Density Tester

Scarabaeus Software

partner for success
ADVANCED RUBBER CHARACTERIZATION

- **Initial Installation & Training**
- **Local Service**
- **TechTip Videos**
- **Theory and Applications Courses**
- **eTraining**
- **Hands-On Training Courses**

Global Support

TA Instruments has a reputation for product innovation and quality. Combined with our dedication to support, it's easy to see why TA Instruments enjoys outstanding customer loyalty. Service is a cornerstone of the support we provide our customers every day. The vast array of training products ensures that our customers utilize their instruments effectively, maximizing return on investment. To provide this support, TA Instruments has assembled the largest worldwide team of service and support professionals in the industry. With direct support staff in 23 countries and 5 continents, TA Instruments can extend its exception support to you, wherever you are.

Others promise good support. Talk to our customers and learn how TA Instruments consistently delivers exceptional support.

Focus, Innovation

TA Instruments is committed to designing, manufacturing, and delivering high value analytical instrumentation based around a few core measurements. We strive for the most accurate and precise measurement of temperature, mass, displacement, and force. These four components form the foundation of a wide array of analytical techniques.

DSC

- Curing profiles and kinetics
- Residual cure
- Phase transitions
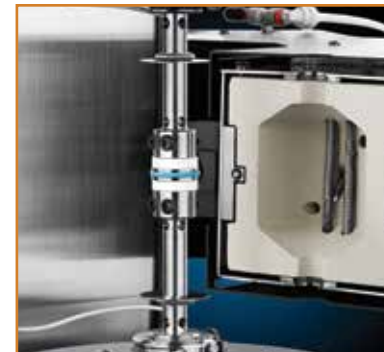- Oxidation Induction Time

TGA

- Compositional analysis
- Thermal Stability
- Evolved Gas Analysis by Mass Spec or FTIR
- Decomposition kinetics

DMA

- Final viscoelastic properties
- Finished part analysis
- Phase Transitions
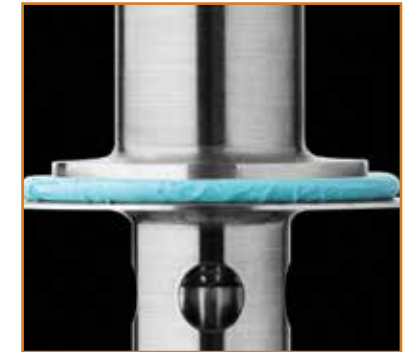- Filler effects

Dielectric

- Dieletric Properties
- Filler networks
- High frequency relaxation
- Phase transitions
- Compatible with DMA or rheometer systems

Thermal Conductivity

- Highly accurate, simple measurement
- Heat dissipation
- Cure process modeling

Rheometers

- High sensitivity rheology
- Solutions, polymers, coatings
- -160 ˚C to 600 ˚C
- Many sample types
- Complementary accessories

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