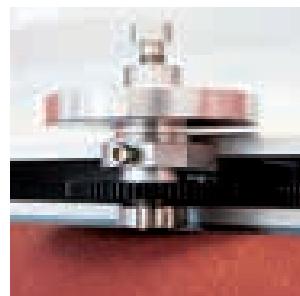


Rubber Testing Solutions



...Innovative testing solutions
made in Germany!



www.rubber-testing.com

MonTech - the global leader in rubber testing solutions...



MonTech®

Werkstoffprüfmaschinen GmbH
Carl - Benz - Straße 11
D - 74722 Buchen / Germany

INNOVATIVE TESTING SOLUTIONS MADE IN GERMANY!

MonTech Werkstoffprüfmaschinen GmbH is the world's leading premium manufacturer of rubber testing instruments.

Since 1998, we have been developing, producing, distributing and servicing high quality testing machines and their components as well as related software solutions for materials and component testing.

The secrets of our success are: very high quality standards for all our products; continuous development of these products; highly qualified employees and, last but not least, proximity to our customers. Their trust in our company is reflected by long-term customer loyalty, and by being appointed "preferred supplier" by many of our OEMs.

Our company with its headquarters based in Buchen, Germany operates a worldwide sales and service network with 24/7 availability. We have an extraordinarily broad global network of branch offices and subsidiaries along with representatives and partners, who guarantee both optimal technical service on site and short delivery times.

MonTech Werkstoffprüfmaschinen GmbH has been certified according to ISO 9001:2008 and accredited in accordance with DIN EN ISO 17025:2005.

Our extensive product range spans from solutions for basic to high-end applications in various fields of quality control, as well as research and development of raw materials, polymers and rubber. Therefore, MonTech rubber testing instruments are either available in standard versions or can be built according to individual customer requests and requirements.

A state-of-the-art facility with a 98% in-house fabrication rate and a team of experienced engineers are the backbone of our capability for custom solutions.

The unique modular product design provides advantages of easy maintenance, interchangeable instrument configurations, and a high testing flexibility for all kinds of elastomeric materials. Due to MonTech's wide variety of products and their applications, we have customers in many industries, but most noticeably the automotive, tire, aerospace, rubber compounding, pharmaceutical, chemical, food, packaging, research centers, universities and institutes.



MonTech World



You can count on us!

We are represented in every continent and in over 53 countries, providing technical and commercial service through a network of highly-qualified local and international support staff.

Technology meets engineering

MonTech Rubber Testing Solutions

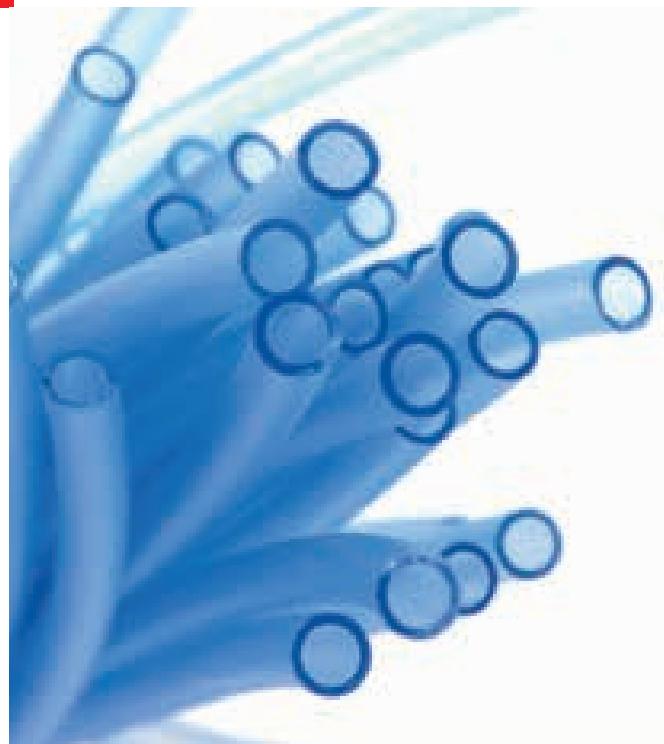
Customer First

We supply the highest quality products, innovative technology, expert support and world-class service. With more than 15 years of experience in the material testing industry, MonTech systems are found in applications and industries such as plastics, composites, elastomers, aerospace, automotive and biomedical components.

Core Values

MonTech's strong values and philosophy put customers first, working with dedication and commitment to develop the best technology and set new standards in material testing machines. Innovation is our culture.

Finding technological solutions to meet customer needs is our common goal. Challenges inspire our passion.



Made in Germany

We manufacture products with the greatest possible care and precision for customers from all sectors and provide state-of-the-art solutions for research and development.

Our testing machines are the embodiment of the proverbial "Made in Germany" quality. See for yourself - and visit one of our showrooms around the world.



Precision in design

We design and manufacture all components used in MonTech testing instruments in-house. This makes us really unique and allows us to have technological knowledge aimed for our users' benefit - the one-of-a-kind, patented cooling options are the best demonstration for how important this knowledge is.





A new standard made in Germany

MonTech is the world's leading supplier in rubber testing systems, developed by our experts for use in demanding testing situations and in a wide range of applications. All our machines are entirely engineered, manufactured and assembled in Germany by our own, skilled team of engineers and technicians. MonTech machines are truly made by MonTech as all production steps are performed in-house in Germany without external labour or subcontractors.



Precision and Reliability

MonTech is not only building machines but also refining, or even engineering, major key components in order to supply our customers with exceptional features.

Our patented wearless direct drive solutions provide unique advantages. They are extremely robust and offer unbeatable dynamic testing performance. Even loadcells and transducers are manufactured by MonTech in order to guarantee excellent test signal quality, machine performance and highly reliable test results.



Individuality and Quality

MonTech is the expert when it comes to special solutions. We set new benchmarks in the design and development of unique products and make testing possible on a new and greater scale than ever before.

Special testing instruments and systems are required for every application or type of test within the rubber industry, and we can supply appropriately tailored solutions. These tailor-made solutions include automated testing systems to reduce cost, minimize operator influence, and ensure reproducible test results.

Technology and Innovation

Since MonTech developed its first products in 1998, we have maintained an up-to-date product range which we are continuously expanding and adapting to the demanding needs of our customers and new applications.

Of course all our systems undergo - besides a very strict quality control process - continuous development to deliver even greater precision. During this process our experts work hand-in-hand with our customers, ensuring perfect solutions for every field of application. MonTech therefore cooperates with major universities and research facilities to ensure that our systems are always world leading.



Durability, Support and Service

Our systems are guaranteed for a minimum of 20 years from delivery, making your MonTech machine a highly secure investment.

MonTech branches and service organizations in over 53 countries ensure expert advice and OEM service available worldwide. Guaranteed.



Series production - custom built

MonTech testing machines are manufactured in a series assembly with hundreds of units per year.

However every single machine is built to order - specially for the application and with the specific configuration for each customer.



Electronics

The efficiency of a testing system, is to a large extent, determined by the control electronics in use. We offer high performance solutions with state-of-the-art PLC-based electronics solutions with all our machines. Our sophisticated control and data acquisition electronics, paired with state-of-the-art data output interfaces, combine total reliability with maximum user-friendliness.



Applications

MonTech offers a wide range of customized solutions for specific applications and in accordance with international standards. Our expertise allows us to meet our customers' requirements by providing superior testing equipment and accessories along with world-class service and support.

MonTech's application engineers are familiar with the individual requirements of many different fields in the rubber and polymer industry right down to the smallest detail, allowing them to tailor the testing solution exactly to the needs of the end user.



Details that make the difference

All custom machine components and assemblies are machined, manufactured and assembled in-house by highly qualified MonTech engineers.

Clean-rooms and climate-controlled environments allow us to have complete control and influence over every step of our manufacturing process, which is in compliance with ISO / ASTM / DIN / JIS / GB and many other standards. These integrated processes are the foundation for every testing system produced by MonTech.



MonTech Showrooms and Academy

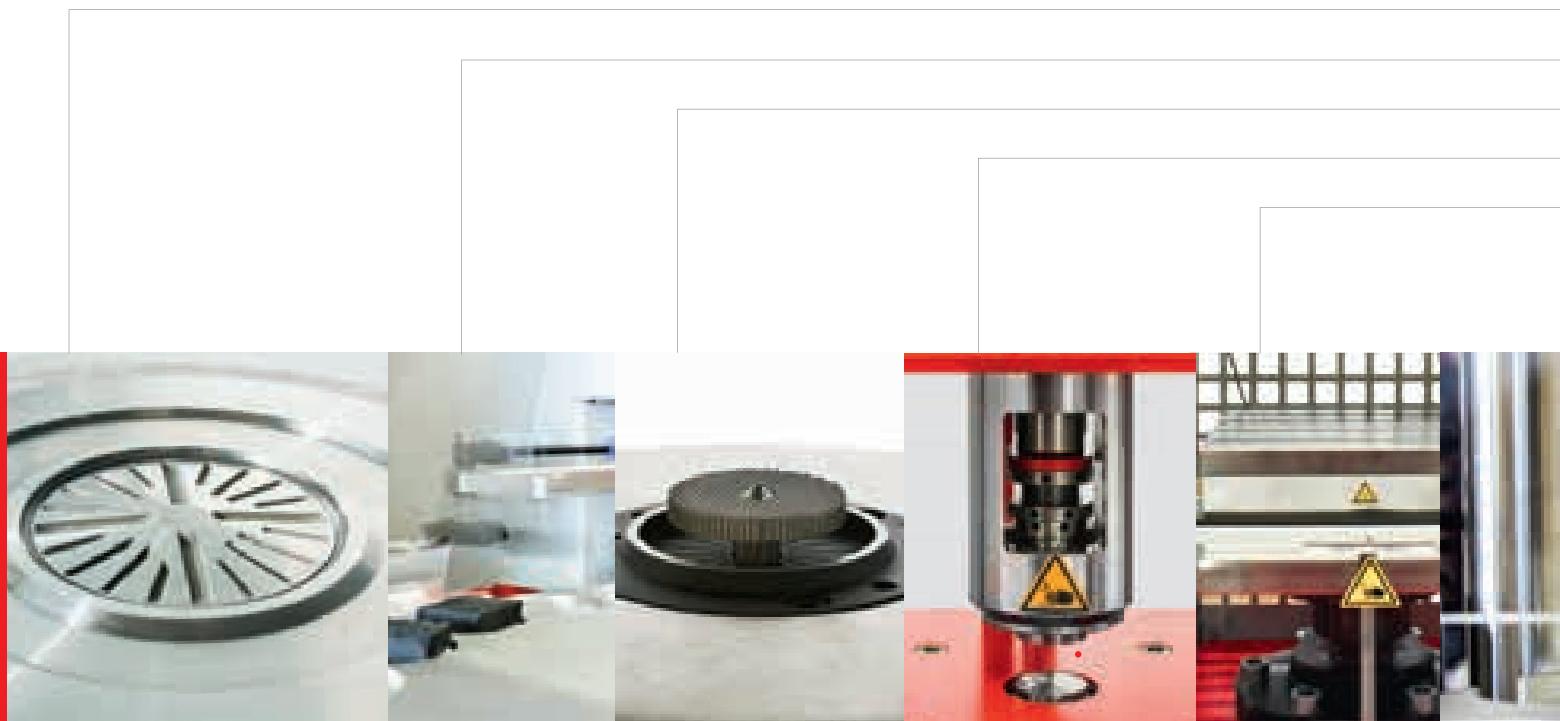
At the MonTech showrooms located around the world, our application specialists regularly engage with operators, technicians and scientists who work in the field of polymer and rubber rheology.

The MonTech academy has been established to intensify the exchange of relevant knowledge and experiences to quickly gain an understanding of the fundamental principles of operation, installed technology and applied methodology of MonTech testing instruments. Therefore MonTech academy offers tailored training courses and seminars covering practical operator seminars, technical and analytical workshops as well as methodology courses.



MonTech

Rubber and Polymer Testing Solutions at a glance



Rheometer

- 12 MonTech Rheometers
- 16 Application Examples
- 22 MDR 3000 Basic
- 24 MDR 3000
- 26 MDR 3000 Professional
- 28 D-MDR 3000
- 30 D-RPA 3000

Automation

- 33 Automation options
- 34 Automation options in detail

Instrument options

- 36 Rheometer Advanced instrument options
- 38 Rheometer Data and productivity options

Rheometer Calibration

- 39 Traceable Calibration Torque standards
- 39 Reference Materials

Mooney Viscometer

- 41 Mooney Viscometer Application Examples
- 42 MV 3000 Basic
- 44 MV 3000
- 46 V-MV 3000
- 48 Mooney Viscometer Cooling, data and productivity options
- 49 Reference Standards and Materials

Specimen preparation

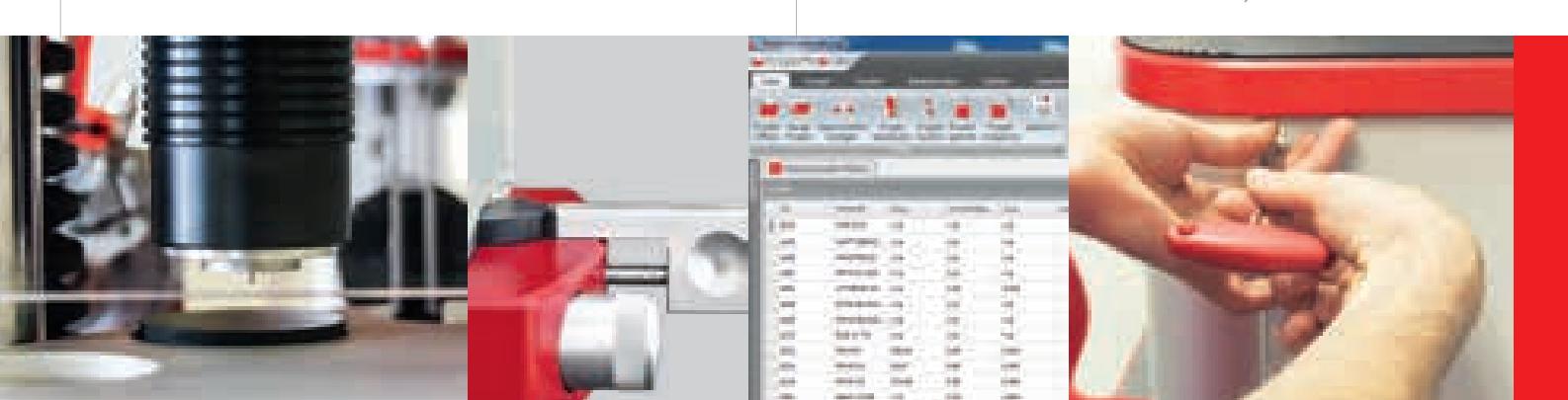
- 50 Sample cutters for specimen preparation
- 51 R-VS 3000
- 52 M-VS 3000
- 53 VS 3000
- 54 P-VS 3000 M
- 55 P-VS 3000
- 56 P-VS plus 15 kN
- 57 Cutting knives, dies and moulds
- 58 CP 3000

Laboratory press

- 60 VP 3000 & LP 3000 Laboratory press series
- 61 Laboratory press moulds
- 62 LP 3000 - H200
- 62 LP 3000 - H400
- 62 LP 3000 - H600
- 62 LP 3000 - H1000

*...Innovative testing solutions
made in Germany!*

- Rheometer
- Automation
- Mooney Viscometer
- Sample cutting
- Sample curing
- Physical properties
- Software systems



Hardness & Compression set

64 HT 3000

64 CS 3000

Density

65 DM 3000

Hardness & Density

66 H&D 3000

Uncured Density

70 RD 3000

Dispersion

72 DisperTester 3000

74 DisperTester 3000 Plus

76 DisperCut 3000

78 DisperCool 3000

Abrasion

80 ABR 3000

Plasticity

82 RP 3000

84 AO 3000

Fatigue

86 FT 3000

Software systems

90 Global Laboratory Information Management Systems

92 MonRecipe & Mon Quality

94 MonControl

96 MonStat

Customer support + service

98 Worldwide Support, Maintenance and Calibration

Instrument upgrades

100 Instrument upgrades and rebuilds

Testing film

102 Precision testing film

Spare parts

103 Consumables and spare parts

Tailor-made solutions

104 Tailor-made testing solutions

MonTech Technology: Moving Die Rheometer (MDR and RPA) Series

Moving Die Rheometers are the standard testing method for characterisation of rubber curing in quality control as well as research and development.

Therefore these rotorless curemeters are equipped with a closed, sealed, biconical die system according to all relevant ISO, ASTM and DIN standards. During the test the lower die performs a sinusoidal oscillation with a fixed oscillation amplitude and frequency, at either a fixed (isothermal) or variable temperature (non-isothermal).

MonTech Moving Die Rheometer systems are the backbone for reliable and repeatable quality control in the rubber industry - offering a unique design with an extremely rigid test frame and superior temperature control.

Depending on the instrument model, the instrument is either equipped with a mechanical or with a direct drive system. Every machine is supplied with the flexible and easy to operate MonControl Software for managing test specifications, acquiring data, and reporting results.

Furthermore, every instrument can be configured to exactly meet the customers specific needs - this includes a modular platform of automation solutions, cooling options and sample preparation systems.



Rugged housing and ultra-stiff machine frame

The machine frame of every MonTech Rheometers is constructed from aerospace grade aluminum and stainless steel making MonTech Rheometers the most rugged and stable Rheometer systems in the market.

This design includes baseplates of up to 80 mm thickness, 50 mm stainless steel pullrods, massive 80 mm crossheads with integral stainless steel force crossbeam support for superb die symmetry and alignment as well as and up to 20 mm thick side panels. This results in an overall superior instrument stiffness; significantly improving repeatability and result correlation, while reducing signal-to-noise ratio as well as guaranteeing the best damping abilities, especially for high frequency testing and unbeaten dynamic testing performance.

This ultra-rigid instrument design has even more advantages: The whole instrument frame is used as a heatsink for all major electronic components so that the instrument does not need any fans or air ventilation for cooling, allowing the complete electronic cabinet to be sealed against pollution and especially conductive carbon black dust.

As only high-strength aluminum and stainless steel are used for every single component in the instrument, corrosion is no issue at all, making MonTech instruments a secure investment.

MonTech rubber testing instruments - truly built to last !

Test dies and die closing system

MonTech Moving Die Rheometers are equipped with a biconical die assembly with integrated direct heating, accurate sample temperature measurement, superior temperature control with unbeaten accuracy, highest heating and cooling rates, and minimized response times.

The specific die and crosshead design ensures a perfect alignment and uniform closing as well as parallelism of both test dies, significantly reducing result variations.

MonTech Rheometer test dies are entirely made from superior, lot-traceable stainless steel, hardened, precision ground and polished, making the dies built to last with an extreme stiffness and durability even against the most abrasive rubber compounds.

The test dies are sealed off with easily changeable long-life seals to provide superior lifetimes of up to 12 months, minimizing maintenance and instrument downtime.

Every MonTech Rheometer is equipped with a pneumatic die closing system for a reliable closing and sealing of the die cavity.

Optionally, instruments can be equipped with variable closing force, cavity pressure and variable die gap control.

In combination with the MonTech loadframe, this instrument design guarantees compliant testing results at the highest possible level of accuracy and precision paired with perfect reproducibility and reliability.



Integrated calibration and diagnostics

MonTech Instruments feature internal diagnostic and condition monitoring routines for every critical process, enabling the instrument to detect, report and even solve problems before they occur.

Along with MonTech precision calibration tools, customers are guided through a software sequence, making the verification of the instrument really easy in order to always guarantee the highest instrument precision and most accurate test data.

Once the verification process is completed, a detailed PDF Report with all critical verification and calibration is generated, assuring traceability to any reference standard used.

Readings of most reference standards and performance parameters are taken by the software, minimizing operator involvement for providing objective results.

MonTech Technology: Moving Die Rheometer (MDR and RPA) Series

Precision torque measurements and transducer systems

Torque / force transducers and loadcells are the most critical part when it comes to precision of the instrument because raw torque and force signals, as well as derived modulus and viscosity signals are directly used for test result calculation. This is exactly the reason why MonTech designs and manufactures all transducers in-house. This guarantees the widest measurement ranges along with clean-room applied strain gauge technology paired together in ultra-rugged and stiff assemblies.

MonTech's intelligent transducer technology possesses various unique features such as variable amplifications, stiffness control and temperature compensation — proof again that MonTech systems are the most advanced testing systems available; guaranteeing the highest accuracy and precision from the smallest Milli-Newton torque readings to the highest dynamic loads over the complete torque range.

Integrated data processing

Programmable Logic Controllers form the backbone of every MonTech testing instrument, providing customers with proven technology and the highest system reliability.

The highly complex set of stress, strain and other raw data streams and results that are all time-critical to each other are analyzed in real-time with the most advanced 24-bit electronics and a 10 kHz high speed data sampling rate. This superior oversampling technology paired with the superior signal to noise ratio eliminates the need for data filtering or further data processing, providing the user with actual true measured data and results. MonTech's advanced rubber testing machines support customers with as much valuable material information as possible, with features including measurement of higher harmonics, nonlinearities, and behavior at extreme processing conditions.

Every MonTech Rheometer and Mooney Viscometer is equipped with a rugged, well-proven and reliable Programmable Logic Controller (PLC) system as well as standard automation components.

Every instrument is directly equipped with an Ethernet interface, allowing direct integration of the machine into the customers network as well as linking host systems and computers by standard TCP/IP protocol with extremely high data rates and throughput.



Powerful drive technology

MonTech Rheometer systems are equipped with the latest, closed-loop digital drive technology. The quality and performance of the instruments' rheological measurements are highly influenced by the precision of the applied deformation and thus the motor positioning. Therefore all MonTech Rheometer testing systems are equipped with the latest high-precision drive systems:

The MDR 3000 Basic instrument features a geared, brushless DC motor with integrated drive control systems, digitally connected to the instrument PLC unit, making this drive the ideal system for static testing at fixed frequencies.

All other MonTech Moving Die Rheometers and Rubber Process Analyzers feature the patented MonTech wearless direct torque drive system which ensures highly precise, stepless, and variable movement of strains, frequencies and other types of controlled sequences. This unique and powerful drive is the only motor system that has been specially designed for MDR and RPA applications.

Unbeaten dynamic performance can be achieved as the drive is mounted directly underneath the lower die, minimizing the moving mass and eliminating the need of any clutches, drive shafts or couplings. Finally, this means that there are absolutely no start delays or backlashes, continuously assuring exact and repeatable movements for the most accurate rheological measurements.

Ceramic and magnetic bearings form the backbone of the drive's high durability, stiffness, rigidity and reliability, resulting in superior precision for the smallest strains to the highest frequencies.

In-line to the main drive system, a specially designed high-precision angular displacement sensor with an accuracy of 0.000001° is mounted, measuring the slightest movements and forming a digital, closed-loop control circuit with a response time of less than 20 nanoseconds.

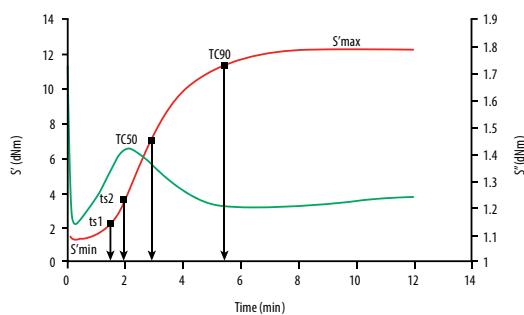


MonTech Moving Die Rheometers are the world-leading instrument series for reliable cure measurements in the rubber industry.

Due to the rugged design and superior design quality, MonTech instruments clearly offer superior accuracy and precision, proven by our certifications and accreditations including ISO 9001:2008 and ISO/IEC 17025:2005.

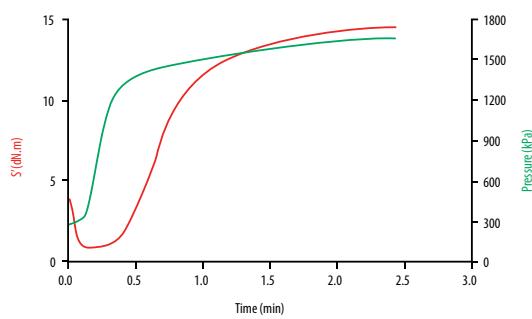
These calibrations services are offered throughout the world by our highly qualified team of MonTech field engineers in order to make sure that the calibrations of your instruments are fully traceable and comply to all local, company, and international standards.

Moving Die Rheometer Application Examples



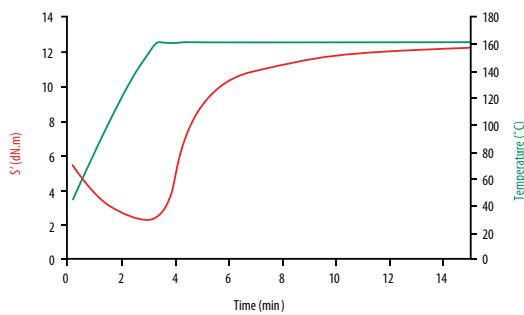
Isothermal Cure

Isothermal cure experiments are the most common type of test for quality control in rubber and elastomer processing. MonTech Moving Die Rheometers provide high precision data as well as a simple operation of the instruments. All the important characteristics, such as minimum / maximum elastic torque, scorch times, cure times and reaction rates are precisely calculated, with over 3500 different datapoints. All data is available in numerical as well as graphical form; limits, control gates and tolerance graphs can easily be set, and Pass / Fail status is automatically evaluated after each test.



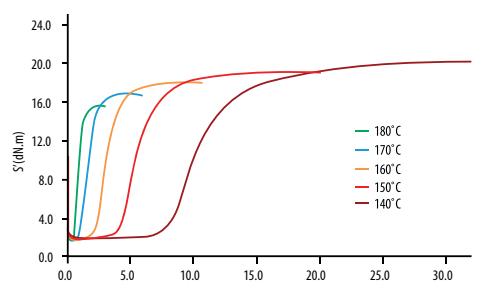
Cure with simultaneous Sponging / Foaming / Blowing Reaction

Especially for sealing applications, blowing agents form a vital part of compound recipes in order to produce a cellular structure via a foaming process that runs in parallel to the cure reaction. The cellular matrix structure which is created during the foaming process reduces density, increases thermal and acoustic insulation, and affects the relative stiffness of the mix. Therefore, MonTech Rheometers can be fitted with a precision normal force measurement transducer in the die cavity in order to calculate cavity pressure simultaneously during the curing and reaction in a single test, and revealing interrelations between the two reactions.



Non-isothermal Cure

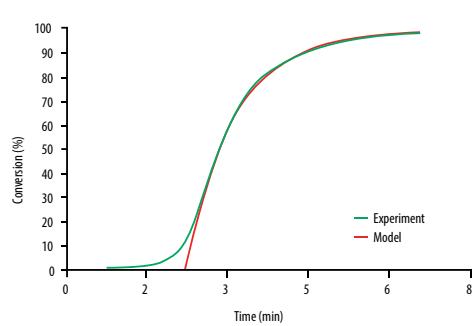
In addition to isothermal static cure testing, MonTech MDRs and RPAs can perform tests at variable temperatures. These non-isothermal sequences can be programmed in order to follow virtually any temperature profile, making them especially valuable for the simulation of manufacturing processes which are usually not isothermal. Typical processes that can be simulated are mixing, milling, extrusion, compression moulding, injection moulding, and storage conditions. Of course, non-isothermal test sequences can be executed in a single test with any other static or dynamic sequence, such as strain and frequency sweeps, providing the most accurate data of the material's behavior at any production stage and material state.



Advanced cure kinetics modeling

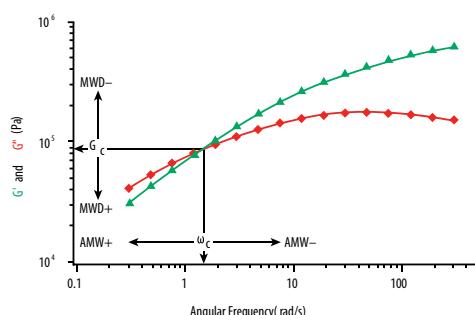
Test data from similar static or dynamic test sequences executed at different temperatures can automatically be evaluated and modelled for an advanced cure kinetics analysis, providing information about:

- Reaction Rate
- Order of Reaction, n
- Rate Constant, k
- Activation Energy, E
- Incubation Time, t_i



Rubber Process Analyzer

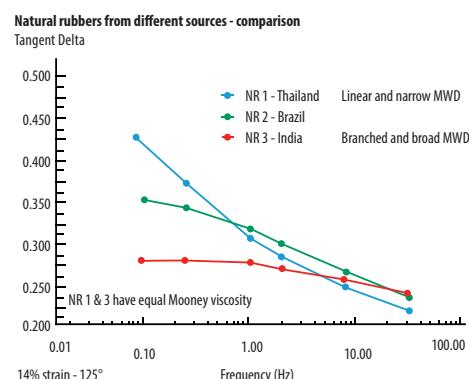
Raw Material Applications



Frequency sweep material analysis

In general, the mechanical properties of materials depend on frequency. A good understanding of the influence of frequency on a material is therefore very important for its practical use. For example, a material appears stiff under the action of a force at high frequency, but soft when the force is applied slowly. Isothermal frequency sweeps provide information about the weight distribution MWD (crossover modulus) as well as average molecular weight AWM (crossover frequency). But the behavior of viscoelastic materials like polymers not only depends on frequency, it also depends on temperature.

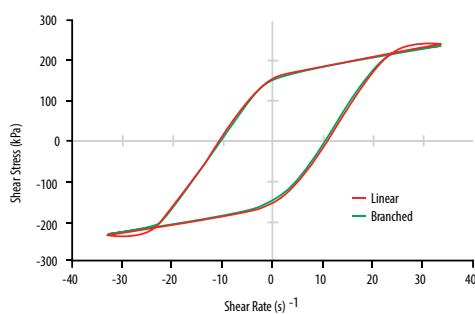
MonTech has incorporated further advanced testing capabilities such as the Time-Temperature Superposition principle (TTS), which is based on the equivalence between frequency and temperature behavior during transition processes, forming the basis of WLF master-curve modelling available on MonTech dynamic Rheometers, even for predicting material performance at frequencies outside the range that can be measured with a dynamic mechanical analyzer.



Structural characteristics and processability

The rheological properties of rubbers are related to their structural characteristics and will influence the behavior of the rubber during processing and the performance of the final product. While Mooney testing does not provide sufficient information to clearly differentiate branching and Molecular weight distribution the Rubber Process Analyzer can easily be used as a tool for solving production problems. Using frequency sweeps to scan the material over the whole shear rate range can reveal substantial material differences and variations e.g. causing a particular material to be very sticky and therefore difficult to process while others can be perfectly processed.

These test can be performed in the linear and also non-linear viscoelastic range to cover all different processing methods and material states. ISO 13145 suggests a simple and quick test procedure utilising a rotorless sealed shear rheometer (RPA) for rheological evaluations as an alternative to traditional Mooney Viscometer testing.

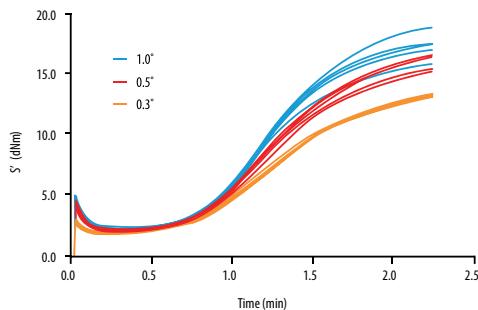


Non-Linear material response at high strain

Dynamic oscillatory shear tests are common in rubber rheology - more specifically, small-amplitude oscillatory shear (SAOS) tests are the most common test method for measuring linear viscoelastic properties of rubber compounds and polymers. But in processing operations, the shear rates can be large and rapid; non-linear material properties form an even more important part in understanding material response. Therefore, MonTech Rheometers provide Fourier transformation analysis capabilities of periodic data, along with full raw-data access, for in-depth analysis to investigate and quantify the nonlinear viscoelastic behavior by using large-amplitude oscillatory shear (LAOS) testing in order to characterize and quantify material stress response which is no longer purely sinusoidal (linear), allowing a better understanding of filler content and structure, as well as the polymer architecture.

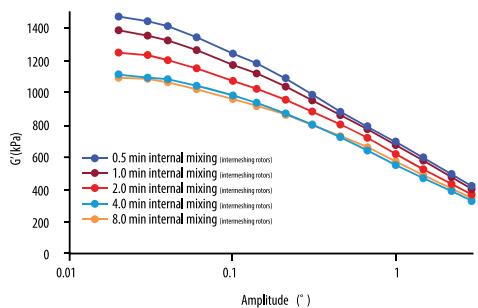
Rubber Process Analyzer

Advanced Cure and Processability Applications



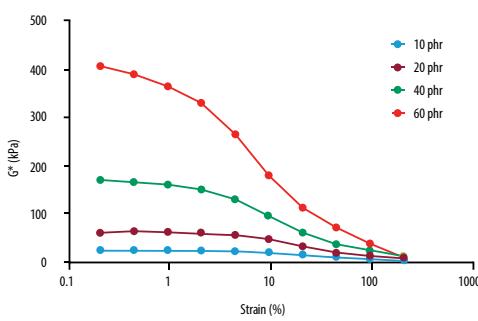
Isothermal Curing at Variable Strain

Typically, cure experiments on rubber compounds - especially for quality control purposes - are performed with a fixed oscillation angle of +/- 0.5° and a frequency of 1.67 Hz. However, for specific rubber compounds or challenging materials such as silicones or epoxy resins, this might not be ideal as either reaction torque readings are too low, providing only a limited ability to distinguish between different batches, or might be too high causing high result variability as the material is damaged as strain already exceeds the linear viscoelastic range. MonTech Rheometers provide the possibility of testing with variable oscillation angles to allow measurements within the ideal strain amplitude for optimal signal-to-noise ratio and the most precise test results, while avoiding any structural breakdown or slippage of the sample in the die cavity.



Structural Breakdown of rubber compounds - process simulation

Rubber compounds are extremely sensitive to processing operations such as milling. Increasing strain causes the carbon black network - which is held together by Van der Waals-London attraction forces to break, causing a decrease in shear modulus of filled rubber vulcanizates. Therefore, MonTech Rheometers provide simulation capabilities for almost any possible production process, providing irreplaceable data for developing rubber compounds, as well as understanding and simulating manufacturing processes and environments.



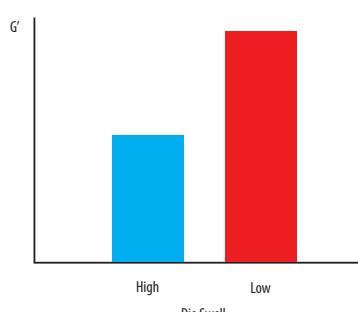
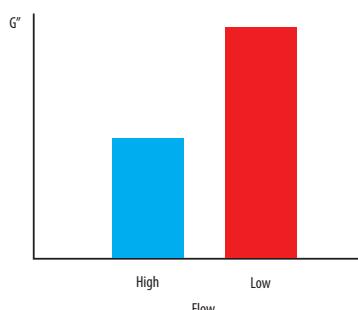
Strain Sweep for Filler Loading "Payne-effect"

The Payne effect is a particular feature of the stress-strain behavior of rubber, especially rubber compounds containing fillers such as carbon black and silica. Physically, the Payne effect can be attributed to deformation-induced changes in the material's microstructure, i.e. to breakage and recovery of weak physical bonds linking adjacent filler clusters.

Measurement of modulus vs. strain is therefore essential to understanding and quantifying filler loading, filler dispersion and filler-filler interaction in the low strain region, and polymer-filler interaction at higher strain. The resulting characterizations of material structure are essential as they directly impact dynamic stiffness and damping behavior of final products such as rubber bushings, automotive tyres and all other rubber goods. Similar to the Payne effect under small deformations is the Mullins effect, which is observed under larger deformations in the non-linear viscoelastic range.

Rubber Process Analyzer

Processability and post-cure Applications

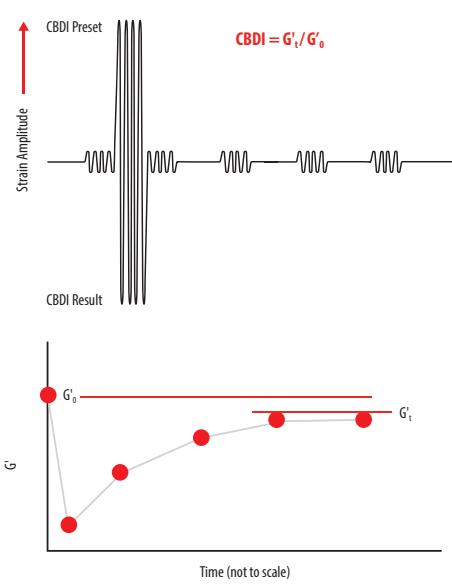


Prediction of processability: Extrusion

Good processing performance is influenced by three main criteria: throughput flow, die swell and surface finish. The rubber is required to flow through the extruder. The flow will be controlled by the viscosity of the rubber. The shear rate from an extruder and extrusion die can easily be calculated and used as the specific test parameters in a Rubber Process Analyzer test setup. The shear rate in MonTech Rubber Process Analyzer is proportional to the frequency multiplied by the oscillation angle.

A low viscosity will mean that rubber will easily flow through the extruder with low die pressure. Once the rubber is extruded it is required to be in the correct size – however as the rubber is extruded through the die it is in compression across the direction of flow and extension in the direction of flow. When leaving the die, the elastic nature of the compound will cause the rubber to expand, resulting in die swell. MonTech Rubber Process Analyzers can obtain the Storage shear Modulus G' at high strains (typically 100%) allowing an excellent prediction of die swell.

The surface finish of the extrudate is required to be smooth, and not rough. Roughness tends to occur when a stick-slip resonance is set up between the speed of the extruder and the elastic response of the compound. Testing at variable shear rates using a frequency sweep allows the comparison of compounds that extrude with smooth and rough finishes revealing processing differences in the storage shear modulus G' .



Mechanical properties: Carbon Black Dispersion

In filled rubber compounds carbon-black particles form a network of mutually interactive agglomerates. These effects can be measured and quantified using a simple D-RPA 3000 Matrix test. Storage shear modulus (G') results at low strains (e.g. +/- 1%) are typically high and get reduced after a larger strain amplitude (e.g. +/- 50%) is applied for a short period of time. With lower strain amplitudes applied over time, the reduced Storage shear modulus (G') will partially recover. This effect relates to the Van der Waals forces linking the agglomerates, getting broken at higher strain amplitudes and the partially recovering over time.

The extent of recovery of the Storage shear modulus (G') directly relates to the Dispersion Rating (DR) of the rubber compound. If the carbon black is poorly dispersed, the recovery of the Storage shear modulus (G') will be much lower indicating a much weaker filler structure and therefore reduced mechanical performance properties.

A simple CBDI performed by a Rubber Process Analyzer allows consistent testing and quality control on the Carbon Black Dispersion rating: $\text{CBDI} = \text{Initial storage shear modulus } G'(50^\circ\text{C}, 1\text{Hz}, 1\%) / \text{Final storage shear modulus } G'(50^\circ\text{C}, 1\text{Hz}, 1\%)$.

The higher the CBDI value, the better the carbon black dispersion.

MonTech Moving Die Rheometers and Rubber Process Analyzers

Static Curemeters are designed to test mixed rubber compounds under isothermal test conditions with fixed strain and frequency.

Dynamic Curemeters are Dynamic Mechanical Rheological Testers (DMRT) designed to measure material properties of raw elastomers or mixed rubber – before, during and after cure in a single test.



STATIC TESTING

	MDR 3000 Basic	MDR 3000
Instrument description	Compact, entry model instrument for repetitive quality control testing as well as simple R&D applications	High-end instrument for QC and static R&D testing for a broad range of materials (from LSR, all kinds of elastomers to composite materials)
International standards	ISO 6502, ASTM D 5289, DIN 53529	ISO 6502, ASTM D 5289, DIN 53529
Die configuration	Biconical, closed die system, sealed	Biconical, closed die system, sealed
Drive system	Mechanical, brushless DC eccentric drive	Direct, wearless servo drive system
Oscillation frequency	1.667 Hz	1.667 Hz
Oscillation strain	+/- 0.1°, 0.2°, 0.5°, 1° or 3° Mechanically adjustable	+/- 0.01° to 5° Programmable via Software
Temperature range	Ambient to 232 °C	Ambient to 232 °C
Measured Data	Torque, temperature, frequency Optional: Normal force	Torque, temperature, frequency, strain Optional: Normal force
Calculated Data	S', S'', S*, tan δ	S', S'', S*, tan δ



Let us help you to determine
the optimal instrument configuration
for your testing needs.
Contact us today!

All instruments are also available
with various automation options:
► Page 32



STATIC AND DYNAMIC TESTING

MDR 3000 Professional	D-MDR 3000	D-RPA 3000
Entry model instrument in the Rubber Process Analyzer (RPA) technology. The MDR 3000 Prof. can be operated either in static testing mode (MDR) or also in dynamic testing mode (RPA).	Top model for advanced dynamic testing of all kinds of rubber, rubber-like, curing or crosslinking materials. This includes TPE, TPV, LSR, Composite materials, Polyolefins, ...	High-end instrument for demanding static and dynamic testing in QC and R&D with a huge set of customizing options. This enables testing capabilities that have not been possible to measure in a Rheometer before, such as die gap regulation, High-speed data acquisition (FT-Rheology), low-temperature cooling, ...
ISO 13145 , ISO 6502, ASTM D 5289, ASTM D 6204, ASTM D 6601, ASTM D 6048, ASTM D 7050, ASTM D 7605, DIN 53529	ISO 13145 , ISO 6502, ASTM D 5289, ASTM D 6204, ASTM D 6601, ASTM D 6048, ASTM D 7050, ASTM D 7605, DIN 53529	ISO 13145 , ISO 6502, ASTM D 5289, ASTM D 6204, ASTM D 6601, ASTM D 6048, ASTM D 7050, ASTM D 7605, DIN 53529
Biconical, closed die system, sealed	Biconical, closed die system, sealed	Biconical, closed die system, sealed
Direct, wearless servo drive system with ceramic bearings	Direct, wearless servo drive system with ceramic bearings	Advanced wearless servo drive system with ceramic bearings
0.001 Hz to 33 Hz (0.001 Hz to 50 Hz optional)	0.001 Hz to 100 Hz	0.001 Hz to 100 Hz
+/- 0.01° to 20° (+/- 0.01° to 90° optional)	+/- 0.001° to 180°	+/- 0.0001° to 360°
Ambient to 232 °C	Ambient to 232 °C	Ambient to 232 °C
Torque, temperature, frequency, strain Optional: Normal force	Torque, temperature, frequency, strain Optional: Normal force	Torque, temperature, frequency, strain Optional: Normal force, die gap, die pressure
S' , S'' , S^* , G' , G'' , $\tan \delta$, η' , η'' and η^*	S' , S'' , S^* , G' , G'' , $\tan \delta$, η' , η'' and η^*	S' , S'' , S^* , G' , G'' , $\tan \delta$, η' , η'' and η^*

MonTech MDR 3000 Basic

Entry level Moving Die Rheometer



The MDR 3000 Basic

is the easiest to operate and most cost-effective way to determine viscoelastic properties of polymers and rubber compounds before, during and after cure.

The acquired data gives exact information about processability, cure characteristics, cure speed and the behavior of the compound after-cure, as well as optional pressure measurement for sponge rubber compounds.

The MDR 3000 Basic comes as a complete and ready-to-test set consisting of the Rheometer itself, an external Personal Computer with the latest Windows Operating System, TFT screen, keyboard and mouse, as well as a printer.

Like every MonTech Rheometer, the MDR 3000 Basic also features an Ethernet Interface and can therefore be directly integrated in any customer's factory network, guaranteeing the most stable data transfer and communication in any laboratory or factory environment, allowing data access at the instrument and from remote and office workstations, creating a digital process chain and integrated workflow based on a digital data repository, eliminating the need of result printing after each test series.

Designed as a table top instrument utilizing only minimal benchspace, the MonTech MDR 3000 Basic is synonymous with a reliable but easy and efficient testing operation.

The instrument is equipped with the latest PLC-based control and data acquisition electronics, ensuring the highest data acquisition precision and reliability, along with superior temperature control - improving overall data significance and laboratory efficiency.

The instrument comes with the MonControl Analysis software for test configuration management, data recording, automated Pass/Fail testing, processing of historical data as well as online statistical process control (SPC), having more than 3500 different datapoints available for selection. With an optional 5" instrument touch-control panel, the instrument can even be conveniently operated in stand-alone mode by directly displaying and printing the most essential datapoints - including the possibility to save and archive test data on a USB flashdrive.

Completely closed, rotor-less, sealed, biconical test chamber system

entirely made from stainless steel, precision machined, hardened and ground to utmost precision for highest durability and testing accuracy. The lower die is directly connected to the central shaft and drive system. All these parts and components are also made from solid stainless steel, making the MDR 3000 Basic a cost-efficient, long-lasting and safe investment. The upper die is attached to the reaction torque measurement for immediate recording of the material feedback at the highest precision.

The MDR 3000 Basic features an extremely stiff, ultra-rugged loadframe paired with a unique, column-guide-free, accessible testing area along with the most simple single-button operation and integrated multi-color status bar making this instrument truly the most reliable testing system for quality control purposes not only in the laboratory, but also directly in the production area.

Of course various different automation options for increasing testing productivity are available and can be fitted to the instrument at any time.



Technical specification

International standards

ISO 6502, ASTM D 5289, DIN 53529

Die configuration

Biconical, closed System, sealed

Die gap

0.45 mm nominal

Sample volume

approx. 4.5 cm³

Drive system

Mechanical, brushless DC eccentric drive

Closing system

Pneumatic with soft-close to prevent foil rips

Oscillation frequency

1.667 Hz (100 cpm)

Oscillation strain

+/- 0.1°, 0.2°, 0.5° (Standard), 1° or 3°, Mechanically adjustable
(+/- 1.4%, 2.8%, 7% (Standard), 14% or 42%)

Torque range

0.01 to 235 dNm

Temperature control system

Ambient to 232 °C, precision +/- 0.03 °C,
Max. heating rate: 85°C/min
digital, microprocessor PID controlled

Temperature check system

Recordings of the temperature gradient on the screen,
microprocessor monitored

Measured Data

Torque (dNm, lbf.in, kgf.cm), Temperature (°C, °F),
Pressure (bar, kg per cm²), Time (min - min / min - sec / sec),
Shear rate (1/s, rad/s), Cure rate (1/min, 1/sec)

Calculated Data

S', S'', S*, tan δ, phase angle, cure speed, ...

Data Interface

Ethernet (10/100 MBit), USB (int.), CF card (int.), RS232 (opt.)

Data points

Over 3500 data points available for each test
Including S' Min, S' Max, TS 1, TS 2, TC 10, TC 30, TC 50, TC 90

Pneumatics

min. 4.5 Bar / 60 psi

Electrical

Single phase 100 - 120 V, 8 Amps or 200 V - 240 V, 5 Amps,

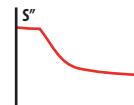
Instrument options

- Instrument control panel with 5" touchscreen display and printer
- Normal force / Pressure measurement
- Single channel forced air cooling system
- Autoloader 5 or 10 sample linear
- Autoloader with 24 or 48 sample tray
- R-VS 3000 constant volume sample cutter

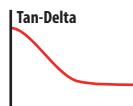
Calculated results



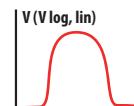
Elastic Modulus



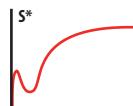
Viscous Modulus



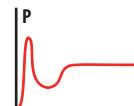
Tan - Delta



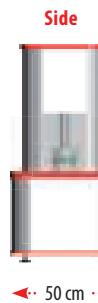
Vulcanization speed



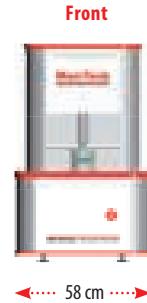
Complex Modulus



Normal force / Pressure
(optionally available)



93 cm
50 cm



58 cm



MonTech MDR 3000

Advanced Moving Die Rheometer



The MDR 3000

is the industry standard for measuring the viscoelastic properties of polymers and elastomeric compounds before, during and after cure.

The acquired data is gives advanced information about processability, cure characteristics, cure speed, as well as the behavior of the compound after-cure at fixed, user selectable strain rates.

The instrument comes in the unique MonTech Series 3000 loadframe - industrial proof, fanless and ultra-rugged even for toughest production environments.

The reaction torque is measured by a high resolution, digital strain gauge assembly with integrated temperature compensation, making the MDR 3000 the most accurate and precise Moving Die Rheometer for static testing.

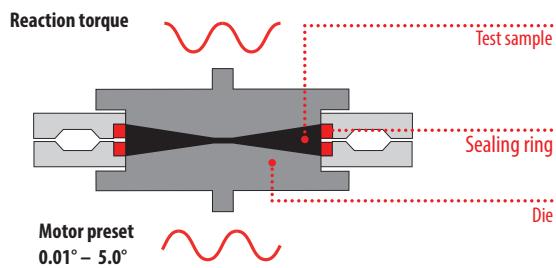
Optionally, the instrument can be equipped with a combined torque / normal force sensor to assess blowing or sponging reactions of the tested material. For increased productivity and throughput, various types of highly reliable automation systems are also available.

Of course the MDR 3000 can be easily upgraded at a later stage to an MDR 3000 Professional to not only be able to run static but also dynamic test sequences.



Unique direct drive system

The instrument utilizes a direct, high-precision, gearless torque drive system mounted directly to the lower die assembly. Therefore, the oscillation angle can be directly changed in the MonControl software, making the instrument capable of always measuring materials in the optimal strain range. This feature significantly reduces signal noise, improving the accuracy of testing results. With this fully digital drive system, no mechanical strain adjustments are needed and the motor positioning is monitored and recorded throughout the test.



The heart of the instrument is the directly heated and precisely regulated biconical die assembly. The lower die oscillates with a predefined angle and frequency whereas the reaction torque is recorded on the upper die.

Technical specification

International standards

ISO 6502, ASTM D 5289, DIN 53529

Die configuration

Biconical, closed die system, sealed

Die gap

0.45 mm nominal

Sample volume

approx. 4.5 cm³

Drive system

Direct, wearless servo drive system

Closing system

Soft closing to prevent foil rips and damage of test sample

Oscillation frequency

1.667 Hz (100 cpm)

Oscillation strain

+/- 0.01° to 5°, Programmable via Software
(+/- 0.14% to 70%)

Torque range

0.01 to 235 dNm

Temperature control system

Ambient to 232 °C, precision +/- 0.03 °C,
Max. heating rate: 85°C/min
digital, microprocessor controlled

Temperature check system

Recordings of the temperature gradient on the screen,
microprocessor monitored

Measured Data

Torque (dNm, lbf.in, kgf.cm), Temperature (°C, °F),
Pressure (bar, kg per cm²), Time (min - min / min - sec / sec),
Shear rate (1/s, rad/s), Cure rate (1/min, 1/sec)

Calculated Data

S', S'', S*, tan δ, phase angle, cure speed, ...

Data Interface

Ethernet (10/100 MBit), USB (int.), CF card (int.), RS232 (opt.)

Data points

Over 3500 data points available for each test
Including S' Min, S' Max, TS 1, TS 2, TC 10, TC 30, TC 50, TC 90

Pneumatics

min. 4.5 Bar / 60 psi

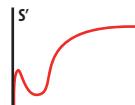
Electrical

200 V - 240 V, 6 Amps, 50/60Hz

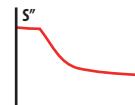
Instrument options

- Instrument control panel with 5" touchscreen display and printer
- Normal force / Pressure measurement
- Double channel forced air cooling system
- Autoloader 5 or 10 sample linear
- Autoloader with 24, 48 or 100 sample tray or tray changers
- R-VS 3000 constant volume sample cutter

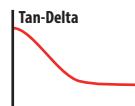
Calculated results



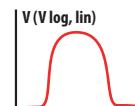
Elastic Modulus



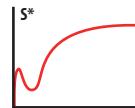
Viscous Modulus



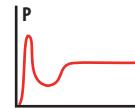
Tan - Delta



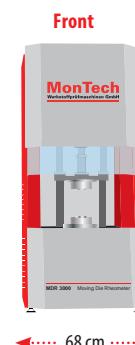
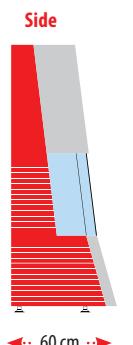
Vulcanization speed



Complex Modulus



Normal force / Pressure (optional available)



MonTech MDR 3000 Professional Performance Moving Die Rheometer



The MDR 3000 Professional

is designed for measuring the viscoelastic properties of polymers and elastomeric compounds before, during and after cure. The acquired data gives exact information about advanced material properties, processability, cure characteristics, cure speed, and the behavior of the compound at the after-cure, as well as final compound dynamic mechanical properties.

The MDR 3000 Professional is a unique hybrid testing system; it can be operated in static testing (MDR) mode and with a single click in the MonControl Software, be switched over into dynamic testing (RPA) operation mode.

This provides the highest possible flexibility to the user as the MDR 3000 Professional can cover everyday routine QC tasks by working like a normal static Moving Die Rheometer at highest accuracy, repeatability and reproducibility while offering full Rubber Process Analyzer testing capabilities for even complex R&D testing, allowing the user to program, execute and evaluate arbitrary test sequences with the included MonControl Software.

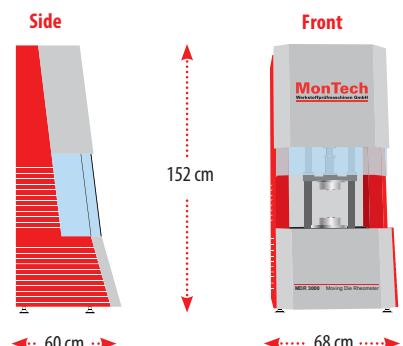
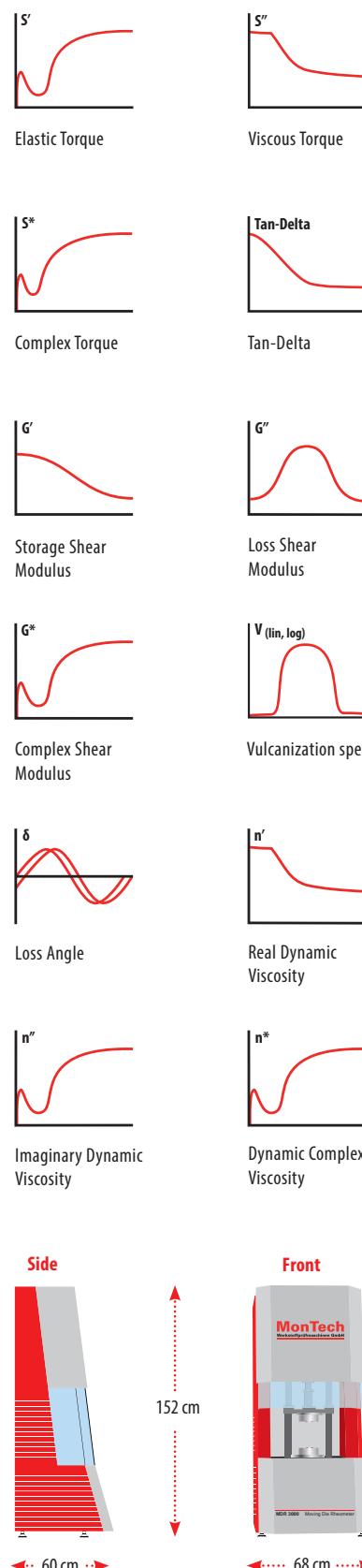
The instrument is equipped with MonTech's unique, patented direct precision drive system, offering variable oscillation amplitude and frequency along with precision temperature control, enabling testing according to almost every DIN / ISO and ASTM test standard in reference to Moving Die Rheometers and Rubber Process Analyzers.

Due to the rugged and flexible construction and various options such as cooling and automation, this device can be used for extended quality control and production monitoring purposes not only in the laboratory, but also directly on the shopfloor.

Technical specification

International standards	ISO 13145, ISO 6502, ASTM D 5289, ASTM D 6204, ASTM D 6601, ASTM D 6048, ASTM D 7050, ASTM D 7605, DIN 53529
Die configuration	Biconical, closed die system, sealed
Die gap	0.45 mm nominal
Sample volume	approx. 4.5 cm ³
Drive system	Direct, wearless servo drive system with ceramic bearings
Closing system	Soft closing to prevent foil rips and damage of test sample
Oscillation frequency	0.001 Hz to 33 Hz (0.001 Hz to 50 Hz optional) (0.05 to 2000 cpm (0.05 to 3000 cpm))
Oscillation strain	+/- 0.01° to 20° (+/- 0.01° to 90° optional) (+/- 0.14% to 280% (0.14% to 1260%))
Torque range	0.01 to 225 dNm
Temperature control system	Ambient to 232 °C, precision +/- 0.03 °C, Max. heating and cooling rate: 85°C/min, digital, microprocessor controlled (Pneumatic double channel cooling system optional)
Temperature check system	Recordings of the temperature gradient on the screen, microprocessor monitored
Measured Data	Torque (dNm, lbf.in, kgf.cm), Shear modulus (Pa, dynes/cm ² , psi), Dynamic viscosity (Pa s), Temperature (°C, °F), Pressure (bar, kg per cm ²), Time (min - min / min - sec / sec), Frequency (Hz, cpm), Shear rate (1/s, rad/s), Strain (deg, %), Cure rate (1/min, 1/sec)
Subroutines	Isothermal, Non-Isothermal, Timed, Temperature Sweep, Strain Sweep, Frequency Sweep, Shear rate Sweep, Relaxation, Retardation, Hysteresis, Tension tests, LAOS, ...
Calculated Data	S' , S'' , S^* , G' , G'' , G^* , $\tan \delta$, phase angle, cure speed, η' , η'' , η^* , ...
Data Interface	Ethernet (10/100 MBit), USB (int.), CF card (int.), RS232 (opt.)
Data points	Over 3500 data points available for each static subtest Including S' Min, S' Max, TS 1, TS 2, TC 10, TC 30, TC 50, TC 90 Integrated, automatic reporting features for dynamic tests
Pneumatics	min. 4.5 Bar / 60 psi
Electrical	200 V - 240 V, 6 Amps, 50/60 Hz
Instrument options	<ul style="list-style-type: none"> - Instrument control panel with 5" touchscreen display and printer - Torque transducer for low-viscosity torque range - Normal force / Pressure measurement - Double channel forced air cooling system - Low-temperature cooling system MCool 10 /MCool -40 - Autoloader 5 or 10 sample linear - Autoloader with 24, 48 or 100 sample tray or tray changers - R-VS 3000 constant volume sample cutter

Calculated results



MonTech D-MDR 3000

Advanced Dynamic Moving Die Rheometer

The D-MDR 3000

is designed for measuring the viscoelastic properties of polymers and elastomeric compounds before, during and after cure. The acquired data gives exact information about advanced material properties, processability, cure characteristics, cure speed, behavior of the compound at the after-cure and final compound dynamic mechanical properties, with an unlimited amount of testing steps and subroutines.

The D-MDR 3000 is the universal dynamic Moving Die Rheometer, providing the highest testing flexibility for static as well as dynamic testing applications for all kinds of rubber, rubber-like, curing or crosslinking materials.

This includes, of course, all kinds of rubber materials filled with carbon black, silica or any other type of organic or inorganic filler, as well as TPE, TPV, LSR, and Composite Materials such as Prepregs, Polyolefins, Glues, Gelatine,

Utilizing a unique, patented, wearless direct drive design with digital drive and control technology, the D-MDR 3000 can cover almost every possible test condition in any combination, with shear rates up to 500 sec⁻¹.

Temperature in the dies is precisely controlled and the unique direct double channel forced air cooling system not only enables rapid cooling to the setpoint but also allows non-isothermal testing and integrated friction heat compensation essential to high-strain testing.

High precision torque and force measurements, in conjunction with the high resolution motor feedback, guarantee the most precise and accurate torque readings to derive elastic modulus, measured as in-phase stress (S'), and viscosity, measured as out-of-phase stress (S''), as well as loss angle and tan-delta.

Based on this fundamental measurement data, modulus (G), dynamic viscosity (η), Compliance (J), Tensile Modulus (E), Compliance under extension/compression (D), Spring rate (K) and Damping coefficient (C) are calculated.



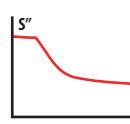
Technical specification

International standards	ISO 13145, ISO 6502, ASTM D 5289, ASTM D 6204, ASTM D 6601, ASTM D 6048, ASTM D 7050, ASTM D 7605, DIN 53529
Die configuration	Biconical, closed die system, sealed
Die gap	0.45 mm nominal, variable die gap and closing force optional
Sample volume	approx. 4.5 cm ³
Drive system	Direct, wearless servo drive system with ceramic bearings
Closing system	Soft closing to prevent foil rips and damage of test sample
Oscillation frequency	0.001 Hz to 100 Hz (0.05 to 6000 cpm)
Oscillation strain	+/- 0.001° to 180° (+/- 0.14% to 2500%)
Torque range	0.001 to 235 dNm
Temperature control system	Ambient to 232 °C, precision +/- 0.03 °C, Max. heating and cooling rate: 85°C/min, digital microprocessor controlled (Pneumatic double channel cooling system standard, low-temperature cooling systems (+10 / -40°C) optional)
Temperature check system	Recordings of the temperature gradient on the screen, microprocessor monitored
Measured Data	Torque (dNm, lbf.in, kgf.cm), Shear modulus (Pa, dynes/cm ² , psi), Dynamic viscosity (Pa s), Temperature (°C, °F), Pressure (bar, kg per cm ²), Time (min - min / min - sec / sec), Frequency (Hz, cpm), Shear rate (1/s, rad/s), Strain (deg, %), Cure rate (1/min, 1/sec)
Subroutines	Isothermal, Non-Isothermal, Timed, Temperature Sweep, Strain Sweep, Frequency Sweep, Shear rate Sweep, Relaxation, Retardation, Hysteresis, Tension tests, LAOS, ...
Calculated Data	S' , S'' , S^* , G' , G'' , $\tan \delta$, phase angle, cure speed, η' , η'' , η^* , ...
Data Interface	Ethernet (10/100 MBit), USB (int.), CF card (int.), RS232 (opt.)
Data points	Over 3500 data points available for each static subtest Including S' Min, S' Max, TS 1, TS 2, TC 10, TC 30, TC 50, TC 90 Integrated, automatic reporting features for dynamic tests
Pneumatics	min. 4.5 Bar / 60 psi
Electrical	200 V - 240 V, 6 Amps, 50/60 Hz
Instrument options	<ul style="list-style-type: none"> - Instrument control panel with 5" touchscreen display and printer - Torque transducer for low-viscosity torque range - Normal force / Pressure measurement - Cavity pressure control system - High speed data acquisition - Low-temperature cooling system MCool 10 / MCool -40 - Autoloader 5 or 10 sample linear - Autoloader with 24, 48 or 100 sample tray or tray changers - R-VS 3000 constant volume sample cutter

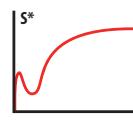
Calculated results



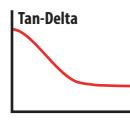
Elastic Torque



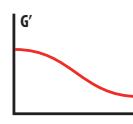
Viscous Torque



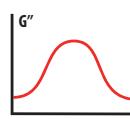
Complex Torque



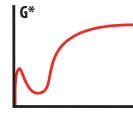
Tan-Delta



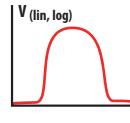
Storage Shear Modulus



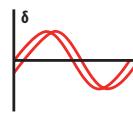
Loss Shear Modulus



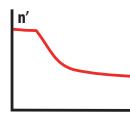
Complex Shear Modulus



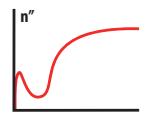
Vulcanization speed



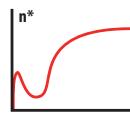
Loss Angle



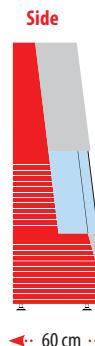
Real Dynamic Viscosity



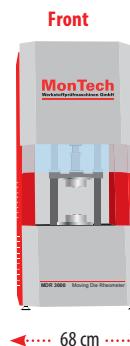
Imaginary Dynamic Viscosity



Dynamic Complex Viscosity



152 cm
60 cm
68 cm



MonTech D-RPA 3000

Flagship Dynamic Rubber Process Analyzer

The D-RPA 3000

is designed for measuring the viscoelastic properties of polymers and elastomeric compounds before, during and after cure. The acquired data gives exact information about the processability, cure characteristics, cure speed, and behavior of the compound at the after-cure.

The D-RPA 3000 fulfills the complete range of all test requirements; Polymers, raw materials, basic, finished and cured compounds can all be characterized. Besides the cure properties, cure characteristics and processability can all be determined and evaluated.

The D-RPA 3000 is the state-of-the-art machine for dynamic testing purposes. The machine can be fitted with several unique options such as variable die gap, low-temperature cooling, and high speed data acquisition - providing the highest frequency-strain combination available on the market.

The high flexibility of the D-RPA 3000 allows the user to program and execute arbitrary test sequences with the MonControl Analyses Software. Each dynamic test sequence can include an unlimited number of the following substeps: timed tests, isothermal tests, non-isothermal tests, amplitude sweeps, frequency sweeps, temperature sweeps, shear rate sweeps, relaxations, retardations, hysteresis and tension tests. Of course, any combination of these sub-tests are possible - with or without an initial strain, as well as strain or stress controlled.

Equipped with single test - multi subtest test procedure programming with up to 1000 sub-programs as well as an unbeaten shear rate range of up to 100 sec^{-1} - the D-RPA 3000 is truly the most flexible and dynamic multi function Rheometer in the market.



Completely closed, directly heated, biconical test chamber system

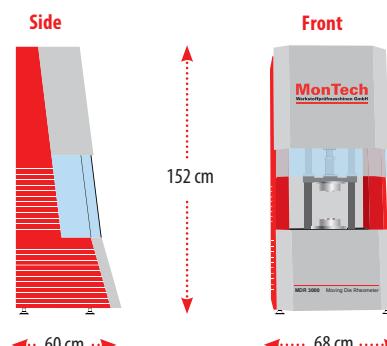
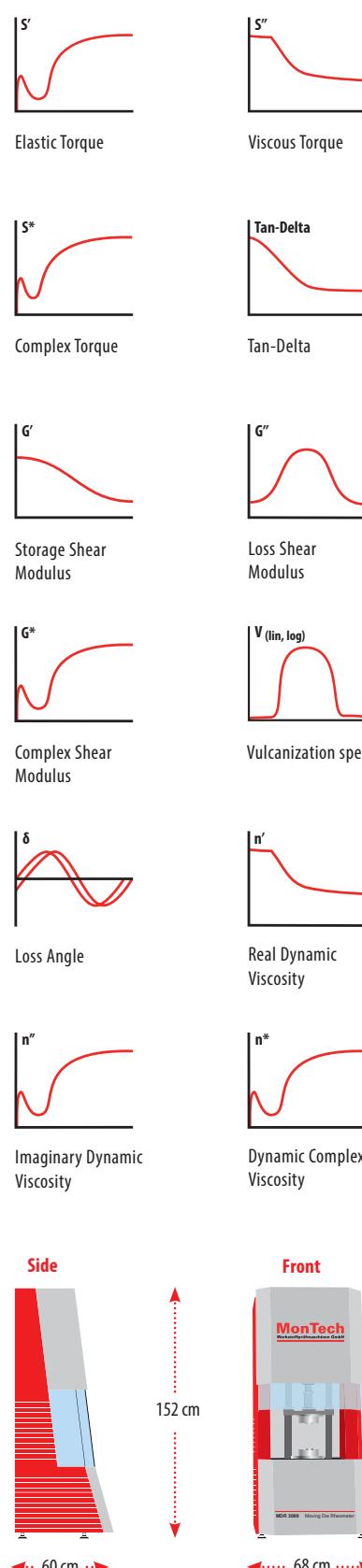
entirely made of high-strength stainless steel, precision ground and hardened, significantly reducing sample slippage for highest dynamic test ranges and most accurate torque, modulus and viscosity readings.



Technical specification

International standards	ISO 13145, ISO 6502, ASTM D 5289, ASTM D 6204, ASTM D 6601, ASTM D 6048, ASTM D 7050, ASTM D 7605, DIN 53529
Die configuration	Biconical, closed die system, sealed
Die gap	0.45 mm nominal, variable die gap and closing force optional
Sample volume	approx. 4.5 cm ³
Drive system	Advanced wearless servo drive system with ceramic bearings
Closing system	Soft closing to prevent foil rips and damage of test samples, optionally variable closing force and die gap
Oscillation frequency	0.001 Hz to 100 Hz (0.05 to 6000 cpm)
Oscillation strain	+/- 0.001° to 360° (+/- 0.14% to 5000%)
Torque range	0.0001 to 235 dNm
Temperature control system	Ambient to 232 °C, precision +/- 0.03 °C, Max. heating and cooling rate: 85°C/min, digital, microprocessor controlled (Pneumatic double channel cooling system standard, low-temperature cooling systems (+10 / -40°C) optional)
Temperature check system	Recordings of the temperature gradient on the screen, microprocessor monitored
Measured Data	Torque (dNm, lbf.in, kgf.cm), Shear modulus (Pa, dynes/cm ² , psi), Dynamic viscosity (Pa s), Temperature (°C, °F), Pressure (bar, kg per cm ²), Time (min - min / min - sec / sec), Frequency (Hz, cpm), Shear rate (1/s, rad/s), Strain (deg, %), Cure rate (1/min, 1/sec)
Subroutines	Isothermal, Non-Isothermal, Timed, Temperature Sweep, Strain Sweep, Frequency Sweep, Shear rate Sweep, Relaxation, Retardation, Hysteresis, Tension tests, LAOS, ...
Calculated Data	S' , S'' , S^* , G' , G'' , $\tan \delta$, phase angle, cure speed, η' , η'' , η^* , ...
Data Interface	Ethernet (10/100 MBit), USB (int.), CF card (int.), RS232 (opt.)
Data points	Over 3500 data points available for each static subtest Including S' Min, S' Max, TS 1, TS 2, TC 10, TC 30, TC 50, TC 90 Integrated, automatic reporting features for dynamic tests
Pneumatics	min. 4.5 Bar / 60 psi
Electrical	200 V - 240 V, 6 Amps, 50/60 Hz
Instrument options	<ul style="list-style-type: none"> - Instrument control panel with 5" touchscreen display and printer - Torque transducer for low-viscosity torque range - Normal force / Pressure measurement - Cavity pressure control system - High speed data acquisition - Low-temperature cooling system MCool 10 / MCool -40 - Autoloader 5 or 10 sample linear - Autoloader with 24, 48 or 100 sample tray or tray changers - R-VS 3000 constant volume sample cutter

Calculated results



MonTech Moving Die Rheometer

Automation options

All MonTech Moving Die Rheometers as well as Rubber Process Analyzers can be easily automated, allowing customers to increase productivity and release operators for other important tasks.

MonTech offers the worlds largest Rheometer Automation portfolio designed for our customers to rely on - in the lab or on the shopfloor, in multiple shifts, 365 days, every year.

Depending on the selected type of automation system, samples are loaded and unloaded automatically from linear or rotary trays, film is fed and tested samples are removed automatically.

Of course, every automated machine can - within a single click - also be switched into manual operation mode.

Semi Automation

Testing made easy:

The semi-automated loader consists of an automatic film feeding system, eliminating the need to manually handle testing film.

This semi-automatic system is especially popular for online testing requirements where workers are cutting warm samples directly from the mill and feeding them into the Rheometer. This means that no delay for queuing or handling the sample can be accepted. However, handling testing film is not easy for workers wearing protective gloves, and can cause variations in test results if film is not placed correctly, or if more than one layer of testing film is used on either the lower or upper die. Therefore, the semi automation automatically provides film transportation and removal of the tested sample so that the operator just has to place the test sample and hit the start button.



Linear Automation

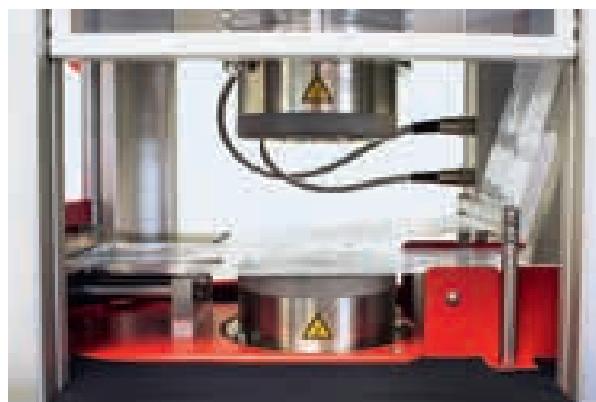
Easily increasing productivity:

Linear Automation systems are mainly used for online testing, utilizing a fast and reliable direct conveyor feeder with the lower film as transportation carrier.

5 Samples: This system features automated sample loading and unloading with a linear queue of 5 test samples. This is ideally suitable for online testing purposes.

10 Samples: This system is equipped with the same features as, the 5 Sample linear loader but can queue up to 10 test samples, making this system ideally suitable for online testing purposes and for laboratory testing.

Linear automation systems are always the preferred choice for very sticky materials such as silicones or glue that sample loading arm systems might not be able to handle.



Tray Automation

Maximum efficiency:

Tray automation systems allow users to queue larger amounts of samples and leave the testing system running totally unattended over long periods.

With MonTech's patented direct sample handling system, sample placement accuracy and test result repeatability is significantly increased.

Samples are handled and monitored by a high-volume vacuum system, ensuring perfect sample pickup, transportation and drop-off - even for less than ideal test samples.

24, 48 or 100 samples tray

This system features automated sample loading and unloading with a direct tray-to-chamber handling system. A interlocking rotary tray with a capacity of 24, 48 or 100 samples is integrated into the right side of the instrument, minimizing the overall footprint of the testing system.

Test samples are queued in the software with their individual identification and test specifications, picked up from the tray and directly placed into the test chamber. Of course, the test queue can be altered at any time, samples can be skipped, planned stops can be inserted and immediate tests can be performed. Film is fed and monitored automatically and tested samples are immediately removed once tests are finished.

Tray automation systems are especially suitable for operator-less testing over long testing times, significantly increasing instrument and lab productivity.



Automation option	MDR 3000 Basic	MDR 3000	MDR 3000 Prof.	D-MDR 3000	D-RPA 3000
Linear	Semi	-	x	x	x
	5 Samples linear	x	x	x	x
	10 Samples linear	x	x	x	x
Tray	24 Samples tray	x	x	x	x
	48 Samples tray	x	x	x	x
	100 Samples tray	-	x	x	x
Tray changer	10x24 tray changer	-	x	x	x
	10x48 tray changer	-	x	x	x

x = available - = not possible

Tray change Automation

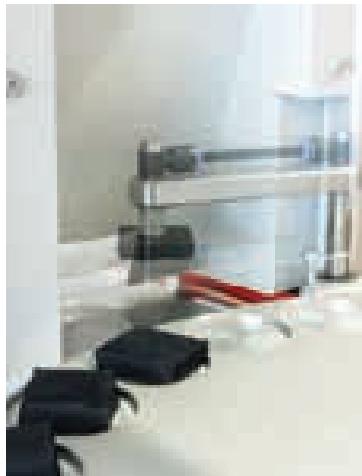
Tray change systems feature similar sample handling like the tray automation but additionally offer an automated 10-slot tray changer system. This results in a 10 times higher sample queuing capacity, allowing the machine to run continuously for multiple days or even weeks.

10 x 24 and 10 x 48 samples tray changer

This system features automated sample loading and unloading with a direct tray-to-chamber handling system and a separate tray handling mechanism.

Up to 10 rotary tables with a stock of 24 or 48 samples each can be stored at the instrument and automatically processed. Trays are automatically moved into loading and unloading positions, where the samples are picked from the trays and directly placed into the test chamber.

MonTech Automation options in detail



Sample queueing and sample detection sensors for fully monitored sample handling.



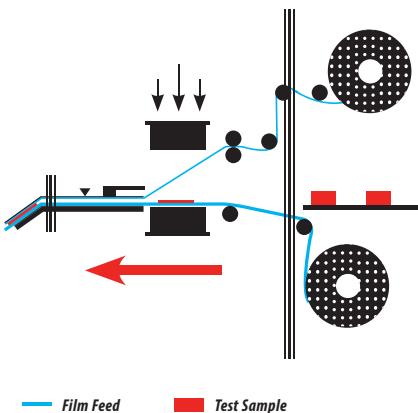
Every step in the sample handling process is closely monitored to have full sample traceability.



Integrated sample scrapers and film guides prevent film breakage and ensure proper sample removal.



High volume vacuum handling of samples guarantee proper sample handling and placement.



Reliable feeding and transportation of testing films from 2 or optionally 4 rolls.



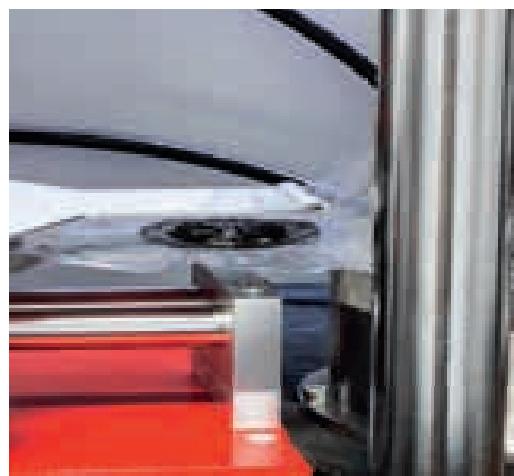
Precise film guiding to avoid any crinkles or folding of the testing film.



With direct tray-to-chamber handling, the sample arm picks samples from the tray. The testing area of 3000 Series is completely isolated by a supervised safety door.



Monitored sample placement directly into the center of the die.



Haul-off mechanism: Sample removal, film guide and feeding



All sample movements are closely monitored by special proximity sensors, light barriers, vacuum or camera. This standard feature on all linear and tray systems ensures full sample traceability and prevents any loss of samples. Optionally, barcode or RFID readers can be directly integrated into the instrument or sample tray.



Samples can be grouped together for easy operator recognition, with room for running immediate tests between scheduled sequences.



Safe, reliable and automated sample removal and film advancement.



Special anti-tack machined sample tray provides high reliability for sample detection, pick-up and handling.

MonTech

Advanced instrument options for MDRs and RPAs

Cooling systems

Pneumatic cooling system

Both chambers are cooled separately by a PID-controlled forced air cooling system.

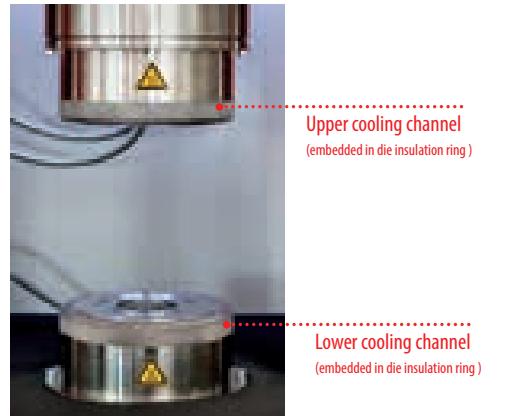
In MDR mode this system can be used to rapidly cool the instrument from a higher to any lower testing temperature and therefore significantly reduce non-productive time of the instrument as well as shorten stabilization and operator waiting times.

Forced air cooling systems enable cooling at any point during test sequences in non-Isothermal and RPA operation modes, allowing test definitions to follow precise cooling ramps and steps. Cooling can also be used to conduct heat from the sample when friction heat is a concern, such as testing with high shear rates.

Forced air cooling operation principle:

	MDR 3000 Basic	MDR 3000	MDR 3000 Professional	D-MDR 3000	D-RPA 3000
Pneumatic	0	0	0	S	S
MCool 10	-	-	0	0	0
MCool -40	-	-	-	-	0

- = not available S = Standard O = Option



MCool 10

Integrated cartridge cooling system that separates the provided air streams into cold (-45°C) and hot (+110°C) fractions to enhance the performance of the machine compared to the standard pneumatic cooling system.

This system is especially suitable for testing at or below room temperature in order to provide the most accurate test results as well as correlations with final product application environments.

This system is highly recommended for dynamic testing on very soft rubbers, polymers and silicones.

The operation principle of the MCool 10 cooling system is very simple:

Air is accelerated and separated in cartridge centrifuges.

Afterwards the cold fraction of the air is used for separate cooling of both test dies down to +8°C.

Only a forced air supply with at least 4 Bars is required - there are no additional chillers or cooling liquids needed.

(Performance of the cooling systems depends on supplied air).

This technology is worldwide patented by MonTech.

MCool -40

The advanced MCool -40 cooling system features a liquid cooling system with external chiller system.

Both dies are separately chilled and cooled by an external cooling unit that is connected with the instrument.

The cooling system works as an addition to the pneumatic cooling system - only if lower temperatures are required the chiller will be started to cool down the dies as low as -40° Celsius.

This makes the instrument equipped with this cooling system the ideal Dynamic Mechanical Rheological Testing System:

The machine is able to run anything from sample curing down to glass transition testing.

The total heating system of the dies remains unchanged so that instruments equipped with this device are absolutely comparable with any other Moving Die Rheometer or Rubber Process Analyzer. This technology is worldwide patented by MonTech.



Advanced technology options

Axial force transducer system for normal force measurement

Features a combined torque / force transducer to measure torque as well as die cavity pressure (derived from the normal force) directly in the test chamber. Before each test, the transducer and amplifier is balanced automatically.

The system also includes a second channel amplifier system for realtime simultaneous measurements of torque and normal force with a data acquisition rate of 10 kHz.

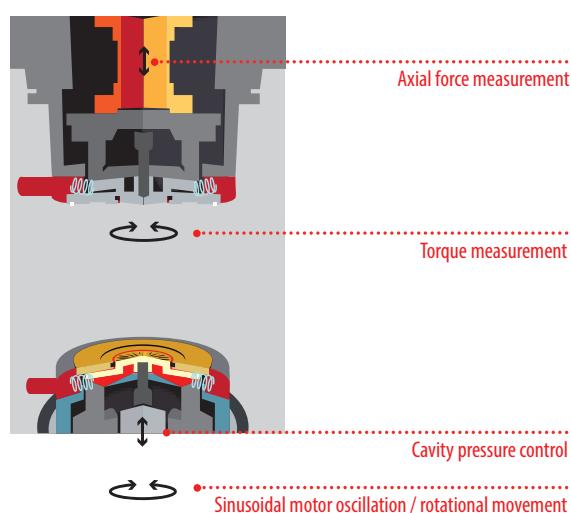
Cavity pressure controller system

With this option, cavity pressure can also be controlled either to a pre-programmed or to an online calculated pressure level.

The closing force and die gap are designed as a variable, independent axis, so that the cavity pressure can be precisely controlled.

This system is especially suitable for test sequences that include curing as well as a cool-down of the sample for a dynamical mechanical analysis, and can be utilized to compensate for material shrinkage as well as to avoid any slippage in the test chamber.

This technology is worldwide patented by MonTech.



High speed data acquisition system

The high speed DAQ option offers unique result stream resolution as well as an ultimate level of precision for the torque signal and motor position.

Both channels are sampled and processed simultaneously with 24-bit resolution at a data rate of 180 kHz.

All data streams are provided on the PC and calculated online in a realtime kernel.

It is also possible to save the raw data streams to the PC's memory.

This makes the system especially suitable for FT-Rheology purposes as well as applications that require precise analysis of material responses in any harmonic.

MonTech Rheometer

Data and productivity options

Increase productivity and efficiency of your testing system with MonTech's unique data and productivity options:

Data / IT options

Integrated Industrial computer

From harsh mixing plants to cleanrooms, special environments demand special encapsulation and protection of the computer system for controlling and managing the instrument. MonTech therefore offers machine integrated and machine mounted computer systems in various protection ratings, guaranteeing the highest reliability under even the toughest environmental conditions.

Instrument Control Panel

Allows the machine to be operated from a remote computer or completely standalone for simple quality control and printing results.

RS 232 Logic Interface

Compatibility to older host or software systems as well as interfacing with proprietary third party software systems is no problem for MonTech testing instruments. Every machine can be equipped with a serial RS232 bi-directional interface to program the instrument as well as retrieve test data and results by a simple, standardized ASCII protocol.

Result and Label Printer

All test results can be directly printed from the instrument through an optional printer. Of course reports for single test results, test series reports and even Pass/Fail labels with or without barcodes are available for printing.

Productivity options

Enhanced instrument protection

Explosive, corrosive, cleanroom or other critical environments are no problem for MonTech rubber testing machinery. All instruments can be tailored to meet any International Protection Rating that our customer's environment requires.

Instrument table or cart

For flexible instrument setup and utilization, MonTech offers movable instrument carts, fixed workbench carts and movable closed-instrument carts. Please contact us to discuss your individual instrument setup and space requirements to identify your ideal workplace scenario.

Forced air aspiration system

For a safe workplace free from smells and fumes, even when testing aggressive or hazardous materials, a forced ventilation and aspiration system can be fitted to every MonTech Rheometer.



5" Color Touchscreen Instrument control panel

Traceable Calibration Torque Standards

MonTech offers a full range of high precision, internationally traceable reference calibration standards for instrument calibration and verification purposes.

Torque calibration standard

MonTech's advanced, fully elastic torsion torque standards have been specially developed for the highest calibration precision of Moving Die Rheometers. Compression as well as clamping types are available. Torque standards allow users, in combination with the MonTech easy calibration system, to verify as well as calibrate the instrument directly, significantly increasing data confidence and instrument uptime.

All MonTech torque standards are fully traceable to national and international standards with overall uncertainties of less than 0.35%.

Torsion springs and torque standards can be calibrated under static and dynamic conditions at single or multiple deflection angles providing additional information on linearity as well as continuous stress-strain profiles by linear regression calculations.

MonTech calibrates torque standards and offers preventive maintenance programs that include accredited calibration.



Compression Torque Standard



Clamping Torque Standard

Reference Materials

Besides reference standards, MonTech offers reference materials for instrument verification purposes.



Reference compound for Rheometer

SBR reference compound for Rheometer cure testing, allowing customer to easily verify and perform consistency checks on MDRs and RPAs.

Each material lot comes with a test certificate and round-robin / interlab validation.

Compound stability is typically good for up to 3 months. Various standard and customer specific delivery plans are available.

MonTech Mooney Viscometer Series

Mooney Viscometers are the backbone for testing the viscous flow of raw materials such as polymers and intermediates such as masterbatches for maintaining stable and consistent manufacturing processes. Furthermore, all MonTech Mooney Viscometers also allow Scorch as well as Stress Relaxation testing.

PERFORMANCE



STATIC TESTING

DYNAMIC TESTING

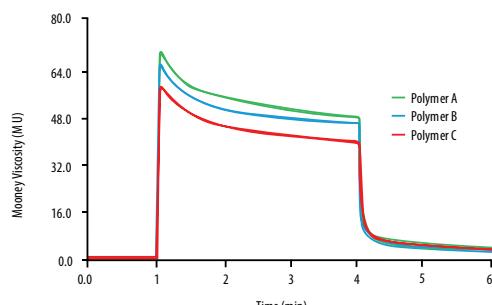
	MV 3000 Basic	MV 3000	V-MV 3000
Instrument description	Entry model instrument for repetitive Quality control testing as well as simple R&D applications	Standard instrument for QC and R&D testing according to international standards.	High-end instrument for QC as well as dynamic R&D testing with maximum flexibility featuring variable rotor speed and temperature sweeps as well as block programming with multi-step stress relaxation.
International standards	ISO 289:2005, ASTM D 1646, DIN 53523, BS 903: Part 58, AFNOR T43-00/005, BS 1673, GOST 10722-76, JIS K6300, TGL 25-689	ISO 289:2005, ASTM D 1646, DIN 53523, BS 903: Part 58, AFNOR T43-00/005, BS 1673, GOST 10722-76, JIS K6300, TGL 25-689	ISO 289:2005, ASTM D 1646, DIN 53523, BS 903: Part 58, AFNOR T43-00/005, BS 1673, GOST 10722-76, JIS K6300, TGL 25-689
Test modes	Mooney Viscosity, Mooney Scorch, Stress Relaxation, Mould release, Delta Mooney	Mooney Viscosity, Mooney Scorch, Stress Relaxation, Mould release, Delta Mooney	Mooney Viscosity, Mooney Scorch, Stress Relaxation, Mould release, Delta Mooney Mooney Variable Viscosity, Variable test sequence block programming Multi-step stress relaxation
Rotor	Large (38.10 mm) and Small (30.48 mm) Sealed, with longlife seals	Large (38.10 mm) and Small (30.48 mm) Sealed, with longlife seals	Large (38.10 mm) and Small (30.48 mm) Sealed, with longlife seals
Rotor speed	2 turns per minute	2 turns per minute	0 to 50 turns per minute, 0.01 steps
Stress Relaxation	According to ISO 289:2005, DIN 53523 Part 4	According to ISO 289:2005, DIN 53523 Part 4	According to ISO 289:2005, DIN 53523 Part 4
Temperature control system	Ambient to 232 °C, precision +/- 0.03 °C, digital, microprocessor controlled	Ambient to 232 °C, precision +/- 0.03 °C, digital, microprocessor controlled	Ambient to 232 °C, precision +/- 0.03 °C, digital, microprocessor controlled
Units	Mooney - units (MU), Temperature (°C, °F), Time (min - min / min - sec)	Mooney - units (MU), Temperature (°C, °F), Time (min - min / min - sec)	Mooney - units (MU), Temperature (°C, °F), Time (min - min / min - sec)

MOONEY VISCOMETER



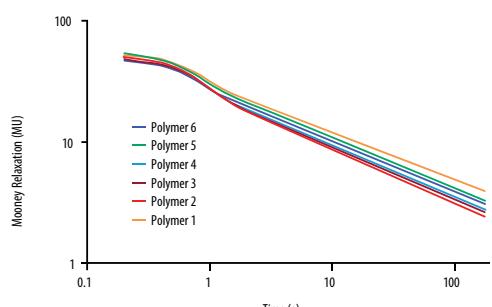
MonTech Mooney Viscometer Application Examples

Contact us today for a demonstration using your compounds and materials!



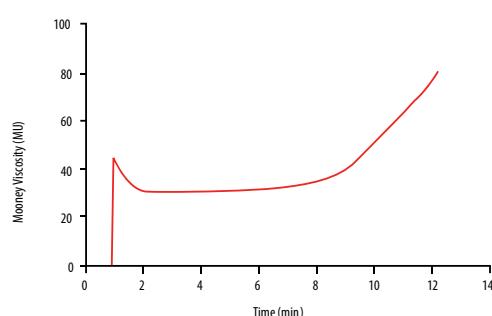
Mooney Viscosity

The Mooney Viscosity test is the most popular test method for characterizing polymers and uncured rubber materials. As defined by international standards, the sample material is preheated for a defined period in a closed die cavity, then sheared by the embedded rotor at a constant rate. The Mooney Viscosity is recorded and data is automatically calculated at predefined time and viscosity points. MonTech Mooney Viscometers offer superior precision and repeatability, providing the user with reliable data and making it easy to differentiate between different types and grades of polymers in order to ensure a high processing consistency.



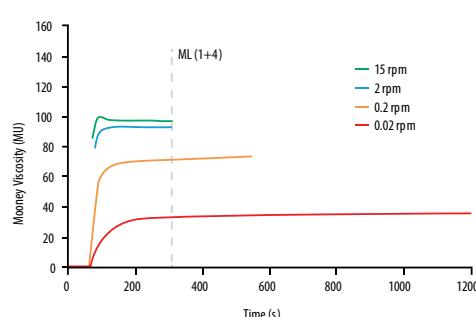
Mooney Stress Relaxation

As Mooney Viscosity testing only provides information about the flow = viscosity of polymers and rubber compounds, stress relaxation testing can be used to assess elastic material behavior. This does not even require additional samples or testing efforts. Once the Mooney Viscosity test is completed, the rotor is stopped within 5 milliseconds and the torque decay is observed and recorded. Once the stress relaxation is completed, the slope-intercept and regression coefficient are calculated, providing excellent correlations in reference to polymer branching and processing.



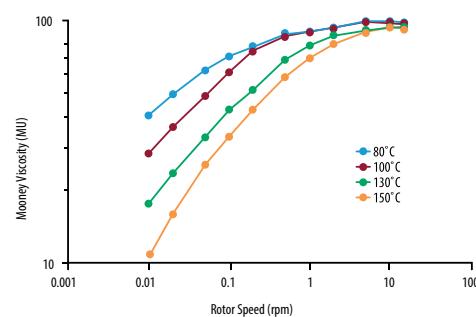
Mooney Scorch

Mooney Scorch is one of the most useful tests to determine starting of cure - so called scorching behavior - of rubber compounds, providing essential data for designing and controlling production processes as well as checking material consistency. Of course, every MonTech Mooney Viscometer offers full Mooney Scorch and Delta Mooney testing capabilities featuring a selection of over 3500 datapoints which include initial Mooney viscosity, minimum viscosity, scorch times and scorch viscosities.



Mooney Viscosity at Shear Rates and Temperatures

Besides only static testing, MonTech Variable Mooney Viscometers such as the V-MV 3000 offer full dynamic testing capabilities, allowing measurement of viscosity at variable shear rates (by stepless changes of the rotor speed) and temperatures. Furthermore, even non-isothermal sequences, variable rotor speed profiles as well as step-relaxations can easily be programmed and executed. Overall, this allows a detailed and complete understanding of the polymer behavior. Along with this, low rotor speed rates in Mooney Viscosity testing even provide the ability to test highly elastic and shear sensitive materials that could not be properly tested and characterized on Mooney Viscometers before.



MonTech MV 3000 Basic

Entry level Mooney Viscometer

The MV 3000 Basic

is a rotational shear viscometer according to Mooney for performing

- Viscosity tests (ML / MS 1+X)
- Stress Relaxation testing
- Mooney Scorch
- Delta Mooney testing

on polymers as well as rubber compounds for quality control, research and development applications.

The MV 3000 Basic is supplied as a complete, ready-to-test instrument set including a personal computer, MonControl Software, cables, connectors and regulators as well as a standard set of tools and consumables.

Easy to use: All test parameters are pre-programmed through the MonControl Software - the instrument is equipped with a single button for starting the test sequence.

Direct feedback: An integrated multi-color LED status bar clearly displays the current machine state.

Rugged: The compact and highly rigid frame is made from high strength aluminum. Along with direct-drive technology, this guarantees stable and accurate test results in every environment.



Rotor, die assembly and drive system

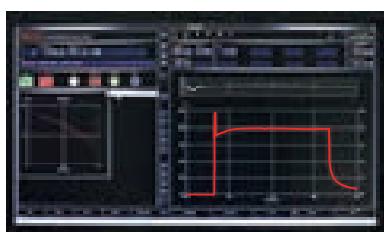
The most fundamental and important parts on a Mooney Viscometer are the rotor, die assembly and in-line drive shaft. The test sample is placed below and above the rotor with optional test film. Then the upper die is lowered onto the lower die with a force of 11.5 kN.

After a pre-heat time, the rotor - which is now totally embedded in the test material in the closed die cavity - rotates at a fixed speed of 2 turns per minute, powered by an in-line drive system.

During the whole test sequence, the temperatures of both dies are measured by a separate precision probe on each die and the heaters are accordingly controlled and regulated to precisely maintain the temperature at its setpoint.

The torque needed to turn the rotor in the test material is precisely measured by an in-line torque transducer. Torque in Mooney Units (MU), die temperatures and rotor speed are recorded. Data is automatically calculated and displayed once the test is completed.

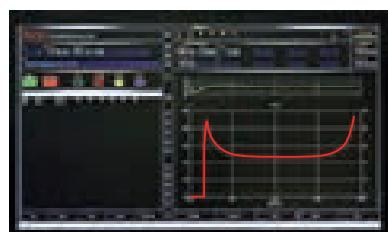
MonControl Software for test configuration, data acquisition, result calculation and reporting



Mooney Viscosity test with stress relaxation and log-log graph



Test results with automatic Pass / Fail calculation

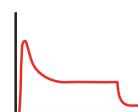


Mooney Scorch test

Technical specification

International standards	ISO 289:2005, ASTM D 1646, DIN 53523, BS 903: Part 58, AFNOR T43-00/005, BS 1673, GOST 10722-76, JIS K6300, TGL 25-689
Die configuration Rotor	According to international standards large (\varnothing 38.1 mm) and small (\varnothing 30.48 mm) Rotor
Force measurement	In-line torque transducer
Closing force	11.5 kN
Rotor speed	2.00 turns per minute (0.21 Radians / second)
Rotor shaft seal	Standard or longlife seals available
Stress Relaxation	According to ISO 289:2005, DIN 53523 Part 4
Torque range	0.01 to 230 MU
Sample volume	Two specimens having a combined volume of 25 cm ³
Temperature control system	Ambient to 232 °C, precision +/- 0.03 °C, digital, microprocessor controlled
Temperature check system	Recordings of the temperature gradient on the screen, PID microprocessor monitored
Calibration	Fully automatic by built in calibration weights, Software guided
Measured data	Mooney - value (MU) Temperature (°C, °F) Time (min - min / min - sec / sec)
Data Interface	Ethernet (10/100 MBit), USB (int.), CF card (int.), RS232 (opt.)
Data points	Over 3500 data points available Including: Initial viscosity, ML / ML 1+X, Y+X+Z, Stress Relaxation (log-log), Slope, Intercept, Regressions coefficient, Scorch viscosities and cure times
Pneumatics	min. 4.5 Bar / 60 psi
Electrical	Single phase 100 - 120 V, 8 Amps or 200 V - 240 V, 5 Amps
Instrument options	- Instrument control panel with 5" touchscreen display and printer - Double channel forced air cooling system - Low-temperature cooling system MCool 10 - M-VS 3000 constant volume sample cutter

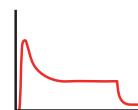
Calculated results



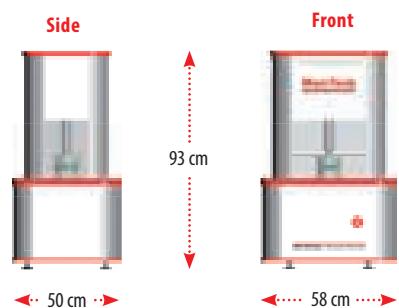
Mooney Viscosity



Mooney Scorch



Stress Relaxation



MonTech MV 3000 Industry standard Mooney Viscometer



The Mooney Viscometer MV 3000

is the leading test instrument for measurement of viscosity, scorching and stress relaxation on polymers and rubber compounds.

The MV 3000 is suitable for quality control as well as research and development purposes with excellent repeatability and reproducibility due to its low-mass die design, direct heating and a unique direct drive design with snap-in mechanics.

The massive aluminum frame of the MV 3000 with its 270° accessible die area allows easy sample loading while integrated rotor ejection simplifies rotor handling. Operation is made easy by 4 illuminated pushbuttons providing clear information about the machine state. A motorized safety shield separates the die area before the test sequence is started.

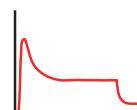
Die temperatures are accurately and precisely measured by calibrated probes and controlled with a precision of +/- 0.03 °C by heaters, dies and rotors with an extremely fast thermal response

The MV 3000 is fitted with built-in software-controlled systems for automatic balancing and calibration, including a double dead-weight system to apply a defined torque of 100 Mooney units, ensuring the utmost data accuracy and eliminating the needs of any external tools or fixtures.

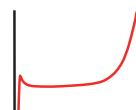
Technical specification

International standards	ISO 289:2005, ASTM D 1646, DIN 53523, BS 903: Part 58, AFNOR T43-00/005, BS 1673, GOST 10722-76, JIS K6300, TGL 25-689
Die configuration / Rotor	According to international standards large (\varnothing 38.1 mm) and small (\varnothing 30.48 mm) Rotor
Force measurement	In-line torque transducer
Closing force	11.5 kN
Rotor speed	2.00 turns per minute (0.21 Radians / second)
Rotor shaft seal	Standard or longlife seals available
Stress Relaxation	According to ISO 289:2005, DIN 53523 Part 4
Torque range	0.01 to 230 MU
Sample volume	Two specimens having a combined volume of 25 cm ³
Temperature control system	Ambient to 232 °C, precision +/- 0.03 °C, digital, microprocessor controlled
Temperature check system	Recordings of the temperature gradient on the screen, PID microprocessor monitored
Calibration	Fully automatic by built in calibration weights, Software guided
Measured data	Mooney - value (MU) Temperature (°C, °F) Time (min - min / min - sec / sec)
Data Interface	Ethernet (10/100 MBit), USB (int.), CF card (int.), RS232 (opt.)
Data points	Over 3500 data points available Including: Initial viscosity, ML / ML 1+X, Y+X+Z, Stress Relaxation (log-log), Slope, Intercept, Regression coefficient, Scorch viscosities and cure times
Pneumatics	min. 4.5 Bar / 60 psi
Electrical	200 V - 240 V, 6 Amps, 50/60 Hz
Instrument options	<ul style="list-style-type: none"> - Instrument control panel with 5" touchscreen display and printer - Easy access and encapsulated electronic system - Double channel forced air cooling system - Low-temperature cooling system MCool 10 - M-VS 3000 constant volume sample cutter

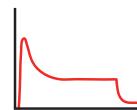
Calculated results



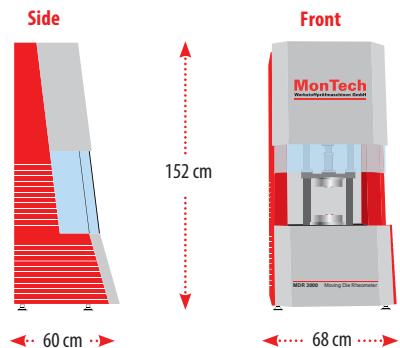
Mooney Viscosity



Mooney Scorch



Stress Relaxation



MonTech V-MV 3000

High-end Mooney Viscometer

The Variable Mooney Viscometer V-MV 3000

brings traditional Mooney Viscosity, Scorch and Stress Relaxation testing to the next level. Besides the ultra-rigid test frame, the instrument incorporates the latest direct servo drive technology and superior design for unbeaten data accuracy and test result precision.

In addition to static Mooney Viscometer testing at fixed rotor speeds under isothermal conditions according to international standards, the Variable speed Mooney Viscometer V-MV 3000 is further capable of running test sequences at variable rotor speeds as well as fully dynamic tests including speed steps, ramps and multi-step relaxation, all this with simultaneous temperature profiles and optional cooling of the sample in the die cavity to as low as +10°C, making the V-MV 3000 not only ideal for polymers and rubber compounds, but also silicone, latex and epoxy resin testing.

This functionality efficiently provides very useful additional information on the test material at the highest accuracy. For example, materials showing similar static viscosities at 2rpm can now be tested at variable shear rates and temperatures.

From these results, polymer specialists can gain a much better understanding of polymer and rubber behavior regarding branching, molecular weight distribution, average molecular weight as well as shear thinning.

The instrument is equipped with MonControl Software and special block programming features to allow an unlimited number of rotor speeds and test temperatures per test - of course in any combination.



Lower radial v-groove die with large, serrated rotor.
The low-mass rotor design ensures homogenous temperature distribution, and in conjunction with MonTech longlife seals, offers the highest accuracy in Mooney readings.



Rubber sample after Mooney scorch testing.
Mooney Scorch testing is made simple with the V-MV 3000. Test can be automatically stopped once the maximum desired Scorch time or Scorch viscosity reading is reached, maximizing instrument availability and sample throughput.



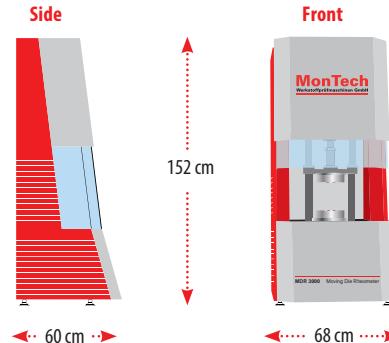
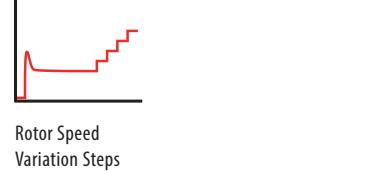
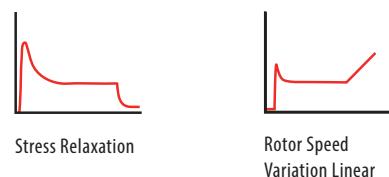
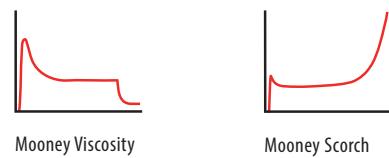
SBR Polymer sample after Mooney viscosity testing.
Various types of testing film are available for easy sample handling, reduced cleaning needs, less die contamination and therefore improved repeatability.



Technical specification

International standards	ISO 289:2005, ASTM D 1646, DIN 53523, BS 903: Part 58, AFNOR T43-00/005, BS 1673, GOST 10722-76, JIS K6300, TGL 25-689
Die configuration / Rotor	According to international standards large (\varnothing 38.1 mm) and small (\varnothing 30.48 mm) Rotor
Force measurement	In-line torque transducer
Closing force	11.5 kN
Rotor speed	0 to 50 turns per minute, 0.01 steps (0 to 5.25 radians / second)
Stress Relaxation	According to ISO 289:2005, DIN 53523 Part 4
Torque range	0.01 to 230 MU
Sample volume	Two specimens having a combined volume of 25 cm ³
Temperature control system	Ambient to 232 °C, precision +/- 0.03 °C, digital, microprocessor controlled
Temperature check system	Recordings of the temperature gradient on the screen, PID microprocessor monitored
Calibration	Fully automatic by built-in calibration weights, Software guided
Measured data	Mooney - value (MU) Temperature (°C, °F) Time (min - min / min - sec / sec)
Data Interface	Ethernet (10/100 MBit), USB (int.), CF card (int.), RS232 (opt.)
Data points	Over 3500 data points available Including: Initial viscosity, ML / ML 1+X, Y+X+Z, Stress Relaxation (log-log), Slope, Intercept, Regression coefficient, Scorch viscosities and cure times
Pneumatics	min. 4.5 Bar / 60 psi
Electrical	200 V - 240 V, 6 Amps, 50/60 Hz
Instrument options	<ul style="list-style-type: none"> - Instrument control panel with 5" touchscreen display and printer - Easy access and encapsulated electronic system - Double channel forced air cooling system - Low-temperature cooling system MCool 10 - M-VS 3000 constant volume sample cutter

Calculated results



MonTech Mooney Viscometer

Cooling, data and productivity options

Expand measurement capabilities and increase instrument flexibility with MonTech's unique instrument options:

Cooling options

Pneumatic cooling system

Both test dies are cooled separately by a PID-controlled forced air cooling system.

This system can be used to rapidly cool the Viscometer from a higher testing temperature (e.g. testing Mooney Scorch at 160°C) to a lower testing temperature (e.g. Mooney Viscosity testing at 100°C), significantly reducing operator waiting and non-productive times of the instrument.

On the V-MV 3000, this option can further be used for running Non-Isothermal testing sequences as well as actively cooling friction heat.



MCool 10

Integrated cartridge cooling system that allows cooling of the test dies and rotor below room temperature down to +10°C, adding additional test capabilities especially for low viscosity materials such as silicones, latex and epoxy resins.

This technology is worldwide patented by MonTech.



Data / IT options

Integrated Industrial Computer

From harsh mixing plants to cleanrooms, special environments demand special encapsulation and protection of the computer system for controlling and managing the instrument.

MonTech therefore offers machine-integrated and machine-mounted computer systems in various protection ratings, guaranteeing the highest reliability under even toughest environmental conditions.

Instrument Control Panel

The 5" Color-Touchscreen allows the machine to be operated from a remote computer or completely standalone for simple quality control testing.

RS-232 Logic Interface

Compatibility to older host or software systems as well as interfacing with proprietary third party software systems are no problem for MonTech testing instruments.

Every machine can be equipped with a serial RS-232 bidirectional interface to program the instrument as well as retrieve test data and results by a simple, standardized ASCII protocol.

Result and Label Printer

All test results can be directly printed from the instrument through an optional printer. Of course, reports for single test results, test series reports and even Pass/Fail labels, with or without barcodes, are available for printing.



Productivity options

Enhanced instrument protection

Explosive, corrosive or other critical environments are no problem for MonTech rubber testing machinery. All instruments can be tailored to meet any international protection rating depending on what the customer environment requires.



Instrument table or cart

For a flexible instrument setup and utilization, MonTech offers movable instrument carts, fixed workbench carts and movable closed-instrument carts.

Please contact us to discuss your individual instrument setup and space requirements to identify your ideal workplace scenario.

Forced air aspiration system

For a safe workplace free from smells and fumes, even when testing aggressive or hazardous materials, a forced ventilation and aspiration system can be fitted to every MonTech Mooney Viscometer.



Reference Standards and Materials

MonTech offers a full range of precise reference standards and materials for Mooney Viscometers.

Calibration weights

High precision calibration weight sets manufactured by MonTech are built into the instrument and controlled using a software guided calibration sequence, guaranteeing the highest accuracy and traceability for Mooney Viscometers.



Reference polymers for Mooney Viscosity

Precut reference butyl rubber for Mooney viscosity as well as stress relaxation verification allows easy verification and consistency checks on Mooney viscometers. Each supply includes a test certificate and interlab validation. Compound stability is typically good for up to 10 months.



MonTech Sample cutters for specimen preparation

MonTech offers a wide range of sample cutters and specimen preparation equipment for every need.

MonTech Sample Cutters

**Cutting of uncured
specimens and preforms**

→ **R-VS 3000**

Rheometer Volume sample cutter

→ **M-VS 3000**

Mooney Volume sample cutter

→ **VS 3000**

Universal sample cutter for preforms

**Cutting of Polymers and
rubber sheets / bales:**

→ **CP 3000**

Laboratory guillotine shear cutter

→ **CP 3000 compact**

Small size guillotine shear cutter

**Die and universal cutting
of cured rubber specimens
and sheets**

→ **P-VS 3000 M**

Manual die cutter

→ **P-VS 3000**

Universal clicker press

→ **P-VS 3000 plus 15 kN**

High force universal clicker press

→ **Sliding table for P-VS Series**

→ **Cutting dies and knives**



R-VS 3000 constant volume sample cutter



CP 3000 laboratory tabletop bale cutter



P-VS 3000 Universal dumbbell sample cutting press



MonTech R-VS 3000

Rheometer - constant volume sample cutter



The R-VS 3000 Rheometer volumetric sample cutter

is designed for the fast, safe and easy preparation of Rheometer test samples, significantly reducing operational variability and increasing test result reproducibility.

The cutter features a rugged double-acting pneumatic system, ensuring a constant, user-defined specimen volume.

The operator needs just to push both control buttons simultaneously to start the cutting sequence. First, the material is compressed to the required sample volume by a compression piston from the top, then after a set compression time the sample is cut automatically by the high force cutting system from the bottom.

Key features and advantages of the R-VS 3000 sample cutter:

- Free, open 270° cutting area for easy accessibility
- Longer lifetime of the knife due to compression piston / sliding knife design
- No consumables / cutting plates needed > no possibility of material contamination
- Easy and simple to operate > just keep the 2 pushbuttons pressed for the duration of the cutting sequence
- The R-VS 3000 uses only compressed air and is equipped with a two-handed safety



Technical specification

Cutting diameter	35 mm
Max. thickness	18 mm
Reproducibility	0.1 %
Sample volume (adjustable)	2 cm ³ to 12 cm ³
Compression - time (adjustable)	1 sec to 15 sec
Dimensions (H x W x D)	600 mm x 430 mm x 380 mm
Weight	50 kg
Pneumatics	min. 5.0 Bar



MonTech M-VS 3000

Mooney - constant volume sample cutter



The M-VS 3000 Mooney volumetric sample cutter

enables higher accuracy, repeatability and optimized testing results in Mooney Scorch and Viscosity testing by preparing constant volume test samples. The M-VS 3000 features an automatic cut of a center hole for the rotor shaft along with a time delay for compressing the material before cutting. This guarantees the highest sample preparation reproducibility.

Therefore the M-VS 3000 volume cutter is fitted with a double acting pneumatic system which is controlled by a two-hand safety control system with anti-tiedown.

The M-VS 3000 sample cutter increases operator safety, reduces operational variability, and totally eliminates the need for manual sample cutting.

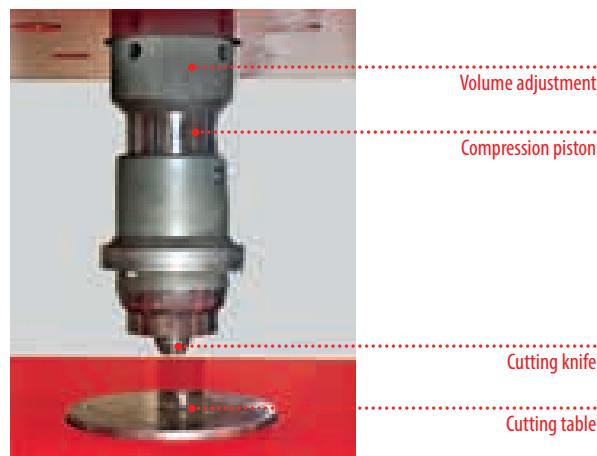


The cutting process is a controlled sequence comprising 2 steps:

- Compression of the material to a constant volume and cutting of an inner borehole for the rotor shaft
- After a set time delay the test sample is cut to the die diameter

Technical specification

Cutting diameter	45 mm
Max. thickness	20 mm
Reproducibility	0.1 %
Sample volume	about 15 cm ³
Compression time (adjustable)	1 sec to 15 sec
Dimensions (H x W x D)	600 mm x 430 mm x 380 mm
Weight	50 kg
Pneumatics	min. 5.0 Bar



MonTech VS 3000

The most universal sample cutter for preforms



The VS 3000 universal constant volume cutter

is the ideal and reliable sample preparation tool for applications that require constant volume samples such as preforms for moulding operations.

The VS 3000 cutter works with a two stage pneumatic cylinder assembly which first compresses the material with an upper piston until a specific volume is reached, then cutting out the specimen in a second step.

This whole sequence is monitored and controlled to ensure precisely cut samples. The cutter is equipped with a pneumatic two-hand anti-tie down control, guaranteeing operator safety and simple operation.

The VS 3000 sample cutter can be fitted with knives of any diameter between 20 and 60 mm per customers requirements, making the cutter an ideal tool for easy preform preparation in lab or production environments.

Technical specification

Cutting diameter	per customer requirement 20 to 60 mm
Max. thickness	18 mm
Reproducibility	0.1 %
Sample volume (adjustable)	2 cm ³ to 80 cm ³ (depending on knife)
Compression time (adjustable)	1 sec to 30 sec
Dimensions (H x W x D)	1120 mm x 400 mm x 390 mm
Weight	90 kg
Pneumatics	min. 5.0 Bar



MonTech P-VS 3000 M Manual sample cutter

The P-VS 3000 M Lever Press

assures constant accuracy and precise cutting results. The cutter can conveniently be used for all types of ASTM, ISO, DIN, JIS cutting dies for all kind of samples made from rubber, leather and paper.

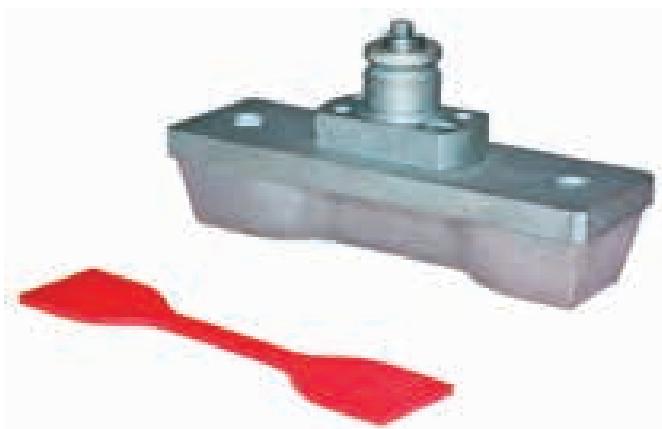
It allows easy, quick and convenient sampling with simplified operation.

The base as well as head of the P-VS 3000M cutter is made from precisely machined cast steel ensuring highest rigidity and best cutting results.

An integrated height adjustment spindle allows a quick set-up and adjustment of the cutter to any height of cutting dies. Once a specific cutting height is the cutting head can easily be clamped and fixed in the particular position.

Cutting dies can easily be inserted in the precisely guided piston rod and simply clamped by a central locking screw.

The cutting table is built from durable PTFE material and fixed to a T-slot groove in the machine base. This design preserves the cutting dies from excessive wear as well as provides a solid work area.



Technical specification

Cutting force	3.8 kN
Cutting stroke	30 mm
Die height	20 - 150 mm
Throat depth	70 mm
Cutting area	120 x 80 mm
Max. material thickness / hardness	6 mm / 95 Shore A
Compatible cutting knives	Any ISO, DIN, ASTM and other standard die types
Dimensions (H x W x D)	380 mm x 120 mm x 180 mm
Weight	14 kg

MonTech P-VS 3000

Universal sample cutter



Technical specification

Cutting force	8 kN
Cutting stroke	30 mm
Max. material thickness / hardness	8 mm / 95 Shore A
Reproducibility	0.1 %
Compatible cutting knives	Any ISO, DIN, ASTM and other standard die types
Dimensions (H x W x D)	440 mm x 300 mm x 380 mm
P-VS Sliding Dimensions (H x W x D)	460 mm x 300 mm x 1050 mm
Weight	50 kg
Pneumatics	min. 5.0 Bar

P-VS Options: Sliding table and multiple knife stations

Designed to simultaneously cut multiple samples from the same rubber sheet for increased productivity.

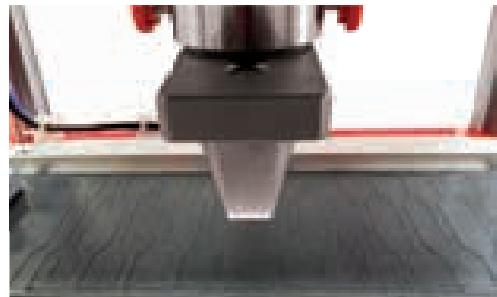
Universal sample cutter

for fast and precise preparation of sample test specimens for tensile tests and all other DIN, ISO and ASTM standard sample shapes from rubber, elastomers, foam rubber, plastic films, foils and paper.

The machine cuts the exact shape of the test samples using a powerful, direct pneumatic piston ram system.

For safe and easy operation, the universal P-VS 3000 sample cutter is equipped with a two-hand safety operation system.

Any type of cutting knife can be used with the P-VS 3000 sample cutter. Knives can be changed in seconds and cutting height can easily be adjusted on the upper piston ram.



MonTech P-VS 3000 Plus 15 kN

High force sample cutting press



Universal sample cutter

for multiple-blade cutting station knives or tough materials requiring high cutting forces.

Whenever there is a need to save time and increase productivity by cutting multiple samples at the same time, P-VS 3000 is the ideal sample cutter.

Equipped with 2-hand anti-tie down control and completely pneumatic operation, sample cutting is made easy and safe.

The cutting force can be preset on the regulator unit, allowing enough cutting force to ensure precise and repeatable results while maintaining a long lifetime for the cutting knife.

By eliminating any need for electric or hydraulic supplies, the cutter can easily be hooked up almost anywhere, and can even be used in cleanroom environments because of the fully enclosed design.

Multi-station cutting knife - Three samples (S2) in one cut

Technical specification

Cutting force	15 kN
Cutting stroke	30 mm
Max. material thickness / hardness	10 mm / 98 Shore A
Reproducibility	0.1 %
Compatible cutting knives	Any ISO, DIN, ASTM and other standard die types
Dimensions (H x W x D)	690 mm x 300 mm x 380 mm
Weight	72 kg
Pneumatics	min. 5.0 Bar



MonTech Cutting knives, dies and moulds

Universal sample cutting knives and dies

MonTech's range of cutting knives and dies are durable and built to last, machined from a solid piece of steel, precision ground and hardened.

MonTech cutting knives guarantee optimal dimensional stability, form accuracy and a long lifetime. All are available with automatic ejectors.



Standard	Type	Application	l_3 mm	l_1 mm	b_2 mm	b_1 mm	h mm	l_0 mm	L mm	Shape	Part - No
ISO 37	1	Preferred size	>115	33±2	25±1	6±0.4	2±0.2	25±0.5	-		MC 1.1010
ISO 37	1A	Smaller size	100	20±2	25±1	5±0.1	2±0.2	20±0.5	-		MC 1.1011
ISO 37	2	Smaller preferred size	>75	25±1	12.5±1	4±0.1	2±0.2	20±0.5	-		MC 1.1012
ISO 37	3	Smaller size	>50	16±1	8.5±0.5	4±0.1	2±0.2	10±0.5	-		MC 1.1013
ISO 37	4	Very small size	>35	12±0.5	6±0.5	2±0.1	1±0.1	10±0.5	-		MC 1.1014
DIN 53504	S1	Larger size	115	33±2	25±1	6±0.4	2±0.2	25	-		MC 1.1020
DIN 53504	S2	Preferred size	75	25±1	12.5±1	4±0.1	2±0.2	20	-		MC 1.1021
DIN 53504	S3a	Smaller size	50	16	8.5	4	2±0.2	10	-		MC 1.1022
DIN 53504	S3	Very small size	35	12±0.5	6±0.5	2±0.05	1±0.1	10	-		MC 1.1023
ASTM D 412	C	Preferred size	>115	33	25±1	6±0.05	1.3...3.3	25±0.25	-		MC 1.1030
ASTM D 412	A	Possible size	>140	59±2	25±1	12±0.05	1.3...3.3	50±0.5	-		MC 1.1031
ASTM D 412	B	Possible size	>40	59±2	25±1	6±0.05	1.3...3.3	50±0.5	-		MC 1.1032
ASTM D 412	D	Possible size	>100	33±2	16±1	3±0.05	1.3...3.3	25±0.25	-		MC 1.1033
ASTM D 412	E	Possible size	>125	59±2	16±1	3±0.05	1.3...3.3	50±0.5	-		MC 1.1034
ASTM D 412	F	Possible size	>125	59±2	16±1	6±0.05	1.3...3.3	50±0.5	-		MC 1.1035
ISO 37	A	Normal size	52.6	44.6±0.2	-	-	4±0.2	152.7	-		MC 1.1016
ISO 37	B	Small size	10	8±0.1	-	-	1±0.1	28.26	-		MC 1.1017
DIN 53504	R1	Preferred size	52.6	44.6	-	-	4±0.2	152.7	-		MC 1.1025
DIN 53504	R2	Small size	44.6	36.6	-	-	4±0.2	127.5	-		MC 1.1026
ASTM D 412	1	Preferred size	17.9	15.9	-	-	1...3.3	50	-		MC 1.1037
ASTM D 412	2	Larger size	35.8	31.8	-	-	1...3.3	100	-		MC 1.1038
ISO 34-1	A	Tear test, trouser preferred size	>100	-	15±1	-	2±0.2	-	-		MC 1.1050
ISO 34-1 and ASTM D 624	B	Tear test, angle with/ without nick	>100	-	19±0.05	12.7±0.05	2±0.2	-	-		MC 1.1055
ISO 34-1 and ASTM D 624	C	Tear test, crescent with/ without nick	>110	-	25±0.5	10.5±0.05	2±0.2	-	-		MC 1.1056
ISO 34-1 and ASTM D 624	B	Tear test, crescent with/ without nick	>110	-	25±0.5	10.5±0.05	2±0.2	-	-		MC 1.1057
ASTM D 624		cutting die A	42	-	-	10.2	-	-	-		MC 1.1060

1) Cutting is only possible for specimen showing a hardness less than 85 Shore A. Harder materials shall be machined by use of milling machines or other convenient machinery acc. to ISO 2818.

2) This specimen shape is specially designed for moulding. Cut specimens do not correspond to any standard.

3) Value indicates the upper and lower tolerances.



MonTech CP 3000

The innovative tabletop laboratory bale cutter



The laboratory bale cutter CP 3000

is the ideal tool for sample preparation in the laboratory environment, particularly for cutting polymer bales, blocks and rubber sheets.

Operation made easy, safe and reliable:

The bale is placed on the conveyor at the rear of the machine, and the desired portion / cut size is pushed into the bale cutter onto the lower striker plate. The cutting blade is guided by hardened, precision-ground ball bearing guides. This ensures a smooth movement of the blade and precise cuts.

The CP 3000 is quiet, pneumatically operated, requires minimal maintenance, and does not require any electrical connection.

All MonTech bale cutters feature the unprecedented monoblock cutting knife which is machined from a solid block of high-strength, corrosion proof tool steel and entirely hardened.

This means to you: Frequent re-grinding or re-sharpening of the cutting knife - that's a thing of the past!

The CP 3000 is available in two different sizes: Standard and Compact.

In addition smaller and larger bale cutters as well as various semi or fully automatic material feeding options are available upon request.



CP 3000 Compact

The CP 3000 compact is the most compact and versatile bale cutter available. The machine is designed for small scale laboratory applications and is ideally suited to prepare pre-cut blocks and slices of polymers for further sample preparation, such as cutting Mooney test samples with an M-VS 3000 volumetric sample cutter

The CP 3000 compact is the ideal tool for small scale and trial mixing applications where the bale cutter is typically located in close proximity to the mixer feeding - to always have the right amount of polymer available when needed.

Safety two-hand control with anti-tiedown, transparent windows at all sides and a fully enclosed top-section of the CP 3000 make it also the safest laboratory scale bale cutter in the market.

Like all other MonTech cutters the CP 3000 series operates free from hydraulics, meaning that operation is extremely ergonomic and bale contamination is simply impossible.

Technical specification	CP 3000 Standard	CP 3000 Compact
Operation	Up to 12 cuts / minute, cutting and lifting speed adjustable	
Bale width / cutting width	max. 520 mm	max. 285 mm
Bale height / cutting height	max. 240 mm	max. 148 mm
Cutting pressure (adjustable)	Min: 0.6 tons @ 2.0 bar Max: 4.6 tons @ 10.0 bar	Min: 0.3 tons @ 2.0 bar Max: 2.5 tons @ 10.0 bar
Cutting knife	hardened and precision ground	
Cutting strip	Teflon, exchangeable	
Material supply	roller conveyor, total length 750 mm	roller conveyor, total length 400 mm
Safety equipment	pneumatic safety 2-hand operation (anti-tiedown), transparent safety shields at both sides as well as front and backside of the machine Safety lid for knife edge and feeding tunnel optional.	
Required supplies	Compressed air with min. 2 bars (5 bars recommended), No electrical connection required!	
Dimensions (H x W x D)	1085 x 900 x 700 mm	940 x 480 x 560 mm
Weight	280 kg Gross / 225 kg Net	140 kg Gross / 120 kg Net



Contact us today for
a demonstration of the
CP 3000 bale cutter!

MonTech VP 3000 & LP 3000 Laboratory press series

The MonTech VP 3000 and LP 3000 are specifically designed for rubber applications and have evolved into the international standard in laboratory presses in the rubber industry.

MonTech presses stand for quality, reliability, high performance and easy operation. All presses are CE compliant and equipped with the latest drive and control technology featuring rigid 4-column press frames, electric heating, stainless steel press platens, a full color touchscreen interface, software proximity switches as well as digital PID temperature control.



VP 3000

Small tabletop laboratory press

Small laboratory press VP 3000

is used for fast and easy moulding, curing and preparation of rubber samples.

The VP 3000 tabletop press is equipped with a 5" Color Touchscreen Display for setting Cure times, Temperatures, Degassing cycles and more, making the press with its single button control the ideal tool for small scale laboratory sample production in various shapes and thicknesses.

The VP 3000 lab press is equipped with a pneumatic closing unit, electric PID-controlled heating systems, a pneumatic safety front shield and protection covers all around the press frame.

Various standards and customer specific press moulds are optionally available.

Online sample preparation

The MonTech VP and LP 3000 laboratory press series, along with optional sample moulds, are the ideal tools for online sample preparation in the production environment. The precise temperature control and homogenous temperature distribution ensure perfect samples for hardness, tensile, density, filler dispersion and abrasion testing.



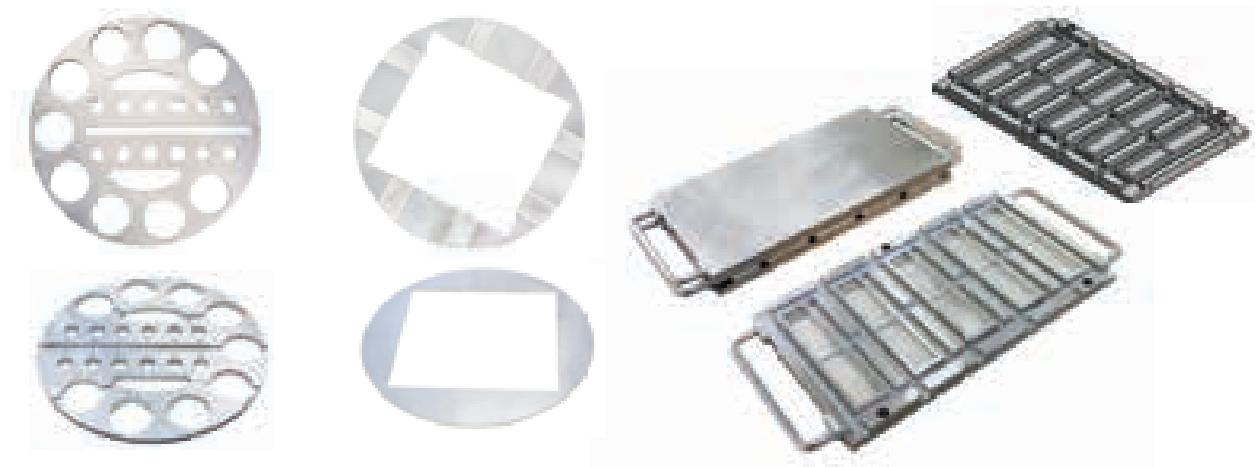
MonTech Laboratory press moulds

Sample preparation and curing moulds

MonTech offers a comprehensive range of precise and durable sample curing moulds according to ISO, DIN, ASTM and GB standards in various different versions. MonTech curing moulds guarantee easy handling and accurate moulding results. The molds are available with single or multiple cavities, hardened or polished stainless steel. Every type of sample preparation for any kind of material can be covered with more than 500 different types of standard curing mould designs, over 20 different material types, and more than 20 different surface finishes and coatings.

Of course moulds can also be engineered, designed and machined per individual customer requirements and specifications.

Please get in touch with us to discuss your laboratory moulding requirements!



Multi-cavity curing mould

2 mm flat sheet mould

DeMattia flex-fatigue mould
(5 cavities)

Advanced curing mould design

Every MonTech curing mould system is a precise toolset to ensure the highest sample preparation precision and optimal results.

All MonTech mould and cover plates are exclusively made from high strength stainless steel, withstanding even highly aggressive compounds and materials.

The fabrication of every mould plate includes tempering to relieve all strains from the material, coplanar grinding for highest parallelism, machining with a dimensional precision of up to 0.002 mm, polishing, final inspection and quality control.

In addition to this, moulds can optionally be fitted with sensors for force, flow and temperature distribution measurement, allowing simple sample preparation, production trials and simultaneous data acquisition for tests like cure simulation.



Hydraulic laboratory press series LP 3000

offers high performance in rubber sample curing and preparation in accordance with ISO, ASTM, DIN, GB and other international standards.

The four-column hydraulic LP 3000 series presses are available in 4 different sizes, with platen dimensions ranging from 196 x 196 mm to 496 x 496 mm and maximum press forces of 20 to 100 tons.

All MonTech LP 3000 presses are equipped with a closed circuit, low-noise integrated hydraulic system requiring as low as 8 to 15 Liters of oil in the whole press, operating at a pressure of up to 400 Bars, making the press very durable and energy efficient at the same time.

All LP 3000 laboratory presses are equipped with electric PID controlled heating systems, pneumatic safety front shield, and 5" Color Touchscreen Display for setting Cure times, Temperatures, Degassing / lifting cycles, closing speeds and switchover points, making these presses simple to use, reliable and rugged at the same time.

LP 3000 presses can be equipped with an integrated data acquisition system with up to 12 additional temperature channels and the MonPress Computer Software, allowing users to record full press cycles including press times, forces, control temperatures, mould temperatures, degassing and more for mould-flow and cure simulation purposes.

Key features of the LP 3000 laboratory press series:

- Enclosed 4-column press frame for high rigidity
- Stainless steel press platens and tension bars
- Electric heating with superior temperature distribution and digital PID temperature control
- Pneumatic front shield
- 2-Hand safety control with anti-tiedown
- Integrated 5" color touchscreen press control
- High efficiency low-noise hydraulics



LP 3000 - 200kN

Medium size benchtop hydraulic laboratory press



LP 3000 - 400kN

Floorstanding hydraulic laboratory press with single daylight



LP 3000 - 600kN

Hydraulic laboratory press

Here shown with optional second daylight with a total of 4 heated plates.



LP 3000 - 600kN

Hydraulic laboratory press

Here shown with optional second daylight with a total of 4 heated plates and height-adjustable press table.



Lab Press Series / Model type	VP 3000	LP 3000 - 200kN	LP 3000 - 400kN	LP 3000 - 600kN	LP 3000 - 1000kN
Type	Pneumatic	Hydraulic	Hydraulic	Hydraulic	Hydraulic
Closing Force kN	40	200	400	600	1000
Press platen size mm	ø 180	196 x 196	296 x 296	446 x 446	446 x 446
Cylinder stroke mm	100	100	300	200	300
Specific platen pressure N/mm²	1.05	5.21	4.57	3.02	5.03
Heating type	electrical	electrical	electrical	electrical	electrical
Capacity per platen kW	1.6	2.8	4.0	6.0	8.0
Max. temperature °C	200	250	250	250	250
Temp accuracy °C	+/- 1.0	+/- 1.0	+/- 1.0	+/- 1.0	+/- 1.0
Options & accessories					
2-Hand safety control	X	X	X	X	X
Pneumatic front shield	X	X	X	X	X
Temperature accuracy +/- 0.5°C	0	0	0	0	0
PLC Control with 5" color Touchscreen	X	X	X	X	X
Data acquisition system with 4, 8 or 12 additional PT 100 temperature channels and MonPress software	-	0	0	0	0
Loadcell for force feedback	-	0	0	0	0
Enlarged ram strokes and platens	-	0	0	0	0
Second daylight - totally 4 heated plates	-	-	0	0	0
Rugged press table (fixed) mounted at the frontside of the press	-	0	0	0	0
Mould cart (movable) / Mould rack	-	-	0 / 0	0 / 0	0 / 0
Dimensions (HxWxD) mm	930 x 560 x 480	970 x 790 x 550	1695 x 800 x 590	1750 x 1250 x 800	1950 x 1450 x 800
Weight	105 kg	450 kg	800 kg	1.100 kg	1.400 kg

- = not available X = Standard 0 = Option

MonTech HT 3000 Hardness testers Series



Rubber Hardness Tester Series HT 3000

Hardness (resistance to indentation) is one of the most important properties of rubber products and parts.

MonTech therefore offers a full range of handheld and benchtop precision hardness testers according to various scales and standards.

This includes devices according to

Shore: A, A0, B, C, D, D0, E, 00, 000, 000S,

IRHD: M, H, N, L, VLRH

Asker: C, CS.

Most popular products from the HT3000 family include:

→ **HT 3000 - A**

Digital Handheld Shore A precision hardness tester

→ **HT 3000 - D**

Digital Handheld Shore D precision hardness tester

→ **HT 3000 - S**

Test stand with pickup arm and integrated loadweights

→ **HT 3000 - SA**

Automated test stand with automated indentation movement

→ **Accessories such as**

- Auto-samplers
- Centering and positioning devices
- Verification and control rings
- Reference rubber blocks
- Additional loadweights
- Software systems
- ...

MonTech CS 3000 Compression Set test fixtures



Compression set fixtures CS 3000

according to ISO 815, DIN 53517, ASTM D395 and other International Standards.

Compression set testing measures the ability of rubber to return to its original thickness after prolonged compressive stresses.

As a rubber sample is compressed over time between 2 flat parallel plates with a predefined percentage and kept for a specific time at a certain temperature, it loses its ability to return to its original thickness. This loss of resiliency, also called memory or permanent set, characterizes the capability of an elastomeric product to perform over a long period of time. MonTech Compression set fixtures are entirely made of precision ground stainless steel and feature stiff compression plates as well as sets of spacers according to customer choice.

Optionally suitable tempering oven and height gages are available.



MonTech

Densimeter DM 3000

Densimeter for testing of individual samples with automated test sequence and internal self-calibration

The MonTech DM 3000 is a semi automated Densimeter. The compact instruments is designed for rapid and accurate determination of specific gravity - with a simplified, software guided operation up to 4 tests per minute can be performed.

The Densimeter utilizes the hydro-static method by comparing the weight of the sample in air as well as in an immersion liquid.

The operator simply hangs the sample from the balance and pushes the start button.

A micro-processor then weighs the sample in air, automatically raises a beaker with the immersion liquid, takes the weight of the sample in the immersion liquid and lowers the beaker.

This whole process is software guided and once the procedure is completed the density is displayed. Additionally the sample weight in air, weight in water, and the weight difference are also recorded and reported.



Technical specification

Measurement method	Hydro-static weighing method
Measured data	Density, Volume change
Weighing range	0.010 to 400.000 grams
Sample weight	1.000 to 50.000 grams
Density range	0.50 – 10.00 g/cm ³ (lower density range possible with anti-float or needle holder)
Complies with	ASTM D 297, ISO 2781, BS903
Resolution / Accuracy	1 Milligram / Better than $\pm 0.020\%$
Output languages	English, French, German, Russian (others on request)
Output interfaces	Serial (RS232), USB 2.0 optional
Electrical	100 - 260 VAC +/- 10%, 50/60 Hz +/- 5 Hz, 2 amp single phase
Options	- Needle type sample holder - Anti float bracket - Set of calibration weight - USB 2.0 interface adaptor



LED Workroom lights

Features:

Ease of Maintenance

- Snap-in Components
- Simple and rugged mechanics

Ease of Use

- Single Button Operation
- Fully automated calibration

Applicable Data Measurement

- Density
- Volume change

Scope of delivery:

- Safety shield, mounted inside the instrument
- DM3000 Software for Density measurement
- Instruction Manual
- Standard accessories, cables

MonTech H&D 3000 Automated Hardness & Density Testing Instrument

2 INSTRUMENTS IN 1: With the MonTech H&D 3000, hardness AND density testing of cured rubber samples is made simple, fast and reliable. Arbitrary test sequences are easily pre-programmed, samples are sequentially processed and test data is automatically collected, without the need for operator involvement. Due to the unique rotary tray design, no manual magazine handling is needed; the instrument can be continuously loaded and operated.

- Hardness and Density testing is combined together into a single tabletop machine requiring minimal bench space in the lab. The system is designed for unattended operation with a fully automated test sequence, totally eliminating any operator influence.
- Test samples can be continuously loaded into an endless rotary tray at the front of the machine and are identified directly on the computer by a host system or by a barcode.
- Fully synchronized parallel operation of hardness and density measurement permits total cycle times of less than 35 Seconds!
- (3 points Shore A + Density)
- During each test, the environmental and immersion fluid temperatures are accurately measured and recorded for a fully automated compensation of the specific gravity test results.
- All test results are recorded online by the MonDevice software system featuring extensive test specification management, more than 60 different datapoints specially for the H&D 3000, automated Pass / Fail evaluation and data export to host systems and databases.
- A standard analytical balance with integrated calibration is used for density testing, providing the most accurate results and full traceability.





Hardness measuring head

The motorized and weight loaded hardness measuring unit featuring an integrated alignment and a digital measurement of the indentor displacement guarantees the highest precision hardness readings on up to 5 different test points per sample.

Various types of hardness heads in accordance to different international standards such as Shore A, Shore D and IRHD are available.

(multiple or interchangeable configurations available)

Precise sample handling

Stainless steel linear, rotational and multiposition electronic / pneumatic actuators provide safe and reliable handling of test samples.

Actuators are mechanically separated into two groups: one for dry and one for wet samples to avoid any cross-contamination of the samples prior to weighing in the immersion liquid.



Integrated pump circuits

ensure that the level of the density liquid in the dip tank is carefully controlled. After each density test, an adjustable amount of liquid is automatically renewed, keeping the density liquid fresh and in good condition.

Also the pumps can be used to automatically fill, empty and change the density liquid in less than 20 seconds.



Endless rotary tray magazine

The rotary sample tray allows continuous operation of the machine, totally avoiding any unproductive time.

The testing area is separated by a supervised transparent safety door and covers all around the machine.



Hydrostatic weighing

Density / Specific gravity is determined by using the "weight in air" and "weight in water" methods.

The H&D 3000 features two integrated weighing stations.

After weighing the sample in air on the first weighing station, and placing the sample on the second weighing station, a user-defined number of wetting cycles can be programmed to remove any air bubbles around the sample. Afterwards the weight is taken.

Simultaneously, the temperature of the density liquid is measured and used as a correction for density calculation.

All readings are rapidly taken by a precise weighing system based on a standard analytical precision scale, minimizing the possibility of water absorption by the sample.



Sample removal

All test samples are automatically removed after being tested and put into a separate container on the lower left side of the instrument.

This ensures that rotary tray for fresh samples never gets contaminated with the liquid used for density testing. This ensures the highest accuracy and precision. Optionally, samples can be separated into 2 containers for passed and failed specimens.

Technical specification - General

Samples	Cured rubber discs
Sample diameter	30 - 45 mm
Sample thickness	5 - 8 mm
Sample capacity	Continuous rotary sample tray with 20 sample capacity (Optional sample trays up to 2000 samples are available)
Data Interface	Ethernet (10/100 MBit), USB (int.), CF card (int.), RS232 (opt.)
Power supply	100 - 230V, 50/60 Hz + N + PE, Single phase, about 1 Amps
Dimensions (H x W x D)	600 mm x 650 mm x 680 mm
Weight	about 80 kg
Instrument options	<ul style="list-style-type: none"> - Sample magazines for up to 2000 samples - Barcode scanner for Compound and Batch identification - Additional Hardness testing heads: Shore B, C, D, DO, O, OO, OOO, Micro A, Micro D, IRHD N, M, H, L, VLRH - Sample separation in different containers



Technical specification - Density

Test method	Hydrostatic weighing according ISO 2781, ASTM D1817	
Measurement range	< 1.0 g/cm ³ to 2.8 g/cm ³	
Immersion Fluid Temperature Measurements	Standard	
Technical specification - Hardness	Shore A	IRHD N
Test method	Shore A in accordance with: ISO 868, DIN 53505, ASTM D2240, ISO 7619, NFT 51-174, BS 903-A26	IRHD N in accordance with: DIN ISO 48, ASTM D1415, NFT 46-003, BS 903-A26
Indenter	Hardened steel rod Truncated 35° cone 0.79 mm diameter	Spherical Ball 2.50 mm diameter
Measurement range	0 - 100 Shore A	0 - 100 IRHD
Pressing force / load	Contact pressure: 12.5 N Spring Force: 8.065 N	Preload: 0.29 N for 2 Seconds Main load: 5.4 N for 1-99 Seconds
Resolution	0.1 Shore	0.1 IRHD



MonTech RD 3000

Density Tester for uncured rubber compounds

Automatic compression density tester for uncured rubber compounds and polymers



The RD 3000

is the simplest way to measure density and specific gravity of raw polymers, masterbatches and uncured rubber compound specimens of any geometry. Due to the extremely rugged instrument design, the RD 3000 is suited for laboratory and production environments.

The true innovation of the RD 3000 is the way it measures density. Typically, a strip of rubber is cut directly from the mill, identified at the control panel of the instrument and weighed. All air is compressed out of the sample in a compression cylinder and the volume of the material is taken. Once the density is automatically calculated, it is checked against tolerance limits and displayed along with Pass / Fail status.

For automatic acquisition and processing of all test related data, the RD 3000 is equipped with:

- an integrated precision scale
- an electronic piston measurement device
- a PLC color 5.7" touchscreen control panel system
- MonDevice PC-Software for data acquisition and storage (optional)
- an integrated printer (optional)
- a barcode scanner (optional)

A single test only takes about 20 seconds comprising the following steps

① Weighing

The sample is placed on the electronic balance which is integrated into the machine table. Therefore only stable weight readings will be accepted.

② Compression of the sample

The sample material is filled into the compression cylinder barrel and the compression of the material is started. Once the piston finally reaches a stable position in the compression process, all air is removed from the sample which means that the test sample is compressed to its specific volume.

③ Volume determination

The sample volume is determined by calculating the difference between the piston stroke at an empty cylinder, and the piston position with the specific test material.

④ Density calculation

The density of the sample is calculated automatically from the weight and the determined volume.

⑤ Displaying of test results

The calculated sample density is displayed on the control panel or in the MonDevice software along with all other results in the test sequence.

Single tests and test series results can also be directly printed by an optional built in printer.



Technical specification

Density	Density range: 0.8 - 2.6 g/cm ³ Accuracy: 0.1 % Reproducibility: 0.03 %
Sample volume	Required sample volume: 40 - 120 cm ³ Recommended sample volume: approx. 100 cm ³
Integrated scale	Sample weight range: 0 - 420 g Resolution: 1 mg
Compression cylinder	Diameter: 60 mm max. stroke: 80 mm
Pneumatics	Supply: 5.5 - 10 bar Pressure range for compression: 4.5 - 5.5 bar Compression force: 40.0 kN (at 5 bar) Volume of air / cycle: 64 l (= 64 dm ³)
Data Interface	Ethernet Network (10/100 MBit), Serial RS232 (optional)
Power supply	100 - 230 V, 50/60 Hz + N + PE, Single phase, about 1 Amps
Dimensions	Height: 1085 mm Width: 525 mm Depth: 720 mm
Weight	about 190 kg
Environmental conditions	<p>Storage: Temperature - 25°C - + 55°C relative humidity 5 - 95 %</p> <p>Operation: Temperature + 5°C - + 45°C relative humidity 5 - 95 %</p>
Instrument options	<ul style="list-style-type: none"> - Barcode scanner for Compound and Batch identification - Integrated test result and test series result printer - Serial (RS232) Output Interface - MonDevice control and data acquisition software



RD 3000 Operating workspace
Panel, Barcode Scanner (Opt), Weighing and Compression cylinder



Fully Integrated weighing system
with automatic, guided calibration sequence



Compression cylinder
made from stainless steel, precision ground



Stainless steel crosshead
with integrated safety and limit switches for safe operation



MonTech Disper Tester 3000

Carbon black dispersion tester

Computer aided, advanced digital reflected light microscopy brought to the next level

The DisperTester 3000

is the most easy to use instrument for filler dispersion analysis; providing superior compliance, reproducibility and repeatability. The DisperTester provides accurate, repeatable results in seconds for both vulcanized and uncured rubber compounds that are applicable to the process, allowing quick and easy testing of dispersion compared to other optical techniques which often take hours to perform (less than 2 minutes with sample preparation).

The DisperTester 3000 is equipped with cutting edge digital image processing to automatically determine dispersion ratings, filler distributions and agglomerate sizes. Up to 5 individual readings can be taken in order to precisely evaluate the dispersion and detect possible variations along the surface of the sample.

To increase testing possibilities even further, the MonDispersion software features variable brightness, contrast and exposure, as well as focus control for every type of test material, allowing colored or even white samples to be tested.

The DisperTester 3000 system includes built-in reference scales and can be used for all filler types including Carbon Black, Silica and natural inorganic materials with fully automatic calculation of X value, Y value, Z %, Dispersion %, White area %, ... in accordance with international standards. All data is processed automatically by the MonDispersion software. Agglomerates are automatically highlighted and can even be manually measured by their diameter and normalized area. Test results are stored in an SQL database. PDF reports along with distribution spreadsheets and histograms are created and images are stored into an image database in a high-resolution JPEG format. Of course custom reference scales can be easily added by the user at any time.

The determination of filler dispersion in technical rubber goods and tire compounds is of great importance to the industry.

Dispersion quality has a direct impact on final product properties and is therefore widely used as a quality control parameter.

Many important properties of the cured compound are directly affected by filler dispersion including:

- | | |
|----------------------|-----------------------|
| → Tensile strength | → Tear strength |
| → Fatigue resistance | → Abrasion resistance |

The DisperTester 3000 is the only instrument that gives a direct measurement of dispersion in a fast and simple test, without requiring subjective assessment. The instrument is available in three models with different magnification levels:

- **30x** with an optical range of **10 to 191 µm**
- **100x** for particles from **1 to 58 µm**
- **1000x** is specially designed for micro agglomeration measurement of silica compounds for particles from **100nm to 3µm**

Sample Preparation

Sample preparation simply involves cutting the sample to generate a "fresh face / gloss cut" for analysis. A simple cutter utilizing ultra-sharp razor blades is supplied to optimize sample preparation for cured samples. For further simplifying sample preparation, the DisperCut automatic sample cutter is optionally available.



Technical specification**International standards**

ISO 11345 : 2006, ASTM D 7723

Electrical Requirements

80 - 250 VAC, 47 – 63 Hz, 1 Amps

Data Interface

USB

Dimensions

Height: 190 mm

Width: 160 mm

Depth: 460 mm

Weight

17.5 kg (net)

Magnification

DisperTester 3000 - 1000x = 1000 times magnification

DisperTester 3000 - 100x = 100 times magnification

DisperTester 3000 - 30x = 30 times magnification

Aperture Size

DisperTester 3000 - 1000x = 4 mm x 3.5 mm

DisperTester 3000 - 100x = 4 mm x 3.5 mm

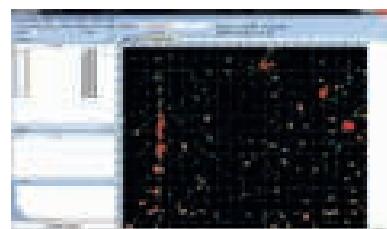
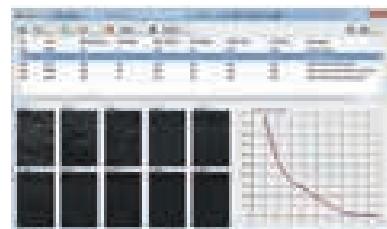
DisperTester 3000 - 30x = 9 mm x 5 mm

Image resolution

5 Megapixel with Carl Zeiss telecentric optics

Data format

PDF, JPEG, ASCII

 **MonDispersion software**

MonTech DisperTester 3000 Plus

Carbon black dispersion tester

The MonTech DisperTester 3000 Plus

is the newest model of carbon black dispersion tester - computer aided, advanced digital reflected light microscopy brought to the next level. The DisperTester 3000 Plus is the most advanced instrument for reliable filler dispersion analysis based on the superior compliance, reproducibility and repeatability well known from the DisperTester 3000 series.

In addition, the DisperTester 3000 Plus has been upgraded with a set of extensive new features for reliable, subjective and operator independent analysis of the mix quality of your rubber compounds:

- Rugged housing machined from a single block of high-strength aluminium
- 10 Megapixel camera with USB 3.0 connectivity
- Multi-direction variably controlled LED light sources
- Precisely guided, horizontally moving camera system to obtain multiple test points from a single sample placement
- Fully automated or manual focusing, scanning and evaluation
- Black and White and Color camera systems available for black, white and colored rubber compounds
- Integrated data acquisition and analysis featuring PDF reports, histograms and high resolution result images
- Optional autosampling systems for 50 or 100 samples

The DisperTester 3000 Plus features a totally new precision optical system paired with latest digital image processing technology. These enhanced capabilities now allow Dispersion analyses for particles from 1 µm to 250 µm - in full compliance with latest ISO 11345 and ASTM D 7725. Imaging capabilities are further extended with variable image thresholds and settings for advanced image and particle analyses.

The DisperTester 3000 plus features a precision double stage linear drive system to precisely evaluate variations along the surface of the sample. This totally eliminates the need for manual sample placement by allowing up to 5 individual readings for each sample placement.

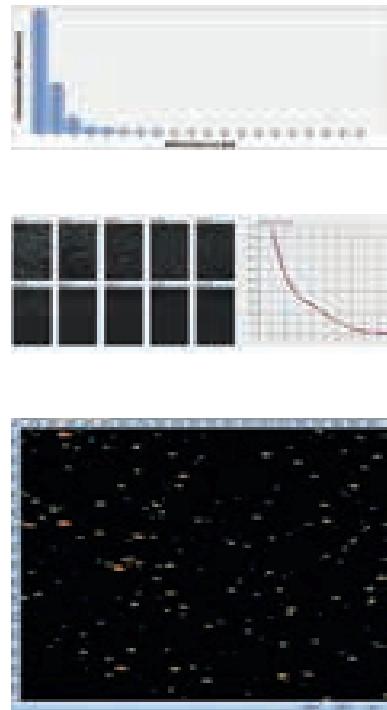
To increase testing possibilities even further, the MonDispersion software now features additional imaging techniques such as variable focus control, freely definable shutters and image filters. This ensures an even clearer, superior quality sample image; providing higher test result precision and improved reproducibility.

The DisperTester 3000 plus system includes additional built-in reference scales and can of course be used for all filler types including Carbon Black, Silica and natural inorganic materials with fully automatic calculation of X value, Y value, Z %, Dispersion %, White area %, ... for the most precise filler dispersion analysis.



Technical specification

International standards	ISO 11345 : 2006, ASTM D 7723
Electrical Requirements	80 - 250 VAC, 47 – 63 Hz, 1 Amps
Data Interface	USB 3.0
Dimensions	Height: 180 mm Width: 220 mm Depth: 375 mm
Weight	24 kg (net)
Magnification	100 times magnification
Aperture Size	12 mm x 3.5 mm
Agglomerate range	1 µm to 250 µm
Focus	Fully automatic or manual
Image resolution	10 Megapixel with Carl Zeiss telecentric optics
Data format	PDF, JPEG, ASCII

 **MonDispersion software**

MonTech DisperCut 3000

Stretched sample cutter for Dispersion testing



DisperCut 3000

The DisperCut 3000 is a small and easy to use tabletop sample cutter that produces fine cuts of cured and uncured rubber samples especially for Dispersion testing samples.

The cutter is equipped with a high-speed close and cut system with simultaneous sample pre-stretching to avoid smearing of the sample and guaranteeing the best straight and clean cutting results.

Test samples can be cut and prepared within a single second!

This makes the patented DisperCut 3000 sample cutter the most reliable tool for producing repeatable samples for Dispersion testing by excluding all kinds of operator influences.

Integrated endstops make sample positioning fast, reliable and easy, ensuring similar test sample dimensions.

The precision-ground blade guides, combined with ultra sharp, heavy-duty single edge blades, ensure straight and precise cuts.

In combination with the DisperCool 3000 chiller unit, the DisperCut 3000 cannot only be used for cured rubber samples, but is also the ideal combination for preparing uncured rubber samples by first cooling them down to glass transition temperature in the DisperCool 3000 and then cutting the samples with the DisperCut 3000.

The cutter is equipped with a two-hand safety control system for simple operation and the highest possible operator safety, eliminating the risks associated with manually operated sample cutters. The cutting knife is always covered and protected to avoid any accidental cutting or touching of the blade.

Technical specification**International standards**

ISO 11345 : 2006, ASTM D 7723

Cutting blades

Ultra-sharp heavy duty single edge blades, easily replaceable

Sample dimensions

Max. Ø 45 mm or 40 x 40 mm

Pre-stretching

adjustable by different cutting plates from 5 to 10%

Operation

2-hand safety control with anti-tiedown

Cutting speed

Up to 20 cuts per minute

Dimensions

Height: 430 mm

Width: 295 mm

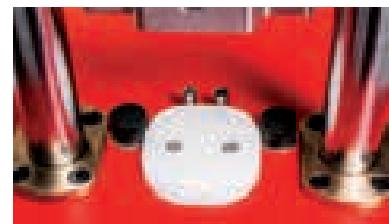
Depth: 205 mm

Weight

12.0 kg (net)

Pneumatics

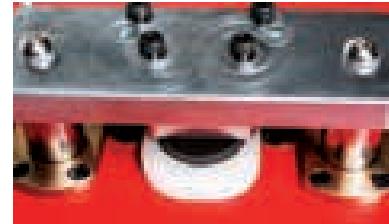
min. 5 Bar

DisperCut - Step by Step

1 - Empty cutting area



2 - Place sample



3 - Active cutting by pressing the 2 control buttons



4 - Release control buttons - blade will return



5 - Cut sample

MonTech DisperCool 3000

Test sample deep freezing unit



The DisperCool 3000

is used for the preparation and sample conditioning of uncured as well as cured rubber samples prior to the cutting process - especially designed for Dispersion Testing.

The sample preparation process is very simple and convenient:

First the sample is pre-cut (if needed) and then easily placed in the quick-open sample holder and then inserted into the tabletop DisperCool unit. Inside the DisperCool chamber, silicon oil is pre-chilled to a low temperature from minus 20 to minus 40°C. The sample holder is placed into the chamber which can hold up to two sample holders.

Once the safety lid of the chamber is closed, the cooling process and integrated timer are immediately started.

During the cooling process, the sample is cooled to glass transition temperature. This means that a totally solid sample is produced.

The cooling / preparation time - usually between 5 and 12 minutes depending on the sample type and shape - can easily be set by the operator and can be monitored during the process on a count-down timer display.

Once the cooling time is over, the operator is notified by an acoustic signal allowing the operator to open the chamber lid and take out the sample holder along with the sample.

Now the sample at glass transition temperature can be cut and processed like a normal solid hard rubber sample without smearing, distortion or modification of the sample surface. The DisperCool 3000 provides perfect samples for conventional cutters or automatic cutters like the DisperCut 3000.

The whole DisperCool 3000 process is closed, sustainable and environmentally friendly as no consumables like liquid nitrogen or other cooling gases are required.



Technical specification

Temperature range	-40 to 200°C (depending on cooling / heating liquid)
Cooling liquid	Silicone oil, approximately 3 liters
Chamber size	Approx. 170 mm x 90 mm x 170 mm (H x W x D)
Sample capacity	Two independent sample holders
Sample size	Max. 25 x 20 x 20 mm
Display	6-digit timer display with acoustic signal 3,5" color-touch temperature display
Additional Inputs (optional)	PT 100 temperature port for immersion probes to measure temperature directly in the sample
Chiller capacity	Max. 420 Watts, air cooled
Electrical Requirements	230 - 250 VAC, 50 – 60 Hz, 10 Amps
Output Interfaces	USB, RS232
Protection levels	Configurable user input modes and levels Integrated temperature and level protection switches
Dimensions	Height: 500 mm Width: 425 mm Depth: 450 mm
Weight	40.5 kg (net)

Sample Preparation



Sample holder in chamber (lid open)



External Input and Output ports



Temperature touchscreen and timer display



Sample temperature recording by optional immersion probe

MonTech ABR 3000

Rotary Drum DIN Abrasion tester

Abrasion Tester ABR 3000

The MonTech rotary drum abrasion tester in accordance with DIN 53516, DIN ISO 4649, AS1683.21 and ASTM D 5963 makes abrasion testing really easy. The test specimen is fixed into a quick clamp sample holder and precisely guided - either with or without rotation - over a predefined distance of either 20 or 40 Meters and with a defined load on a sheet of abrasive paper mounted to a stainless steel rotary drum of 150 mm diameter. The drum rotates with a speed of 40 rpm. Finally the frictional loss is calculated by comparing the sample weight before and after testing.

The MonTech ABR 3000 Abrasion tester is a tear testing instrument for determination of the resistance of elastomers in regards to the frictional loss of a rotating or fixed specimen.

- **Standards** DIN 53516, ISO/DIN 4649, AS1683.21, ASTM D 5963
- **Description** The test is made on materials which wear off or abrade, e.g. tires, belts, conveyor belts, shoe soles.
- **Basic equipment** Stiff aluminum machine frame with brushless drive system and specimen holder, abrasion drum, metal housing, electric motor for rotation of the drum and the specimen holder

The working area is protected with translucent cover and protective safety switch. The specimen holder has a integrated dead weight of 2,5 N. Additional loading weights of 2,5 N and 5,0 N are supplied as standard accessories.

Test Procedure:

1. After determination of the abrasiveness of the abrasion sheet, the instrument is ready for testing. Samples can easily be drilled out of a rubber sheet or final product with the optional circular cutting knife. Typically tests are performed at ambient temperature of $23 \pm 5^\circ\text{C}$ or with the optional drum heating at elevated temperatures.
 2. Initially the weight of the test specimen is measured
 3. Afterwards the sample is mounted into the sample holder, the desired abrasion distance is set and the load weights are applied. The instrument cover is closed and the test is started by a simple click on the start button. The rotation of the drum will start and the specimen will be moved over the abrasive sheet. Once the pre-set abrasion distance is reached, the instrument will stop automatically.
 4. After the test run is finished, the sample is removed from the sample holder and the weight of the sample after abrading is measured.
 5. For calculation of the abrasion, the mass loss (average value of 3 to 10 single values) is converted to the loss of volume by help of the density and corrected for the deviation of the abrasiveness of the abrasion sheet from the set value of abrasiveness.
- Formula: Abrasion = mass lost x 200 specific weight x abrasiveness



Technical specification

International standards	DIN 53516, DIN ISO 4649:2002 (E), AS1683.21, ASTM D 5963														
Contact pressure for specimens expandable up to	<table border="1"> <tr> <td>N</td><td>2.5</td><td>5.0</td><td>7.5</td><td>10.0</td></tr> <tr> <td>N</td><td>12.5</td><td>15.0</td><td>17.5</td><td>20.0</td></tr> </table>					N	2.5	5.0	7.5	10.0	N	12.5	15.0	17.5	20.0
N	2.5	5.0	7.5	10.0											
N	12.5	15.0	17.5	20.0											
diameter of roller	<table border="1"> <tr> <td>mm</td><td>150</td><td></td><td></td><td></td></tr> </table>					mm	150								
mm	150														
length of roller	<table border="1"> <tr> <td>mm</td><td>460</td><td></td><td></td><td></td></tr> </table>					mm	460								
mm	460														
number of revolutions of roller	<table border="1"> <tr> <td>min-1</td><td>40</td><td></td><td></td><td></td></tr> </table>					min-1	40								
min-1	40														
peripheral speed of roller with abrasion sheet	<table border="1"> <tr> <td>m/s</td><td>0,32</td><td></td><td></td><td></td></tr> </table>					m/s	0,32								
m/s	0,32														
dimensions of abrasion sheet L/W	<table border="1"> <tr> <td>mm</td><td>472,5 (+2) x 400</td><td></td><td></td><td></td></tr> </table>					mm	472,5 (+2) x 400								
mm	472,5 (+2) x 400														
film tape W/D	<table border="1"> <tr> <td>mm</td><td>50 x 0,2</td><td></td><td></td><td></td></tr> </table>					mm	50 x 0,2								
mm	50 x 0,2														
abrasion distance of specimen	<table border="1"> <tr> <td>m</td><td>40 (20)</td><td></td><td></td><td></td></tr> </table>					m	40 (20)								
m	40 (20)														
corresponds to roller rotations	<table border="1"> <tr> <td></td><td>84 (42)</td><td></td><td></td><td></td></tr> </table>						84 (42)								
	84 (42)														
angle of inclination of axle center of the specimen to vertical position of roller	<table border="1"> <tr> <td>degree</td><td>3</td><td></td><td></td><td></td></tr> </table>					degree	3								
degree	3														
granulation of abrasion sheet	<table border="1"> <tr> <td></td><td>60</td><td></td><td></td><td></td></tr> </table>						60								
	60														
specimen diameter	<table border="1"> <tr> <td>mm</td><td>16</td><td></td><td></td><td></td></tr> </table>					mm	16								
mm	16														
specimen thickness	<table border="1"> <tr> <td>mm</td><td>6 ... 15</td><td></td><td></td><td></td></tr> </table>					mm	6 ... 15								
mm	6 ... 15														
maximum gripping length of specimen	<table border="1"> <tr> <td>mm</td><td>13</td><td></td><td></td><td></td></tr> </table>					mm	13								
mm	13														
lateral feed of specimen per roller rotation	<table border="1"> <tr> <td>mm</td><td>4,2</td><td></td><td></td><td></td></tr> </table>					mm	4,2								
mm	4,2														
number of revolutions of specimen holder for rotating specimen	<table border="1"> <tr> <td>min-1</td><td>0,9</td><td></td><td></td><td></td></tr> </table>					min-1	0,9								
min-1	0,9														
power supply	<table border="1"> <tr> <td></td><td>100-240 V 50 / 60 Hz 100 VA</td><td></td><td></td><td></td></tr> </table>						100-240 V 50 / 60 Hz 100 VA								
	100-240 V 50 / 60 Hz 100 VA														
weight	<table border="1"> <tr> <td>kg</td><td>gross 80 / net 50</td><td></td><td></td><td></td></tr> </table>					kg	gross 80 / net 50								
kg	gross 80 / net 50														
dimensions of abrasion tester W/D/H	<table border="1"> <tr> <td>mm</td><td>760 x 360 x 320</td><td></td><td></td><td></td></tr> </table>					mm	760 x 360 x 320								
mm	760 x 360 x 320														

Scope of supply:

- Abrasion tester as described above, 230 Volts, 1 Amps
- Set of emery papers / abrasion sheets
- Roll of adhesive tape
- Set of brushes
- Safety cover

Optional:

- Analytical balance, max. 83 g, 0.1 mg
- Heated drum
- Additional load weight 10 N
- Drum cleaning unit
- Circular sample cutter, diameter 16 mm
- Standardized test elastomer specimen according to ISO4649
- Set of emery papers / abrasion sheets



Load weight system



Quick clamp sample holder



Accessories

MonTech RP 3000 Rapid Plastimeter for Polymers and Natural Rubber



The MonTech Rapid Plastimeter

measures the plasticity or viscosity of polymers and unvulcanised rubbers. The test is simple, clean and quick. The instrument is typically used in conjunction with the MonTech ageing oven for plasticity testing to determine the Plasticity Retention Index (PRI) of raw natural rubbers.

The variable temperature range from 25°C to 200°C for easier to read with freely programmable conditioning and load times allow a convenient characterisation of the flow behavior of natural and synthetic rubbers at variable test conditions. For some applications this method offers a quick, low cost alternative to a Mooney Viscosity test.

The instrument is supplied in a complete set along with a table-top, mechanical volumetric specimen cutter for a reliable preparation of test specimens with a volume of 0.40 cm³ according to international standards. The instrument is supplied with 10 mm diameter top platen installed period. Alternative top platens of 7.3 and 14 mm diameter are supplied as accessories. The platens are easily interchangeable.



Plasticity Retention Index (PRI):

PRI is a measure of the resistance of raw natural rubber to oxidation.

The oxidation effect is assessed by measuring the plasticity before ageing (P₀) and after ageing for 30 mins in the MonTech ageing oven for Plasticity testing at 140°C (P₃₀)

$$\text{PRI} = \left(\frac{P_{30}}{P_0} \right) \times 100$$

Working Principle

A modified parallel plate compression principle is used with automatically timed "conditioning" and "load" periods. A sample is compressed between two circular platens which are maintained at a temperature of typically 100°C.

The sample is conditioned for 15 seconds at a thickness of 1 mm. A compressive force of 100 N is then applied for 15 secs. The final thickness of the test piece expressed in units of 0.01 mm, is the plasticity number.

Besides this procedure described by the standards, the MonTech RP 3000 can operate at fully variable temperature and conditioning / load times.

During the loading period, the material flow and plasticity curve can be acquired by the optional MonPlast computer software.

Test Procedure

The sample is prepared using the mechanical, double-working specimen cutter and it is then enclosed between two pieces of tissue paper, as defined by international standards, before being placed between the platens. The tissue paper prevents the material sticking to the platens or sliding between them.

The automatic test sequence is started when the start lever on the instrument is rotated. Conditioning and loading periods are then automatically controlled.

The reduction in thickness of the sample as well as the load that is applied to the sample is displayed digitally on the PC screen by the optional MonPlast software. After testing, all results are shown on the PC screen and automatically stored in the database for recalling them later or creating batch reports.



Features

The MonTech Plastimeter offers greatly enhanced operator access and is available in only one, full option version with all possible features included. One of the most important features is the powered zero and load calibration and automatic platen parallelism alignment totally eliminate the need for any manual setting of the instrument.

The RP 3000 Rapid Plastimeter can be calibrated in less than 20 seconds!

A strong aluminum and stainless steel frame, paired with direct linear drive technology ensures highest instrument rigidity and stability to guarantee the highest precision of test results.

- Fully automatic and easy operation
- Single/Median mode of operation
- Fully automatic calibration
- Built in diagnostics with Service and Diagnostics screen
- Variable platen temperature 25°C - 200°C
- Variable conditioning and load times
- Digital, continues temperature display on the PC as well as temperature graph

With optional MonPlast Software:

- Full P0 and PRI evaluation possibility
- Single/Median mode of operation
- Display and calculation of Plasticity curve
- Various parameters can be entered and stored to each individual test:
e.g. Batch number, Lot, Date, Time, Operator...
- By the help of the software a full traceability of aborted tests can be guaranteed
- All Parameters as well as results can later be printed out together with the load, Plasticity as well as Temperature graphs as a Batch Report.
- The language on the Plastimeter as well as the software can be changed online
Standard languages are English, German and French
- Integrated calibration and service reminder

Package including:

- Full P0 and PRI evaluation possibility
- 3 sets of Platens in different sizes
- Variable Temperature 25°C to 200°C
- Double-working sample cutter
- RS232 Interface
- Standard accessories package
- Optional: MonPlast computer Software with flow curve acquisition and automatic PRI calculation



Technical specification

Standards	BS 903:Pt A59: section A59.1:1997 ISO 2007:1991
Platen sizes	10 mm, 7.3 and 14 mm diameter
Platen temperature	25°C - 200°C
Test time	Default: 15 secs conditioning, 15 secs load Variable from 0 to 99 seconds
Compressive force	100 N
Calibration sample	Included
Total Weight of Plastimeter	35 kg
Data Interface	RS 232
MonPlast computer software	optional
Data printer	optional



Double working sample cutter for fast and easy specimen preparation

MonTech AO 3000

Ageing oven for Plasticity Testing

The MonTech ageing oven for plasticity testing

ages rubber in accordance with international testing standards. In conjunction with the MonTech Plastimeter, it allows the user to determine the Plasticity Retention Index (PRI) of raw natural rubbers.

Housed in a robust stainless steel case, the MonTech ageing oven for plasticity testing features an aluminum block with four chambers that carry the drawer units and sample dishes. Heater elements are wrapped around and inside the block and high quality insulation inside the case minimizes heat loss.

An adjustable air blower system , which provides pre-heated air to the chambers, is located on the rear panel for easy service access. Test samples are placed on round foil dishes, which are located in recesses in the drawer units. When a drawer is pushed in, a timing sequence starts only for that chamber.

As the 30 minute ageing process ends, the light next to the drawer changes color to remind the operator to remove the sample. Also the ageing oven beeps to show that ageing is finished. If the ageing period is exceeded, the light changes to red indicating that the samples should be discarded.

A temperature of 140°C (required by the standard) is maintained by a PID Controller, which continuously displays the chamber temperature. The MonTech ageing oven for plasticity testing is protected by a warning system, which is initiated if the correct temperature is exceeded by more than 10°C.

Features

- Temperature controlled to $140 \pm 0.2^\circ\text{C}$
- Four chambers with independent timers
- Stability check and overheat protection
- Digital temperature display



AO 3000 - Sample loading made easy



1 - Remove drawer from the oven



2 - Place aluminum dish



3 - Install aluminum dish



4 - Remove installation tool



5 - Load samples



6 - Put drawer back in the oven to start the 30 minute ageing sequence

Technical specification

Standards	BS 903 Pt. A59, ASTM D3194
Temperature Recovery	1 minute at 140°C after sample insertion
Operating Temperature	140 ± 0.2°C (adjustable from ambient to +200°C)
Max Samples per Oven	48
Max Samples per Tray	12
Dishes Per Tray	4
Heating Chambers	4
Air exchange rate	adjustable 0 to 120 times / hour
Chamber Dimensions	50 mm x 12 x 280
Max Power	2.8 kW
Weight	27 kg



Drawers loaded with samples

Package including:

- Temperature controller (PID)
- 4 trays wish 4 dishes each
- Electronic system with 4 independent timers, beeper and monitoring system
- Standard accessories package

MonTech FT 3000 C-H

Fatigue Tester



Key Features

- Tension and bending fatigue (De-Mattia) in a single machine
- Stainless steel grips holding a total of 16 samples
- Frequency, Grip distance and dynamic stroke can freely be set
- the number of total cycles and cycles before automatic stop can be set
- optional image recording by CCD camera and MonFT evaluation software

State of the art fatigue testing and lifecycle simulation

The FT 3000 is a high-end, direct linear drive fatigue tester of advanced design; providing a full test which indicates material properties such flex cracking/crack growth test and tension fatigue test in accordance with:
ISO 132, 6943, ASTM D 430-B , ASTM D 813, DIN 53 522 -1/2/3.

The instrument is designed for continuous operation in compound / material research & development laboratories as well as industrial applications like in-process quality control in rubber plants requiring repetitive testing of rubber samples to assess dynamic material performance properties.

Especially due to the unique advanced linear motor design, optional arbitrary waveform programming and CCD camera data acquisition system, the machine can easily be set-up and adapted to individual customer testing needs.

Precisely controlled thermal environment

The sample holding system is located in a thermal chamber. This 120 liter heating and cooling chamber permits temperatures between -40 °C and +180°C, covering almost all possible application environments.

Due to the unique triple stage closed loop chiller and compressor design, a superior temperature uniformity of +/-1°C is achieved with no gases or external media required for the cooling process.

Highest accuracy, rigidity and durability - guaranteed!

The direct drive, linear motor drive system with digital control and inline position measurement ensures extremely precise movements, low levels of noise and vibration, high durability and long lifetime. The instrument is fitted with a massive, deflection free stainless steel sample holder system. Optionally, samples can be inspected with a motorized camera CCD system for crack and crack-growth measurement - this system also includes the MonFT data acquisition software.



FT 3000 CH - Instrument options:

Camera CCD System (incl. MonFT software)

(Computer to be supplied locally according to specification)

For automated crack growth measurement and recording (De-Mattia) with variable camera setup for through hole or surface measurement, automated lateral camera travel as well as integrated LED light system.

Sensor grip system for FT 3000 CH

with single clamp (replaces standard grips)

For exact measurement of completed cycles to failure of the sample.

Each position in the sample holder has a variable clamp for individual sample mounting; with an integrated, non-contact tension, precision sample sensor for exact detection of the cycle at sample failure. The time of failure (in cycles, minutes or seconds) is automatically transferred to the software and stored.

Control device:

The instrument is controlled by a front mounted

5.7" color touch screen display.

The following functions are incorporated in the display:

Inputs:

- Input number of set cycles
- Input set temperature in °C / °F
- Set motor speed in strokes per minute

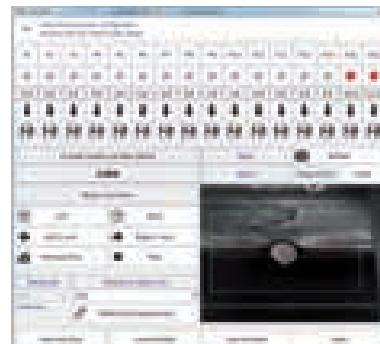
Readings:

- Number of cycles done
- Current chamber temperature
- Actual motor speed / position
- Cycles to next pause
- Cycles since last pause

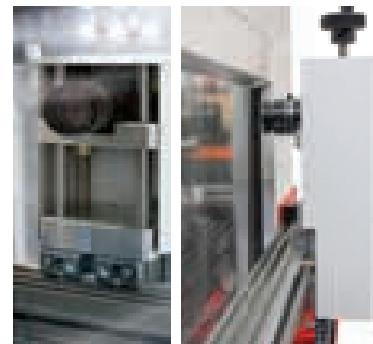
The display unit can be used to configure tests and display status alerts. It can also be used start, stop, or pause testing at any time.



MonFT Software – crack growth graph



MonFT Software – specimen identification



CCD Camera system
for crack-growth measurement

Technical specification

International Standards

ISO 132, 6943, ASTM D 430-B, D 813; DIN 53 522 -1/2/3

Speed adjustment

DIRECT LINEAR DRIVE from 0,05 to 5 Hz

Run Adjustment

between 0 and 60 mm

Distance of the grips maximum

100 mm

Maximum force in traction

600 N (at 1 Hz oscillation frequency)

Sample holder

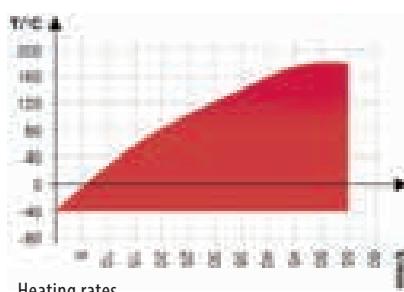
16 samples can be tested at the same time.

Thermal chamber temperature

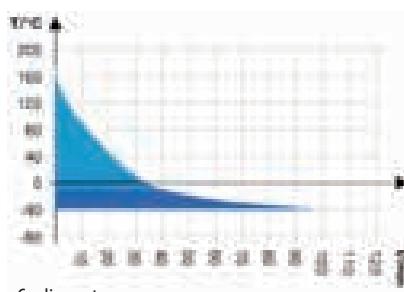
From -40°C to 180°C with +/-1°C accuracy

Instrument Dimensions (W x D x H)

1200 x 880 x 1880 mm



Heating rates



Cooling rates

MonTech Software systems

The IT-backbone of your lab operations!

With its extensive built-in features for instrument, test specification and sample management, MonTech software solutions will generate, store and report on valid and traceable data to support your quality and laboratory processes.

Now you have the ability to redefine your laboratory processes for improved efficiencies, cost savings and compliance with a configurable and expandable system that will grow with your business and support your data management needs in the future. Take advantage of the pre-configured solution that helps your laboratory improve efficiency, maintains records and traceability, and meets your compliance requirements for ISO 17025.



MonQuality - A fully integrated Laboratory Information Management System



MonRecipe - Bringing consistency and traceability to your Compound and Recipe development processes



MonControl - the most easy-to-use and versatile instrument control software



MonStat - the innovative Statistical Process Control (SPC) and reporting solution



Customisation and integration services

Why pick MonTech integrated software solutions to run your lab?

Most Modern Lab Software Solution

Reduce maintenance costs and increase scalability by using the latest, industry standard technologies.

Right Information Management and lab order execution system for You

Pick from our prepackaged or pre-validated editions to accelerate implementation and go live faster.

Range of Services

Our implementation, validation and managed services make adoption and maintenance easier.

Innovating Faster

We are innovating faster, adding features that will maximize the value of your lab software system over time.



Key features of MonTech integrated Laboratory software solutions:

- Role-and group based, multi-layer user concept
- Full sample processing beginning with the master data level up to order and sample data
- Freely defineable workflows including sample preparation and ageing
- Reliable sample traceability with barcode and RFID support
- Multi-site data management for entire QC and R&D data
- Automated order processing with Pass / Fail testing and instant production feedback
- Integrated flexible reporting and document management system

MonTech Software Systems

MonQuality Laboratory Information Management System LIMS



MonQuality - A fully integrated Laboratory Information Management System

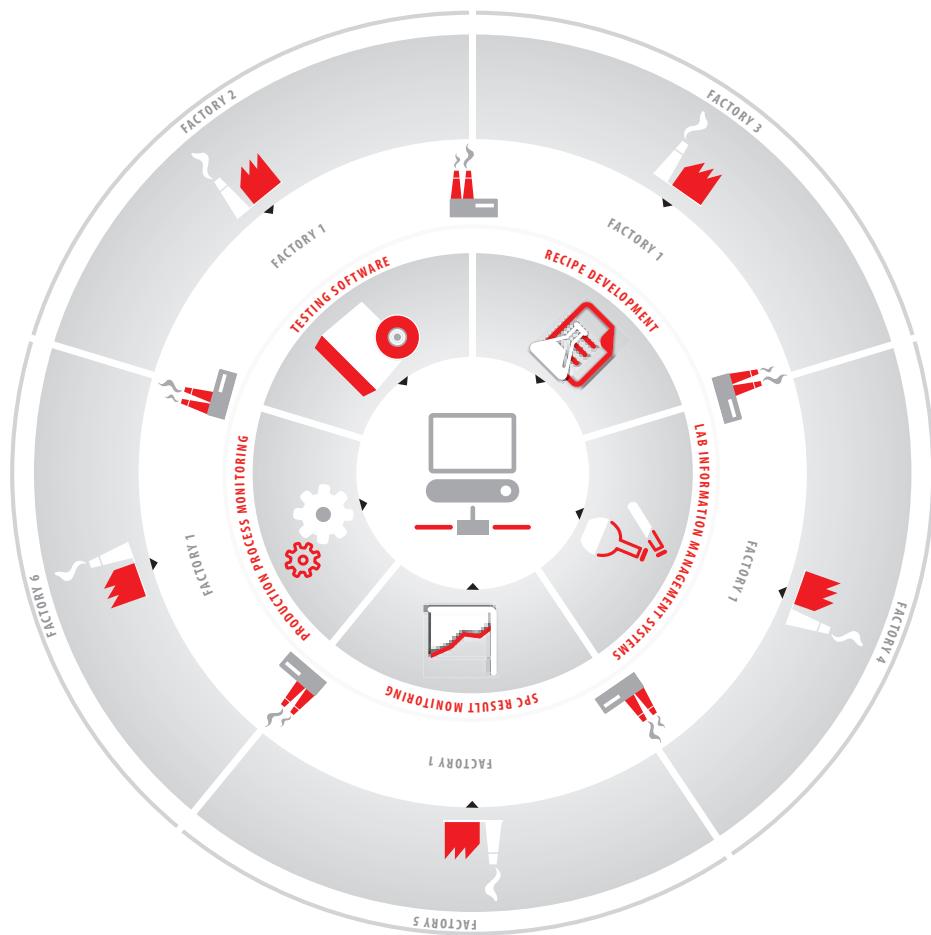
Information is the biggest asset in every lab. Our MonQuality Laboratory Information Management System (LIMS) helps you to guarantee its integrity and enhance its value. MonQuality has been designed to help you to meet all your information management objectives, manage all your complex lab processes and provide exactly the information needed, at the right time and in the right format. MonQuality flexibility is manifested in multiple levels of the system, from automated workflow and records management to closed-loop traceability. Developed specially for the rubber and polymer industry, providing unique features such as full multi-site collaboration capabilities, remote data access and customized reporting, MonQuality LIMS truly is the ideal software platform for your laboratory.

Seite 1 / 1 26.03.2015										MonTech	
Material: MonTech Demo1											
	S Min	S Max	TC 0	TC 10	TC 90	Time to Peak Rate (S)	Time@E S	@Peak Rate	Final Temperature	Peak Rate (S/min)	
Obere Toleranzgrenze	1.50	21.00	n/a	78.00	162.00	97.20	0.00	9.03	0.00	22.79	
Obere Kontrollgrenze	1.32	19.16	n/a	72.00	156.00	94.20	0.00	8.77	0.00	21.96	
Obere Warngrenze	1.16	18.64	n/a	66.00	150.00	91.20	0.00	8.52	0.00	21.13	
Sollwert	1.00	18.00	n/a	60.00	138.00	88.20	0.00	8.26	0.00	20.29	
Untere Warngrenze	0.85	17.61	n/a	54.00	126.00	85.20	0.00	8.00	0.00	19.46	
Untere Kontrollgrenze	0.69	17.10	n/a	48.00	120.00	82.20	0.00	7.74	0.00	18.63	
Untere Toleranzgrenze	0.50	15.00	n/a	42.00	114.00	79.20	0.00	7.48	0.00	17.80	
	dNm	dNm		Sec	Sec	Sec	Sec	dNm	°C	dNmMin	
Anzahl	6	6	1	6	6	6	6	6	6	6	
Minimum	0.76	16.31	5.8	21.70	99.82	27.00	234.00	7.13	160.10	18.01	
Maximum	1.96	28.75	5.8	69.20	146.38	90.20	480.00	8.30	189.98	37.39	
Mittelwert	1.21	20.95	5.8	50.59	129.91	67.83	349.00	7.60	182.51	24.76	
Standardabweichung	0.54	5.61	0.0	20.56	21.34	28.91	95.52	0.41	10.27	8.94	
Varianz	0.29	31.48	0.0	422.55	455.48	835.97	9125.00	0.17	105.39	79.88	
Varianzoeffizient	0.44	0.27	0.0	0.41	0.16	0.43	0.27	0.05	0.06	0.36	
Material											
IWS 302											
RR 100138											
RR 100138											
IWS 302											
RR 100138											
RR 100138 neu											

MonQuality easily allows you to manage and trace all your compounds with fully digital workflows including test and control plans and work order instructions and specifications providing you with any required information of any laboratory related process such as sampling, routine quality control testing, customer specific or custom testing and research and development work orders at any time. MonQuality features full integration of any MonTech testing instrument as well as also the possibility to connect, send and retrieve data from any kind or type of third party instrument.

MonTech's Strategic Software Consulting team is an essential resource for complex laboratory IT projects that cut across areas of technology, business and scientific processes. Let us help you to resolve the complex planning and execution tasks associated with your LIMS project.

With our certified project management and transition services, a smooth software implementation and your project's success is guaranteed!



Multi-site networking

MonTech's Software system can be expanded to wherever your factory and laboratory might be located. Featuring multi-site data collection and replication for full production continuity, providing global and local business rule management and compliance. This enhanced fully digital process chain - for the first time - allows global, collaborative Research and Development as well as Quality Control in the rubber industry. Intranet or internet-based global laboratory solutions can be implemented, meeting any standard on data security and traceability.

MonTech multi-site software solutions even permit further vertical business integration by making data accessible in web-based portals for suppliers and customers, providing the highest possible consistency and transparency in all laboratory related business processes.

MonTech Software Systems

MonRecipe Compound and Material management

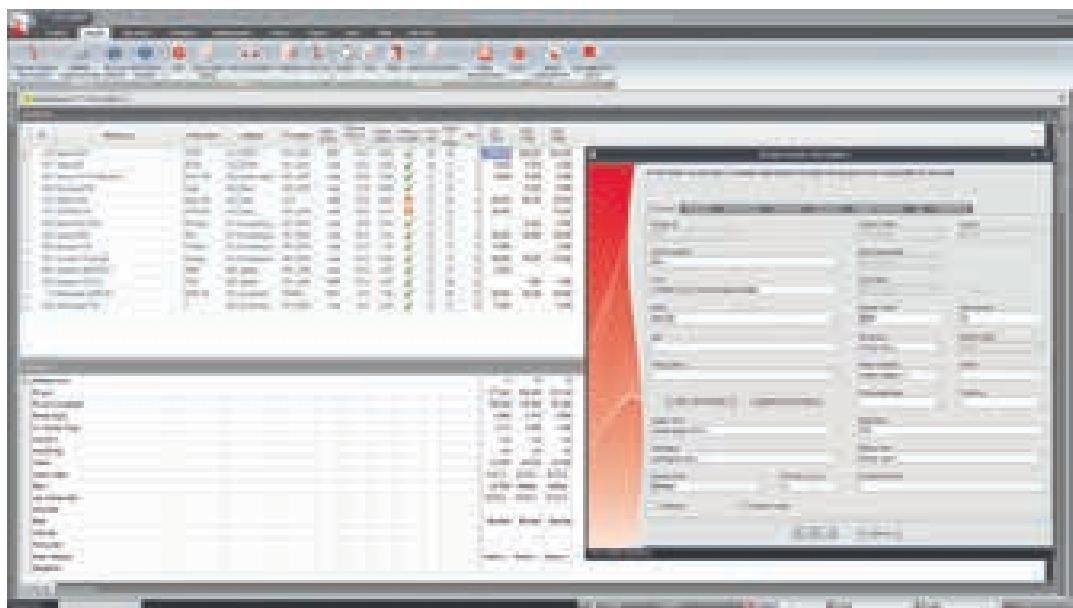


MonRecipe - Bringing consistency and traceability to your Compound and Recipe development processes

MonRecipe was specifically designed for formulation and compound development needs in the rubber industry. This unique software system helps you to create, cost, maintain and modify complex formulations quickly and easily with unprecedented version control, allowing you to streamline your formulation process along with speeding up and reducing costs of bringing new products to the market.

MonRecipe is the dynamic workbench for your recipe ideas, allowing you to experiment and manage multiple scenarios for even the most complex recipes with the ability to simultaneously optimize raw material and process costs for true value engineering.

Excellence in rubber compound formulation development: MonRecipe is the ideal solution to streamline the recipe and formulation development process, adding integrated capabilities for single-stage, multi-stage and trial mixing, masterbatch management, production upscaling, management of recipe specifications and acquired laboratory data and test results. Set and enforce corporate compounding compliance with the integrated advanced multi-site collaboration capabilities, allowing you to create global recipe and compounding standards with the ability of answering local needs of recipe customizing based on raw material and mixing equipment availability.

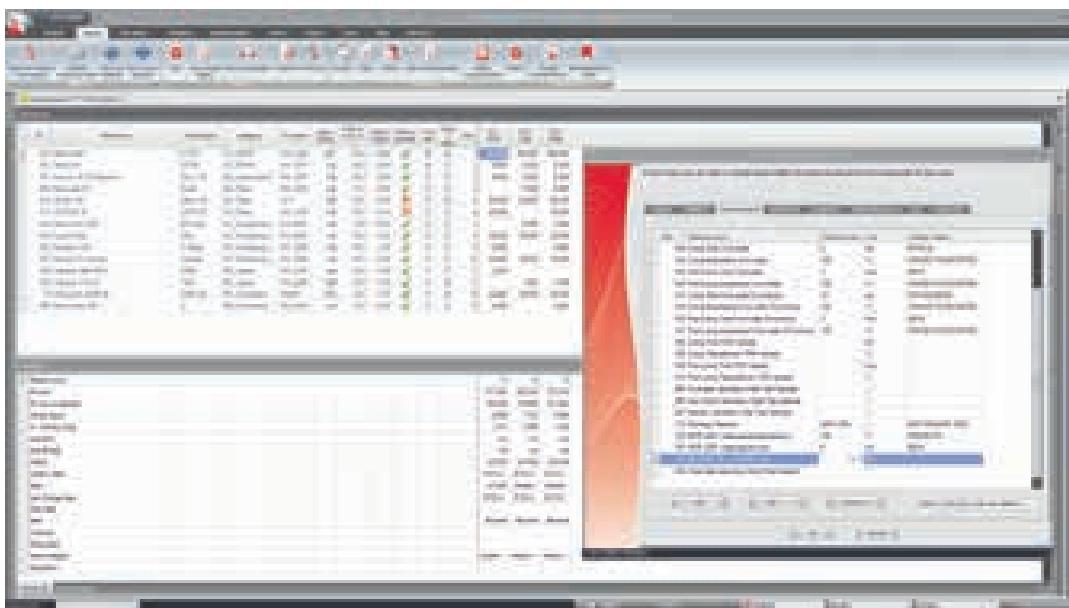


A vital part of the MonRecipe compound development system is MonMaterial for driving your ingredient, supply and raw material specification lifecycles. MonMaterial will transform your specifications collection, approvals and management - speeding it up, reducing your effort and tightening your control.

The system allows you to gather and collect any specification data that you might require when creating any possible formulation.

All raw materials can be hierarchically grouped together making them easy to retrieve while creating or editing formulations. MonMaterial is able to handle any kind of specification data from specification sheets, suppliers and supply forms, storage conditions, chemical characterizations, availability at different production sites, ROHS status, test certificates, images, web-links, barcodes, documents or any other type of attachment. Even alternative materials can be specified, providing flexible compounding alternatives in case of raw material shortages.

Software Integration included: MonRecipe and MonStat feature full application capabilities to integrate in your factory and laboratory environment, retrieving and providing data automatically to ERP, MES and Mixer control systems, creating a lean and fully digital compound development process.



MonTech Software Systems

MonControl Analyses Software for testing instruments



MonControl - the most easy-to-use and versatile instrument control software

MonControl represents a totally new generation of universal testing software, developed on the latest Microsoft Windows platform using state-of-the-art software technology and algorithms.

MonControl operation is designed to be purely intuitive for a variety of instruments, providing your laboratory staff the same unique and user-friendly interface on every workstation and instrument in your laboratory.

This includes for example:

- | | | |
|----------------------------|--------------------------|----------------------|
| → Rheometers (MDR/ODR/RPA) | → Processability testers | → Mooney Viscometers |
| → Rebound testers | → Tensile testers | → Hardness testers |
| → Abrasion testers | → Balances / Scales | → Density testers |



Experience flexibility in your testing

From a single workstation to work order based testing as a Laboratory Information Management System (LIMS), MonControl can be configured to reflect your laboratory setup and daily workflow needs. MonControl provides the most versatile platform for managing your laboratory and testing data, from a single machine with remote MonView data viewers for office clients, to multi-machine integrated laboratory systems.

Flexible programming, simple instrument control and fully automated data acquisition & processing make MonControl a stable software solution to count on every day. Whether static or dynamic testing, MonControl already comes with preloaded test routines for most standard industrial applications and test sequences according to international standards (ISO / ASTM / DIN), allowing even new or untrained users to start testing within minutes.



Automate processes and increase the efficiency of your operators

Customizable user input fields for sample identification along with integrated automation features such as instant Pass / Fail feedback with various trend displays and levels, tolerances, limit curves, gate calculations, batch series and label printing provide users with information exactly when they require it.

Improve the accuracy of your results

Automated input checks for plausibility of test configurations, multiple levels of security with usernames and passwords, individually defined permissions and an electronic help assistant with step-by-step procedures bring additional value to your lab operation and help you to avoid mistakes.

Create a professional appearance

MonControl is able to create customized reports by user selection or automatically. This covers multiple graphs, report tables, test parameters, logos, remarks, test dates and more. Reports can be printed, saved as PDF, exported or e-mailed.

MonControl speaks your language:

Integrated terminology swapping allows you to adapt MonControl to your industry by matching terms, abbreviations and symbols, parameters and units to your individual requirement, even per test configuration.

Single-click language changeover opens new possibilities for collaborative laboratory testing, especially in multi-national companies and laboratory environments.



MonControl does more than other software:

Possibilities include simple export functions, direct data transfer to Excel or integration of third party data interfaces and structures. Featuring Open Database Connectivity (ODBC), MonControl can work with any type of database system.



MonTech Software Systems

MonStat Statistical Process Control (SPC) Software

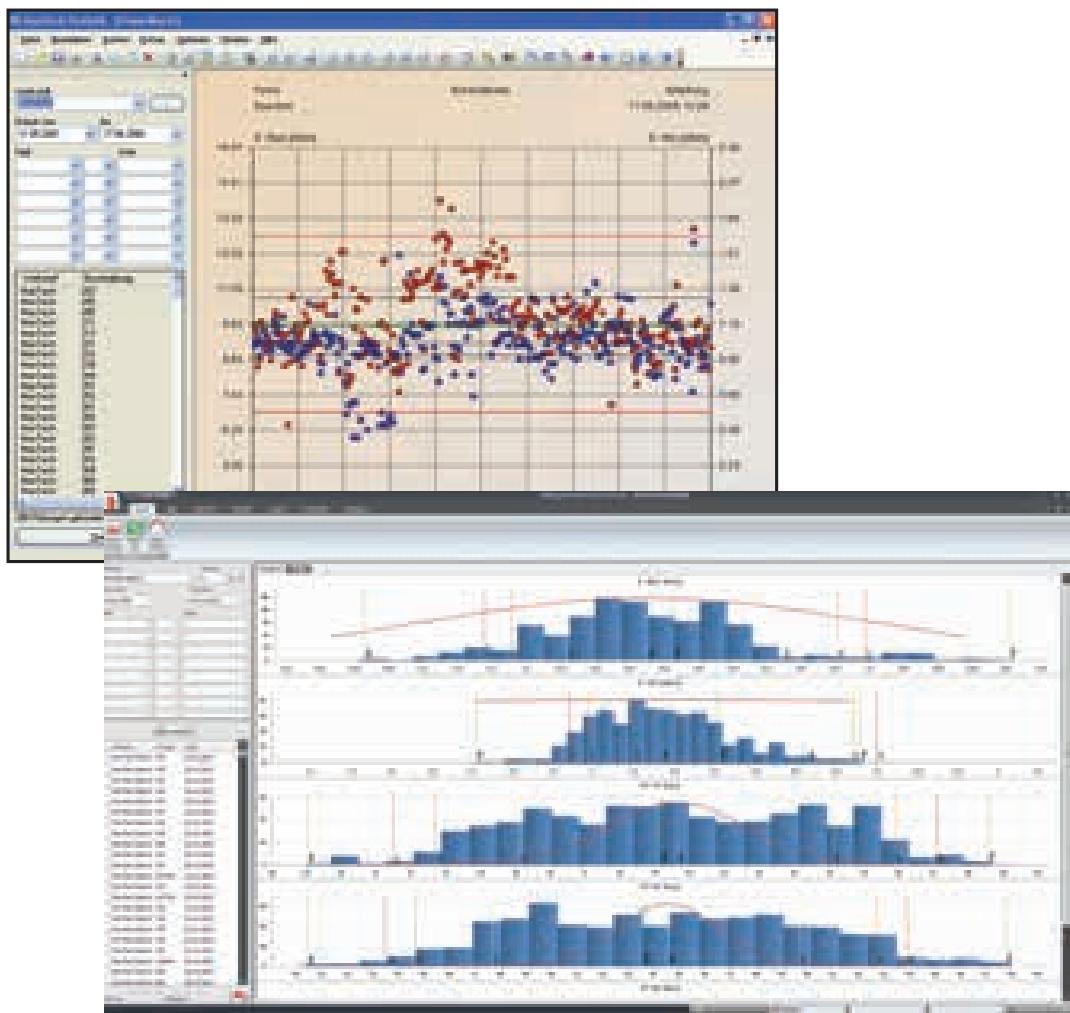


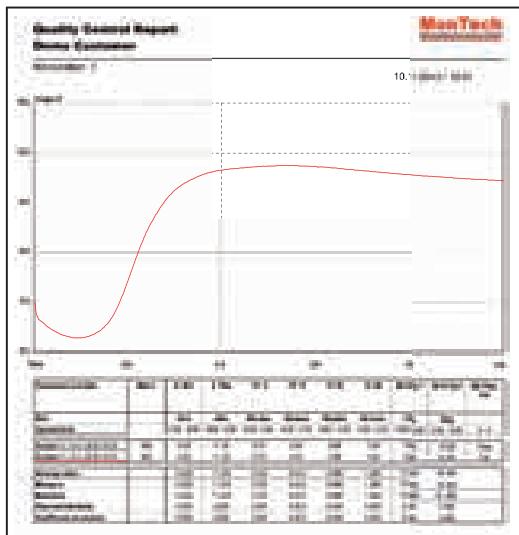
MonStat - the innovative Statistical Process Control (SPC) and reporting solution

Statistical Process Control Software helps to quickly reduce variations and costs as well as improve productivity.

MonStat is a dynamic and adaptable software for SPC featuring both realtime and historical data analysis to help you to improve product quality and understand and optimize manufacturing processes.

MonStat offers powerful analytical techniques by joining data retrieved from LIMS database systems with data collected from production machinery on the shop floor, transforming it into actionable quality information.





MonStat provides powerful data analysis capabilities, allowing everyone to quickly understand and interpret quality relevant data.

Available charts include:

- Attributes control charts
- Variables control charts
- Histograms
- Spreadsheets and data tables
- Pareto bar charts
- Multi-line, type or source charts

A key requirement of continuous improvement, Six Sigma and Lean Six Sigma programs is the ability to access timely quality-related data. MonTech's data collection features enable you to make data-driven decisions, create quality awareness by visualization of all relevant data, increase responsiveness and optimize processes for substantial cost savings and improved customer satisfaction.

Besides featuring a huge variety of standard reports, every MonTech Software system features fully customisable reporting. Of course even third party reporting modules such as CrystalReports, JasperReports, FlexiReports can be integrated.



Online Production process monitoring

MonTech Software is able to collect and process data of laboratory instrumentation and machinery; and can be directly integrated into manufacturing processes for automated data acquisition on critical production machinery such as mixers, mills, batch-off units, calenders and extruders. All data is acquired and displayed in realtime and stored in a common database.

This permits online performance, consistency and reliability analysis of the related manufacturing processes. Automatic detection of process violations during mixing or other production processes, and ordering corresponding laboratory testing, ensures the highest possible quality standards while minimizing testing efforts and saving critical resources and cost.

MonTech Worldwide Support, Maintenance and Calibration

Global customer support

Customer orientation is our top priority. That is why we are active on your behalf worldwide with one aim: to provide first-class service and support throughout the entire life-cycle of your instrument.

MonTech's customer support services include consulting, demonstration, pre-testing, successful and trouble-free commissioning, preliminary acceptance and installation, initial calibration, instruction on hardware and software, safety briefings, application seminars, workshops and of course, a continuous on-site hotline and remote support. We also supply testing film, consumables, spare parts and instrument upgrades or repairs.

Whenever our customers need help of any kind, we are at their service! Therefore, we are available 24 hours a day, 365 days a year worldwide.

Single source ISO 17025 calibration services

MonTech's on-site calibration service provides ISO 9001 certified and ISO 17025 accredited field calibrations to any brand, type or model of rubber testing machinery or lab equipment. These on-site service visits and calibrations are designed to be fast and reliable with minimum down time.

MonTech employs a global team of the most qualified field service engineers, strategically positioned for cost-effective service wherever calibration services or assistance may be needed.

Our KWP preventive calibration, maintenance and service program can be tailored to the customer's environments and specific demands for test data traceability with the highest instrument precision. On-site service intervals can be scheduled to minimize the risk of any unplanned downtime.



Service, maintenance, calibration

MonTech provides fully traceable calibration services using the latest equipment and methodology by highly skilled field service engineers keeping your instrument in a perfect shape. All work and calibration procedures are fully in compliance with ISO, ASTM, DIN and other applicable standards, proven by our ISO 9001 certification and ISO 17025 accreditation. This allows us to offer a huge scope of mechanical, dimensional, thermal and many other calibrations wherever your laboratories might be located.

Our services ensure that your testing instrumentation is reliably providing you with consistent and accurate data, instrument-to-instrument correlations and site-to-site crosschecks.

Preventive maintenance is essential to guaranteeing instrument performance in tough environments, producing accurate and reliable data and minimizing the risk of instrument breakdowns or unplanned downtime.



Quality Management

We are certified

Regular voluntary monitoring according to ISO 9001:2008



Remote and emergency support

Our remote and hotline provides help and support whenever it might be needed.

Whether you might have questions on specific instrument applications, test setups, test executions, results, calibrations, correlations or diagnostics and troubleshooting, our superb team of technical and application specialists is only a quick phone call away.

Dedicated MonTech remote assistance software allows us to connect directly with the instrument in your lab, helping you with full instrument diagnostics, data transfer and immediate software and firmware updates.

Our qualified team of software specialists is available for any kind of IT assistance that might be needed for your laboratory operations including software coaching, configuration, re-installation, upgrades, data export and database setup.

Training and application support

MonTech's unique range of training covers everything from basic rubber rheology and testing courses, software classes for data management and Laboratory Information Management System trainings, advanced polymer and rubber rheology seminars in different operator levels to high-end scientist courses.

MonTech helps you to ensure that you get the most benefits out of any investment in MonTech instruments or software, making these products a truly safe investment that you can rely on.

Training courses are offered at any MonTech facility or on-site in the customers laboratory with a tailored focus on their specific environment and challenges, including QA as well as R&D, consulting services for recipe development, raw materials, production and machinery including compounding and downstream processes. With these services we assist our customers to quickly increase efficiency and quality at reduced costs for an overall improved customer satisfaction and business performance requiring less internal resources.

Instrument upgrades and rebuilds

Use today's technology on any instrument for maintaining the highest reliability, reproducibility and repeatability at a fraction of the cost compared to a new system

Instrument modernization, upgrade and rebuild programs

MonTech has designed specific programs to answer every customer's instrument needs and budget and guarantee the highest instrument performance.

→ Repair, Rebuild and Upgrade:

Heavily used instruments that are worn or have suffered severe damages can easily be repaired on-site or in one of our local MonTech workshops.

At the same time, instruments can be upgraded to PLC-based controller technology with digital data acquisition and the latest software systems.

→ Convert:

Convert your instrument to adapt it to your specific testing needs while bringing your testing operation up-to-date again e.g. by converting your ODR to an MDR, providing significantly better accuracy and reproducibility, much easier instrument operation and even shorter test times.

→ Exchange:

Exchange your instrument for another already upgraded and rebuilt instrument available from stock at many MonTech locations.

→ Trade in:

Trade in your used instruments towards the purchase of a new instrument.



Rebuilt and upgraded Monsanto MDR 2000



Rebuilt Monsanto R100 S



Completely remodelled Monsanto R100

Instrument rebuilds and upgrades

A full instrument rebuild typically covers the following work items, making the instrument as reliable as a new one:

- New instrument covers and panels to make the instrument fanless and rugged enough for harsh environments by sealing off the electronic system.
- Overhaul of the mechanical system including main stack, dies, frame, drive system, pneumatics
- Replacement of all sensor switches as well as the entire wiring harness of the instrument
- Single-button control or optional 5.7" color touchpanel control with LED status lights
- Removal of all custom boards and upgrade electronics to a new PLC-based system featuring Ethernet, USB and RS232 connectivity
- An optional upgrade of the drive system to either a fixed speed brushless DC or direct servo drive

→ Of course all instrument options that are available for new instruments are also available for instrument upgrades as well as many further upgrade kits such as:

- Touchpanel control displays
- Various transducer options
- LED cabinet lights
- Retrofit automation systems
- Cooling and data output options
- Software upgrade to the latest version of the universal MonControl Software
- Optional shotblasting and repainting of the instrument frame
- Fully traceable instrument calibration, commissioning, installation and training along with a 1 year warranty on parts and workmanship.



Why upgrade?

Upgrading your materials testing equipment and software not only extends the system's life, but brings you our latest technology and operational features. Also, some components in your material testing system can become obsolete while other components still have years of useful life.

An upgrade of your system utilizes up-to-date technologies enabling you to increase productivity, reduce overhead, maximize machine uptime and improve the accuracy and reliability of results. Most upgrades and improvements will unlock new functionality and features not previously available to you, while still retaining your core system and minimizing costs.

Upgrading your instruments allows you to retain your machine frame while replacing or overhauling older components and software.

This results in a revitalized testing system at a fraction of the cost of new testing equipment.

The upgrade of your machinery is carried out by MonTech's qualified engineers together with the appropriate services including calibration, preventative maintenance, software updates, system set-up, and training to ensure a successful startup of your revitalized material testing system.

Maximize the Potential of Your Testing Equipment:

Upgrading is one element of your MonTech solution ownership experience. We can help you extend the life of your materials testing system by working with you to plan ahead with an equipment protection and upgrade program – helping you to avoid unexpected surprises and keep you operating at peak performance for the life of your materials testing system.



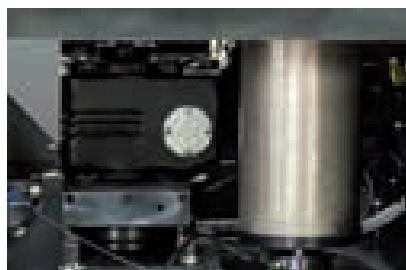
Fully rebuilt TechPro ViscTech



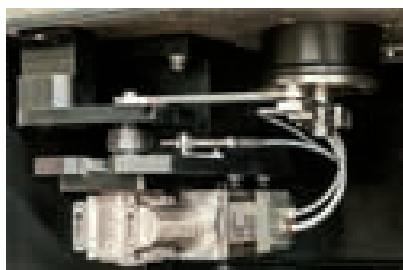
Converted Techpro MDPt to MD+



Upgraded MV 2000 with Touchpanel control



Automatic, software guided calibration sequence



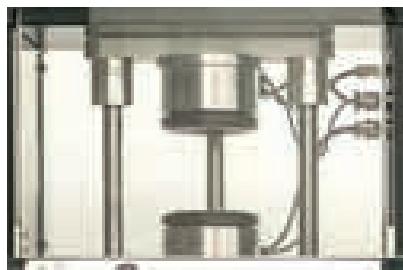
Rheometer brushless DC drive upgrade



Advanced, PLC based control and DAQ electronics



Die upgrades including precision heaters and probes



Integrated safety controls and diagnostic circuits



Mooney Viscometer variable rotor speed upgrade

Quality precision testing film

for simplifying instrument operation and increasing efficiency

MonTech advanced testing films

have been precisely developed and are typically used for Rheometers, Mooney Viscometer testing applications as well as cure wrapping and various laboratory compression moulding applications.

While using testing film is not required for most test applications, it is highly recommended in order to protect dies, seals, seal plates and moulds from test material contamination and wear, minimizing the need for cleaning, increasing the lifetime of major components such as seals and extending calibration as well as maintenance cycles.

Being one of the first companies that introduced precision testing films to the market, MonTech provides testing films that are fully lot traceable, providing our customers the guarantee that every production lot has been thoroughly inspected and tested according to strict product-specific tests and having passed an extensive test cycle including a round robin test covering different testing instruments and fields of application in the polymer and rubber industry.

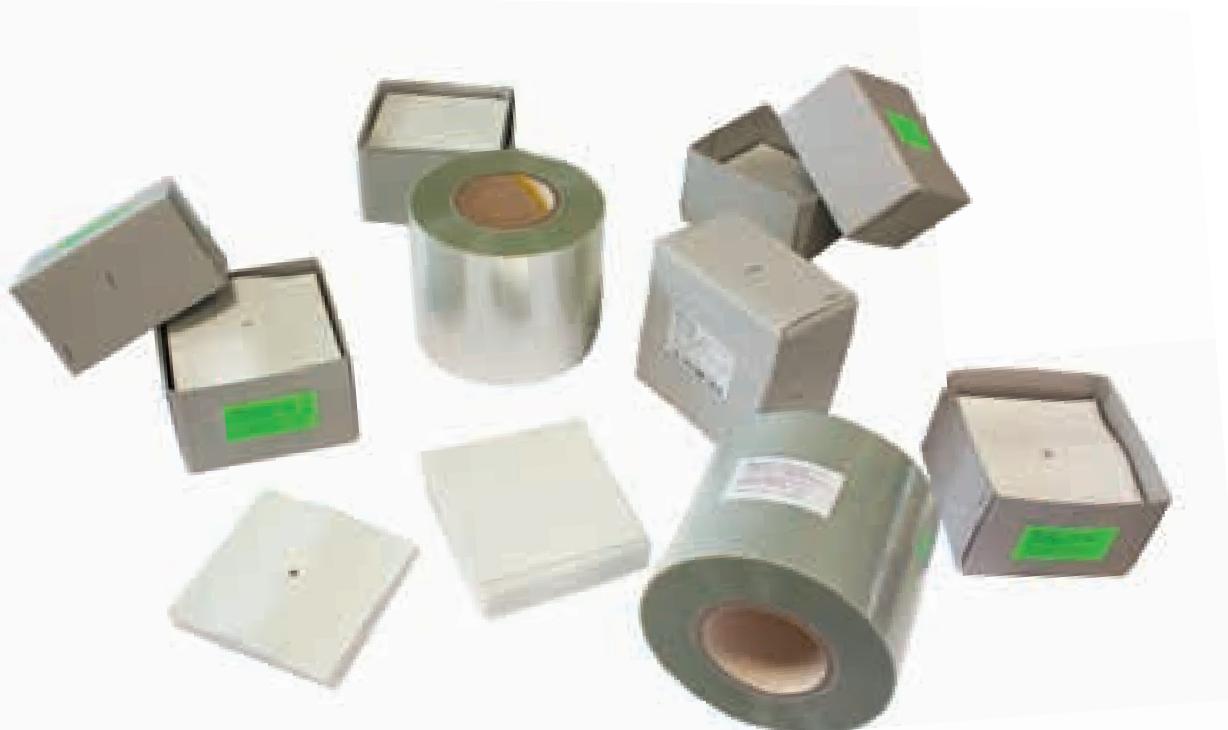
The scope of testing films includes various types, grades and thicknesses made from Polyester, Polyethylene and Nylon. Of course any type or grade of film can be tailored to specific shapes, dimensions or forms of supply, specifically for your demand and application.

MonTech therefore keeps an extensive stock of almost any type and grade of film ensuring shortest delivery times on even customer specific forms or sizes.

Films available from stock include:

- Pre-cut sheets of Polyester films for Rheometer and Mooney testing: Supplied with or without separation paper in several formats readily available. Optionally also available with center-borehole for Mooney and Rotor Rheometer lower die usage.
- Pre-cut sheets of Nylon films for Rheometers specially designed for demanding dynamic testing applications such as high strain testing, silica filled compounds, highly oil-loaded mixes, aggressive and abrasive materials.
Films are supplied with or without separation paper in several formats.
- Rolls of Polyester and Nylon films for Rheometer applications are spooled on paper or plastic cores providing the highest reliability especially for automated instruments. Rolls are also available for multi-roll and multi-feed applications.

For more information please get in touch with us today to discuss your specific testing requirements and suitable types of testing films.



Consumables and spare parts

Maximize uptime and productivity of your laboratory equipment



Instruments and laboratory consumables

With over 500,000 different parts and assemblies in our worldwide warehouses, along with our global supply chain, we can guarantee rapid response and fastest delivery of high-quality genuine consumables and spare parts that you may need for maximum uptime of your laboratory machinery.

Spare part availability is guaranteed for at least 20 years for every MonTech Instrument. For more information, please request our spare parts and consumables brochure.



MDR / RPA dies



MV dies



MDR and MV Standard
and Longlife seals



Heaters



Precision probes



Rotors



Adjustment screws



Central shafts



Bearings



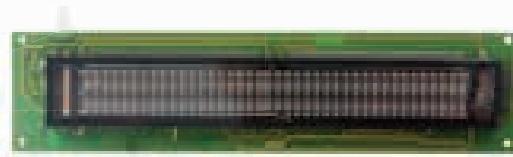
Air mufflers



Wire brushes



Knives and dies



Display boards



Control boards and PCBs

Tailor-made testing solutions

Cost-effective solutions customized to your application

Commercially available standard testing devices and machinery do not always fit the requirements of a specific laboratory process or testing setup. In that case, the solution comes from developing a new, tailor-made machine. This is another major business area for MonTech:

We provide customized solutions for our customers in all fields of application in rubber and polymer testing.

Depending on the material or product to be tested, more or less individual approaches are required. In order to best fulfill your individual testing demands, we apply our decades-lasting experience and know-how. Our superb engineering is a combination of machine development, electronics design, automation, software development and integration of the device in your laboratory and testing environment by linking it to your database and host systems. Of course, MonTech's tailor-made laboratory systems also include global delivery, installation, commissioning and customer services such as continuous support, after sales service, maintenance and calibration.

Our customers trust us because they know that we not only design and assemble instrumentation but also conduct all production steps in-house in our extensive workshop and assembly facilities, which are equipped with the latest production machinery utilizing latest and most innovative manufacturing processes. This includes machine design, development of control and operating software, machining in its highest precision, final assembly and functional testing. They know that our thorough German quality, together with a certified quality management system and accredited laboratory are convincing reasons to deploy MonTech materials testing machines worldwide.

MonTech truly offers custom testing machinery starting from the client's idea and requirements to the final, most advanced and reliable testing system solution.

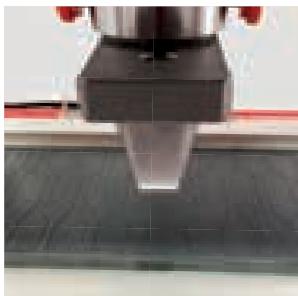


www.rubber-testing.com

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