Rotorless Rheometer

MODEL: UR-2010

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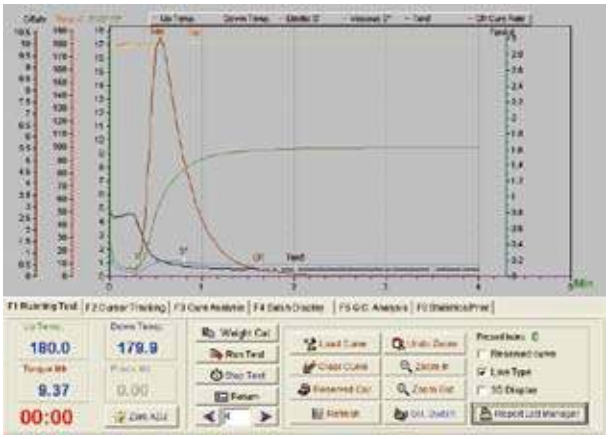
STANDARD FUNCTIONS

Graphical Curves	Cure Data
a. Elastic torque curve (s') b. Viscous torque curve (s") c. Elastic and viscous complex curve (s*) d. Tan. delta curve (Tanδ) e. Loss angle curve f. Cure rate curve g. Test temperature curve	a. Scorch time (Ts1, Ts2, Ts3...) b. Cure time (Tc50, TC60, Tc90...) c. Minimum torque (ML) d. Highest torque (MH) e. Cure rate f. Loss angle value g. Tan delta value (Tan δ) h. Any selected dynamic value on the curve from any scale.
	**MDR Curing Report**

TS1	TS2	TC10	TC50	TC90	ML	MH	TAN@ML	TAN@MH	CRI	CHK
0:24	0:26	0:25	0:35	0:56	1.31	15.10	0.520	0.042	200.00	O
0:23	0:26	0:24	0:35	0:56	1.32	15.11	0.510	0.040	200.00	O
0:23	0:26	0:25	0:35	0:57	1.32	15.19	0.516	0.037	193.36	O
0:23	0:25	0:24	0:34	0:56	1.31	15.16	0.529	0.042	193.55	O
0:23	0:25	0:24	0:35	0:55	1.32	15.08	0.522	0.042	200.00	O

DIE CHAMBER TYPES

Die Chamber with Seal (UR-2010SD)

Die Chamber without Seal (UR-2010)

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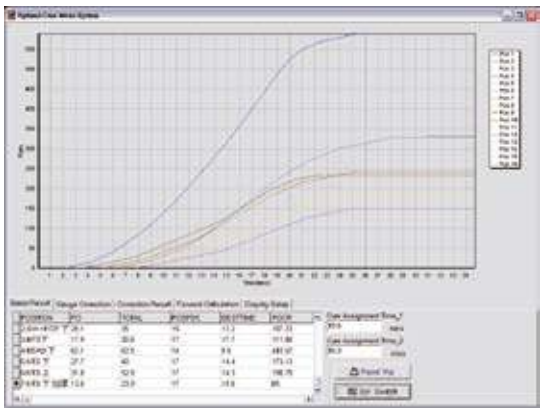
OPTIONAL FUNCTIONS

1 Optimum Cure Analysis System (OCAS):

a. Including this system's tools, particular software, temperature measurement, temperature calibration of tools, ...etc.
b. Combine the curing data from rheometer to the processing time from workshop.
c. Provide direct values in percentage (%) to understand the curing process from different positions on the same specimen.
d. Calculate the best curing time at workshop to avoid the under-curing or over-curing at particular position .



Minutes	Pos-1 Temp.	Pos-1 Cure Rate	Pos-2 Temp.	Pos-2 Cure Rate
9.0	153.87	28.75	153.72	44.00
9.1	154.16	30.00	153.87	45.33
9.2	154.36	31.25	154.01	46.67
9.3	154.63	32.50	154.16	48.00
9.4	154.8	33.75	154.29	49.33
9.5	155.22	35.00	154.53	50.67
9.6	155.57	36.25	154.68	52.00
9.7	155.71	37.50	154.8	53.33
9.8	155.97	38.75	154.95	54.67
9.9	156.21	40.00	155.07	56.00
10.0	156.45	41.25	155.32	57.33
10.1	156.75	42.50	155.52	58.67
10.2	157	43.75	155.62	60.00
10.3	157.09	45.00	155.76	61.33

2 SPC software (Statistical Process Control software) is able to analyze and store the following test data:

a. Data storage: ML, MH, scorch time, cure time, elastic and viscous values, cure rate, and test date.
b. Provide statistical analysis of curing by X-Rm, $\overline{X}$-R, Normal Distribution, and Histogram Chart.
c. Evaluation of cure testing properties and making classification in A, B or defect categories.

3 VCH software is able to analyze functions of rubber compounding homogeneity:

a. Showing the compound viscous and elastic variation in the curing process by dynamic diagram.
b. Showing whether moving die frequency and torque transmitting normal.
c. Support detecting mechanical noise.

VCH Software

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4 UCAD software is able to choose the excellent formula-matching and experimental recommendations:

a. When the formula is renewed by single or multiple chemicals, this software will analyze the interaction between the new chemicals and the requested product properties.
Furthermore, it will provide new formulas by reorganizing chemical quantity matching and give experimental recommendations.

b. The math model of this software can arrange testing points in the experimental disposition space into rationalizations, minimizing the testing frequencies, but still can sufficiently obtain an effective data.

c. Varieties of functions in this software can obtain the best combinations among the demand of product property, cost, and the feasibility of producing technology.

Rubber Property Contour lines providing formula recommendations

FEATURES

a. New type rheometer offers good repeatability and reproducibility based on the anti-noise circuit and the exclusive DSP analysis program improves significantly the machine design and quality.

b. Able to calibrate torque and loss angle automatically. (Please refer to the Sine Wave Chart on P7)

c. Noise from the equipment and torque transmission can be checked automatically by our VCH software.

d. It would not exceeding 2 min and 40 seconds when heating up from room temperature to the equilibrium of 170°C±0.3°C

e. Time needed for changing temperature :
From 170°C to 190°C and reach the state of equilibrium 190°C±0.3°C .....within 55 seconds.
From 190°C to 170°C and reach the state of equilibrium 170°C±0.3°C .....within 1 min and 40 seconds.

f. During testing, die chamber temperature will be redeemed to the tolerance of ±0.3°C within 30±3 seconds from die closure.

g. The software can check whether motor speed (or die oscillation frequency) conforming to the 100rpm (or 100cpm) regulated in standards. (ASTM/ISO)

h. With the built-in software able to provide suitable volume of specimen to fit the die cavity.

i. Key components are from US, Germany, and Japan.

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SPECIFICATIONS

a. The standard model UR-2010 or UR-2010SD consists of one main testing unit and one subunit of control and data analysis equipped with one IBM compatible PC, colour monitor, hardisk, DVD drive and one printer.

b. Manufacturing Standards: in compliance with ASTM D5289, ISO 6502

c. Temperature Range: from room temp. to 200°C, extensible in according to customer order.

d. Temperature Accuracy: within ±0.3°C, providing with smaller resolution.

e. Temperature Display Resolution: 0.1°C, providing with smaller resolution.

f. Oscillating Frequency: 1.66Hz (or 100cpm)

g. Torque Range: preset at 25, 50, 100, 200 lbf-in; or discretionary at user pleasure.

h. Torque Unit: lbf-in., kg-cm., or dN-m.

i. Torque Accuracy: ±0.2% of full scale

j. Oscillating Angle: ±0.5°, ±1°, ±3°

k. Electricity Supply: AC 220V±10%, 50/60Hz±3Hz, 7A, Single Phase. Others are selectable by order.

l. Pneumatic Pressure: 65Psi or 4.5kg/cm^2 or 0.45Mpa
(Air-compressor is to be user's own equipment.)

m. Size of Specimen: about 5cm^3.

n.

	Rheometer(mm)	Packing(mm)
Main unit:	1240(H) x 590(W) x 700(L)	1510(H) x 880(W) x 880(L)
Sub unit:	1450(H) x 640(W) x 900(L)	800(H) x 700(W) x 820(L)

o.

	Net weight	Gross weight
Main unit:	250 kgs	300 kgs
Sub unit:	40	90

p. Accessories: copper brush × 1, calibration torque standard × 1, die cutter × 2, calibration certificate × 1, operation manual × 1, rubber seal × 5 sets (for UR-2010SD), fuse × 10, printer paper sheet × 500, Cellophane (70mm X 100M) × 1

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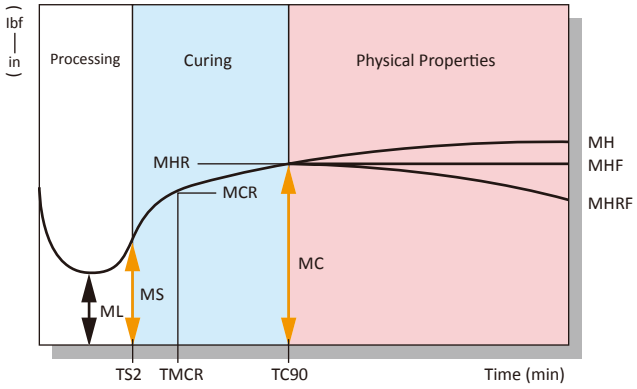
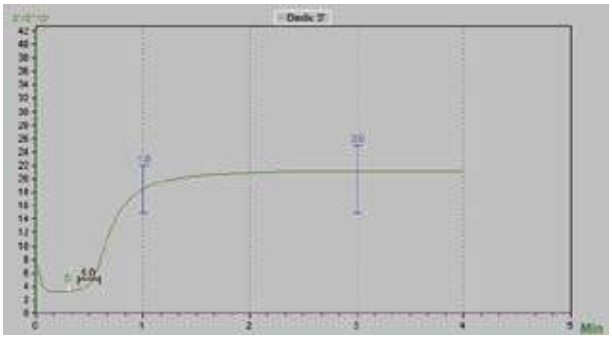
CURVES ILLUSTRATION

Definition of scorch data

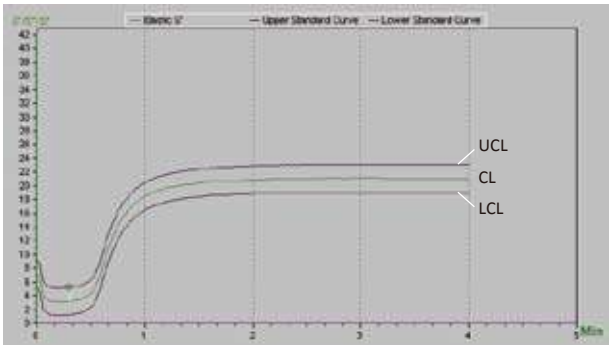


TS: Scorch time
TC: Cure time
ML: Minimun torque
MH: Highest torque attained (During a specified period of time when no plateau or maximum torque is obtained)
MS: Torque value at Ts
MC: Torque value at Tc
MCR: Maximum cure rate
TMCR: Corresponding time to MCR
MHR: Maximum torque of reverting curve
MHF: Maximum torque where curve plateaus
MHRF: Final reversion torque value
Ts2=Corresponding time to the ML+2 units of torque.
Tc90=(TMH-TML)X90%+TML

1. Chart of dual control by torque and cure time

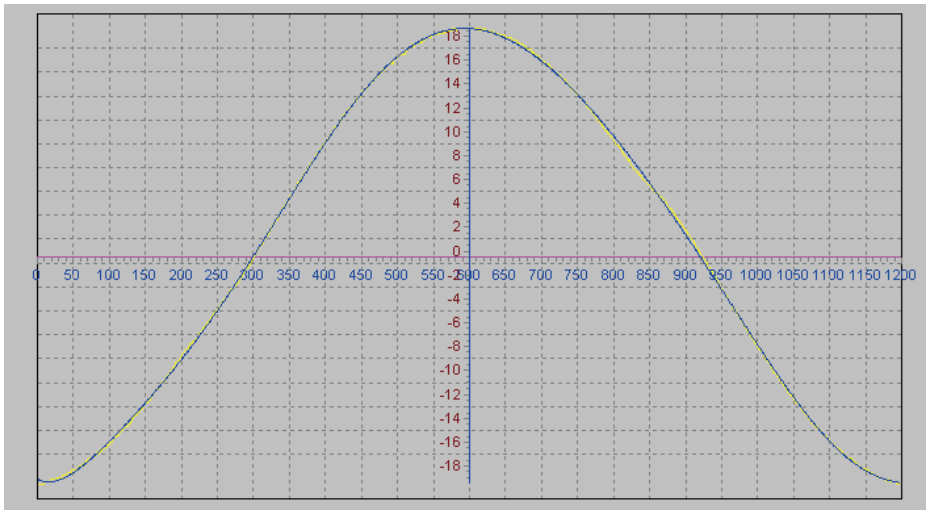


2. Chart of control by cure curve



Able to set standard upper / lower limit curves

Automatically calibrate loss angle



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