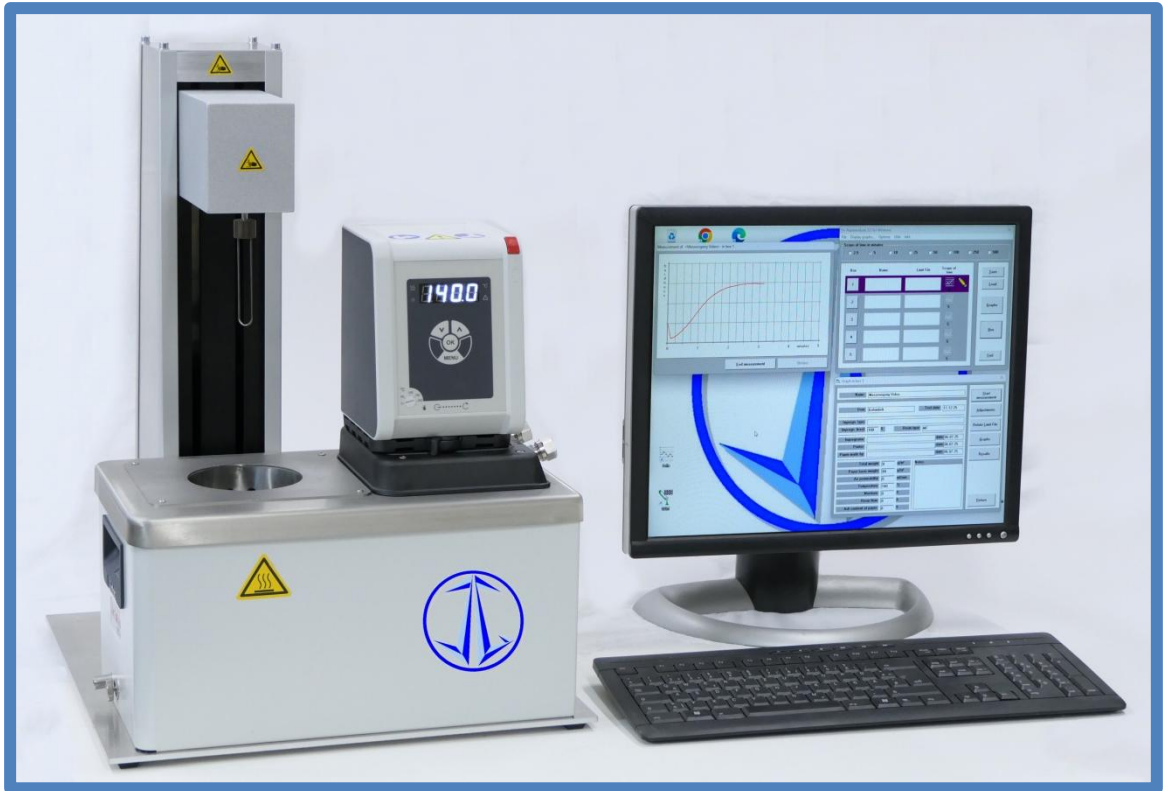


FILM TESTING DEVICE



Device and method for measuring the curing and the condensation properties of reaction resins (e.g. aminoplast, epoxy, polyester, polyurethane etc.) of impregnated papers, fleeces, tissues etc.

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Application

E.G. lamination of wood composites

Resin impregnated paper sheets are used in many applications to provide decorative and functional characteristics to a diverse array of products. Raw unimpregnated paper is dried prior to impregnation. The paper passes through a resin impregnation line where a specified quantity of „ A „ stage liquid resin saturates the paper. This „ wet „ paper passes through a dryer which both, dries the paper and takes the resin to the „ B „ stage. The „ B „ stage laminate can be stored prior to lamination onto a product.

During board, moulding, tape, roll, etc. production, the „ B „ stage laminate is taken to the final „ C „ stage. The impregnation resin is now in an irreversible thermoset condition.

The „ B „ stage impregnated papers are judged according to the following criteria:

- Basis weight of saturable material
- Resin impregnation level in %
- Volatile content in %
- Resin flow value in %

The „ C „ stage finished products are judged according to the following criteria:

- Chemical and stain resistance
- Hardness
- Flexibility
- Crack resistance
- Abrasion resistance
- Surface porosity
- Gloss level
- Transparency etc.

Currently, the resin condensation degree, curing speed as well as the curing properties between the B- and C-condition are unknown. Until now, no method has been available for measuring these properties which are dependant on many factors.

The main difficulties during multiple laminate processing appear when the different properties of the single layers are incompatible. This leads to porous surfaces, delamination and overcured or undercured resin systems.

Mr. Joerg Golombek, at the time a staff member of the research and development services of the WERZALIT company, has developed a method for picturing the above described properties in the measurable scope between B- and C-condition and via the automatic recording of the hardening properties as a graph in the coordination system hardness / time.

The practical experiences gained in more than 30 years of use have revealed a lot of reviously unknown information concerning the manufacture and control of impregnated papers. This information can be used for quality control and to modify process conditions to improve the performance of laminates.

The subsequent application of this method by the impregnator and processor produces a reduction in the manufacturing risks and costs by reducing the reject rates and assuring that the quality requirements are met.

Further Applications of the Paper Testing Device for 'Reactivity Measurements'

Reactivity and hardening properties of glue mixtures, e.g. for the manufacture of particle boards and plywood

- With the paper testing device it is possible to analyse changes in the glue mixture before utilization and especially during the curing under pressing conditions.
- What happens in the cover layers at pressing temperature?
- How quick is the reaction in the core (centre layer), where only temperatures of approx. 105 °C - 120 °C (at plywood < 100 °C) can be reached?
- Which hardener has the longest potlife at the maximum reactivity under pressing conditions?
- Production control of the glue mixtures.
- Control of incoming glues and hardeners.

Casting-, laminating resins or prepregs and reaction gluing systems

- Potlife, storing stability and curing properties at temperatures up to 200 °C and for every known resin system.

2K-lacquers (solvents or aqueous solutions), stove enamels

- Simulation of the forced drying of reaction lacquers.
- Test of the lacquers and hardeners at the incoming material control.

Should you be interested in the above described applications of the paper testing device, please contact us and profit from our great experiences with this device.

From 1989 - 1993 the paper testing device was marketed by Werzalit company.

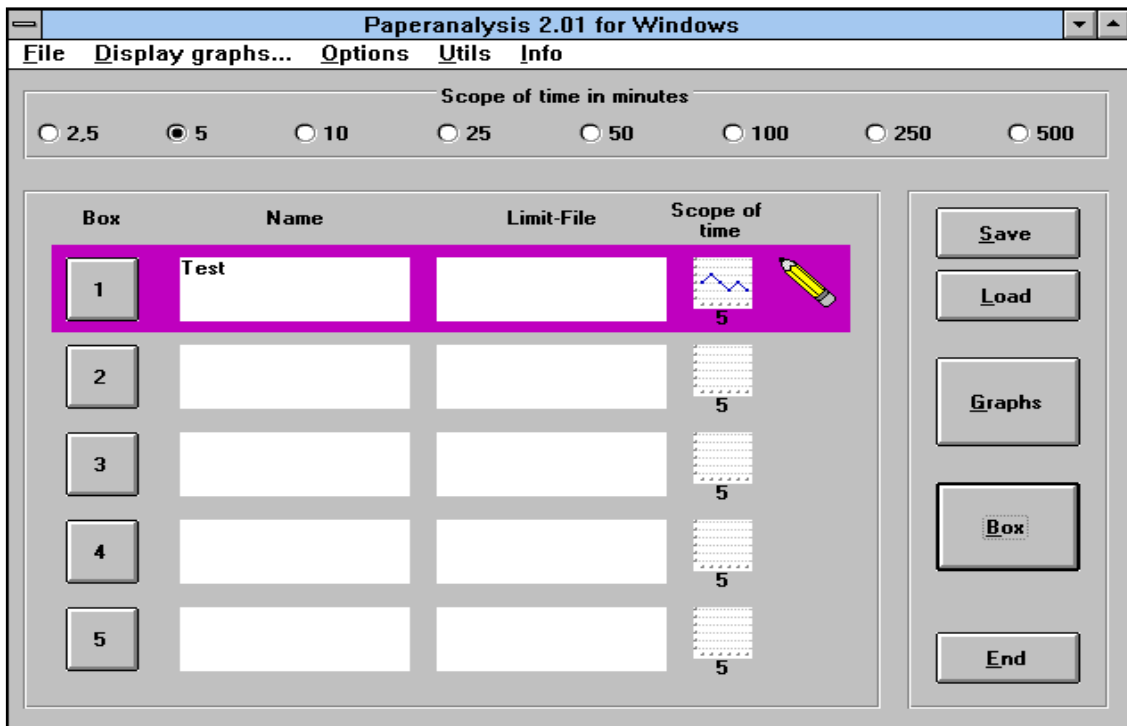
Since 1994 the paper testing device is exclusively marketed by us, the company of the inventor.

The comfortable Windows - Program

- **Clearly arranged, quick printing also on network-printers.**
- **Easy to operate under newest Windows operating system.**
- **The result of the measurement and all relevant data of the samples are stored in a database.**
- **Network capable**
- **Many time scopes.**
- **Limit value control.**

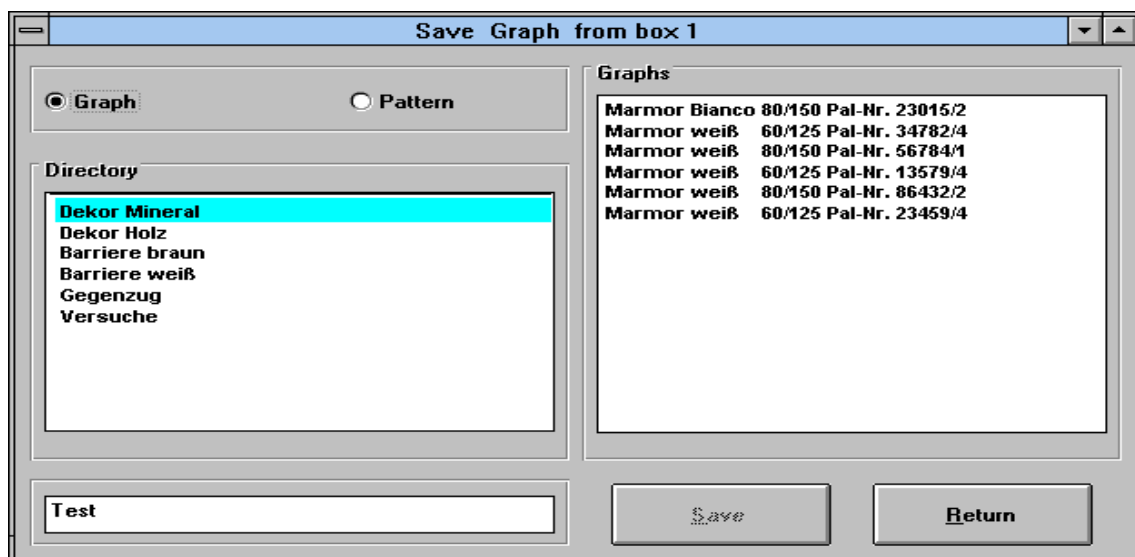
Illustration Models for Monitor Pictures:

Main Window



This main window contains all operation possibilities.
All setups or functions can simply be chosen using the mouse.

File administration



The storing and loading of graph files can be done in a very simple way.
On the one hand sub lists can be established, on the other hand the names to be stored can contain up to 80 symbols! At saving the content of the display „Name“ automatically is proposed as the name.

Model of a print output of three graphs (approx. 65% of original size)

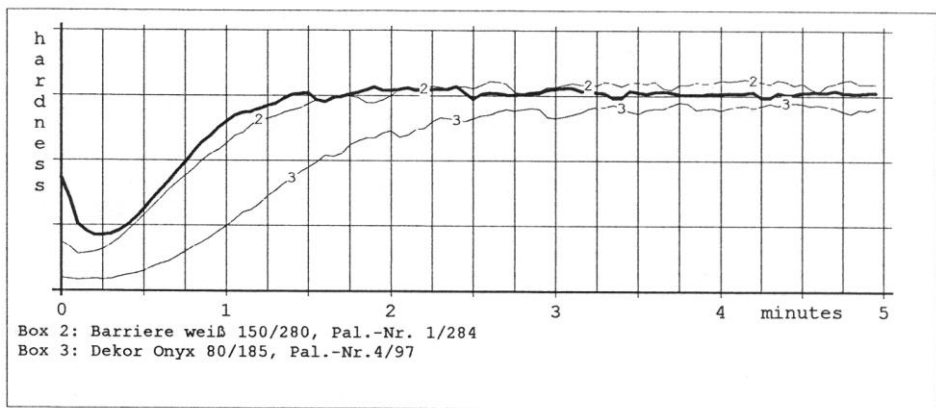
Paper analysis 2.0	Test report	
Box 1	User: Golombek	Date: 22.02.95

Paper

Name: Barriere braun 150/320, Pal.-Nr.1/205
 Impregnation type : Asymetrisch
 Impregnation level: 125 %
 Resin type : Reinmelamin
 Impregnator: Imprägnierer
 date: 17.02.95
 Printer:
 date:
 Paper made by:
 date:

Total weight : 340 g/m²
 Paper basis weight: 150 g/m²
 Air permeability : 184 ml/min
 Temperature : 140 °C
 Moisture : 7 %
 Resin flow : 0 %
 Ash content of paper: 0 %

Notes:
 Menge : 1065 Blatt
 Format : 432x68
 Schicht : 2
 gelf. : 21.02.95



Results

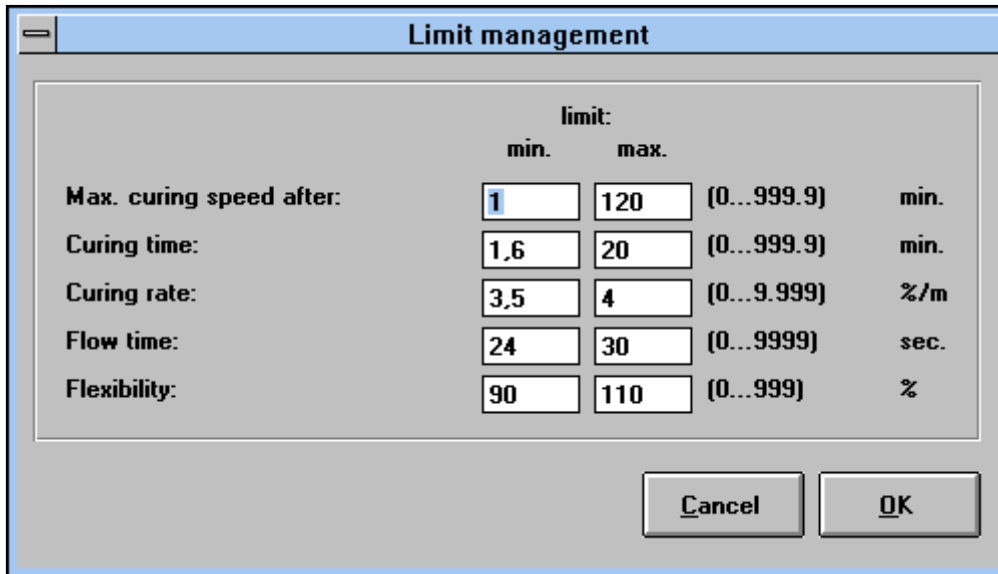
		limits		abberation
		minimum	maximum	
Max. curing speed after:	0,7 min.	0,6 min.	1,0 min.	0 min.
Curing time :	1,3 min.	1,1 min.	1,5 min.	0 min.
Curing rate :	5,067 %/min.	4,500 %/min.	5,500 %/min.	0 %/min.
Flow time :	21 sec.	18 sec.	25 sec.	0 sec.
Flexibility :	72 %	60 %	90 %	0 %

Limit-File: Barriere braun 150/320, Pal.-Nr.1/205

Adjustments

Scope of time : 5,0 min.	Oil viscosity : 350 m'Pa's
Specimen no. : 1	Amplification : 100
Voltage : 8 V	Starting time : 0,180 s
Measuring cycle : 3,0 s	Measuring time : 0,500 s
	Open circuit current: 2,1 mA

Limit Value Administration



The screenshot shows a dialog box titled "Limit management" with a table of adjustable parameters. Each parameter has a minimum and maximum value input field, a range specification in parentheses, and a unit. At the bottom right are "Cancel" and "OK" buttons.

	limit:			
	min.	max.		
Max. curing speed after:	1	120	(0...999.9)	min.
Curing time:	1.6	20	(0...999.9)	min.
Curing rate:	3.5	4	(0...9.999)	%/m
Flow time:	24	30	(0...9999)	sec.
Flexibility:	90	110	(0...999)	%

You can control the field of variation of the paper properties in a simple and sure way.

The program can be supplied in German or English version.

Measuring Principle

The measuring principle consists of putting a specimen (95 mm x 60 mm) for curing into tempered silicone fluid. In order to measure the curing degree the impregnated paper is automatically rotated clockwise in certain intervals. The torque needed for the rotation is directly dependant on the curing degree of the impregnated paper. This torque need i accumulated over time by the computer and the curing graph is plotted.

The testing temperature can be between 30 ° C and 200 ° C (with optional cooling down to -20 °C). Manual changes in temperature (heating) during the measuring are possible up to 1 °C / 5 seconds. Cooling and additional heating for double the heating rate are optional.

The measuring time can run from 10 seconds - 500 minutes, however the time scale, 2.5, 5, 10, 25, 50, 250, or 500 minutes has to be set up beforehand.

Technical Data

Curing time: 10 sec... 500 minutes

Temperature: 30°C ... 180 °C
- 20 °C ... 30 °C with additional cooling

Size of specimen: 96 mm x 60 mm

Main connection: 220 V 50 Hz, optional 110 V 60 Hz

Product and price:

Current personal computer with expansion modules for measuring and controlling of the Paper Testing Device , colour screen, ink-jet printer, sample cutter.
Paper Testing Device ready for using.

Total price: € 24.800,--
