



ATS 600



Thwing-Albert
INSTRUMENT COMPANY

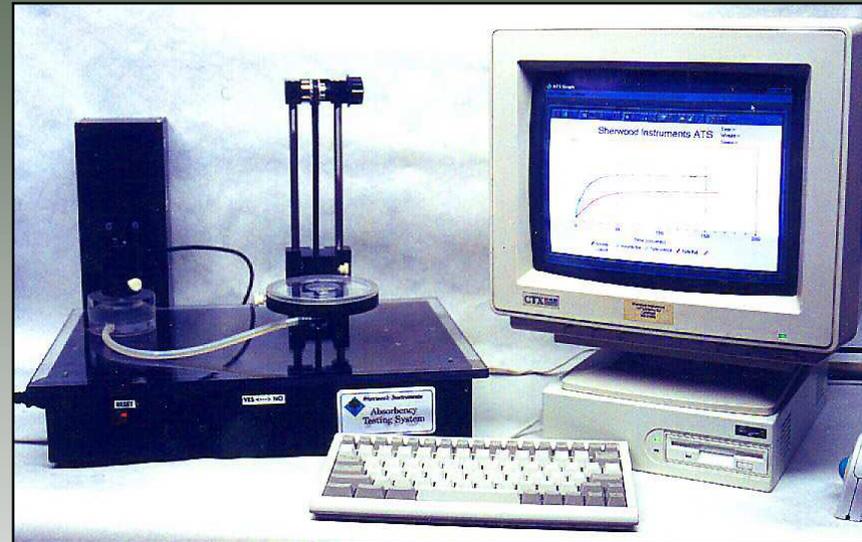
*A Century of Testing
Solutions*

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ATS-600

The ATS-600 optical Absorbency Testing System is a tabletop instrument designed for absorption and desorption rate and capacity measurement.



The ATS-600 was developed to meet the need for an accurate, fast, and robust instrument capable of testing a variety of absorbent products and features many significant advantages over previous instruments and methods.



ATS-600

Applications & Markets

Applications include:

- Quality Control
- Research & Development

Markets include:

- Paper Products
- Sanitary Products
- Super Absorbers
- Nonwovens
- Absorbent Powders
- Battery Materials

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Major Components

Syringe Assembly
(inside enclosure)

Opto-Detector
Assembly

Fluid Transfer
Tubing

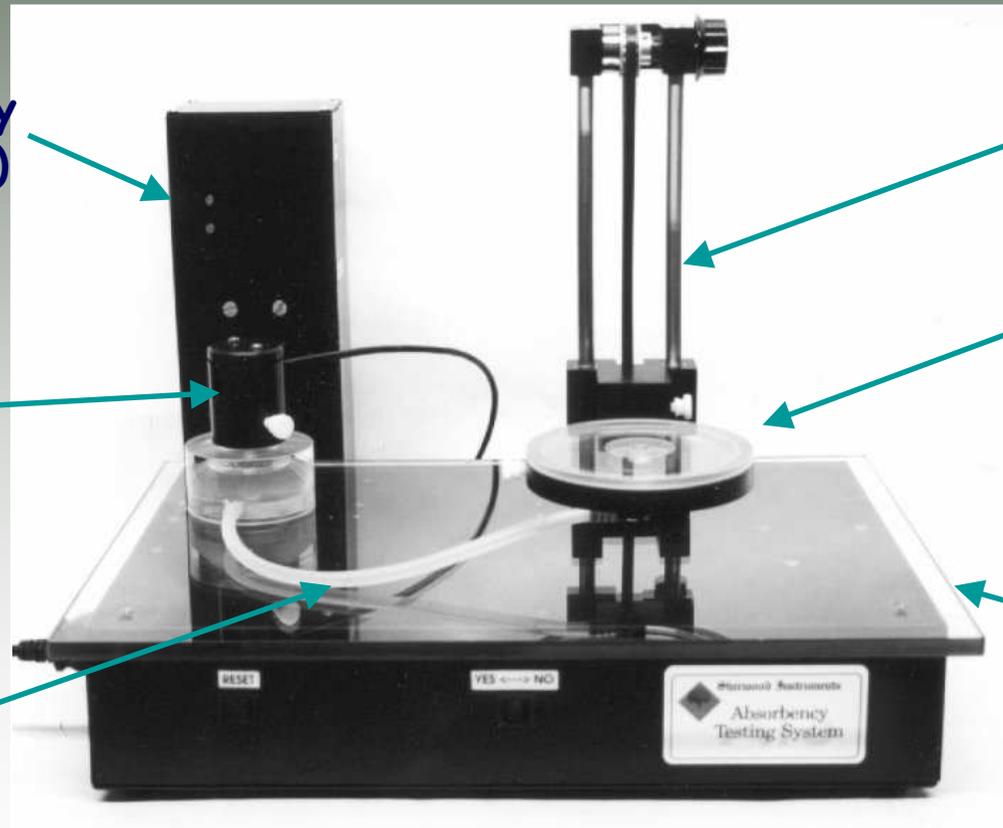


Table
Elevating Slide

Sample
Table
Assembly

Electronics
Base Unit

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Advantages and Features:

- The ATS-600 is a volumetric absorbency testing system.
 - Optical Sensor
 - stepping-motor controlled syringe
- No electronic balance.
 - Calibration
 - Accuracy -> non stable reading
- No calibration and is virtually maintenance free.
- Faster data capture
- Flexible

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Advantages and Features:

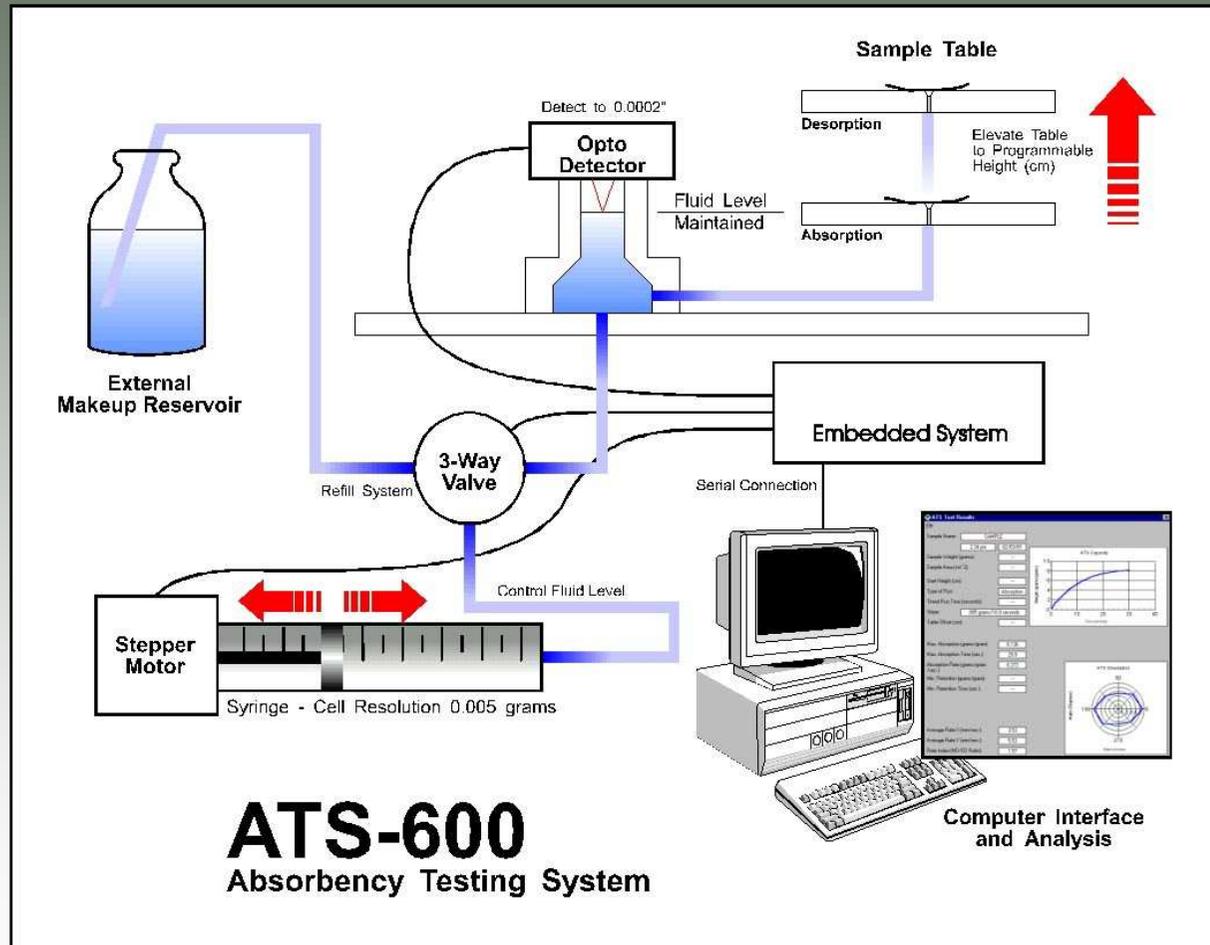
- ❑ Automating the entire measurement process,
 - Adding and removing water to “zero” the system,
 - Starting the test
 - Accurately maintaining the fluid head pressure during a test.
- ❑ Fast and easy test setup programming and data analysis with the Windows 98/NT® interface software.
- ❑ Automatic filling and drainage for cleaning or fluid change.
- ❑ A fast, belt-driven slide for elevating the sample table, provides virtually infinite control over test starts and rapid sample elevating for accurate desorption tests.

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Advantages and Features:

- ❑ The optical/linear actuator absorption measurement technique allows to quickly refill the system after each measurement for very high sample throughput.
- ❑ Remote feed reservoir to draw fluid from in order to refill the system.
- ❑ Diverse fluid types can be used.
- ❑ The test results can be normalized for sample weight or area.
- ❑ Connection with balance

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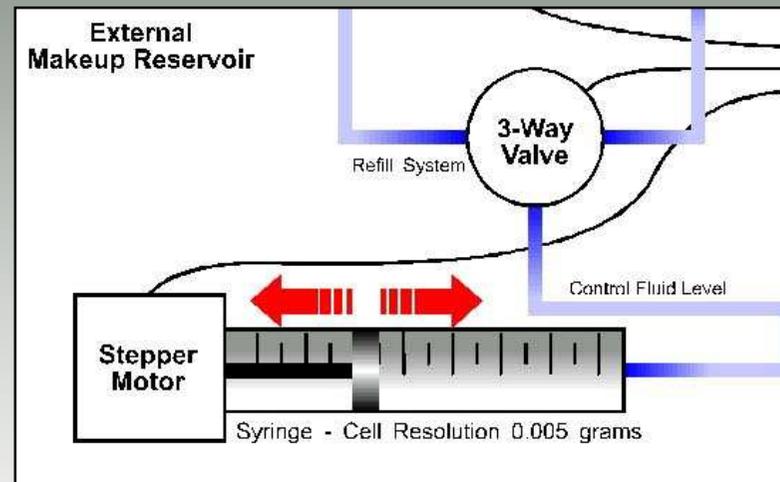


Operation

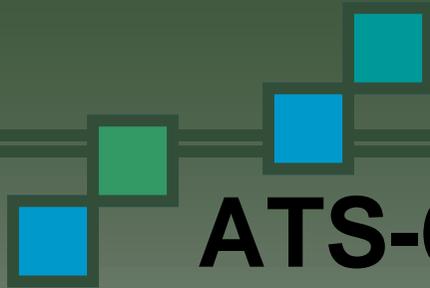
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Syringe Assembly

The Syringe Assembly is protected yet easily accessible inside the syringe enclosure. The assembly consists of a removable syringe / stepping-motor linear actuator combination and a three way Teflon control valve



- Resolution : 0.005 grams.
- Easy syringe exchange



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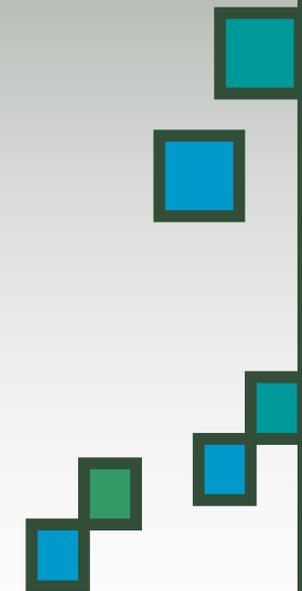
Opto-Detector Assembly

The Opto-Detector Assembly consists of:

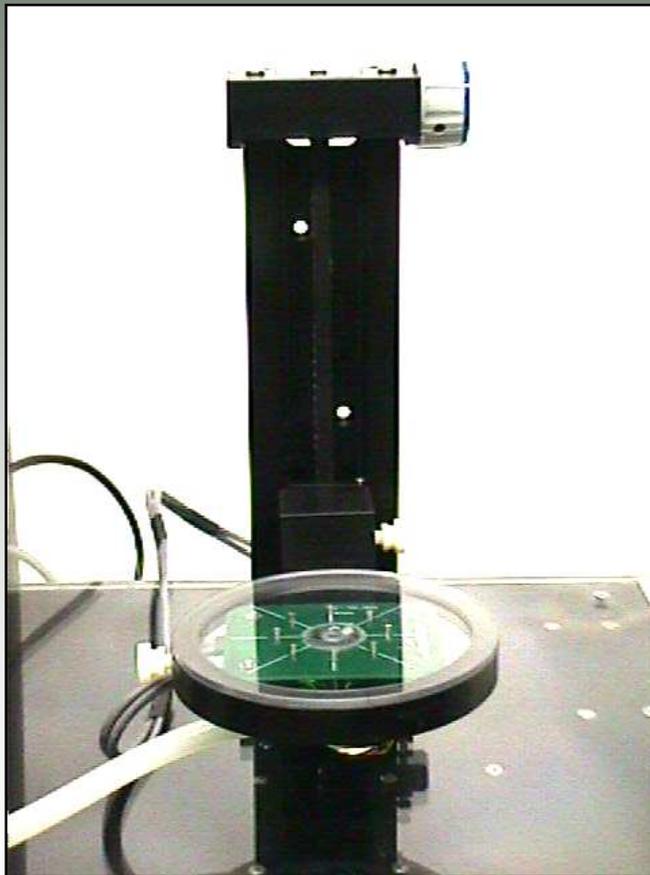
- ❑ Small reservoir of fluid
- ❑ Opto-Detector

How it works:

- ❑ The Opto-Detector senses the height of fluid in the column above the reservoir.
- ❑ The linear actuated syringe automatically adds or removes fluid to maintain the fluid height inside the reservoir as determined by the Opto-Detector.
- ❑ The quantity and rate of fluid added or removed from the reservoir to maintain the fluid level is recorded as absorption and desorption data.



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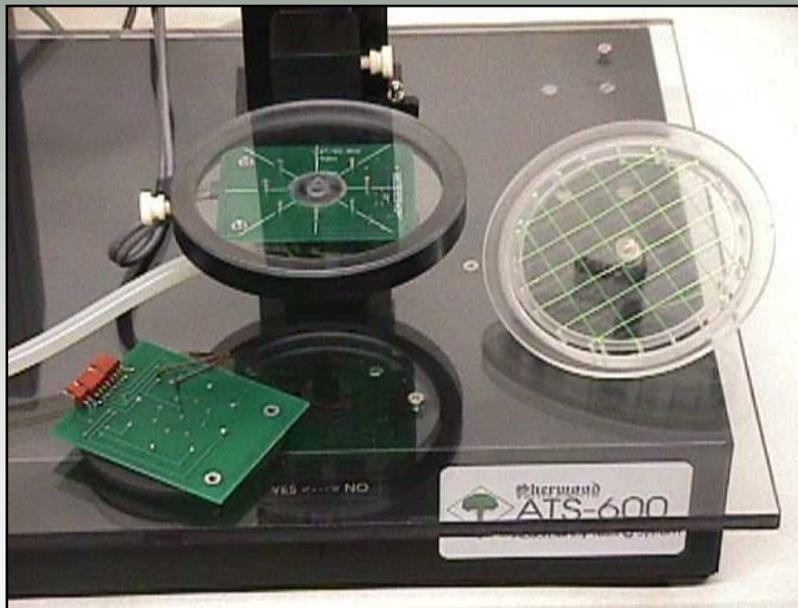
Test Table Platform

Function:

- ❑ The sample rests on a Test Plate and is connected to the Opto-Detector Reservoir by means of silicone tubing.
- ❑ The Test Plate is mounted on the belt-driven Slide Assembly. This allows the table to be set to different heights to create a differential fluid head for testing and to be elevated during the test for desorption tests.
- ❑ There is a variety of different table styles and configurations available (The Directional Rate Table is shown).

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Test Table Platform



The available table styles include:

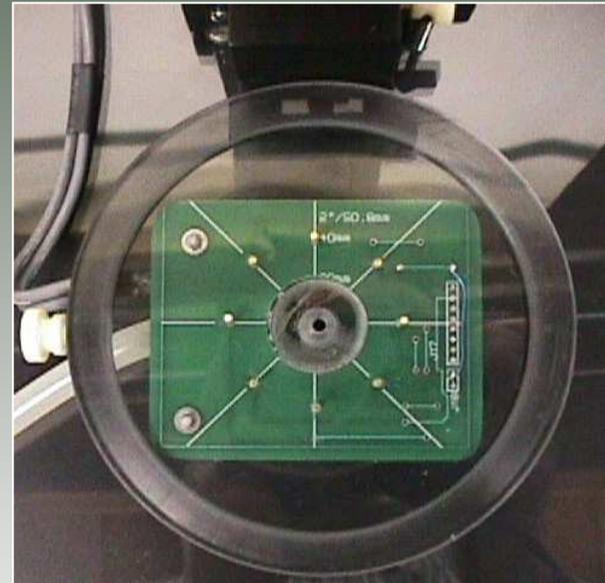
- ❑ **Standard flat single-point source table (not shown)**
 - ❑ Flat uniform surface with a single point source for absorption / desorption tests.

- ❑ **Non-contacting web-supported single-point-source table (shown above)—**
 - ❑ Single-point-source surrounded by an interwoven web of monofilament.
 - ❑ No fluid can collect on the table under the sample.
 - ❑ Easy table cleanup following a test. This is the recommended table for most testing.

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Test Table Platform

- ❑ **X-Y Directional Rate single-point-source table (shown on right)** — Same construction as the standard flat table but features eight electrodes evenly spaced every 45 degrees in a 20mm radius circle around the center point source. Requires the Directional Flow Rate option and allows for directional flow rate measurements.
- ❑ **X-Y-Z Directional Rate top table (shown on previous page)** —
 - ❑ Same electrode layout as the X-Y table on a small disk to be placed above the sample instead. Allows vertical (Z) direction penetration measurements and directional rate measurements from the top of a sample. Can also be equipped with pins to penetrate a sample for directional flow rate measurements inside a sample. Requires the optional Directional Flow Rate system.

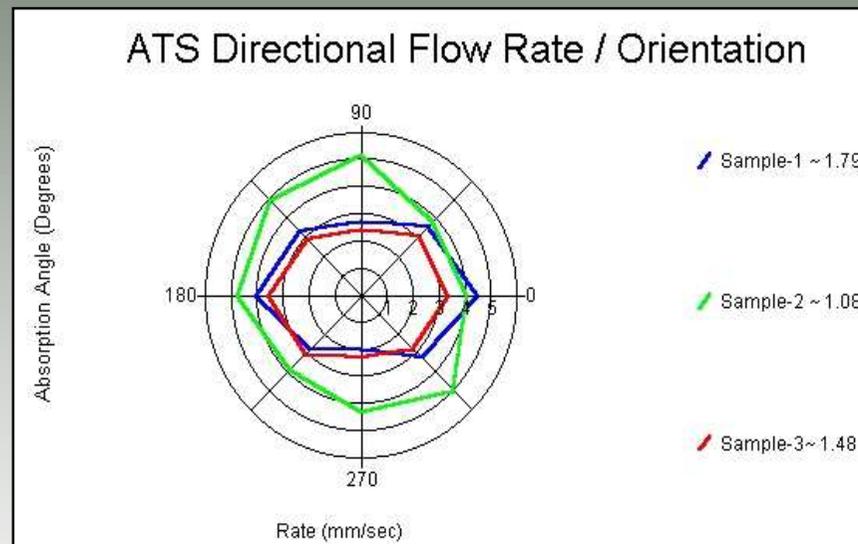


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Options

Directional Flow Rate / Orientation System -

- This option uses 8 sensors mounted around the sample table which provides directional absorption rate, sheet orientation information and MD/CMD ratio measurement.



- The sample graph above shows a comparison of the “in plane” Directional Flow Rate in eight directions for three samples, including their respective MD/CD ratios.

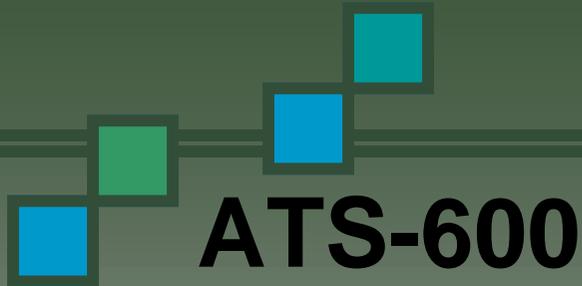
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Options



Static/Dynamic Pressure Testing —

- ❑ Provides absorption rate and capacity under static or dynamic pressure.
- ❑ Allows total control over the amount of pressure applied to the sample at all times (currently manual control only).
- ❑ Requires compressed air.
- ❑ Useful for high loft nonwovens or diaper material.



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Typical Test

There are two basic types of tests available:

- Timed Test

A Timed Test will measure the absorbency of the material for a specified time and produce a curve showing the amount of liquid absorbed versus the time of the test.

- Slope Test

A Slope Test will measure the absorbency of the material until the absorption slows to a programmed slope value. This test will also produce a curve showing the amount of liquid absorbed versus the time of the test. Desorption tests are also possible.



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Typical Test

Start of test:

- Step 1** The operator enters the sample weight (or area if desired). The sample weight can be entered manually or automatically read from an electronic balance.
- Step 2** The system starts by checking the “zero” calibration and sets the fluid level.
- Step 3** When acceptable, the sample table will rise to allow placement of the sample to be tested. The sample should be placed in the center of the table when the display indicates “Place Sample Now”.
- Step 4** When the operator starts the test, the table will lower to begin the absorption process. The table drops to overcome the head and creates a slight fluid surge. This forces the liquid up to touch the sample and starts the test.
- Step 5** The sample continues absorbing fluid and the instrument measures and records the volume of fluid absorbed. The Opto-Detector is used to check and maintain the fluid head at all times during the test.

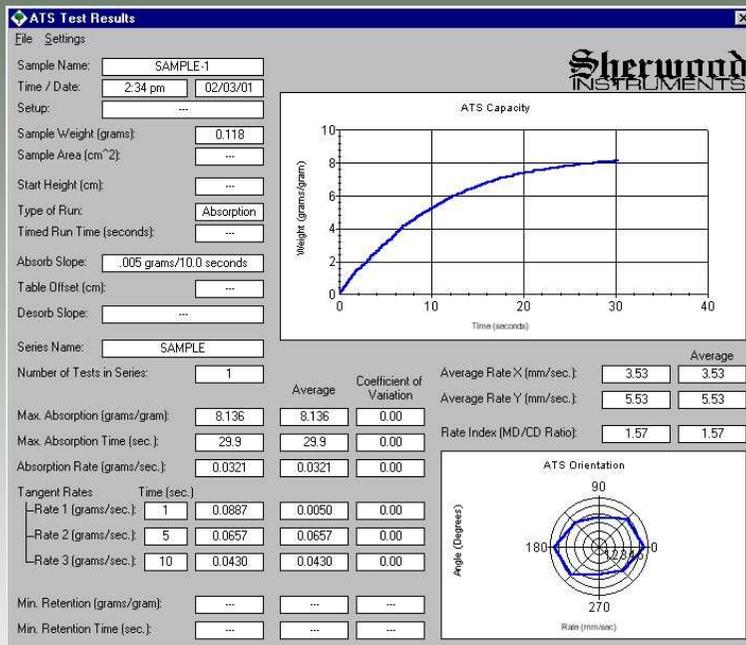
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Typical Test

Following a test:

- Step 6** Once the test is finished the data is transferred to the computer and the table will again elevate to allow removal of the sample.
- Step 7** Sample cleanup - The operator should remove the tested sample and clean the table with a soft dry cloth.
- Step 8** The operator then presses “Yes” on the computer or the front panel-mounted switch to continue when finished. The syringe will automatically refill itself and the sample table will return to the home position. The instrument will also verify the “zero” calibration and adjust the fluid height while the following step is occurring.
- Step 9** The operator verifies the sample name and designates whether this test is part of a test series. Data is stored in the computer and the test results are saved and presented as the operator has specified.
- Step 10** The instrument is now ready to perform another test.

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Test Summary

Shows all of the pertinent data from the test at a glance including graphs and test series averages and coefficient of variation.

- Can be automatically printed and/or the test summary data saved to a text file and/or sent as RS-232 output.

- The top graph, on the sample summary page above, shows a typical absorption curve with weight vs. time.
- The bottom graph shows the optional “in plane” Directional Flow Rate in eight directions.

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Test Summary

Test Summary Content:

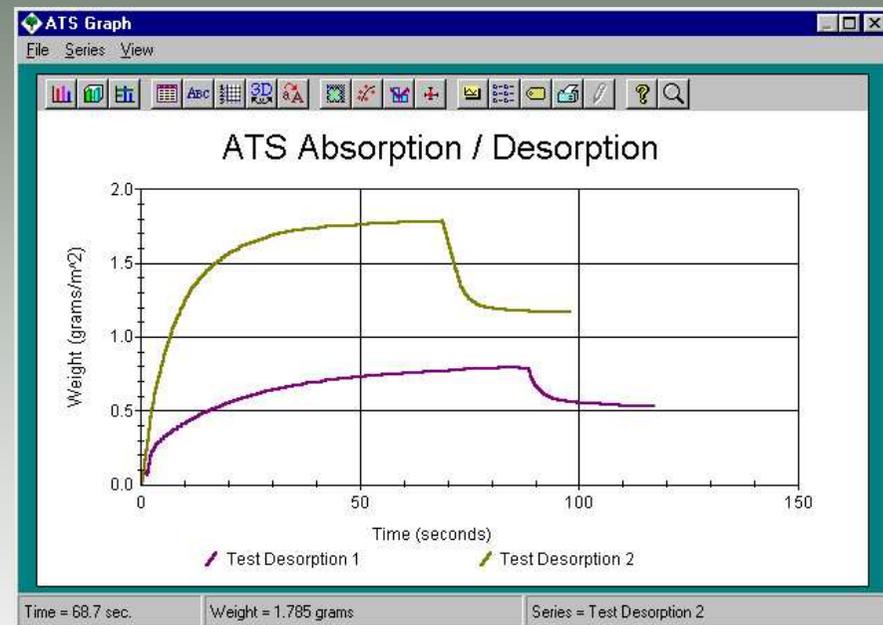
- ❑ The test summary Includes the following data:
 - ❑ Sample name, date, and time of test
 - ❑ Sample weight (grams) or area (cm²)
 - ❑ Start height (cm)
 - ❑ Run type and either time of run (sec) or absorption slope (grams/sec)
 - ❑ Table offset (cm) and desorption slope (if applicable)
 - ❑ Maximum capacity (grams, grams/gram, grams/m²) @ time
 - ❑ Total cumulative absorption rate (grams/sec)
 - ❑ Minimum retention @ time (if applicable)
 - ❑ Tangent or cumulative absorption rate @ 3 programmed times during the test
 - ❑ Average flow rate (mm/sec) in MD and CD directions (optional)
 - ❑ Directional rate MD/CD ratio (optional)

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Graphing

Shows absorption, absorption rate, and directional flow rate (if available) curves.

- ❑ Up to 9 tests can be displayed together for comparison.
- ❑ All tests in a series can be loaded automatically.
- ❑ Graph can be set to open automatically following a test.
- ❑ Graphs can be printed or saved in WMF, BMP, or JPEG file formats.
- ❑ The graph displayed above shows a typical absorption / desorption curve with weight vs. time for 2 tests.
- ❑ The data bar at the bottom of the graphs can display the data for any point on any of the graphs.





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The main system includes:

- 9 inch belt-driven slide (provides 6+” table travel)
- Linear Actuator controlled Fluid Syringe
- Fluid Reservoir with Optical Sensor
- Windows 98/NT® Interface Software for data storage and analysis

Required:

- Select a sample table
- Pentium PC with one available serial port for data communications

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Maintenance

Under normal operating conditions the ATS-600 requires very little maintenance. Typical maintenance might include:

- ❑ The system may require periodic cleaning, depending on installation and fluid used, to ensure proper operation.
- ❑ The syringe o-ring may eventually require replacement. Periodic lubricating of the o-ring with silicone grease will extend its life. O-ring life will vary with use and fluid used.
- ❑ Lubrication of linear actuator leadscrew with approved lubricant should also be performed periodically to ensure expected performance.
- ❑ Instrument calibration should be checked annually by means of a simple volume-verification procedure.