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### Advanced Friction Tester

- Static and dynamic COF
- Fast, repeatable measurements
- Compliant to multiple standards

# Who measures slip/friction?



**Friction testing is used in the packaging industry to measure the slip resistance of a product, with the aim of predicting feeding and running speed on an automatic gluing, erecting, filling or packaging line.**

Friction parameters help the manufacturer understand how the finish of the blown film or printed carton can influence the feeding and running speed. Surface slip is a key factor when printing, erecting or filling packaging materials on an automatic line.

## What is slip/friction?

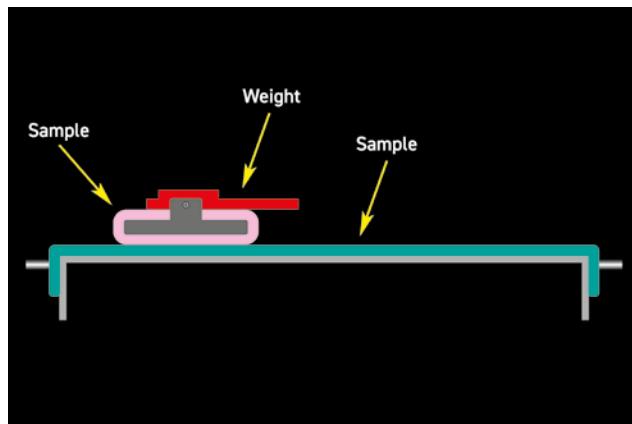
A product's slip resistance is characterised by its coefficients of friction:

$$\text{Static COF} = F_s/N$$

$$\text{Dynamic COF} = F_d/N$$

Where  $F_s$  is the maximum static frictional force and the  $F_d$  is the average dynamic frictional force.

$N$  is the Normal force, i.e. the force of gravity acting on the sample and test sled.



In practical terms, the static slip relates to the force required to get two resting surfaces moving, dynamic slip is the smaller force that is required to keep the surfaces moving once this initial "inertia" is overcome. These values are expressed as ratios and do not have units, they are usually quoted as a decimal value between 0 and 1.

- Product consistency
- Packaging speed
- Improving manufacturing process
- Optimising machinery settings

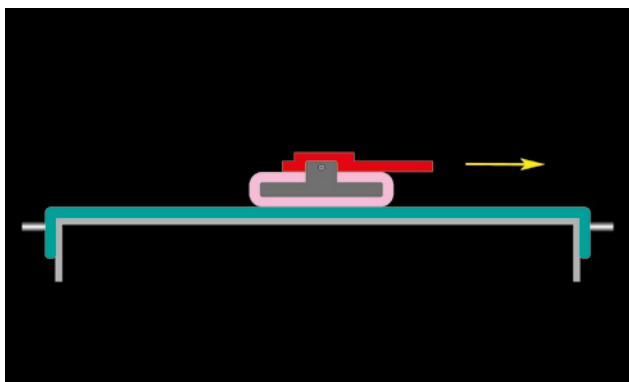
- **Direct costs:** Raw materials, especially speciality polymers
- **Indirect costs:** Rework/ Recycling/ Replacement cost/ Spoiled package content

# How is coefficient of friction measured?

All methods of COF measurement involve preparing a sample into two flat pieces, the samples are placed together and a weight is applied. One of the samples is held in a fixed position, a force is applied to the other sample until they begin to slip against one another.

## Horizontal Plane (Flat Bed) Friction Testing

To measure Static and Dynamic coefficients of friction it is necessary to use a fixed bed instrument. These instruments use a motor to pull a sled across the sample, using a load cell to measure the forces.



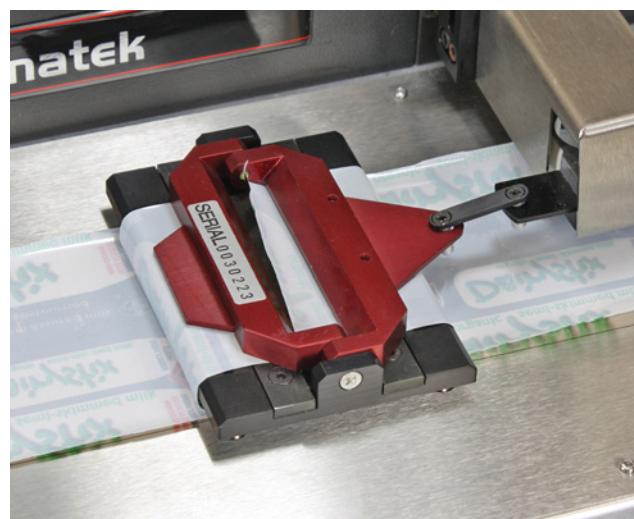
Original slip testing instruments were converted tensile testers that used a cord to pull the sample. The use of a cord has now been removed from most friction measurement standards due to the uncertainty added by its own elasticity and problems with sample positioning.

## How can Coefficient of Friction Values Relate to Packaging Speeds?

COF can often be related to the feeding and running attributes of products, for instance UV varnished food cartons have a slip coefficient that is related to the formulation of the UV coating its cure and film weight.

Cartons that have a very low static coefficient of friction may have handling difficulties as they will tend to slide apart and are difficult to place into feeding hoppers.

In contrast, products which have a high COF will tend to stick together and can be prone to misfeeding due to multiple cartons entering the packaging line at once.



Different packaging lines will often require products with specific surface frictional profiles to achieve their highest running and feeding speeds, it is only by measuring and specifying these values that a manufacturer can achieve maximum productivity.

## What Parameters Affect Coefficient of Friction Values?

COF is primarily influenced by the chemical composition of the surface and its surface profile, in packaging this is often a coating applied to the packaging.

Other important factors that affect COF are test speed, the normal force (mass of the sled), contact area and geometry of the sample, these values are often specified in the test method (ASTM D1894 and ISO 8295).

Friction parameters help the manufacturer understand how the finish of a blown film or printed carton can influence the feeding and running speed.

# Test types



## Friction Test

Static and dynamic coefficient of friction measurement.

- ✓ Automatic sled placement with variable dwell times give more repeatable static slip results
- ✓ Uses mechanical linkages to apply the force



## Peel Testing

Optional attachments transform the AFT into a precision peel test instrument, accurately measuring the force required to separate glued or laminated films, tapes, labels etc.

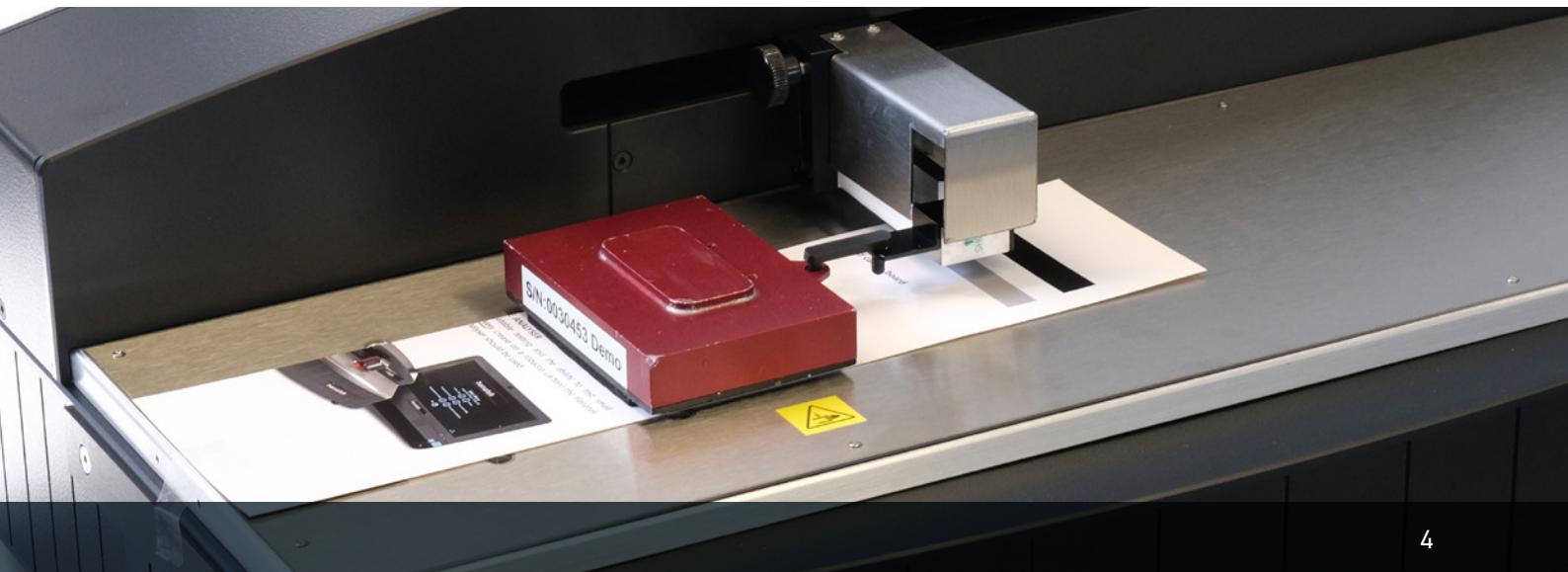
- ✓ All tests are to FINAT international standards
- ✓ T-Peel, 180° peel or 90° peel tests



## Tear Testing – Substrate Strength

Optional tear strength attachment allows the user to measure and control tear strength to international standards.

- ✓ Trouser tear method
- ✓ Full graphical instructions and sample templates

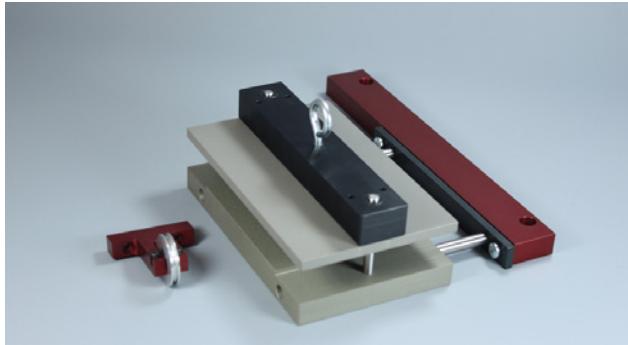




## Block Test

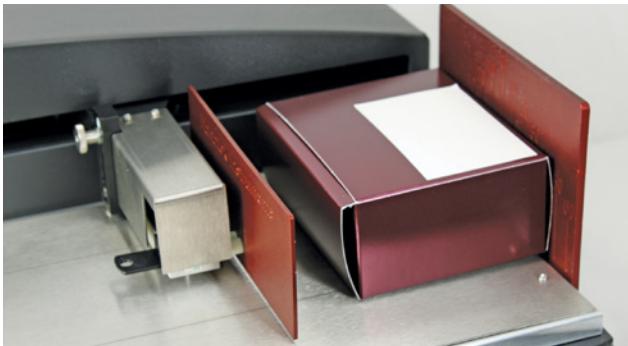
During storage, films, labels or cartons can inadvertently block together making them difficult to separate and feed into finishing or packing lines.

- ✓ Measure the force required to separate blocked samples
- ✓ Full testing and sample conditioning instructions
- ✓ Test to international standards



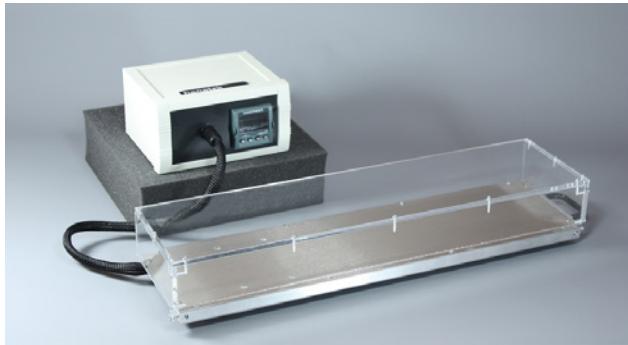
## Box Closing Force

Measure the forces required to close filled cartons. This test ensures that carton based packages can be stacked and displayed correctly. Cartons must also be properly closed to ensure that any secondary process such as film wrapping can be performed.



## Detachable Heated Bed

A detachable heated bed can be added to test frictional characteristics at elevated temperatures of up to 110°C.



## Improving Productivity

The detailed force curves identify any inconsistencies on the sample surface that may reduce packing or feeding performance in the production environment.

This powerful feature can highlight subtle differences in substrates or coatings that allow the user to fine tune their product for their production conditions giving optimum feeding, running and packing speeds.

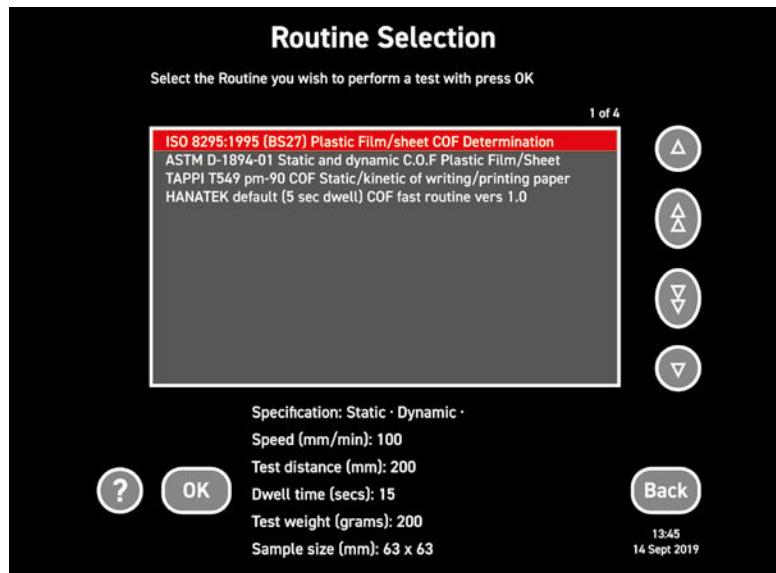


# Operation & Results

This flexible instrument can be configured for quality or research use. All operations and test methods have comprehensive graphical on-screen help. The COF produces detailed force graphs that can be saved and compared.

## Pre-loaded ISO/ASTM/TAPPI Slip Test Methods

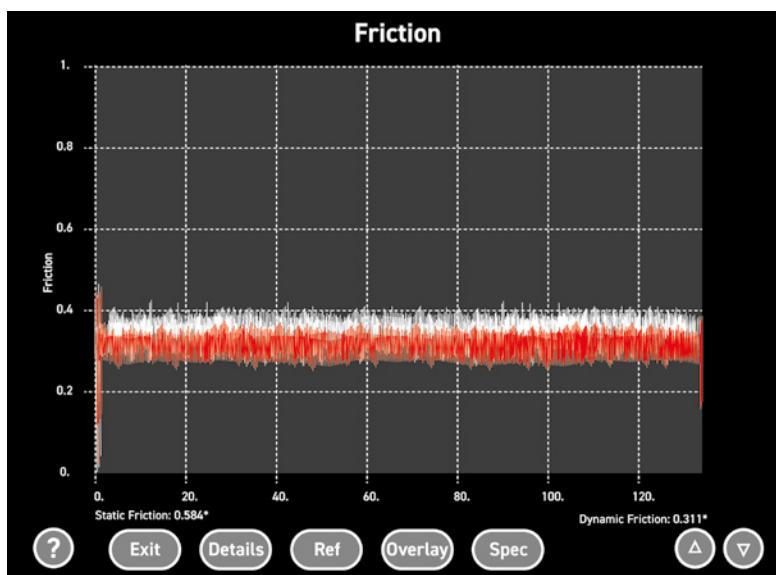
The instrument has pre-loaded test instructions that help ensure samples are tested to international standards.



## Live Graphical Representation of Results

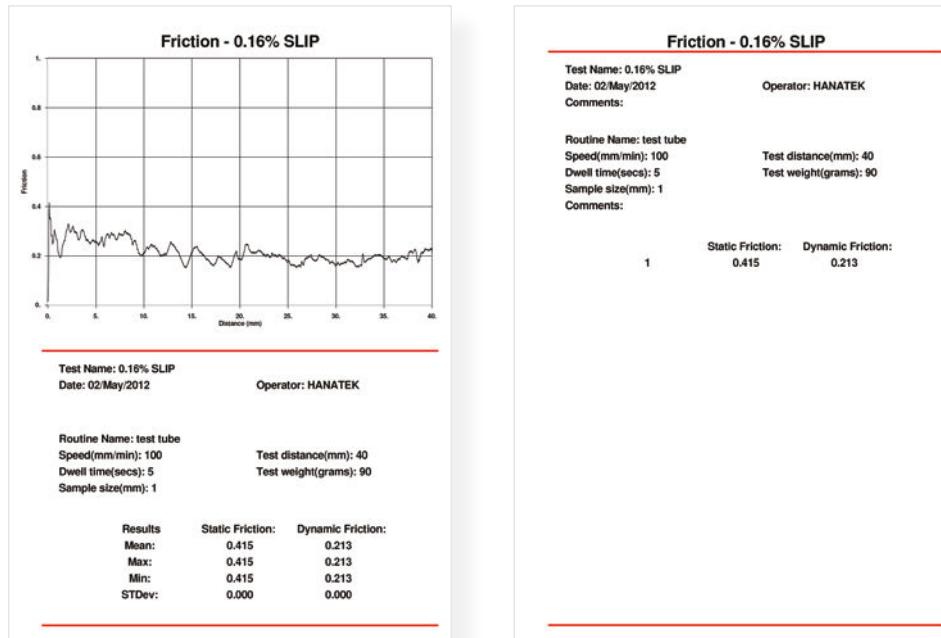
Results are given at the end of the test for static and dynamic COF.

All results can be compared graphically – a previously tested reference can also be overlaid to help understand batch to batch consistency and quality.



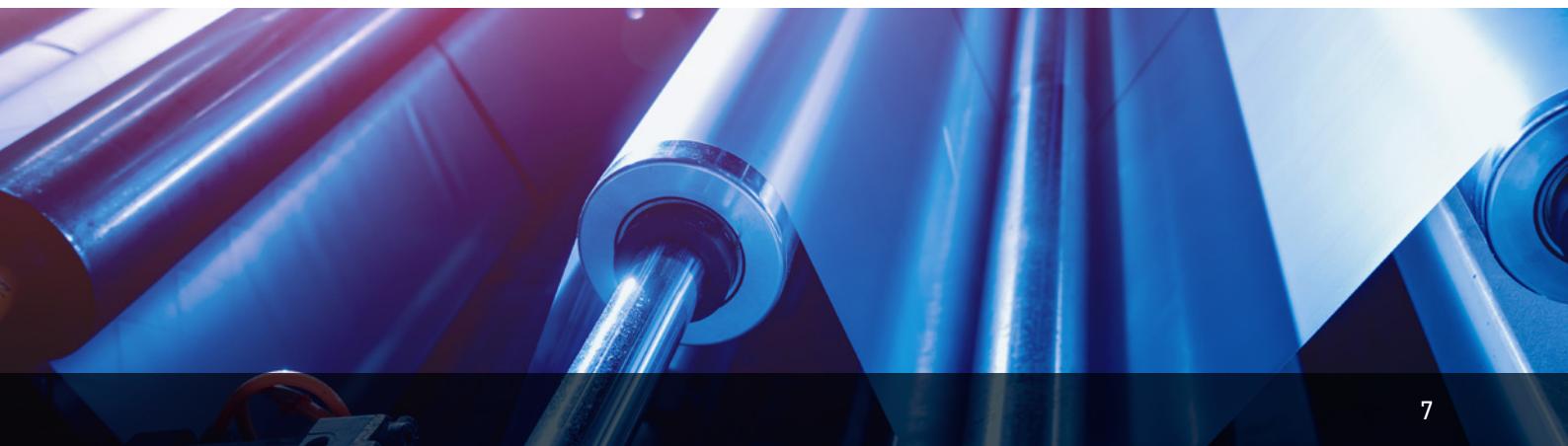
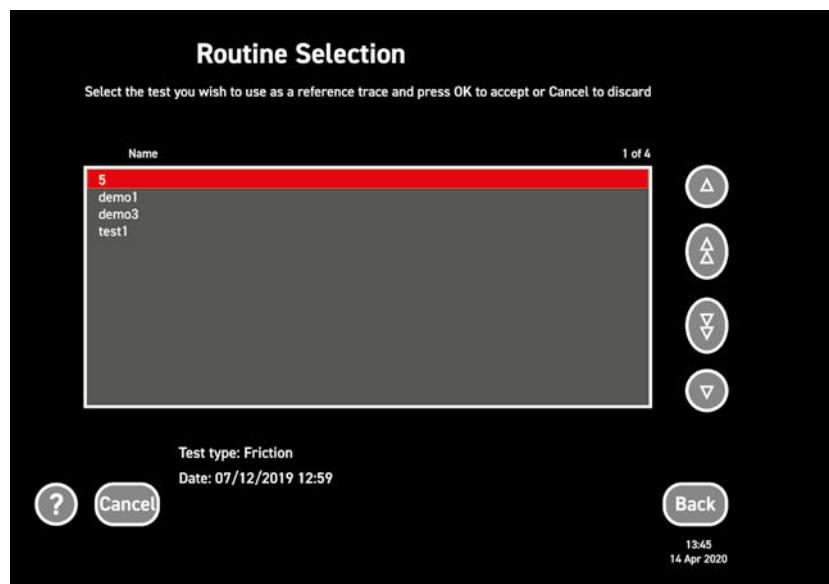
## Test Results in PDF Format

Full graphical and statistical analysis of test results can be printed to PDF for easy reporting.



## Create and Store Electronic References for Future Comparison

The instrument calculates detailed statistics for multiple measurements which can be saved. The graph of these measurements can be overlaid against future tests.



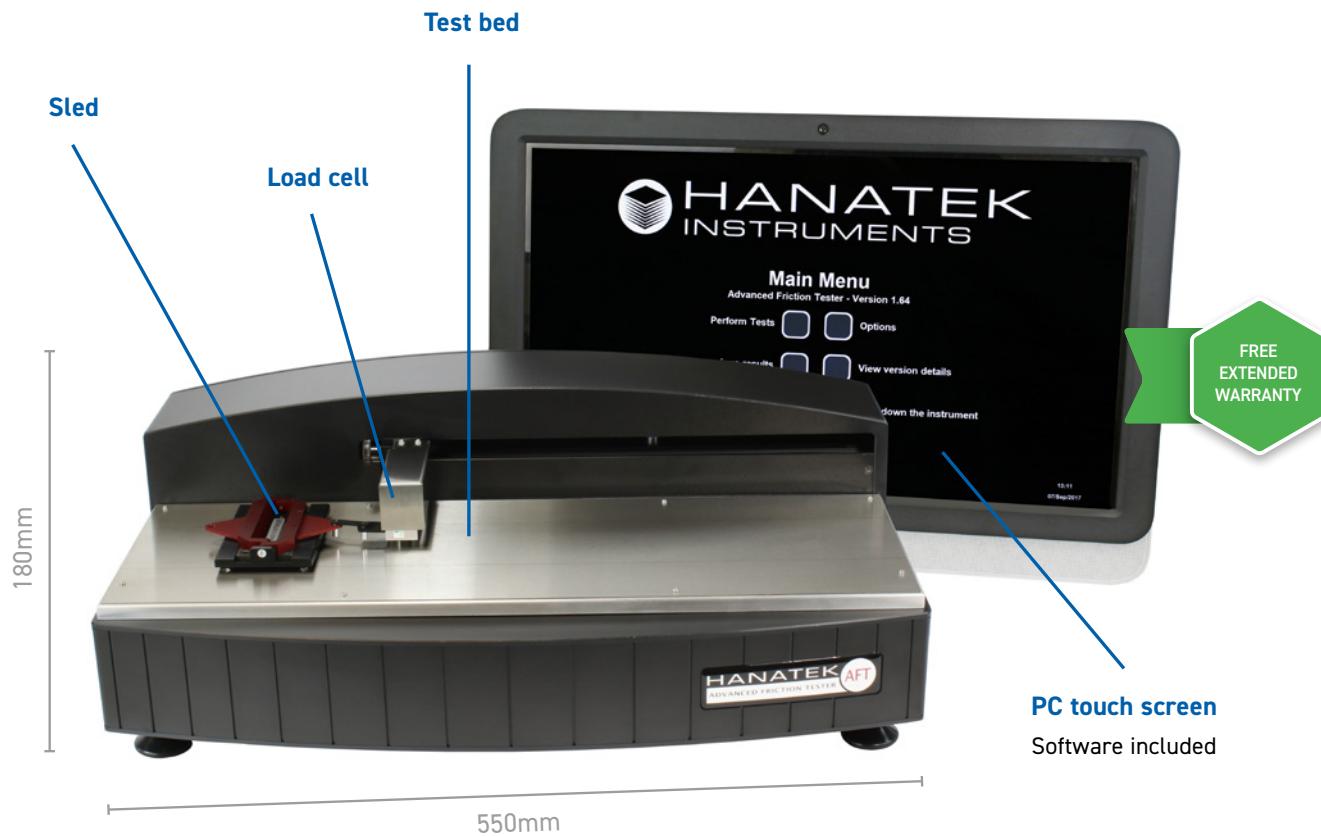
# Applications

The Advanced Friction Tester (AFT) produces detailed fingerprints of new substrates, coatings and production samples. These characteristics can be saved and compared at any time allowing the manufacturer to specify the optimum surface finish for any packaging process.



# Features

The Hanatek Advanced Friction Tester (AFT) allows the user to measure and store the full force curve which graphically illustrates the frictional characteristics in addition to providing the static and dynamic COF values.



## Intuitive and easy to use

No need to consult complicated manuals and easy training for new users



## Static friction measuring

The initial force required to make two surfaces slip against each other



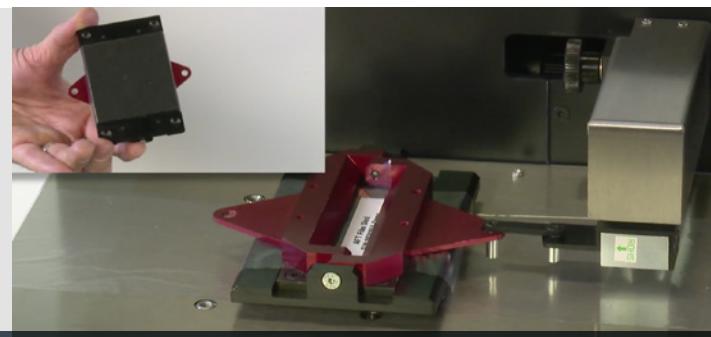
## Dynamic friction measuring

The ongoing force required to maintain movement between two surfaces

## How is friction measured?

A sample of 63.5mm<sup>2</sup> with a weight acting over the entire surface area is run on top of another sample at a given speed.

Exact test parameters are specified in ASTM D1894, ISO 8295, ISO 15359, ASTM D2534, TAPPI T549.



# Features

## Sled placement

Automatic sled placement with variable dwell times give more repeatable static slip results.



Sled is positioned on lift pins



Lift pins retract into the instrument and the sled is placed in the same position each time

Fixed link between the sled and the load cell means that there are no errors in friction from pulley wheels or cords associated with other measuring instruments.



## Touch screen interface

The AFT uses an intuitive touch screen interface making it accessible and easy to use.



## Development tool or Q.A. instrument

This flexible instrument can be configured for quality or research use.

### Research Tool

Create bespoke test methods. Statistical and graphical analysis of results

### Q.A. Instrument

Pre-loaded ISO/ASTM/TAPPI/FINAT test methods. Date/operator stamped results. User definable pass/fail criteria with optional password protection.

- Intuitive and easy to use
- Easy to train new users
- Consistent results for all operators
- No need to consult complicated manuals

# Accessories

The Hanatek Advanced Friction Tester offers flexible testing to multiple standards and test types.

The package includes:



Touch screen PC with software and connection cables



Easy-load sled for films and flexible substrates



OR

Board sled for more rigid materials

## Included accessories:

- 2 x USB data cables
- 1 x Friction sled template
- 4 x Sample securing magnets
- 1 x Hanatek USB drive
- 1 x Calibration pulley attachment with fixing attachments
- 1 x 100g calibration check weight
- UKAS traceable calibration certificate

## Optional Extras:



Box closing attachment



Peel test attachments



Heated bed



Tear testing attachment



Block testing attachment



Paper and board friction attachment



Weights for board sled



## Simple sample preparation with the Hanatek Universal Sample Cutter (USC)

The Hanatek USC has been designed for the simple cutting of samples for the packaging industry. Dies can be configured to cut samples for most test types including: friction, tensile, grammage, O<sub>2</sub> permeability, CO<sub>2</sub> permeability, WVTR, rub resistance, carton crease, carton stiffness and many more.

# Specifications

Standard	Application	Details
<b>ISO 8295</b>	Plastics - film and sheeting	Determination of the coefficients of friction
<b>ISO 15359</b>	Paper and board	Determination of the static and kinetic coefficients of friction - horizontal plane method
<b>ASTM D1894</b>	Plastics - film and sheeting	Standard test method for static and kinetic coefficients of friction
<b>TAPPI 549</b>	Printing paper	Coefficients of static and kinetic friction of uncoated writing and printing paper by use of the horizontal plane method
<b>ASTM D2534</b>	Wax coating	Standard test method for coefficient of kinetic friction for wax coatings
<b>ASTM D3330</b>	Tape	Standard test method for peel adhesion of pressure sensitive tape
<b>FTM1FINAT</b>	Peel test	Test method no. 1, Peel adhesion (180°) at 300mm per minute
<b>FTM2FINAT</b>	Peel test	Test method no. 2, Peel adhesion (90°) at 300mm per minute
<b>FTM3FINAT</b>	Adhesion	Test method no. 3, Low speed release force
<b>FTM21FINAT</b>	Adhesion	Test method no. 21, Ink Adhesion - basic
<b>ISO 6383</b>	Textile	Determination of tear resistance -- Part 1: Trouser tear method

Instrument Specifications	Details
<b>Resolution</b>	0.1g / 0.001 COF
<b>Accuracy</b>	0.5g
<b>Sleds</b>	200g (film) or 200g (board) Other sled weights by request Custom sled base materials available
<b>Power</b>	110/240v 50/60Hz
<b>Load cell capacity</b>	20N (Upgrade to 30N available on request)

Instrument Dimensions	Details
<b>Size</b>	(H) 180mm x (W) 550mm x (D) 300mm
<b>Net weight</b>	7kg (Instrument), 4kg (PC)
<b>Gross weight</b>	21kg

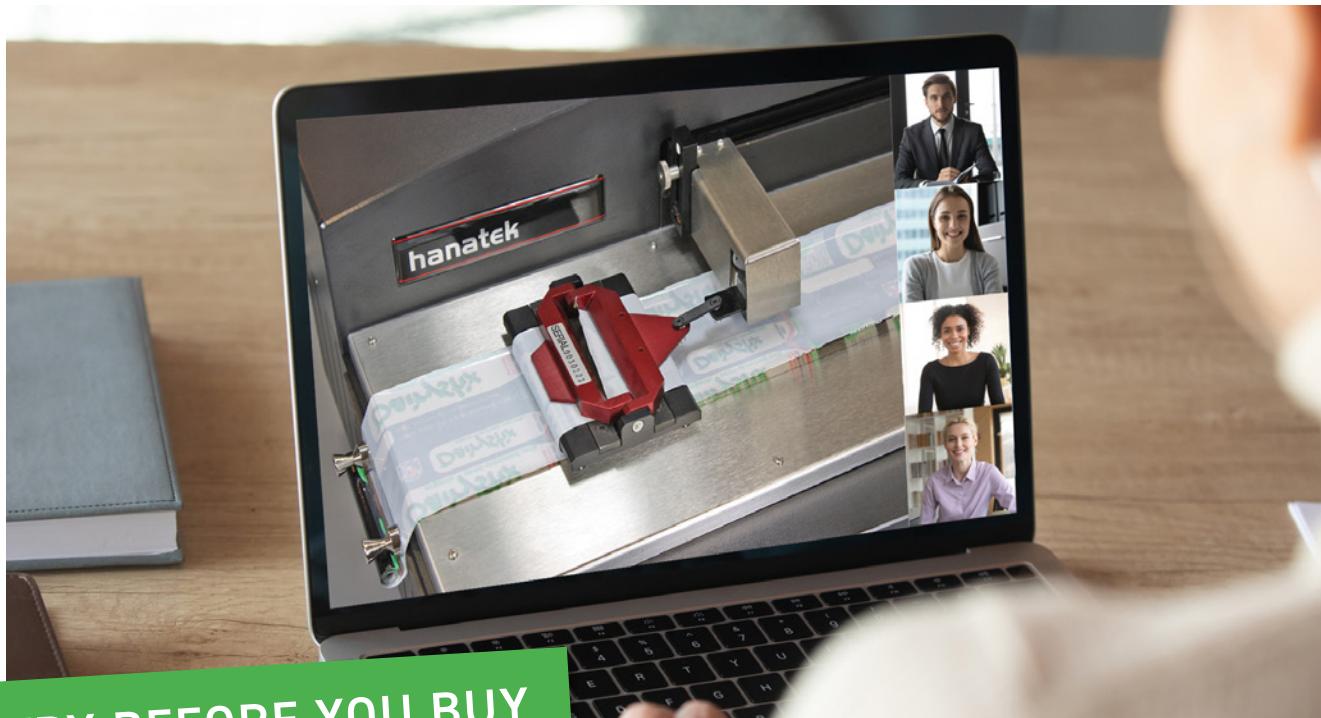
Touch Screen PC Specifications	Details
<b>Operating system</b>	Windows 10

Order Codes:	Details
<b>HAN-A6040FRICTION/FILM</b>	AFT - Advanced Friction Tester (Film) + kit
<b>HAN-A6040FRICTION/BOARD</b>	AFT - Advanced Friction Tester (Board) + kit



**Free extended warranty:** Free extended 2 year warranty: Requires registration at [www.rhopointinstruments.com/instrument-registration](http://www.rhopointinstruments.com/instrument-registration) within 28 days of purchase. Without registration, 1 year standard warranty applies.

**Calibration & Services:** Fast and economical service via our global network of accredited calibration and service centres. Please visit [www.rhopointinstruments.com/support](http://www.rhopointinstruments.com/support) for detailed information.

**TRY BEFORE YOU BUY**

We offer two options for you to try out the Hanatek AFT before buying

**1**

**Online demonstration:** Online presentation of the Hanatek AFT with your samples measured LIVE on Zoom, Microsoft Teams or Skype. Includes a consultation with an application specialist

**2**

**Factory sample testing:** Send in samples of your material for testing and receive a comprehensive test report

[Arrange a demo](#)**Ready to receive a quote?**[Click here](#)

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