the texture analysis applications directory
food products
Texture is an important attribute of products in that it affects processing and handling, influences habits, and affects shelf-life and consumer acceptance.

Texture analysis is the mechanical testing of food, cosmetics, pharmaceuticals, adhesives and other consumer products in order to measure their physical properties. Because of its adaptability, texture analysis has become commonplace in many industries to measure a specific or range of characteristics or properties relating to the way a material behaves.

It is a cost-effective method to determine the effects of raw material or excipient quality or the adjustment of formulation or processing variables on end product acceptability — whether this is to measure the ‘mouth feel’ properties of food, the flow properties of creams and pastes, the break or bend of a product or the tackiness of adhesives.

Many texture analysis tests, such as the Bloom Strength test for gelatin gels, are International Standards, whereas others are recognised as standard tests within an industry, such as Texture Profile Analysis for many food products. To be successful, all of these tests depend upon the integrity of the Texture Analyser and the selection of the correct testing method, the manufacturing precision of the probe or attachment used and the accuracy of the analytical software to provide the results in a clear, concise format. Stable Micro Systems Texture Analysers, with their wealth of application methods and the range of over 200 probes and attachments, are the result of decades of experience in the design and manufacture of this equipment.

The choice of probe or fixture that you use will depend upon the sample’s form, the property that you wish to measure or the action that you wish to perform. Fixtures are available to provide the required action of compression, extrusion, cutting, extending or bending on the sample or to support, anchor or deform the sample in a customer-specific way.

The main goal of many texture studies is to devise one or more mechanical tests with the capacity to replace human sensory evaluation as a tool to assess texture. Measurements that yield both fundamental and empirical product characteristics are well developed, whilst wide-ranging imitative test procedures are also becoming increasingly important. Their relevance is in imitating a real-life situation, which permits far simpler data interpretation.

Stable Micro Systems offers the most universal Texture Analysers available today — the TA.XT plus and TA.HD plus ‘World Standard’ instruments — to completely satisfy the increasing demands for accurate, repeatable and quantifiable textural information. They assess textural properties by capturing force, distance and time data at high speed — data which is then displayed graphically by Exponent software.

Stable Micro Systems’ range of instruments can measure and analyse fundamental, empirical and imitative tests covering those relating to texture analysis, materials properties as well as effects of rheology of solid, semi-solid, viscous liquid, powder and granulate materials across a wide range of industries.

No-one can design the solutions to your testing challenges like we can...

Probes and fixtures are attached to a Texture Analyser to allow a particular action or test to be performed. They are in everyday operation worldwide, testing a wide range of products, materials and properties in both Research and Quality Laboratories, as well as being integrated into many production lines.

Only the finest quality materials and the best quality finishes are used in the manufacture of our probes and attachments: food quality or better Stainless Steels (polished and mirror finish), aerospace quality aluminium alloys (micro finished and hard anodised) and ICI or GE engineering plastics.

Every probe and attachment is rigorously inspected for dimensional accuracy, profile and finish during manufacture, again both during and after assembly and finally before despatch to the customer. Where applicable, optical inspection is also utilised.

Above all, we listen to you, the user, and constantly work to improve our products to suit your requirements. We are always enthusiastic to hear from users with suggestions on how we could improve or extend our range of accessories. In-house mechanical, electronic and software engineers also provide us with the ability to design bespoke probes and fixtures to solve new testing requirements or according to customer specification.

As a Texture Measurement professional, you may notice how frequently the inventions and innovations of Stable Micro Systems are copied by our imitators. However, such imitations often lose the subtlety and elegance of the original design and in all cases lack the application background and development understanding required for successful implementation. That is why, since 2007, all of Stable Micro Systems’ original probes and fixtures have been filed as European Community Registered Designs.
**INTRODUCTION**

- Attachments marked with an asterisk are designed for use with the HDP/90 Heavy Duty Platform.
- Specifications are subject to change without notice.

**For information about maximum loads and operating temperatures, please see our detailed Application Help Files.**

**Note:** The applications in this document are typical examples only, and we do not guarantee that you will be able to correctly test a specific sample of the product.
A family of flat-ended probes from 2mm to 50mm diameter is available to test a wide range of samples. Cylinder probes are used for puncture and penetration tests on gels, fruit, yoghurts and margarine to provide an index of Hardness, Firmness or Yield Points. A puncture test measures both compressive and shear forces. Properties such as visco-elastic creep, compliance and stress relaxation can also be identified.

The needle probe is used for puncture tests to measure, for example, the skin strength (or yield point) of fruit or the surface crust of a baked or confectionery product.

Compression platens are used for tests on self-supporting products such as gels, fruit, cheese and cake. Direct or bulk compression tests require the test sample to be smaller than the compression platen and measure compression/recovery, failure mode and visco-elastic creep characteristics. Imitative results such as product freshness can also be determined from the tests.

The Bloom jar is the International Standard (ISO 0665) jar for Gelatine testing. It has an internal diameter of 59mm and a capacity of approximately 155ml.

A Bloom jar centralising base which fits in the heavy duty platform is available for quick centralisation when testing multiple samples.

A chuck adapter provides a quick and accurate means of attaching customers’ own small probes up to 4mm diameter, such as a hypodermic needle, directly to the Texture Analyser.

Commonly used for the testing of thin products.

A cylinder probe is a 1cm² cylinder probe used for standard measurements of Agar Gels.

Perspex display bases are only made to order and can accommodate 6, 12 or 18 probes. Probe code numbers and quantity must be specified when ordering.
Four conical perspex probes with angles of 30° to 60° are available for cone penetration tests on samples such as butter, margarine and similar spreads which all exhibit a plastic behaviour. Cone penetrometry correlates well with sensory evaluation and spreadability indices.

Note: Conical probes can be made from stainless steel or different angles to order.

Code

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This probe quantifies the firmness and hardness of products such as ‘thick cut’ marmalades or ice cream that contain particulates. For example, these can be meringue pieces, chocolate chips or fruit chunks. These products can be difficult to measure as the number, size, shape and distribution of particulates is usually random within each container.

While it is relatively easy to quantify the firmness of a homogeneous sample using standard penetration probes this method is extremely difficult when the sample contains particulates. A standard penetration test on such a non-uniform product is expected to have low reproducibility.

The use of a Multiple Puncture Probe that penetrates the sample in several regions serves to create an averaging effect and is therefore usually more repeatable.

The HDP/90 Heavy Duty Platform is the base by means of which many attachments are fitted to the Texture Analyser. It ensures the precision alignment of probes and product samples using the ‘target centring’ rings provided on the flat insert. PTFE insulating pillars provide a thermal barrier to minimise heat transfer between the sample under test and the Texture Analyser. The platform is attached with ‘easy to adjust’ screws for simple installation. An optional product catchment drawer is available.

All attachments having a code prefixed with HDP must be used in conjunction with the HDP/90 heavy duty platform to ensure their correct operation.

Spherical (ball) probes with 0.25"-1.0" diameters (6.25-25.4mm) and one hemispherical probe are available. They are used to measure the fracturability characteristic of crisps (which are also known as chips) and other snack products. They can also be used for indentation tests to measure the surface hardness of fruit, cheese and packaging materials and are often preferred to penetrate samples which have an uneven surface.

SPHERICAL

Comparison of the firmness and stickiness of two brands of cheese spread triangles

CONICAL

Measurement of spreadability/softness of butter and margarine using a conical probe

MULTIPLE

Comparison of firmness of two preserves using the Multiple Puncture Probe

HDP/CAT Product Catchment Drawer
Granule hardness/compressibility testing is important to provide an indicator of the tabletting potential of some materials, or a measure of friability or compaction strength of granules. Where granules are irregular in form, the testing of single granules is discouraged as repeatability is compromised. In this instance, the testing of a fixed area of sample creates an averaging effect and improves the repeatability of the results.

The Granule Compaction Rig provides a circular testing area into which the sample is contained before compression with a cylinder probe of similar diameter to the testing area. Normally, the maximum force and energy (area under the curve) are taken and used as an indication of hardness. The higher the force and energy required to compress, the more difficult it will be to form the granules into tablets.

Measurement of fracturability of a tortilla chip using the Crisp Fracture Support Rig
Measurement of hardness of peas using the Multiple Pea Test Rig
Firmness measurement of French fries using the Multiple Chip Rig
The TTC Spreadability Rig measures the ease with which a product, such as margarine and table spread, can be applied in a thin, even layer. It comprises of a male 90° cone probe and five precisely matched female perspex cone shaped product holders.

The material is either deposited and allowed to set up in the lower cone holders in advance of testing or is filled with a spatula and then the surface levelled. The sample holders can be stored in frozen, refrigerated or ambient environments before testing of the sample.

The product is forced to flow outward at 45° between the male and female cone surfaces during the test, the ease of which indicates the degree of spreadability. Withdrawal of the cone probe from the sample provides information about adhesive characteristics which may be present.

This cell measures the compression force required for a piston disc to extrude a product through a standard size outlet in the base of the sample container. The sample container can accommodate base discs with outlet diameters of 3, 5, 7 or 10mm diameter, their selection depending upon the consistency of the sample. The complete sample container is located into a centralising insert fitted into the Heavy Duty Platform and a piston disc is attached to the loadcell using a probe adapter.

Products suitable for this type of test include baking fats, sauces, pastes, gels and viscous liquids.

This rig comprises of a sample container which is centrally located beneath a disc plunger. The disc plunger performs a compression test which extrudes the product up and around the edge of the disc.

This test measures the consistency of viscous products such as yoghurt, creams and sauces as well as processed fruit and vegetables. Results relate to measurements of viscosity. Three discs of different diameters are provided. Usage depends on the type of product to be tested and whether it contains any particulates such as found in soups or jams.

The cheese extensibility rig consists of a microwavable vessel and double-sided fork probe. The vessel and fork assembly is filled with a known weight of cheese and microwaved (A/CE) or oven cooked (A/CEA) until the cheese is molten. A sample retaining insert is added to the vessel and the vessel/fork assembly slides into the fixture base, which is securely fastened to the Texture Analyser. The fork is connected to the load cell via a rapid locating adapter.

The Texture Analyser pulls the fork through the molten cheese allowing the extensibility and resistance to extension to be measured. Cheese strength and extensibility are important textural attributes for many foods, most notably pizza.

**Measurement of the spreadability of margarine**

**Measurement of forward extrusion forces of yoghurt**

**Comparison of consistencies of full-fat and low-fat mayonnaise when subjected to backward extrusion**

**Measurement of extensibility properties of a cheese sample**
Attachments with code prefix HDP must be used in conjunction with HDP/90 Heavy Duty Platform

**LIGHT KNIFE BLADE**
A/LKB

This fixture consists of a small perspex blade that locates directly into the loadcell. It is used for small samples which require limited force to cut or break. The sample can be placed either on the HDP/90 Heavy Duty Platform or directly on the base of the Texture Analyser. This blade is an ideal alternative to the Knife edge blade, which is included in the Blade set.

**BLADE SET**
HDP/BS HDP/WBV HDP/WBR

The HDP/BS blade set comprises a Warner-Bratzler blade, a reversible blade, a slotted blade insert and a blade holder. The reversible blade has a knife edge at one end and a flat guillotine edge at the other.

In operation, the blade is firmly held by means of the blade holder which screws directly into the Texture Analyser. The slotted blade insert is located directly into the Heavy Duty Platform and acts as a guide for the blade whilst providing support for the product.

Suitable selection of one of Stable Micro Systems blade/knife options can provide a useful determination of ‘bite force’ of a product.

HDP/WBV Warner Bratzler Blade Set with ‘V’ slot blade for USDA Standard
HDP/WBR Warner Bratzler Blade Set with rectangular slot blade

**CRAFT KNIFE ADAPTER**
A/CKB
**EXTENDED CRAFT KNIFE**
A/ECB

This fixture accommodates a standard 50mm wide craft blade and enables precision cutting of samples. Hard products can be cut whilst providing a ‘disposable’ blade option if blade blunting is of concern.

The blade thickness (0.6mm) enables precision cutting of very small samples (e.g. nuts, seeds) or shearing without compression of very soft or brittle samples (e.g. laminated pastry). A high density polythene cutting block and 10 spare blades are provided.

The Extended Craft Knife version accommodates a replaceable 0.9mm thickness blade supported on a 115mm wide frame. This enables the cutting of deeper and wider samples with a maximum sample width of 100mm.

*Note: Protective goggles or other eye protection are recommended when using this attachment.*

**MEULLENET-OWENS**

Tests using the MORS blade are conducted on whole intact fillets which minimises the experimental errors attributable to sample preparations, shortens sample preparation time and leads to a simpler testing solution.

This method will thereby provide advantages over existing poultry breast meat tenderness methods as it could significantly save labour, time and expertise to implement for routine quality control.

Measured forces are also substantially lower than those produced with a Kramer Shear test, thereby allowing testing on a TA.XT plus Texture Analyser.

**Comparison of "al dente" texture of spaghetti at three different cooking times**

**Cutting force of hot dogs using a Warner-Bratzler blade**

**Measurement of laminated pastry crispness using the Extended Craft Knife**

**Chicken breast tenderness using the MORS blade**
Two versions of the Kramer Shear Cell are available. The 10 bladed HDP/KS10 must be used with a 50Kg loadcell or greater. The 5 bladed HDP/KS5 can be used with a 25Kg or 30Kg loadcell for soft products but a 50Kg loadcell or greater is recommended. Easy locating adapters ensure fast blade removal for cleaning and replacement or further testing. Cells have perspex front panels for precise positioning of the blades close to the sample, and easy removal for cell cleaning.

The cell is used for analysing multi-particle products such as cereals and pickles in sauce together with fruit and vegetables. This test applies a combination of compression, shearing and extrusion.

The Miniature Kramer/Ottawa cell is particularly suited to reduce the force of bulk shearing/compression of multi particle products or non-uniform products. It attaches to the HDP/90 Heavy Duty Platform. A 5-bladed head or compression platen can be attached to the arm of the texture analyser depending upon whether a shearing or bulk compression/extrusion test is required.

By reducing the volume used in this rig, smaller forces are produced during the test thereby making it ideal to use with the single column Texture Analyser.

The AACCI Standard Method 56-36.01 for determining firmness of cooked pulses uses the HDP/MKS to compress and extrude the sample and provide an indication of the cooking quality.

This comprises of upper and lower wedges each with a cutting angle of 30° and 30mm width. The lower wedge is fixed directly to the base of the Texture Analyser and the upper wedge is connected directly to the loadcell. Typical examples include cheese and vegetables which are held on the lower wedge and the force to fracture is measured. The maximum sample width is limited to 30mm.
ATTACHMENTS FOR BAKERY PRODUCTS

The Bread V Squeeze rig enables testing of the softness and springiness of both packaged and unpackaged loaves, thereby giving a good indication of freshness.

A common way to test the softness of a loaf is by squeezing it between the thumb and fingers, creating a ‘V’ shape with the hand. The rig imitates this process and allows repeatable, scientific analysis of the freshness and appeal of bread. It consists of ‘V’ shaped rounded ‘fingers’, which are lowered onto a packaged or unpackaged loaf, and the force required to compress the bread is measured.

Post-test calculations are then used as an indication of freshness – the lower the force and higher the value of springiness, the fresher the loaf. This non-destructive test offers simplicity and speed as the loaf requires no sample preparation and can be analysed within the packaging.

*Community Registered Design

Comparison of freshness of two types of packaged loaves of bread

Comparison of biscuit dough firmness of three different formulations

Comparison of toughness of bread induced by microwave heating for different times

Extensibility of dough/gluten using the Kieffer Dough & Gluten Extensibility Rig
This rig comprises two four-pronged attachments. The upper attachment fits directly to the load cell and the lower to the base of the texture analyser. The rectangular shaped test sample is positioned on the attachments using the prongs. The tensile force and extension to break the sample is measured and used as an indication of pizza toughness.

The Stable Micro Systems’ Chen-Hoseney Dough Stickiness Rig, is an improved version of the widely used and acclaimed original development by Prof. Carl Hoseney and Dr. WeiCh Chen at Kansas State University. The Stable Micro Systems’ version offers all the advantages of the original but with added durability, ease of use and ease of cleaning.

The accuracy of the stickiness result is ensured by using a lapped finish cylinder probe, which has a uniform adherence surface, to make the measurement.

Examples of research to date include the investigation of dough stickiness due to overmixing, addition of excess water, overactivity of proteolytic enzymes, difference in wheat varieties and composition.

This fixture has been developed to perform extension and elasticity measurements on laminated pastry and tortilla dough. It can also provide secure and rapid location for many types of thin or sheeted samples. The rig consists of two plates that can be bolted together with the sample sandwiched between. The plates have holes through their centres which expose a circular section of the sample allowing a 1” Spherical probe to be pushed through. It also accommodates a smooth support ring which prevents the breakage of samples at the inside edge of the holding plates.

Other applications could include burst testing on packaging films allowing the operator to measure strength, recovery and elasticity.

The D/R Dough Inflation System measures dough extensional rheology under conditions of strain similar to those of baking expansion, and enables the rheological properties of both dough and gluten to be measured during biaxial stretching.

The system combines ease of use with automatic data collection and rapid project based data analysis. The procedure requires minimum handling of the dough when preparing samples. Typical results include:

- Baking strength
- Tenacity
- Extensibility
- Elasticity
ATTACHMENTS FOR PASTA PRODUCTS

Attachments with code prefix HDP must be used in conjunction with HDP/90 Heavy Duty Platform  *Community Registered Design

SPAGHETTI FLEXURE RIG
A/SFR

This rig measures the compression and flexure characteristics of uncooked spaghetti which is of interest when investigating possible inherent weakness due to sprout damage of the durum wheat or incorrect drying procedures.

The test sample is located between upper and lower supports in centrally located holes. The upper support is directly connected to the loadcell and the lower support to the base of the texture analyser. Test samples of 100mm are prepared and the average force and distance to break is measured. Attention is paid to fluctuating force before final break which would indicate weaknesses. These measurements give a good indication of the suitability of the product for packaging and transportation.

PASTA FIRMNESS/STICKINESS RIG
HDP/PFS

This rig is used to measure the firmness and stickiness of cooked pasta. Strands of pasta or pasta sheet are held on the texture analyser using a support block which accommodates a rectangular section exposing the pasta.

A rectangular compression platen is connected the loadcell and is used to determine the firmness of the pasta during the compression stroke and the stickiness upon probe withdrawal.

SPAGHETTI/NOODLE TENSILE RIG
A/SPR

This tensile rig is ideally suited to perform break strength and elasticity measurements on both noodle and spaghetti samples. The sample is located through slots in the parallel friction rollers and then wound round two or three times to reduce any slippage and also to anchor the sample ends.

The rollers ensure that the sample is not split or cut during the test and that the break occurs along the extended part of the sample.

NOODLE/PASTA LOOP TENSILE RIG*
A/NPLT

The Noodle/Pasta Loop Tensile Rig comprises of a unique annular sample cutter, hand press and sample mounting washers that fit to the Spaghetti/Nooodle Tensile Rig. This fixture adapts the Spaghetti/Nooodle Tensile Rig for use with sheet dough samples.

The unique cutter produces an annular sample that has been designed to promote failure away from the sample mounting points. Failure within the gauge length of the sample is imperative to ensure good quality test data. This rig allows noodle/pasta extensibility and tensile strength to be determined. These are important properties for assessing the quality of ingredients and the effect of formulation and additionally how dough may withstand further processing during manufacture.

COOKED PASTA QUALITY/FIRMNESS RIG
A/LKB-F

This fixture is identical to the A/LXB (see page 8) except for a 1.0mm flat which is machined along the knife edge. A flat perspex insert to fit the HDP/90 is also provided. This system complies with AACC Method 16-50.

Measurement of bend and fracture resistance of uncooked spaghetti using the spaghetti flexure rig
Measurement of firmness and stickiness of spaghetti
Measurement of elasticity and tensile strength of noodles
Comparison of extensibility of two types of lasagne
This device allows the measurement of burst strength of thin, film-like foods such as the increasingly popular breath strips, nori, leaf gelatine, wafer thin meats or rice paper.

During a test, the maximum force to rupture the product (burst strength) is recorded. The additional measurement of resilience and relaxation of a wide range of food products broadens the application of this rig, which can also assess mechanical properties of sheet packaging materials.

The large three point bend rig provides a base with graduated variable support length up to 240mm and accommodates samples up to 90mm wide. The small three point bend rig provides a variable support length up to 70mm for a sample width of up to 80mm. Typical applications include measuring freshness (by assessment of rigidity or flexibility) of vegetables and the break strength (or brittleness) of bread sticks, biscuits and chocolate bars.

Using this rig, cone strength is defined as the amount of force required to cause breakage, when a ball-shaped object of specified diameter and weight is pressed into the cone using a compression platen whilst the cone is supported by the rig. This simulates the stress imposed when an ice cream scoop is forced into the cone.

This rig allows the determination of rice kernel resistance to extrusion after cooking according to ISO 11747. Resistance to extrusion is measured as the mean force (over the plateau region of its curve) to push the cooked rice through a perforated plate using compression and shear.

Assesses firmness of block forms of butter, margarine, cheese using a fine wire.

The Ottawa Cell is the basis of the Ottawa Test Measurement System (OTMS) and is comprised of a square section test cell and loose fitting plunger. Test samples, which include fruit, vegetables and pulses, are extruded through an extrusion plate located in the base of the cell. Extrusion plates feature holes, wire, blades or bars, to suit the sample and are supplied separately.

A watertight base and liquid catchment tray expands the range of products which may be tested using this attachment, such as ‘bowl life’ assessment of breakfast cereals.

**Film Support Rig**

**HDP/FSR**

**Three Point Bend Rigs**

**A/3PB HDP/3PB**

**Ice Cream Cone Support Rig**

**A/ICC**

**Ottawa Cell and Plunger**

**A/OTC**

**Rice Extrusion Rig**

**HDP/RE**

**Butter Cutter**

**A/BC**

**Ottawa Cell Accessories**

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Comparison of burst strength of fresh and 13 day old Breath Strips

Measurement of fracture of breadsticks when subjected to three point bend

Comparison of cutting force (firmness) of butter and margarine using the Butter Cutter

Measurement of hardness and crispness of breakfast cereal flakes using an Ottawa Cell
The friction rig comprises a support leg and levelling feet which are fixed to the Texture Analyser, so that the assembly can be laid in a horizontal position. A platform is fitted to the base on which a friction sled, which is attached to the load cell, is constrained to slide over the sample.

Additional load may be provided by adding weights positioned centrally on the sled. This arrangement offers the advantage of measuring sliding friction in both directions and also during cycling. Typical applications include films, creams and packaging.

This rig is used to determine the static and dynamic coefficient of friction for plastic film and packaging materials. It meets the requirements of ASTM D 1894-90. It can be used to determine the friction characteristics of material sliding over itself as a reference material or other substances under specified test conditions.

The reference material is fixed firmly to the base and the test material to the sled. This sled is 63.5 x 63.5 mm and weighs 200 +/- 5 g. The sled is pulled across the reference material at a constant speed and the force measured. The coefficient of friction is determined from these results.

This is a device which quantifies the force required to extrude the contents of sachet and tube style packaging and was designed to allow food manufacturers to gauge the ease of removal and application of products such as icings, sauces, pastes and purées.

Removal of the contents relies on the consumer’s ability to squeeze the packaging, and on the consistency of the product, assuming the aperture of the tube/sachet remains constant. Product developers can analyse changes in a product’s consistency throughout its shelf-life and adapt formulations accordingly whilst also enabling manufacturers to assess the suitability of packaging material and its construction.

A rectangular compression platen is employed to assess the compression strength of packaging, such as egg boxes and cardboard boxes. Compression strength data can assist manufacturers in determining the allowable stacking height for transportation and in a retail environment. Manufacturers can also directly measure the effect of applied force (simulation of stacking) on a packaging box over a defined time period. Test data provides an accurate way of assessing the overall strength of a filled container and determining if the product/package will survive the compression loads expected within distribution.

The aluminium compression platen is mounted to the load cell via a cross-pin adapter. Compression testing of packaging is likely to generate or require application of high force levels; as such a TA.HDplus is recommended for these types of tests.

Comparison of ease of spreading of full-fat and low-fat cream cheese.

Static friction (stiction) and dynamic friction characteristics of packaging film.

Assessment of extrusion characteristics of a fondant tube.

Measurement of crush resistance of packaging.
This test method provides a means of assessing probably the most important and yet the hardest to measure property of pressure sensitive materials, the tack. The test performs a loop tape method according to FINAT method no. 9. This allows the end user to compare the "initial grab" or "application tack" of different laminates and can be extremely useful to those working with automatic labelling equipment where this property is of particular importance. The ‘Quick-stick’ tack value of a pressure sensitive material is expressed as the force required to separate, at a specified speed, a loop of material (adhesive outermost) which has been brought into contact with a specified area of a standard surface.

This test is for adhesive tapes and uses a 1 inch stainless steel ball probe to ensure contact consistency for effective adhesiveness measurement. Double-sided tape is recommended to mount the test sample such that the effect of facestock stiffness on test data is minimised. The measurement involves both bonding and debonding in a controlled manner to provide an accurate and complete stress-strain profile.

Using this device a 90 degree peel angle is maintained by the use of a cord and pulley system. A strip of tape is applied to the test bed or other standard surface of interest (according to customer specifications). The tape is peeled from the panel at a 90° angle at a specified rate, during which time the force required to effect peel is measured. The test is commonly used for quality assurance purposes where the minimum or maximum peel values expected for a particular tape can form an acceptance criteria.
The gripping action of the A/TG tensile grips is provided by a screw initiated vice clamp operating on knurled jaw faces of 35mm x 35mm. They are general purpose grips suitable for holding samples which have a uniform rectangular shape and a maximum thickness of 25mm.

The A/MTG has jaw faces of 25mm x 10mm with a maximum opening of 8mm. Used for assessment of tensile characteristics of samples such as packaging materials, plastic and aluminium film; and also (in a cycling motion) the flexibility of e.g. chewing gum sticks and confectionery leathers.

The A/ATG Articulated Tensile Grips are lightweight grips which have been designed for the gripping of thin materials whilst providing a good degree of rotational flexibility during the tensile test. This allows for product distortion which may be necessary for unevenly adhered products like packaging and makes loading of difficult samples easier.

Spring loaded cross-hatched rollers provide the self-tightening mechanism by which samples up to 45mm wide and 10mm thick are gripped. These grips are ideal for measuring the tensile strength and tear characteristics of a wide range of materials which have a smooth surface finish or whose physical characteristics alter when a tensile force is applied. Typical examples include snack product packets and seal strength tests.

A/HDT vice action tensile grips have a maximum holding capacity of 500kg (5kN). The jaw faces are 50mm wide and 30mm high and have a knurled finish as standard. Jaw faces with different finishes can be supplied to special order. The grips will accommodate samples up to 12mm maximum width.

A/HDG vice action tensile grips have a maximum holding capacity of 100kg (1kN). The jaw faces are 30mm wide and 30mm high, however, the design of the grips enables jaw faces up to 100mm wide and 30mm high to be accommodated.

Applications include geo-textiles, polymers and heavy-duty packaging and can be used to determine the tensile characteristics of any uniform material that can be accommodated within the grip profile.

Significant improvements have been made to previous designs of peel rig for evaluating the quality and strength of container seals and adhesive bonds. The universal peel rig consists of a multi-position platform which is adjustable to allow the container to be held at 0, 45 and 90 degrees. The platform is screwed securely into position on the base of the Texture Analyser to suit the container. An adjustable rubber strap accommodates different sized containers and multiple shapes. When attached to the peel tab of the container, a low profile peel clip and post maximise the peel length for use on a standard height Texture Analyser.

In combination with Exponent software, the appropriate test fixture produces fast, accurate results for comparing batches in packaging and adhesive quality control and product development programmes.
ACCESSORIES

EGG SUPPORT
A/ES

CIRCULAR SAMPLE SUPPORT
A/CS

The Egg Support provides stable support for egg penetration/compression tests with the ability to retain any potential fluid expressed.

The Circular Sample Support can accommodate circular, spherical or irregular shapes which do not sit easily on the Texture Analyser surface or Heavy Duty Platform.

CONFECTIONERY HOLDER
HDP/CH

When needing to assess the stickiness of a product such as confectionery, the product must be held down, otherwise the sample would be lifted up when the probe attempts to withdraw. This holder comprises a base plate on which a second plate is supported by spring loaded screws. A confectionery sample is located between the plates so that a portion of it is exposed. This allows complete penetration and withdrawal from the sample, through the holes in the plates, whilst avoiding sample slippage or movement.

The aperture of the top plate is 9mm and therefore limits the test to that of penetration using a probe with a maximum diameter of 8mm.

LOADCELLS

Loadcells are interchangeable and calibrated over 0-100% of their range. They are supplied in a protective case with full instructions and all installation tools.

Calibration Weights available separately.

Max. Load | PL Loadcells for TA.XTplus | HDPL Loadcells for TA.HDplus | XPS Loadcells for TA.XTExpress
---|---|---|---
500g | PL/CEL0.5 | HDPL/CEL0.5 | XPS/CEL0.5
5Kg | PL/CEL5 | HDPL/CEL5 | XPS/CEL5
10Kg | - | HDPL/CEL50 | XPS/CEL10
30Kg | PL/CEL30 | HDPL/CEL30 | -
50Kg | PL/CEL50 | HDPL/CEL50 | -
100Kg | - | HDPL/CEL100 | -
250Kg | - | HDPL/CEL250 | -
500Kg | - | HDPL/CEL500 | -
750Kg | - | HDPL/CEL750 | -

TRANSPORTATION CASE
PL/CAS

This case accommodates a single column texture analyser with additional space for accessories and tools. The watertight case is made from lightweight, strong HPX Resin with in-line wheels, 2 padlockable hasps, telescoping handle, four soft-grip handles and seven press and pull latches.

DUST COVERS
PL/DUS PL/DUS/EX HDPL/DUS XPS/DUS

These dust covers are made from waterproof light grey nylon with mid-blue rib edging. Covers are available for all models of Stable Micro Systems Texture Analyser. They provide excellent environmental protection for the instrument when not in use.

CORE BORER
SP/CB

For the preparation of repeatable diameter samples by insertion into the sample mass.

SHATTER SCREEN
XT/SHT

FLEXIBLE CLAMPING ARM
XT/FCA

REMOTE SWITCH
XT/RS

This USB User Programmable Remote Foot Switch is able to replicate a keystroke combination, for example to commence a test or for any defined Exponent shortcuts, up to 2.5m away from your PC.

The Flexible Clamping Arm allows for a good degree of flexibility around the testing area. A strong clamp is positioned on the end of the arm which possesses spring-loaded jaws to hold a device firmly in place.

CONSTRUCTION BORER
SP/CB

MATERIALS HANDLING PLATFORM
HDP/MP

For the preparation of repeatable diameter samples by insertion into the sample mass.
Thermal cabinets solve the problems usually associated with the testing of hot and cold foods such as molten cheese or ice cream. Samples can be allowed to equilibrate to the required temperature before testing is performed within the cabinet.

Thermal cabinets with liquid nitrogen cooling and electric heating provide an accurately controlled temperature environment over the temperature range of -40°C to +180°C.

The temperature controlled Peltier Plate provides a stable surface temperature for testing small or thin products such as pressure sensitive adhesives or films. This ensures that temperature effects are either minimised or are able to be accurately investigated. A Peltier Control Unit is provided on which temperature is set and displayed. The surface dimensions are 110mm x 100mm and maximum operating temperature is 80°C to a minimum of 30°C below ambient.

The Peltier Cabinet provides a temperature controlled environment using PID control with an operating range from 80°C to 20°C below ambient. It is fixed directly to the base of the texture analyser via nylon insulating pillars that provide a thermal barrier from the instrument. Samples are allowed to equilibrate to the required temperature before testing is performed. A double walled transparent hinged door allows the sample to be seen during testing. A Peltier Control Unit is provided on which temperature is set and displayed. A total internal height of 85mm provides a testing area suitable for many typical sample sizes.

A PT100 thermocouple probe that plugs directly into the PT100 connector and gives direct measurement over the temperature range -50°C to +250°C. Two probes can be connected via the PT100 ports to log data simultaneously from separate locations.

Exponent software is integrated to the Stable Micro Systems Measurement and Control products so that it can set-up and automate tests at specific temperatures. Quick temperature changing may be of benefit, but more important is the ability to measure, capture and display temperature and humidity data in real time during a texture analysis test plotting via a second y axis.

This module adds to the versatility of the Texture Analysers by providing the facility to capture temperature and humidity data during a test.

When Exponent software is used the temperature is sampled every ten seconds and recorded with the texture analysis data. Up to four modules can be connected at one time to the Texture Analyser via the RS485 port to log data simultaneously from up to four locations.

The Hygroclip is a product designed according to ISO 9001 and meeting EN50082-2 EMC requirements. It has an operating range of 0-100%RH (relative humidity) and -30°C to 100°C. Accuracy at 23°C is ±2.5%RH and ±0.3°C.

As this device is not for insertion into a product, a Flexible Clamping Arm is also included for fixed positioning of the probe close to the measuring area.
This device provides a means of measuring the acoustic energy release during a physical test. Acoustic emission in the audible range up to 12kHz is measured and transformed into an analogue voltage that represents the amount of acoustic energy release from the product as a function of time. This voltage is typically measured using one of the Auxiliary ports of the TA.XTplus/TA.HDplus Texture Analyser, whilst the instrument simultaneously measures the mechanical response of the product in force, distance and time.

Detailed analysis and research have allowed the design of an Acoustic Envelope Detector that has high sensitivity to the frequencies emitted by such crispy or crunchy products but low sensitivity to any mechanical noise emitted by the Texture Analyser.

Some Texture Analysis tests occur either very quickly or there are transient events during the test that are easily missed. Such characteristics can be due to the brittle or ‘crunchy’ nature of the product or to the test protocol, such as the rapid probe withdrawal during the adhesive ‘stick’ test.

Due to the speed of events, visually the test features may be missed and therefore, video capture of the test that allows for replay will be of use. Video playback can also identify anomalies in the result when retesting at a later date may not be possible due to sample availability or the limitation of time.

A Powder Flow Analyser is an accurate and reliable method of measuring the flow characteristics of powders. It can be rapidly fitted to a Stable Micro Systems’ Texture Analyser which enables manufacturers to assess and avoid typical problems such as batch and source variation of ingredients, caking during storage/transportation and problems with discharging from hoppers or bins.

Samples are placed in a standard (140mL) or small (25mL) borosilicate glass vessel; allowing users to observe the powder as the sample is displaced. The powder is conditioned at the beginning of each test to eliminate any variations in loading and the precision-engineered, patented blade is then rotated through the sample, causing “controlled flow”.

Stable Micro Systems’ Powder Flow Analyser is supplied with library tests so operators can start testing quickly and conveniently after straightforward installation and calibration. Users can, however, fully program the instrument to carry out slicing, shearing, compressing, compacting and aerating cycles in any combination.

During the test, axial force, time and distance are measured by a sensitive transducer and data is displayed and analysed in real time by Exponent software. Sample results can be ranked and compared to assess the impact of external conditions including humidity and moisture content, surface properties, electrostatic charge and particle or granule size, shape and distribution.

The Automated Linear Indexing System (ALIS) enables the loading of multiple test samples prior to testing and does not require constant supervision by the user during testing.

It is integrated seamlessly with a TA.XTplus texture analyser with quick and easy set-up and sample mounting. Test specimens are typically located in bespoke support plates; then, with prompted steps, testing conditions are set, tests are performed, and results are reported with little or no operator involvement. Testing can then be performed with ‘walk-away’ time for skilled technicians to perform more sophisticated tasks while accurate, repeatable testing information is generated automatically.

Exponent software provides for entry of set-up parameters that define the configuration of the test such as test speed, degree of deformation, speed of data acquisition, in a project based environment. A Batch Testing interface facilitates a multiple testing protocol that moves the platform in either direction for regular or irregular spaced samples. The ability to add customisable operator prompts allows warning messages and instruction to the user to be configured, providing improved operator safety and elimination of operator errors.

The Automated Linear Indexing System is available in two platform lengths – 250mm and 600mm – and has two modes of operation. The platform can either be moved and paused for the testing of each sample, or can be moved constantly at the same speed as the texture analyser’s arm, which is ideal for peel testing, for instance.

Test result of compression of a breakfast cereal.
Force/Time is shown on the upper curve and Acoustic Emission/time on the lower curve.
Both data sets are synchronised to the same time scale.
Note that (1) and (2) indicate coincident force and acoustic emission peaks.
**SERVICES**

**UNRIVALLED APPLICATION SUPPORT AND DEVELOPMENT**

Stable Micro Systems are totally dedicated to scientific texture analysis. Our range of Texture Analysers is internationally recognised as the ‘complete’ instrument and your passport to the advancing world of texture analysis.

At Stable Micro Systems we do not just manufacture texture analysers; we strive to provide our users with continual information to enhance their instrument understanding and increase the background knowledge available to them.

Through our continued co-operation with universities and research establishments involved in texture analysis, and our in-house product testing and method development laboratory, we aim to provide you with the most up to date applications information and to offer you the most comprehensive range of attachments and analytical techniques available.

As well as offering a design service for new attachments, users benefit from free software updates and a dedicated applications support team that will endeavour to exceed your expectations.

Our software is written in-house, giving us the ability to rapidly add required features suggested by our users, providing unmatched, continuously enhanced software, dedicated to texture analysis. We constantly strive for improvement and pride ourselves on our quality of customer support throughout the world.

**Application Studies**

Our Application Studies library is perhaps of primary importance to you. These studies demonstrate a viable test method for a wide range of specific products, and also act as an ideal starting point for studying similar products. Detailed reports present typical results and interpretation.

Test methods can be chosen by **Product Type**, by **Probe/Fixture** available, by **Textural/Physical property** or according to a **Standard Method**.

**ONLINE TESTING ADVICE SERVICE**

We would like to help you to get the most from your Texture Analyser by enabling direct contact to our in-house application laboratory from which useful testing advice can be given confidentially and free of charge. We are confident that our laboratory services demonstrate our commitment to the ‘complete system’ philosophy.

**MACRO / SEQUENCE WRITING SERVICE**

If you would like us to help you to write a macro or special sequence for your Texture Analyser, our online form will enable you to supply us with your bespoke analysis requirements.

**SOFTWARE TROUBLESHOOTING**

Often customers have a requirement to train new staff and, coupled with the rapid advancement in computers and their operating systems, customers have the need to call us for technical advice. Our team of Software development and support engineers are available to troubleshoot your software problems.

**WORLDWIDE SALES / TECHNICAL SUPPORT**

Handpicked distributors are specifically trained to meet your testing and analysis needs.

**Rappresentante per l’Italia**

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