



Food Testing Machines



F Series Machines

Tinius Olsen, one of the world's leading manufacturers of materials testing machines, offers a machine specifically for analysis of food textures. The F series food texture analyzer is a simple, accurate, flexible, and powerful machine that is ideally used for common texture tests such as TPA, puncture, back extrusion, deformation, snap, puncture, shear, extrusion and related tests on applications up to 200 lbf (1 kN).

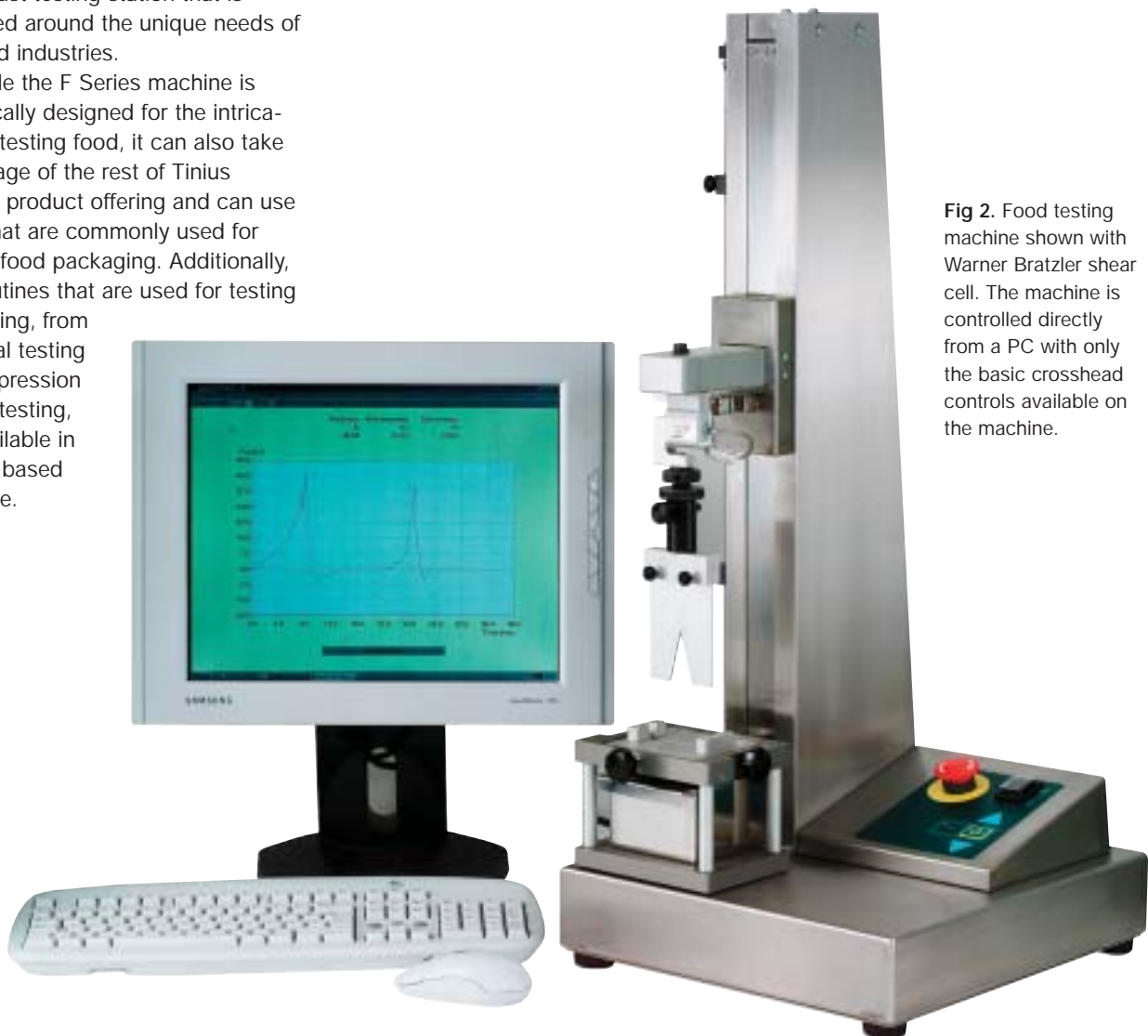
The machine can be fitted with a variety of special grips, probes, and cells, specifically engineered for testing food. When combined with our powerful testing software, the resultant system becomes a flexible yet robust testing station that is designed around the unique needs of the food industries.

While the F Series machine is specifically designed for the intricacies of testing food, it can also take advantage of the rest of Tinius Olsen's product offering and can use grips that are commonly used for testing food packaging. Additionally, test routines that are used for testing packaging, from frictional testing to compression or tear testing, are available in the PC based software.

Fig 1. Food tester being cleaned with water after testing. The surgical grade stainless steel construction of the food tester makes this possible without damaging the machine.



Fig 2. Food testing machine shown with Warner Bratzler shear cell. The machine is controlled directly from a PC with only the basic crosshead controls available on the machine.



Key Features

- Surgical grade stainless steel construction allows for quick and easy hose down and cleaning.
- PC control via high speed RS232 using ASCII mode and our proprietary super high speed binary mode.
- Machines are proof loaded to 200% of capacity.
- Force accuracy of 0.5% of applied load across the load cell display range.
- Built in intelligent active force and displacement alarm system.
- 32 bit precision motor controller.
- Displacement resolution of 0.0001 mm (in binary mode).
- Speed resolution of 0.001 mm/min.
- 150% mechanical overload capacity on each interchangeable load cell.
- 20% digital tare while maintaining full load cell capacity.
- Automatic motor drive alarms that monitor over/under voltage, current, and temperature.

Features of single column machines

- PC control via high speed RS232 using ASCII mode and super high speed binary mode.
- Force accuracy of 0.5% of applied load across the load cell display range.
- Built-in intelligent active force and displacement alarm system.
- 32 bit precision motor controller.
- Displacement resolution of 0.0001 mm.
- Speed resolution of 0.001 mm/min.
- 150% mechanical overload.
- 20% digital load tare while maintaining full load cell capacity.
- Automatic motor drive alarms that monitor over/under voltage, current, and temperature.



Fig 3. Puncture probes are used to determine the ripeness of various fruits. Here you can see the simple collection tray after testing some ripe watermelon.

Technical Specifications

MODEL		H1K
CAPACITY	lbf kN kg	200 1 100
MAXIMUM SAMPLE DIAMETER	in mm	6 150
LOAD CELLS		Rapid change, Z beam, load cells with digital encoding for automatic recognition and scaling available — 1 kN, 500 N, 250 N, 100 N, 50 N, 10 N, 5 N
MAXIMUM CROSSHEAD TRAVEL (excluding grips)	in mm	Measurement direct from ballscrew — fully auto scaling of single measurement range 17.5 445
TESTING SPEED RANGE	in/min mm/min	0.00004 to 40 up to 100 lbf, 0.00004 to 20 up to 200 lbf 0.001 to 1000 up to 500 N, 0.001 to 500 up to 1 kN
JOG SPEED	in/min mm/min	0.00004 to 40 0.001 to 1000
RETURN SPEED	in/min mm/min	0.00004 to 40 0.001 to 1000
DIMENSIONS H x W x D	in mm	32 x 14 x 14 820 x 360 x 360
WEIGHT	lb kg	55 25

Specifications:

Load measurement accuracy: +/- 0.5% of indicated load from 2% to 100% capacity; extended range down to 1% capacity with accuracy of 1% of indicated load

Position measurement accuracy: +/- 0.01% of reading or 0.001 mm, whichever is greater

Speed accuracy: +/- 0.005% of set speed

Operating temperature range: 32 to 100°F (0 to 38°C)

Storage temperature range: 14 to 115°F (-10 to 45°C)

Humidity range: 10% to 90% non-condensing, web bulb method

Power: standard optional voltages 220/240VAC, 50-60 Hz, 2000W (power must be free of spikes and surges exceeding 10% of the nominal voltage)

Notes: 1. Load weighing system meets or exceeds the requirements of the following standards: ASTM E4, EN 10002-2, BS 1610, DIN 51221, ISO 7500-1. Tinius Olsen recommends that systems are verified at installation in accordance with ASTM E4 and ISO 75001. 2. Strain measurement system meets or exceeds the requirements of the following standards: ASTM E83, EN 10002-4, BS 3846, and ISO 9513. 3. These models conform to all relevant European CE Health and Safety Directives EN 50081-1, 580081-1, 73/23/EEC, EN 61010-1. 4. Specifications are subject to change without notice.



Fig 4. Both fruits and vegetables can be tested, such as the tomatoes shown here, and any spray from the samples can be simply washed off.



Fig 5. Large and small fruits and vegetables can be tested on the sample test platform. This platform has a holed insert table with a product collection tray located underneath.

Fruits and Vegetables

Magnus Taylor Puncture Probe

The complete Magnus Taylor Puncture Probe set comprises two sets of two cylindrical probes with diameters of 8 mm and 11 mm; one probe has a hemispherically domed end and the other has a flat end. A familiar drill chuck is supplied within which the selected probe is fixed, along with the base support. Additionally, eight flat end probes are supplied that have diameters starting at 1.6 mm and increasing in diameter increments of 1.6 mm up to a maximum of 12.8 mm diameter.

Texture Probe Set

Similar to the Magnus Taylor Puncture probe set, the Texture Probe set comprises a series of flat ended cylindrical probes of various diameters. A drill chuck is provided to mount an individual selected probe. The set comprises seven probes which range in diameter from 0.06 inches to 0.5 inches.

Ottawa Forward Extrusion Unit

The Ottawa Extrusion unit is ideal for food products that use an extrusion process in their manufacture, such as pie fillings, beans, and snack foods. The unit consists of a square piston and cell, and a series of four interchangeable plates that are either perforated or slotted. Foods are extruded through these different plate types in the course of a compression type test.

Back Extrusion Cell

The back extrusion cell is ideal for testing fruits, vegetables, and doughs whose consistency or stickiness would cause a forward extrusion cell to become easily blocked. The principle of operation is to compress the food with a circular piston whose diameter is smaller than the inside diameter of the cylinder in which the food is placed. The compression action forces the food to be extruded back over the piston through the ring created between the piston and cylinder. Four pistons with diameters of 34, 36, 38 and 39.9 mm are provided along with the containment cylinder, which has an inside diameter of 40 mm.



Fig 6.



Fig 7.

Fig 6 and 7. Before and after shots of an aubergine (eggplant) being tested with a texture probe to determine the skin strength.

Screen 1. An example of the test profile of processed peas being tested in a back extrusion cell.



Fig 8.

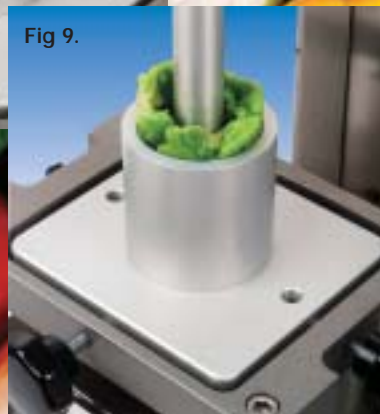
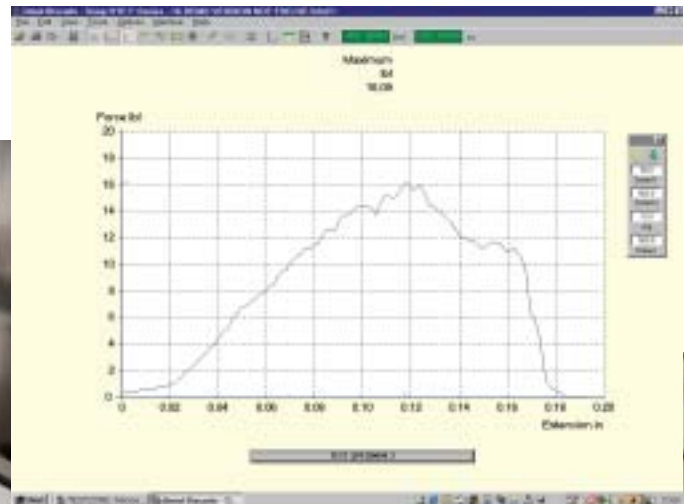


Fig 9.

Fig 8 and 9. Before and after shots of a back extrusion cell being used to determine the consistency of peas.



Meats

Warner Bratzler Shear Cell

The Warner Bratzler Shear Cell is ideal for meats and vegetables and simulates cutting and slicing. The cell comprises four interchangeable plain V shaped shear blades and appropriately sized and guided base plate. The four blades have different V angles of 30°, 50°, 60° and 70°.

Kramer Shear Cell.

The Kramer Shear Cell is ideal for testing the texture of meats, fruits, and vegetables by determining the shear and extrusion forces as a ten bladed compression unit passes along guides, through the food, and out through the appropriately slotted base. This fixture is ideal for determining the texture of meats and other food products such as pie fillings, baked beans, coleslaw, and prepared salads.

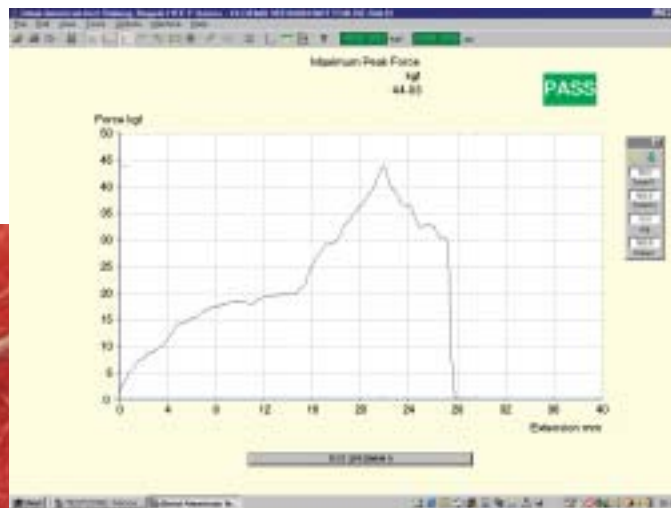


Fig 10.



Fig 11.

Fig 10 and 11. Before and after shots of a frankfurter being sliced in a Warner Bratzler shear cell.



Screen 2. Test profile of some cat food being tested in a Kramer Shear Cell.

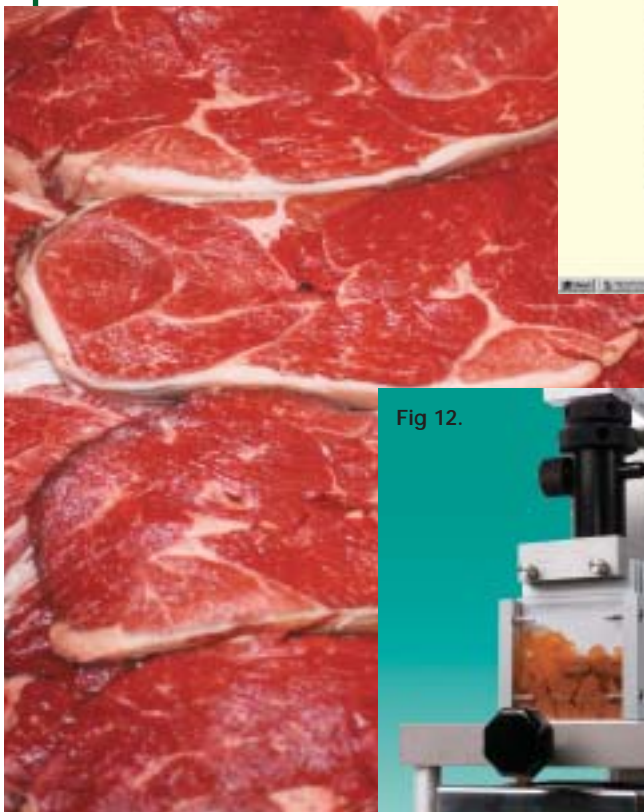


Fig 13.

Fig 12.

Fig 12 and 13. Before and after shots of cat food being checked with a Kramer Shear Cell.

Dairy Products

Food Texture Probes

Tinius Olsen has a variety of standard food texture probes that can be attached to the machine. These conical or spherical probes come in a variety of sizes and are typically used with dairy or gelatin based products.

Conical Probes

Conical probes come in a variety of angles, including 15°, 30°, 45°, 60°, and 90°, and are ideal for determining the spreadability of dairy products and spreads.

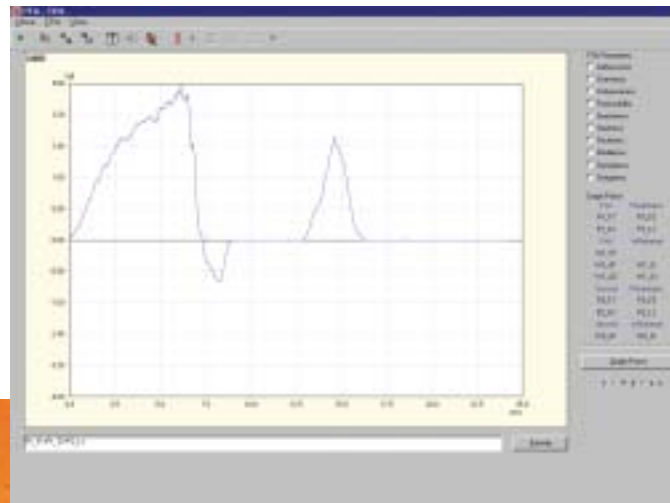
Ball Probes

Ball probes come in a variety of diameters and are typically used to determine product softness. The key principle employed is that the ball probe exerts a compressive force that is applied at a normal angle to all parts of the surface. Diameters of available ball probes include metric sizes of 2 mm, 4 mm, 6 mm, 8 mm, and 10 mm, and English sizes of 1/4", 1/2", 3/4", and 1".

Fig 14.

Fig 15.

Fig 14 and 15. Before and after shots of a conical probe being used to determine the spreadability of margarine.



Screen 3. Texture profile of a ball probe being inserted in some jelly and then removed.

Fig 16.

Fig 17.



Fig 16 and 17. Before and after photos of a ball probe being used to determine the softness of a gelatin based pudding.

Grains and Cereals

Dough Test Attachment

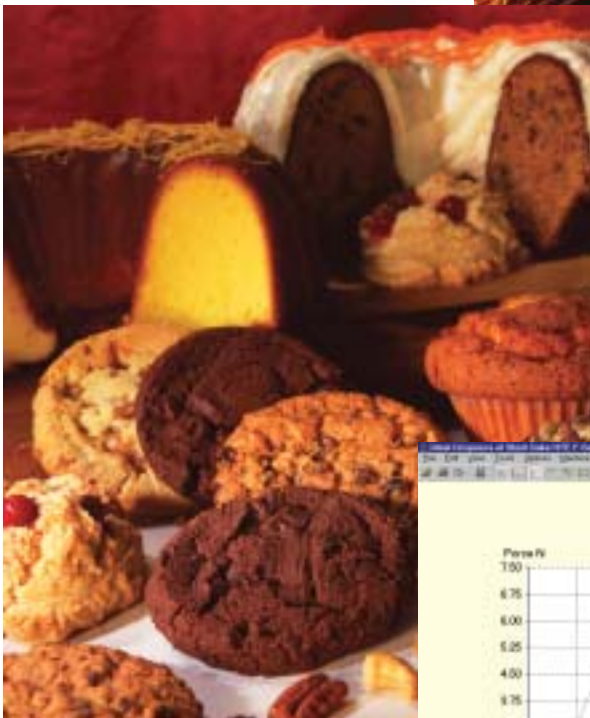
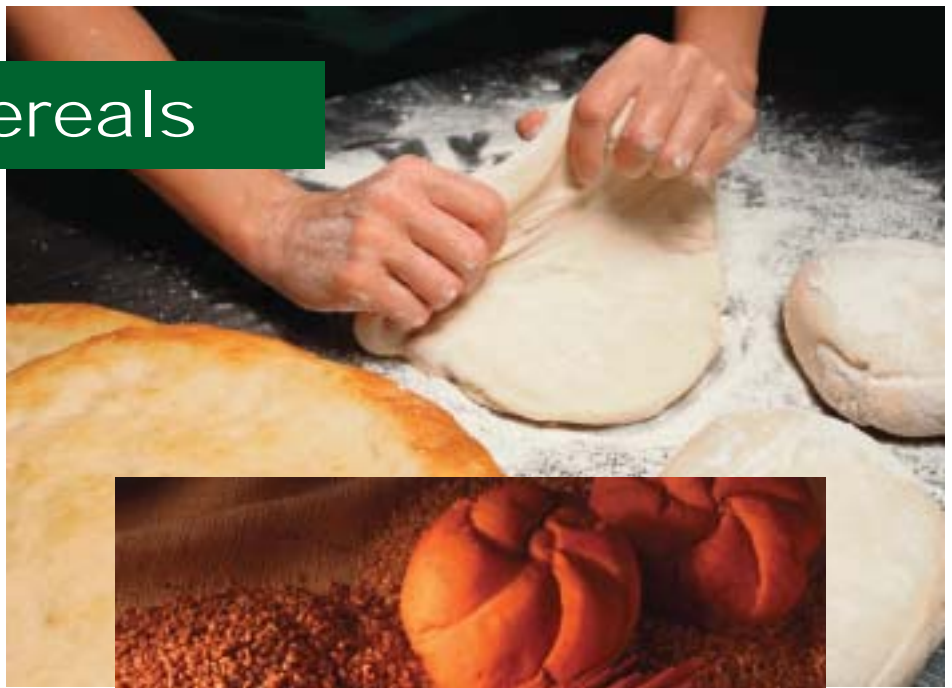
This special jig is used to determine the consistency of dough and comprises a test cylinder, and aeration piston and a normal flat piston. The sample is placed in the test cylinder and any air pockets are removed by the spiked aeration piston, prior to being compressed by the normal piston.

Three Point Bend Attachment

Special three point bend/flexure attachment designed for measuring the bend and snap values of food products such as cookies, cereal snacks, and crackers.

Spaghetti /Noodle Holder

This roller type of grip is specifically designed for tensile testing of food products like spaghetti and noodles.



Screen 4. Test profile of a crisp, or potato chip, being crushed with a ball probe.



Food Testing Software

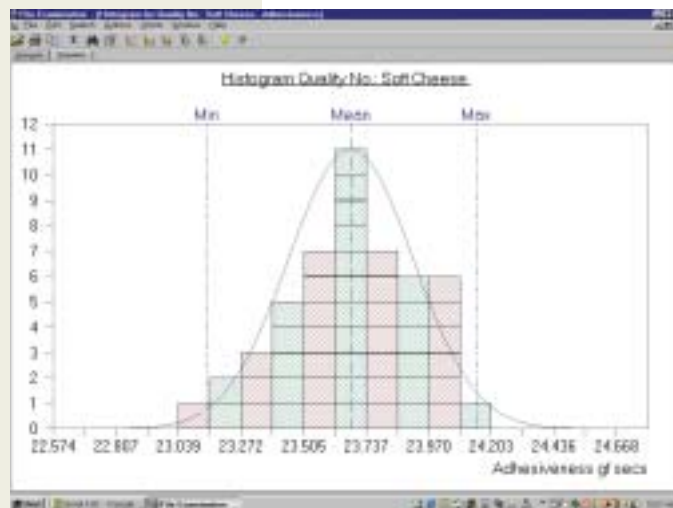
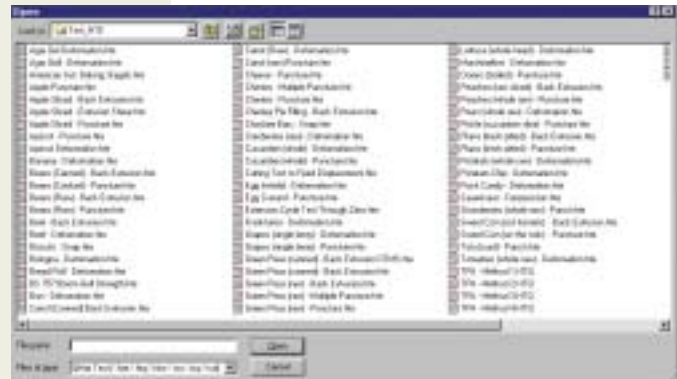
Tinius Olsen Food Testing Software is supplied with various routines for food testing such as:

- American Institute of Baking; Bagels
- Agar Gel Deformation
- Apple Puncture
- Apple Sliced – Extrusion Shear
- Beans (Cooked) – Puncture
- Beans (Raw) – Puncture
- Beans (Raw) – Back Extrusion
- Beans (Canned) – Back Extrusion
- Beet – Back Extrusion
- Beet – Deformation
- Bun – Deformation
- Rock Candy – Deformation
- Carrot (Raw) – Deformation
- Carrot (Raw) – Puncture
- Carrot (Canned) – Back Extrusion
- Cheese – Puncture
- Cherry Pie Filling – Back Extrusion
- Chocolate Bar – Snap
- Cookies/Biscuits – Snap
- Egg (Whole) – Deformation
- Frankfurter – Deformation
- Marshmallow – Deformation
- Onions (Boiled) – Puncture
- Green Peas (Raw) – Multiple Puncture
- Tofu (Curd) – Punch
- Turkey Roll (Sliced) – Tensile etc.

Tinius Olsen has a Test Generator from which several test methods can be chosen, for instance TPA, Deformation, Extrusion, Bend, Puncture, Cutting, and Tensile.

Within each, the user can select a variety of results and test parameters that can be saved and used whenever required. Within the selection for TPA, the standard results such as Adhesiveness, Chewiness, and Fracturability (brittleness), can be chosen.

A Post Test Module can be used to interrogate the data to modify or calculate new results. For TPA, the post test analysis section allows the user to define their own areas, force points, displacements (as mm or seconds) and then use these to build their own formulae in conjunction with the standard areas and forces normally used. These formula macros can be saved and re-used as required.



World Headquarters:
 1065 Easton Road
 Horsham, PA 19044 USA
 (215) 675-7100
 Fax (215) 441-0899
www.TiniusOlsen.com
info@TiniusOlsen.com

6 Perrywood Business Park
 Honeycrock Lane, Salfords
 Redhill, Surrey RH1 5DZ England
 +44 (0) 1737 765001
 Fax +44 (0) 1737 764768

Contact Your Local Representative: