Bulletin
140-D

Tinius Olsen

Benchtop Materials Testing Machines

Single Column Models

Fig 1. Model H5kS shown with HW10 grips

The single column materials testing machines have frame capacities of 1 kN or 5 kN (200 lbf or 1,000 lbf) and include two model types — the S series and the T series. These machines are designed to test a wide range of materials, including, but not limited to: plastics, films, paper, packaging materials, filter material, adhesives, foils, food, toys, medical devices and components, in tension, compression, flexure, shear, and peel.

S Series

Using a combination of quality engineering and advanced technology, Tinius Olsen has produced a series of machines that are accurate and simple to use. All S series machines feature an easy-to-read backlit liquid crystal display that can be switched between a numerical and graphical display. All data shown on this display is obtained in real time, with the autoranging graphical display showing the test curve of the specimen under test. The control unit features dedicated keys for moving the crosshead up, down, stop, performing the test, as well as keys for load and extension tare and crosshead return. The control panel also features an alphanumeric keypad to allow the input of test conditions, test data and the formatting of the test report. The control unit can retain up to five separate test routines for easy and rapid recall. While powerful as stand-alone units, these machines can be enhanced by direct connection of a printer through which comprehensive test reports and high resolution graphs can be quickly obtained.

The S Series of testers are also designed for users all over the world — an optional language module can be plugged into the control panel and all data on the backlit LCD will be shown in the selected language: (for example English, etc.).

Fig 2. S Series control panel

Fig 3. Model H1kS testing paper printing QA/QC test report direct from the machine using a regular printer

Fig 4. Model H1kT testing a stuffed toy

Fig 5. Model H5kT ready to perform a flexural test

T Series

Building on the quality and technology of the popular and successful S series, Tinius Olsen has developed the T series of machines. The T series models have similar specifications, without the S series control panel. Instead, the T series machines communicate directly with a standard PC or network running one of our Windows based data analysis software packages, via high speed RS232 in both ASCII and super high speed binary modes.

Common Features

The S and T series use rapid change Z beam load cells that allow for simple and quick “sizing” of the machine to an appropriate capacity for the test. These load cells have an accuracy of +/- 0.5% of the applied load value, from 2% to 100% of the load cell capacity. The S and T series have a huge assortment of specimen grips and fixtures allowing the selection of an ideal configuration for your application.

Key Features

- PC control via high speed
- RS232 using ASCII mode and 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 (T series in binary mode)
- Speed resolution of 0.001 mm/min
- 150% mechanical overload capacity on each load cell
- 20% digital load tare while maintaining full load cell capacity
- Automatic motor drive alarms that monitor over/under voltage, current and temperature

Fig 6. Testing of rigid plastics and use of Model 100R multi gauge length extensometer

Fig 7. Model H5kT being used to determine the flexural strength of a printed circuit board

Fig 8. Model H1kS being used to find the tensile strength of a baby's pacifier

Technical Specifications

MODEL		H1k	H5k
CAPACITY	lbf kN kg	200 1 100	1000 5 500
MAXIMUM SAMPLE DIAMETER	in mm	6 150	8 200
LOAD CELLS		Rapid change, Z beam load cells with digital encoding for automatic recognition and scaling available — 1kN, 500N, 250N, 100N, 50N, 10N, 5N	Rapid change, Z beam load cells with digital encoding for automatic recognition and scaling available — 5kN, 2.5kN, 1kN, 500N, 250N, 100N, 50N, 10N, 5N
MAXIMUM CROSSHEAD TRAVEL (EXCLUDING GRIPS)	 in mm	Measurement direct from ballscrew — fully auto scaling of single measurement range 17.5 445	Measurement direct from ballscrew — fully auto scaling of single measurement range 30 750
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 500N 0.001 to 500 up to 1kN	0.00004 to 60 up to 200 lbf, 0.00004 to 20 up to 1000 lbf 0.001 to 1500 up to 1kN 0.001 to 500 up to 5kN
JOG SPEED	in/min mm/min	0.00004 to 40 0.001 to 1000	0.00004 to 40 0.001 to 1000
RETURN SPEED	in/min mm/min	0.00004 to 40 0.001 to 1000	0.00004 to 60 0.001 to 1500
DIMENSIONS H x W x D	in mm	32 x 14 x 14 820 x 360 x 360	45 x 19 x 18 1140 x 490 x 450
WEIGHT	lb kg	55 25	110 50

Specifications:

Load measurement accuracy: +/- 0.5% of applied load from 2% to 100% capacity; extended range down to 1% capacity with accuracy of 1% of applied 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 degrees F (0 to 38 degrees C)

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

Humidity range: 10% to 90% non-condensing, wet 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 9. A model H5kT and a model H5kS being used to determine the bonding strength of adhesive tape

COMMON APPLICATIONS

Fig 10. Testing the ripeness of apples using a set of Magnus Taylor probes

Fig 12. Testing the strength of fishing line using single bollard grips, HT33

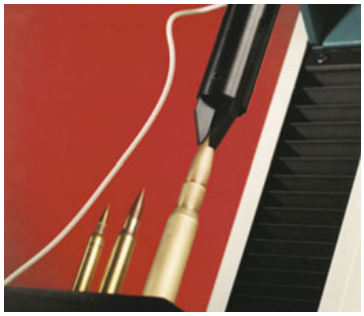


Fig 14. Testing the extraction force of a bullet from its cartridge using custom pneumatic grips

Fig 16. Testing the compressive resistance of a polymer cement mixer

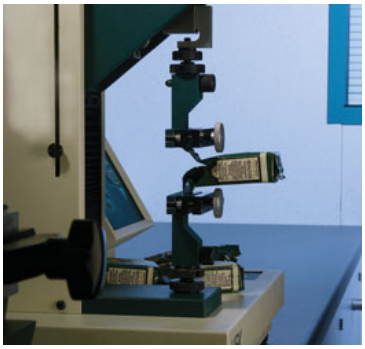


Fig 11. Testing the strength of coffee packaging using the quick release vise grips, HT55

Fig 13. Testing the tensile and peeling forces of breakfast bar packaging

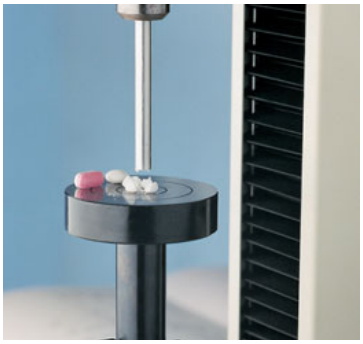


Fig 15. Testing the crushing strength of pills

Fig 17. Checking the peeling strength of the outer layer of rubber hose, using a combination of standard and custom grips

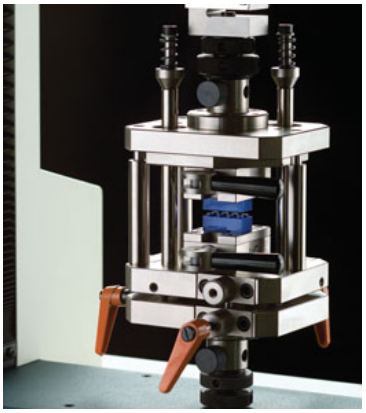


Fig 18. Testing the strength of plastic building blocks with a custom attachment

Fig 19. Testing the adhesive peeling forces of foil packaging

Fig 20. Testing the puncture and bursting strength of packaging material

Fig 21. Determining the force to remove the lid from a plastic package

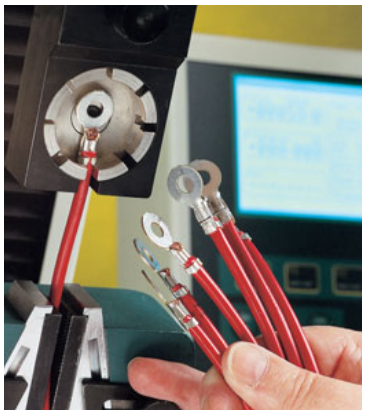


Fig 22. Testing strength of crimped connections using HT20 grips

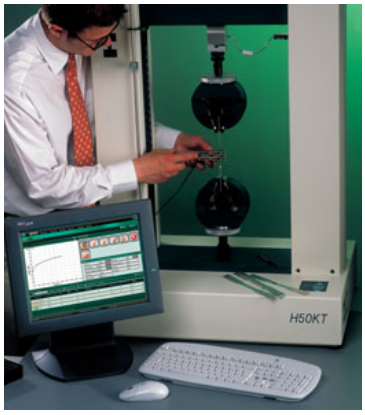


Fig 23. Dumbbell sample of sheet metal being tested with HW21 grips

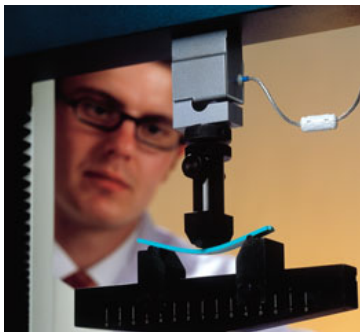


Fig 24. A 3 point bend test being performed with model HF72 flexural jig on plastic sample

Fig 25. Reinforced plastic dumbbell samples

Fig 26. Model H10kS shown with an environmental chamber for testing at elevated or reduced temperatures; note the use of a laser extensometer that can be used with the chamber to determine the elongation of the sample

Fig 27. Compression test on crash helmet

Fig 28. Testing webbing material using S453 grips

Fig 29. Tinius Olsen high travel extensometer, model 100RC

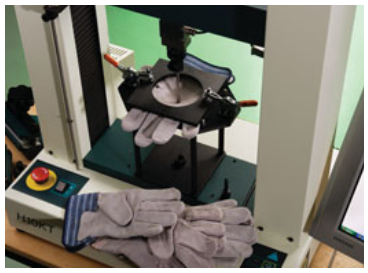


Fig 30. Testing the puncture resistance of work gloves

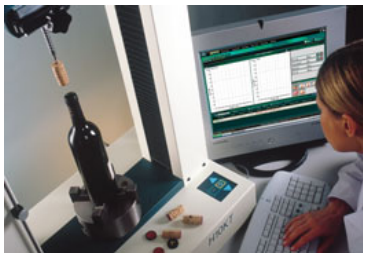


Fig 31. Testing the extraction forces of new material for wine bottle corks

Fig 32. Tear test on rubber specimens

Dual Column Models

Fig 33. Model H10kS using split bollard grips to test PP and PE packing tapes

Fig 34. Model H50kS with model HT43 bollard grips testing seatbelt webbing

The dual column materials testing machines have frame capacities of 10kN, 25kN and 50kN (2000 lbf, 5000 lbf and 10,000 lbf) and include two model types — the S series and the T series. These machines are designed to test a wide range of materials, including, but not limited to: rigid plastics, films, paper, packaging materials, filter material, thin sheet metal, adhesives, foils, food, toys, medical devices and components, in compression, flexure, shear, and peel.

S Series

Using a combination of quality engineering and advanced technology, Tinius Olsen has produced a series of machines that are accurate and simple to use. All S Series machines feature an easy-to-read backlit liquid crystal display that can be switched between a numerical and graphical display. All data shown on this display is obtained in real time, with the autoranging graphical display showing the test curve of the specimen under test. The control unit features dedicated keys for moving the crosshead up, down, stop, performing the test, as well as keys for load and extension tare and crosshead return. The control panel also features an alphanumeric keypad to allow input of test conditions, test data and the formatting of the test report. The control unit can retain up to five separate test routines for easy and rapid recall. While powerful as stand-alone units, these machines can be enhanced by direct connection of a printer through which comprehensive test reports and high resolution graphs can be quickly obtained.

The S Series of testers are also designed for users all over the world — an optional language module can be plugged into the control panel and all data on the backlit LCD will be shown in the selected language (for example English, etc.).

Fig 35. Model H10kT being used with HT29 grips to test thin rope

Fig 36. Model H25kT using model HT40 grips to test high strength flexible sheet materials

Fig 37. Model H50kT with HT21 grips

T Series

Building on the quality and technology of the popular and successful S series, Tinius Olsen has developed the new T series of machines. The T series models have similar specifications without the S series control panel. Instead, the T series machines communicate directly with a standard PC or network running one of our Windows based data analysis software packages, via a high speed RS232 in both ASCII and super high speed binary modes.

Common Features

The S and T series use rapid change Z beam load cells that allow for simple and quick "sizing" of the machine to an appropriate capacity for the test. These load cells have an accuracy of +/- 0.5% of the applied load value, from 2% to 100% of the load cell capacity.

The S and T series have a huge assortment of different grips and fixtures available allowing the selection of an ideal configuration for your application.

Key Features

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

Fig 38. Machine being used to determine the strength of a flexible geo material

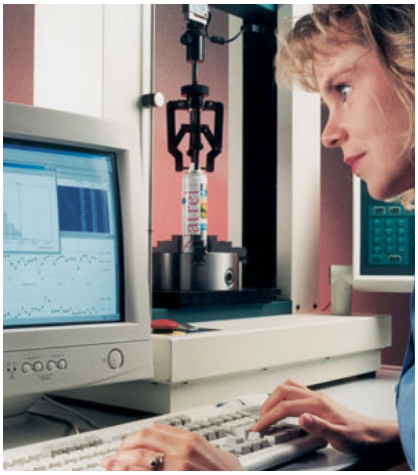


Fig 39. Testing the tensile strength of the seam on a shaving foam canister

Technical Specifications

MODEL		H10K	H25K	H50K
CAPACITY	lbf kN kg	2000 10 1000	5000 25 2500	10,000 50 5000
CLEARANCE BETWEEN COLUMNS	in mm	16 405	16 405	16 405
LOAD CELLS		Rapid change, low profile Z type load cells with digital encoding for automatic recognition and scaling available – 10kN, 5kN, 2.5kN, 1kN, 500N, 250N, 100N, 50N, 10N, 5N	Rapid change, low profile Z type load cells with digital encoding for automatic recognition and scaling available – 25kN, 10kN, 5kN, 2.5kN, 1kN, 500N, 250N, 100N, 50N, 10N, 5N	Rapid change, low profile Z type load cells with digital encoding for automatic recognition and scaling available – 50kN, 25kN, 10kN, 5kN, 2.5kN, 1kN, 500N, 250N, 100N, 50N, 10N, 5N
MAXIMUM CROSSHEAD TRAVEL	 in mm	Measurement direct from ballscrew – fully auto scaling of single measurement range 43 1100	Measurement direct from ballscrew – fully auto scaling of single measurement range 43 1100	Measurement direct from ballscrew – fully auto scaling of single measurement range 43 1100
TESTING SPEED RANGE	in/min mm/min	0.00004 to 40 0.001 to 1000	0.00004 to 40 0.001 to 1000	0.00004 to 20 0.001 to 500
CAPACITY AT MAXIMUM SPEED	lbf kN	1000 5	2000 10	5000 25
MAXIMUM SPEED AT CAPACITY	in/min mm/min	20 500	20 500	10 250
JOG SPEED	in/min mm/min	0.00004 to 40 0.001 to 1000	0.00004 to 40 0.001 to 1000	0.00004 to 20 0.001 to 500
RETURN SPEED	in/min mm/min	0.00004 to 40 0.001 to 750	0.00004 to 40 0.001 to 1000	0.00004 to 20 0.001 to 500
DIMENSIONS H x W x D	in mm	63 x 26 x 18 1600 x 650 x 450	63 x 26 x 18 1600 x 650 x 450	64 x 29 x 20 1613 x 720 x 500
WEIGHT	lb kg	255 115	265 120	310 140

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 degrees F (0 to 38 degrees C)

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

Humidity range: 10% to 90% non-condensing, wet 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.

Software

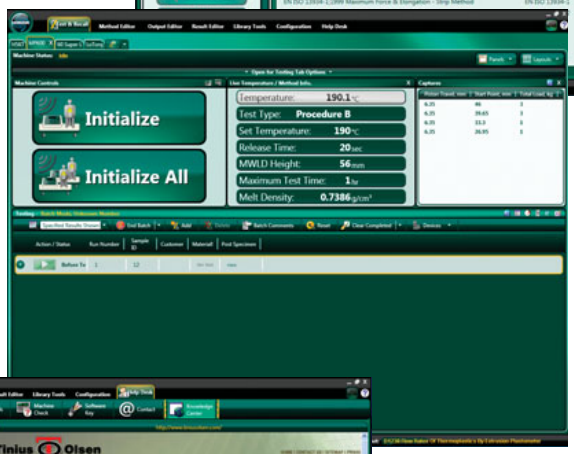
Tinius Olsen has built upon its long history of providing solutions to an enormous variety of testing problems to develop Horizon, a comprehensive software program that makes testing simple, precise, and efficient. Whether the test sample is metal, paper, composite, polymer, rubber, textile, or a micro component, Tinius Olsen's Horizon software goes far beyond data collection and presentation. It will help you automate your operations, from R&D to the charting and analysis of QC testing. Horizon provides a libraryof standard, specific, and application-focused test routines that have been developed in close cooperation with our customers around the world and to the standards they are using.

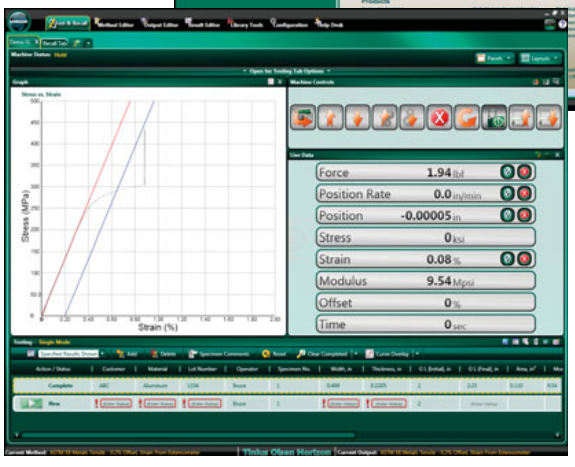
Among the many valuable features offered by Horizon are: a test routine library; simultaneous multiple machine control; test, output, method, and result editors; and multilayered security. This software is designed for data acquisition, data analysis, and closed loop control of nearly all Tinius Olsen testing machines.

Horizon also includes the following:

- Generation of user customized reports
- Standard SPC programs for X-bar, R, and frequency distributions/histograms
- Ability to recall, replot and rescale test curves
- Recall of data that spans different test modules
- User-configurable machine parameter and control settings
- Multilingual capabilities

Horizon is rich with capabilities that improve productivity and enable you to build, access, and use a modern, powerful materials testing database. It employs the latest Windows environments to create an intuitive user experience. Built-in tutorials, on-line help, and help desk access provide additional user support.





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