

Multi-Specimen Fatigue

Accelerating high cycle fatigue and durability studies by combining many samples of simultaneous loading with industry-leading dynamic performance and instrument reliability.

TA Instruments' Multi-Specimen Fatigue (MSF) Instruments accelerate fatigue studies by simultaneously testing 6 or 16 specimens. Designed to test a variety of materials, subcomponents and complete devices, MSF offers higher statistical confidence in less time.



MSF6 with Oven

MSF16 with Bath

- Durability testing can take a long time, especially when the material or product is expected to last for many years and a high number of cycles. Multi-specimen fatigue shortens durability test time by simultaneously applying cyclic displacement to many samples and detecting each sample's cycles-to-failure for the applied loading level. This allows users to generate many failure datapoints for each loading. When multiple tests are run on similar samples, researchers can quickly build N curves with many data points to improve statistical confidence levels of the resulting fatigue model. Otherwise, these millions, 10s of millions and even 100s of million cycle-long tests can extend product development time and hinder efforts to accelerate time to market of new materials and products.
- Multi-specimen fatigue instruments use a dynamic linear motor and have the capacity to secure many samples into a test fixture and effectively share the loading from that motor. This approach applies a common displacement amplitude to all samples, often using a high frequency sinusoidal loading profile to accelerate the fatigue loading on the many samples. Each specimen has a force sensor to track the applied force; this sensor measures the degradation and/or failure point (number of cycles to failure) for that sample.

Features and Benefits:

- Simultaneous axial fatigue of 6 or 16 specimens.
- Flexibility to convert to single specimen loading for executing quasi-static strength, fatigue or DMA methods.
- Unparalleled durability and dynamic performance with the patented ElectroForce linear motor technology.
- Accelerated testing frequencies up to 100 Hz with unparalleled displacement amplitudes.
- Nanometer resolution and 5 micron accuracy displacement sensor.

Two Configurations, quicker insights to develop more reliable products faster.

1. The MSF6 configuration is compatible with an oven to deliver high-throughput fatigue results in temperatures between -20 to 150 °C, and therefore useful for a range of material studies such as polymer and elastomer fatigue.
2. The MSF16 configuration is particularly well-suited for testing in 37 °C fluid environments for medical device durability studies such as stent wire fatigue.



Built on the versatile 3330 Load Frame

The TA Instruments' MSF solutions leverage the premier high frequency and high durability electrodynamic driven 3330 Load Frame. Its motor design offers a unique combination of best-in-class accelerated fatigue frequencies to deliver more data faster, coupled with premier reliability backed by a 10-year warranty.

The 3300 Load Frame is also available with a DMA Package which delivers High-Force Dynamic Mechanical Analysis to measure the viscoelastic characteristics of materials or products that cannot be miniaturized for testing on smaller conventional DMA instruments.

Waters™



For more information visit
tainstruments.com

Fail More Specimens Faster

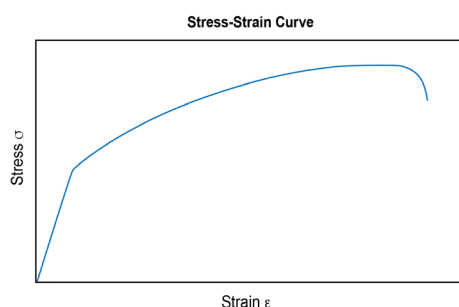
Instrument Specifications	3330	MSF6	MSF16
Number of Samples	1	6	16
Maximum Displacement	25 mm	25 mm	25 mm
Maximum Force per sample	3,000 N	225 N	100 N
Maximum Test Frequency	100 Hz	100 Hz	100 Hz

Environment Options	3330	MSF6	MSF16
Ambient	●	●	●
37 °C Fluid	○	—	●
-20 to +150 °C Oven	○	○	—
-150 to 350 °C Oven	○	—	—

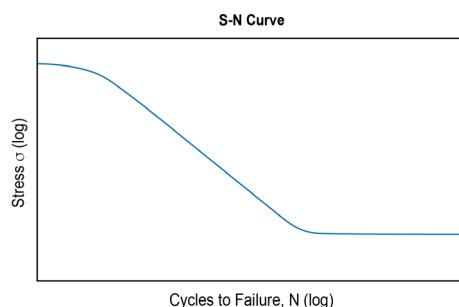
Test Methods	3330	MSF6	MSF16
Quasi - Static Strength	●	—	—
Fatigue Strength	●	●	○
Dynamic Mechanical Analysis (DMA)	○	—	—

● Included, ○ Optional, — Not available

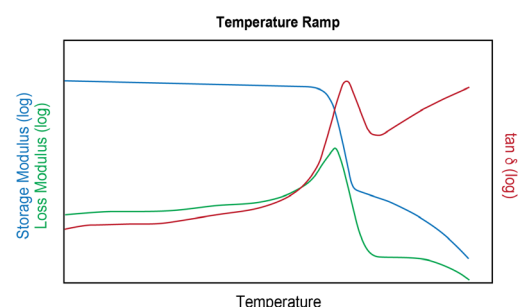
Example Quasi - Static Strength Plot



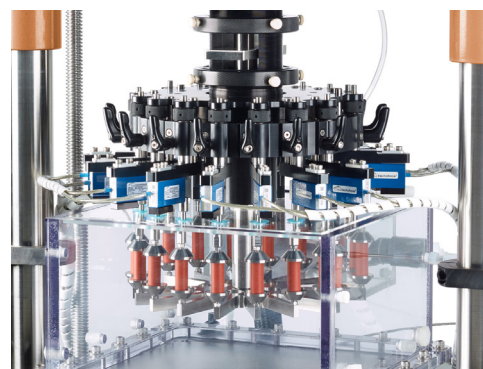
Example Fatigue Strength Plot



Example DMA Plot



MSF6



MSF16