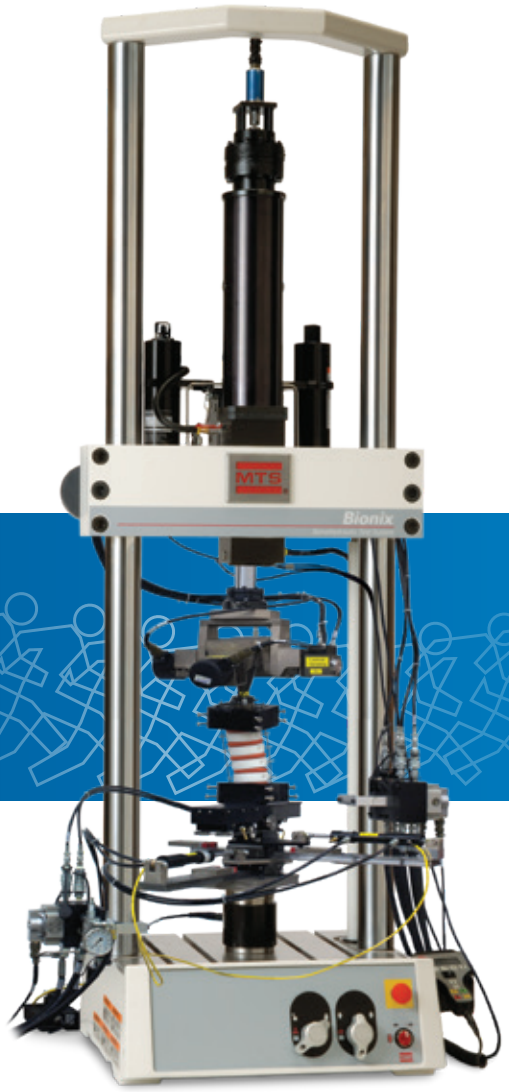


Bionix® Spine Kinematics System

A flexible solution for all types of spine kinematics research

- Adaptable, modular design supports a wide array of evolving test requirements
- Addresses spinal flexion, extension, lateral bending, axial rotation, axial force and displacement, and combined motions
- Supports force, motion and displacement measurements
- Versatile software and controls allow triggering of external devices, such as imaging and motion detection systems
- Highly accessible test space facilitates quick and easy specimen setup
- Combined motion accelerates testing, helping you make the most of highly perishable cadaveric specimens
- Smooth motion facilitates precise evaluations

Developing effective treatments for spinal injuries and disease is one of the more daunting challenges facing the field of orthopaedics today. Whether the approach involves fixation techniques or the use of motion preservation devices, meaningful development requires extensive knowledge of the complexities of spine kinematics.

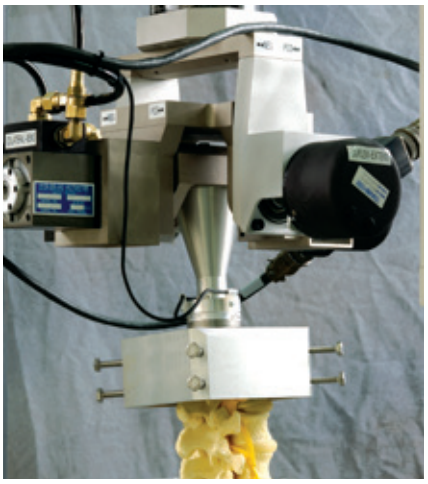
To help build this body of knowledge, MTS has developed the Bionix Spine Kinematics System: a modular, easy-to-use mechanical testing platform designed specifically for evaluating the behavior of spine specimens under a full spectrum of real-world forces, motions and displacements.

Drawing from decades of experience working closely with leaders in the orthopaedic industry, the Bionix Spine Kinematics System was designed to deliver the versatility and capabilities you need to conduct thorough, precise cadaveric durability and characterization studies.

This platform includes a compact axial/torsional servohydraulic load frame, versatile MTS digital controls and intuitive multipurpose testing software, along with a full complement of components that allow you configure the ideal "out-of-the-box" solution based on your specific needs and testing preferences.

The Bionix Spine Kinematics System delivers the flexibility required to adapt to evolving application demands. You'll find a comprehensive toolkit of hardware, software and standard and optional components to support your specific needs and preferences.

System components include a broad selection of both actively controlled (powered) modules and passive (non-powered) modules that can be integrated to simulate flexion, extension, lateral bending, axial rotation, axial force and displacement, and combined twisting and flexural motions. To isolate a specific mode of loading for study, other loads can easily be held at zero or another value that you define. The components of the system include:



1. Base Load Frame

The versatile Bionix Model 370.02 load frame makes the latest MTS servohydraulic technology available in a compact tabletop design. The actuator enables the precise application of axial motions, axial rotations and compressive forces.

In addition to spine testing, the base system can be used for evaluations involving the foot, knee, ankle, hip, and other joints, along with basic materials testing.

2. Spine Kinematics Subsystem

A. GIMBALS ASSEMBLY

Gimbals permit combined bending in any position, including flexion/extension and lateral. The standard single-gimbal configuration will suffice for studying shorter spinal specimens, such as the lumbar or cervical spine, for example. If your testing involves the full spine or longer spinal specimens, you can choose to incorporate an optional two-axis gimbal configuration, creating a highly realistic load condition for such applications and keeping the spine more centered and in the measurement field of view. (Testing of longer specimens requires the addition of extended columns and a 150 mm actuator stroke.) The gimbals assembly is available with a force transducer capable of supporting motion in a full six degrees of freedom. This transducer attaches to the end of the specimen cup, facilitating an accurate force and motion state at the end of the test specimen.

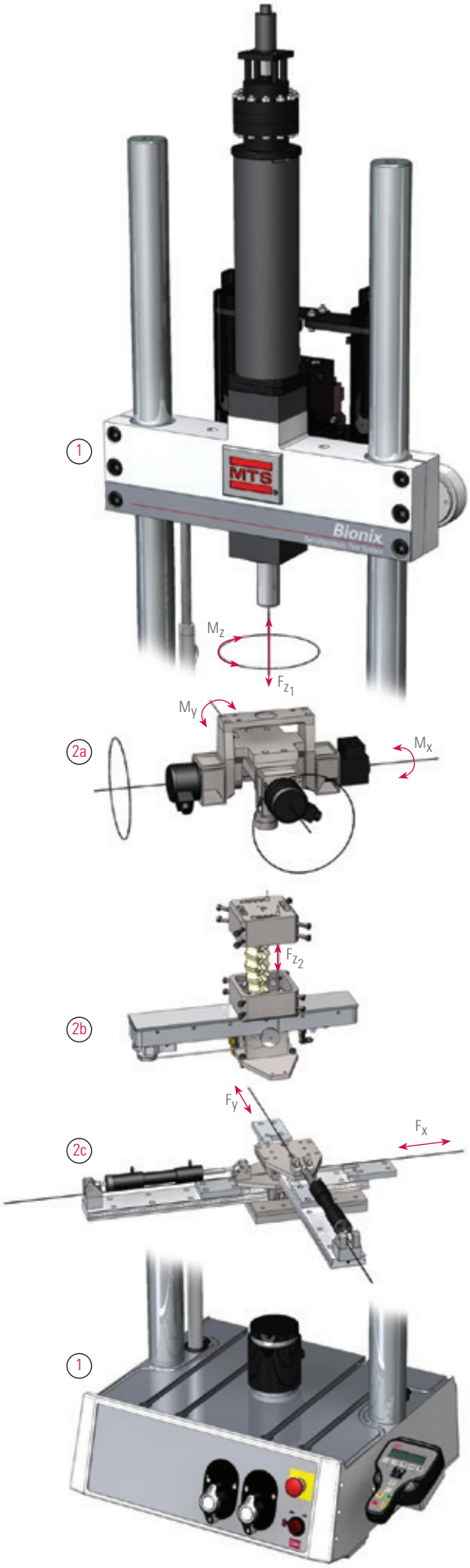
B. LOAD FOLLOWER

If you prefer to accommodate for the influences of body masses above the section of the spine under evaluation, an optional load follower works in conjunction with the biaxial shear table to actively apply force along the axis of the spine as it bends during testing. This state is achieved by passing a cable through eyelets attached to the cadaveric specimen, and applying constant compressive loading to the specimen through a dedicated load cell.

C. BIAXIAL SHEAR TABLE

Choose from powered and passive biaxial shear table configurations to meet your specific needs. The passive configuration provides a non-powered, free-floating shear table. For applications requiring high control and precision, the active (powered) configuration allows you to smoothly move the shear table to any given position.

To maximize specimen life and reduce downtime, innovative design features allow the specimen to be prepared outside of the test system, with only a small amount of on-system setup required.



Intuitive Test Application Software

The Bionix Spine Kinematics System employs on Multipurpose TestWare® (MPT™) application software, which provides a powerful, versatile and extremely user-friendly environment for managing every aspect of your kinematics studies. Easily and flexibly orchestrate such processes as function generation, image capture, data acquisition, data correlation, and events and triggers – all with drag-and-drop simplicity, and all from within a single user environment.

By using this MTS software, you will be limited only by your imagination, not your test equipment.

Global Coordinates

F_{z_1} Axial Compression

M_z Axial Torsion

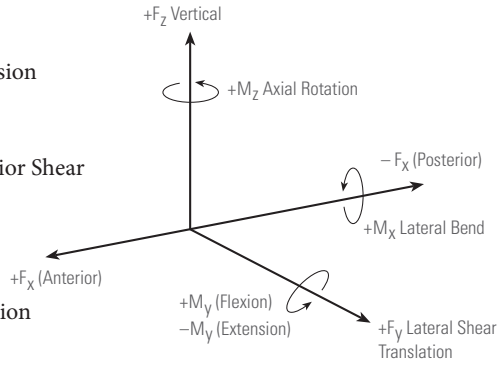
F_x Anterior/Posterior Shear

M_x Lateral Bend

Fy Lateral Shear

M_y Flexion/Extension

F_{z_2} Follower Load



Spine Kinematics System Specifications

		Single	Dual
Displacement	x	+/- 50 mm	
	y	+/- 50 mm	
	z	+/- 50 mm	+/- 75 mm
Force	F_x	+/- 580 N	
	F_y	+/- 580 N	
	F_z	+/- 1.16 kN	
Force Moments	M_x	+/- 20 N-m	
	M_y	+/- 20 N-m	
	M_z	+/- 20 N-m	

Load Follower Specifications

Displacement	z	±50 mm
Force	Fz	+1200 N*

**Maximum force of load cell is 2200N; Fz is part of a pressure-reduced circuit and can be adjusted according to testing needs.*

FlexTest® Digital Controls

The FlexTest family of digital controllers provides the flexibility required to address a full spectrum of testing needs and adapt to evolving standards and requirements. Scalable and easy to use, FlexTest controllers provide the high-speed closed-loop control, data acquisition function generation and transducer conditioning needed for reliable, multi-channel, multi-station testing.

Quiet and Compact HPUs

MTS SilentFlo™ hydraulic power units (HPUs) are recognized for their superior performance, small footprint and extremely low noise. They are so compact and quiet that they can easily be installed almost anywhere in your laboratory. A "wall-hugging" design also conserves floor space.

Unrivaled Service and Support

The Bionix Spine Kinematics System by is supported by the largest, most experienced global service and consulting network of any biomedical testing solutions provider. This team offers a wide range of onsite services to help maximize your test laboratory's productivity, including preventive maintenance, system lifecycle management, problem solving, technology transfer, consulting engineering and process optimization.

Learn More Today

The MTS Spine Kinematics System provides the most complete and versatile toolkit available for helping you conduct your spine cadaveric testing with confidence. Contact your MTS representative today to learn more.

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