AMTI

FORCE AND MOTION

The AMTI Ortho-POD and supervisory PC

AMTI Ortho-POD

Description and Specifications

AGT Absolute Gauge Technologies™

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Description:

The AMTI Ortho-POD is a multidirectional pin-on-disc machine capable of replicating the complex motions essential for accurately simulating the in vivo wear of polyethylene joint implants.

Research has demonstrated that the wear rate of certain polymers, such as ultra-high molecular weight polyethylene, is highly dependent on the "cross-shear" motions that occur between the mating components of prostheses. Unidirectional motion strain-hardens polyethylene, gradually increasing its integrity along the established path. However, this same effect also makes the material increasingly susceptible to wear from cross-shear motions, which cross the established path in another direction.

The Ortho-POD is capable of simulating both unidirectional and bidirectional sliding, allowing it to easily replicate the cross-shear motions experienced by a prosthesis in vivo. The machine provides three independently controlled degrees of freedom for pin movement relative to the plate – pin rotation, disc rotation, and dynamic pin loading.

The machine's motions and loads are fully programmable through the included control and acquisition software. Custom waveforms serve as motion and loading templates. Waveforms may be defined mathematically or through the Ortho-POD's intuitive learning mode, which allows users to teach the pin-on-disc machine a path by "sketching" it using the Ortho-POD's manual jog controls.

Cross-shear motions can be recreated by programming sinusoidal motions for both the eccentrically mounted pins and the disk. By varying the frequency and the phase of the two motions any desired crossing angle may be achieved.

The Ortho-POD consists of six temperature-controlled stations. Each pin-on-disc station is load-programmable up to 445 Newtons (100 pounds) and can be set to perform dynamic loading cycles. AMTI's multi-axis force sensors are integrated into the pin-on-disc machine, enabling the three orthogonal forces to be measured at the pin/disc interface. Additionally, the coefficient of friction may be independently sampled at each pin periodically during the course of a test.

Each of the pin-on-disc stations has its own vertical position sensor with resolution better than 10µ, which allows for measurement of specimen wear throughout the testing process. The pin axes are supported on rolling-contact bearings to provide high lateral stiffness and low vertical sliding friction.

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Feature highlights:

Replicates complex motions and crossing patterns

Six pin-on-disc stations for rapid acquisition of statistical results

Three controlled degrees of freedom: pin rotation, disc rotation, and dynamic pin loading

Displacement or velocity modes of operation

Integrated force sensors for friction and wear measurements

Acrylic enclosure allows wear surfaces to be submerged in a test fluid like bovine serum or water.

Can be configured to isolate individual specimen fluid

Temperature-controlled platen permits isothermal testing up to 50°C (120°F)

System includes supervisory PC and software for data collection and machine control

Included collet pin holders are designed to grip 0.375-inch-diameter pins. Other pin holder sizes are also available.

Each station of the pin-on-disc machine has its own low-friction pneumatic actuator and shut-off valve for performing tests on a limited number of stations.

Pin axes are supported on rolling-contact bearings to provide high lateral stiffness and low vertical sliding friction.

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ADL-Ortho-POD-06-08 specifications

Ortho-POD specifications [1]		
Test stations	**Specification**	
Six pin-on-disc stations	Stations are semi-independent	
Pin motion	**Specification**	**Comment**
Speed	0 to 180 degrees/second	
Torque	2.26 Nm (20 inch-lbs)	
Modes	Cyclical, continuous	Programmable cycle profile
Backlash	<10 minutes of arc	
Platen motion	**Specification**	**Comment**
Speed	0 to 180 degrees/second	
Torque	13.5 Nm (120 inch-lbs)	
Modes	Cyclical, continuous	Programmable cycle profile
Load control	**Specification**	**Comment**
Type	Servo-pneumatic	Programmable cycle profile
Maximum per station	450 N (100 lbs)	
Specimen environment	**Typical method**	**Comment**
Fluid	Immersion chamber	Bovine serum, saline, or other fluid
Temperature	Controlled to 50°C (120°F)	
Physical specifications	**Specification**	
Length	46 cm (18 in)	
Width	46 cm (18 in)	
Height	100 cm (39 in)	
Weight	87 kg (191 lbs)	
Power requirement [2]	**Specification**	**Comment**
Electric	115 or 220 VAC, 20 Amp	(1.7 kva) at 50 or 60 Hz
Pneumatic	440 L/min (5 cfm)	6 bar (90 psi)

[1] Specifications may change without notice.

[2] The system is normally delivered configured for the indicated power requirements. If your available power differs in phase or voltage, please contact AMTI.

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