



## Model 320 Tire-Coupled Road Simulators

Versatile, repeatable road simulation for the full range of vehicle sizes and applications

be certain.

**THE MTS MODEL 320 TIRE-COUPLED ROAD SIMULATOR** SETS THE  
INDUSTRY STANDARD FOR ROAD SIMULATION EFFICIENCY IN THE TEST  
LAB. WITH ITS EXCEPTIONAL ACCURACY AND REPEATABILITY, THIS  
SYSTEM ALLOWS VEHICLE DESIGNERS TO CONDUCT FAR MORE  
MEANINGFUL TESTS THROUGHOUT THE VEHICLE DEVELOPMENT PROCESS.



## Unmatched Tire-Coupled Road Simulation From the Technology Pioneer

More than 45 years ago, MTS changed vehicle structural testing forever with the introduction of “four-poster” tire-coupled road simulation technology.

By applying vertical forces through the tire of the vehicle, the MTS Model 320 Tire-Coupled Road Simulator made it possible to provide actuator displacements in the test lab that were nearly identical to the profile of the original road surface. With this came a new standard for vehicle testing cycle time, repeatability and efficiency. For the first time, meaningful tests could be conducted before road load data became available, and while vehicle changes were still in process.

We’ve been refining this technology ever since, continually adding new capabilities to meet emerging industry demands. Today, more test labs around the world use the MTS Model 320 Test System than all other tire-coupled road simulation systems combined. The reason for this is simple. You won’t find a more versatile or productive tire-coupled road simulator anywhere else.

### Key Advantages

#### HIGH-FIDELITY TEST DATA

The MTS Model 320 test system enables fast and highly repeatable reproduction of desired motions, providing you with absolute confidence in your test data. You’ll find performance to meet all conditions, ranging from small road surface vibrations to high-velocity pothole strikes.

#### EASY SETUP AND OPERATION

The MTS Model 320 test system is typically mounted below floor level, with a wheel pan design that allows vehicles to simply be driven on and off the simulator with minimal setup. Intuitive application and controller software also makes the road simulator easy to learn and use.

#### ONE-STOP CONVENIENCE

Only MTS offers the full range of products you need to meet your specific test requirements. You’ll find everything from hydraulic pumps, service manifolds and actuators to best-in-class software and control options, all optimized by MTS for use with the MTS Model 320 test system.

#### EXPERT SERVICE AND SUPPORT

When you partner with MTS, you benefit from decades of tire-coupled simulation technology leadership, along with a robust network of global service and support. MTS invented the technology

more than 45 years ago, and we know exactly what it takes to help you reach peak productivity with your structural testing, now and in the future.

#### VERSATILITY TO MEET YOUR NEEDS

Only the MTS Model 320 tire-coupled simulator features a complete offering of standard products to address almost any vehicle simulation application.

Choose from a full complement of application software, digital controllers, components and accessories to customize an MTS Model 320 test system that perfectly matches your needs and application. All of these products are interchangeable, so you can easily and affordably add new functionality as your needs change. Applications include:

- » Structural durability
- » Ride comfort
- » Buzz, squeak and rattle
- » End-of-line production quality
- » Racing vehicle optimization

#### ALL VEHICLE TYPES AND SIZES

From motor scooters to commercial vehicles and agricultural equipment to off-highway construction vehicles, the MTS Model 320 test system provides unmatched flexibility to accommodate almost any vehicle size.



Motorcycles and other small vehicles



Passenger cars



Motorsports vehicles



Light trucks



Commercial vehicles



Heavy industrial equipment

## The Complete Tire-Coupled Simulation Solution

Whether you need individual components or a turnkey solution, and whether you require consultation on pit design, restraint system configuration or another mounting approach, MTS provides everything you need to make the most of the MTS Model 320 test system.

### Actuators

MTS Model 248 Actuators employ hydrostatic pressure-centering bearings for reliable high-speed operation under heavy side load conditions. A large-diameter, one-piece, chrome-plated piston rod provides superior strength and lateral stiffness, and the thick-walled cylinder provides high rigidity and transverse resonant frequency.

### Close-Coupled Accumulators

MTS close-coupled accumulators optimize system transient response performance by minimizing the physical length of the oil column between the accumulators and servovalves. This efficient design facilitates superior simulation of transient events such as pothole strikes, and enables the movement of hydraulic fluid using a less-expensive, lower-flow-rate hydraulic power unit (HPU).

### Servovalves

Precision-engineered MTS servovalves provide high-flow, quick-response and low-distortion performance. They are available in either a low-velocity, two-stage configuration for less demanding applications such as squeak and rattle testing, or in a special three-stage, high-velocity configuration for efficiently moving high volumes of oil to meet durability testing demands. For maximum testing flexibility, you can also easily switch between two- and three-stage servovalves on your MTS Model 320 test system.

### Integrated Wheel Pans and Restraints

Adapting to the full range of wheel sizes is quick and easy with a variety of MTS wheel pans and restraints for the MTS Model 320 test system. Article installation and changeover is made simple with drive-on/drive-off pans.

### Hydraulic Power Units (HPUs)

MTS SilentFlo™ HPUs are renowned for their superior performance, compact footprint and extremely low noise. They are so small and quiet, in fact, that they can easily be installed almost anywhere in your laboratory. SilentFlo HPUs are up to 30 dB(A) quieter than conventional HPUs, and a “wall-hugging” design requires minimal floor space. A variable-volume pump design also helps to optimize energy-efficiency.

### Wheelbase and Track Width Positioning Controls

MTS offers multiple XY Positioning System options to accommodate the full range of wheelbase and track-width variations for the vehicles you test. That includes manually activated, electrically activated, hydraulically activated or even fully automated systems. We also offer a wide range of wheel pans to support almost any tire size and capacity requirement.

### Environmental Chambers

We partner with leading environmental chamber manufacturers to provide integrated systems for reliable testing in a wide range of temperature, humidity, anechoic and solar conditions. An optional sliding floor assembly enables simple integration of an environmental chamber with the MTS Model 320 test system.



### Advanced Controllers

Achieve the highest accuracy and repeatability in less time with MTS digital control systems, which combine superior ease-of-use with the industry's most advanced compensation techniques. MTS control options include everything from the simple, push-button interface of the First Road™ controller for production line applications, through the MTS FlexTest® family of controllers that apply advanced algorithms to facilitate online adaptive control.

### Best-in-Class Application Software

MTS software such as First Road software and Component RPC® Pro software provide the ultimate in simulation simplicity and accuracy, employing proven Remote Parameter Control™ techniques to duplicate field-recorded data in the most repeatable and efficient manner.

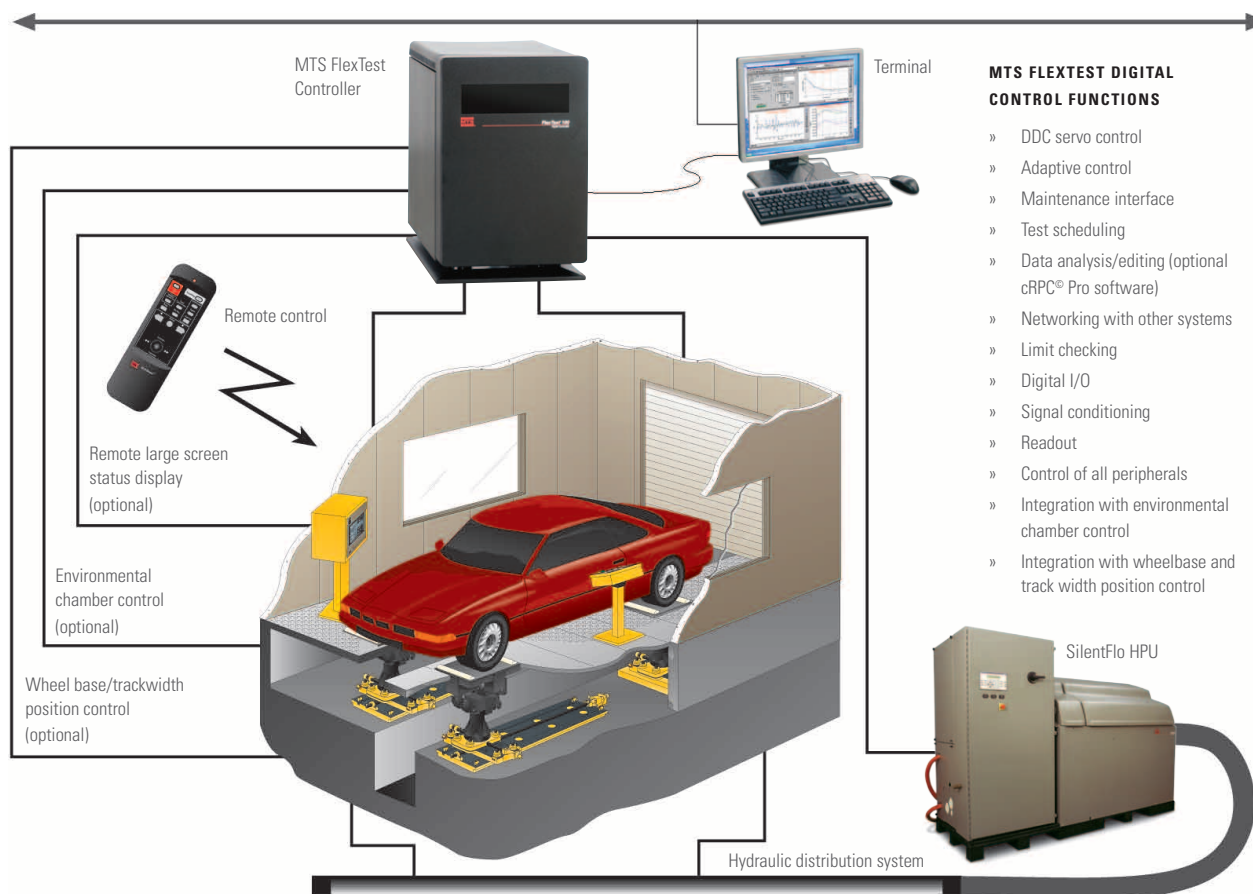
### Additional Functionality

You can further customize your MTS Model 320 test system by integrating:

- » XY positioning systems
- » Wheel pans and restraints
- » Static support
- » Downforce actuation packages

*See page 13 for more information on these MTS solutions.*

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# Typical Test Applications

## Structural Durability Testing

Today, laboratory simulation testing is a common approach to fatigue and durability tests around the world for the evaluation of platforms, components and subassemblies. The MTS Model 320 test system provides an ideal solution for accurately and efficiently performing baseline structural tests on early vehicle prototypes.

By integrating laboratory testing into the vehicle development cycle, your test lab will have a powerful means of improving product reliability, performance and quality, while reducing costs and overall vehicle development time.

Add flexible and easy-to-use MTS cRPC Pro software to optimize testing accuracy, efficiency and repeatability. In addition, adapting to a variety of wheel sizes is quick and easy with integrated MTS wheel pans and restraints.



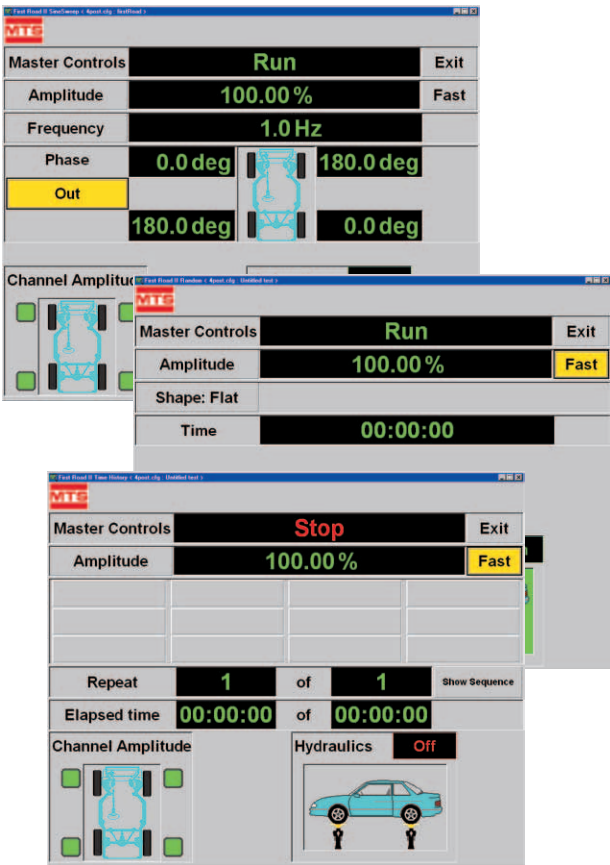
## End-of-Line Production Quality Testing

The MTS Model 320 test system is an integral component of the MTS First Road End-of-Line Test System. The First Road test system is designed to operate in a controlled, repeatable test lab environment — as opposed to the costly and non-repeatable proving ground, where discovery is costly and can be compromised by such variables as driver behavior, wind noise and weather conditions. Test control is achieved with the advanced MTS FlexTest controller, working in tandem with MTS First Road software specifically designed for end-of-line test applications.

With the MTS First Road test system, you simply drive a vehicle on the test rig to accurately subject it to your choice of simulation profiles. Simply push a button on the remote to activate your test sequence.

### POWERFUL APPLICATION SOFTWARE

The MTS First Road test system is powered by application software specifically designed to optimize the efficiency of end-of-line testing. A highly intuitive user interface makes it fast and easy for operators at all skill levels to set up and run tests, while having the flexibility to easily switch between test inputs.

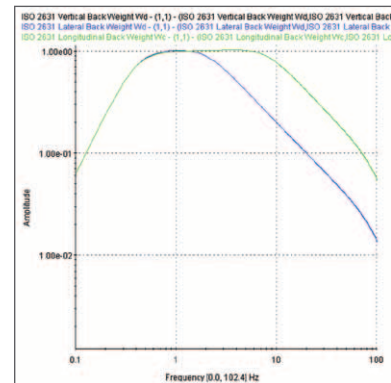
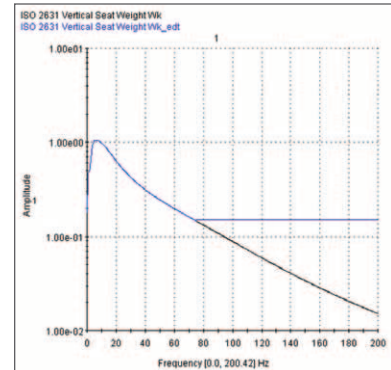
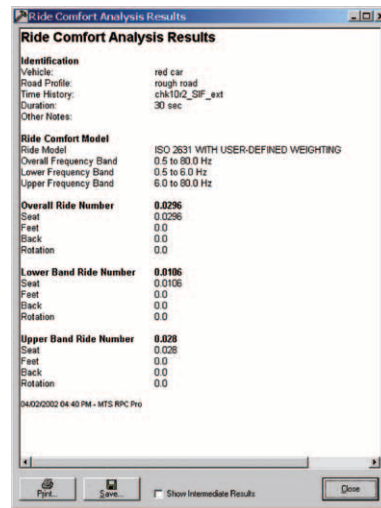


## Ride Comfort Testing

As ride comfort becomes increasingly important in vehicle designs, manufacturers are finding a greater need to compare the performance of their vehicles against the competition, and to monitor the effects of parameter changes. Subjective evaluations from the driver and passenger are no longer sufficient.

The MTS Model 320 test system adds tremendous accuracy, repeatability and simplicity to evaluating ride comfort. Rather than performing evaluations of several vehicles traversing the same surface on the proving ground, you can reproduce exactly the same surface repeatedly in the test lab, and several vehicles can be quickly driven on and off the test rig for quantitative measurements. Engineers are also able to observe under the car for direct evaluation of various suspension elements.

Flexible and user-friendly MTS cRPC Pro software includes an application focused on ride comfort evaluation to meet the ISO 2631 standard. Custom weighting functions can also be applied with outputs presented automatically in a simple summary report.



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## Buzz, Squeak and Rattle Testing

Vehicle buzzes, squeaks and rattles were once perceived as unimportant. Today, they have become a primary indicator of vehicle quality to both manufacturers and consumers.

Temperature, humidity, vehicle age and load environment all influence the amount of buzzing, squeaking and rattling. By installing the MTS Model 320 test system in an environmental chamber, you have an excellent means of efficiently monitoring these sound levels under various conditions as the vehicle degrades. Standard waveforms can be applied while the investigator is inside the vehicle and making note of noises heard and their likely sources.

For added convenience, an infrared remote control is available for users to select specific test profiles.

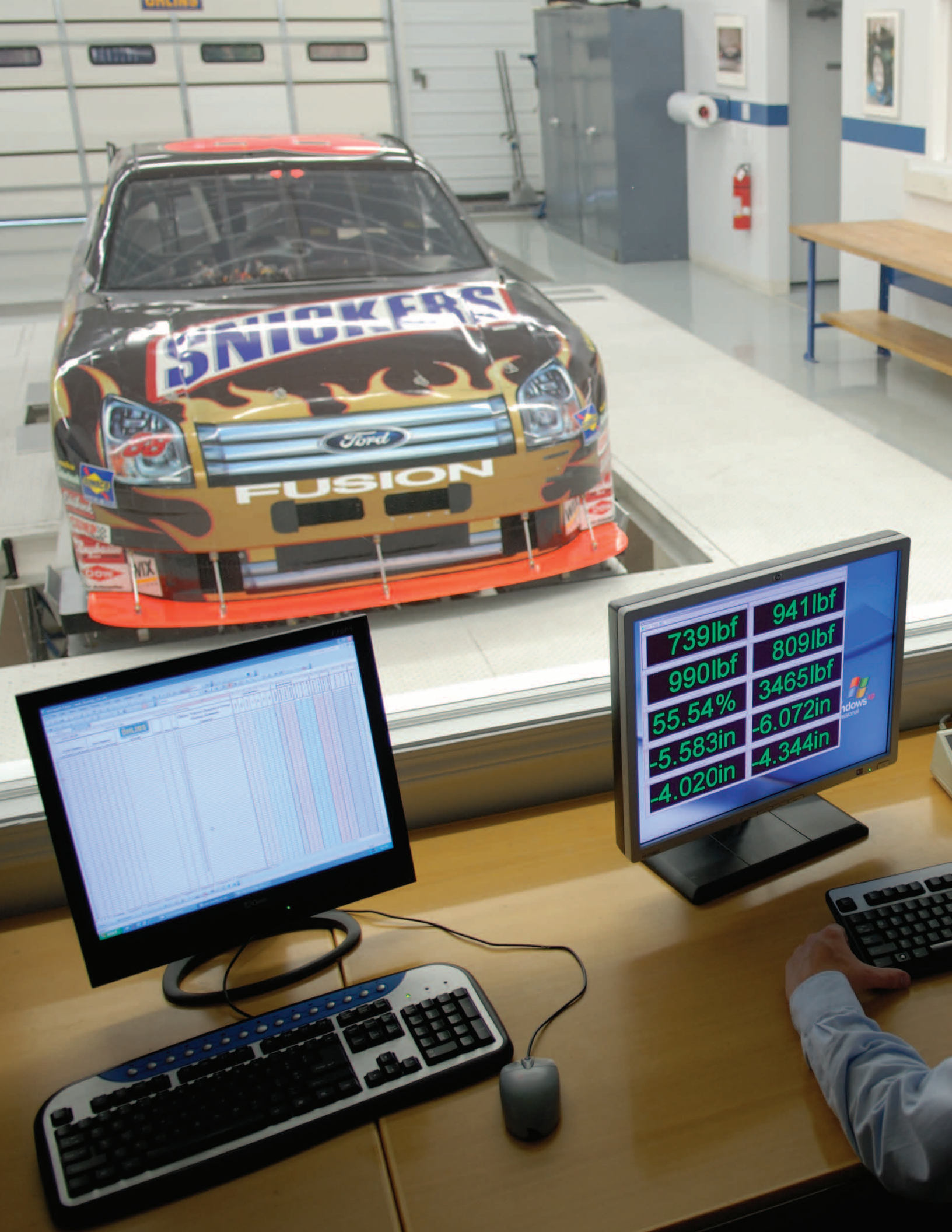
## OPTIONAL SWITCHABLE FLOW LIMITER

A switchable flow limiter allows your system to be used for both durability testing and buzz, squeak and rattle evaluation. The valve accommodates the high flow rates required to reproduce the punishing forces to fatigue the vehicle, and switches to the low flow rates to detect the resulting squeaks and rattles.

## QUIET TEST SYSTEM OPERATION

The MTS Model 320 test system features a low-noise design that allows you to precisely evaluate the buzzes, squeaks and rattles coming from the test specimen. That includes wheel pans that are coated with a damping material to minimize noise transmission to the test cell, and sound enclosures that confine noises created by the actuator and servovalve operation. Hydraulic line tamers minimize both mechanically coupled and audible noise.





739lbf	941lbf
990lbf	809lbf
55.54%	3465lbf
-5.583in	-6.072in
-4.020in	-4.344in



## Racing Vehicle Development

You can accurately simulate racing vehicle dynamic performance by adding three or four downforce actuators to the MTS Model 320 test system. These additional channels allow the heave, pitch and roll of the vehicle to be controlled to low frequencies, while precisely simulating aerodynamic loading effects on the vehicle.

You can use this “seven-poster” simulation rig to determine a wide variety of vehicle performance attributes. Tests such as full-vehicle spring rates and roll stiffness can be completed with ease. You can also conduct critical dynamic testing to maximize traction, control chassis dynamics and perform clearance testing for best aerodynamic performance, along with in-depth analysis using cRPC Pro application software.

### High-Performance Downforce Actuation

Single-ended, double-acting MTS Downforce Actuator Systems feature remarkable passive compliance, which is accomplished by using accumulators in the control ports. Other downforce actuator performance advantages include:

- » Polymer hydrostatic bearings that help to minimize frictional losses.
- » A low-friction, low-pressure seal and drain line that eliminate the need for a scavenging pump.
- » A built-in bell crank in the fixture assembly that matches the actuator capability to typical loading requirements, presenting minimum mechanical inertia to the test specimen.
- » A tubular aluminum feedback load cell built into the system’s lightweight carbon-fiber strut, enabling servohydraulic control of the output force.
- » A DC-coupled accelerometer at the specimen attachment point to support reporting functionality and further control enhancement.



### Feature-Rich cRPC Pro Software

MTS cRPC Pro software enables the simulation of racetrack data to be performed on the seven-poster rig. By instrumenting the vehicle to collect track data and combining this information with aero maps generated in a wind tunnel, you can perform a highly accurate simulation of a racing lap in your test lab. Changes may then be made to the vehicle to improve the setup for a given portion of the track (bumps, curb strikes, mid-corner, etc.).

### Aero-Mapping Capabilities

This calculated control technique can be used with downforce actuators to simulate aerodynamic input into the vehicle affecting body position, resulting in highly accurate simulation of racing conditions.

### Wide Variety of Wheel Pans and Restraints

MTS offers a wide variety of wheel pans and restraints systems for easy drive-on/drive-off test article installation and changeover.

## MTS FlexTest Digital Control Systems

The MTS FlexTest controller family represents the latest generation of digital control, providing your vehicle test lab with a versatile controller platform to meet your current and future testing needs.

**VERSATILE.** You can easily reconfigure MTS FlexTest controllers to meet the full range of test applications.

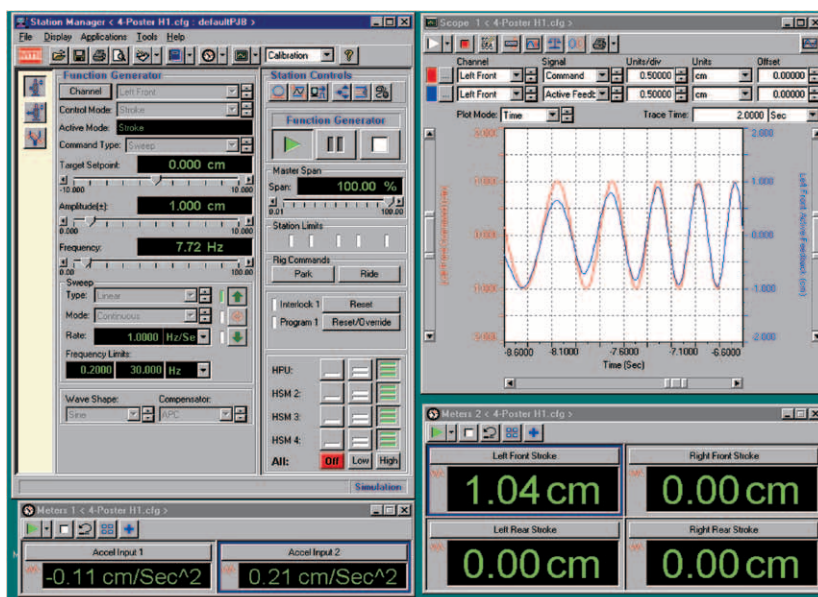
**MODULAR.** MTS FlexTest controllers are easily expandable to meet new test requirements.

**ACCURATE.** Advanced adaptive compensation techniques let you run complex tests on difficult specimens with utmost accuracy and repeatability.

**EASY TO USE.** You can easily define and automate test procedures, and openly share hardware between control systems and test labs for improved efficiency.

These MTS FlexTest models are commonly used with the MTS Model 320 test system:

- » **FLEXTEST 60 CONTROLLER** — supports up to eight control channels and six test stations
- » **FLEXTEST 100 CONTROLLER** — supports up to 16 control channels and eight test stations



### MTS MPT™ Software

Easy-to-use MTS MultiPurpose TestWare® (MPT) software offers powerful test design and automation capabilities to help you test at peak productivity. You can quickly create your own test sequences, including any combination of command generation and data acquisition. New test requirements can be satisfied in a few minutes by designing a new test and saving it for future use. You are not limited as you might be with fixed-function generator application. Other useful tools include those for waveform generation, data acquisition, event triggering, external device control and more.

### Adaptive Inverse Control Compensation

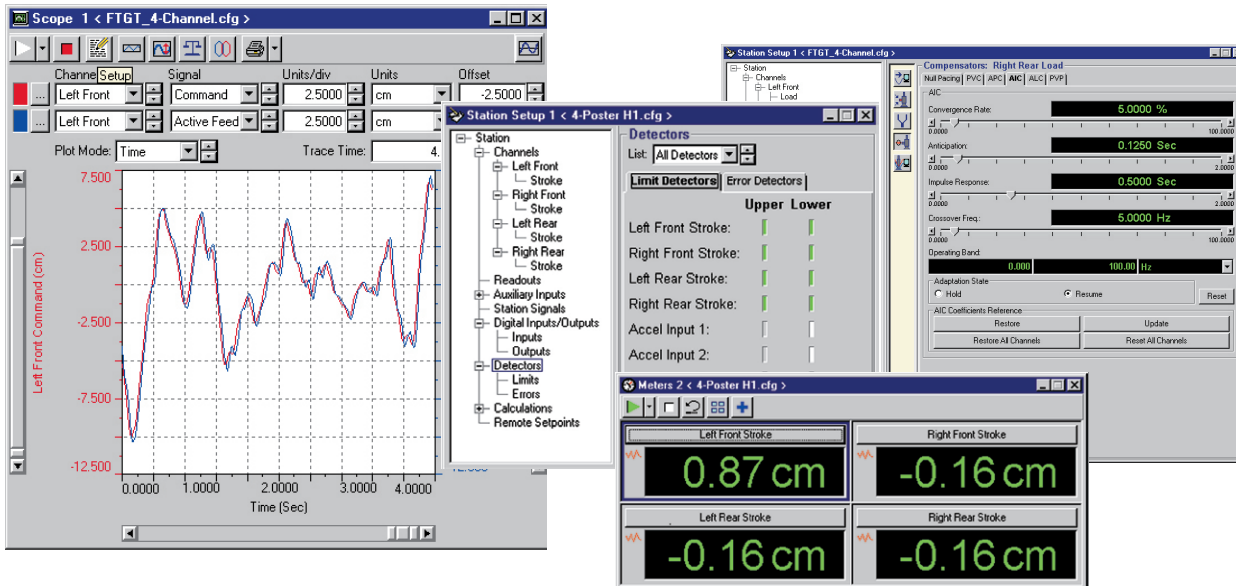
Adaptive Inverse Control (AIC) is an adaptive compensation technique that automatically adjusts the command signal to achieve the desired response signal. AIC is used to improve test accuracy for variable amplitude command signals such as random and RPC drive files.

### Amplitude Phase Control Compensation

Amplitude and Phase Control (APC) is a compensation algorithm that monitors feedback from sine and sine-tapered commands, and adjusts the command to correct for any error. This powerful capability can help you more accurately meet the amplitudes and phase relationships between channels in block cycle tests.

### Trend Monitoring

This control capability allows you to monitor changes in a test specimen during a test, by periodically measuring data from transducers attached to the tested part. This data's statistical properties (maximum, minimum, mean, RMS and variance) are logged and then compared to a reference. If a statistic has changed drastically from its reference, the process can perform any number of user-specified actions, including logging a message or stopping the test.



### Fatigue Monitoring

Fatigue monitoring tracks changes in a test specimen during a test by measuring data from transducers attached to the tested part on a regular basis at specified points in a long-term test. A rainflow analysis is done on each data set to calculate a damage number. This number is logged and compared to a reference. If damage has changed drastically from its reference, you can then either log a message or stop the test. Fatigue monitoring also calculates and logs accumulated damage for all the collected data sets.

### Calculations

The FlexTest calculation control feature enables users to easily define calculations from input signals. Several available math functions exist including: +, -, x, /, cos, exp, ln, log, power, sin, tan and time. You can even use one defined calculation within another calculation.

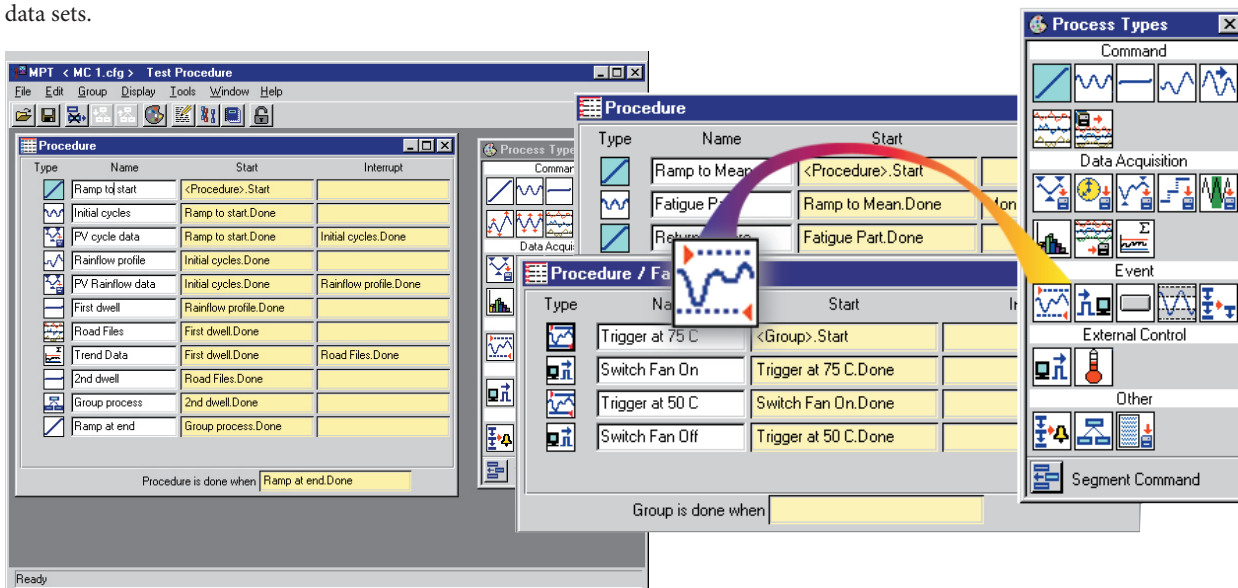
### CAN Bus Support

FlexTest CAN (Controller Area Network) Bus Interface provides you with the flexibility to integrate a wide range of

CAN devices into a test. The flexible MTS Series 793 software interface allows both inputs and outputs to and from CAN devices to be easily configured.

### Time History Playback

This capability allows you to drive a test system with an RPC time history file. This gives you the benefit of playing pre-recorded time history files without purchasing the full suite of cRPC Pro software tools.





## Component cRPC Pro Software

When you use Component RPC Pro (cRPC Pro) software with your MTS Model 320 system, you'll be putting the industry's most powerful simulation and analysis software to work in your vehicle test lab.

At the beginning of the Remote Parameter Control process, filed-recorded data provides you with information about your vehicle operating environment. This information can provide critical details about the character of your test article's performance.

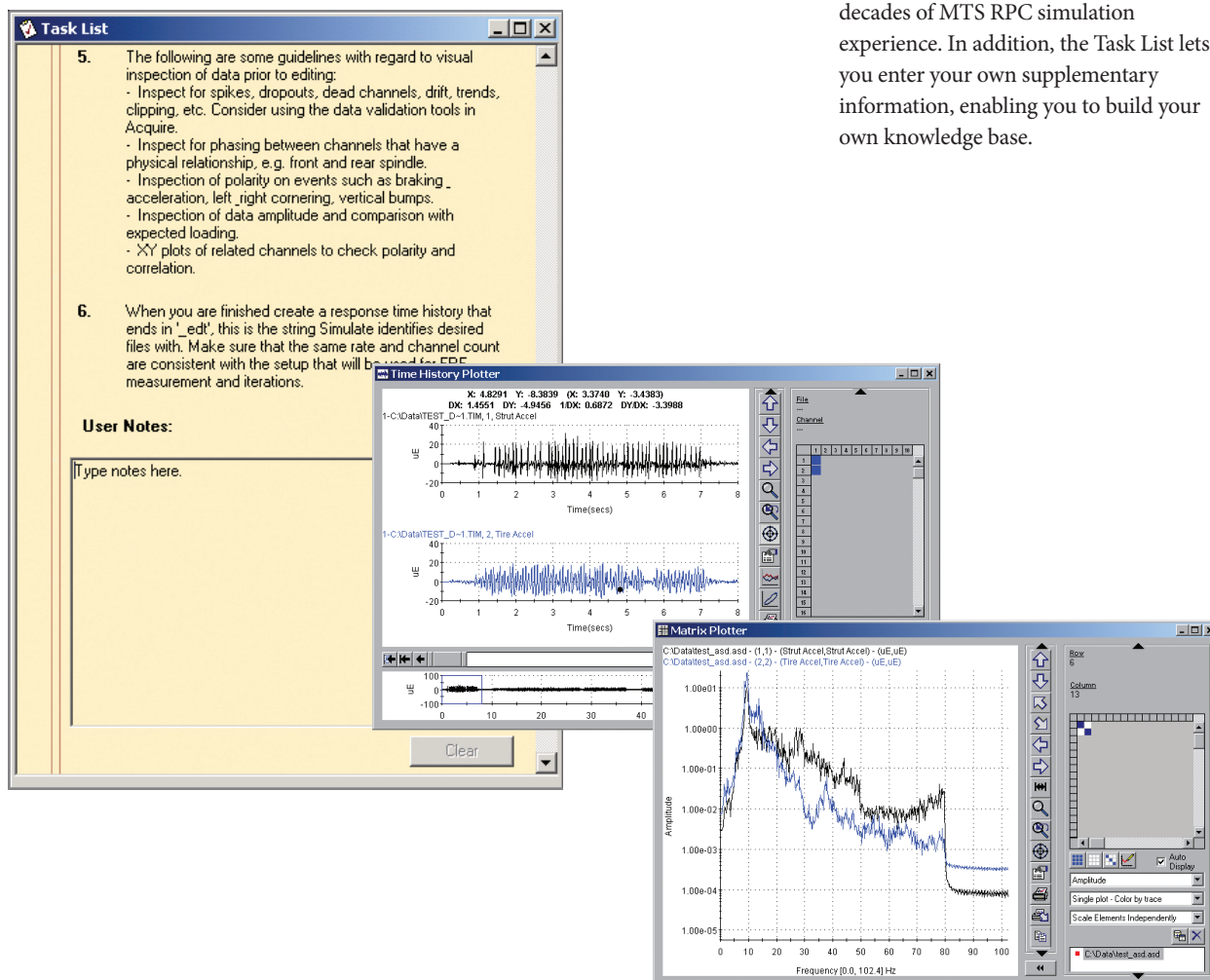
You can use cRPC Pro software to replicate the acceleration of a vehicle spindle by controlling the displacement of the tire, or you can reproduce the strain on a part by controlling the force on the part, and many other component testing applications.

RPC laboratory testing makes it easier for your design and product engineers to see firsthand the environment to which their components are subjected, and the specific nature of any failures that occur.

You'll discover cRPC Pro software to be as intuitive as it is powerful. It includes many helpful features to guide the novice user, making the software extremely easy to learn and use. User-friendly features include:

- » Preconfigured templates
- » Interactive wizards
- » Graphical displays
- » Integrated data management
- » Online context-sensitive Help

A process-sensitive Task List also informs and guides you through the entire vehicle simulation process, resulting from many decades of MTS RPC simulation experience. In addition, the Task List lets you enter your own supplementary information, enabling you to build your own knowledge base.



## Additional Functionality

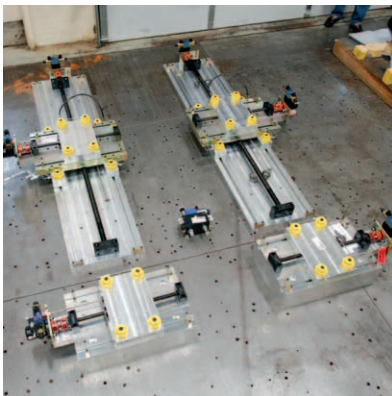
Want to add even greater capabilities and customization to your MTS Model 320 system? Consider the following optional MTS solutions.

### XY Positioning Systems

If your testing involves a wide variety of vehicle sizes, an MTS XY positioning system will allow you to quickly and accurately adjust your MTS Model 320 test system to accommodate the physical dimensions of your test specimen.

MTS XY positioning systems are available in these variations:

- » **MANUAL** — using bolts and clamp
- » **POWERED** — featuring an electric or servohydraulic motor and hydraulic clamping
- » **AUTOMATIC** — using preprogrammed or remote control and hydraulic clamping



### Environmental Chambers

We partner with leading environmental chamber manufacturers to provide integrated systems for reliable testing in a wide range of temperature, humidity, anechoic and solar conditions.



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### Wheel Pans and Restraints

Maintaining the vehicle on the test system without introducing unrealistic horizontal forces is always a challenge. After years of refinement, MTS has arrived at a restraint system that has proven itself in this regard, in a full range of vehicle applications.

Standard wheel pan designs for the MTS 320 test system include:

- » 432 mm (17 in.) with restraint
- » 432 mm (17 in.) with bump
- » 635 mm (25 in.) with restraint
- » 635 mm (25 in.) with bump

*Both wheel pan sizes are also available with Constraint Layer Damping (CLD).*



### Downforce Actuation Packages

You can simulate vehicle dynamic performance by adding three or four downforce actuators to the MTS Model 320 test system. These additional channels allow the heave, pitch and roll of the vehicle to be controlled to low frequencies. You can also simulate aerodynamic loading effects on the vehicle.

While this “seven-poster” configuration is most often used with racing vehicle structural testing, it can also be used to determine a wide variety of performance attributes for any vehicle type. For example, tests such as full-vehicle spring rates and roll stiffness can be completed with ease, and you can conduct critical dynamic testing to maximize traction and control chassis dynamics.



## Standard System Configurations

Model Number	320.025 FR	320.025	320.035	320.050
Description	First Road System S&R	Small Car System S&R	Large Car System Durability/S&R	Light Truck System Durability
Typical GVW	2500 kg (5500 lbm)	2500 kg (5500 lbm)	3500 kg (7700 lbm)	5000 kg (11000 lbm)
Actuator Rated Force <sup>1</sup>	28 kN (6.3 kip)	28 kN (6.3 kip)	38.6 kN (8.7 kip)	50 kN (11.2 kip)
Dynamic Double Amplitude Displacement	152 mm (6 in)	254 mm (10 in)	254 mm (10 in)	254 mm (10 in)
Servovalve	2 x 57 lpm (2 x 15 gpm)	2 x 57 lpm (2 x 15 gpm)	340 lpm (90 gpm)	340 lpm (90 gpm) Optional 680 lpm (180 gpm)
Performance (@ Wheel Pan) <sup>2</sup>				
Maximum Velocity	1.5 m/s (59 in/s)	1.5 m/s (59 in/s)	3.6 m/s (142 in/s)	2.7 m/s (106 in/s) Optional 5.4 m/s (213 in/s)
Maximum Acceleration (Sinusoidal)	19.5 g	20 g	24.5 g	21 g
@ assumed unsprung (dynamic) mass	40 kg (88 lbm)	40 kg (88 lbm)	60 kg (132 lbm)	100 kg (220 lbm)
@ assumed sprung (static) mass <sup>4</sup>	750 kg (1653 lbm)	750 kg (1653 lbm)	1050 kg (2315 lbm)	1500 kg (3307 lbm)
Recommended Hydraulic Supply <sup>5</sup>	505.30	505.30	505.90	505.150 Optional 2x 505.150
Operating System Pressure	210 bar (3000 psi)	210 bar (3000 psi)	210 bar (3000 psi)	210 bar (3000 psi)
Wheel Pan Diameter (round) <sup>6</sup>	635 mm (25 in)	432 mm (17 in)	432 mm (17 in)	432 mm (17 in)

Model Number	320.100	320.200	320.250	320
Description	Medium Truck System Durability	Heavy Truck System Durability	Heavy Truck System Durability	7/8 Poster w/ Downforce Racing
Typical GVW	10000 kg (22000 lbm)	20000 kg (44000 lbm)	25000 kg (55000 lbm)	
Actuator Rated Force <sup>1</sup>	100 kN (22 kip)	100 kN (22 kip) [F] 160 kN (35 kip) [R]	160 kN (35 kip) [F] 213 kN (48 kip) [R]	Actuator: 38.6 kN (8.7 kip) DF: 15-20 kN (3.5-4.5 kip) Adjustable Downforce 10.2-15.1 kN (2.3-3.4 kip) Adjustable Upforce
Dynamic Double Amplitude Displacement	254 mm (10 in)	254 mm (10 in)	254 mm (10 in)	Actuator: 254 mm (10 in) DF: 300-198 mm (12-7.8 in) Adjustable
Servovalve	680 lpm (180 gpm)	680 lpm (180 gpm) [F] 950 lpm (250 gpm) [R]	950 lpm (250 gpm) [F] 1515 lpm (400 gpm) [R]	Actuator: 340 lpm (90 gpm) DF: 2 x 38 lpm (2 x 10 gpm)
Performance (@ Wheel Pan) <sup>2</sup>				
Maximum Velocity	3.4 m/s (134 in/s)	3.4 m/s (134 in/s) [F] 3.0 m/s (118 in/s) [R]	3.0 m/s (118 in/s) [F] 3.6 m/s (142 in/s) [R]	Actuator: 3.6 m/s (142 in/s)
Maximum Acceleration (Sinusoidal)	29 g	21 g [F], 20 g [R]	28.5 g [F], 18 g [R]	Actuator: 24 g
@ assumed unsprung (dynamic) mass	120 kg (265 lbm) <sup>3</sup>	180 kg (397 lbm) [F] <sup>3</sup> 350 kg (772 lbm) [R] <sup>3</sup>	250 kg (551 lbm) [F] <sup>3</sup> 450 kg (992 lbm) [R] <sup>3</sup>	60 kg (132 lbm)
@ assumed sprung (static) mass <sup>4</sup>	3000 kg (6614 lbm) <sup>3</sup>	6000 kg (13228 lbm) <sup>3</sup>	7500 kg (16535 lbm) <sup>3</sup>	1050 kg (2315 lbm)
Recommended Hydraulic Supply <sup>5</sup>	2 x 505.150 (2 axle) 3 x 505.150 (3 axle)	2 x 505.180 (2 axle) 3 x 505.180 (3 axle)	3 x 505.180 (2 axle) 5 x 505.180 (3 axle)	505.150
Operating System Pressure	210 bar (3000 psi)	210 bar (3000 psi)	210 bar (3000 psi)	210 bar (3000 psi)
Wheel Pan Diameter (round) <sup>6</sup>	635 mm (25 in)	635 mm (25 in) [F] <sup>7</sup> 1016 mm (40 in) [R] <sup>7</sup>	635 mm (25 in) [F] <sup>7</sup> 1016 mm (40 in) [R] <sup>7</sup>	457 mm (18 in) square

### NOTES:

- Rated force is determined at 2800 psi differential across the piston.
- Performance is measured at the wheel pan. Performance is not representative of spindle motion.  
For performance estimations at the spindle see below tire magnification factors (valid near wheelhop frequency):  
Passenger car: 2.0 to 2.5  
Truck: 1.25 to 1.5
- Static Support is used to zero out the mean load resulting from the sprung and unsprung masses so that actuator force is available solely for acceleration forces.
- Vehicle weight distribution for the 320.025 through 320.050 systems is taken as 60/40 Front/Rear. The 320.100 and 320.200 systems are distributed 40/60 Front/Rear.  
Worst case for all systems is for an actuator supporting 30% of total vehicle weight.
- HPS sizing assumes average flow requirement is 25% of peak flow and HPU is operating at 50 Hz. This is only an estimate. More exact requirements can be determined by analyzing customer's drive files, if available.
- Custom wheelpan solutions are available upon request.
- External vehicle restraints are required.

Mass assumptions shown are per corner.

Performance specifications are based on assumptions for sprung and unsprung masses.

Specifications are subject to change without notice.

Please contact MTS Systems Corporation for specifications critical to your needs.



## MTS Global Service and Training

With a proud history of maintaining laboratory test equipment, MTS service focuses on providing the timely and cost-effective monitoring, maintenance and repair support demanded by today's fast-paced development environment.

MTS supports you with hundreds of expert service technicians working around the world. Local, experienced, technical service personnel are kept current on test equipment maintenance and repair techniques through regular internal training courses.

### Responsive Maintenance and Repair

MTS maintenance and repair parts are often available locally for many systems, and other items are usually available as quickly as air shipping allows. Our local focus, organization and commitment allow us to offer timely maintenance and repair services for maximum uptime.

### Software Update Agreements

To support our integrated simulation solutions even better, MTS Software Maintenance Enhancement and Support (ME&S) agreements make it easy and affordable to stay current with rapidly changing software technology. Within your contracted period, you will automatically receive updates to all software covered in your contract, including minor enhancements of existing MTS software and all upgrades that become available after initial software purchase.



### Consulting Services

MTS has a global engineering and consulting organization with numerous consultants who specialize in a wide range of performance evaluation methods. This individual specialization, combined with a team approach, allows our consultants to deliver innovative and analytical performance evaluation solutions.

### Training

As your partner in successful testing, MTS provides in-depth, focused training on the operation and maintenance of the products you have purchased. MTS will provide onsite presentations for all standard course offerings, and has the expert capability to develop custom courses on a broad range of test-related subjects not covered by the standard course offerings.



## Regional Business Centers

### THE AMERICAS

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