

The Siemens logo is displayed in a bold, teal, sans-serif font. It is positioned in the upper right corner of the image, within a white rectangular box. The background of the entire image is a photograph of an industrial test stand, showing various mechanical components, cables, and a large black cable tray in the foreground.

**SIEMENS**

*Ingenuity for life*

# Test stands for the automotive industry

Precise, efficient and flexible

[usa.siemens.com/teststands](https://usa.siemens.com/teststands)

# The more flexible, faster and more precise they are, the higher the competitive advantages that can be created

Test stands are an essential component of precise quality assurance procedures in the automotive industry.

Research achievements must be rigorously checked and tested, and new functions meticulously verified to ensure that they are effective. They must have outstanding efficiency when it comes to energy, time and costs—and safety for people must be guaranteed in compliance with the applicable standard (according to C Standard EN 528).

As a complete supplier of electronic components and application-specific concepts, Siemens has the answer to every one of these challenges. We are more than willing to help you implement your innovative test stand concepts that are fit for the future.

## The ideal drive and motor technology for different test stand system tasks

<p><b>SINAMICS S120</b></p>	<p><b>SINAMICS DCP</b></p>	<p><b>SIMOTICS M-1PH8 main motors</b></p>
		
<ul style="list-style-type: none"> <li>■ High speed and torque precision</li> <li>■ Active infeed unit for a constant DC link voltage</li> <li>■ Control system with a high dynamic performance</li> <li>■ Firmware extensions for application-specific functions</li> </ul>	<ul style="list-style-type: none"> <li>■ Bi-directional buck-boost converter in a single device</li> <li>■ High switching frequency</li> <li>■ Can be connected simultaneously</li> <li>■ Can be connected to an Active Line Module</li> </ul>	<ul style="list-style-type: none"> <li>■ High torque precision</li> <li>■ High dynamic performance</li> <li>■ Safety-related encoder</li> <li>■ High power density</li> <li>■ Low noise levels</li> </ul>
<p><a href="http://usa.siemens.com/sinamics-s120">usa.siemens.com/sinamics-s120</a></p>	<p><a href="http://usa.siemens.com/sinamics-dcp">usa.siemens.com/sinamics-dcp</a></p>	<p><a href="http://usa.siemens.com/simotics-m-1ph8">usa.siemens.com/simotics-m-1ph8</a></p>
<p><b>SIMOTICS T-1FW6 torque motors</b></p>	<p><b>SIMOTICS L-1FN3 linear motors</b></p>	<p><b>SIMOTICS T-1FW3 torque motors</b></p>
		
<ul style="list-style-type: none"> <li>■ Modular design</li> <li>■ Large rotor diameter</li> <li>■ High torque levels</li> <li>■ Low torque ripple</li> </ul>	<ul style="list-style-type: none"> <li>■ High dynamic performance</li> <li>■ High precision</li> <li>■ Constant linear force</li> <li>■ Wear-free force transmission</li> </ul>	<ul style="list-style-type: none"> <li>■ Direct drive—mechanical transmission elements are not required</li> <li>■ High torque levels</li> <li>■ Wide speed range</li> <li>■ High control quality</li> </ul>
<p><a href="http://usa.siemens.com/simotics-t-1fw6">usa.siemens.com/simotics-t-1fw6</a></p>	<p><a href="http://usa.siemens.com/simotics-l-1fn3">usa.siemens.com/simotics-l-1fn3</a></p>	<p><a href="http://usa.siemens.com/simotics-t-1fw3">usa.siemens.com/simotics-t-1fw3</a></p>

# Flexible and energy efficient solutions for test stands

**+** Maximum diameter of the rotor mechanical

Increased stiffness

▶ Improved controllability

**+** Segmented motor design

Can continue to operate even if individual stator segments fail

▶ High degree of availability

**+** Lower moved mass

The motor is integrated in the mechanical system of the machine

▶ High dynamic performance

**+** Directly generated linear forces

Mechanics are not required to convert from rotary to translatory motion

▶ Lower wear

**+** DC source

Variable DC voltages are generated

▶ Can be used for various vehicle types

**+** Energy efficiency

Energy exchange in the DC link

▶ Lower infeed power and costs



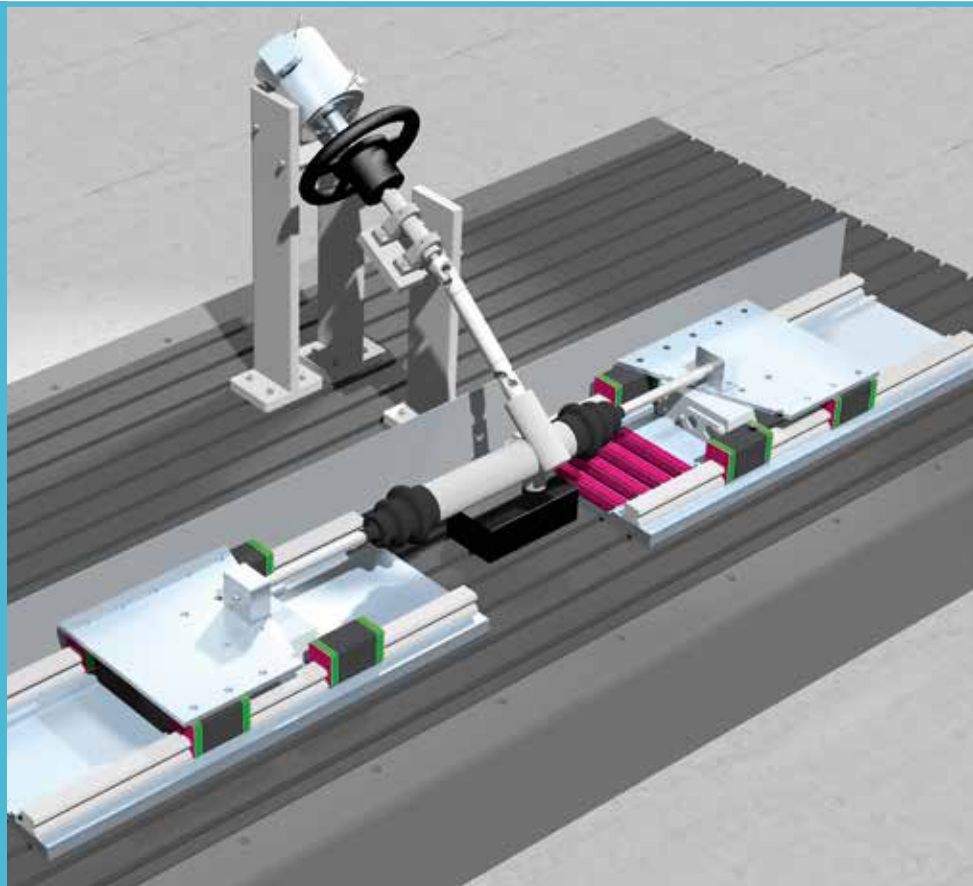
## Roller test stand

- Simple handling
- High degree of availability—the test stand can continue to operate even if individual stator segments fail
- Stiff mechanical design—direct drive system instead of a two-mass oscillating system assembly
- Improved control characteristics
- Space-saving as a result of the overall compact design



## Linear motor test stand

- High dynamic performance
- Low wear of the mechanical system
- Simple mechanical design
- Constant-force applications without damage to the mechanical system
- Hydraulic axes replaced by electric drive technology



## Roller test stands—the segment motor is in full control

Classic roller test stands generally have a design based upon a two-mass oscillating system assembly—a somewhat unfavorable concept. Using a SIMOTICS segment motor is an efficient way of improving the dynamic response of roller test stands. The direct drive technology allows the test stand design to be radically changed and innovated.

- The coupling between the roll and the motor must have a maximum degree stiffness to be able to efficiently control the high moment of inertia of the load that is coupled to the motor. This is why the SIMOTICS segment motor is directly integrated in the roll. The system can be precisely adapted to customer requirements as the motor diameter can be scaled.

High degree of availability

High dynamic performance

## Linear motor test stands—as dynamic as they get

Test stands are becoming increasingly faster and more dynamic. Efficient drive technology is a fundamental pre-condition in order to achieve the high demands on test stands based upon linear motion. Completely new possibilities are created by integrating a SIMOTICS 1FN3 linear motor directly into the mechanical system of the test stand.

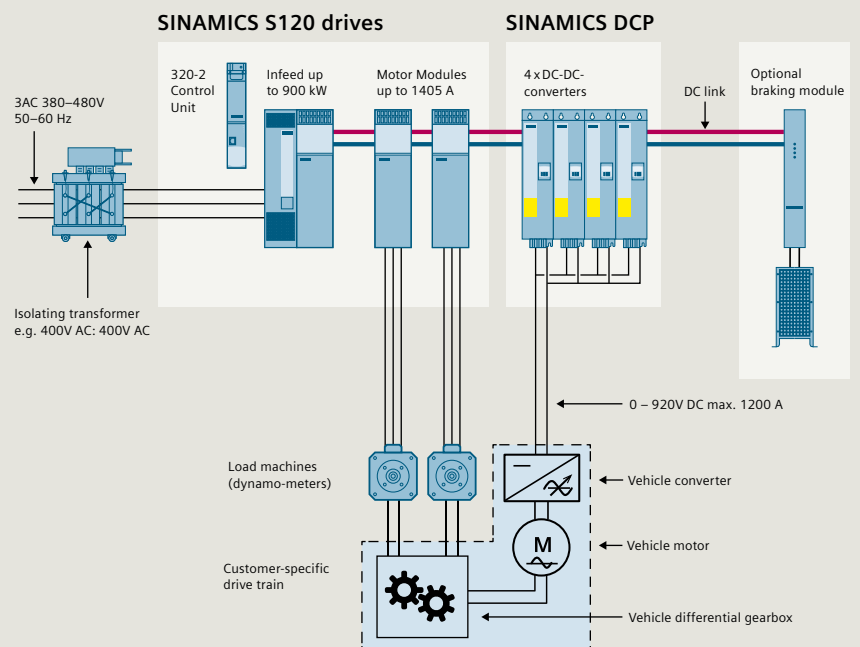
- Low motion amplitudes place high demands on the mechanical system. Punctiform loads that occur when converting rotary into translatory motion and force automatically result in high wear levels. SIMOTICS linear motors allow translatory force to be directly generated—therefore eliminating mechanical systems that are prone to wear and tear.

## E-mobility test stand

- Solution for a variable DC source
- Solution for the battery test
- All components for the complete system from a single source
- The 380–480V voltage level can be kept, even for higher DC output voltages



## Concept to test vehicle drive systems based upon standard SINAMICS components



## Energy exchange in the DC link

- Low line connection power
- Lower rating line supply in the test stand area
- Controlled stopping when the power fails

# E-mobility test stands—this is the future

The fast advance of electromobility and the development of new technologies means that the automotive industry has to embark on some significant capital investments. While classic internal combustion engines are essentially autonomous or externally driven, electric drive systems must be supplied with electric power—which requires new test stands. Efficiently providing the required DC power represents a considerable challenge when planning and designing test stands for electric vehicles.

A variable DC voltage can be generated in two different ways. The DC link voltage of a SINAMICS S120 drive system serves as the basis to achieve this.

## Can be used in end-of-line test stands for vehicle motors

Producing an electric motor involves a workflow comprising various consecutive steps. After the stator and rotor have been produced, the motor function must first be tested before the assembly process can continue—a time-consuming procedure. With the SINAMICS S120 drive system and the SIMOTICS motor portfolio, we are well equipped when it comes to checking electric motor functionality.

## End-of-line test stands for batteries

In addition to the traction system itself, an electric vehicle also requires a battery. Batteries must be subject to charge and discharge cycles in order to reliably test them. In conjunction with the DCDCCONV\* Technology Extension, SINAMICS S120 motor modules can be used as the DC source with a highly-dynamic response. Filters can be flexibly dimensioned so the system can be perfectly adapted to the specific application requirements.

## Energy efficiency

## Can be used in end-of-line test stands for the complete vehicle drive system

Testing the complete vehicle drive system—vehicle converter, vehicle motor, differential gearbox—means that the converter must be supplied with power and a load must be simultaneously applied to the vehicle motor. Today, energy efficiency plays a huge role. Energy can be efficiently exchanged between the various loads in the DC link by combining SINAMICS S120, SINAMICS DCP and SIMOTICS M-1PH8 products. Only the energy required for acceleration has to be drawn from the line supply. This facilitates a low line connection power. The ability to generate different voltage levels is ensured as a result of the buck-boost functionality of the SINAMICS DCP converter.

- The DC link voltage can be stepped-up and stepped-down using the SINAMICS DCP converter—resulting in a very wide voltage control range. The high clock frequency facilitates a low current ripple and a high voltage quality.
- In conjunction with the DCDCCONV\* Technology Extension, SINAMICS motor modules allow voltages to be generated up to the amplitude of the DC link voltage (max. of 720V when connected to a 400V line supply). A filter at the motor module output means that the solution can be flexibly deployed. The fast communication and current controller clock cycle means that high dynamic setpoints can be entered and a control with high dynamic performance can be achieved.

\* DC-DC converter / not UL-certified

Everything about test stands  
can be found on the web

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