

**Acutronic**

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# Test systems for autonomous cars

A wide range of solutions, from component to full system level test platforms, leverage varied technological and engineering expertise

➤ Acutronic is an expert in the design of customized automated test equipment (ATE) solutions, which incorporate motion simulation technology. Acutronic Group has been working with customers worldwide from its offices in Bubikon, Switzerland and Pittsburgh, Pennsylvania, for over 40 years. The company's test systems are used for evaluation of airbag impact sensors, dynamic stability control, rollover detection and other modules containing inertial sensors.

Acutronic designs and develops three key types of product. First, it provides one- and two-axis test systems (rate tables), which produce high-precision motion excitation of devices under test (DUT). Users are able to define test profiles as required.

Second, it provides HIL systems, which simulate real-world driving conditions using physical motion, for testing discrete sensors, safety and control modules or entire vehicles. The HIL control system communicates in real time with sensor suites and safety systems and compares their actual responses with the expected responses for particular driving conditions.

Third, it provides ATE solutions for automotive component and module testing. In addition to



Acutronic's in-house inertial test laboratory can be used by clients for testing and/or calibrating automotive-related motion sensors such as gyros, accelerometers and/or IMUs

providing a motion test system, a fully integrated solution consists of mechanical and electrical interfaces to the DUT, data acquisition hardware and a software suite responsible for controlling test profiles, and collecting and analyzing test data.

Acutronic's technical team provides a full turnkey service. The customer provides a statement of work, detailing requirements for the test system, including a description of the DUTs, interface and communication requirements, types of tests to be performed (motion, pressure, software, etc), and pass/fail criteria. Acutronic's team handles, in close cooperation with the client, all steps of development, from initial concept formulation through to design and performance and acceptance

testing of the full system, on location at the client's facility.

A typical test system might include the following components, which can be customized according to the client's requirements:

An automated rate table for motion control, which enables precise sequence of the motion steps required for testing DUTs; automated thermal profile control; test execution flow control ensuring proper timing and order of the test steps; data acquisition through serial synchronous and asynchronous interfaces including SDLC, RS422, RS485, RS232, SPI, I<sup>2</sup>C

and other communication protocols; data acquisition with analog outputs using National Instruments (NI) hardware, including a selection of analog to digital conversion options and noise effect analysis capabilities; simultaneous data acquisition from multiple DUTs, ensuring sufficient processing power with a modular design, which enables future capacity expansion; power supply selection and implementation of automated control; data management and supporting database designs for MySQL, MS SQL Server and similar database systems; various GUI design configurations for the simplest operation and clear communication of test results; and test plan optimization and design to increase the efficiency of testing processes.

In its test systems Acutronic uses modern scripting and programming languages such as Python, LUA, NI TestStand, C++/C# and similar.

Solutions are implemented in close collaboration with the customer, ensuring transparency in developmental processes and management of customer requirements and expectations. Acutronic's high throughput ATE systems are capable of testing extremely high numbers of discrete sensors, subassemblies, and/or complete vehicles per year. ◀

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