Test rig technology: seamless integration of measurement technology in the control system

## EtherCAT, the core of the modular machine concept



Test system for gearboxes

The French company Sitia develops and constructs test rigs for industrial and technical laboratories. Its product range includes automatic testers for material fatigue, for quality measurements and the characterization of parts, HiL (hardware in the loop) as well as quality test rigs for different industries. Today, Sitia equips the majority of its plants with PC-based control technology from Beckhoff. The modularity of the Beckhoff technology perfectly suits the company's new policy of meeting its customers' multifaceted requirements with a modular and standard machine concept.

Sitia, with headquarters in Nantes, France, has made a name for itself since 1995 as a supplier of turnkey automatic test rigs for the simulation of mechanical, physical, hydraulic, pneumatic, climatic and electrical parameters. Sitia's customers include the automotive, aerospace and railway industries as well as bicycle manufacturers, the wood and furniture industry, civil engineering and many other branches of industry.

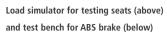
As a rule, the tests to be performed are clearly defined by manufacturers and outfitters. Sitia develops the test rig on the basis of a precise specification sheet, which is drawn up together with the customer. Apart from the construction of custom machines, the company has developed standard test equipment for industries that are subject to very strict standards, such as

civil engineering, the woodworking industry as well as the manufacture of furniture and bicycles etc.

## Modular control concept offers the customer greater flexibility

Sitia relies on Beckhoff technology both for custom machines and for standard machines. "Today, 80 % of the machines that we supply are equipped with a Beckhoff control solution on the basis of TwinCAT, EtherCAT I/Os and EtherCAT Servo Drives. We are convinced that we have chosen the right technology," says Fabien Arignon, Managing Director of Sitia. EtherCAT is the core of the company's new control strategy, a decision taken in 2007. At that time, Sitia took stock of the situation and decided on a new machine







concept with which it could align itself to market requirements. "Industrial laboratories need machines that are tailored precisely to their tests. But at the same time they also demand independence, which means they don't want to constantly rely on their supplier if sensors or actuators have to be added to or removed from the machine, or if settings have to be changed and parameters entered. We had to come up with a solution that would allow us to offer this flexibility," explains Fabien Arignon. These considerations ultimately led to the concept of a modular universal test rig. "Modularity and the standardization of components form the matrix of our new machines," adds the Sitia Managing Director. This modularity exists on several levels and extends from the mechanical components to the controller.

With respect to the controller, test systems differ from most other automation applications in that they encompass a large number of sensors and actuators in various versions. "On the one hand, we wanted a higher degree of modularity, but on the other, the configuration of the hardware and software had to be simple to adapt," says Fabien Arignon, explaining the reason for choosing Beckhoff technology. "In addition to the modularity and scalability of the hardware and software, Beckhoff also covers the wide range of I/O signals required for applications in test rig automation."

## Seamless integration of measurement technology in the control system

With EtherCAT, Beckhoff also fulfilled Sitia's expectations for a fieldbus system with real-time performance. For example, the EL3602 EtherCAT Terminal acquires the measured values with an accuracy of 0.01 % and offers an ideal basis for high-performance and high-precision measurement technology. The seamless integration of the measurement technology into the automation solution makes special modules unnecessary. "With EtherCAT Terminals we can acquire measuring signals directly in the standard I/O system," explains Fabien Arignon, "which considerably simplifies the control architecture." Sitia uses LabView from National Instruments as the operator interface. "Both we and our customers know this software well," says Fabien Arignon, explaining the choice. "LabView is particularly interesting for us because of the software libraries for the visual representation of measurements in the most diverse formats (digital or dial displays, curves, tables etc.)." Sitia uses TwinCAT PLC from Beckhoff as the universal programming and automation software. Data is exchanged very simply between TwinCAT and LabView via the Beckhoff communication DLL.

## Open concept allows subsequent extensions and changes

In addition, the universal test rigs from Sitia are intended to allow the customer to further develop the configuration of its machines independently. This function was even one of the priorities in the specification sheet for the modular machine concept. I/O reserves are provided so the user can add or change sensors and actuators as well as the necessary measuring modules in its machine, depending on needs. The changes concerned are specified in a table under LabView and passed on to TwinCAT. "Special knowledge is not required on the part of the user, because the software is easy to use," says Fabien Arignon. "Of course, this flexibility could only be accomplished because a wide range of potential changes and developments were considered from the outset."

Sitia www.sitia.fr

Beckhoff France www.beckhoff.fr