



Advantech Time provides consultancy services on design, modeling, numerical simulation and laboratory testing, as well as the ad-hoc development of test equipment or software for measurement applications.

PC-based measurement and testing technology offers optimization potential

High flexibility, precision and integration in test bench engineering

When it comes to creating test benches, Italian company Advantech Time is breaking new ground and changing the traditional landscape in the field of measurement and test engineering. PC-based control from Beckhoff ensures flexibility and a multidisciplinary approach in the test laboratory, integrating two activities that were previously always separate: industrial control and data acquisition.

Advantech Time, started as a spin-off of the University of Udine, is an engineering company that supports companies in research and product development projects and examines specific issues, e.g., in thermodynamics, fluid dynamics, acoustics or the process industry. It combines scientific research methodologies with practical experience using a multidisciplinary approach. "We take a 360-degree approach to the requests we receive from companies in the areas of design, modeling, numerical simulation and laboratory testing," explains Alessandro Armellini, General Manager and co-founder of Advantech Time. Based on this, appropriate test setups and software for the measurement campaigns are developed on an ad-hoc basis.

"Even though most of the requests relate to air conditioning on both an industrial and residential scale or come from the thermodynamic sector, Advantech Time does not have a specific reference market," emphasizes Armellini. Projects often involve ventilation issues, thermal management and heat transfer. In addition, the company also takes orders from other sectors – household appliances,

automotive, environment, energy, and measurement and control technology, to name just a few.

"We usually carry out experimental studies on components or processes," Armellini explains further. He believes that Advantech Time's strength is that they do not just provide Excel spreadsheets, but answers to concrete questions. It is often a matter of discovering the causes of a product's malfunctions or improving its performance. "Our customers have very specific questions, which means that from time to time we have to come up with entirely new ways of getting answers efficiently," Armellini outlines an interesting aspect of his work. This is also where the solutions from Beckhoff come into play, the features of which have proven crucial in effectively implementing these often tricky tasks.

PC-based control increases flexibility and precision

Compared to industry, projects in the laboratory environment are usually limited in time and require a multidisciplinary approach. Consequently, aspects such

as flexibility, modularity and reusability are very important. This is because the components installed in a test bench must also be reusable in subsequent projects. According to Armellini: "This is why optimum levels of flexibility are the most important requirement for the hardware – in addition to the prerequisites of accuracy and reliability. The features of the Beckhoff solutions support us in this regard without limiting our imagination." Availability is just as important, including when it comes to delivery speed. Customers often expect quick answers. Short project times are therefore the rule, rather than the exception.

"The features of the Beckhoff solution match our philosophy and way of operating perfectly," sums up Luca Furlani, Area Manager for software development, measurement and acoustic modeling projects at Advantech Time. He adds:

General Manager Alessandro Armellini:

“ Our customers have very specific questions, which means that from time to time we have to come up with entirely new ways of testing. PC-based control helps us do that.”



© Advantech Time Srl

and presentation) due to its open and flexible nature. Automating test procedures with PC-based control has increased the accuracy of the tests, especially in cases where multiple components need to be conditioned with high precision and time variance.

The typical design of a test bench, which always has a Windows PC as the main interface, is comparable to a PLC-based control system in which a Beckhoff Industrial PC acts as the master. All data acquisition and control I/O modules are connected to this platform. The logic used to perform the tests runs in the control system. The PLC handles communication with the specific instruments of the application in question, which are usually specified by customers. "With conventional systems, managing these test setups was inef-

Area Manager Luca Furlani:

“ Beckhoff gives us the opportunity to use powerful, modular and open industrial-grade hardware in the world of testing, which has always lacked a solution that combines flexibility and fast development with accuracy.”



© Advantech Time Srl

"Multidisciplinary, flexible, and real-time capable – what we buy and use today may be used somewhere completely different tomorrow. As a result, it must be possible to precisely adapt the measurement and data acquisition system to the requirements of an application and its components."

Normally, a test bench "grows" throughout its life cycle, as know-how is constantly generated during the ongoing tests, which also changes the way the tests are performed. This continuous adaptation must not be limited by the platform used. The same thing applies to the software. "If adapting the software by adding more signals or a new component becomes too complicated, it ultimately restricts our business development," emphasizes Furlani. PC-based control impressed Advantech Time in this respect, too.

Real-time and synchronization capabilities are essential for test bench equipment. In virtually every case, certain tasks need to be performed reliably in real time – in parallel with other tasks that do not have the same strict time requirements. This aspect is very important to Furlani: "If there is an interruption during an ongoing test, much of the time and energy spent up to that point can be lost. While there are systems on the market that enable real-time tasks, they are tedious to program and difficult to integrate with the rest of the system. Therefore, using these is much less efficient, especially in terms of progressive system development."

Reliable, expandable and accurate

"Initially, we worked mainly with manual test benches equipped with multiplexers for data acquisition," explains Armellini. "We tried different systems, but they all proved to be unreliable, too inflexible, or required too much time to set up the test benches." Furlani adds: "We looked for a solution without these limitations and found it at Beckhoff." Advantech Time has now chosen Beckhoff as the ideal platform for automated test management (data acquisition, analysis

cient, but that's a thing of the past with PC-based solutions from Beckhoff," emphasizes Furlani.

The engineers are also satisfied with the accuracy of the Beckhoff platform. "It is by all means comparable to that of conventional devices designed specifically for certain measurement tasks," adds Armellini. "Most important, Beckhoff has a huge range of components available, which means that, whatever the task in question, we can always use the right I/O module or even one of the precision measurement terminals from the ELM series."

Linking the industry and test lab environments

"The fact that our test benches can communicate with a wide range of fieldbuses via PC-based control has been a real help," explains Furlani. And that is exactly why Advantech Time now not only uses the test benches for its own purposes, but also sells them to industry customers.

With Beckhoff technology, the company is going one step further and closes the gap between industrial control and the laboratory environment. "In the lab, we usually focus on data acquisition and leave the control to other, often inflexible, devices," explains Armellini. He believes that it is much better to integrate the two systems: "This is possible with PC-based control, which was developed for industry but provides the precision measurement technology needed for laboratories. An integrated data acquisition and control solution enables software-in-the-loop systems, where the symbiosis of the real and virtual worlds enables efficient testing."

More information:

www.advantech-time.com

www.beckhoff.com/measurement