

Test Automation for Shock Absorber Production

ADwin Pro System for Real-Time Modular Data Acquisition

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CAS DataLoggers recently provided the modular data acquisition and control solution for an automotive manufacturer using test systems to determine the dynamic characteristics and parameters of their line of shock absorbers. On the factory's production lines, test benches ensured a higher level of quality through individual component testing. All the test information and data needed to be transferred to a PLC control system via Ethernet or a Fieldbus interface so that it could then be stored as quality records in the production database. Management realized the need for a modular data acquisition and control system which could flexibly handle testing and could be easily configured in order to meet all the demanding test specifications.



The manufacturer installed a full rack mainframe **ADwin-Pro Data Acquisition and Control System** in a control cabinet located in their testing area. The modular, expandable ADwin-Pro system was suited for this application with its many channels, flexible configurations and field bus interfaces, including Profibus, Interbus, CANbus, and serial interfaces enabling use with a programmable controller. The ADwin-Pro formed an intelligent data acquisition solution performing online evaluation of measurement data, performed immediately after each sample was taken. The system also enabled complex triggering conditions, high sampling rates, and freely programmable mathematical operations and functions including RMS values, min/max, mean, derivative, digital filters, and signal analysis.

The modular data acquisition system applied analog and digital stimuli to the shock absorber under test, using multiple channels of actuators and amplifiers. In addition to the stimulation, the response of the components was acquired by reading the system's analog and digital input channels. The ADwin system evaluated the response in real-time to immediately calculate how well the shock absorber under test matched the manufacturer's required specifications. The stimulation and acquisition could be performed over a very wide range of frequencies, from a few hundred hertz to several hundred kilohertz. By precisely timing stimulation, acquisition, and on-line evaluation, the ADwin system performed all tests and evaluated the data to accurately calculate the dynamic parameters of each shock absorber. The results were then sent to an office PC control system, connected via USB to display the test results.

The ADwin-Pro system supported parallel, individually-controlled, real-time processes, all while running independently of the PC's operating system to provide deterministic operation with response times of 1 usecond or less. Tightly-coupled analog and digital inputs along with counters provided extremely low

latency operation. The system could also be configured for specific uses, utilizing a modular form factor with different I/O boards and expansion plug-in modules to allow up to 480 analog or digital inputs or any combination of these in a single chassis. The customer was also offered a variety of other I/O options including CANbus, SSI, Profibus/Fieldbus, RS-232/485, and signal conditioner modules.

Communication with the host PLC was done via Ethernet. Plug-in boards supported analog and digital I/O, counter/timers, PWM signal I/O, thermocouples and RTDs, 5B or MB input modules, serial, CAN, and Fieldbus communication. The high-performance onboard DSP processor with its own local memory handled system management, data acquisition, online processing and control of outputs. Processing of each measurement occurred immediately after acquisition.

Additionally, the ADbasic control language allowed users to program mathematical operations and functions which were executed immediately after each sampling step, even at sampling rates as high as 1.25 MHz. The ADwin software environment could be used under Windows (2000/XP/Vista/Win7) and Linux, or as a stand-alone data acquisition system. ADwin also offered drivers for many of the popular programming environments including Visual Basic, Visual C/C++, LabVIEW/LabWindows, TestPoint and others.

Every sampled value or event could be evaluated in the same step so that a control function or online analysis could be performed immediately. This was made possible by the ADwin-Pro's design which featured a local CPU, additional analog and digital interfaces, as well as various expansion options. The local CPU was a fast, 32-bit floating-point DSP, equipped with internal memory for executing real-time code and external SDRAM for data. In conjunction with the ADbasic real-time development tool, this DSP allowed fast, deterministic program execution, with a guaranteed reaction time of less than 1 μ s.

The manufacturer benefitted in several key ways from installing the ADwin-Pro data acquisition and control system in their shock absorber test program. The powerful ADwin system handled all the rigorous and fast-paced testing while its powerful communications options enabled data transfer to the PLC. The ADwin's modular design made it simple to configure in line with all the test specifications, and the system could be easily expanded to accommodate future needs.

For more information on the ADwin-Pro modular data acquisition system, other powerful ADwin systems, or to find the ideal solution for your application-specific needs, contact a CAS Data Logger Applications Specialist at (800) 956-4437 or visit the website at www.DataLoggerInc.com.

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