Molecular Characterization Detector

Background

The Precision Detectors PD2000 family of molecular characterization detectors measures absolute values of molecular weights, sizes, and shapes. Typical applications are polymers, proteins, antibodies, polysacchrides and other macromolecules used in the plastics, biotechnology, pharmaceutical and food industries. The PD2000 series is available in single angle, dual angle and high temperature versions with or without dynamic light scattering (DLS) capabilities. The high performance cell design provides exceptionally accurate measurements for a broad range of molecules from less than 1000 daltons up to 10^6 daltons for most samples, and to 10^7 daltons for certain proteins and polymers.

System Overview

Bolton Engineering, Inc. worked with the client to specify and design a modular instrument platform using a set of flexible function-specific boards. The client created different instruments by combining boards in various configurations. Each board supported a variety of I/O options, allowing products to be further customized for specific applications:

- Medium-power semiconductor Laser Driver board supporting both common-anode and common-cathode laser diodes.
- Eight-channel low-noise 16-bit data acquisition system, with 8-bit input programmable range offset (providing 20-bit effective resolution). Board also included four 16-bit programmable analog outputs, and a variety of programmable digital inputs and outputs.
- DSP-based single- and double-channel correlator board.
- Low-noise power supply board.

The system requirements were specified at the start, but individual boards were designed incrementally, to meet the clients' product introduction and cash flow requirements.

Results

- System exceeded all performance specifications.
- Boards completed on-time and on-budget.
- Implemented several useful "for free" features.
- Beat client product cost targets by 20%.

Project Scope

Bolton Engineering wrote the specification, designed the schematics, designed programmable logic, obtained vendor quotes, developed the circuit boards, constructed prototype boards, wrote diagnostic software in 'C', wrote driver code in assembly code and 'C', debugged the system, and assisted with regulatory certifications.

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