



Engine Endurance Testing

Automotive

using PointScan™, DBK70™,
& DASyLab®

Application Note #42

Engine performance is affected by many parameters. Some items such as the basic design are under the control of the manufacturer, but often the consumables like oil and gas can drastically affect performance too. Poor quality or incorrect additives can clog injectors, leave deposits, and decrease performance over the long run.

Application Summary

A major US automotive manufacturer set up a new endurance testing station specifically to study, test, and evaluate the long-term effects of various engine additives. To simulate real conditions, the engine is mounted outdoors in a metal shack with only a roof for protection.

The basic instrumentation configuration called for a system to monitor various parameters like temperature (air, oil, water), engine RPM, oxygen mix, and other proprietary engine parameters. Eventually the system would expand to over 60 parameters if phase one went according to plan. The system would need to run for over a year logging data, reporting status, and controlling the engine through a variety of speed/load conditions.

Potential Solutions

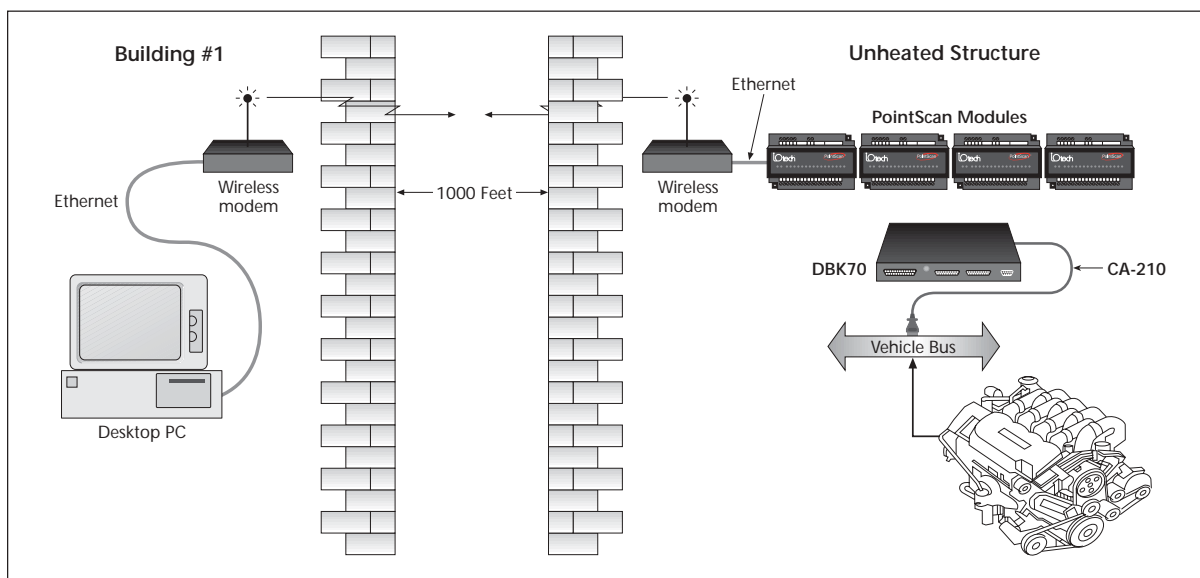
The major problem was funding and manpower. Initial design called for a large VXI system to do both the acquisition and control. This solution was not viable due to managements concern over the large capital expenditure and engineering resource

requirements when compared to similar size projects. In addition, the logistics of operating in a non-lab environment during the harsh northern winters and hot, humid summer were a concern. A low-cost PC plug-in board solution was proposed using a visual instrument type software-programming environment but rejected due to software complexity, an over reliance on external software contractors, and physical wiring for the configuration.

IOtech's Solution

The final solution combined three IOtech products not normally bundled together: PointScan™ distributed I/O with RF modems, DBK70™ vehicle network interface, and DASyLab®. The benefits are plentiful.

- PointScan offers several benefits not found in many data acquisition solutions
 - Ethernet to RF for long point to multi-point connectivity to a remote PC
 - Good channel density with DIN mounting in a NEMA enclosure
 - Excellent accuracy and long term stability
 - Distributed I/O decreases the probability of a single point of failure improving up time
 - -30° to +70°C extended operating range
 - Class 1, Div. 2 certification for operation in hazardous locations
 - IOtoolkit with on-line help and diagnostics makes configuring easy



IOtech's PointScan provides wireless distributed I/O for convenient, remote monitoring.



- DBK70 allows easy selection of up to 16 engine parameters and is easy to reconfigure should the need arise
 - Scaled analog outputs make it universal in its use with any data collection device
 - Pulling values directly from the engine bus reduces set up time and eliminates the expense of extra sensors
 - Quickly reconfigures to monitor other network parameters
- DASYSLab has long been used for physical test applications and with OPC compliance it is suitable for many small to medium sized control applications. Using DASYSLab with KEPServerEX™ as the OPC spigot, PointScan with DASYSLab can control and acquire all the data.
 - Sequence the engine through its speed/load conditions using a combination of digital and analog I/O on the PointScan thus eliminating the need for PLC controls or high powered VXI control systems
 - Log data to disk while simultaneously displaying data
 - Allow Ethernet access to both the data and setup parameters from nearly anywhere in the facility
 - DASYSLab's built-in feature set and "no code" programming icons were instrumental in getting the job done quickly and economically. A short learning curve and intuitive interface eliminates the dependency on outside contractors for custom programming to save time and money.

Conclusion

IOtech's solution minimized wiring while improving the connectivity over other systems. Our building block components provide a low-cost entry point to prove concept without making a large capital investment. Since expansion is designed into all IOtech acquisition systems applications can grow in size and complexity as the need arise.

At the time of this publication the system breezed through its phase one evaluation by meeting all objectives and coming in under budget. The full 60-channel system is operational with a second purchase expected in the near future.

PointScan, DBK70, & DASYSLab®



PointScan Distributed I/O

- Over 40 I/O modules for measuring and controlling a wide variety of signals
- Cost-saving integrated terminal base for direct field wiring
- 4-, 8-, & 16-channel analog input moduleA; up to 16-bit resolution
- 4- or 8-channel analog output modules; up to 14-bit resolution
- NIST-traceability for all analog I/O modules
- 8- or 16-channel isolated industrial digital I/O modules
- Economical combination analog/digital I/O modules
- 1200 Vrms isolation (module-to-communication port)
- Direct Ethernet connection (/100 series) 10BaseT @ 10 Mbps
- Direct RS-485 connection (/200 series)
- RS-232 or Ethernet gateway-based connection (/300 series)
- Hot-swap function for module substitution under power
- On-board diagnostics and status LEDs
- -30° to +70° C extended operating range
- Class I, Div 2 (hazardous location) compliance
- Space and cost saving compact form factor



DBK70 Vehicle Network Interface

- Measure up to 16 vehicle network parameters with one DBK70™
- Synchronously record vehicle network data along with analog and digital measurements made with IOtech's data acquisition systems
- Supports J1850 VPW, J1850 PWM, ISO-9141, CAN, J1939, Keyword2000
- Up to 4 network types can be attached to one DBK70
- DBK70 can also be used with any data acquisition device in a stand-alone mode

DASYSLab® Software

DASYSLab® picks up where DaqView™ and WaveView™ leave off, letting you interactively develop PC-based data acquisition applications by simply attaching functional icons. DASYSLab offers real-time analysis, control, and the ability to create custom graphical user interfaces (GUIs). What's more, in contrast to other graphical programming environments, which can require weeks of training to master, DASYSLab has a very short user-learning curve. Many applications can be configured in a few minutes, rather than days or weeks.



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