

Title: Pump Test Facility Software (PTFS)

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Category: Alliance Member

Industry: Pumps

Products Used:

LabVIEW 8.6, LabVIEW RT 8.6, LabVIEW FPGA 8.6, Sound & Vibration measurement toolkit 5.0, NI MODBUS Toolkit, compactRIO 9072, compactRIO 9074, NI 9201, NI 9203, NI 9217, NI 9233, NI 9265, NI 9401, NI 9425, NI 9476

The Challenge: Develop an integrated system to conduct Performance Tests on multiple test facilities simultaneously. Acquire data from different field sensors like flow, pressure, temperature, torque, power, sound & vibration. Control the solenoid valves, control valves and VFD to achieve test data. Process & store all acquired data and display the status of test results in API standards format.

The Solution: Design an integrated system using NI compactRIO with different C-series modules for real time data acquisition and processing of field sensor data, followed by data storage and report generation at host application.

Benefits of using NI Products: Using combination of Real time, FPGA and multiple Hosts gave us 7 times the power of a normal processor. It was the same LabVIEW code that was executing in multiple Hosts, multiple compactRIO controllers and their FPGAs. Ordinarily, either multiple codes would have to be written for three platforms but with LabVIEW the time was reduced by 66% to harness the same power. Also, since these are large pumps, it is critical to run some interlocks very quickly. This was made possible with LabVIEW FPGA on compactRIO.

Description:

Optimized Solutions Pvt. Ltd. is an ISO 9001:2008 certified Test, Measurement and Automation Solutions Company. Our expertise is in the domain of High Speed Data Acquisition, High Speed Closed loop system design, Electronic Testing and Turn-Key Automation Solutions.

Pump Test Facility software (PTFS) allows the users to confidently test and certify pumps as per API standards. This internal QC procedure allows our customer to test their products prior to dispatch and ensure that their clients get what is committed. These pumps are used for pumping oil from Offshore to land. The PTFS provides the customer with internal Test certificate for all pumps. The report includes performance curve and NPSH test data, with vibration and sound levels for the same. The software can be used to test both Horizontal and Vertical pumps.

PTFS runs on three different touch screen computers to conduct three different tests. Single touch screen PC can be used to perform three tests simultaneously or single test can be run

at a time on three different touch screen PC. Data acquired from all three stations are stored in workstation database server.

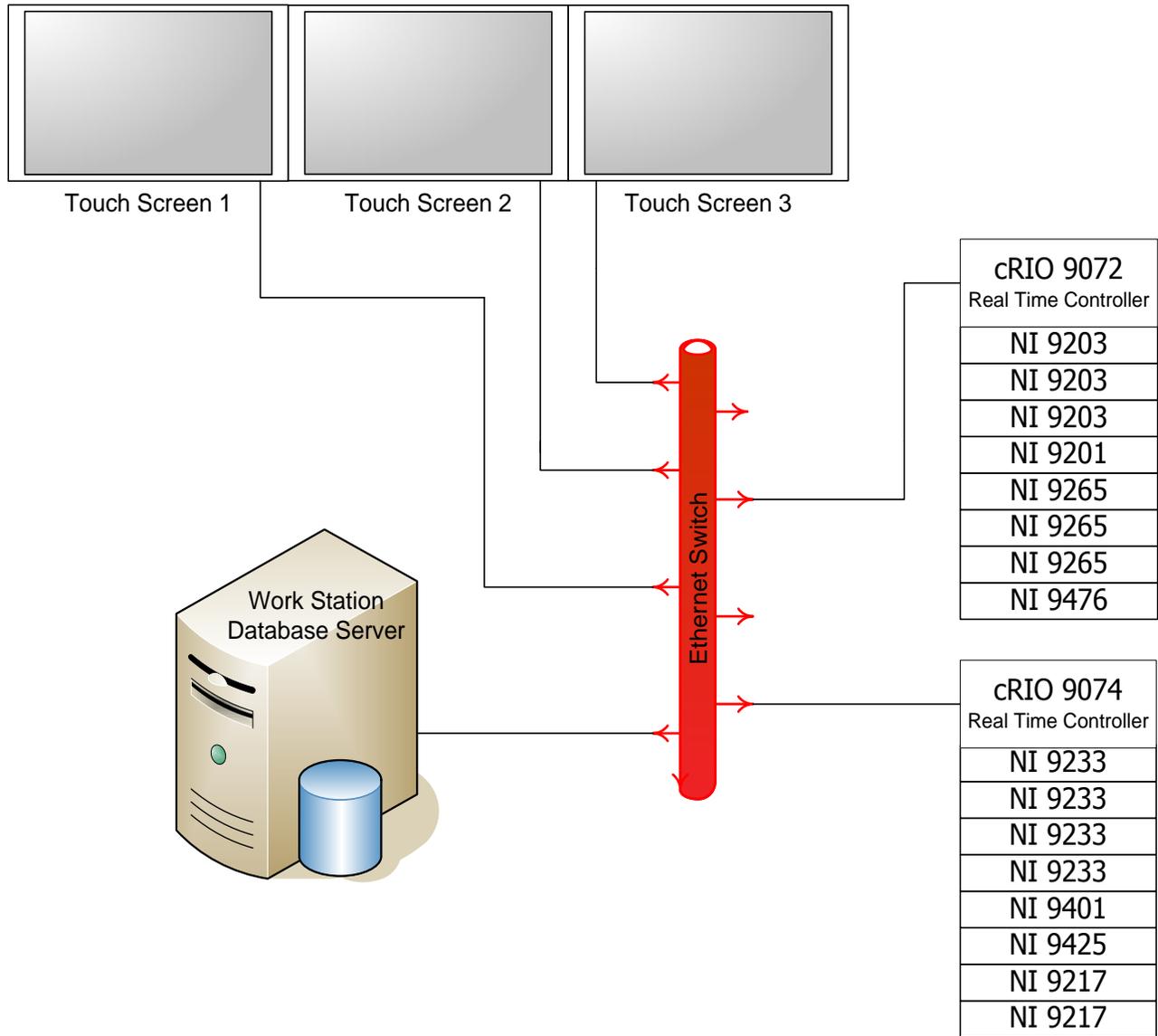


Figure 1 System diagram

C-series modules according to measurement data

Parameter	Type of Input
Flow	4 to 20 mA
Pressure	4 to 20 mA
Torque (Power)	± 5 V
Temperature	RTD
Speed	Pulses
Sound	
Vibration	
Digital inputs for feedback	
Parameter	Type of Output
Vacuum Pump	24 V DC
Service Water Pump	24 V DC
Solenoid Valve	24 V DC
Main flow Control valve	4 to 20 mA
Fine Flow Control Valve	4 to 20 mA

PTFS has administrative level of security for test facility selection, conducting test and report generation.

The pump test facility has three separate facilities that can be operated simultaneously, with each facility having three openings. Each opening is provided with defined flow meters, torque meter, suction & discharge pressure gauges, and vibration & sound sensors for each channel in a module.

Before the Test has been started, PTFS has provision to Provide details of pump for the customer. This detail contains the information regarding its configuration parameter as well as test parameter which is used during the test calculation. This information is also used for report generation of each test carried out.

The host application software provides user interface to conduct the test on centrifugal pumps. It communicates and instructs real time operating system of compactRIO hardware to acquire measurement data and control field devices as per the system requirements. CCTV system is installed for online viewing of test beds and selection of appropriate sensors in the software. Test Software shares database of ERP system to integrate with CRM software.

The software also compares the test results with the pumps standard test result. This software support different types of pump standards

- API 610
- HIS GRADE A
- HIS GRADE B
- ISO9906 GRADE 1
- ISO9906 GRADE 2
- IS 9137

The PTFS provide following test reports

1. Test Report for 3 different test
 - a. HQ (Performance) test
 - b. NPSH test
 - c. Mechanical Run Test
2. Sound & Vibration Test Report
3. Sample calculation Report for each test result

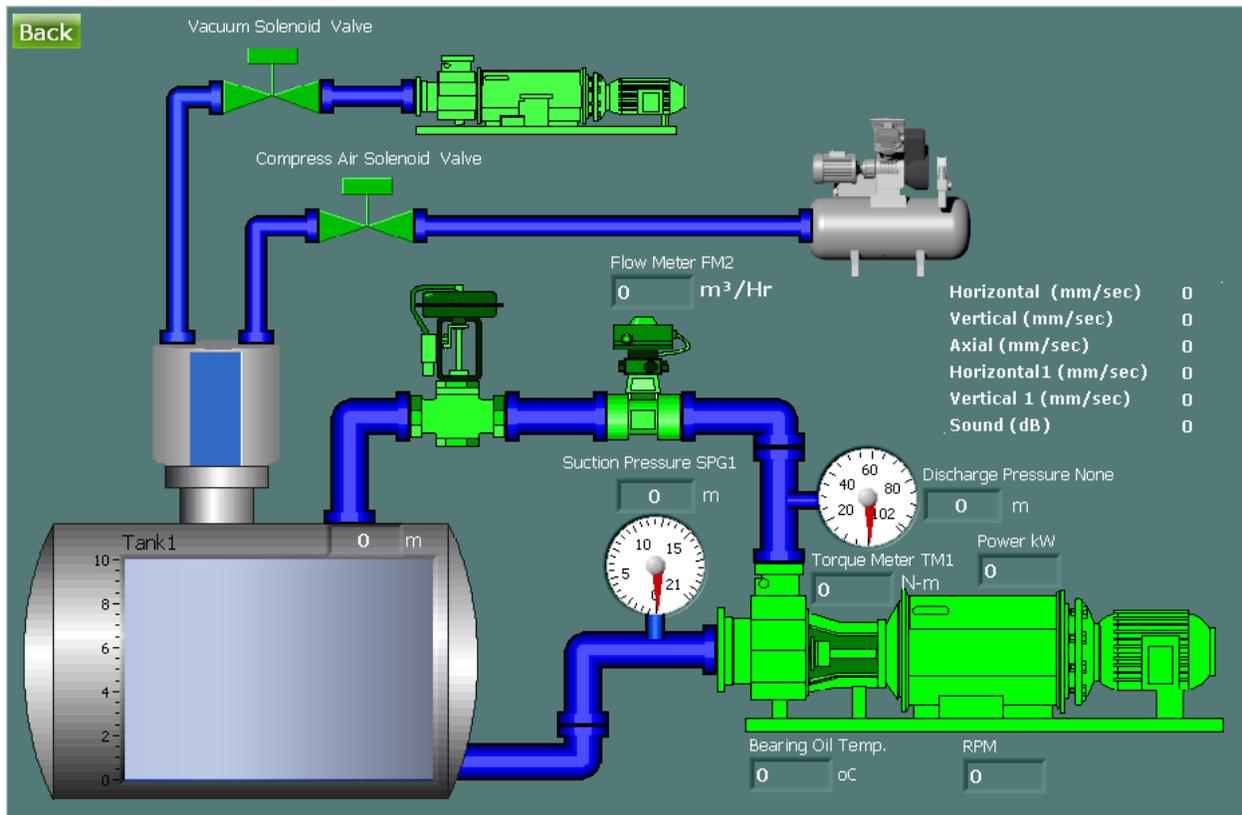


Figure 4 Graphical Test Screen

PTFS made easy and simple way to perform the pump performance tests for end user and provide fully automated system to reduce human efforts on the test facility system. Administrator level of security of PTFS increases high level of security. Data server shares the data with ERP system thereby ensuring that all customer orders are fulfilled according to customer requirements and all data is preserved by company's CRM for warranty and post warranty support of the Pumps. Since the test is conducted without any human intervention, it provides the visiting auditors more confidence on the reports. Those who can't visit the facility can audit the test from remote place with just a net connection as the software is Web enabled.