

Case Study: Test Stands for an Oil & Gas Equipment Manufacturer



Quad Plus®



Oil & Gas equipment manufacturer needed a facility for testing large, high horsepower pumps used in well stimulation operations.

Objective

- Design and construct a system for testing large, high-horsepower pumps.

Solutions

- Quad Plus provided the design, systems integration, and project management to deliver an optimal and reliable solution allowing the manufacturer to validate their pumps to meet the extreme demands of their customers.

Results/Benefits

- Separate, enclosed areas built for component and trailer-based pumps.
- Electric prime mover for the component test cell managed by variable frequency drive.
- HMI support for multiple testing profiles according to the size of the pump and applications for the test.
- Multi-station closed circuit Television (CCTV) with integrated thermal imaging.
- Electrically activated choke and valve systems.
- E-house for safe operator interaction with the test stand.
- Test data acquisition for analysis and reporting.

Background

Quad Plus received a request from an equipment manufacturer for the oil and gas industry to build a system for testing the large, high horsepower pumps used in well stimulation. The customer desired a solution from a vendor that included design, fabrication, installation, and certification of the facility that would test both component pumps and the self-powered transportable pump systems.

Quad Plus Solution

The Quad Plus team provided the design, construction, installation, and certification of the test facility.

The component test stand uses a transportable cart system to mount pumps ranging from 1,000 to 3,000 horsepower. Each cart provides a way to move the unit into position without an overhead crane system in the test area. The component stand provides all lubrication, cooling, and support services that would normally be provided as part of a self-powered system. Both stands provide test fluids and connections for internal and external sensors used to detect and mitigate out-of-spec operations. The self-powered test area provides a large drive-in space and hookups to attach the system for performance testing.

Ballistic enclosures for both component and self-powered areas protect facilities and personnel from catastrophic failures involving high-pressure operations. Electronic management and monitoring systems used throughout provide for operating controls located inside a climate-controlled e-house. Three screens allow the operator to see multiple views of the human-machine interface (HMI) simultaneously while a separate monitor displays multiple feeds from all areas of the test facility. This allows visual observation of hazardous test conditions without risk of operator injury.

Programmable, automated test systems allow for repeatable testing across multiple pump capacities. Automatic collection of test data provides information for pump certification and trend analysis. Flow loop actuators and a continuously-variable choke operate under manual control or automatically as part of the programmed test routine. Full VFD control of the drive motor allows configurable settings for torque and speed. Water is used as the test fluid pumped through controllable flow loops according to the needs of the test, and test water remains viable for subsequent test sessions through continuous treatment systems. Freeze protection systems also prevent damage during idle and low-temperature test conditions.