

Rugged HMIs

For reliable performance in the oil and gas industry

Dani Alkalay
Eaton's
Crouse-Hinds
Business

Introduction

Human machine interfaces (HMIs) and visualisation units present mission critical data across many industries, enabling users to make decisions and take actions about their process and equipment to work more efficiently. They are especially important in the oil and gas industry where understanding rig performance and operation is key primarily to safety but also to improving profitability. With the cost of oil at the lowest it's been for more than five years, operating efficiently has never been so important. The cost of rig downtime is exceptionally high, estimated at up to \$500,000 per day offshore, so it is clear to see that increasing reliability and uptime goes a long way to increasing productivity and profitability.

Choosing the right electrical equipment, which includes HMIs and visual displays is vital to achieving this, and in this article Dani Alkalay from Eaton, reviews the latest HMI technologies, advising how engineers and operators can have both increased productivity and improved profit, without compromising on safety and reliability.

Understanding the application

When designing and specifying HMI systems and instrumentation electrical engineers need to first and foremost understand the application and where and how the equipment will be used. There is a wide variety of applications for HMIs within the oil and gas industry, for example, on the rig floor of a refinery, on-shore versus off-shore, from permanent installations in a plant to truck-mount displays. Within the upstream exploration segment rugged and hazardous area approved visual devices are designed for directional drilling, measurement / logging while drilling (MWD/ LWD), cementing, fracing, coil tubing, blowout preventer, mud logging, choke control, casing and production monitoring.

In designing and specifying, there are many considerations to take, for example, what is the environment like? How will the equipment be mounted? Is it a permanent or rig-up/ rig-down installation? What is the lifetime expectation of the equipment? And what happens in case of failure? There are also a number of design priorities to address:

Computing power and connectivity

Computing power and bandwidth to run the most demanding distributed control system (DCS) or supervisory control and data acquisition (SCADA) software packages, without configuration challenges is essential to a smooth operation. Having an available full client performing computing platform reduces the need to develop specific software for the HMI. For example, modern equipment such as the MTL Azonix ProPanel PRO4500Z1 for Zone 1 environments features Intel Core i7 2655 processor, and the Azonix Barracuda 15 workstation for Zone 2 hazardous areas features the very latest Intel i7 2.5GHz processor and up to 8GB of dynamic random access memory (DRAM) to deliver increased processing power compared to alternative technologies.



MTL Azonix ProPanel PRO4500Z1

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MTL Azonix Barracuda 15 WS

There is also a trend within the industry for increased communication options. Workstations that are built with wireless and Bluetooth options and offer high speed communications enable installation flexibility reducing the amount of cables required during rig-up and rig-down, therefore increasing productivity.

Ease of use

How easy it is to use the HMI is critical for ensuring the operator can run the process as smoothly and reliably as possible. Intuitive workstations with state-of-the-art touch panels and which feature either resistive or projective capacitive touchscreens make the HMI exceptionally user-friendly. In the oil and gas industry operators wear gloves in cold weather, so it is vital that touchscreens support glove touch capability for use in harsh and cold environments.

Visibility of the screen in all working conditions is also important so users can see at quick glance the status of the process. HMIs are often positioned outdoors and can be in direct sunlight, so screens with an LED backlit display with proper optical protection can be read easily in sunny positions.

Ease of installation and integration

In oil and gas exploration equipment is commonly moved from one rig to another after completion of a job. As the drilling has to stop during the set up phase, reducing the downtime for transition is critical. Creating multiple mounting points, using connectors versus glands, supplying intrinsically safe I/O are all features integrated in Azonix products which lowers installation costs and downtime, thus increasing rig uptime and process efficiency.

Ruggedness

As the industry continues to explore further afield in search of oil reservoirs, operating conditions can be extremely challenging. HMIs positioned outdoors need to be protected from the elements and electronics need to be reliable in extreme environments. Modern equipment provides reliable operation between -40°C and 60°C. The devices also need to be shielded against electromagnetic interference (EMI) and radio frequency interference (RFI) and to be able to withstand high shock and vibrations. Industrial grade parts and thermally designed cast aluminium housings protect electronics in extreme environmental conditions, which makes the HMI robust, therefore increasing reliability and improved asset uptime.

Portable devices

How portable does the equipment need to be? Will it be fixed to a station or does the engineer need to carry the HMI around with them on site? Data visibility is key here and there is a growing trend for portable devices that can be easily transported close to the application. A decade ago, portable devices were rare and cumbersome because of the power consumption of the electronics. However, the mobile product demand in the consumer market has driven chip companies to develop low power processors that have led to the design of more easily portable devices in the industrial platforms such as Eaton's Azonix product portfolio.

Summary

Intelligent HMI and display systems are making a real difference in the exploration of oil worldwide, giving decision makers critical data so they can improve the safety and productivity of drilling operations. Experts in HMIs and visual displays provide essential engineering resources, sharing computing and electronics knowledge that ensures faster integration and installation of rugged and robust systems for increased profitability.

Eaton Electric Limited,
Great Marlings, Butterfield, Luton
Beds, LU2 8DL, UK.
Tel: + 44 (0)1582 723633 Fax: + 44 (0)1582 422283
E-mail: mtlenquiry@eaton.com
www.mtl-inst.com

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EUROPE (EMEA):
+44 (0)1582 723633
mtlenquiry@eaton.com

THE AMERICAS:
+1 800 835 7075
mtl-us-inf@eaton.com

ASIA-PACIFIC:
+65 6 645 9888
sales.mtlsing@eaton.com

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