MARKO ELO

Exploratory surgery

EXPLORATION DRILLING RIGS HAVE A HUGE ARRAY OF SPECIAL AND COMPLEX FUNCTIONS. SIMPLE OPERATION, WITH CONTROL FROM AN EASILY-UNDERSTOOD INTERFACE, IS JUST WHAT THE DOCTOR ORDERED

Standard hydraulic and manual controls are increasingly being replaced with electric-over-hydraulic control systems, driven by in-vehicle networks and commanded through premium user interfaces. In one particular Australian oil and gas industry project, CrossControl introduced a touch-based HMI solution to an exploration drilling rig and its accompanying pipe-loading trailer.

User experience – a term that perhaps most often brings entertainment gadgets to mind – is no longer neglected in industrial vehicles, however. A well-designed user interaction provides immediate and accurate feedback to the operator, turning improved usability to efficiency. As more functionality is realised via the software, the operator can focus on the key actions that require human attention.

An exploration rig is highly mobile, often operates on difficult terrain, and needs to get operational quickly. An easy and safe setup routine is therefore essential. The industry-wide shortage of experienced operators can be mitigated by building more knowledge into the control system, automating certain operations, predefining operation modes, offering self-diagnosis and creating easy-to-understand settings. All this supports users throughout setup and operation, speeding up the learning process.

The control system of this exploration rig is run by three CCpilot XM display computers in the driller's cabin, utilising CrossControl's software application platform in a real-time Linux environment. The I/O layer is connected via CANbus. Each display runs an IEC 61131-3-compliant CoDeSys V3.4 application, with user interfaces implemented on CrossControl's Premium GUI concept, based on the renowned Qt library. A truly open software tool chain builds a solid foundation for a long system lifecycle.

FIGURE 1 (RIGHT): **Graphical user interface (GUI) providing immediate and accurate feedback to the operator, turning improved usability to efficiency**

FIGURE 2 (BELOW): **New operator panel including three CCpilot XM display computers**

Platform-driven strategies

Vehicle design is all about finding common solutions, and choosing the fields in which to differentiate. Equally, with software, it is as crucial to concentrate resources on value-adding applications, the layer that builds the real differentiation and identity, including visual appearance. This is where the CrossControl software application platform works for both the OEMs and their system suppliers.

In a market that requires new product releases and more variants in shortening cycles, the ability to be quick and efficient is increasingly important. This does not just cover the development phase – total lifecycle cost is key, and is impacted by maintenance and change-management capabilities. Adaptability to changing needs and environments requires multifunctionality from the control system infrastructure.

Typical to this application, the very high amount of I/O-signals was managed without exposing the complexity in terms of user controls and HMI. Here, CrossControl data repository handles instant data exchange between the GUI and the application logic, so that GUI execution runs independently of the real-time cycles of the machine control system. The GUI provides style sheets, day-and-night modes and ready-made components for gauges, alarm lists and warning lamps, with a number of parameters that enable easy adaptation of behaviour and graphical appearance aligned with the vehicle brand.

Enabled by mobile connectivity, vehicle-control systems increasingly interact with neighbouring peers and back-office systems, bringing more information and control to remote stakeholders. Such system integration provides also new approaches to safety in the workplace, for example with shared detection and awareness of other objects at the worksite.

CrossControl provides solutions within industries such as construction, mining, forestry, agricultural, rail, marine, cargo and utility vehicles. This control system project, with compliments to Comet Tech, is yet another reference in putting humans in control of vehicles in critical environments. **iVT**

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