



A ROBOTICS SUCCESS: Deployment of the Compact Remote Operator Console

The Problem: Two extremes currently exist in the remote systems community with respect to operator interfaces. Generally, either a large and expensive control room-based system is employed or a small, and frequently strap-on, portable operator interface is used. The need is to address the shortcomings of both extremes by providing a high level of operator console functionality at lower system cost and with minimal impact to facility installation and operations.

The Technology: The U. S. Department of Energy (DOE) Office of Science and Technology Robotics Crosscutting Program (Rbx) developed the Compact Remote Operator Console (CRC) to address cost and facility impact issues related to operator control stations. The solution incorporates the capability of maintaining a human factors-based design necessary to support efficient long-term operation. The CRC provides remote viewing and audio, remote tool control, and integration of the existing manual controller into the remote hardware system. Human factor elements are addressed using an adjustable control chair that can be positioned to accommodate the requirements of individual operators as they view the work site and manipulate the controls. Cost and size constraints are addressed by use of new video and controls technology and packaging techniques. Operator interface menus are handled via a touch-screen computer.

The Deployment: The CRC, integrated with a commercially available Brokk Demolition Machine, was deployed during deactivation and decommissioning (D&D) activities at the Idaho National Engineering and Environmental Laboratory Security Training Facility (STF) in January 2000. Specifically, the system was used by an operator to remotely remove, size-reduce, and stage overhead piping and facility equipment located in the basement of the STF. Prior to the availability of the CRC, this work was done by the

standard Brokk with the operator exposed to inclement weather and in close proximity to the demolition work and its associated hazards. The CRC was placed in a heated control trailer located approximately 600 ft from the demolition work site. Subsequent to the deployment with the Brokk Demolition Machine, another CRC was deployed at Oak Ridge, Tennessee, to control two hydraulic manipulators mounted on a mobile platform and used for equipment dismantlement in a chemically and radiologically contaminated facility. Additional CRC units are under construction to support a wide variety of remote system deployments.

The Benefit: The benefits of the CRC are that it removes the operator from hazardous environments while providing adequate interfaces to permit the operator to conduct D&D activities. The operator can perform for an extended period of time at nearly the same level of performance as for direct control. The relevance and benefit of the CRC has been confirmed by additional deployments and requests for additional units for operator control of many diverse remote systems.

Future Advances through Rbx

Initiatives: The CRC has provided good remote functionality and removed workers from the hazardous environment, but the deployed systems to date have had little or no automated capabilities. The Rbx will provide the technologies to increase the level of automation within these systems, thus increasing their efficiency and productivity. Rbx telerobotic control technologies will produce more productive remote systems that will increase the cost benefit of these systems. The CRC provides a platform upon which to implement these advanced operator interface and control technologies.

For more information on this project please contact:

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