

Remote Welding

Background

Historically, welding hoods and leather clothing protected welders from the heat and sparks emanating from the hot metal on which they worked. Today, welders can weld remotely with sophisticated camera systems and touch-screen computer controls. This eliminates the need for protective clothing and lowers radiation exposure.

Rather than deploy welding equipment and personnel inside containment or other hazardous environments, a mobile welding command center can be located on-site and can house as many as 20 welding stations. The welding stations, which can be as far as a mile away from the work area, are linked by fiber-optic cables to welding equipment specifically designed for remote operation. Thus, the remote welding stations offer a valuable option when working with various site layouts.

Description

Supervisor stations with 42-inch touch screens allow control and monitoring of all operations through overview camera systems. Each touch-screen terminal communicates with a programmable logic controller in the work location to direct the weld head, video controls and operations.

The Westinghouse Eclipse II™ Vision System provides a discernible video monitor image throughout wide current and voltage ranges, with both pulsed and continuous currents. This approach provides a uniform image of the arc, the weld pool and the surrounding area. The key to the system is regionalized filtration, which provides a means to obtain optimum filtration for any area within the field of view. The combination of remote and advanced technology allows for much more flexibility for extended operations.

Benefits

- Improves weld quality by the use of new power-supply technology, the reduction of personnel exposure and the reduction of the need to decontaminate equipment.
- Places less equipment inside containment where lay-down area is limited, using less anti-contamination clothing and fewer personnel entering and exiting containment.
- Currently used in remote gas-tungsten arc welding processes; i.e., steam generator replacement projects, Alloy 600 mitigation, spent fuel storage, etc. Future considerations are to incorporate remote electric discharge machining and computer numeric-controlled machining applications.
- The system is not limited to welding applications, as programs can be developed to incorporate many other process applications. Westinghouse's vision is for a universal operating system that can adapt to many of its applications.
- The remote welding station can be located up to a mile away from the work location and can weld at 20 separate work locations.

Remote welding also:

- Allows the supervisor to peer check all operations from one location.
- Can be stationed far from the work area to reduce site congestion.
- Allows operators to share skills due to work environment.
- Reduces operator strain and permits inspection at a faster rate due to advanced vision system.

Experience

Locating welding control consoles outside containment is not a new concept, but it was previously limited to distances of less than 300 feet by the length of the service extension cables. Now the remote welding station's use of fiber-optic cable makes setup much more flexible. For example, the previous system was not favorable for a recent steam generator replacement layout since an outside containment location was not available; however, with the new remote welding center, this was made possible during the units' steam generator replacement project, as the remote welding center was able to be located conveniently outside of containment.

Ultimately, the reactor coolant system welding was completed two days early with zero code final radiographic testing rejects.



Inside a remote welding center



Inside the welding command center are as many as 20 remote welding stations, which may be connected for remote operation up to a mile away



Remote welding station computer screen