Shield Plug-Mounted Hot Cell Manipulator

Principle of Operation

Par Systems developed the Shield Plug-Mounted Hot Cell Manipulator (Plug Manipulator) in conjunction with Oak Ridge National Labs. The Plug Manipulator is an alternative to the bridge mounted manipulator. Since no human access is possible in these hot cells, all operations and maintenance must be done remotely. The arm can be installed and removed through the shield plug opening. All electrical connections are made outside the cell to a bulkhead on the top of the plug. The plug also contains access ports for long-handled tools to attach to hex drives on the back of the motors for manual retraction of joints.

The photo to the right shows the manipulator attached to the shield plug for testing in Par's factory. The plug is supported by a temporary structure.

Typical Par M3000 Manipulator System

- Bridge (long travel)
- Trolley (cross travel)
- Telescoping Mast (vertical travel)
- Shoulder Rotate
- Manipulator Arm
- Interchangeable Grippers
- Power Center
- Controller

Hundreds of Par's M3000s are in service in hot cells worldwide. Some have been in service for more than 50 years. Par has utilized this time proven design and all of its advancements to develop this new Plug Manipulator.
Benefits

- Use of a shield plug-mounted manipulator makes replacement of bridge mounted systems (example at right) possible without removal of existing hardware - existing system is abandoned in-place
- Installation of plug system eliminates or reduces exposure to personnel during installation and maintenance as no entry into hot cell is required; manipulator maintenance is performed in a clean area using a maintenance stand
- Can be used in active hot cells or designed into new facilities
- Turret rotate, boom extension, mast and manipulator joints have secondary recovery features for retrieval or maintenance in case of damage or failures
- Robust, simple and intuitive control interface for ease of use.

Features

- ± 180 degree rotating turret and 2-stage extending boom with 8’ (typ) reach
- Telescoping mast with 10’ (typ) vertical travel
- M3000 manipulator has 7 degrees of freedom
- Radiation hardened to last minimum of 30 years
- Remotely detachable grippers
- Provision for CCTV cameras
- Size/reach can be customized
- Remotely exchangeable end of arm tools.

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