Continuous Shoulder Rotation
Thanks to a proven shoulder rotate and slip ring design, the manipulator can be infinitely rotated in either the clockwise or counterclockwise directions.

Remote Recovery Drives
In the event of loss of power or a motor or control system failure, PaR provides standard external remote recovery drive couplers that allow the arm to be easily repositioned in addition to intentionally slipping the clutched joints.

High Capacity Lifting Hook
The high capacity lifting hook provides a convenient means of moving large loads (M3000 – 1000lbs/450kg; M6000 – 4000lbs/1800kg) when the manipulator is installed on a telescoping mast system.

Continuous Hand Rotation
The powered, continuous rotation of the hand eases operation with no external or internal cables to limit rotation - which is also extremely useful when working with threaded objects, such as fasteners and threaded lids.

Variable Force Hands
Grip force can be set at the operator controls allowing the grip force to be adjusted as needed.

Modular Hand Design
End-of-arm (EOA) tooling (e.g. grippers, dual hook hands) can be quickly exchanged using our proven locking collar design, which provides operators with readily available general purpose or task specific EOA tools.

Continuous Shoulder Rotation
Thanks to a proven shoulder rotate and slip ring design, the manipulator can be infinitely rotated in either the clockwise or counterclockwise directions.

Telescoping Mast Mount
A typical PaR manipulator accesses a work area using PaR’s bridge, trolley and telescoping mast system.

Manipulator Removal and Storage
With the manipulator resting on a storage rack, removal of a single pin easily disconnects the manipulator from the mast - reverse the steps and the manipulator is re-installed and ready for work.

Shoulder, Elbow and Wrist Pivots
Pivot angles of 210° to 310° provide PaR’s M3000 and M6000 a generous range of motion.

Slip Clutch Protection
All motions are electrically driven and are protected against overload by low maintenance slip clutches.

Modular Wrist Design
The modular wrist design allows for remotely and quickly exchanging wrist assemblies for maintenance, optional features or repair reasons.

Remote Tool Power
Located next to the hand is a remotely operated electrical power socket, with reversible polarity, for externally powered tooling solutions – providing operators unlimited access to powered tool solutions (and the socket’s location at the hand and not at the mast, ensures tangle free convenience).

Radiation Hardened
PaR’s manipulators are rad hard up to 10E8 Rads (10E6 Gray)
FEATURES

On Storage Rack

- Wrist Removal
- Hand Removal
- Camera Systems
- Tool Power
- High Capacity Lifting Hook
- Rad-Hard Stainless Steel Option
M3000

- **DEPLOYMENT**
- **WEIGHT**: 200 LBS [91 KG]
- **REACH**: 45.5 IN [1156 MM]
- **HAND CAPACITY**: 150 LBS [68 KG]
- **HOOK CAPACITY**: 1000 LBS [455 KG]
- **RAD RESISTENCE**: $10^8$ Rad $10^6$ Gy

M6000

- **WEIGHT**: 550 LBS [250 KG]
- **REACH**: 77.0 IN [1956 MM]
- **HAND CAPACITY**: 400 LBS [181 KG]
- **HOOK CAPACITY**: 4000 LBS [1814 KG]
- **RAD RESISTENCE**: $10^8$ Rad $10^6$ Gy

TensileTruss™ SYSTEM
PaR Manipulators are typically deployed from telescoping mast/trolley/bridge systems, wall-mounted carriages or elevators. Above is a roof plug deployed system in a hot cell with roof access.

Manipulators have the ability to be mounted on tracked vehicles. The above system is used for remote MSM removal.

Multiple mounting and deployment combinations can be designed and engineered to tackle any and all extreme environmental applications. Above is a typical bridge-trolley-mast system.
Single and Double Hook Hands and Parallel Jaw Grippers
PaR’s manipulators use a locking collar and slip ring design, allowing the end-of-arm tools to be treated as modular, exchangeable accessories. Typically, hook hands and parallel jaw grippers are used, but other special purpose end-of-arm tools can be developed using the interface features as well. Hook hands are either configured as single hook or double hook and both have a powered anvil to provide positive holding and locking on picked or held items. Parallel jaw hands are provided in different jaw opening sizes with varying finger shapes, lengths, features, finishes and materials. Powered and non-powered tools can be picked up and operated using uniform grab features if needed. A single hook hand (shown above) can grab a standard powered tool or a lifting fixture can be added to the tool to allow for single, parallel jaw or double hook interface (shown on tools below) for a higher degree of tool control. Powered tool plugs can also be inserted and removed remotely.

Standard & Customized Tools
PaR Systems can provide tools which utilize the remote tool power socket located on the wrist assembly. We have a wide variety of existing designs, such as nut drivers, reciprocating saws, nibblers or we can develop a custom design for your needs. Non-powered tools, such as the window wiper tool have been developed by PaR upon customer request. Other customers have in-house capabilities and develop their own tooling to match up with the features of the hook hands and grippers.
CONTROLS

**Finger Switch Controller**
PaR Systems manipulators are operated using a finger switch controller. The portable control console is easily mounted via wall brackets or can be placed on a dedicated control stand. Features include a flexible power cable with a quick-disconnect plug making it easy to mate the controller to the power center or an outside cell junction box. The intuitive console provides precise control of all axes, grip force, tool power and rotation direction. Additional switches can be added for mast, trolley and bridge functionality.

**Interface Wiring**
PaR has incorporated the use of slip rings at the mast and hand interface to provide continuous rotation at these two critical axes. This design is time tested and is the most reliable wiring interface available, providing a cable free, snag free manipulator.

**Joystick Controller**
PaR offers a joystick controller option as an alternative to the standard finger switch controller. Motion of individual axes is controlled by joystick movement and push buttons. Joystick controllers utilize an HMI interface, which provides graphical support for the operator.

**Wireless Controller**
Wireless finger switch controllers have all the proportional and accurate movements found in the hardwired controllers. When lightweight portability is required PaR wireless controllers are a great option.

**Top 10 Design Features**

1. Slip clutches and electric current limiting are built-in protecting against accidental overload of the system.

2. Fully sealed, corrosion-resistant materials and finishes are used on external surfaces, allowing for easy wash-down.

3. The manipulator is compact to ease restricted space operations.

4. Practical “box” construction is used to provide maximum rigidity and external smoothness.

5. All wiring is internal to eliminate snagging and to allow for easy decontamination of the exterior.

6. Access plates are built-in for easy clutch adjustment and general maintenance.

7. Easily adjustable and stable drive chain tighteners are provided on all pivoting motions.

8. Hands and tools can be changed remotely by simple push-pull motions.

9. A high load-capacity hook is fastened to the shoulder housing. The manipulator hand easily reaches the hook, for placing of lifting straps.

10. The intuitive console provides precise control of grip force, tool power, as well as deployment axes (e.g. bridge, trolley, mast) and is variable speed and stepless for fluid control.