



# Defense vehicle systems

## from Parker Hannifin Corporation

**Parker's industry leading engineers** draw on the corporation's enormous breadth of technologies to create system solutions addressing the most challenging needs and optimizing platforms for weight, cost, power, and reliability.

Collaborating with our customers, Parker designs advanced components and technologies more quickly and efficiently compared to other global organizations. At Parker, we engineer your success.



## Vehicle actuation systems

### Armored door actuator system

Both passive and active systems ensure a safe egress every time

- All systems are environmentally tested for military applications
- Systems operate on demand in any vehicle orientation
- Damper is a passive speed control with locking mechanism, configurable for speed and loads
- Egress damper system (EDS) provides normal damper plus emergency egress power actuation
- No electrical, pneumatic, or hydraulic hookup for damper and EDS
- Active systems include both pneumatic and electrohydraulic actuator (EHA) options
- Pneumatic solutions are lightweight options powered by existing vehicle pneumatics
- EHA solutions are self-contained, have a 24V connection, and combine electronics ease and hydraulics power densities
- System options include backup power and obstacle detection for increased operator safety
- Combat lock solutions available
- Integrated, low-resistance manual release for actuation in unpowered state
- Proven technology fielded in several military ground vehicles



### Armored window actuator system

Normal appearance, remarkable protection

- Single uniform compact design can be integrated into any vehicle door
- Supports armored glass sizes up to 500 pounds
- Manual crank available as stand alone or back-up for power system
- Environmentally sealed, impact-resistant drive train
- Multi-stage telescoping actuator for reduced overall height
- Operates in any position, including completely inverted
- Parallel-mounted, low-maintenance, high-torque brushless DC motor



### Automated articulated trailer hitch system

Allows for safe trailer connection without having to leave vehicle

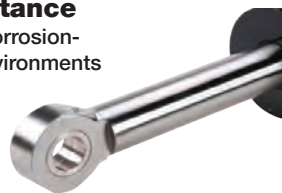
- Operator protection while connecting/disconnecting trailer
- Rapid connection time for improved readiness
- Single operator capability
- Three-axis articulation
- Retrofit kits available



### Global Shield™ corrosion resistance

Cylinder coating technology addressing corrosion-resistance requirements of challenging environments

- Significantly improves corrosion resistance of traditional rod coatings
- Tested to over 3,000 hours of salt spray
- Ductile and tough, bends with rod
- Engineered hardness (HRC 54 minimum) for wear resistance
- Exceptional interfacial adhesion and impact resistance
- Less downtime with reduced maintenance intervals
- Environmentally safe (no chromium or hexavalence)



### In-hub electric motor

Electric in-hub motor provides independent drive control for traction, turn radius, eliminating traditional chassis configuration

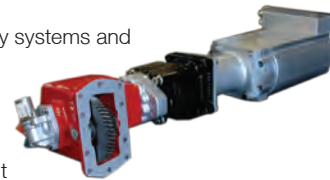
- Hybrid technology
- Dramatically increased ground clearance
- 600 hp in 5 x 20-inch package
- Silent run and silent watch operations
- Reduced vehicle signature
- Enhanced crew safety
- Increased fording capability
- Lower fuel consumption



### Power takeoff unit

Transforms drive train mechanical power to hydraulic and/or electrical power

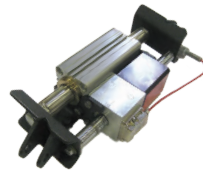
- Used for various vehicle auxiliary systems and components
- Alternator-generator drives
- Constant RPM regardless of engine RPM
- Constant high-amperage output



### Rear steering

Complete rear steering system

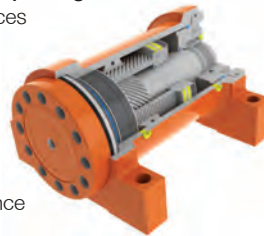
- Lightweight
- Power-unit, PTO, or belt-drive pump capability, with controls to isolate rear-steering circuit
- Subassembly kit means simple, fast installation
- Cylinder/rod lock assembly designed with Global Shield and Intellinder™ absolute position feedback



### Rotary hydraulic actuators

High driving and holding torque in a compact package

- High-power density unit that fits into tight places
- Added rotation up to 360 degrees
- Ideal for severe climates and unforgiving environments
- Torque generating splines are sealed and lubricated with hydraulic fluid inside actuator housing
- Sealed system for excellent corrosion resistance and virtually maintenance-free operation



### Winch system

Winch technology to meet the most demanding requirements

- Multiple lightweight winch options
- Complete system including PTO, pump, valve, electronics, winch, rope, and integration
- World leader in orbit-style, low-speed, high-torque, hydraulic motors
- Lightweight synthetic rope
- Integrated solutions with optimum performance over a full line of vehicle platforms
- Hydraulic options include auto level-wind, full line-pull capability for multiple wraps of drum



## Filtration systems

### Platoon reverse osmosis water system

Potable, independent, fresh water filtration

- Self-contained water supply, portable and independent
- Processes 25 to 30 gallons per hour from 12/24 volt power
- Industry-leading technology produces more water in a smaller package than competitors
- Patented energy recovery device allows for more water with lower power consumption
- Patent-pending filter design allows for filter changes external of case



### Fuel filtration transfer system

Filter fuel reliably for vehicles anywhere in the world

- Lightweight solution fits existing vehicle portable can brackets
- Same flow as traditional fuel pump
- Uses Parker filter for water separation and particulate filtration
- 12/24V DC or AC power options
- Parker E-Z Form suction/outlet hoses
- Electronic and hydraulic circuit protection
- Multiple size options available from portable cans to carts and skids
- Portable can threaded insert for in-field water/sediment contamination filtration



### On-vehicle engine filtration

Air, oil, and fuel filtration to ensure continuous vehicle operation

- Two-stage diesel fuel filtering for maximum water and particulate protection
- Fuel systems with built-in relief, water-in-fuel sensor, diagnostic valves, and cold weather heaters available
- Air pre-filtration and filter systems to extend service intervals and reduce maintenance times
- Oil filtration systems for all engines to protect against harmful wear and contaminants



### Quick-oil-change systems

Simple and reliable system for improved maintenance

- Change drivetrain fluids without removing chassis armor
- Eliminate hazardous spills, reduce labor hours
- Kits available for existing vehicle
- Time stamping options available for enhanced maintenance records

## Fluid conveyance

### Hoses and fittings

Transport fluids and air throughout the vehicle, within integrated conveyance systems

- Lightweight materials provide cost and fuel savings
- Extreme abrasion resistance or flexibility available to solve plumbing challenges
- Available in kits and subsystems
- Complete line of hose, tubing, fittings, adapters, quick couplers, and diagnostics
- Applications: airbrakes, central tire inflation lines, engine coolant lines, fire suppression hose, fuel lines, heater hose, transmission hydraulic coolant lines, water purification systems



## Sealing systems

### Seals

**Fuel filtration** – Multiport sealing solution with built-in filter screens to prevent foreign debris from entering key engine components

**Picture frame gaskets** – These environmental seals protect vehicles from water ingress and contamination. Door seals can be extruded and fabricated into various custom shapes and cross sections to fit any specific groove configuration

**Oil pan seals** – The Gask-O-Seal® is a metal, plastic, or composite retainer with a machined groove into which a custom-engineered rubber element is chemically and/or mechanically bonded, creating a dependable, responsive seal



**Fabric-reinforced bellows** – Flame-resistant and high-temperature fuel-resistant bellows are flexible enough to allow movement in joints during vehicle travel



**Rotary axle seals** – Provide sealing and wiping functionality for rotating and swiveling movements under low pressure and high velocity



**Turret seals** – Precision-formed rubber and combination rubber/fabric sealing products are manufactured using a single-step process that molds the entire spiral length of the product at one time

### EMI shielding & grounding

Complete EMI seals, gaskets, mesh, paints, additives, grease, adhesives, window coatings, and any other method of providing EMI protection of vehicles and equipment



## Vehicle controls

### Electronic controls

Hardened mobile electronic subsystems

- Cooling fan-drive systems, both hydraulic and electric, for improved vehicle operating ranges
- Color displays for accurate vehicle status information
- Color displays with video capability, for hitch alignment, back-up cameras, and exterior threat assessment
- Complete line of controllers, sensors, displays, gauge clusters, joysticks, and cameras



# Aerospace technology

Parker can engineer your success with off-the-shelf solutions that are cost-effective and efficient. With 100 years of experience, we offer military-grade components that meet demanding specifications without needing to be custom-manufactured. Here is a sampling of solutions that save time and money:

## Aircraft engine-driven pumps

- Provide primary hydraulic power for many of today's leading military and commercial aircraft
- Ranging in size from 0.03 to 5.5 in<sup>3</sup>/rev and capable of operation at system pressures between 1,000 and 8,000 psi
- Unmatched efficiency and reliability
- Superior power-to-weight ratio



## Electric motor-driven positive-displacement pumps

- Engine oil cooling systems and military electronic cooling systems applications
- Accepts a variety of dielectric fluids
- Fixed-speed device
- Easily adjustable flow by changing width of the gerotor to meet the specific application
- Modifiable pressure relief valve for safety to control maximum discharge pressure



## IndiLok™ quick-disconnect (QD) couplings

- Provide reliable performance in cooling, fuel, hydraulic, and pneumatic systems across a wide range of temperatures and pressures



## Medium- and high-pressure PTFE hoses

- Reliable fuel, oil, and hydraulic fluid conveyance
- Most hose assemblies are available with FAA, TSO, c53a, C75, AS, and ABS approvals



## Slide-Lok™ couplings

- Quick connect/disconnect action
- Self-sealing action and superior performance during operation and maintenance of fluid systems
- Push-to-connect, pull-to-disconnect style



## Hydraulic accumulators

- Piston-type hydraulic accumulators meet stringent weight, envelope, and performance requirements
- Double end-cap accumulators designed in accordance with MS28700 and MS28797



## Bootstrap reservoirs

- Supplies system pressure to the reservoir connection and acts on the small piston
- Found in service on the F-22 Raptor, F-16 Fighting Falcon, F/A-18 E/F Hornet, C-17 Globemaster, V-22 Osprey, and 787 Dreamliner



## Black Hawk main rotor flight control actuators

### Main rotor pitch and roll control

- Ballistic tolerant
- Jam tolerant with fail-safe operating modes
- Pressure switch for hydraulic system failure detection



## Javelin control actuation system

### Missile pitch, roll, and yaw control

- Integrated control electronics
- Independent fin control



## Cold plates

### Thermal management

- Unique macrolaminate construction
- Transports coolant with complex liquid paths



## Advanced liquid-cooled enclosures

### Thermal management

- Answer-to-reset (ATR) format
- High-power, high-density, electronic connectors
- Suitable for ruggedized military, aerospace, industrial, and commercial applications



# Naval technology

## Electromechanical actuator

### Safety barrier positioning, platform locking, door and hatch latching

- Stainless steel construction for corrosion resistance
- Improved sealing to prevent environmental moisture contamination
- Mechanical over-ride for emergency operation
- Multiple move profiles
- Absolute positioning
- Adjustable acceleration

## Drive control system

### High-powered variable speed drive for AC motors available as either stand-alone unit or complex multi-axis motor control system

- Power range: 160-600 hp (100-400 kW)
- Modular design, low maintenance
- Dynamic braking



Milton Manufacturing is Parker's design partner for prototype vehicles. A leading supplier of metal components and critical systems and kits, Milton is a HUBZone, certified woman-owned small business. [www.miltonmfg.com](http://www.miltonmfg.com)



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