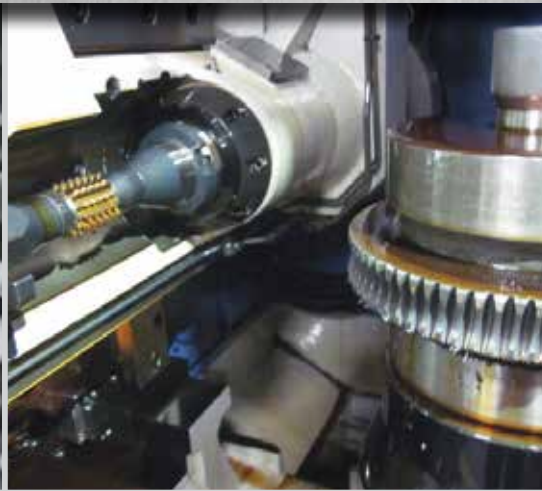
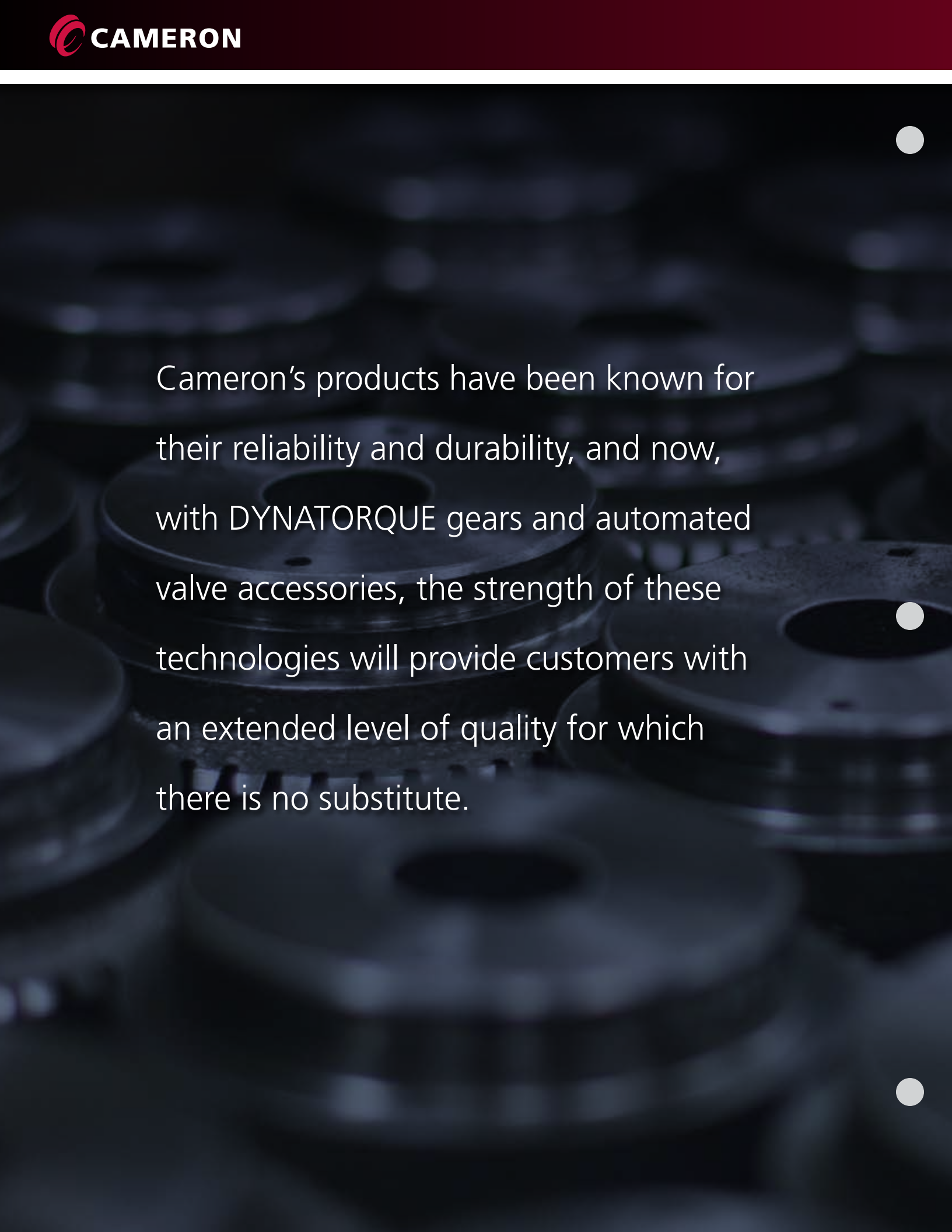


# DYNATORQUE Gears and Automated Valve Accessories

Delivering customer-focused solutions rapidly and economically

TECHNOLOGY





Cameron's products have been known for their reliability and durability, and now, with DYNATORQUE gears and automated valve accessories, the strength of these technologies will provide customers with an extended level of quality for which there is no substitute.



For years, Cameron's DYNATORQUE™ brand has been recognized as an innovator in manufacturing technology, with commitments to quality and design that result in a trustworthy and solid product portfolio.



The DYNATORQUE product line is a single-source solution for both standard and customized gears and automated valve accessories, including declutchable and non-declutchable manual overrides; the D-Stop™ automated valve partial-stroke test device; the D-Lock™ automated valve locking device; spur and miter gears; handwheels; and ground position indicators.

To us, customer focus means our products are backed by our commitment to customer needs:

- Customized products are no problem – accessing many different frame and spur combinations, a wide variety of material options, one-off capability and rapid turnaround
- Onsite static and dynamic-load test benches create DYNATORQUE gears that will perform in trying real-world applications
- Attention to quality at every level of the manufacturing process – rigorous approval standards for material sourcing, preproduction and postproduction inspections, ISO certified, and randomly selected, measured and tested operators (for complete technical information, please visit [www.c-a-m.com/dynatorque](http://www.c-a-m.com/dynatorque))

## Worm Gear Operators

Cameron's DT Series worm gear operators are designed for use with valves and dampers, as well as most other quarter-turn applications requiring a self-locking mechanism. Our flexible manufacturing process allows us to offer both standard construction and custom configurations for customer-specific applications.

Standard operators are available with various mounting interface dimensions. Custom-machined gears come with bores and bolt holes for direct mounting to the valve. Standard materials are cast gray or ductile iron, but the line also offers a varied selection of alternate materials to meet customer application requirements.

For extremely corrosive applications, operators with external components constructed of cast CF-8M stainless steel are available. These operators are completely sealed and are ideal for applications such as brewing, food processing, leaching operations, offshore platforms and pulp and paper plants. Gear operators with stainless steel internal parts also are available.



### FEATURES

- 16 different frame and spur combinations provide output torque ranges from 4500 to 300,000 lb-in (500 to 33,900 N-m)
- Standard mounting dimensions or configured to customer requirements
- Chainwheel operation available on select frame sizes
- Variable handwheel shaft lengths
- Optional models with 180- and 360-degree multi-turn capabilities
- Marine, submerged and high- and low-temperature applications
- Available with AWWA C-504 material and design criteria

## Bevel Gear Operators

The BG Series bevel gear operators provide smooth, even torque transmission for thrust and non-thrust applications such as gate, knife gate, pinch, sluice gate or globe valves. This line of operators also can be used in almost any multi-turn, right-angle application requiring mechanical advantage.



### FEATURES

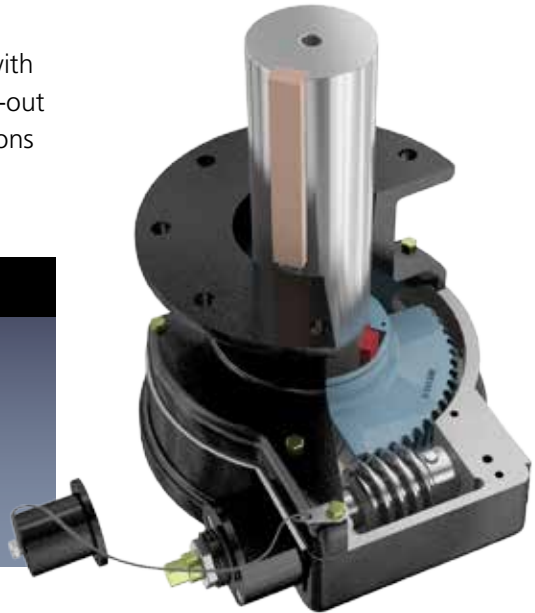
- 20 different frame and spur combinations provide output thrust of 22,000 to 150,000 lb (98 to 667 kN) and torque output ranges up to 3500 ft-lb (4745 N-m)
- BG3 and BG6 have standard ISO 5211 mounting patterns (optional patterns on request)
- Gearbox housing of ductile iron
- Investment-cast ductile iron bevel and pinion gears for smooth, continuous transmission of torque
- Optional bronze stem nuts for direct threaded interfacing and lug drivers for existing valve yoke nuts
- Motor mounts available for electric motor

## Valve Locking Devices

The DYNATORQUE D-Lock automated valve locking device is used with automated valves (pneumatic, hydraulic or electric) that require lock-out capability to prevent valve rotation. This feature is ideal for applications such as maintenance shutdowns, when the valve must remain in a locked position even if an actuator is unintentionally engaged.

### FEATURES

- Holds valve in either open or closed position while compensating for hysteresis and machining tolerances (select models provide both open and closed locking)
- Ideal for torque-seated valves such as triple offset butterfly valves
- Applicable for almost any rotating device



## Manual Overrides

Cameron's DYNATORQUE automated valve manual overrides are used with pneumatic, hydraulic and back-drivable electric actuators. These products are sandwich mounted as part of an automated valve package to provide manual operation of the automated valve if a loss of plant air supply, power gas, hydraulic fluid power or electricity occurs.

### FEATURES

- Standard ISO 5211 mounting dimensions on top and bottom flanges or custom machined for mounting to actuator and valve
- Device is transparent to valve operation when disengaged

### SD SERIES FEATURES

- Suitable for either double-acting or spring-return actuators
- Nine different frame and spur combinations provide output torque ranges from 3000 to 140,000 lb-in (340 to 15,815 N·m)
- One-handed declutch mechanism
- Declutchable override sandwich mounted between valve and actuator

### SRD SERIES FEATURES

- Alternative to SD Series for spring-return applications only
- 11 different frame and spur combinations provide output torque ranges from 3000 to 140,000 ft-lb (340 to 29,375 N·m)
- Select frame sizes available with chainwheel option for spring-return actuators in overhead locations
- Non-declutchable override sandwich mounted between valve and actuator



SD Series



SRD Series



## D-Stop Partial-Stroke Test Device

The DYNATORQUE D-Stop device is one of the world's premier mechanical devices for partial-stroke testing of installed critical service valves, such as emergency shutdown valves (ESDVs), while the valves are flowing process fluids and full-stroke valve testing is not practical.

### How It Works

The D-Stop device has two internal cams. During normal valve operation, the D-Stop device is disengaged and the actuator is free to stroke the valve on demand. When the partial-stroke test is to be performed, the stainless steel engagement key is inserted into the D-Stop key socket.

A safety feature designed into the device forces an intentional, two-handed operation in order to engage the D-Stop device. When the safety release mechanism is pulled, the engagement cam is free to rotate 90 degrees counterclockwise. Once the key is turned, it is locked into the device and the engagement cam rotates. The device is now engaged (see illustration below).

At this point, when the valve actuator is sent to the test position, the drive cam that is attached to the actuator through the drive coupling rotates until it comes into contact with the engagement cam, normally 20 degrees (this is a specifiable value). Metal-to-metal safety prevents the actuator from rotating past the set point.



D-Stop devices are built for both large and small valves. This DT4000 D-Stop will fit between a large pneumatic actuator and a 36" 600# ball valve installed on an offshore platform.

### A LOOK INSIDE

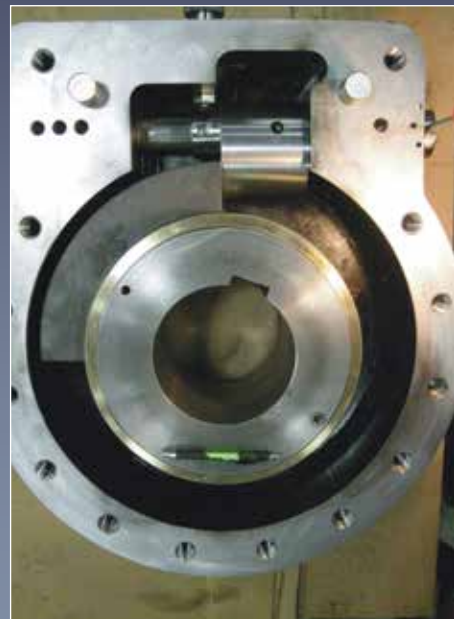


The photo to the left is a DT1000 D-Stop in factory assembly with the cover removed. Note the D-Stop is not in the engaged position. Cameron manufactures D-Stop devices up to 4,000,000 lb-in (451,939 N·m) capability.

The picture at the right shows the same DT1000 D-Stop, but with the device now engaged. Standard travel is 20 degrees, but this value can be specified to your unique requirements.



The photo to the left shows the D-Stop device fully engaged with metal-to-metal safety, preventing the valve from closing during the test procedure.





D-Stop devices are modular: specify local key operated or remote operated with or without optional limit switches to indicate "on-test/off-test."

For additional information on the D-Stop partial-stroke test device, scan the QR code with your smart phone or visit [www.c-a-m.com/dstop](http://www.c-a-m.com/dstop).



## BENEFITS OF CAMERON'S DYNATORQUE D-STOP DEVICE

- **SIMPLE** When it comes to testing systems, the temptation is to take what already might be a sophisticated automated valve system package and make it even more complex by adding controls. With Cameron's DYNATORQUE D-Stop device, it is not necessary to integrate into the control loop or add ancillary controls, as is the case with electric systems. It's simple.
- **ECONOMICAL** The basic cost of a D-Stop device, depending on the torque requirement, is more economical than an electric or controls-driven system. Instrumentation personnel and software programmers are not required to install the D-Stop device, lowering installation costs. Commissioning or routine calibration of controls is not required because there aren't any. Most process plants have qualified in-house mechanics or valve automation centers nearby, and since there are no additional controls required, installation cost savings can be substantial.
- **TRUE SAFETY SYSTEM TESTS** Because the D-Stop device requires no extraneous controls when the valve is tested, all the actual SIS components, controls and elements used in an ESD or safety valve will be activated. You have information about the exact controls that will be relied upon to protect your plant and personnel.
- **BUILT FOR A DEMANDING, INDUSTRIAL ENVIRONMENT** The D-Stop device is vibration resistant. It is externally corrosion protected with coatings and independently certified to IP 67 to prevent water ingress. Stainless steel trim is used for keys, shafts and sockets. The D-Stop device is permanently lubricated, factory sealed and requires no routine maintenance.
- **SIL CAPABLE** The D-Stop device has been reviewed by an independent third party and found to be SIL capable. Email us at [info-dyt@c-a-m.com](mailto:info-dyt@c-a-m.com) for a copy of our Failure Modes, Effects and Diagnostics Analysis (FMEA) for information such as Probability of Failure on Demand (PDFavg) necessary to calculate SIL values for your application.

## Actuator-to-Valve Direct Interface

The complete DYNATORQUE line of automated valve accessory products – manual overrides, partial-stroke test devices and valve locking devices – are suitable for use with all styles of quarter-turn automated valve and damper packages. Actuators can be powered by pneumatics, hydraulic oil or electric motors.

Common to all of these products is the direct interface mounting concept; that is, the DYNATORQUE product fits between the actuator and the valve (see below for an example of the DYNATORQUE D-Stop). The actuator drives the valve open and closed by means of a driver that connects the actuator to the valve stem. The driver and the top and bottom of the device will be machined to custom fit your valve and actuator combination or DYNATORQUE standard dimensions or ISO 5211 – you decide.

Cameron's DYNATORQUE automated valve accessories can be provided as a component of a new automated valve or it can be field-retrofit to an existing valve/actuator package. Just give us the dimensions and we will make it.



Any Actuator



D-Stop



Driver



Any Rotary Valve



Cameron's LEDEEN® actuator mounted on a DYNATORQUE D-Stop partial-stroke test device.



## Spur and Miter Gears

Spur and miter gears are used in applications requiring a non-self locking mechanical advantage or where a change in input drive orientation is required. Both devices can be used as add-on features to our worm and bevel gears or can be purchased as standalone products.



### SPUR GEAR FEATURES

- Heavy-duty iron and steel components
- Used with worm gear and bevel gear operators to allow for reduction in handwheel sizing and handwheel rim pull effort
- May be used independent of worm and bevel gears with small non-rising stem gate and globe valves and other non-self locking applications that require torque multiplication. When used with small electric motor operators, it provides a low-ratio, non-self locking torque multiplier

### MITER GEAR FEATURES

- Heavy-duty iron and steel components
- For use as a close-coupled gearbox that changes handwheel input shaft direction on worm and bevel gears
- May be used to change shaft direction (90 degrees) on any rotating device with compatible torque values and interface dimensions

## Handwheels

A comprehensive line of handwheels is offered in 6" through 48" diameters. Standard handwheels are designed for use with our gear operators, and many are available in either recessed or flat versions.



### FEATURES

- 6" to 10" handwheels are recessed, cast duct iron
- 12" to 18" handwheels are manufactured from tubing and are available in standard recessed and optional flat configurations, as well as in stainless steel
- Tubular handwheels are epoxy powder coated
- Cast handwheels are e-coated
- Additional diameters and interface machining available

### FEATURES

- Allows mounting of the chainwheel directly to the operator-input shaft rather than the rim of a handwheel
- Design reduces the amount of cantilever load on the operator-input shaft and eliminates the need for a handwheel
- Standard chainwheel construction is cast iron with many optional materials available
- Fabricated of 1018 steel

## Chainwheel Adapters

DYNATORQUE chainwheels are available for applications where valve and operator combinations are in locations where direct handwheel operation is not possible.



## Ground Position Indicators



The remote ground position indicators are mechanical devices used to visually indicate the position of a buried or otherwise hidden valve. For example, when a valve and gear are installed in a buried service application, it may be difficult (or impossible) to know if the valve is open or closed.

### FEATURES

- Capable of exceeding 30,000 turns
- Ground-level window indicates valve open or closed in bold red lettering
- Optional limit switches indicate valve position to operator in a remote location
- GPS offers sealed version
- Optional 2" square operating nuts, extension stems and couplings



## Memory Stop/Multi-Turn Worm Gears

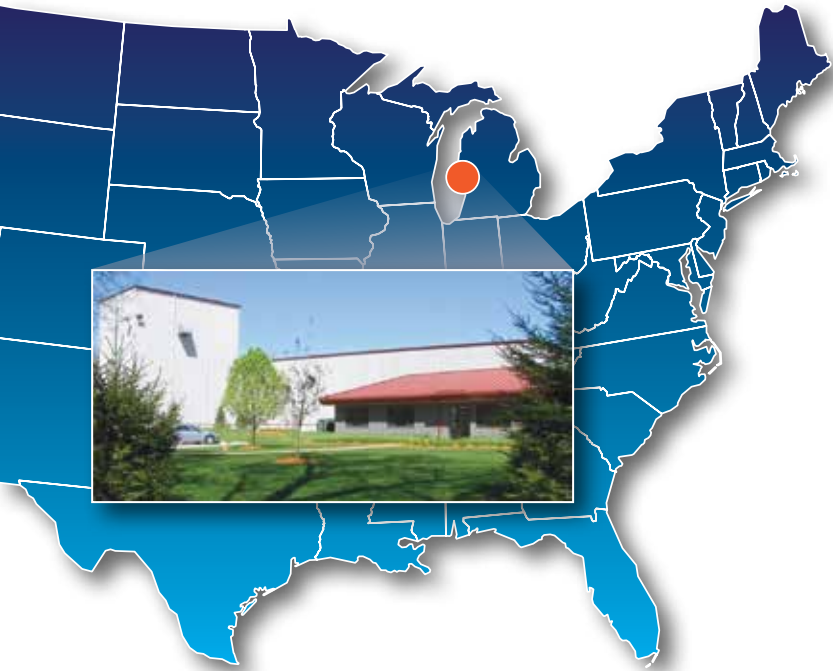
A special traveling-nut module is added to the standard DYNATORQUE worm gear, providing a highly adjustable memory stop. Ideal for use when the driven device is used for flow control and must always be opened or closed to the same exact position.



### FEATURES

- Highly adjustable travel stops
- "Memory stop" device suitable for valves and dampers
- Traveling nut module allows repeatable valve travel to the predestinated set-point

## World-Class Manufacturing



### CORE CAPABILITIES

#### Cameron's DYNATORQUE Manufacturing and Service Facility – Muskegon, Mich., USA

- Manufacturing: 30,000 sq ft
- Warehouse: 20,000 sq ft
- Office: 6000 sq ft
- CNCs: 17
- Testing:
  - Dynamic up to 400,000 lb
  - Static up to 1,500,000 lb
- Lifting Capability: 2 ton (1), 1/2 ton (5)
- Quality Certifications: ISO 9001:2008
- Operational Since: 1984





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**HSE Policy Statement**

At Cameron, we are committed ethically, financially and personally to a working environment where no one gets hurt and nothing gets harmed.

