

The Most Trusted Water-Lubricated Bearings for Rotating Shaft Applications.



Our Cutless® brand water-lubricated rubber bearings have been trusted by more industry professionals than any other. Even in the most abrasive conditions, they are at the head of the class of hydrodynamic industrial bearings.

The Cutless® bearing is a well-engineered product that delivers maximum value in both performance and service for a wide range of industrial applications.

Duramax® Industrial is the only true manufacturer of Cutless® brand bearings. With Duramax, you'll benefit not just from our innovative bearing technology, but from our unmatched product availability and technical support as well.

DURAMAX® INDUSTRIAL ADVANTAGE.

Duramax Industrial is your exclusive source for true Cutless® brand bearings.

We can engineer our Industrial Bearings for use in all rotating shaft equipment where approved liquids can be used as the lubricant.

Duramax® Industrial Capabilities:

- Can reline used bearing shells, reducing replacement costs
- Rubber compounds engineered to match application requirements
- Custom shell materials for specific corrosion and temperature applications
- Able to meet tight industrial ID/OD tolerances
- State-of-the-art manufacturing and inspection assures consistent quality and bearing concentricity
- Dedicated engineering staff to assist when specifying a bearing for a new application or retrofitting an existing application

Cutless® Quality Control.

Cutless® brand industrial bearings are individually inspected to insure our highest standards of quality and are manufactured to meet all required industrial tolerances. Bearing design, fabrication and testing are all done at our facility, under the eyes of our dedicated, qualified professionals. It's the reason why Duramax Industrial Bearings continually outperform other bearings.



Cutless® Rubber Compounds.

Simply put, rubber is an excellent hydrodynamic water lubricated bearing material. In fact, all hard surface bearing materials, including hard plastic, fail to measure up to the high performance standards of our rubber bearing compounds. Why? Because the presence of water dramatically reduces rubber's coefficient of friction to make it one of nature's most slippery surfaces.

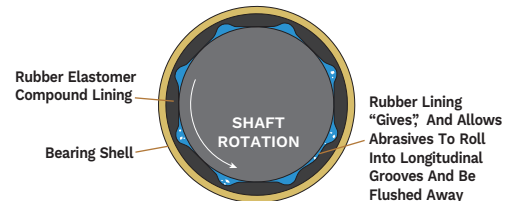
Cutless® elastomeric compounds control Total System WearSM (TSW). Some hard surface polymer bearing manufacturers may claim to have an impressive life span compared to Cutless® Industrial Bearings. However, this is only half of the story. Hard surface bearings are just that - hard. This hardness may extend the longevity of the bearing, but unlike rubber,

it may cause scoring or increased wear to the rotating shaft. What would you rather replace? A bearing or your pump shaft? Our Cutless® brand hydrodynamic rubber bearings are engineered to provide maximum protection - controlling TSWM (Total System Wear) and minimizing the chance for damage to your rotating shaft.

Avoids premature wear under varying conditions. Traditionally, Cutless® bearings are designed to operate with a maximum projected area loading of 40 npsi. In reality rubber is capable of supporting much heavier loads.

Sand or other abrasive particles in the water? The elasticity of rubber combined with the appropriate geometry minimizes wear on the shaft by creating hydrodynamic grit rejection on each bearing land. Through this phenomenon only the very smallest abrasives can pass between the bearing and shaft. Whether it is a continuous high speed application, or one with frequent stopping and starting, Cutless® brand rubber bearings are designed to typically give years of continuous, efficient performance.

Vibration absorber. Cutless® elastomer rubber compounds are extremely effective at dampening vibration. Their resilient composition absorbs shock and vibration, and reduces noise, resulting in less bearing wear and better overall operation.



Cutless® Engineered Design.

The Cutless® fully molded design and the elastomeric properties of rubber dramatically reduce the problems caused by harmful abrasives.

The "water-wedge" effect. Cutless® Industrial Bearings are engineered to create the optimum "water-wedge" effect. This means the rotating shaft and the rubber bearing surface are completely separated by a film of the lubricating media during operation through the formation of a hydrodynamic pocket. A minimum journal surface speed of approximately 3.2 ft/sec is required to establish a fully hydrodynamic film of lubricant.

Abrasives are flushed away. When abrasives are present, our resilient rubber elastomer lining "gives", and the abrasives roll into straight, longitudinal grooves and are then flushed away - thereby reducing the chance for scoring of the shaft.

Cutless® Industrial Water-Lubricated Bearings:

- Efficiently dissipate heat
- Flush away abrasives with minimal damage to bearing or shaft
- Easily withstand low & high speeds
- Can carry high shaft loads with minimum deflection
- Significantly reduce friction and wear
- Have low coefficient of friction
- Reduce vibration and noise
- Have excellent bearing concentricity
- Resist common oil, grease and chemicals
- Are easy to install
- Are non-polluting, environmentally-friendly

TYPES OF CUTLESS® INDUSTRIAL BEARINGS.

Sleeve and Flange Bearings.

Cutless® Industrial Bearings are manufactured using high quality, corrosion resistant Naval brass shells and non-metallic composite shells as standard. Custom shells can be manufactured in a variety of materials such as: stainless, carbon steel, Monel®, aluminum, titanium, and various composites and plastics.

Custom rubber elastomer linings engineered for any application. Whatever type of fluid or working condition - from abrasive dirty or sandy water to caustic chemicals like chlorine, sulfuric acid and high temperature oils - we can custom engineer a pump bearing to fit your specific need.



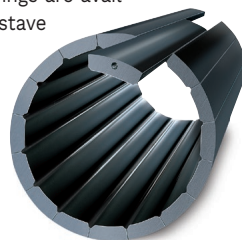
We offer many industrial rubber compounds that are specially engineered for performance and long life in industrial pumping applications. Our Duramax® Industrial engineers can compound a rubber elastomer to meet the performance requirements of your application.

Superior rubber-to-metal shell bond. The unique techniques developed by Duramax® Industrial insure the strength of the rubber-to-metal or rubber-to-composite bond.

Meet tight tolerances. You can trust Cutless® brand bearings because they are custom machined to meet exact specifications. They are available in solid or split design, depending on your specific requirements.

Demountable Rubber Stave Bearings.

Cutless® Industrial Bearings are available in a demountable stave configuration for shaft diameters from 3 to 35 inch shaft diameters. These provide a unique advantage - bearings can be replaced without shaft removal.



Relining Your Bearings - A Cost Effective Way to Extend Bearing Life.

A sleeve or flanged Cutless® bearing with undamaged and undistorted shell can be returned to Duramax and relined. After we inspect the bearing, the old rubber lining is removed from the bearing shell and new rubber is molded, vulcanized and bonded to the bearing shell. The restored bearing is equal in its operation to a new bearing.

CUTLESS® INDUSTRIAL BEARINGS APPLICATIONS.

Used as OEM Parts by the World's Leading Pump Manufacturers.

For over 40 years the world's most reputable pump manufacturers have used Cutless® Industrial bearings made by Duramax® Industrial as original equipment in their products.

Our bearings are used in: Hydroelectric plants, nuclear power plants, utilities, mining operations, off-shore drilling operations, manufacturing plants, sewage and water treatment plants, and agricultural operations.

Specific Applications Include:

- Vertical turbine pumps
- Guide bearings in hydroelectric turbine applications
- Aerators
- Classifiers
- Vertical sump pumps
- Irrigation
- Mining operations
- Custom pumps
- Vertical bowl pumps



Other Applications for Cutless® Industrial Rubber Bearings.

Cutless® Industrial Rubber Bearings can be used in any application where lubricating water or similar fluid is available.

- Dredging and other horizontal pumps including those handling sand, cement slurry and other abrasives.
- Cutterhead suction dredges.
- Drainage pumps.
- Industrial processing equipment including agitators, washers, water treatment, sewage treatment, elevator boot pulleys, thickeners and classifiers.



For more information about Cutless® brand bearings or to talk personally with one of Duramax® Industrial engineers, contact:

440-834-5400 or sales@DuramaxIndustrial.com

The Revolutionary Low-wearing, Low-friction, Dry-run, Rubber-based Polymer Bearing Material.

DMX[®]

DMX[®] is a proprietary bearing material that gives you all the hydrodynamic advantages of vulcanized rubber along with abrasion resistant characteristics found in a high-strength advanced polymer without increased shaft wear.

The Ultimate Vertical Pump & Hydroelectric Main Shaft Guide Bearing Material.

Through Innovative research and development, this tough bearing material was developed by Duramax[®] Industrial, the leader in water-lubricated bearing technology for over 40 years.

This technically advanced, rubber-based polymer, has been tested by an independent lab and operates with near-zero bearing and shaft wear*. Our exclusive “water-wedge” design separates the shaft and bearing surface completely with a film of water, providing unmatched 0.14 coefficient of friction at breakaway and friction coefficients down to .0036 during operation. And, harmful abrasives are no problem because of its “giving” elastomeric properties. DMX[®] is not subject to hydrolysis or hysteretic failure - unlike other bearing materials.



Hydroelectric Pump in Operation

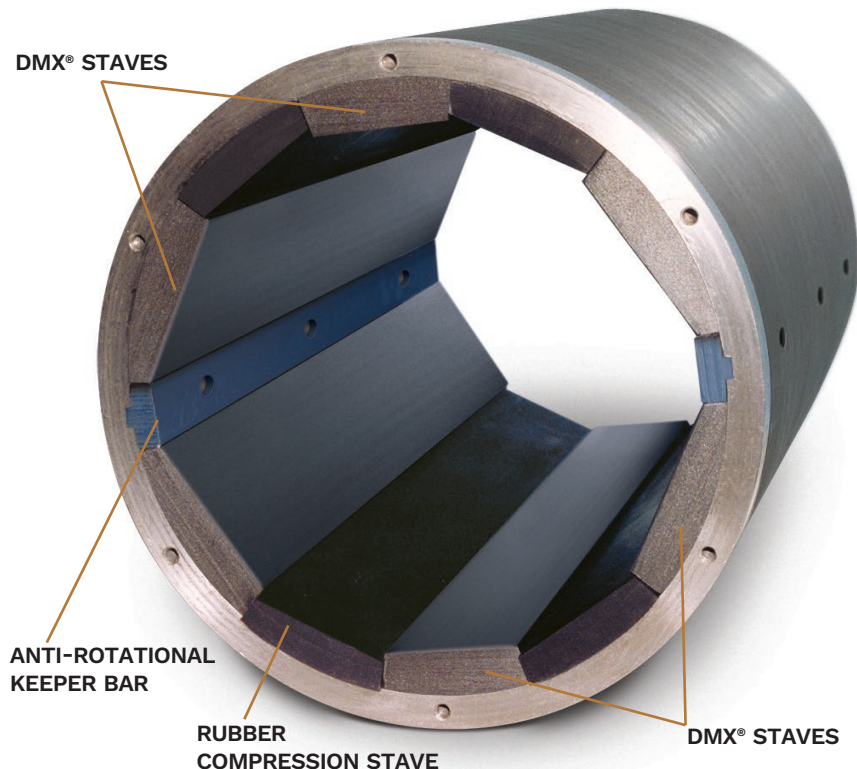


Vertical Pump in Operation

Successful operation under heavy load.

Traditional water lubricated bearings operate with a length to diameter ratio of 4:1 with a maximum of 40 npsi. DMX[®] can be used in a 1:1 L/D configuration and a maximum operating load of 240 npsi, which means a smaller housing and reduced cost.

DMX LOCKING STAVE SYSTEM



The Difference Is Our Technically Advanced Use Of Rubber.

Unlike solid polymer bearing materials, water-lubricated DMX[®] is an elastomer alloy and contains vulcanized rubber. Vulcanized rubber also helps maintain the bearing's elasticity and allows for the formation of the unique plasto-elasto-hydrodynamic pocket - which provides unmatched low friction operation.

DMX[®]. Best In TSWSM (Total System Wear).

DMX[®] has an extremely low breakaway coefficient of friction which reduces premature wear and misalignment caused by vibration, easily handles high levels of abrasives, and results in near-zero TSW. Duramax Industrial utilizes its state-of-the-art laboratory and testing facility to measure both shaft and sleeve wear*. The result - a longer service life for both the bearing material and the shaft.

*Independent test results confirmed by BMT Defence Services Ltd.

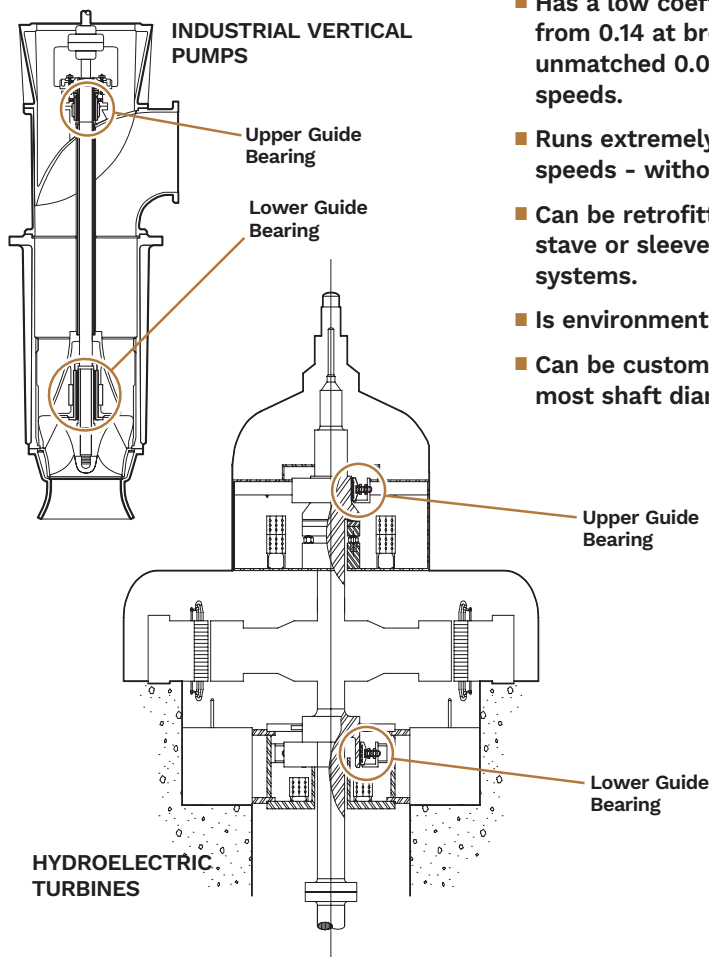
DMX[®] Advanced Rubber-based Polymer Staves are locked in place in the housing by a patented rubber stave system. When the rubber staves are compressed by the compression head, they expand outward locking the adjacent DMX[®] stave bearings in place.

TSW.SM The Key To Proper Bearing Selection.

While some competitive bearings systems claim to be long-wearing, they may only be talking about half of the tribological story. If that is the case, you are only given half of the performance results required to make your bearing selection. Duramax Industrial recommends comparing both bearing and shaft wear - which combined gives you TSWSM - to help determine your bearing selection.

DMX[®] is a unique and proprietary bearing material brought to you by Duramax Industrial. With Duramax, you'll benefit not just from our innovative bearing technology, but from our product availability and technical support, as well. Our engineers are always ready with the support you need, when you need it.

So, trust DMX[®]. It's the ultimate bearing material for all of your rotational shaft equipment.



Benefits Of Using DMX[®] Elastomeric Bearing Systems.

- Operates with near-zero shaft/sleeve wear. With our exclusive "water wedge" design, a rotating shaft and the bearing surface are completely separated by a film of water during operation.
- **Dry-run capable up to 10 minutes in event of water shut down.** DMX[®] performs well under operating conditions with little to no lubrication. Contact Duramax for engineering specifications for dry-run applications.
- **Can be used in a 1:1 or less L/D configuration.** This means less material, a smaller housing and less weight. This advantage also allows for easier installation and replacement of the bearing. And, DMX[®] can operate in a variety of conditions and under various bearing loads. DMX[®] was successfully tested at 40 to 240 npsi.
- **Performs very well in abrasive environments.**
- **Has a low coefficient of friction from 0.14 at breakaway to an unmatched 0.0036 at all shaft speeds.**
- **Runs extremely well at low shaft speeds - without noise or vibration.**
- **Can be retrofitted into existing stave or sleeve and flange bearing systems.**
- **Is environmentally-friendly.**
- **Can be custom-fabricated to fit most shaft diameters.**

DMX[®] CONFIGURATIONS

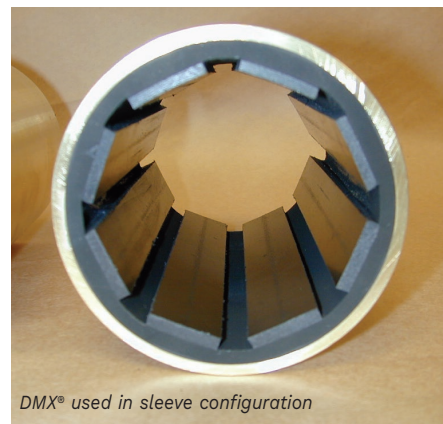
DMX[®] Industrial is available in two standard configurations:

- Molded Sleeve or Flange bearing
- Stave configuration
 - Dovetail Stave
 - Locking Stave System (*as shown on front*)

Duramax Engineers can design a DMX[®] bearing to fit all types of rotational shaft equipment.

We can also reline your existing sleeve and flange bearings with this rubber-based polymer.

Contact Duramax Industrial about your specific application.



For more information about Cutless[®] brand bearings or to talk personally with one of Duramax[®] Industrial engineers, contact:

440-834-5400 or sales@DuramaxIndustrial.com



DMX® Material

PHYSICAL AND TECHNICAL PROPERTIES TYPICAL VALUES

Compression Modulus	67.3 kpsi	464.19 MPa
Ultimate Compressive Strength (DMX is an elastic material that can be compressed beyond 40% with out failure, at 40% strain, comp stress is 46Mpa) (ASTM D695-02a)	3626 psi @20% Strain	25 MPa @20% Strain
Tensile Strength	2006 psi	13.83 MPa
Max Strain	0.39	
Modulus Elasticity	103 kpsi	0.71 GPa
Poisson's Ratio (ASTM D638-02)	0.52	
Izod Impact (un-notched) (ASTM D4812-99)	26.9 ft-lb/in	1436 J/m
Hardness (ASTM D2240-02a Shore Hardness)	64 shore D	
Water Absorption H₂O (ASTM D570-98,Immersion in H ₂ O, 24 hrs @23°C)	0.12 %	
Water Absorption Sea Water (ASTM D570-98,Immersion in Sea Water 24 hrs. @ 23°C - volume change)	0.1%	
Oil Absorption (MIL-B-17901B, Amendment 3, Immersion in IRM 903 46 hrs.@23°C) (volume change)	0.15%	
Thermal Expansion (ASTM D696-98) Range -25°C thru 100°C	9.6 x 10⁻⁵ F⁻¹	17.3 x 10⁻⁵ C⁻¹
Specific Gravity (ASTM D792 – 91)	1.03	
Break-Away Coefficient of Friction	0.14 to 0.20	
Shear Strength (ASTM D3846-02)	320 lbs. ft.	434 Nm

Duramax Industrial may, from time to time, provide design, installation, application, or related information to engineers or other persons. Such information is offered for consideration by the individual receiving it with the understanding that the information will be evaluated for merit and suitability for the intended application. Duramax Industrial reserves the right to change design or specification to improve product of processing at anytime, without notice. The data contained in this document has been derived from reliable laboratory tests. However, Duramax Industrial cannot assume liability for products not directly under their control.

