BOSTON GEAR™

Getting the Most Out of Your Gearboxes

RegalRexnord™

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The right-angle worm gearbox has been regarded highly over the years for its simplicity and reliability. At its core, it consists of two shafts mounted at right angles within a housing – the worm on one shaft and the gear on the other – supported and aligned by precision bearings and the housing itself. While the architecture is straightforward, the performance of a gearbox over time reflects the expertise behind the design.

Like many critical mechanical systems, worm gearboxes can tolerate some misuse. However, when properly specified, installed, and maintained, they deliver significantly longer service life, greater efficiency, and reduced operating costs. Today's advanced gearbox designs build on this foundation with engineered improvements that address many failure points of the past.

Running Dry: The Most Common Cause of Gearbox Failure

Historically, many gearbox manufacturers prefer to ship units without lubrication. This approach reduces shipping weight and allows facilities to standardize on a single lubricant supplier, minimizing compatibility concerns and helping reduce itemization needs. However, this practice also introduces one of the most common – and preventable – causes of failure.

Operating a gearbox without lubrication results in immediate and irreversible damage, particularly to the bronze worm gear. Even brief exposure can compromise the gear surface, and once the damage occurs, no amount of lubrication can restore it.

While this remains an industry-wide risk, modern gearbox programs are increasingly paired with clearer guidance and application-specific lubrication recommendations. Ensuring proper lubrication prior to startup is still essential and prioritizing its importance will lead to getting the best performance possible out of your gearbox.

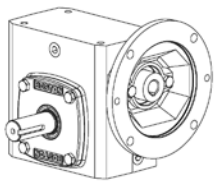
Running with Too Little Lubrication

While running completely dry of lubricant causes major issues, too little lubrication is another frequent cause of premature failure – often stemming from mounting variations. In many facilities, the same gearbox model may be installed in multiple orientations based on the envelope and environment, each requiring a different oil fill level to ensure proper internal coverage.

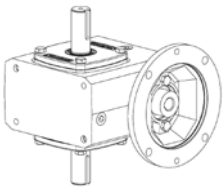
Traditionally, this requires careful reference to oil capacity charts and manual adjustments based on the specific mounting position. When overlooked, the result is insufficient lubrication and accelerated wear.

Leak-Free In Any Mounting Position

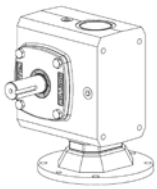
Mounting Position	Boston Gear 7700 Series	Others
Floor or Ceiling Mounted - Worm Over (Horizontal input shaft above output shaft)	●	●
Wall Mounted (Output shaft vertical)	●	
Wall Mounted - Input Shaft Down (Input shaft vertical)	●	
Wall Mounted (Output shaft vertical)	●	
Wall Mounted- Input Shaft Up (Input shaft vertical)	●	



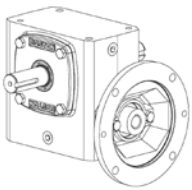
Floor or Ceiling Mounted - Worm Over
Horizontal input shaft above the output shaft



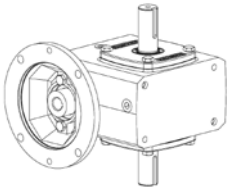
Wall mounted
Output shaft vertical



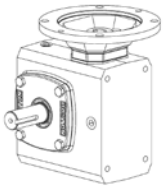
Wall mounted, Input shaft down
Input shaft vertical



Floor or Ceiling Mounted - Worm Under
Horizontal input shaft below the output shaft



Wall mounted
Output shaft vertical



Wall mounted, Input shaft up
Input shaft vertical

Modern gearbox designs address this challenge more directly to avoid this. The latest worm gear platforms, including the Boston Gear™ 7700 Series worm gearbox, are engineered with advanced sealing systems that enable true mounting flexibility in any orientation. Unlike traditional designs that rely heavily on orientation-specific oil distribution, these systems maintain lubrication integrity across a mix of various mounting positions depending on the specific model.

This advancement does more than simplify installation overall – it reduces risk. By eliminating the dependence on orientation-sensitive lubrication performance, users gain confidence that their gearbox will operate as intended, regardless of how it's mounted.

Using the Right Lubricants for Long Gearbox Life

Lubricant selection remains a critical factor in gearbox longevity. Worm gear systems, in particular, are sensitive to lubricant chemistry. Additives such as sulfur or chlorine – commonly found in extreme pressure (EP) lubricants – can degrade components over time.

Manufacturers continue to recommend specific lubricants based on extensive testing to ensure optimal performance under load, temperature, and operating conditions. These recommendations should always serve as the baseline.

What has changed is the performance expectations of these gearboxes. Modern gearboxes are now engineered to operate more efficiently and handle higher loads, placing greater importance on lubricant stability and compatibility. In high-performance systems, lubricants become an integral part of the engineered solution.

The Importance of Proper Seal Maintenance

Seals have historically represented one of the most vulnerable points in a gearbox system. Their role is simple in concept – help retain lubricants while simultaneously preventing contamination – but challenging in execution, especially in harsh operating environments.

Seal wear is heavily influenced by application conditions. Environments with abrasive particulates, such as paper mills or aggregate facilities, will naturally accelerate wear compared to cleaner applications and environments. As these seals degrade, they create a path for lubricant loss and contamination ingress, both of which contribute to a shortened gearbox life.

Modern gearbox designs have significantly advanced in this area. The latest sealing technologies are engineered to extend service life and eliminate leakage as a failure mode entirely. Features such as hardened and ground seal journals provide a more stable running surface for seals, reducing wear and maintaining sealing integrity over time.

This results in a shift where instead of managing leakage as an expected maintenance task, users can now rely on leak-free performance as a design standard, even in demanding applications.

Managing Internal Pressure and Extending Seal Life

As gearboxes operate, internal temperatures rise, causing thermal expansion of both the air and lubricant. This creates internal pressure that can place additional stress on seals, contributing to leakage over time.

Because of this, pressure relief mechanisms have long been used to mitigate this effect. However, in older designs, the effectiveness of the pressure relief mechanism often depended on proper maintenance and operating conditions. Today's engineered sealing systems take a more holistic approach by combining pressure management with robust seal geometry and materials. This integrated design reduces the overall burden on seals, helping maintain integrity while minimizing maintenance demands.

Additional advancements in pressure relief systems – such as the 700 Series PosiVent® - features a unique pressure equalization system designed to minimize internal pressure and further safeguard the gearbox from water, washdown solutions, and other contaminants that are often present in these environments.

Careful Motor Installation: A Key to Long-Term Reliability

Proper motor installation remains one of the most important factors in ensuring the performance of your gearbox. In C-face motor configurations, the motor shaft must align and engage smoothly with the gearbox bore.

Forcing or misaligning the motor during installation can damage seals before the unit even begins its operation. Even minor deformation can create leak paths that compromise its performance over time. See Oil Seal Image/Damage.

While installation best practices have not changed, modern gearbox systems are designed with tighter tolerances and more durable interfaces. A precise and controlled installation ensures that the engineered advantages of the gearbox – particularly in sealing and alignment – are fully realized from the start.

Long-Life Performance Through Engineered Advancement

The latest generation of worm gearboxes represents a meaningful step forward in both performance and usability. The Boston Gear™ Gen2 SS700 stainless and 7700 Series cast iron gearboxes, for example, builds upon a proven foundation while introducing targeted enhancements that directly address long-standing industry challenges.

These improvements fundamentally redefine expectations for worm gear performance. Increased load capacity through tapered toller bearings enables higher overhung load ratings which support more demanding, high-tension applications. At the same time, optimized torque and horsepower capabilities allow users to achieve more output from a smaller footprint, improving efficiency without making things more complicated.

Durability has also been significantly enhanced. With improved resistance to shock loads and continuous operation demands, modern gearboxes are engineered to deliver extended service life further reducing downtime and lowering total cost of ownership.

It's important to note that these advancements do not come at the expense of usability. The Boston Gear™ 7700 Series is designed for seamless integration, offering backward compatibility with existing platforms and drop-in replacement capability for many competitor models. This allows users to upgrade performance without redesigning their systems or disrupting operations.

A More Reliable Standard

Maximizing the life of your gearbox has always required extensive attention to detail through proper lubrication, careful installation, and consistent maintenance, and those fundamentals still apply. What has changed, however, is the gearbox itself.

With advancements in sealing technology, mounting flexibility, load capacity, and overall durability, today's worm gear systems are engineered to eliminate many of the traditional failure points that once required constant oversight. The result is a gearbox that not only performs more reliably but does so with greater consistency and less intervention.

For users, this means less time managing risks – and more confidence in the performance of the system as a whole.

About the Company

Regal Rexnord Corporation is a global leader in the engineering and manufacturing of factory automation sub-systems, industrial powertrain solutions, automation and mechanical power transmission components, electric motors and electronic controls, air moving products, and specialty electrical components and systems.

Through longstanding technology leadership and an intentional focus on producing more socially conscious and environmentally-friendly products and sub-systems, the Company is regularly addressing increasingly relevant secular demands of customers in the medical, alternative energy, aerospace, food & beverage, general industrial and warehouse/intralogistics end markets, among others. In short, Regal Rexnord's 30,000 associates around the world are proud to be working each day towards fulfilling the Company's purpose: to create a better tomorrow with sustainable solutions that power, transmit, and control motion.

Regal Rexnord is comprised of three operating segments: Industrial Powertrain Solutions, Power Efficiency Solutions, and Automation and Motion Control. Regal Rexnord is headquartered in Milwaukee, Wisconsin and has manufacturing, sales and service facilities worldwide. For more information, visit www.regalrexnord.com.

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