

Ball Screws Go Green

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We've all talked for years about the revolution to reduce the use of hydraulics and replace with eco-friendly electro-mechanical actuation that removes the waste associated with driving constant running pumps, and most of all, elimination of hydraulic fluid leaks which plague even the tightest systems. This takes us to the next step: How to adapt our use of ball screws to a level which will work to help make our environment cleaner and safe.

Today, we live in an environment where most people practice the three "R's"; Reduce, Re-use, and Recycle. By applying these techniques to ball screw use, we all will benefit from an improved environment.

Reduce

Reduction of waste is the key here, and the waste we create should not be harmful. The selection of materials for ball screws can be a major step in the right direction. Corrosion and wear are the two largest enemies of bearing-type products. Many coatings and platings were developed over the years to provide protection, but these processes are costly and utilize harmful chemicals. Cadmium, Zinc, Lead based, and Chromium are among the worst offenders. Many new grades of stainless steels have been introduced over the past decade that provide excellent properties for bearing grade materials that won't require harmful plating processes.

Certainly stainless steels are not the answer for everything, but we can reduce the usage of coatings and platings that use harmful chemicals. Ask for materials and processes that are ROHS (Restriction of Hazardous Substances Directive) compliant. Acid free zincs, nickel, and black oxidizing are a few of the friendlier coatings that offer good environmental protection. The machine tool industry has long preferred the use of high luster polishing in lieu of coatings or platings that can affect ball screw stiffness characteristics. This fine polishing minimizes corrosion initiation sites and the use of lubrication with anti-corrosion additives does an excellent job of preservation.

Reuse

Clean it up and use it again is as simple as it gets. Why not? Sure, a few components may

require replacement, but refurbishment of tired and worn out ball screws is a very common occurrence. 50% of ball screws removed from service only require a thorough cleaning, re-straightening, and replacement of the correct size bearing ball to place it back in proper working order. Removal of the ball screw from the application on a properly administered preventative maintenance cycle can dramatically extend the working life of a screw and significantly reduce its life cycle cost by avoiding permanent damage which could render major components unusable. Balls generally wear at a rate faster than the ball nut. The screw itself wears the least as it is typically distributed along its length unless a “Sweet spot” is created in the machine or application. Replacing balls and ball nuts (if needed) still minimize the cost of a repair as the screw is generally the majority of the cost. Screws and ball nuts can also be re-ground to further extend their life. Rebuilt and refurbished ball screws function as good as a new part with usually the same amount of life.

Bearing journals and other mounting surfaces may become damaged during use or removal and usually can be repaired. Suggest to your re-builder to utilize metallizing techniques that rebuild journals with a stainless steel additive as opposed to having worn journals built up with harmful chrome plate. Metallizing can also be done in the re-builder’s shop and will expedite repairs.

Recycle

If you are at the very end and cannot refurbish, the scrap value of all the ball screw elements are recyclable. Steel brings a good return at scrap value so make sure you get some return on that investment. Polymers used in return systems and wiper/seals are also reclaimable and usually can be sent to recyclers as well.

Green Applications

Don’t forget Ball Screws are widely used in technologies which are contributing to a healthier environment too. Electric vehicles replace common hydraulic systems with EMA and ball screws for steering, traction control, and brakes. Windmill farms utilize ball screw actuation in blade pitch and directional position. Hydro electric stations to control gates. Solar panels, designed to track the sun to maximize their efficiency, use electro-mechanical actuators to provide two or three axis movements. And lastly, electro-mechanical actuation utilizing ball screws are the method of choice among lawn care professionals for adjusting mower decks on equipment used to shave the “Greens” at your favorite golf course.



Stainless steel greener than chrome plate



Repair Ball Screws rather than discarding them



Coatings can affect environment