



## Encoders in Inhospitable Environments

Encoders are often times called to duty in an environment that is not conducive to a long life. For protection against corrosion of the housing, shafts, connectors, etc., encoder housings should be made of 6061-T6 or 6063-T6 aluminum with a tough powder coated finish. This combination provides a rugged unit that is protected against most industrial environments.

Some applications call for frequent wash downs with caustic chemicals. Some of these chemicals can attack the aluminum and cause corrosion, eventually shortening the life of the encoder. Some encoder models are available in a stainless steel housing. These all stainless steel units will provide an additional level of corrosion protection where needed.

For extremely harsh environments, an encoder isolated from the corrosive elements is often the best long term choice.

One method of isolation is to place the encoder in a sealed and corrosion proof enclosure. However, this can be an expensive alternative and often it makes the unit so large that it becomes quite cumbersome.

A more economical solution is to use a flexible drive shaft and place the encoder in a remote location, out of the corrosive environment. These flexible drive shafts are similar to the speedometer drive cable used in automobiles. They transmit rotary motion around curves, obstacles, etc. The portion of the flexible drive shaft that is exposed to the hostile environment can usually be replaced quicker and more economically than the encoder.

Some of these flexible drive shafts can be obtained with conformal coatings which will enhance their life in harsh environments. Or it is usually a simple matter to coat the outer sheath with some type of corrosion resistant compound like heavy grease or Cosmoline\* coating. There are many different configurations of flexible drive shafts available and they are available in any reasonable length. There are a number of manufacturers that carry a complete line of flexible drive shafts, and can provide custom designs for any application.

A few known examples of where these flexible shafts have been used with encoders are in the nuclear industry where the position of valves, rods, etc, in a radioactive environment existed. The radiation would shorten the life of the solid state electronic components of the encoder. By placing the encoder external to the machine environment, the problem was solved.



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## Encoders in Inhospitable Environments Cont.

Another example was in a food processing plant where the machinery has to be completely washed down every shift or every few hours. Stainless steel plumbing was used throughout the plant and it was considered "routine maintenance" to completely replace all the plumbing and associated equipment every six months as a matter of course. Naturally, the encoders were replaced along with all the rest of the equipment. When this customer went to the flexible shaft drive to the encoder, he found out that over a period of three years, the encoder was the **ONLY** item in the plant that was still original! Many thousands of dollars were spent replacing stainless steel drive motors, pumps, plumbing, etc., but the encoders were still performing like new!

Torsional windup is one concern when implementing flexible drive shafts. With the proper flexible drive shaft (configuration, length, etc), and correct installation (proper bend radius, sealing), windup can be greatly reduced. The migration of liquids inside the inner sheathe of the flexible cable can also cause problems. With proper sealing methods on each end of the cable, this should not be a problem. Remember that liquids flow downhill, so be sure to provide a drain loop at the end of the cable, or have the encoder elevated above the rest of the machine.

\*Cosmoline is a registered trademark for Schafco Packaging Company