EP

ADVANCED RELIABILITY SOLUTIONS

HOW TO STOP BEARING FAILURE

In ideal conditions modern bearings will run for years with very little maintenance. Yet in some industries, conditions are so far from ideal that bearings may fail in a few months or even weeks, requiring frequent replacement and causing expensive production delays.

Conveyor bearings, for example, are particularly vulnerable to the dust, debris and slurry from the materials the belts carry. The same is true in many production settings where essential components will fail if they are not given sufficient protection from contaminated environments.

Any engineer will tell you that the key to bearing survival is lubrication; as long as the bearing surfaces are protected from wear, they will continue to run cool and vibration free. If lubrication fails for any reason, wear increases, bearings overheat and, sooner or later, the bearing will fail. In dirty environments, standard maintenance may not be sufficient to prevent contamination and trying to keep bearings clean - by pressure washing, for example - can make ingress worse. So various shields and caps have evolved to protect bearings, with varying degrees of success.

Over the last 15 years Enviropeel has developed a unique bearing protection system that has consistently produced great results. It provides a reliable and cost-effective solution to premature failure in rotating equipment, prolonging bearing lifetimes by 500%, dramatically reducing shutdowns and the need for maintenance. A simple spray application of Enviropeel will immediately prevent contamination ingress and stop corrosion in the bearing housing and bolts as well as reducing the need for purging grease.

Images left show a dirty bearing at a roofing plant prior to coating with Enviropeel and same bearing after application. At this plant, contamination was so heavy that some bearings were completely submerged in debris.

KEY BENEFITS

- **Increase bearing life by 500%**
- **Prevent contamination & corrosion**
- **Reduce purging & maintenance**

Proven Results

Cost savings can be substantial. In the Australian mining industry, where the product has been in use for more than fifteen years, conveyor bearings that had previously required

replacement every nine months were still in perfect condition more than four years after being protected with Enviropeel. In the US, bearings on a pickling line were only lasting six weeks. Eight months after Enviropeel was first applied, the bearings were still fully operational.

Users regularly experience greater than 500% reduction in bearing changeouts with enormous savings in replacement costs as well as reducing downtime, labor costs and accident rates. Data collected by BHP Billiton and Napier Salt (part of Rio Tinto Group) showed a complete elimination of failures in stored equipment and an increase of over 500% in bearing lifetimes. This led to the adoption of Enviropeel as standard practice for all conveyor bearings, both in storage and on production facilities in Australia.

Costs drop from $153,000 to $40,000

Data from a US-based building products company with heavy cement slurry contamination show incredible savings. Prior to using Enviropeel, the bearing maintenance program had eight planned changeouts a year to ensure continuous production. In the first year after the Enviropeel application, engineers were able to immediately halve the changeout rate, saving $73,000. But, after a year, results were so good they halved the changeout frequency again, saving over $113,000 in just twelve months - at a cost of only $1,800 for the Enviropeel protection, an overall cost reduction of 74%.

IMMEDIATE SAVINGS

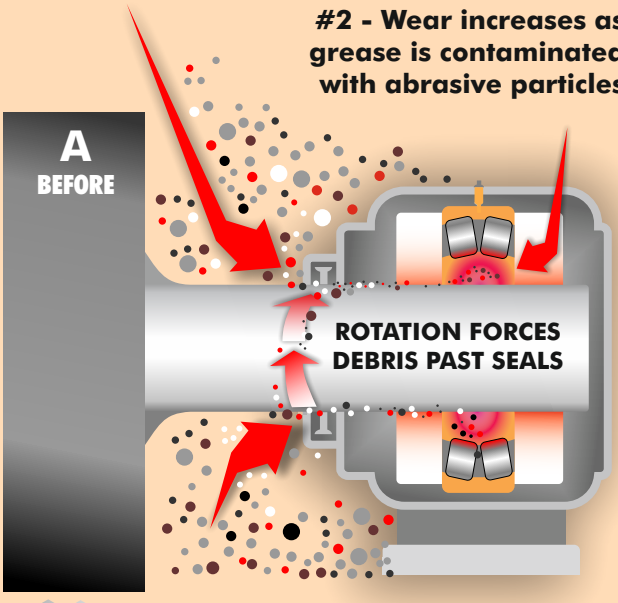
Original maintenance cost	**$153,000**
After Enviropeel is applied	**$40,100**
Annual saving	**$113,100**
Percentage saving	**74%**

WHY SOME BEARINGS FAIL - AND HOW YOU CAN PREVENT IT!

Diagram A, below shows how, in heavily contaminated environments, large quantities of debris build up around bearings (#1). Although bearing seals will prevent initial ingress, shaft rotation will grind and reduce particles which will eventually pass through the seals and into the moving parts of the bearing (#2), a process often made worse by pressure washing. This reduces lubrication and increases wear, causing premature failure. Diagram B shows how Enviropeel works, shielding against dirt and debris (#3) while built-in inhibiting oils cover all contact surfaces, allowing the shaft to rotate within the coating and preventing ingress of contaminants (#4)

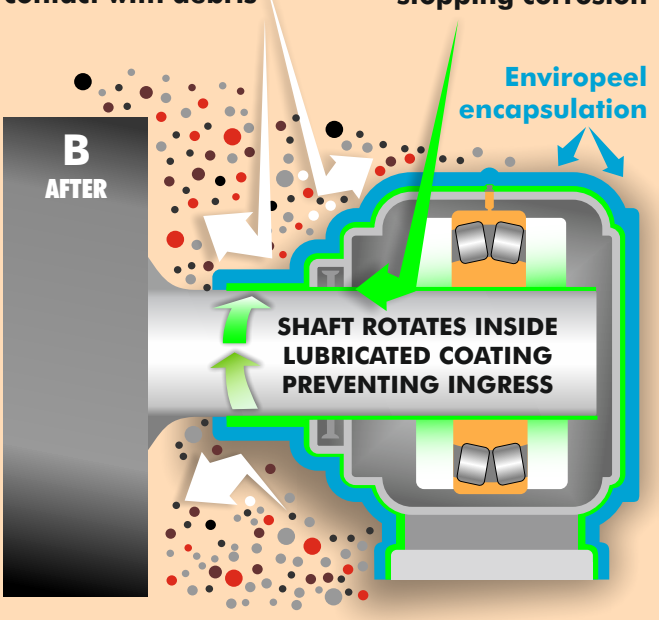
#1 - Dust, debris and slurry accumulate around the bearing housing and are rotated through the seal along the shaft and into the bearing

#2 - Wear increases as grease is contaminated with abrasive particles



#3 - Encapsulation of bearing and shaft protects bearing from contact with debris

#4 - Inhibiting oils coat all surfaces lubricating shaft and stopping corrosion



Application Description

The system uses a purpose-built application unit to apply the Enviropeel material, which is supplied chipped for easy handling. Using patented heating technology, the units melt the material into a liquid which can then be sprayed on to any size target substrate. The Enviropeel thermoplastic material is solid at normal temperatures and, once applied, it cools rapidly to form a tough, perfectly-fitting second skin that protects the entire bearing, inside and out. It is manufactured using a UV-resistant thermoplastic polymer that incorporates a slow-release inhibiting oil. It is re-usable and recyclable.

The material fully encapsulates but does not bond to the substrate, so it can also be sprayed directly onto and around the bearing shaft. Inhibiting oil coats and protects all surfaces, lubricating the shaft, allowing it to rotate freely within the coating. The inhibiting oil also prevents corrosion in the bearing casing and fixing bolts, providing unrivalled protection.

Designed and manufactured in the USA

Enviropeel equipment is engineered for reliability and ease of use. The units are mobile and completely self-contained, with their own hose, spray gun and compressor. The heating tank at the top of the unit has a lid for easy entry of the chipped materials at any time. Using straight-forward controls and secure safety systems to monitor and control material temperatures and pressure, the operator is able to adapt flow rates and spray patterns to suit any type of substrate and environmental conditions.

Top: Enviropeel application on-site

Above & below: Before and after application

Right: The Enviropeel MA-25 mobile unit

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FAQ QUESTIONS & ANSWERS ABOUT USING ENVIROPEEL MATERIAL & EQUIPMENT

General:

Question: How does the Enviropeel Thermoplastic System work?

Answer: Enviropeel is a thermoplastic system involving two parts - our mobile application equipment and the Enviropeel chipped material, otherwise known as EP. EP is spray applied, allowing application to any size or shape of substrate. The material provides active lubrication and surface protection within a close-fitting protective coating.

Question: What are the primary benefits of Enviropeel?

Answer: Equipment protection, including rotating equipment such as bearings, corrosion prevention and long-term storage protection.

Question: Does the coating bond or adhere to surfaces?

Answer: No, EP only bonds to itself and does not bond to the substrate. This characteristic allows the spread of inhibitors across the substrate and makes it very effective when protecting rotating equipment. In other words, Enviropeel encapsulates while forming a protective barrier.

Question: Is Enviropeel cost-effective and how much maintenance does it require?

Answer: Our customers are seeing typical savings of up to 85% compared to current maintenance cost with no added requirements other than visual checks for damage. Bearings and other rotating equipment properly protected with Enviropeel typically experience 500% life increases.

KEY BENEFITS

- **Increase equipment life by 500%**
- **Prevent contamination & corrosion**
- **Reduce maintenance cost by 85%**
- **Eliminate failures in stored equipment**

Equipment and Material:

Question: How does the application unit work?

Answer: The application unit is a digitally controlled mobile unit with multiple heating zones that utilizes a powered hose and handheld applicator to spray material.

Question: How long are the hoses?

Answer: Hose lengths can be up to 60 feet. Each unit is supplied with a standard-length hose to suit its capacity, see Equipment Overview for further details.

Question: How mobile is the application unit?

Answer: All units are self-contained and extremely mobile, see Equipment Overview for further details.

Question: What are the power requirements for the application equipment?

Answer: Power requirements vary by mobile application unit, see Equipment Overview to confirm specifications and requirements.

Question: What type of maintenance does the equipment require? Is it necessary to purge hose after each use?

Answer: Periodic cleaning of the tank and filter system is required as part of the normal maintenance program. Cleaning of the exterior of the machine is also recommended. No, it's not necessary to purge the hose after each use. The hose has a heating coil that reheats solid material when machine is reheated.

Question: How is the Enviropeel material supplied?

Answer: EP comes as loose, easily handled chips packed in plastic buckets.

Question: What colors of EP are available?

Answer: Our most common colors are Blue and Gray but it's also available in Red, Yellow, Green, Black and White. Minimum quantities are required for any color other than Blue or Gray.

Question: Can Enviropeel bond to itself if a small repair is required?

Answer: Yes, when reheated the coating will bond to itself after application.

Question: How abrasion resistant is Enviropeel?

Answer: Although Enviropeel has durable characteristics, in highly abrasive or impact environments, a secondary urethane coating is recommended and sold separately.

Question: What is the life of the coating?

Answer: The coating typically will last as long as the equipment. If not damaged, we have seen the coating last in real life situations for over 12 years.

Question: Is Enviropeel environmentally friendly?

Answer: Yes, not only are its components environmentally safe and recyclable, Enviropeel contains no solvents or volatile organic compounds.

Question: Is Enviropeel FDA approved, and can it be used in food environments?

Answer: Although Enviropeel has not yet been approved by the FDA, it is often used outside of food contact areas.

Question: Can Enviropeel withstand chemicals?

Answer: This depends on the chemical and the conditions. Enviropeel has excellent resistance to splash contact from caustic soda solutions and most acids. For a complete answer, we would need specific details of chemical type, concentration, and temperature.

Question: Is Enviropeel flammable?

Answer: Enviropeel is classified as non-flammable but does become combustible above 400 degrees Fahrenheit. Under normal circumstances, ignition of Enviropeel only occurs when in contact with an open flame.

Question: What is the dielectric strength of Enviropeel?

Answer: Its dielectric strength as measured by an Elcometer 105 DC holiday detector is 40KV/mm.

Question: Does Enviropeel conduct electricity?

Answer: EP does not conduct electricity and is a very good electrical insulator. For this reason, it will not allow electrons to pass through the coating between flange halves, for example, inhibiting galvanic effects.

Application Process:

Question: What surface preparation is required?

Answer: Minimal surface preparation is required. For existing corroded substrates, a wire brush preparation is sufficient to remove loose flaking rust or paint particles. Pre-treatment oil is available and used on a case-by-case basis where corrosion layers remain within the encapsulation.

Question: What are the maximum and minimum substrate temperatures on which Enviropeel can be applied?

Answer: Maximum substrate temperature is 200 degrees Fahrenheit. Enviropeel has been successfully tested down to -80 degrees Fahrenheit.

Question: How quickly can coated items be ready for use?

Answer: EP cools rapidly and should be safe to touch within a few minutes. We recommend waiting 15 minutes before operating rotating equipment after coating.

Question: Does the application process require any protective safety wear?

Answer: Yes, standard personal protective equipment (PPE) should include a minimum of safety glasses or full-face visor, gloves, safety shoes and coveralls.

Question: What sort of ventilation is required?

Answer: Normal shop/factory environments have adequate ventilation. The fumes created in the melting process are non-hazardous. The mineral based oil vapors created in melting process are non-hazardous.

Question: What is the application temperature?

Answer: Enviropeel is spray applied at 338° Fahrenheit.

Question: Can contaminated material be reused?

Answer: Filters in the application units will filter minimally contaminated material but heavily contaminated material should be discarded.

Question: What special training is required to apply Enviropeel?

Answer: All applicators must complete training conducted by a certified trainer. The training includes proper application techniques, safety, equipment maintenance and troubleshooting.

Equipment Protection, Corrosion Prevention & More:

Question: How can a shaft and bearing operate when encapsulated with Enviropeel?

Answer: EP only bonds to itself and does not bond to the substrate. Once coating has cooled, equipment can rotate freely inside the self-lubricated protective coating.

Question: Will Enviropeel insulate equipment and cause overheating?

Answer: No, Enviropeel dissipates heat very well and does not cause an appreciable increase in bearing temperatures. In some cases, equipment temperatures are lower since contamination (which causes heat) is no longer present.

Question: How does grease escape from the bearing?

Answer: On pillow block bearings, there is a natural relief point around the base of the coating and bearing. The grease will find the path of least resistance.

Question: Can EP users reduce or eliminate greasing over the life of the bearing?

Answer: Yes, most customers are over lubricating to purge contamination, and this becomes unnecessary after protection with Enviropeel.

Question: Would we be able to use heat or vibration sensors through the layer of Enviropeel?

Answer: Thermal heat sensors are fairly accurate through the coating. Vibration sensors can also be used.

Question: Can Enviropeel be used on equipment other than bearings - such as a gearbox or a bolted assembly?

Answer: Absolutely! One of the best qualities of Enviropeel is the versatility of the coating. We work with our customers daily discussing new and creative applications.

Question: Does the coating provide corrosion control for the life of the system?

Answer: ASTM Hot Salt Fog tests show protection lasting for the equivalent of 30 years. EP's built-in corrosion inhibitors are especially effective against dissimilar metal corrosion.

Question: Is Enviropeel resistant to UV?

Answer: Yes, it has been tested to ASTM G154 and achieved excellent results. No cracking or flaking with only a slight surface color change. Enviropeel will effectively protect in high UV environments.

Question: Can Enviropeel be used to seal leaks in our conveyance system?

Answer: It is often used to seal around shafts and openings in sheet metal where the rotating shaft enters a housing and there is a leakage gap where materials leak out and onto the shaft/bearing assembly. The nature of Enviropeel is not to bond with anything except itself, so some leakage points may not be suitable applications.

Question: Can EP be used on piping being placed underground?

Answer: Yes, however, care must be taken during backfill to prevent damage to the coating.

Question: Can Enviropeel be painted over?

Answer: Better to color the material to match customer requirements, but painting is possible on weathered EP.

Summary:

Enviropeel fulfils every requirement for successful equipment protection, offering tremendous cost savings and incredible flexibility for a wide variety of applications and industries. In addition to protecting flanges and pipes, it can also be used to protect rotating equipment such as bearings and gearboxes as well as stored equipment (mothballing). Enviropeel represents a major step forward in the ability for industries to finally prevent the enormous costs and damage caused by corrosion and contamination.