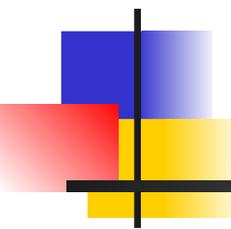


POLYMECH ENGINEERING

Specialists in Teflon Coating with
Grades of Halar, Hdpe, Ldpe,
Nylon, PP and Ptfе Xylan



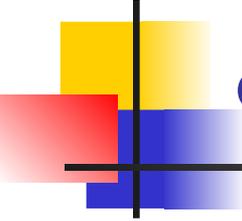
HIGH PERFORMANCE FLURO POLYMER COATINGS

Coating Grade :- XYLAN GRADE

Functions Of Coating
To Reduce:

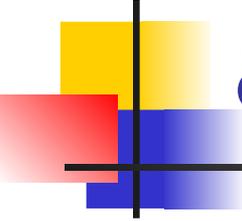
- a) **Friction**
- b) **Wear**
- c) **Corrosion**
- d) **Noise Reduction**
- e) **Temperature extremes**

From Whitford Worldwide USA



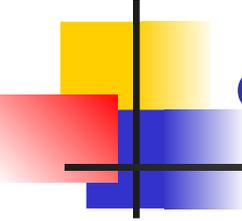
a). Friction

- Friction Cause Heat, Wear and loss of Energy in dynamic applications. In severe Circumstances, Friction can cause over heating and seizure.
- Friction causes brinelling , galling ,scoring and underloading of fasteners.
- Drive- line vibration and chatter result from friction.In these cases, stick/slip motion is usually the cause. This unstable sliding motion occurs at very slow speeds, when friction increases above the force causing the movement and motion stops , then drops below the moving force, at which point motion restarts
- Deformation or destruction of delicate mechanisms such as lock components can be caused by excessive friction.



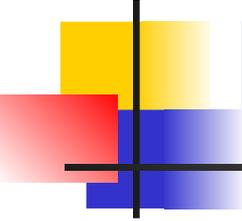
a) Xylan coatings for friction

- Friction coefficients (measured by mating surfaces rubbing against a coating) typically vary from about 0.06 for PTFE materials to about 0.15 for Moly coatings, although values as low as 0.02 have been measured for some Xylan coatings.
- Xylan coatings are particularly useful when temperatures exceed the operating limits of conventional mineral and synthetic oils. Because Xylan coatings are based on resin systems with a wide range of temperature capabilities, they can be used from cryogenic levels to 260°C/500°F, with many being stable for brief periods at 315°C/600°F.
- Where Galling , abrasion, and high energy loss due to friction are anticipated , consider applying coatings of 25 microns/0.001inch or more to minimize friction and wear.



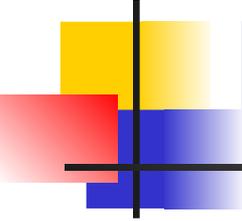
a) Xylan coatings for friction

- Potential applications include rotors for compressors, air- cylinder pistons, hinges, sliding bearings. The best coating choice is the one which provides the desired coefficient of friction and the maximum pressure/velocity(P/V)capability.
- Using a Xylan coating in a bearing cavity in which a fluid lubricant is also used reduces friction losses in the bearing to the lowest possible level because Xylan is oleo phobic(it sheds oil). During rotation, viscous shear forces within the bearing are reduced slightly. Thus instrument bearings or other systems in which minimum bearing friction is critical can benefit from a thin coating (7.5 microns /0.0003inch).



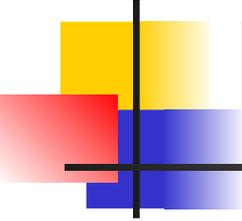
b).Wear

- Initial contact between mating metal parts results in momentary welding of asperities (peaks) on each surface. As each part continues to move, the welded asperities are ripped off, leaving behind minute pits.
- Every bearing and wear surface , no matter how smooth the finish , has these asperities.
- The problem is common to impellers and housings, air- cylinder pistons, machine slides, telescoping mechanisms, ball joints, plungers, gear- teeth, hinges, journal bearings, valves, power screws.



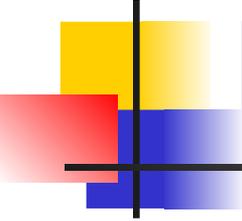
b). Xylan coatings for Wear

- First: the ability of a coating to bear loads increases as thickness decreases. For instance, while a 25 micron/0.001 inch film may be able to bear PV of only 50,000, a 5 micron/0.0002 inch film may be able to bear PV of 150,000. For this reason, the PV tolerance of a coating may be modified by the film thickness.
- Second: the lubricants themselves. PV limits are not constant. They tend to increase with pressure and decrease with speed.
- Xylan coatings provide a thin layer of lubrication to prevent the asperities on mating surfaces from making physical contact with each other. The selection of the best dry lubricant (PTFE, Moly, or graphite) for these applications depends primarily on the PV value (Pressure x Velocity), atmosphere, and temperature of the application.



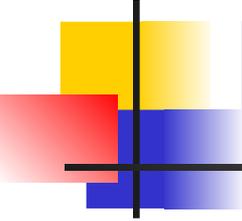
b). Xylan coatings for Wear

- Wear is often severe in bearing-type applications. Rods that slide through glands, rolling element bearings, slide assemblies, telescoping booms, ball reversers, rocker arms, ball joints, tracks, bushings, and thousands of other applications are configured so that one part rolls or slides over another part. In most cases, friction and wear of the parts are reduced when one or both are coated with a dry-film lubricant. Also, the coatings serve as a thin cushion, spreading high point loads in bearings and reducing element fatigue. The energy that is transmitted and dissipated in a bearing is a function of the PV of the application. As the PV increases, so do heat and wear on the bearing surfaces. Dry lubricants have a "limiting PV value" that they can withstand for a reasonable wear life. Typically, the highest limiting PV which a 25 micron / 0.001 inch coating of Xylan can withstand is approximately 50,000(PV). This limiting value varies from coating to coating. Two factors to bear in mind.
- When equipment is started and stopped frequently, lubricants are subjected to stress, which can diminish their ability to lubricate. This can bring sliding metal surfaces into virtual contact (a condition known as "boundary lubrication"). If metal to metal contact does occur, the boundary lubrication can convert into actual failures as the metal surfaces meet and begin to wear, which can, in turn, lead to seizure.



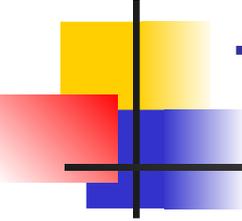
b). Xylan coatings for Wear

- A thin coating of Xylan reduces the chance of failure and lengthens the life of such products as sprockets, seal plates for compressors, pump pistons , cams, ball joints, conveyor trolleys, gears, journal bearings.
- These coatings solved wear problems under start/stop conditions in reciprocating plungers in electrical solenoids. Typical plungers are chrome-plated (and extremely hard). But the starting and stopping at the end of each half – cycle put the plunger into a boundary lubrication condition, causing the plating to wear rapidly. When a matrix coating replaced chrome plating, the boundary lubrication condition was overcome and plunger life was extended by 90 percent.
- A maker of chain saws uses Xylan 1010 as a fail- safe lubricant on the cage of the saw's main bearing. Clearance between the cage and connecting rod is only 100 to 150 microns /0.004 to 0.006 inch. When the engine started , the bearing was in boundary lubrication and , without the coating, it tended to seize. As proof of the coating's ruggedness, these engines run eight hours per day and have a life expectancy of three years.
- PTFE – type Xylan coatings are recommended for applications where initial wear is anticipated to be light to moderate: Moly-type coatings are recommended for conditions of heavy wear, especially in high – load situations.



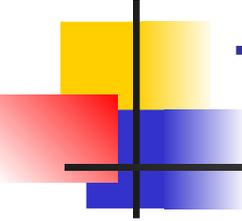
b). Xylan coatings for Wear

- In any circumstance in which a mechanism must function when needed, even if only once, Xylan coatings provide a good margin of security , even under the most critical circumstances.
- This includes aircraft parts such as bearings for turbine engines, solenoids, seat ejectors, actuators, door pins, and firing mechanisms for ordnance.
- Another category is equipment that would be damaged were a component to fail. For example, removing a frozen bolt for chemical processing equipment could cause damage costing thousands of times more than the bolt. In refinery equipment ,the use of a wrench is infinitely safer than the use of a cutting torch.
- A good rule of thumb: apply coatings of approximately 25 microns/0.001inch to the surfaces of these parts. This ensures that the component will function when required, and provides good lubrication and excellent corrosion protection.



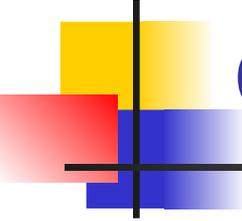
b). Xylan coating to increase fuel efficiency for automobiles

- Xylan can be used instead of PTFE “buttons” on piston skirts to reduce piston “slap”.
- For Viscous fan drives, a Xylan coating proved to be the ideal way to prevent the internal drive rotor from striking the drive housing. This eliminated the heat buildup that caused the drive fluid to gel.
- Parking –brake actuators found on vehicles should be coated with Xylan – because it resists corrosion and the high thread loads(2,000 kg percm²/28,000 psi).
- Xylan coatings improve the mechanical performance of the products by reducing friction, resisting corrosion and withstanding wear.



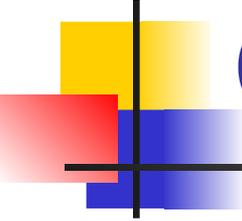
b). Xylan coating to increase fuel efficiency for automobiles

- The internal components of an engine operate in an environment that is hostile to most low-friction coatings. It is hot ($>205^{\circ}\text{C}/400^{\circ}\text{F}$), and many of the fluids encountered (fuel, combustion vapors, battery acid, brake fluid, glycol) attack many polymer coatings. Also, wear rates on pistons, bearings, gears, valve stems, and fan drives, are greater than most coatings can withstand.
- Several formulations of Xylan coatings worked well in this environment. Xylan 1010, 1014 and 1052 were tried and selected for several applications because they were hard, wear-resistant, and stable at over $260^{\circ}\text{C}/500^{\circ}\text{F}$.
- Coating the pistons, bearings, connecting rods and crankshaft of engine with Xylan 1010, proved with careful documentation that during 200000 miles/322,000 km, the engine used almost 15 percent less fuel. henceforth engine manufacturers have determined that friction reduction has resulted in increases in engine output by as much as 16 percent.



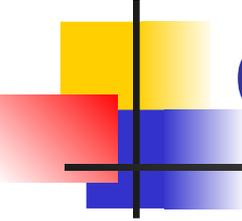
c). Corrosion

- The electrochemical process of corrosion is complex, and can result from single or multiple sources. Oxidizing fluids such as salt water, electrolytes, under-hood chemicals, wetting agents, by-products of combustion, acid fumes, food materials, process chemicals, fuels, car wash solutions, even high performance synthetic lubricants, can attack metal.
- Dissimilar metal Unions (galvanic corrosion) and vibration between tightly joined components (fretting) can cause corrosion. The effects range from catastrophic failure of studs/nuts on compressors to seizure of door-lock components.



c). Xylan coatings for Corrosion

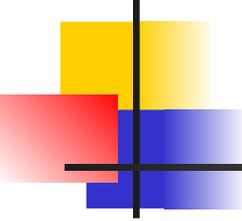
- Xylan coatings , particularly the formulations made with PTFE , offer a simple solution to the problem. Xylan is an excellent corrosion barrier, even if applied as a thin film. Most formulations form functional films at about 25 microns/0.001 inch. However they may be microscopic pin holes in the coating.
- Even if corrosives eventually penetrate the coating and attack the substrate, little or no underburrowing occurs, so the parts may still be easily disassembled for refurbishing.



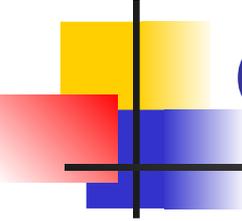
d). Noise Reduction

- Vibration generates noise. Vortices trailing high-speed impeller blades, impacting gear teeth, bearings spinning in races, slapping piston skirts, plungers sliding against the walls of actuators, reciprocating detents, and other sources of vibration are dampened when treated with Xylan. Under impact, noise generation is reduced

d). Xylan coatings for Noise Reduction

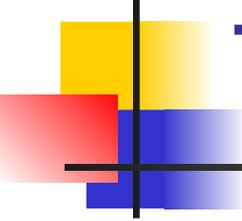


- In most cases , noise generation is effectively reduced by coatings of 25 to 40microns/0.001 to 0.0015 inch.
- If excessive noise is the primary problem, multiple coats of Xylan (upto 60 microns /0.0025 inch) may be applied to achieve optimum results. Caution should be taken to avoid excessive thickness, since the coating could be subject to delamination or tearing.
- A manufacturer of domestic dryers used a bearing coated with Xylan 1010 to replace an oil-impregnated bearing. The problem with the old bearing was that, after approximately one year of service, the oil migrated out of the bearing and the dryer developed an annoying squeak. The coating not only provided the required lubrication, but also eliminated the squeak.



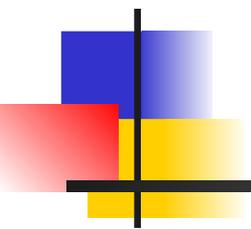
e). Temperature extremes

- Few fluid lubricants are recommended for use at cryogenic temperatures (most become solid) or above 205°C/400°F(they oxidize rapidly), The Xylan 1000 series dry – lubricant coatings, however, operate comfortably at both extremes.



e). Xylan coatings for Temperature extremes

- Xylan coatings retain their hardness at high temperatures because most binders for these coatings are thermosetting resins.
- Xylan 1000 series coatings are also useful for preventing damaging “hot spots” between two rubbing parts, which enables some temperature sensitive materials to operate at conditions under which they would otherwise fail.



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