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RING MAINTENANCE TIP #7 ADDITION OF “CHEMICAL RING CLEANERS” TO RING OIL GENERALLY NOT RECOMMENDED

REVIEW: Ring Tip #1 covered the extreme importance of regular chemical cleaning of the ring’s internal structure. Ring Tip #2 covered the importance of the external cleaning of the surfaces of the ring, holder, rails, and separators. Ring Tip #3 covered the avoidance of ring breakage. Ring Tip #4 covered avoiding ring breakage with sintered rings. Ring Tip #5 dealt with reducing ring heat and the plant electric bill. Ring Tip #6 reviewed controlling ring oil usage with sintered rings.

The catchword “ring cleaner” is something of a misnomer in that these chemical additions to ring oil do not really internally clean the ring at all. Rather, they tend to soften the mass of petroleum oxidation within the porous structure of a sintered ring, or in the passageways of a solid steel ring. This softening effect does tend to allow some intermittent oil flow through the plugged ring.

Although these “cleaners” have some effect on softening petroleum oxidation sludge within the ring, they have no effect on particulate matter that has entered the ring from plant air or the oil itself, nylon or steel traveler debris, etc.

When petroleum ring oils have been used, it is common for the ring to show serious plugging within 6 to 12 months, and almost invariably (in more than 98% of all cases) the rings are completely plugged within two years, so that no oil flows through the ring as designed. Rather, oil intermittently gets to the traveler face by leakage around the ring, pulled there by the partial vacuum of the rotating package.

In the past, and still today, a somewhat typical reaction to this plugging by North American plants runs the course in the early stages of plugging of adding perhaps 10% of the cleaner every month, or allowing the rings to



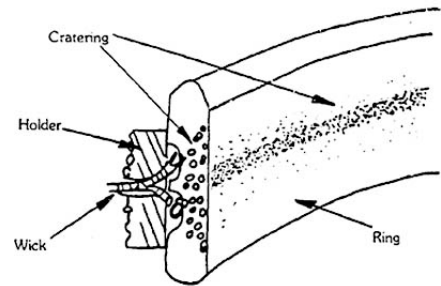
POROSIMETER

soak during a shutdown week in almost pure “cleaner”. As plugging continues, “cleaner” is added every two weeks, then every week, then is added as a 90% oil- 10% “cleaner” mixture as a continuous feed and often even higher percentages of the “cleaner”. And, typically at this point, if the plant stops feeding the “cleaner”, oil flow stops completely. The Porosimeter can clearly show that this progressive plugging and that higher dosages of “cleaner” still leave a totally plugged ring and that the “cleaner” is not a cleaner at all, and in fact, contributes to further ring plugging.

WHEN SHOULD A RING CLEANER BE USED? If rings start to become plugged from petroleum ring oil during a period when the plant is running at full capacity, so that rings cannot be removed for true chemical cleaning (performed by Epic Ring Service), occasional use (e.g., small additions every two weeks) can carry the plant over to a slacker period, when the rings can be sent to Epic for complete internal (and external) cleaning and rebuilding with new parts. (Note that Epic can often supply loaner rings or assemblies from its available 500,000 assemblies inventory so that downtime is minimized.) The limited exposure over a month or two will not do serious damage to the ring or the holder (but see below). In brief, use of a “cleaner” should only be considered as a SHORT-TERM EXPEDIENT until the rings can be removed for true cleaning by Epic.

WHY SHOULD THE PLANT NOT USE A “RING CLEANER”? The chemical compositions of these “cleaners” vary considerably but usually contain a detergent/emulsifier and sometimes more active agents. One particularly strong active agent that has been used in some formulas is a phosphate ester (check the MSDS with your Safety Officer); we strongly recommend that it not be used. Although it is a strong softening agent, the phosphate ester (not to be confused with a diester or triester) readily breaks down into phosphoric acid and starts rapid acid and severe pitting attack of the carbon steel ring and the aluminum holder. Attack of the holder is seen in surface pitting; attack of the ring is usually not observed on the face of the sintered ring as much as it is seen when regrinding the ring, where large caverns of red ferric oxide (rust) and lesser pockets of gray-black ferrous oxide are found. (See drawing)

Almost all other “cleaners” are not as active as those containing phosphate ester. Yet the oxidized petroleum sludge within the ring is naturally acidic of nature and almost all the active agents and detergents within the “cleaner” have a tendency to promote acidity or be acidic. Long-term, allowing a ring to remain plugged or using of “ring cleaner” produces an acidic condition that will eventually ruin the ring. Using Epic’s Porosimeter as the instrument for gauging porosity reveals that the longer the ring has been exposed to petroleum and these “cleaners”, the more open the structure after Epic cleaning; this is simply the result of long-term acidic attack. Some of the negative effects include:



- 1) Acidic pitting of the ring internally and externally
- 2) Formation of red rust or less harmful ferrous oxide
- 3) Change in effective oil viscosity, either making the oil too thin to protect the ring, or so heavy that oil impedes free motion of the traveler
- 4) Formation of a hard patina over the surface of a porous sintered ring causing additional plugging and pore smearing
- 5) Acidic pitting of the holder
- 6) Severe destruction of the wicking; in some cases traces of wicking can no longer be found

Because of these negative effects, Epic joins the ring manufacturers in not recommending the use of these so-called “ring cleaners”.

OTHER UNSUCCESSFUL IN-PLANT TECHNIQUES FOR CLEANING: Other techniques that have been tried include:

- 1) **SOLVENT WASHING** does not reach into the internal structure of the sintered ring or even into the passageways of a solid steel ring (e.g., a Herr ring); cannot dissolve traveler debris and particulate matter
- 2) **BOILING IN OIL:** Boiling in ring oil tends to loose surface contamination, but only hard cooks the mass of petroleum oxidation sludge within the ring. Very negative.
- 3) **OVEN BAKING OF RING** at high temperatures does tend to burn sludge out of the ring, but the temperatures required are so high that the ring shrinks and distorts so that it cannot be reused.
- 4) **ULTRASONIC CLEANING** does a good job on superficial surface cleaning, but cannot reach into a plugged or partly plugged sintered structure or solid steel ring passageways.

USING PURE SYNTHETIC RINGS OILS TO CLEAN THE RING: There are two families of synthetic oils used in ring oils as the esters (not phosphate ester) and PAOs (polyalphaolefins). Esters have the advantage in being somewhat stronger natural cleaners than the PAOs; both possess good solvency for built-up internal petroleum sludge, but the yellowish esters tend to become acidic, attacking the ring and holder, and further they fluoresce the yarn. PAOs have virtually no tendency to acidify in operation, are clear, and show no fluorescence even after yarn heat-set.

In a few well-documented instances, particularly where rings are relatively new and have been regularly cleaned externally (using Epi-Brite), pure synthetic ring oil has, in fact, slowly internally cleaned the rings over a period of 1 to 2 years. In these cases of slow cleaning, the frames had to be closely monitored for a gradually increased traveler weight to compensate for the loss of drag from the plugged ring, and to prevent yarn chafing. Obviously, any ring oil containing any amount of petroleum (known as para-synthetic or a semi-synthetic) will totally defeat this cleaning attempt.

However, in the vast majority of cases, the ring that has been exposed to petroleum ring oil for 1 to 2 years or more is so tightly plugged with hardened sludge that synthetic oil cannot penetrate to clean. (Note that even an unused, new sintered ring sitting in the storeroom will show complete plugging from atmospheric petroleum oxidation within 4 to 5 years of manufacture.)

THE ONLY TRUE, PROVEN AND SAFE METHOD OF INTERNAL RING CLEANING involves removal of the ring from the frame and chemical cleaning in a series of processes (performed by Epic Ring Service with certified results). At this time, the normal procedure is not only to clean the ring and holder, but also to rebuild with new parts.

If you did not receive Ring Maintenance Tips #1, 2, 3, 4, 5 and/or 6, contact Epic.

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