



Epic Enterprises, Inc.

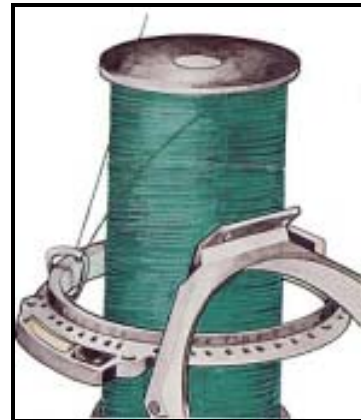
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RING MAINTENANCE TIP #1 MAINTAINING INTERNAL RING CLEANLINESS

Internal ring plugging, occurring with both sintered and solid steel (Herr type) rings, is progressive and has a very negative effect on production efficiency. Plugging is primarily caused by petroleum ring oil oxidation, but also by particulate matter in the oil and plant air, and by nylon and steel traveler wear debris.

THE PLUGGED RING CAUSES:

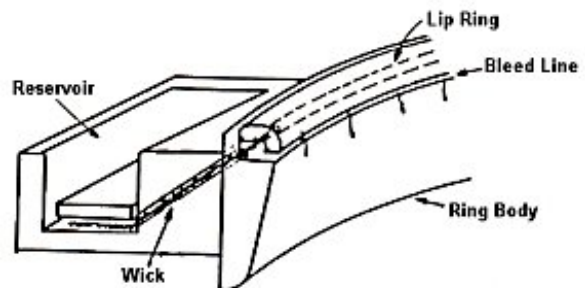
- 1) Tension variation resulting in ends-down, chafed yarn, scrap yarn and a reduction in yarn quality
- 2) Excessive, wasted electric power use
- 3) High ring temperatures and an added load on air conditioning
- 4) Decrease in traveler life
- 5) Increased oil use and oil on floors
- 6) Reduced productivity in real lbs/hr
- 7) Damage to the ring



THE SINTERED RING is a micro porous structure of hardened carbon steel particles. Particle hardness runs Rockwell C 60-62, while apparent mass hardness is about Rockwell C 50.

Although ring wall thickness ranges from about 0.090" to 0.200" typical, the porous structure is like a foam pad many feet in thickness. Any solid matter, or any oil, that oxidizes will quickly and progressively foul or plug a sintered ring.

In general, the sintered ring is the preferred ring, because it can feed oil on demand to the entire ring, as required. When a hot spot develops, oil thins, allowing greater oil flow to the specific heat sources to cool it down. The sintered ring, when internally clean, requires less power (KW) than a solid steel ring, due to evenness of oil delivery.

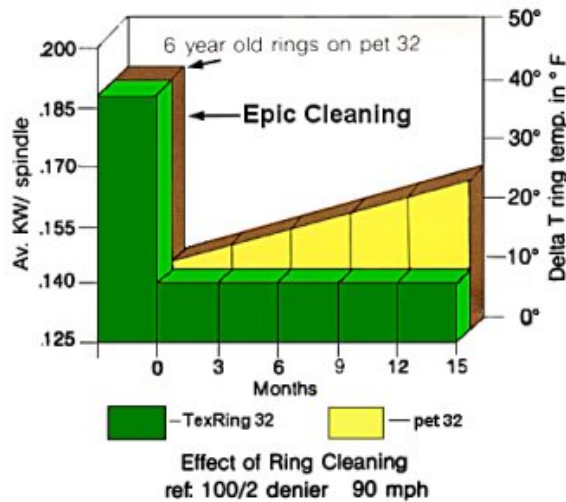


Passageways of Solid Steel (Herr) Ring

THE SOLID STEEL RING (Herr type) has a higher

real hardness, at Rockwell C 60-62, and has larger passageways, to bring oil from the reservoir to the ring face, through the bleed line, so it does not plug quite as rapidly as the sintered ring. The passageways, particularly behind the lip ring and in the bleed line, are very subject to plugging from oxidized petroleum oil and particulate matter in the oil. Fibers caught in the bleed line also block oil flow. Loss of lubrication from internal plugging promotes progressive chatter marking and smearing of the ring steel into the bleed line, further closing the bleed line.

Although the solid steel ring does not have the capability of delivering oil evenly to the entire ring, it does have greater real hardness and, therefore wear resistance when running with steel travelers. This type of ring is therefore used almost exclusively where metal travelers must be used; such as fine count worsted yarns.

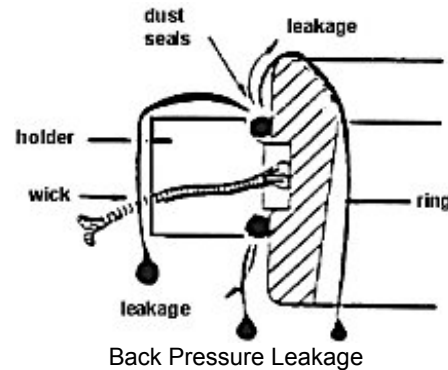


CAUSE OF RING PLUGGING: By far the greatest cause of fouling is petroleum ring oil that oxidizes to a hard, impenetrable mass; petroleum also contains about 20 to 25 times more particulate matter than a pure synthetic ring oil. Other contaminants are nylon wear debris from a nylon traveler, steel wear debris from both ring and traveler, and plant environmental particulate matter. Above all, the biggest culprit is petroleum ring oil.

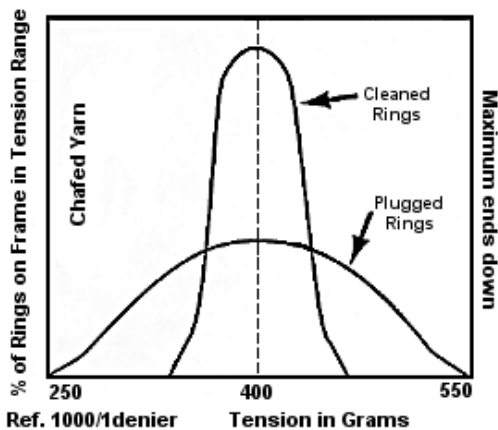
HOW LONG DOES IT TAKE A RING TO COMPLETELY PLUG? Statistically, more than 95% of all sintered rings are 100% plugged by petroleum oil within two years. Likewise, the solid steel ring (Herr type) will exhibit virtually no oil flow after 3 years of running. Even new, unused rings stored with petroleum oil will be almost totally plugged within 3 to 4 years, from petroleum oxidation.

THEN HOW DO MY OLDER RINGS KEEP RUNNING? Oil no longer flows through sintered porosity or through the solid steel ring passageways. Yet there is still some oil on the ring surface. Oil gets to the ring face intermittently by leaking from the reservoir and by back-pressure leakage created by oil within the ring, expanding oil toward both ring ID and OD as heat builds in the ring.

Oil is also pulled to the ring surface by a partial vacuum caused by the rotating bobbin and yarn. This partial vacuum works on the same principle as cigarette smoke being pulled from a moving car once the window is opened.



The successful operation of the Herr type solid steel ring, even in a clean state, is highly dependent on this partial vacuum to draw oil to the ring face. Nonetheless, a considerable amount of leaked oil still makes its way onto the frame and down to the floor.



TENSION & TENSION DISTRIBUTION

WHAT ARE THE PRACTICAL CONSEQUENCES OF RING PLUGGING?

They are many and include:

- 1) **VARIABLE TENSIONS, ENDS-DOWN AND SCRAP YARN:** As a ring plugs, the supply of oil becomes intermittent to the traveler. This causes variable tension from ring to ring, as seen in the diagram on tension distribution. Too high a tension causes ends-down and scrap yarn, while too low a tension may cause yarn chafing; both damage yarn bundle filaments and reduce yarn quality.
- 2) **EXCESSIVE POWER USE:** Ring spinning and twisting are by far the largest power users in a yarn

plant and typically account for 50% or more of all plant KW. Repeated experience in many plants shows that either a new or a cleaned ring will reduce power consumption, typically by 15 to 20%. The annual savings with an Epic cleaned ring for a carpet yarn plant, with 4000 rings, usually exceeds \$100,000 per year, and, for a large twisting plant (e.g., tire cord) with 30,000 rings, KW savings run well into many \$100,000s per year. On power use alone, the average payback from an Epic cleaned ring runs about 15 weeks.

- 3) **INCREASED RING TEMPERATURES** usually result from inadequate lubrication of the traveler. With a clean ring and a well-fitting, correct-weight traveler, there is no reason, even with the heaviest yarns, that ring holder temperatures should be more than 10°F (6°C) above surrounding room temperatures. In air-conditioned plants, it is typical that heat generated from the plugged ring/traveler contact can add another 17% KW load onto the air conditioning system. In plants without air conditioning, summer room temperatures can hit 120°F (50°C) and more, making very unpleasant working conditions.
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- 5) **DECREASED TRAVELER LIFE:** As evidenced by high KW and high ring temperatures, plugged rings with poor traveler lubrication decrease traveler life, usually by 3 to 4 times, causing an added plant expense.

As rings foul, plants must adjust traveler weight downward. The reason is that the loss of lubrication caused added drag, or, in other words, increases the effective weight of the traveler.

- 6) **REAL PRODUCTIVITY DECREASES:** With internally plugged rings and their uneven tensions, the plant typically reduces frame speed in order to prevent high ends-down frequency and excessive scrap yarn. This means a loss in real lbs/hour production. The highest real productivity rates are obtained on either new, or Epic cleaned, rings.
- 7) **INCREASED OIL USE:** The internally plugged ring often requires priming (oil pre-swabbing ring prior to start-up). The unclean ring, through backpressure leakage, also means that much of the oil ends up running down the frame and onto the floor. It has often been noted that internal cleaning can reduce oil use by as much as 5 to 10 times.
- 8) **RING DAMAGE:** Long term, the loss of lubrication promotes sintered ring pore smearing and chatter marking of both sintered and solid steel rings. Avoidance of these problems will be covered in subsequent RING TIPS.



POROSIMETER

ABOUT RING CLEANING AND RING REBUILDING: Simple solvent washing or ultrasonic cleaning by the plant only cleans the exterior of the ring and does not internally clean the ring. Many plants have attempted internal cleaning and almost none have succeeded; those that have succeeded have abandoned in-house cleaning because of the OSHA requirements on the use of strong reagents and EPA requirements on disposal of contaminants.



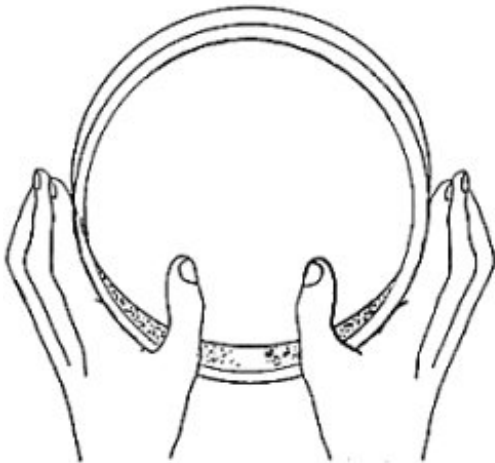
The Epic process of internal cleaning involves a complex series of chemical processes resulting in a certified clean, "like-new" ring. Epic Ring Service is the only full service agency in the Americas cleaning rings and certifying its work with the Porosimeter (see photo). Rings are separated from the holders and chemically cleaned to new ring standards. Holders are also disassembled, cleaned and rebuilt with new parts (windows, buttons, springs, wicks, etc.). When required, rings are refaced. Also when required, broken or damaged rings are replaced with good rings, so that the plant receives back a full frame of "like-new" assemblies.

Costs of ring cleaning and rebuilding are about 20% of a new ring or ring assembly, and yield a certified "like-new" condition.

RING MANUFACTURER RECOMMENDATIONS: All sintered ring manufacturers recommend that rings be internally cleaned and rebuilt with new parts every 1.5 to 3 years, if they are run on petroleum ring oil. With pure synthetic ring oil, experience indicates that internal cleaning and rebuilding

can be done about every 3 to 5 years.

The solid steel ring manufacturers generally recommend internal cleaning and rebuilding with new parts at the same 1.5 to 3 year interval, if run on petroleum, and again about every 3 to 5 years if run on a pure synthetic ring oil.



HOW DO I KNOW WHEN MY SINTERED RINGS NEED INTERNAL CLEANING?

A simple qualitative test is to disassemble a ring from its holder. Hold the ring tightly in the palms of your hands for a minute. If the ring is clean, hundreds of little beads of oil will appear evenly on the ring ID from the heat of your hands. This technique does not work with solid steel rings. The Porosimeter is used to gauge passageway cleanliness for both sintered & solid steel rings.

A better, quantitative procedure is to send a sample of 6 ring assemblies from working frames (not rings that have been lying around as these are subject to oil dry out and petroleum oxide) to Epic. These rings are inspected 100% incoming on the Porosimeter, inspected for faults, cleaned, and rebuilt, 100% porosity checked, and returned with a certified laboratory report on condition compared to a new ring.

HOW DO I KEEP MY NEW OR CLEANED RINGS INTERNALLY CLEAN? All ring manufacturers recommend pure synthetic ring oils, as they virtually do not oxidize and contain about 20 to 25 times less particulate matter than petroleum ring oils. Pure, synthetic ring oil, is well justified, because it greatly reduces ring plugging.

Subsequent RING TIPS will cover plant external ring maintenance and a wide variety of subjects including travelers, oil types, oil viscosity, oil flow control methods, regular rebuilding, avoidance of pore smearing & chatter marking, avoidance of oil and black stains, regrinding, etc.

For additional help, contact Epic Ring Service.



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