

How to Prevent Electrical Pitting Damage

Electrical pitting damage, caused by intermediate arcing between stationary and rotating machine components, erodes the babbitted surface of a bearing, causing it to fail. With the right precautions, however, this type of damage can be prevented.

In this example of a steam turbine application, the consequences of erratic thrust pad temperatures were not obvious until the bearing was removed from the machine. In this case, the normal pad temperature was 95° C for a 10½", 6 x 6 LEG thrust bearing operating at 5700 RPM. The pad temperatures had been rising steadily for several days when suddenly the temperature of one pad shot up to 118° C and the other to 103° C. A few days later, the pad temperatures dropped back to 111° C and 92° C.

When the bearing was removed from the machine, all thrust pads showed signs of distress, as shown in Figure 1.

In Figure 2, the original babbitt remains only at the leading edge of the shoe. Evidence of wiping is visible toward the outer edge. Clusters of small pitted marks appear at the trailing edge and near the inner diameter at the leading edge.

Figure 3 shows a significant loss of babbitt toward the shoe's trailing edge.

Figure 4 shows a closer view of the pitted marks. Note how they appear frosted. The babbitt is nearly gone at the trailing edge of the shoe as shown in Figure 5.



Figure 1

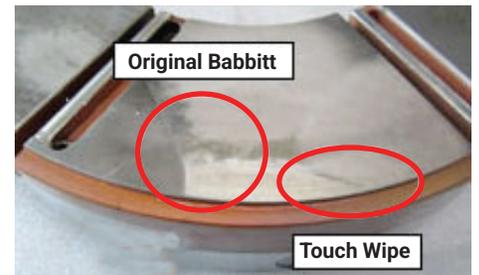


Figure 2



Figure 3

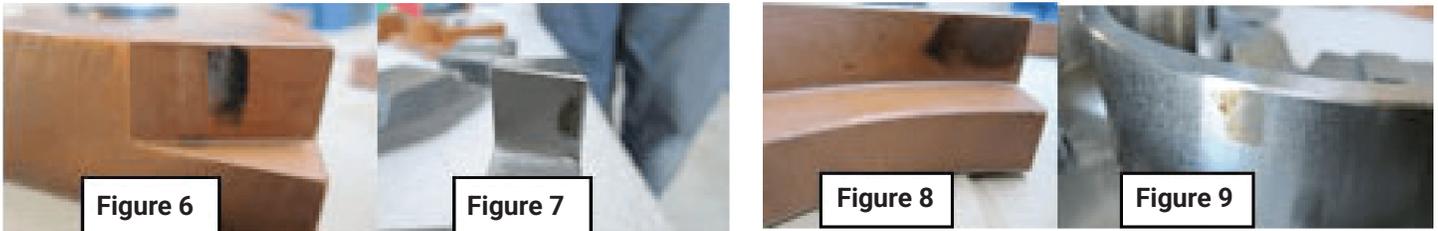


Figure 4



Figure 5

How to Prevent Electrical Pitting Damage (Continued)



Figures 6 and 7 show evidence of burned oil in the contact area between the shoe's straddle mill and the base ring.

Figures 8 and 9 show similar signs of burned oil in the contact area between the shoe's inner diameter and the base ring. The small pit marks and surface frosting observed on the shoes are classic indicators of electrical pitting damage.

This damage is caused by intermittent arcing between stationary and rotating machine components. Electrical current follows the path of least resistance, which is typically through the thin oil films in the active, loaded thrust bearing. Pitting damage initiates at the trailing edge of the shoe, where oil film thickness is smallest.

As electrical currents remove babbitt material, the shoe tilt changes, reducing the effective load-carrying area. The damage then progresses gradually toward the leading edge of the shoe. Eventually, the bearing can no longer support the applied load and wiping occurs.

Recommendations to prevent this type of damage:

- Install grounding or earthing brushes on the rotor.
- Insulate the bearings to interrupt current flow.
- Investigate and eliminate the source of stray electrical current.

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