PLANT PROBLEMS... put your know-how to work

How Does Water Get Into Fan Bearings?

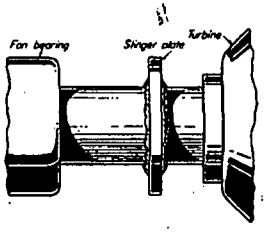
HERE ARE THE FACTS: One boiler in our plant has a 34-in.-dia turbine-driven f-d fan. It's a propeller type, driven by a single-stage turbine using oil-free exhaust steam.

Turbine seals on the shaft are mechanical type. Fan has two bearings, with oil supplied from a reservoir by a gear pump at shaft end.

Recently we've been getting water in oil reservoir. The first time we kept turbine running without changing the oil. Both bearings burned out and had to be replaced.

Now we drain oil from reservoir every week. If we don't, bearings fail after about two months. How does water get into these bearings? What can we do to stop it?—*KC, October Power*

Here Are the Answers



CHECK OIL COOLER for tube or element leaks. In our plant we try to keep oil pressure a few pounds higher than water pressure. Then if there's leak, water cannot enter oil side of cooler.

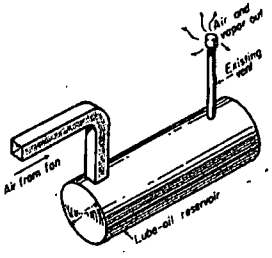
If cooler is OK, check mechanical seals on turbine. Steam leaking past seals may strike bearing housing and heat it. Air temperature in housing rises, and the relatively cool oil passing through bearing condenses water vapor in air. Water formed falls into the oil and settles in bearing, or is carried back to lube-oil reservoir.

To stop steam from striking bearing, weld a slinger ring to shaft as shown in sketch. *This stops any steam and water* that may start to flow along the shaft from the turbine seal.

H E Alekna *Brownsville, Tex.*

TILT OIL TANK or make a slanting bottom for it so water will accumulate at a low point. Drain sludge and water each shift. Check reservoir while fan is running and while it is stopped. You may find condensation cause this way. If necessary, change reservoir location in the plant turbine room.

Don Cochrane *Milaca, Minn.*



CONDENSATION in lube-oil reservoir is most likely source of water if turbine seals are tight. Ventilate reservoir by running a small duct from fan to top of tank, as in sketch. This setup is good only when fan runs all the time. If main fan is shut down from time to time, use a small electric fan to circulate air because worst condensation occurs while fan is stopped.

You can use another trick to get rid of the water. Fit a small trap tank to bottom of main reservoir. Water will settle in small tank, from which it is easily drained. If water and oil emulsify, see your oil company.

P D Honson *Ottawa, Canada*

MECHANICAL SEALS sometimes leak more on starting and stopping. Check for this condition if fan runs less than 24 hr per day. Also check to see if turbine throttle leaks while fan is shut down during the day or night.

C C Howarter *Canton, Ill.*

BE SURE oil-tank cover is tight and hasn't any holes. Water or vapor-laden air may enter tank through these openings. Use a tight cover with a gasket and don't forget to install a breather line venting to a dry location or to outside of building.

Check for air entering around oil feed line to bearing, through horizontal joint in bearing halves or from a draft passing over bearing. Use slinger plate on shaft to deflect drafts and moisture that may pass along it.

Sergio Martinez *New York, N. Y.*

IN OUR PLANT we had the same trouble. Tracing out the oil line we found it ran parallel to a refrigeration line for a short distance. Refrigerant cooled the oil, causing moist vapors to condense. Moving the oil pipe away from refrigerant line cured the trouble.

J H Squires *Newark, N. J.*

WATERCOOLED BEARINGS may have condensation in interior of bearing housing. In some plants the cooling water is extremely cold and it condenses moisture from the warm, humid air in bearing housing. Moisture runs down housing wall into the oil.

Reduce cooling-water flow so outlet temperature is about 120 F when inlet temperature is 70 F. Flow control may be automatic or manual.

I J Karassik *Harrison, N. J.*

LOOK FOR SEAL WEAR that permits steam leakage. Use a deflector disk on shaft to keep steam away from bearing. Install a thermometer in oil reservoir and hold oil temperature at 110 to 120 F.

Connect a vent to bearing or drain line to relieve vacuum that might pull air into bearing or oil system. Be sure all watercooling coils are submerged in oil or they may sweat at times. Ventilate reservoir with a small electric exhaust fan that draws an air current *across top of oil. Also, collect water* in a leg in reservoir's lowest part. Drain as often as necessary.

J B Turner *Toronto, Ohio*

GLAND LEAKOFF drain may be plugged, causing condensate to back up. Clean all drains. If turbine isn't fitted with a leakoff drain, install one.

Check slinger plate to see it works right. Look over bearing for cool drafts that may condense moisture vapor.

Edward Delnick *Valley Stream, N. Y.*

help the other guy cure his headaches

TYLER HICKS, *Associate Editor*

FLOOR CLEANERS in our plant splashed water from hoses into oil reservoir. More care in handling water hoses stopped this fast.

L R Meyer *Cincinnati, Ohio*

TEST OIL for moisture content. It's possible reclaimed oil is being used. A demulsification process takes place as oil temperature rises, allowing water to enter lube-oil lines.

J P Demas, Sr. *Roselle Park, N. J.*

SOME SMALL TURBINES do not have tight lids on oil reservoir. Air entering around lid may bring moisture with it.

Moisture from turbine seal can leak along shaft and enter bearing. Suction of oil pump may draw moisture into bearing.

Seal reservoir lid against entrance of air. Check seals in turbine and bearing to be sure there are no leaks. If there are, repair seals. If trouble still exists after these checks, install a small moisture-removal unit in oil-pump suction. If *KC* has the same trouble in all plant fans, a central reservoir with moisture-removal unit would be best solution.

A J Breugelmans *New York, N. Y.*

PINHOLE in oil cooler may open at certain temperature, allowing cooling water to enter oil reservoir. Try to keep oil-cooler temperature at a fairly constant level to prevent this trouble.

Best cure for *KC's* headache is obtained by (1) keeping oil reservoir full at all times (2) preventing drafts from passing over cooler (3) keeping oil-cooler temperature steady.

H W Congdon *Auburn, Mass.*

SMALL HEATER of the immersion type in oil reservoir cured this trouble for us. Breather tube was also installed and we changed oil so it had suitable viscosity at the higher temperature in reservoir. Thermostat keeps oil temperature constant.

KC would also benefit by using an oil purifier to remove moisture, sludge, metal and carbon particles. Oil lasts longer and does a better job.

L W Fitzpatrick *Jefferson City, Mo.*

FIT A NIPPLE, 1/4-0 in., and a small cock to lowest part of oil reservoir. Drain regularly. Use only nonemulsifying oil.

P Knight *Toronto, Canada*

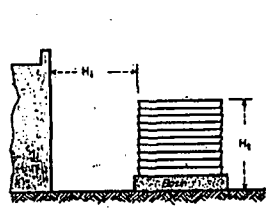
How Can We Cut Tower Windage Loss?

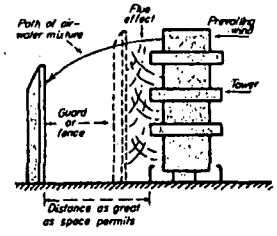
HERE ARE THE FACTS: We use a large amount of cooling water in our manufacturing plant. This water is circulated through cooling towers to reduce its temperature after it comes from plant heat exchangers.

Plant has six cooling towers: two forced-draft, two induced-draft and two natural-draft types. Windage losses in the two natural-draft towers are so bad windows in nearby buildings must be kept closed. Roof vents and other metal structures near these towers show more corrosion than those on other buildings.

How can we reduce windage losses from these towers? Is it possible to install fans on natural-draft towers and get the same cooling? Does windage increase delignification?—*BE, Oct Power*

Here Are the Answers





NATURAL-DRAFT towers are design compromises. This is necessary because to meet all atmospheric conditions found during tower life an extremely large unit would be needed. With this setup windage losses would be low but tower cost high.

To keep tower cost within reasonable limits and still have good performance a compromise design is worked out. In usual natural-draft towers windage losses can be reduced by installing boards in the main framework on the prevailing-wind side. Don't try this without first getting advice from tower manufacturer because you may change tower outlet water temperature on wind-free days.

When spotting natural-draft towers near buildings, H_1 should be equal to or greater than H_2, sketch.

John Constance *Cliffside Park, N. J.*

TURN TO page 132 for two new problems from *Power* readers

TOWER LOCATION can't be changed easily. One way to stop water from striking building is to use spray guards or a fence on the building side of the tower, sketch. Build the fence of wood or other material that resists the elements. Reinforce to withstand wind loads.

Have fence high enough to stop all spray leaving tower. Don't have fence too close to tower or you may get a flue effect causing turbulence and carryover of air-water mixture to nearby areas. Check horizontal distance spray travels and locate fence as far from tower as space permits.

Another solution is to install more fill in tower to reduce free area available for movement of the air-water mixture. Be sure to talk to tower builder before trying this scheme.

Fans can be put on a natural-draft tower. But before doing so, check free area available for air flow. With a small free area, air velocity through tower may be high, reducing cooling effect.

Induced-draft fans at tower top may need extensive reinforcement for support. Vibration may be a problem, too.