

The Fan doctor



Most industrial fans are very reliable, designed by knowledgeable manufacturers for long life under a multitude of conditions. However, breakdowns do happen. They can be caused by incorrect installation, lack of maintenance or even improper fan selection. It can also be that years of strenuous service have simply worn out the fan.

The Fan Doctor provides a checklist for major symptoms of fan illnesses, the more common causes and suggested remedies.

Since we have presented this as a guide and not a technical service manual, more complex causes and remedies are not included. Remember also that some ailments may have more than one cause.

If you don't find the answer to your question here, please complete the help request below. Your request will be answered within 24 hours by a qualified Naaykens service technician.

Vibrations

Out of balance fan wheel or rotor

1. Check the wheel for any dirt or foreign material, especially hard-to-see places like the backside of the wheel and the underside of the blades.

2. Airfoil blades are usually hollow. When exposed to rain or excessive moisture, they can get water inside of them. Drilling one 3/16" drain hole in the upper surface of each blade near the trailing edge should cure the problem. Rebalancing is not usually necessary.

3. Inspect the wheel for corrosion or erosion. Usually wheel erosion will occur at the leading edge of the blade. On a paddle wheel type fan the outer blade tip may also be worn. An airfoil wheel exposed to sand or abrasive dust can actually develop pin holes in the leading edge of the blades. Do all possible to eliminate these damaging conditions and then rebalance the wheel. If the wheel is seriously damaged, it will have to be replaced.



Improper or loose mounting

1. Foundation bolts and bearing mounting bolts can loosen themselves. Make sure they are tight.

Loose set screws that hold the wheel to the shaft

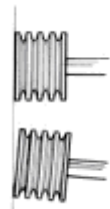
1. Again, tighten the screws, but first be certain the wheel hasn't shifted on the shaft or is rubbing on the inlet cone or drive side of the housing.

Bent fan shaft

1. First, check the shaft with a dial indicator. If bent, it should be replaced as soon as possible to avoid replacing the entire fan

Misaligned V-belt drive, another very common problem on belt driven fans

1. Realign assembly so fan and motor shaft are parallel and faces of sheaves (pulleys) are flush to a straight edge. We've found that a taut string will work fine.



Fan wheel turbulence due to the rotor running backwards

1. Since blade angles and shapes vary greatly, it is easy to misread rotor direction. Check for correct wheel rotation, clockwise or counter clockwise, as seen from the drive side. We illustrate the correct rotation for various wheel types elsewhere on this site.

Air pulsation

1. Fan may be operating in the stall area of its performance curve. That means it is oversized for your particular system or the system resistance is higher than intended. You can lower the system resistance by cleaning the filters or opening the dampers.

See next page

Noise

Foreign material in the fan housing

1. This could be anything from a loosened bolt to somebody's lunch bag. Inspect the wheel and inside of fan housing and clean thoroughly



Squealing V-belts

1. Belts are either loose or misaligned. If belts show wear, you are better off to replace them now and avoid a future breakdown.

Worn ball or roller bearings (howling, screeching or clicking)

1. Change the bearings immediately before they cause additional damage. Failing bearings tend to wear the shaft, so you want to be absolutely certain the shaft is full size before installing these new bearings. "Mike" the shaft both under the bearing and next to it and compare the two readings. If they do not match, replace the shaft. New bearings installed on a worn shaft will not last long.

Bearing seal misaligned (high pitch squeal)

1. Realign the face of the bearing so that it is perpendicular to the shaft.

If the fan housing has a metal shaft seal, it could be misaligned and rubbing on the shaft.

1. Loosen seal plate bolts, recenter the seal on the fan shaft and tighten the bolts. If the seal is fiberglass, cork or rubber, be sure the metal backing plate does not touch the shaft.

Overheated Bearings

Ball or roller bearings tend to heat up when they have been over greased and will cool down to their normal running level when the excess grease oozes out. The normal operating temperature of a bearing may be well above 60 degrees C which is hot to touch. Temperatures above this have to be read with instruments and anything above 90 degrees C should be questioned. If you place a drop of water on the bearing and it sizzles, the bearing is in distress and should be changed before it seizes and ruins the shaft.

Bearings may be worn and failing

1. Replace the bearings. Remember to also check the shaft. (refer back to **noise** section)

Improper grease

1. Use a lithium base, high speed, channeling type grease. Do not use high temperature or general purpose grease.

Over greasing

1. If you allow the bearing to run for a few hours, it will normally purge itself of the extra grease. You can simply remove excess grease from split roller bearings by lifting the top half of the block for access.

Bearing exposed to "heat soak" from an oven or dryer after shut down

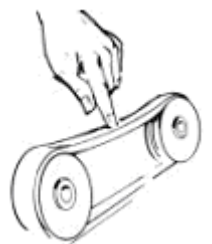
1. "Heat soak" occurs when a fan is idle and its shaft cooling wheel can no longer cool the inboard bearing. Heat from inside the fan can actually cook the grease. A 15 minute fan run after the oven heat is turned off will cool the fan shaft and protect the bearing.

Loose V-belts may cause belt slippage and friction heating resulting in hot bearings, shafts or sheaves.

1. Tighten belt to proper tension. A good rule of thumb - you should be able to depress the belt the same distance as the thickness of the belt.

Excessive V-belt tension

1. Belts may be too tight. Adjust to the correct tension.



See next page



Poor Air Performance

Fan rotation incorrect

1. Refer to **Vibration** section. An easy way to change rotation on most 3-phase motors is to reverse any two motor leads.

Abrupt turn in the duct close to the fan discharge or air pre-spin caused by ductwork elbows at the inlet

1. Install turning vanes or elbow splitters in the duct. If air performance is still inadequate, the discharge position may have to be changed.

If fan has an Inlet Volume Control (IVC), is it properly installed?

1. Be sure the IVC is installed with pre-spin of the air in direction of wheel rotation when the IVC is partially closed.



Off-center wheel

1. This can occur on double width, double inlet fans. Center the fan between the inlet cones to avoid overloading one side of the wheel while starving the other.

Fan horsepower unexpectedly low

1. Correct one or more of the following conditions:

- Air pre-spin into the fan inlet
- Fan drive sheaves set for too low a fan speed
- Resistance to airflow, such as caused by a closed damper, much higher than calculated

Fan horsepower unexpectedly high

1. Be sure fan speed is not too high. Fan may be operating without ductwork at low resistance so that too much air is flowing.

The fan may be handling ambient air when it was originally intended for hot, less dense air.
Fan may be running backwards.