



AMCA International

Troubleshooting Problems in Fan Systems

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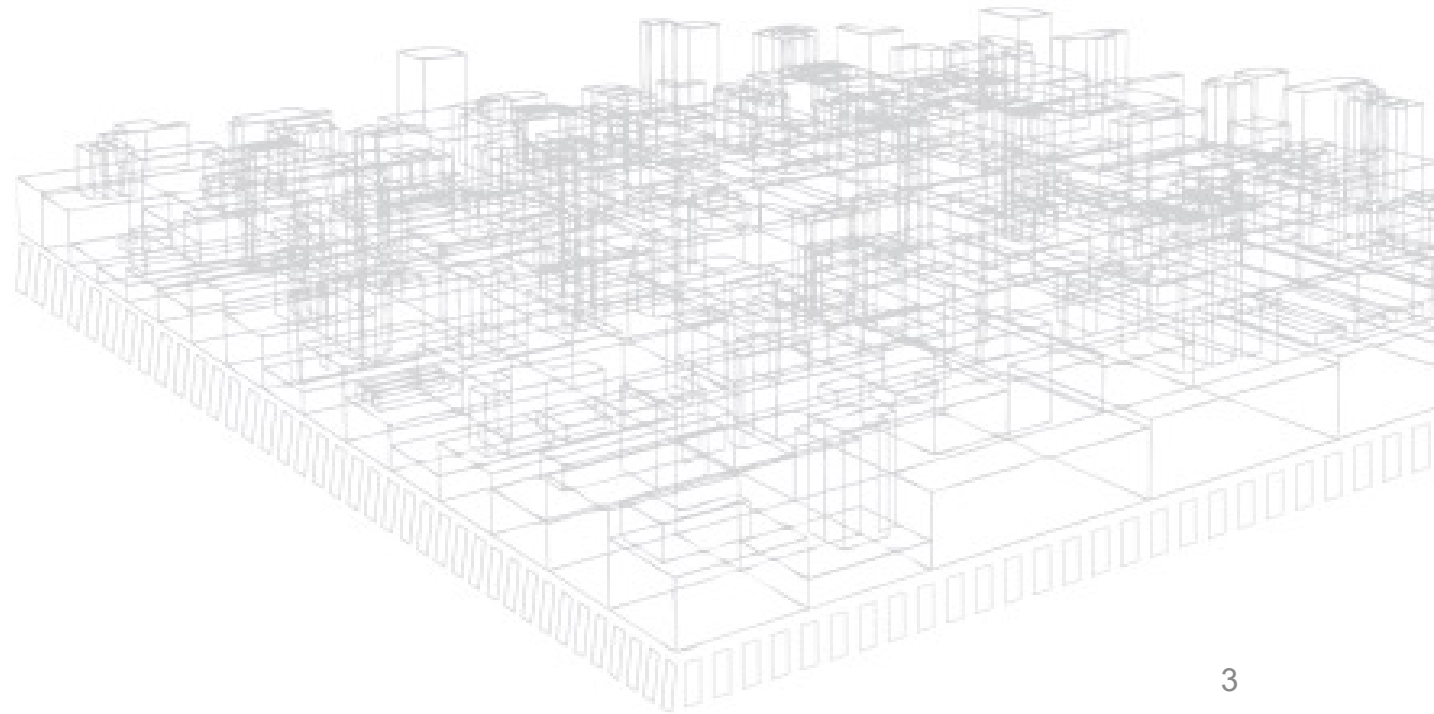
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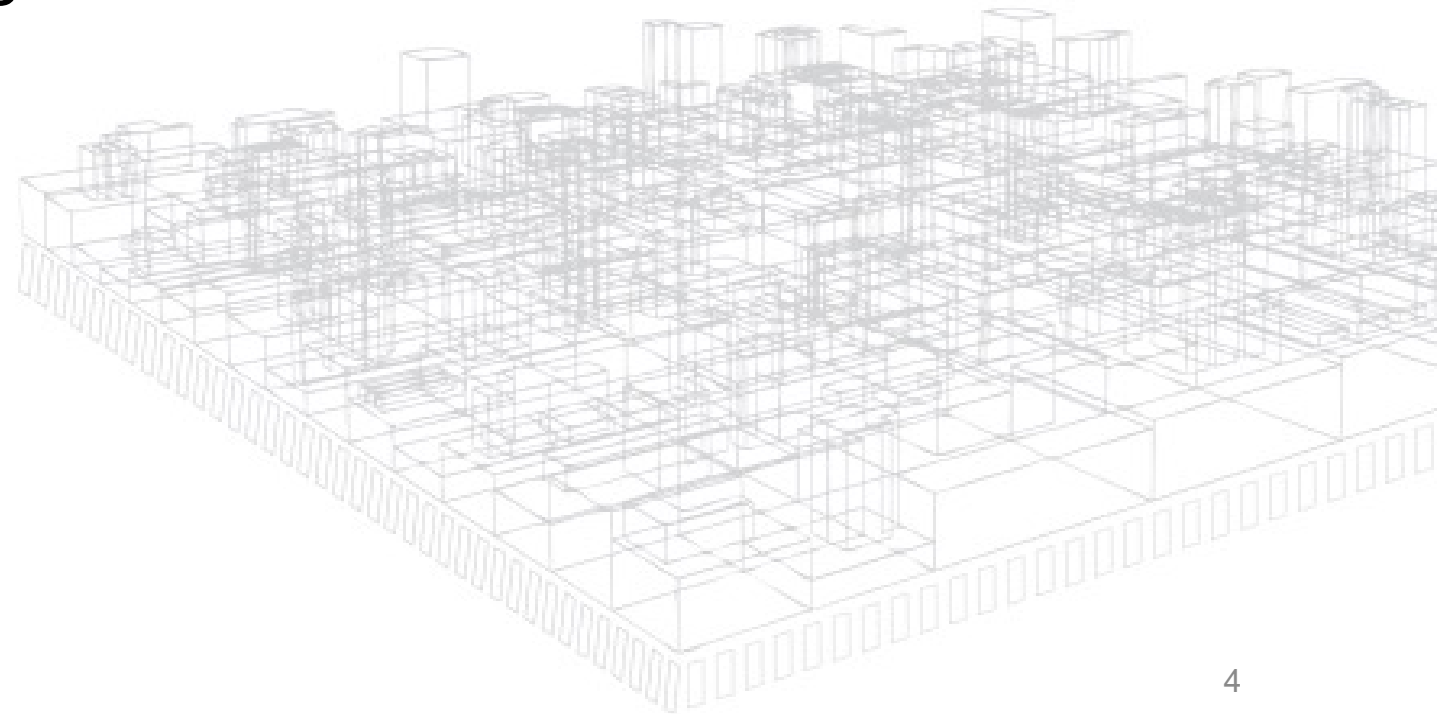
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Learning Objectives

- List main indicators of fan problems
- Identify typical causes of problems
- Suggest possible remedies



Problems in Fan Systems

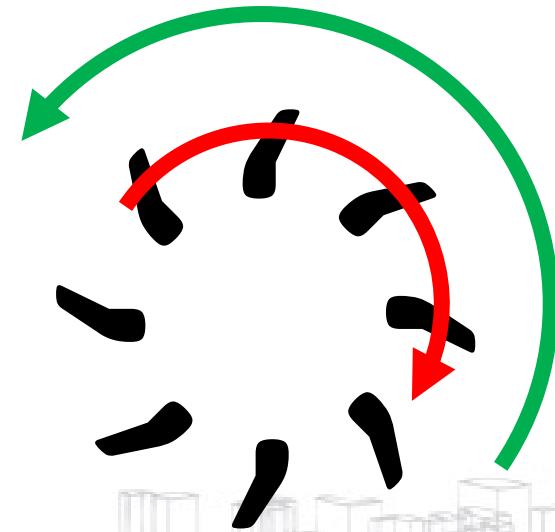
1. Reverse Rotation
2. Corrosion/ Erosion
3. System Effect
4. Stall / Surge
5. Imbalance
6. Motor Failure
7. V-Belt Failure
8. Bearing Failure



Reverse Rotation

Indicators:

- Inadequate flow
- Lack of pressure



Causes:

- Reversal of two electrical phases

Remedies:

- Rewire motor for correct rotation

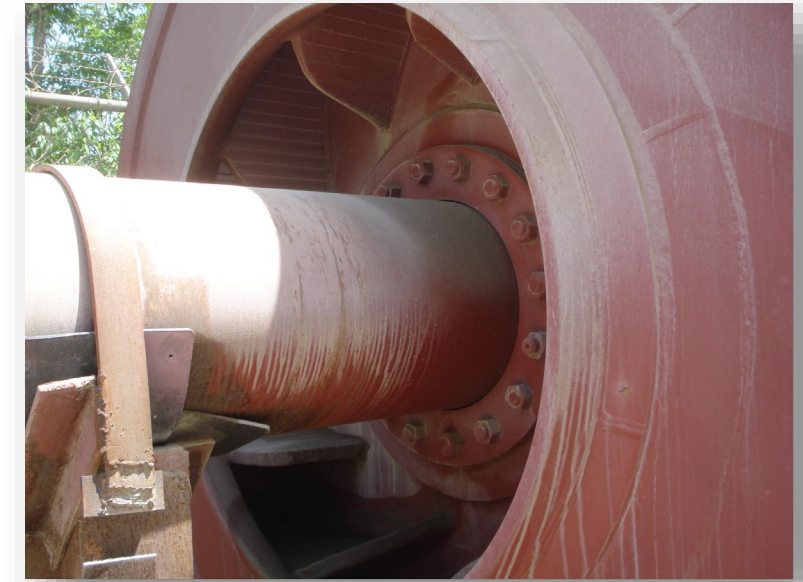
Indicators, Causes and Remedies

- *Form* a small team of 3 or 4 people sitting near you
- Starting with the problem assigned to your group, *list* the indicators, causes and remedies
- *Send* someone to the corresponding flip chart to list your ideas
- *Address* other problems as chosen by team members in the 15 minutes of time allotted for small group discussion
- *Add* your ideas to the corresponding flip chart(s)
- We will *discuss* each problem as a group

Corrosion / Erosion

Indicators

- Lack of airflow
- Imbalance
- Visual signs upon routine inspection

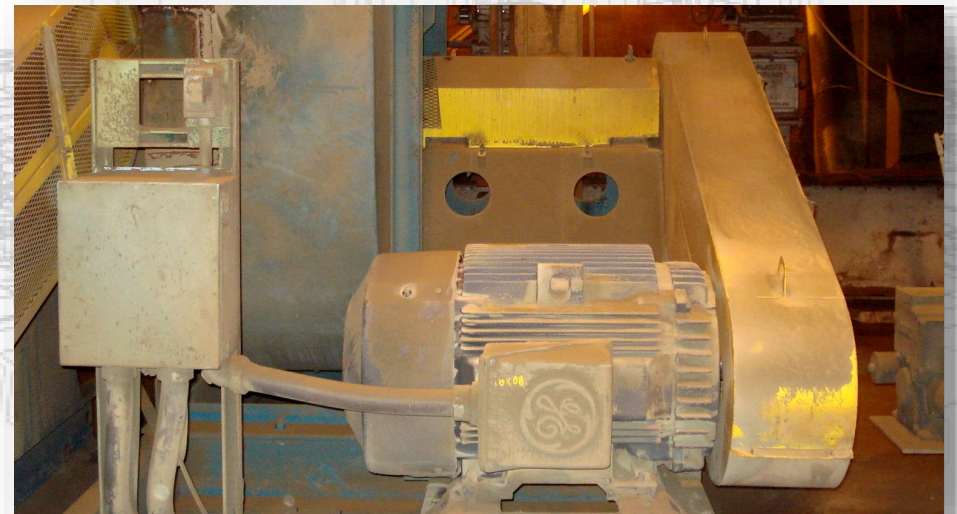
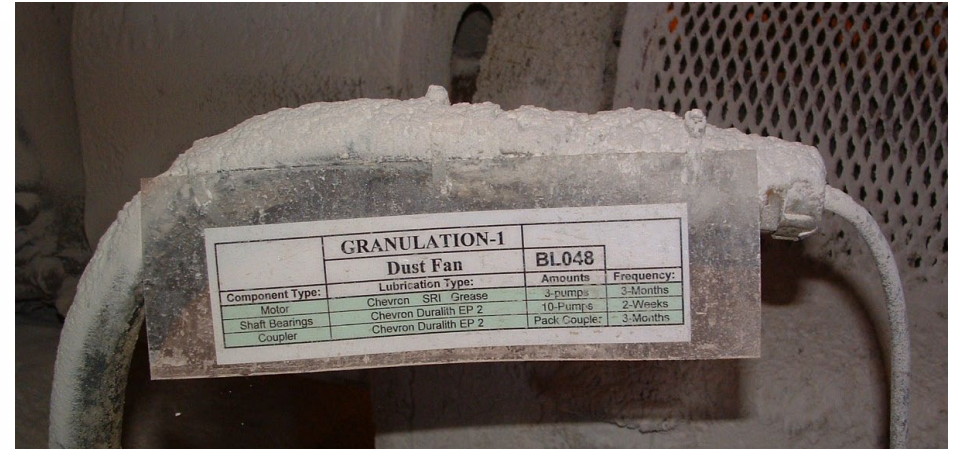


Corrosion / Erosion



<u>Causes:</u>	<u>Remedies:</u>
<ul style="list-style-type: none">• Particulate in airstream	<ul style="list-style-type: none">• Replace wheel• Wear plates• Use upstream filter• Different style of fan wheel that can stand up to particulate• Wear plates
<ul style="list-style-type: none">• Water or other corrosive agent present in airstream	<ul style="list-style-type: none">• Employ anti-corrosive finish or use exotic metals in replacement wheel

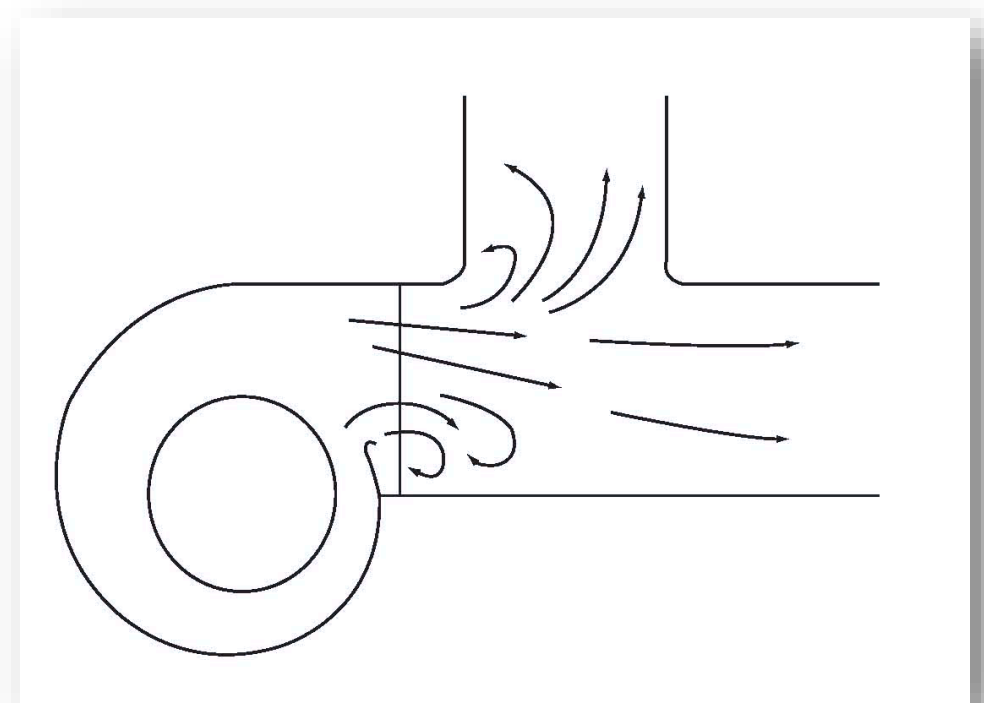
Corrosion / Erosion



System Effect

Indicators

- Lack of performance



Causes:

- Poor installation practice:
 - Elbow or abrupt turn at Inlet
 - Lack of outlet duct
 - Abrupt turn at outlet

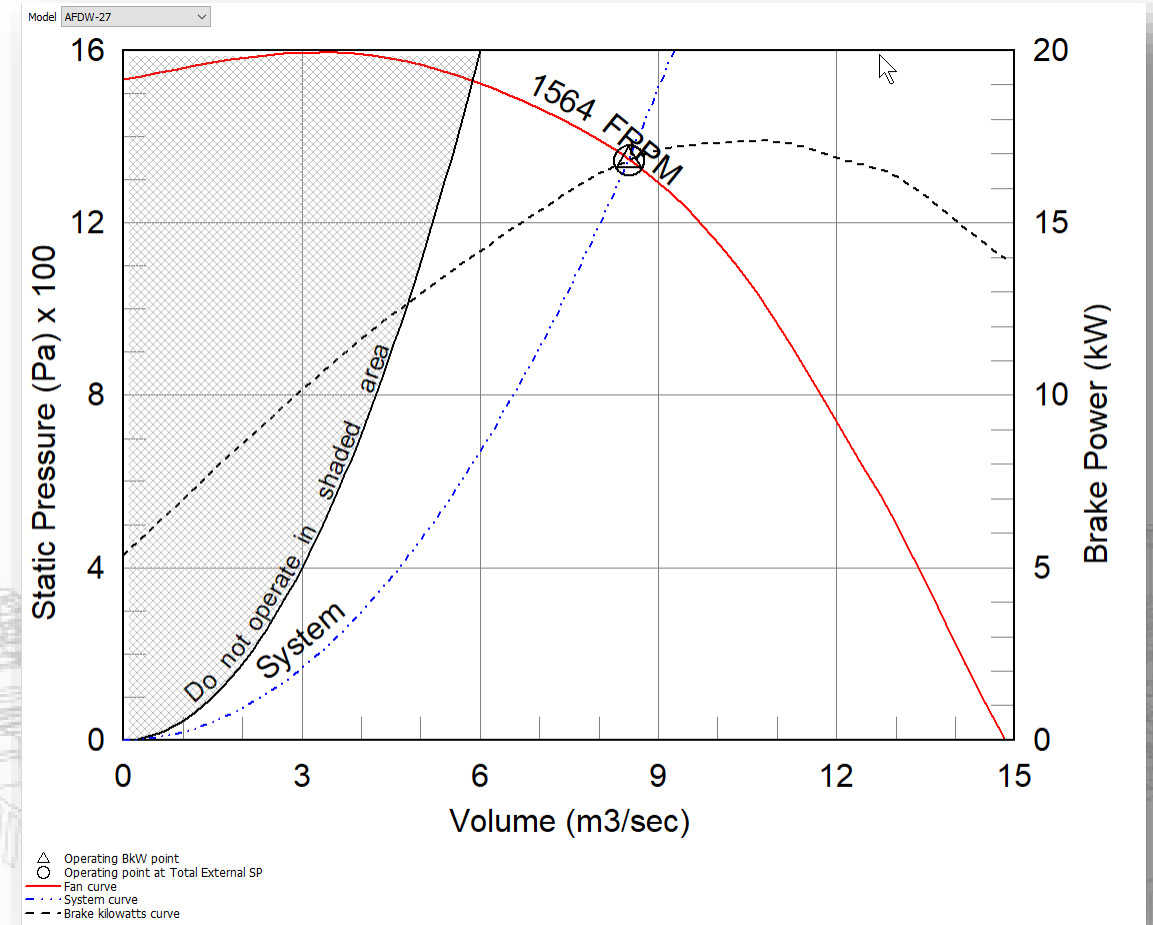
Remedies:

- Rearrange ductwork
- Speed up fan rotation
 - uses much more power

Stall/Surge

Indicators

- Intense vibration
- Loud Rumbling
- Rising and falling pitch (whooping noise)
- Air coming out of the fan inlet
- Differential Fan Pressure Flips positive to negative



Stall/Surge

<u>Causes:</u>	<u>Remedies:</u>
<ul style="list-style-type: none">• Operation near peak pressure of fan	<ul style="list-style-type: none">• Change fan• Faster rotation• Change impeller
<ul style="list-style-type: none">• Un-coordinated VFD control of parallel fans	<ul style="list-style-type: none">• Better control coordination<ul style="list-style-type: none">• All must rotate at same speed
<ul style="list-style-type: none">• Discharge into large plenum especially with multiple fans	<ul style="list-style-type: none">• Avoid designs with multiple fans discharging into common plenum
<ul style="list-style-type: none">• Excessive pressure loss or clogging on filters, coils, etc.	<ul style="list-style-type: none">• Remove blockage

Imbalance

Indicators

- Excessive vibration
- Vibration at same frequency as rotation



<u>Causes:</u>	<u>Remedies:</u>
<ul style="list-style-type: none">• Uneven dirt loading	<ul style="list-style-type: none">• Clean the impeller
<ul style="list-style-type: none">• Known or unknown changes to impeller wheel	<ul style="list-style-type: none">• Have a nice technician from fan company visit you to balance the wheel

Motor Failure

Indicators

- Smoke “gets out of the motor”
- Fan stops making noise and doesn’t deliver any airflow



Image courtesy Peterson Predictive Maintenance

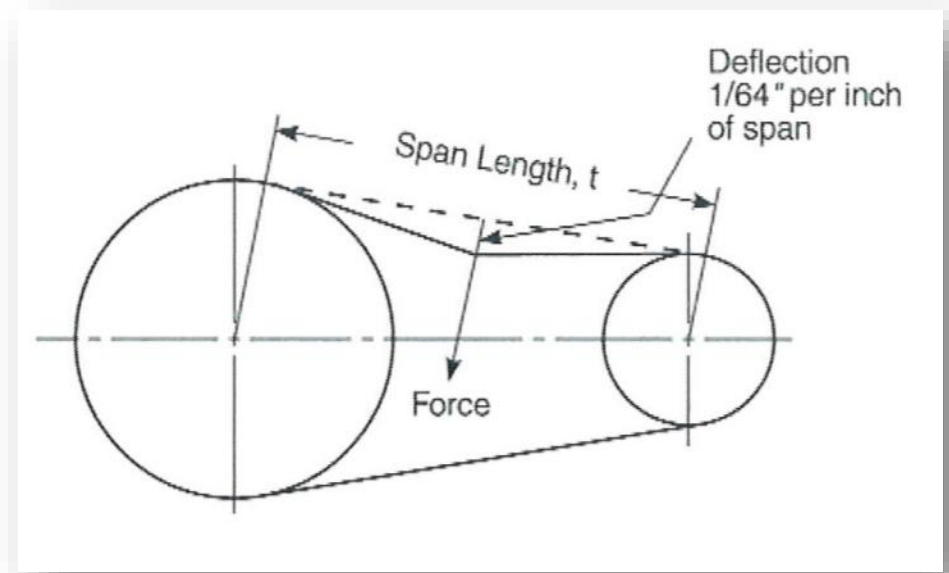
Motor Failure

<u>Causes:</u>	<u>Remedies:</u>
<ul style="list-style-type: none">• Electrical supply fault<ul style="list-style-type: none">• Over / under voltage• Voltage imbalance	<ul style="list-style-type: none">• Correct electrical fault• Re-tap transformer• Balance single phase loads
<ul style="list-style-type: none">• Power harmonics	<ul style="list-style-type: none">• Better grounding• Proper cables• Harmonic filters
<ul style="list-style-type: none">• Ambient environment fault<ul style="list-style-type: none">• High temperature• Water / dirt	<ul style="list-style-type: none">• Correct ambient fault• Ventilate room• Use totally enclosed motor
<ul style="list-style-type: none">• Power spike from higher than anticipated airflow (especially forward curved fans)	<ul style="list-style-type: none">• Analyze system curve and choose a different fan

V-Belt Failure

Indicators

- No airflow
- Motor power and amps much lower than normal
- Belts that are loose or “slap”



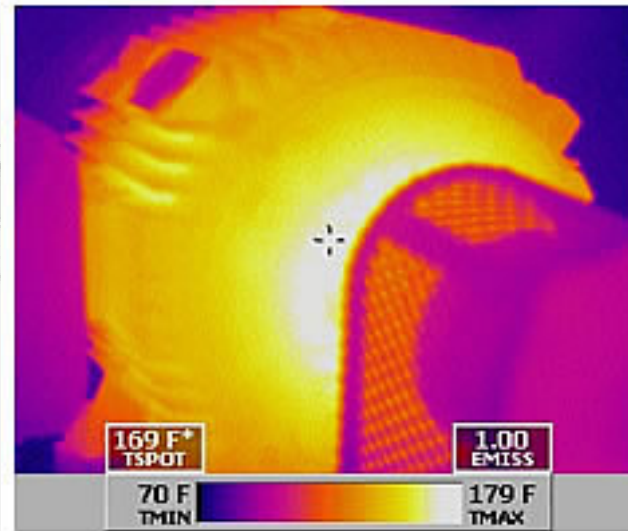
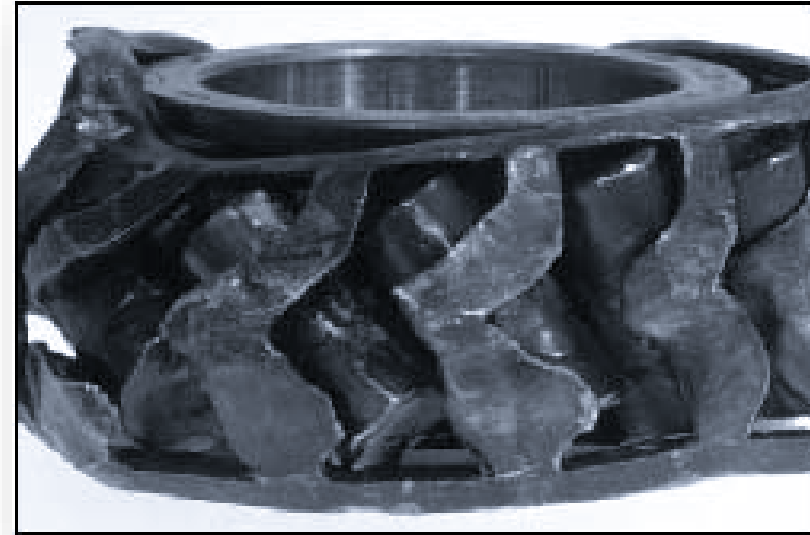
V-Belt Failure

<u>Causes:</u>	<u>Remedies:</u>
<ul style="list-style-type: none">• Limited life of belts<ul style="list-style-type: none">• 8,000 – 10,000 hours considered normal	<ul style="list-style-type: none">• Replace with new matched set
<ul style="list-style-type: none">• Improper setup<ul style="list-style-type: none">• Too tight / loose• Not properly aligned	<ul style="list-style-type: none">• Properly tension and align belts• Re-tension after 24 hour break-in period

Bearing Failure

Indicators

- Excessive noise such as whining or growling
- Excessive vibration
- Smoke
- Shaft frozen in place and cannot turn



Bearing Failure

<u>Causes:</u>	<u>Remedies:</u>
<ul style="list-style-type: none">• Improper maintenance	<ul style="list-style-type: none">• Grease according to manufacturers schedule• Use proper grease• Use proper amount of grease• Purge old grease
<ul style="list-style-type: none">• Electrical current through bearing from VFD	<ul style="list-style-type: none">• Provide electrical ground path• Use insulated bearing
<ul style="list-style-type: none">• Excessive load	<ul style="list-style-type: none">• Avoid over-tightening belts• Mount pulley close to bearing



Image courtesy of Timkin



Image courtesy of Timkin

Questions?

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