action
repair or replace the unloading valve
repair or replace the pump
adjust the relief valve
open the discharge valve
inspect the line for broken or loose connections to determine the source of the leak
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report this as an engineering problem; it may require design changes. clean filters
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increase the supply source level
check the suction system and glands for air ingress. if the source is from a pond, check to see if there are any whirlpools sucking air into the system. throttle the pump to reduce the rate of withdrawal from the supply source
perform vibration analysis to determine the source of the problem(s). mechanical maintenance should conduct alignment checks and make the necessary adjustments
perform vibration analysis to determine the source of the problem. mechanical maintenance should conduct balancing corrections
lower the suction temperature
increase the clearance at the exit tips of vanes to eliminate and avoid discharge restrictions
have maintenance open the pump casing and remove any obstruction that may be there. check to ensure that there is no further damage
inspect the oil well sight glasses, or check the dipsticks. add lubricant as necessary. determine if the proper grade of lubricant is being used. change the lubricant if necessary
the pump should be turned frequently when it is on standby to avoid false brinelling and other surface defects on bearings
contact mechanical maintenance to have the installation checked

check the direction of the arrow that is usually cast on the casing to verify the rotation direction. have electricians check the wiring connections and correct them
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have mechanical maintenance verify the impeller mounting and reverse the impeller on the shaft
have maintenance verify and correct the problem
check the pressure differential across the filter. if the differential is too high, change and clean filters
throttle the discharge valve until the rated capacity is reached
perform phase angle analysis to determine piping misalignment. perform soft-foot analysis. check to see if the correct grease is used and correct application. determine if the bearing was installed per manufacturer's procedure
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use the maintenance management tracking system to see if the bearing was replaced in an emergency with a substitute bearing because it was
close enough
and the substitute was never replaced with the correct one
tighten the glands slightly. check the suction line for leaks
replace wear rings. determine correct wear ring clearances
replace wear rings. determine correct wear ring clearances

determine the proper size of the foot valve
determine the correct speed and specific gravity or viscosity. a design change may be required
replace the shaft
remove the shaft and inspect
loosen the gland slightly if the stuffing box is too tight
replace the rings
replace the rings
consult with the lubricant manufacturer to verify the correct grade of lubricant, and replace the old grease or oil with the correct one
add oil until the oil level is just below the center of the lowest ball or roller in the bearing
purge the bearing until only the lower half is 1/2 to 2/3 full of grease

purge the bearing until only the lower half is 1/2 to 2/3 full of grease
replace with a bearing that meets the original design specification
determine what the true bore is and scrape the housing to relieve the pinching of the bearing
check the running clearance of the rotating seal to eliminate rubbing. check the alignment of the bearing
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clean the holes. investigate the type of debris
rebalance the machine. replace the housing with one having the correct size bore
clean the clogged holes to vent the oil gauge. ensure bearing material is not the clogging agent. if it is, the bearing may have to be overhauled or replaced
check oil specs for the machine, and use the correct grade of lubricant
clean out the bearing housing. replace any worn seals

rotate shafts 1/4 turn in all stationary machines at least once per two weeks
ensure insulation and grounding gear are in good order
add a shroud or a finger to throw off any foreign matter
carefully clean the housing and always use fresh lubricant
carefully clean the housing and always use fresh lubricant
replace the bearing
replace the bearing without hammering any part of it. use a press to install the bearing or uniformly heat or chill bearing to set it
replace the bearing without hammering any part of it. use a press to install the bearing or uniformly heat or chill bearing to set it
check every moving part for interference. reset the parts to provide the necessary clearance
rebalance the unit. replace the housing with one that has the correct size bore

carefully examine the bearing for wear spots that are separated by the distance equal to the spacing of the balls. replace the bearings
remachine the shaft fillet to obtain the correct support
remachine the housing fillet to obtain the correct support. check the manufacturer's tolerance measurement guides
check the running clearance of the rotating seals to eliminate rubbing
replace with a new bearing without hammering it into place. follow the bearing manufacturer's fitting recommendations
remachine the housing fillet to relieve stress. remachining may require a shoulder collar
check the balance of the machine. rebalance the machine if necessary
remachine the parts to obtain squareness. ensure that there is a radius machined in at the root of the shoulder to minimize stress riser
remachine the parts to obtain squareness. ensure that there is a radius machined in at the root of the shoulder to minimize stress riser
metalize the shaft, and regrind it to obtain a proper fit. retighten the adapter to get a firmer grip on the shaft

metallize and regrind the shaft to the proper size. stress relieve shaft before putting it back into service
remachine the shaft fillet to relieve stress. this may require a shoulder collar to be fitted
remachine the housing shoulder to clear the seal
grind and hone the shaft to obtain a proper fit between the inner ring of the bearing and the shaft
remachine the housing shoulder to clear the seal
grind and hone the shaft to obtain a proper fit between the inner ring of the bearing and the shaft
shim the pillow blocks to correct the alignment. ensure that the shafts are coupled in a straight line. this is especially important when three or more bearings operate on one shaft
remachine the housing fillet to obtain the proper support
rework the shaft, the housing, or both to obtain a proper fit. a new shaft may be required
provide adequate baffling to divert the direction of the airflow

use a thin layer of gasket cement to seal off the leakage. shutdown the equipment if the leakage is excessive
always carefully clean the housing and use fresh lubricant
tighten the packing enough to stop the leak
repack the gland with new, correctly sized packing rings
check the number of packing rings that should be in the gland. repack the gland with sufficient turns
stagger the ring butts by placing the first at 0°, the next at 180°, and then a 90°-270°. repeat the rotating sequence until the stuffing box is filled
replace the valve stem. check why it is scored first
replace with the correct grade
replace with the correct grade
adjust the gland follower to correctly place the follower at a 90° angle to the stem axis

replace the gasket with a new one. smear the gasket surfaces with a suitable lubricant to help preserve it
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replace the gasket with a new one. smear the gasket surfaces with a suitable lubricant to help preserve it
replace the gasket. gaskets should always be cut with a circular cutter and holes put in using a belt punch
replace with the correct gasket material. the most expensive material is not always the best. use the gasket material that is recommended for the application
replace with a new gasket. new gaskets should always be used for replacements. never reuse the old gasket
adjust the packing until the valve operates easily
check the drawing for the correct number of turns required, and adjust
break the joint, and correctly realign the pipe to the valve. align piping with zero cold spring
straighten the stem to +/- 0.002" tir max

check the specifications, and replace with the proper handwheel
clean the threads, using thread chaser
contact maintenance. to prevent this problem from occurring, avoid forcing the valve into the seat in high temperature systems
avoid twisting valve body, especially check valves, gate valves, and butterfly valves
avoid twisting valve body, especially check valves, gate valves, and butterfly valves
adjust the valve to fully open or fully closed. gate valves are not designed to control or throttle flow. do not use them for this function
install spring hangers, and check the valve to the piping nozzle alignment. piping to valve alignment should have zero-cold-spring. in other words, both connections should be perfectly aligned with each other with no stress
open or shut the valve completely. the gate valve should always be fully open or shut
change the mass by stiffening the valve. add a weight to the pipe as close as possible to the valve
change the valve for a non-rising stem valve

tighten the yoke nut
caution: during throttling operations, do not close the valve far enough to induce a high-pitched screaming noise
caution: during throttling operations, do not close the valve far enough to induce a high-pitched screaming noise
machine the disc and seat to produce a very narrow contact band around the seat and disc faces. ideally, maintain a 0.5° differential angle between the seat and disc faces
change the valve immediately if the valve is rated at 200 wog and 125 s and is operating in a 400-psi steam system
warning: if the valve is overpressurized, it is dangerous to operate at this pressure. it should be operating at no more than 200 psi in a water, oil, or gas system, and no more than 125 psi in steam system
remove the stem, and check the tir. straighten the valve stem
change the valve. check piping alignment to the valve body. piping should have zero cold spring with valve nozzle
add shims one at a time between the stem nut and disc shoulder until sufficient float is achieved
retighten the bonnet lock nut. warning: if this problem is not corrected, the valve may blow out and cause injury. to avoid this problem, do not force the stem to the backseat against the cover, particularly using a valve wrench

verify the need for a lock screw or tab by reading the drawing or manufacturer"s documentation, and reinstall the tab or lock screw if necessary. warning: never install a screwed bonnet globe valve in a high-pressure system or a dangerous substance system because the bonnet can become unscrewed if it is forced against the backseat
verify the setting, using a torque wrench to correct the setting if required
loosen the bolts, and retighten properly. flange bolts need to be tightened sequentially around the bolt pitch circle. after the first nut is tightened snugly, go 180° across to the second nut, and tighten it snugly. go 90° to the third nut, and tighten it snugly. go 180° to tighten the fourth nut. repeat this sequence until all the bolts are snugly tightened. torque all nuts to specification in the same sequence to complete the tightening process
scrape the flange clean of all foreign material. ensure that the flange faces are properly aligned to each other and at the zero cold spring setpoint. always use a new gasket when installing a valve or making repairs
if the compression is less than 60% and no other damage is apparent, then tighten the gasket to the correct setpoint. if the compression is greater than 60%, scrap the gasket, and replace it with a new gasket. flexitallic gasket corrugations must be compressed to a minimum of 60% of the original thickness for effective sealing. if the gasket is compressed beyond 90%, it becomes ineffective
correct the setting, or contact maintenance. warning: ensure that a gag is not left in place or being used to try to stop leakage across valve seat. pressure tests the valve to lift at 110% of the working pressure of the boiler
reface the seat face and disc face to maintain a 1/2 degree angle differential between the points of contact
perform a visual inspection of the spring for cracks or breaks. if the spring can be taken off valve without being broken, hang it on a string, and strike it very lightly with a peen hammer. if the spring rings loudly and clearly, it does not have a crack. if the spring makes a clunking sound, it is cracked. replace it
check the stem tir to ensure that the stem is not bent. straighten the stem if necessary
evaluate the current setpoints to ensure that they meet specifications

remove anything that should not be on the piping. piping and valves may be loaded down with scaffolding or maintenance walkways. this can alter the mass, affecting the natural frequency and causing the scaffolding or walkways to vibrate in tune with a pump or motor having the same natural frequency. this vibration can have devastating results
ensure that the steam traps are operating and do not need maintenance. clean the traps as necessary. open the drain valves during any plant shutdown
check the direction arrow casting on the side of valve body. reverse the body installation if the directional arrow indicates that the valve is incorrectly installed
inspect and report the findings to maintenance. piping misalignment can distort the valve body and can cause the disc shaft trunnions to get out of alignment and bind up
check the valve seat to ensure that it did not kink or roll during installation. straighten as necessary
take the stem out of the valve. and run a die-nut down the thread if it is a standard thread. if it is an acme thread, use a thread chaser or a fine file to remove any imperfections
remove the shaft, and check tir. straighten the shaft, and reinstall in the valve
separate the pipe from the valve, and observe how far the pipe moves out of alignment. if the pipe is out of alignment, the pipe must be bent until it meets the valve nozzle with zero cold spring. warning: if a hand-operated valve cannot be moved without difficulty, it requires maintenance. never force a valve by using a wrench
separate the pipe from the valve, and observe how far the pipe moves out of alignment. if the pipe is out of alignment, the pipe must be bent until it meets the valve nozzle with zero cold spring. warning: if a hand-operated valve cannot be moved without difficulty, it requires maintenance. never force a valve by using a wrench
contact maintenance and the machine shop to correct this problem and replace the valve

slacken off the gland follower, and allow the packing to move slightly
repack the valve
check the slack side span for 2% deflection, and adjust the chain tension as necessary
check the drive for proper lubrication. lubricate the drive as necessary
check the chain and sprocket for wear, and have it replaced if worn
check the alignment, and realign as necessary
draw up all bolts and brace the casings as required
check chain drive spec chart. change the chain
check for chain wear. replace chain as necessary
check chain tension. increase tension as needed

clean sprocket. eliminate cause of material buildup
notify the maintenance department
change the driver arrangement to get more sprocket-teeth in contact with the chain, or use an idler take-up sprocket to increase the wrap
adjust the centers or take-up sprockets for a 2% final deflection
check drive for proper speed. adjust as required
check for the correct type and amount of lubricant
use the oil stream system to lubricate the chain
check the drive for obstructions, and check the guard design. remove all obstructions
check for chain wear and replace the chain as necessary
clean and lubricate the sprockets correctly

check the grade of the lubricant, and refer to the lubricant chart for that particular chain drive configuration. replace with the recommended lubricant as necessary
correct the tension. the tension should be set to deflect 2% of the pitch between the driver and the driven sprockets
replace the bad joints or install a new chain
install a chain take-up or idler sprocket or adjust the centers of the sprockets
reduce the load where possible or replace the chain with one of suitable length
investigate why the chain is wearing in an irregular manner. replace the chain
have maintenance check the alignment and correct as necessary
replace the chain. provide the correct lubrication
clean and lubricate the chain correctly. refer to the lube manual for the correct lubricant and application
remove any corrosion, lubricate the chain correctly, and protect the chain from further corrosion by keeping it clean and well lubricated

identify the overload cause and reduce it
clean and lubricate the chain more frequently
check for chain interference and repair as necessary to remove peeping marks
remove the chain and correct the alignment of the sprockets and shafts
check the number of sprocket teeth to ensure that it is within the recommended limits for the speed involved. use a shorter pitch chain of equal or greater strength. select a sprocket with more teeth, if necessary
remove material buildup from the sprockets
reduce the shock loads
check the shaft runout for eccentricity paying particular attention to the locking device on the sprocket hub. the locking device can draw the hub off-center if there is a loose fit on the shaft
lubricate the chain correctly
check the sprockets for wear and correct the bottom diameter

remove any corrosion from the chain or sprocket, lubricate the chain correctly, and protect the chain and sprocket from further corrosion by keeping the chain clean and well lubricated
adjust the take-ups to restore the proper tension
increase the size of the sprocket or increase the conveyor speed
remove the obstruction and ensure that the lower strand is not striking a foreign object
clean and lubricate the chain correctly
replace with sprockets having the correct number of teeth
correct eccentricity of hub hole
check the chain and sprocket clearances. remove any foreign materials
reduce excessive shock loads or change to steel sprockets
eliminate the obstruction. tap the ends back until the cotter pin fits snugly against the side plates or use a riveted chain

correct the faulty installation
repair or replace the damaged parts
remove the obstruction
check timing sequence, chain elongation, and chain selection
check the alignment of the unit. check the condition of the coupling. if misalignment is the problem, have the maintenance group perform an alignment of the shafts
check oil level. add lubricant if needed. determine if lubricant is the correct grade. if the lubricant is not the correct grade, replace with the correct lubricant
check the tension and alignment of the drive auxiliaries and relieve the tension if required
adjust or replace the worn parts
reduce the load
check the lubricant against the specification instructions. replace with the correct lubricant

check the level in the sight glass, and fill to the correct level. ensure that the air breather is clean and functioning properly
reduce the load
check the air supply for proper fan circulation. remove any obstructions. avoid any high surrounding ambient temperatures. if the ambient temperature is high because of a local heat source, place some form of barrier between the heat source and the machine
recheck the oil level with the unit shut down. remove any excess oil
remove the breather, and clean it
tighten all of the joints and end cap bolts
check and realign the system. tighten all of the bolts
close the pump relief valves
check pump relief valves and the pressure control valve for normal operation. adjust as needed
check for an oil leak. repair as necessary

check the system control valve, and adjust as needed
check the flow controls for proper settings and positive indication of flow. adjust the setting as necessary
adjust the system pressure control valve to maintain a constant system pressure
check the oil level in the reservoir and the free-floating operation of the floating suction. verify there are no obstructions causing flowing suction to stick. remove any debris from operation area. check the suction line and the strainer to the pump for a possible air leak. check the pressure tanks. if the tank is empty of oil, air may be leaking into the system from the air connection. add oil as necessary
purge any air from the filter casing before changing over to the standby filter to put it into service
purge any air from the filter casing before changing over to the standby filter to put it into service
change the pump selector switch to reverse pumps. if the system now runs normally, investigate the pump taken out of service for a problem, such as a broken shaft
set the standby mercoid switch approximately 5 and 15 psi below the desired system pressure
look for oil leaks or some drastic change causing increased oil flow
check that oil temperature on discharge side of cooler is within 10 °f of operational temperature. if it is not, make adjustments accordingly

adjust the fluid supply to the pump
adjust the pressure-relief valve to lower the pressure
adjust the pump
locate and correct the leak
decrease the pump speed
have maintenance align the motor and pump
find obstruction. clear intake. clean suction filters
repair or replace the pump
lower the suction temperature
lower the suction temperature

avoid discharge restrictions. increase the clearance at exit tips of vanes. /never/ install higher horsepower driver without redesigning discharge and suction piping
increase the tension. the deflection of the belt at midspan should be 1/64' for each inch of span between the centerlines of the driven and driving sheaves
increase the belt size
clean or change the belts or sheaves
increase the tension
lengthen the center distance, or use an idler
reduce the drive centers when you are installing the belts. adjust the motor position to lessen the tension on the belts. install new belts, and retention them
increase the tension
test the shaft runout for eccentricity. have maintenance make repairs. increase the tension or drive capacity
reduce the drive centers when you are installing the belts. adjust the motor position to lessen the tension on the belts. install new belts, and retention them

provide protective guards
replace the sheaves
increase the sheave diameter
align the drive
increase the drive capacity
provide the correct running clearance
clean and protect the belts
track down and eliminate the heat source. provide ventilation
reduce the drive centers, or provide an idler
reduce the drive centers, or provide an idler

lubricate the bearing
open the vent/drain plug, and purge the lubricant cavity with fresh lubricant. leave the vent open for approximately 30 minutes, and then close it
adjust the belt tension. the deflection of the belt at midspan should be 1/64' for each inch of span between the centerlines of the driven and driving sheaves
replace the drive belts with matching belts
move the motor inwards to detension the belts, and replace with matching belts, using the proper installation procedure. /caution/ do not use different manufacturers' belts to make up a set. always use belts from one manufacturer because manufacturing processes differ from one manufacturer to another
replace all the belts
reduce the overload, or install a larger drive system
replace the belt. /caution/ never use a pry bar to install the belt in the sheave because this breaks the inner fibers on the belt and can break the sidewalls of the sheave
replace with matching belts
check and adjust the alignment of the sheaves, and correct the tension

check and adjust the alignment of the sheaves, and correct the tension
replace the belts
replace the belts
replace the sheaves
replace with properly sized sheaves
check and adjust the belt tension
remove the obstruction
adjust and inspect the belt. replace as required
clean and inspect the belt. replace the belt as required
check the belt for an abrasive condition or any of the conditions mentioned as a probable cause; replace the belts as required

clean and inspect the belt; replace the belt as required
clean and inspect the belt; replace the belt as required
check whether any other fans are discharging into the same outlet as the fan having problems; this could be a design problem; inform engineering for an evaluation
check to see whether any dampers have been accidentally closed; open any dampers that should be open
check the drive belts for slippage. adjust the tension if the belts are not damaged. ensure there is adequate lubrication to bearings. have the electricians check out the motor
readjust the damper control linkage turnbuckles to the calibrated setpoints
check the pressure differential across the filters, and clean or replace the dirty filters
walk ducting system down, and check for leaks. an ultrasonic leak detector is an ideal tool to determine exactly where leaks occur
ensure that the belt drive is not crossed. have the electricians check the rotation of the motor
stop the fan, and have maintenance reverse the wheel

perform vibration analysis to determine the magnitude of the problem, and then balance the fan. water wash the fan blades to remove the buildup of dirt. if the fan operates in a boiler exhaust system or some other high-temperature gaseous system, descale the blades
check the foundations for cracks and breakage. report the findings to engineering for resolution
perform vibration analysis to determine the magnitude of the problem, and then align the fan shafts
perform a soft-foot check on all the feet of the unit to determine if a soft-foot condition is the problem. add or remove shims to correct condition
check for ducting distortion if no expansion or flex joint is fitted. adjust the hangers as needed
ensure that the sheaves are the same width and are properly aligned with each other
ensure that the correct lubricant is being used and that the bearings are vented during the lubricant application
ensure that the bearing installation practices are correct
when the fan is off, ensure that the unit is turned to change the resting point periodically to prevent the shaft from sagging due to its own weight. check the bearing mounts for undue stress due to bad foundations and misaligned ductwork
ensure that the belts are sitting in the correct sheaves and are aligned to run true in the v-grooves. check the lineup of the sidewalls of the sheaves with a straightedge or a stretched string

conduct a vibration analysis to determine whether the coupling is worn. the wrong grade of lubricant may have been used and accumulated in one spot, causing an unbalanced condition
perform an evaluation to determine the extent of resonance and to track down the excitation source(s). to temporarily stop resonance-induced vibration, alter the mass of the unit by placing some weight, such as a bag of sand, on the unit
have electricians check the motor rotation and correct the rotation as required
ensure that no foreign objects are causing a partial blockage on the inlet side of the fan. as fan blades turn past the obstruction, they will be unable to carry the full load and deflect
determine the capacity of the bearing and follow the manufacturer's recommendations for lubrication
ensure that the belts are sitting in the correct sheaves and are aligned to run true in the v-grooves. check the lineup of the sidewalls of the sheaves with a straightedge or a stretched string
rotate the shaft, and let it roll until it comes to rest on its own to check for static unbalance. static unbalance can be corrected by hanging an appropriate weight opposite the resting, 6 o'clock position. engineers who have the proper instrumentation should do more complex balance correction
when the fan is off, make sure the unit is turned off the resting point periodically to prevent the shaft from sagging due to its owm weight. check for undue stress on bearing mounts because of bad foundations and misaligned ductwork
depress the belts at midspan, and measure the deflection to test the belt tension. the deflection should be equal to 1/64' per inch of span between the centers of the driven and driver units
this can be caused by gross misalignment between the driver and the driven units. it can also be caused when one sheave is wider than the other one. to correct either one, align the belts to the center of the v in each sheave

plug the bore, and remachine it true. eccentric bores cause the sheaves to turn off center, causing the belts to tension and detension each revolution. this continual jerking back and forth causes the bearings to take a terrible pounding. keys and setscrews can have the same effect by drawing a sheave ofllcenter when the force is tightened
prime the trap
prime the cleaned trap
remove or repair the bypass valve
install a check valve ahead of the trap
clean the trap
repair or replace the defective parts
replace the bellows
repair or replace the defective parts
clean the trap

increase the line or pig tank size
no corrective action is required for this normal condition
install the correct size trap
replace the worn orifice
readjust or replace the pressure-reducing valve. the valve may require a new diaphragm
install the correct pressure change assembly
blow out the screen with air, or replace it
remove the obstruction
remove or repair the bypass valve
open the steam supply valve

clean the strainer, and reinstall it
repair or replace the defective mechanism
install the correct pressure change assembly
remove the restriction
install the correct pressure change assembly
install the proper size trap
install the correct pressure change assembly
clean the trap internals, and reinstall the strainer
clean the strainer
replace the bellows

install a check valve on the inlet side of the trap
replace the worn parts
clean the trap
replace the worn parts
install the proper size larger trap
use thermic buckets, or increase the vent size
when steam traps are grouped, i.e. multiple traps are run into the same line, there is a possibility of condensate backup due to pressure inconsistencies or obstructions. systems with many traps feeding into one return line are hard to troubleshoot because it is hard to determine which trap has the problem. pipe traps individually from vessels
restore normal steam pressure
readjust or replace the reducing valve
install a larger condensate return line

locate and repair other faulty traps
clean out pig tank vent line
remove the obstruction
install the correct pressure change assembly
replace with fuses that are at least 12% of the amperes listed on the nameplate
check and reset the overload in the starter
verify that the current supplied matches the specifications on the motor nameplate and the load factor
check the connections, using the diagram supplied with the motor. if the wiring is connected improperly, have the electricians rewire it to the connection specified on the diagram
have an electrician check for loose wiring connections. verify that the starting switch inside the motor is closed. note: a humming sound when the switch is closed indicates an open circuit. repulsion induction motors may spark at the brushes
stop the motor, and ensure that the motor and drive turn freely. check the bearings and lubrication. add some lubricant to the bearings, and rotate the shaft slowly by hand. if it still feels rough, have the motor repaired by the maintenance group

have maintenance rewind the motor. note: blown fuses indicate short-circuited stator
remove the end bell, and locate the connection problem, using a test lamp. if a fault is found, have the electricians repair it
look for broken bars or end ring, replace/repair
reduce the load
check the lines for the open phase
have maintenance rewind the motor. note: blown fuses indicate short-circuited stator
check for wear, and replace as necessary. check for the correct brush pressure. clean the commutator if it is dirty
verify that the type or size of motor is correct and is within the specified operational parameters. if the motor is not correct, an electrician should install a new motor that meets the specifications
reduce the load
ensure the nameplate voltage is restored and maintained

check overload relay, stator, and the push buttons to reset the fuses. replace the fuses if necessary
check the control sequence replace the broken resistors. repair the open circuits
have an electrician check for loose connections to the line, to the fuses, and to the control. correctly tighten any loose connections that are found
consult supplier for the proper type of motor, and replace the motor with the correctly sized unit
use a higher voltage on the transformer terminals, or reduce the load
correct the secondary control
check the load that the motor is supposed to carry at the start, and adjust as necessary
look for cracks near the rings, and repair or replace as necessary. new rotor may be needed. repairs are usually temporary
locate the fault, using a resting device
reduce the load

check for high resistance. have an electrician correct any deficiencies found. refer to the manufacturer's manual for guidance
replace with a new rotor
have the power company increase the power tap
reverse connections at motor or switchboard
reduce the load
clean the blower or air shield. note: a continuous stream of air leaving the motor indicates good ventilation. if this does not happen after cleaning, check with the manufacturer for advice. if the wrong blower or air shield is being used, the manufacturer may have to recommend a design change
ensure that all of the leads are well connected
locate the fault and repair
check for faulty leads, connections, and transformers. and repair or replace as necessary
repair, and then check the wattmeter reading

have an electrician look for a faulty connection and correct the problem
have an electrician check the terminals of the motor, using a voltmeter. make adjustments to lower the voltage
have an electrician check the terminals of the motor, using a voltmeter. make adjustments to raise the voltage
check the machining. if the rubbing is due to bad machining practices, replace the bearings
realign the motor
strengthen the base
dynamically balance the coupling
dynamically balance the driven equipment
line up the bearings properly
replace the bearing

dynamically rebalance the rotor
dynamically rebalance the rotor
check for an open circuit
adjust the bearing, or add a washer
have an electrician check the leads and connections and adjust as necessary
have an electrician check for open contacts
have an electrician check the control devices. correct the contacts
ensure that the brushes are properly seated and the shunts are in good condition
clear the fan
remove the interference

tighten the hold down bolts
check and correct the bracket fits or the bearing
dynamically balance the rotor
straighten or replace the shaft
decrease the tension on the drive belts
move the pulley closer to the motor bearing
replace with larger pulleys
correct the misalignment. realign the units
remove bracket or pedestal with bearing. clean bearing housing and oil grooves. replace oil
use recommended lighter oil

use recommended heavier oil
reduce the thrust that is induced by the driver. check the magnetic center of the motor
replace the defective bearing
maintain correct amount of lubricant in bearing
reduce the quantity of lubricant. /note/ reservoir should not be more than half full
remove the old grease, wash the bearing thoroughly with kerosene, and replace with new grease
check the alignment and the side and end thrusts
clean housing thoroughly. replace the bearing
check the diameter of the sheaves to ensure that they are correctly sized for the unit. check the motor for the correct horsepower and loading. clear any obstacles
check lubrication practices. correct as required

collect a gas sample, and have engineering and chemistry check the gas analysis to determine the problem
ensure that the belt drive is not crossed. have the electricians check the rotation of the motor
when the fan is off, ensure that the unit is turned off the resting point periodically to prevent the shaft from sagging due to its own weight
check for undue stress on the bearing mounts due to bad foundations and misaligned ductwork
ensure that the belts are sitting in their respective sheaves and are aligned to run true in the v-grooves. check the lineup of sidewalls of the sheaves with a straightedge or a stretched string. have electricians check wiring. check for overgreasing, especially on units that are greased by a pump grease gun
nan
check the motor that has only a pedestal bearing with the other end connected to the coupling. /note/ the fan could be badly misaligned, which would affect the air gap between rotor and stator
perform a vibration analysis. /note/ this problem will require major work and may require a new rotor
sand or turn down
grind or turn down balance of commutator

if extreme, lower with a mallet blow and tighten clamp ring.. grind true
undercut
replace with harder grade — if worn too soon — and not by a rough commutator
adjust
replace
free them. clean brushes if glazed
wipe clean. clean brushes if glazed
test for a short. do this after removing metallic contact between commutator bars. repair armature
locate and replace bad coil — or repair defective joint
realign set

ensure all connections are tight. resolder all connections
correct. check source of power supply. do not try to make the motor turn as it may burn up
reduce load - or replace motor with unit of greater capacity
replace bearings - before scraping noise indicates rotor is rubbing against stator
check balance of rotor on parallel bars. check rotor tir. not to exceed +/- 0.002'
remove the rotor and clean
realign the set until knocking disappears. reset the magnetic center
determine source of vibration through analysis and correct problem
misalignment. unbalance. bent shaft. resonance. oil whirl
realign set

eliminate source in machine, if possible. or change to a flexible belt drive may be in order
balance the rotor
compare nameplate rating. check for excessive friction. reduce load. replace motor with one of a bigger capacity
ensure sufficient airflow across motor. clean out dirt with a suitable solvent
replace bearings
test with wattmeter and correct
locate with a test lamp or growler and repair
realign set
reduce tension using the following formula: center span of belt deflection should be 1/64 inch per inch of centerline span between driver and driven units. chain deflection should be 2% of centerline span
reduce thrust from driver or machine. ensure motor's magnetic center is correctly located

relieve supply to point set by the manufacturer
clean, repair, or replace
add to point set by the manufacturer
replace with the proper grade
decrease the brush spring tension
reduce the load. use a larger contactor
clean any discolored or dirty connections, and retighten them to the recommended torque setting
adjust the overtravel as necessary. replace the contacts, and replace the contact springs as required to correct any defects
clean the contact surfaces, using a fine file or sandpaper. /note/ when performing this task in a dusty environment, use a dust-tight enclosure
change the operating procedure, and check with the factory for contacts more suitable for the length of use

reduce the load. provide better ventilation. relocate the starter. use a larger contactor
replace with line and cables that meet the proper nec standards recommendation
adjust the overtravel as necessary. replace the contacts, and replace the contact springs as required to correct the defect
correct the coil overvoltage condition. correct any mechanical defects
adjust contacts to touch simultaneously within 1/32' or to the manufacturer's specifications
reduce the jogging cycle. use a larger contactor
readjust the accelerating time or the operating sequence. use a larger contactor
insulate the starter from shock. provide a more rigid support for the starter
adjust the overtravel, replace the contacts, replace the contact springs, and set them to the correct contact force as necessary
correct the coil overvoltage condition. correct any mechanical defects

clean and dress the contact faces in a dust-free environment. /caution/ do not use an emery cloth to clean and dress the contact faces. use glasspaper or a diamond file
reduce the load. use a larger contactor
reduce the jogging cycle. use a larger contactor
replace with an air breaker contactor. /note/ an air breaker contactor may have 10 to 20 times longer contact life than an oil-immersed contactor of equal rating
the breaker may be operating properly and clearing an overload. have an electrician check to see if the current is in excess of the thermal trip rating
visually inspect the breaker for discoloration that would indicate loose connections. have electricians torque the connections to the correct setpoint
visually inspect the breaker for discoloration that would indicate loose connections. have the electricians check and correctly tighten the connections. /note/ machine vibrations can cause cables to loosen and can also cause cold flow when aluminum cables are used. cold flow refers to the contraction of the aluminum when the line is cooling down after the load is removed. this shrinkage can sometimes cause the connections to loosen
replace with the correct size wire. /note/ since the cable acts as a heat sink and carries heat away from the breaker, the proper wire size is important
if the temperature fluctuates and frequently exceeds 140 °f, install an ambient compensating breaker

remove the trip unit from the base, and inspect it for discoloration. reinstall the trip unit, and torque it to the base in accordance with the designed settings that come with each unit. /note/ a bright cherry red color indicates a temperature of approximately 1,450 °f for the trip unit. if the unit has experienced thermal damage, then it must be replaced
adjust the magnetic trip rating to the next higher setting or until the breaker does not trip when the motor is started
retest, using a six-cycle impulse test. /note/ a slow or gradual increase in current until the trip range is reached results in the breaker tripping at a lower value than that indicated on the trip unit. a six-cycle impulse test should be used. this is how the breakers are calibrated at the factory
close the open circuit. /note/ if an open circuit happens during transfer, the peak current during transfer could exceed 20 times the full-load amperes. /caution/ an extremely high magnetic trip setting can be supplied on the breaker, but the desired motor protection will be lost
remove the breakers from high humidity locations since high humidity can cause dielectric and other problems associated with moisture. install heaters in the enclosure if the breakers cannot be removed from the humidity
remove the breakers from corrosive environments if possible
remove the cover from the breaker, and determine what type of attachment is fitted. ensure that the attachment is functioning correctly. ensure that the proper voltage is applied to an undervoltage release so that the breaker will operate when shunt trips are used. /warning/ ensure that the shunt trip is not energized while the operator is trying to close the breaker
adjust and secure the core clamps. if other problems exist, have a qualified electrician correct them
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inform electrical maintenance
have them correct the condition
repair or replace as necessary
clean the coils
clean the air ducts
replace the insulation. reset the breakers or fires