

Motor Failure

Root Causes

Motor Component	Stress Type	Actual Stress or Damage
Bearings	Thermal	Friction, lubricant, ambient
	Dynamic and static loading	Redial, axial, preload, misapplication
	Vibration and shock	Rotor, driven equipment, system
	Environmental	Condensation, foreign materials, excessive ambient, poor ventilation
	Mechanical	Loss of clearances, misalignment, shaft and housing fits
	Electrical	Rotor dissymmetry, electrostatic coupling, static charges, variable-frequency drives
Stator	Thermal	Thermal aging, thermal overload, voltage variation, voltage unbalance, ambient, load cycling, starting and stalling, poor ventilation
	Electrical	Dielectric aging, transient voltages, partial discharge (corona), tracking
	Mechanical	Winding movement, damaged motor leads, improper rotor to stator geometry, defective rotor, flying objects
	Environmental	Moisture, chemical, abrasion, poor ventilation, excessive ambient
Rotor	Thermal	Thermal overload, thermal unbalance, excessive rotor losses, hot spots/sparking, incorrect direction of rotation, locked rotor
	Dynamic	Vibration, loose rotor bars, rotor rub, transient torque, centrifugal force/overspeed, cyclical stress
	Mechanical	Casting variations/voids, loose laminations and/or bars, incorrect shaft-to-core fit, fatigue or part breakage, improper rotor-to-stator geometry, material deviations, improper mounting, improper design or manufacturing practices
	Environmental	Corrosion, abrasion, foreign materials, poor ventilation, excessive ambient temperature, unusual external forces
	Magnetic	Rotor pullover, uneven magnetic pull, lamination saturation, noise, circulating currents, vibration, noise, electromagnetic effect
	Residual	Stress concentrations, uneven cage stress
	Miscellaneous	Misapplication, effects of poor design, manufacturing variations, inadequate maintenance, improper operation, improper mounting
Shaft	Dynamic	Cyclic loads, overload, shock
	Mechanical	Overhung load and bending, torsional load, axial load
	Environmental	Corrosion, moisture, erosion, wear
	Thermal	Temperature gradients, rotor bowing
	Residual	Manufacturing processes, repair processes
	Electromagnetic	Excessive radial load, out-of-phase reclosing