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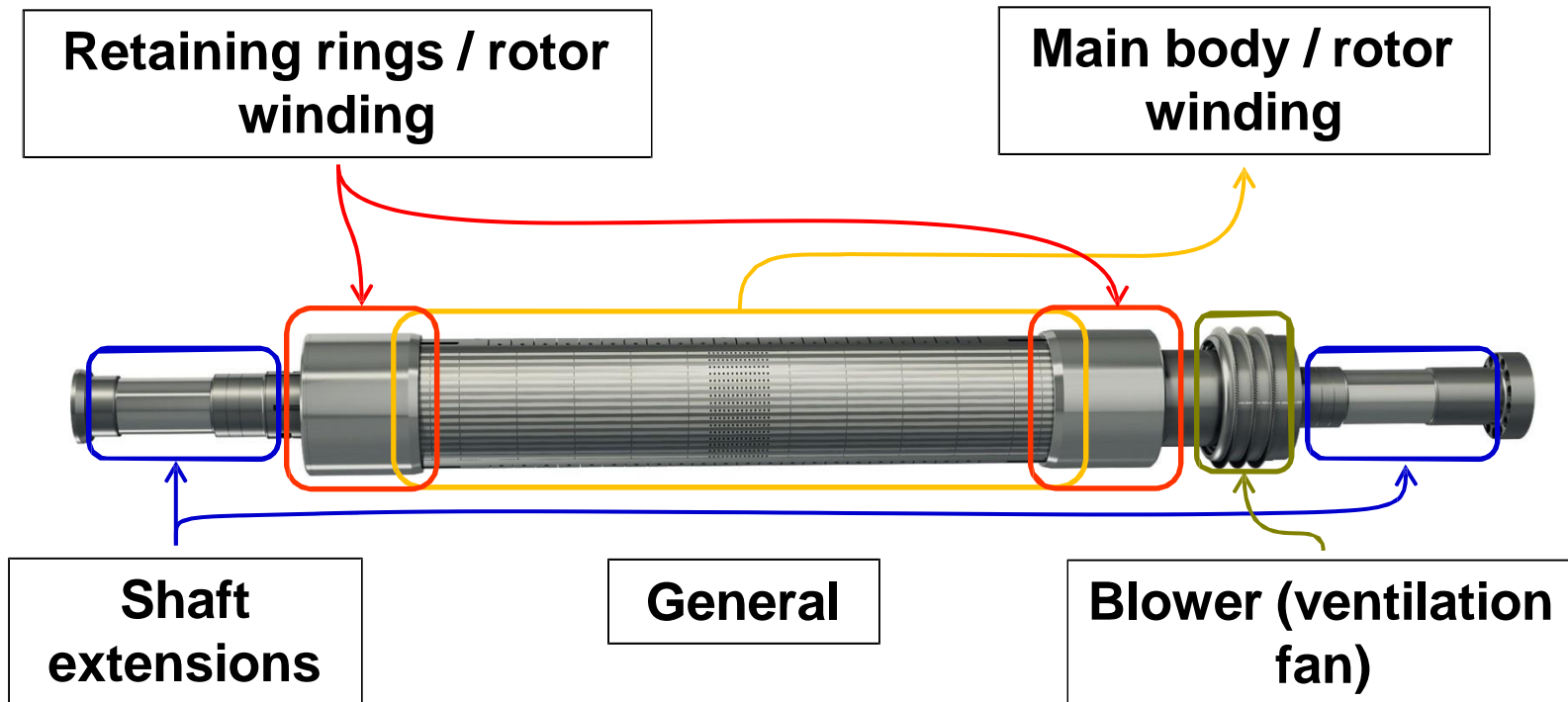


Generator Users' Group (GUG) / November 2015

Industry Experience: Forging Crack Issue Neil Kilpatrick

Large Two Pole Generator Rotor

AL=N; ECCN= EAR99

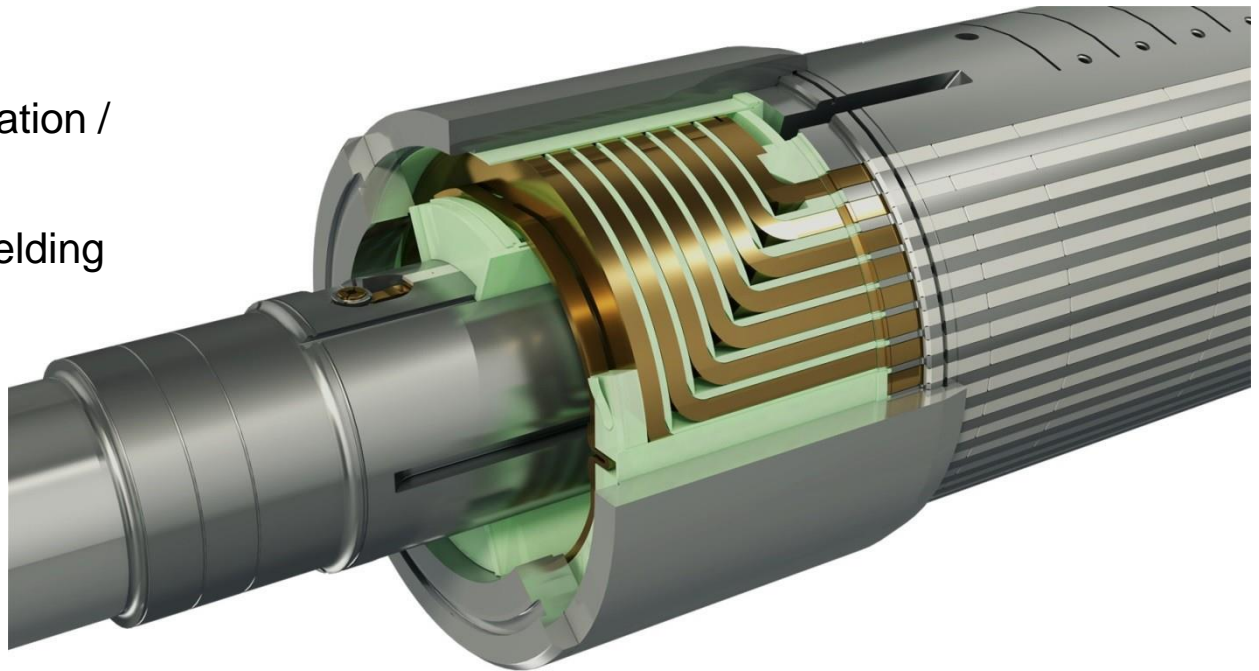


Retaining Rings / Rotor Winding

AL=N; ECCN= EAR99

Potential serious issues can include:

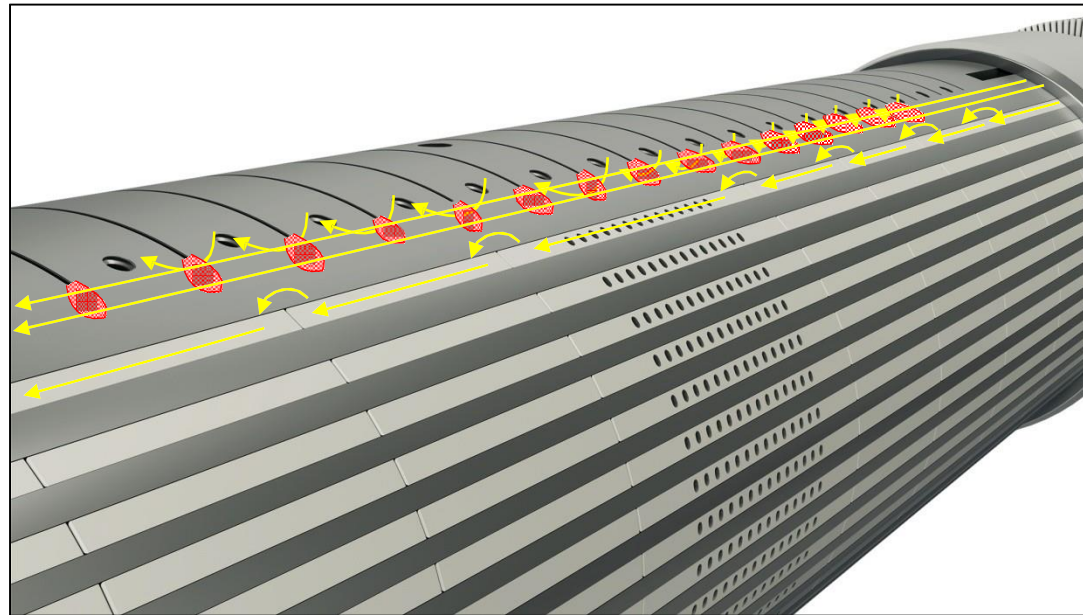
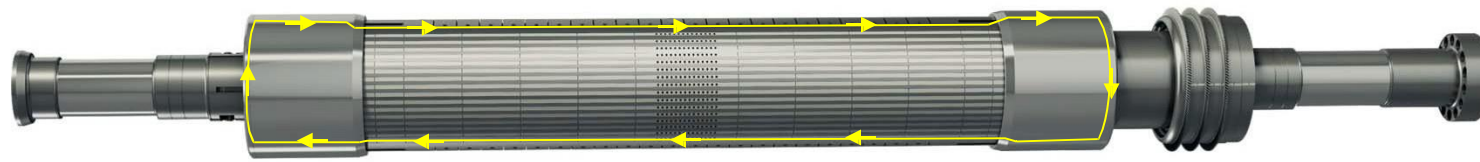
- End turn fault \Rightarrow liner penetration \Rightarrow ring melting, cracking
- Runaway overspeed expansion / rupture
- (Some designs) ring – rotor – end plate fretting
- Excessive damper current flow
 - Arcing
 - Metallurgical transformation / embrittlement
 - Retaining ring / rotor welding
- Corrosion & stress corrosion



Damper Current

AL=N; ECCN= EAR99

Damper current runs subsurface through the rings and rotor

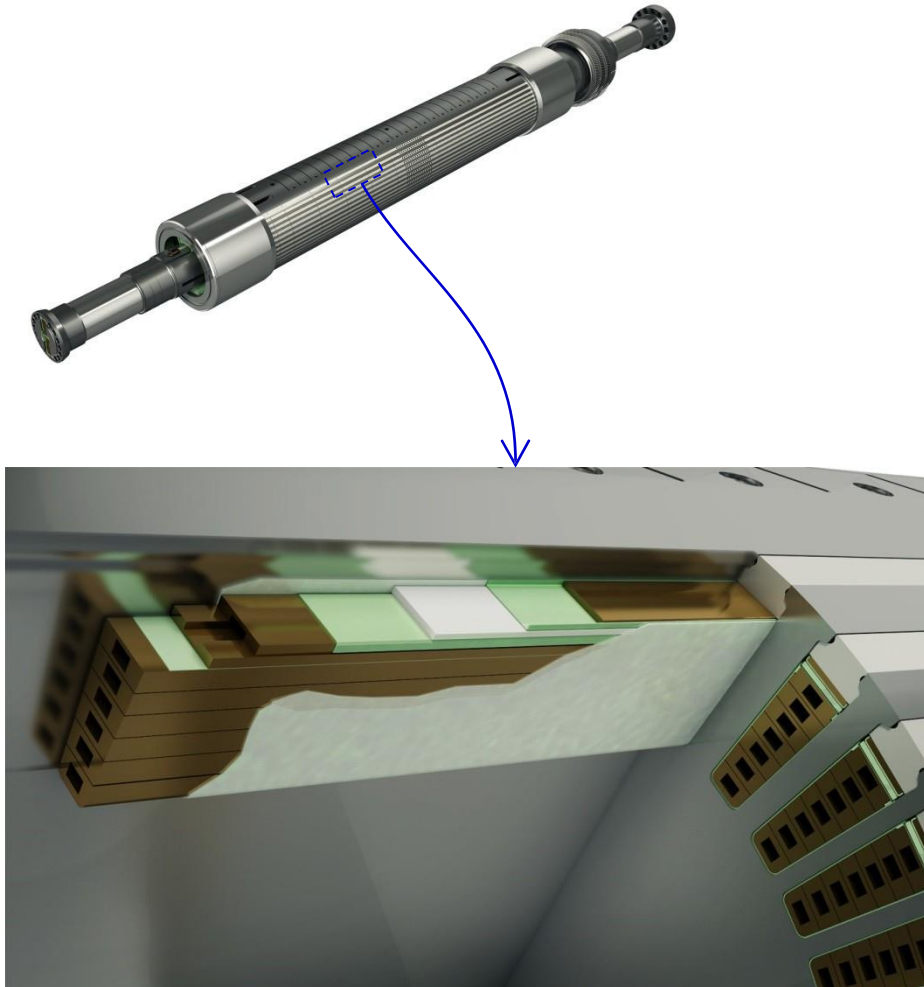


Damper current flow pattern at pole edge and wedge ends - -

Hot zone formations - - - - -

Main Body / Rotor Winding

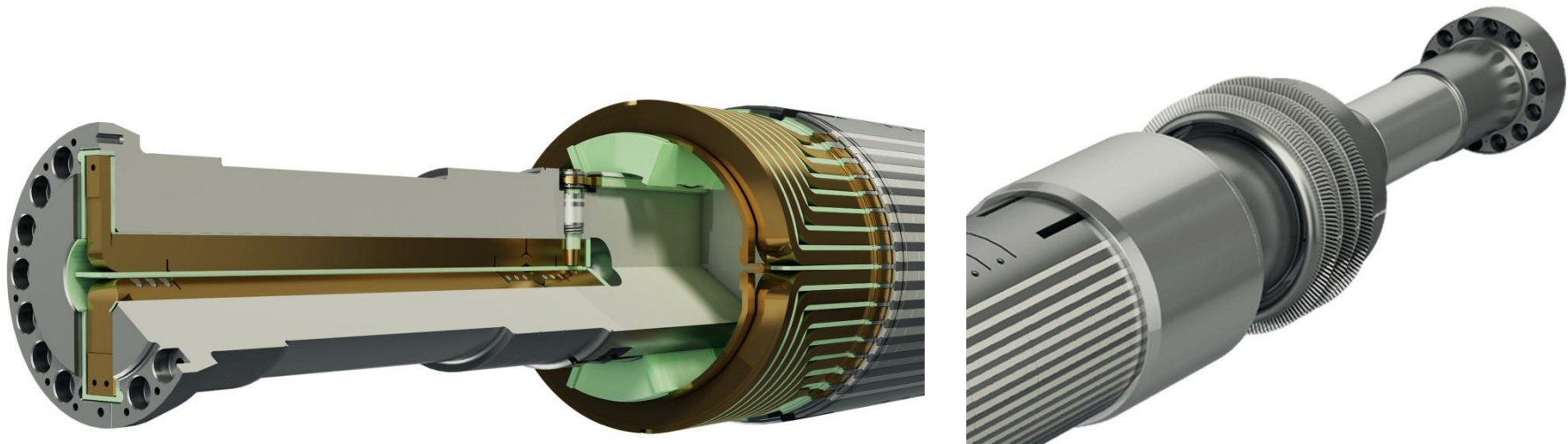
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- Tooth – wedge fretting & galling
- Potential for rotating – bending fatigue
- Double ground catastrophic current flow
- Excessive damper current flow
 - Arcing, melting
 - Metallurgical transformation / embrittlement
 - Wedge / rotor tooth cracking
 - Retaining ring / rotor welding
- Tooth top cracking
- Metallurgical discontinuities:
 - Flaking
 - Porosity
 - Segregation

Shaft Extensions

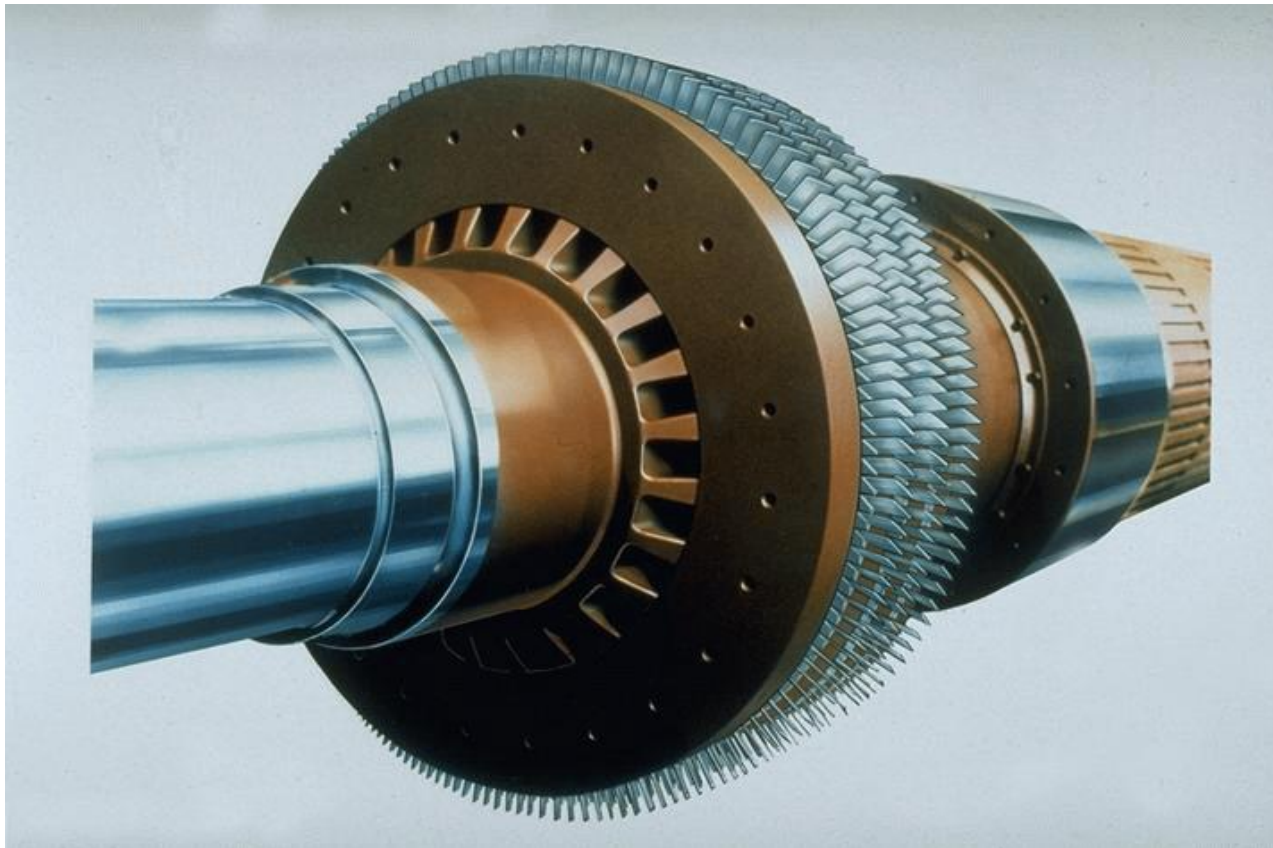
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- Friction rubs
- Loss of oil events
- Bearing failure
- Journal wear
- Journal / bearing electrolysis
- Rotating bending fatigue
- Electrical fault
- Coupling bolts / screws

Blower (Ventilation Fan)

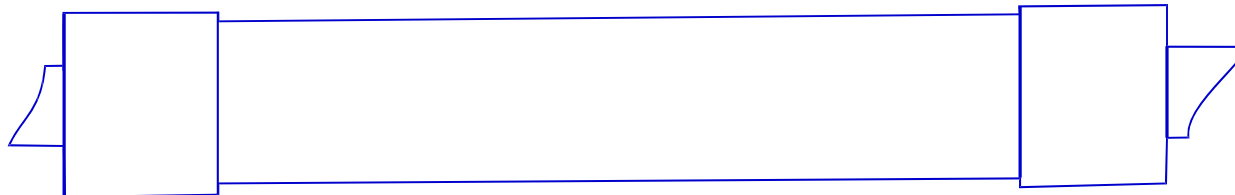
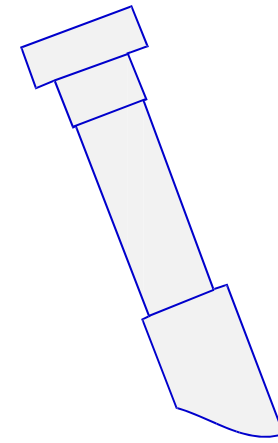
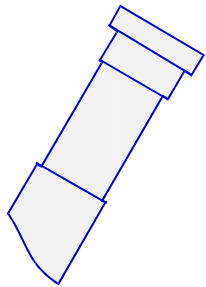
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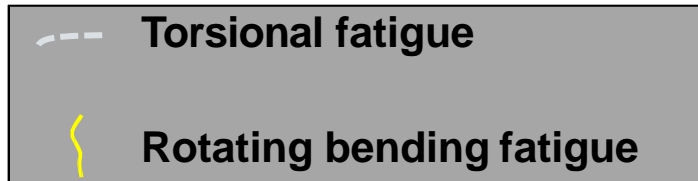
- Friction rubs
- Blade fatigue
- Blade – hub fretting
- Foreign body ingestion
- Hardware fracture

Large Lateral Shaft Set Excursions

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Grid Torsional Input & Shaft Dynamic Response



- Grid torsional input & shaft dynamic response
 - Retaining ring
 - Generator main shaft
 - TG Shaft set
- Rotating bending fatigue



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Thank you!