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BEARING RELIABILITY CONFERENCE & EXPO

# Bearing Failure Analysis for Improved Plant Reliability

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DASH ENGINEERING

# Bearings: The Plankton

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Without bearings, our ‘ecosystem’ fails.

Cost of failure:

- Financial/operational loss
- Personal grief/pressure
- Downtime
- Collateral Damage
- Rebuild costs
- Safety concerns

# About DASH

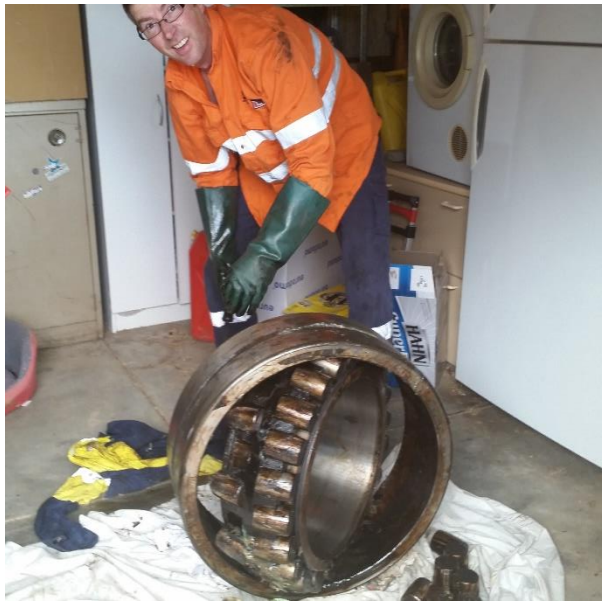


Frustration due to:

- expertise underutilised
- square pegs in round holes
- salespersons selling incorrect products and influencing decision making
- reliance on sales persons to make technical decision on Engineer's behalf

WE DO NOT SELL PRODUCT:

- No alignment with suppliers



# Failure analysis – it is worth it!

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- Knowledge from NSK and SKF
- Experience from industry exposure
- Skill from being inquisitive

EVERY BEARING HAS A LIFE
EVERY BEARING TELLS A STORY

# CASE STUDY 1 – Conveyor Pulleys

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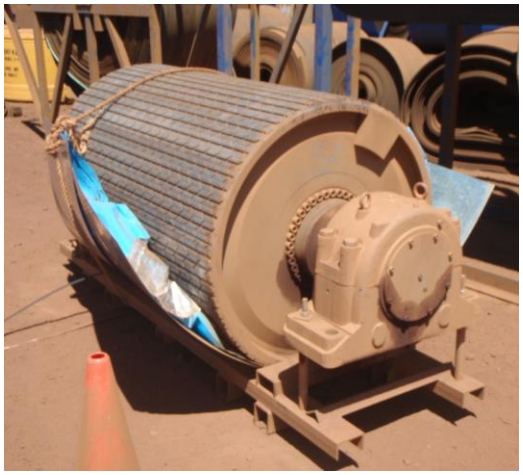
Pulley objective: Achieve lagging life (approximately 4 years)

Actual pulley life: From 2 months to 2 years




Primary mode of failure:

- Misalignment
- False Brinelling
- Lack of lubricant
- Bearing Overloading
- Incorrect installation
- Wrong internal clearance
- Wrong grease
- Bearing manufacturer
- Or other wives tales, red herrings and perceptions

There are many theories, ideas, stories and perceptions, however there is little evidence to substantiate many of these claims.

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The Primary Root Cause of Premature Pulley Bearing Failure at this time is CONTAMINATION from DIRT and WATER.

- Contamination entry is primarily via the grease filled labyrinth seal
- Contamination utilises the excess cavity grease to migrate to the bearing rolling surfaces
- The cavity grease is perceived (and sold) as a contamination barrier – in reality, it is a carrier.

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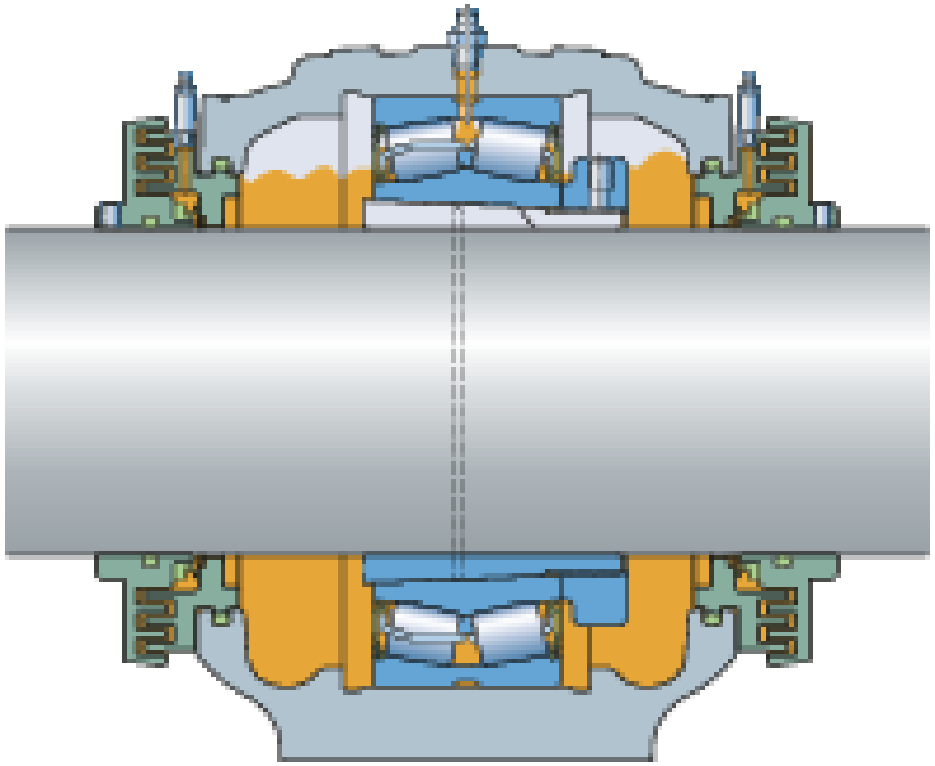
*Bearing manufacturers recommend:*



Drawing Reference: SKF Website: http://www.skf.com/au/products/bearings-units-housings/bearing-housings/skftaconiteseal.html

# CASE STUDY 1 – Conveyor Pulleys

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## EXCESS GREASE in housing cavity.

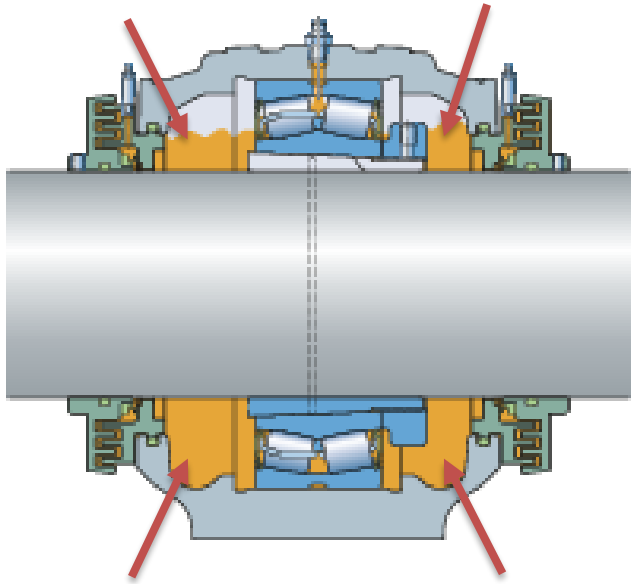
Perceptions:

- Additional barrier (universally adopted)
- Grease filled labyrinths are effective

Seals:

- Standard Labyrinth
- Taconite Labyrinth
- Scorpion Labyrinth (CBC)
- Kobra Vertical Labyrinth (SKF)

Recommendation: Excessive cavity grease fill



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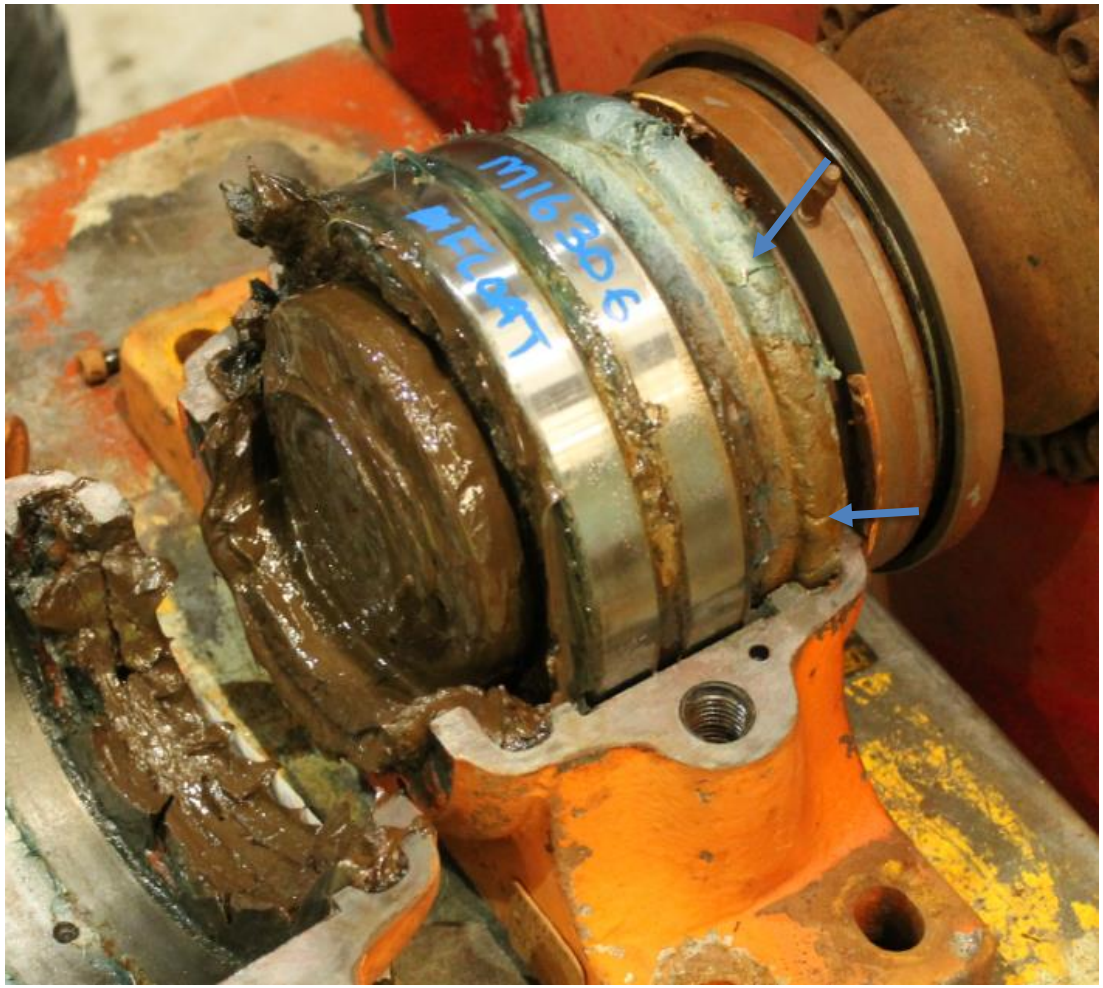

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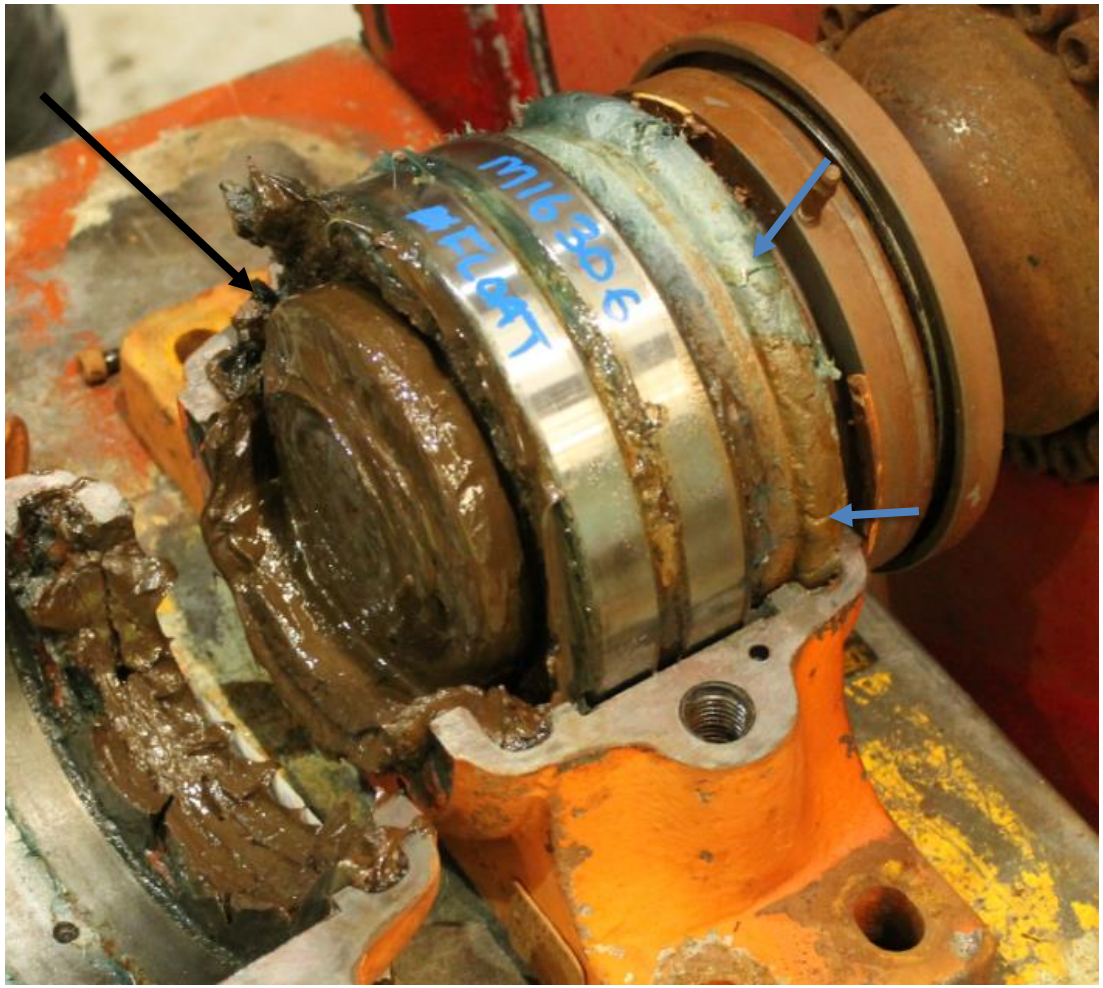

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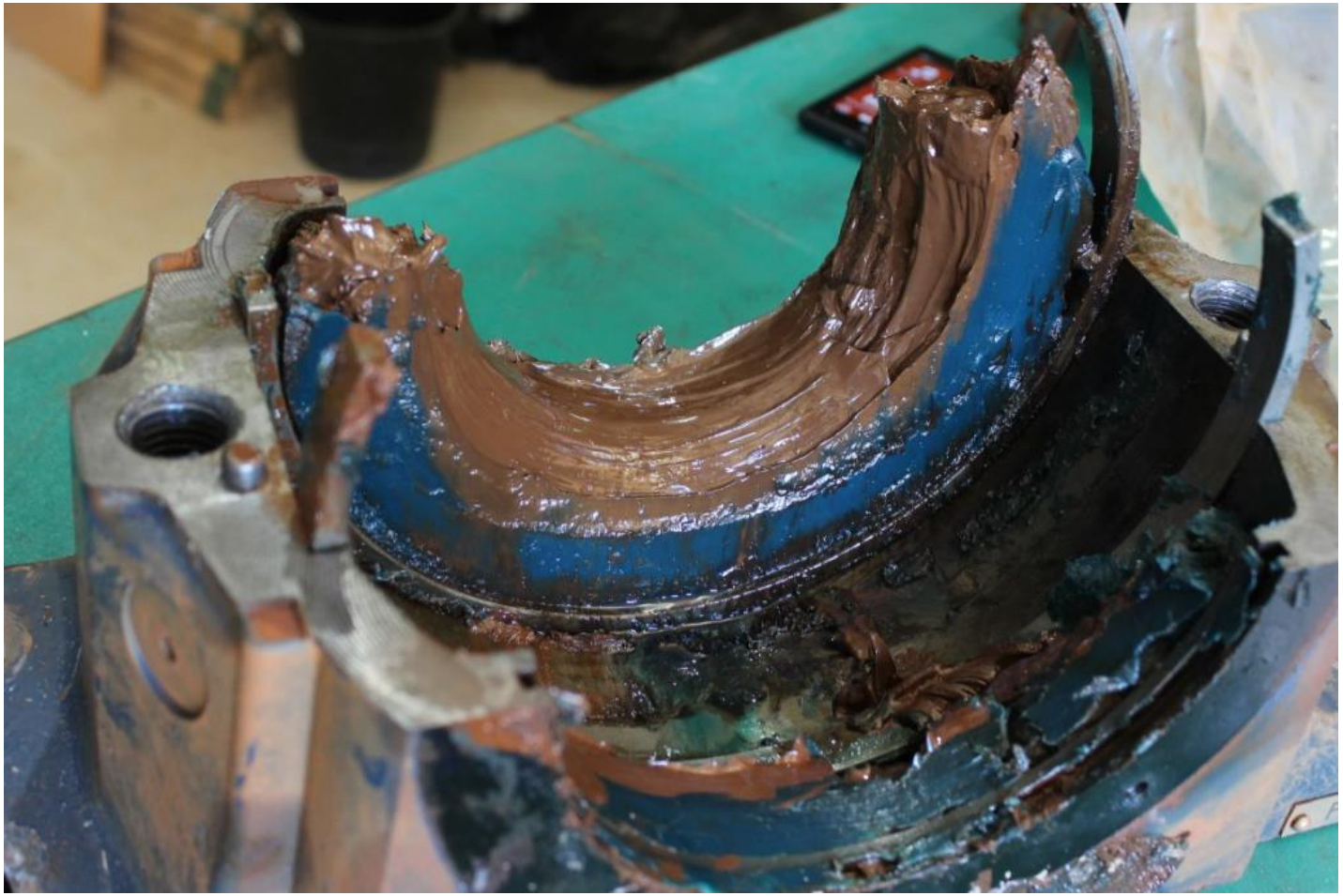

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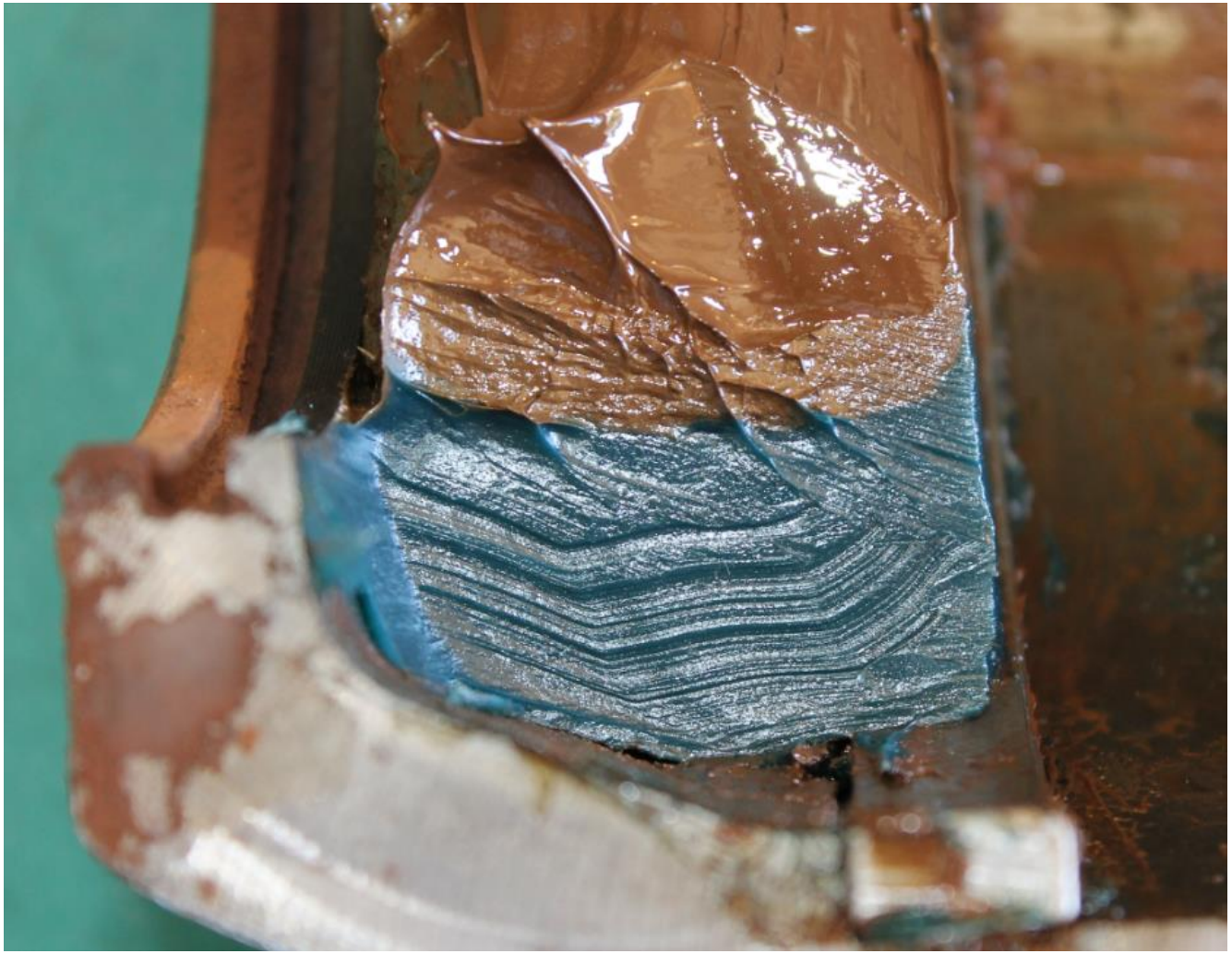

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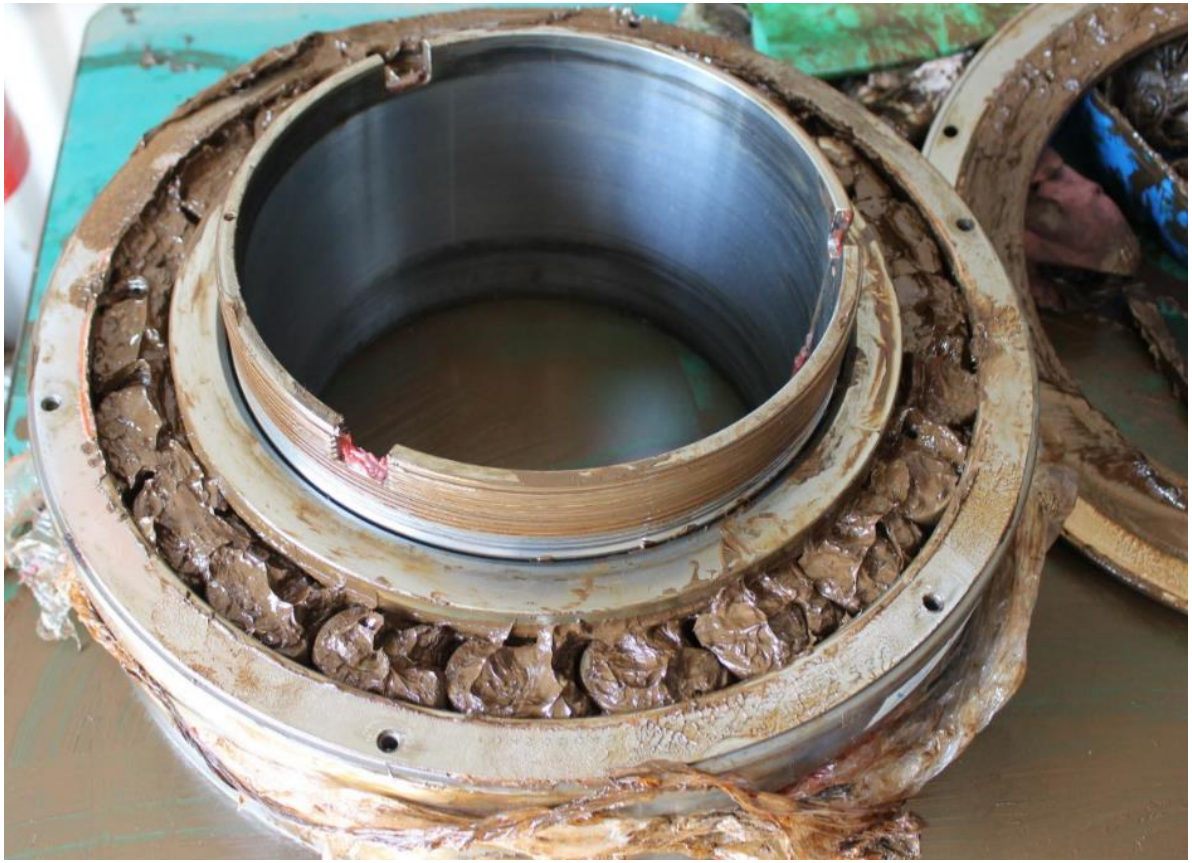

# CASE STUDY 1 – Conveyor Pulleys

Contamination ingress into sealed bearing

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Bearing Damage from Contamination – sealed or unsealed bearing:

Fractures, accelerated surface degradation, spalling, vibration, cage failure, scalloping, adhesion, lubricant degradation, heat generation....

# CASE STUDY 2 – Electric Motors

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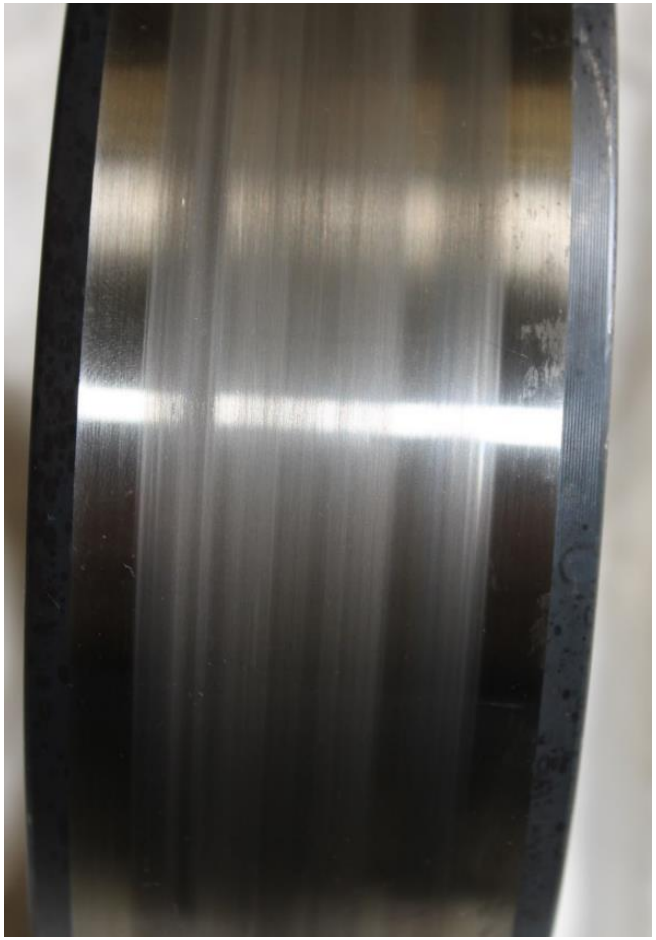
THEORETICAL LIFE V ACTUAL LIFE

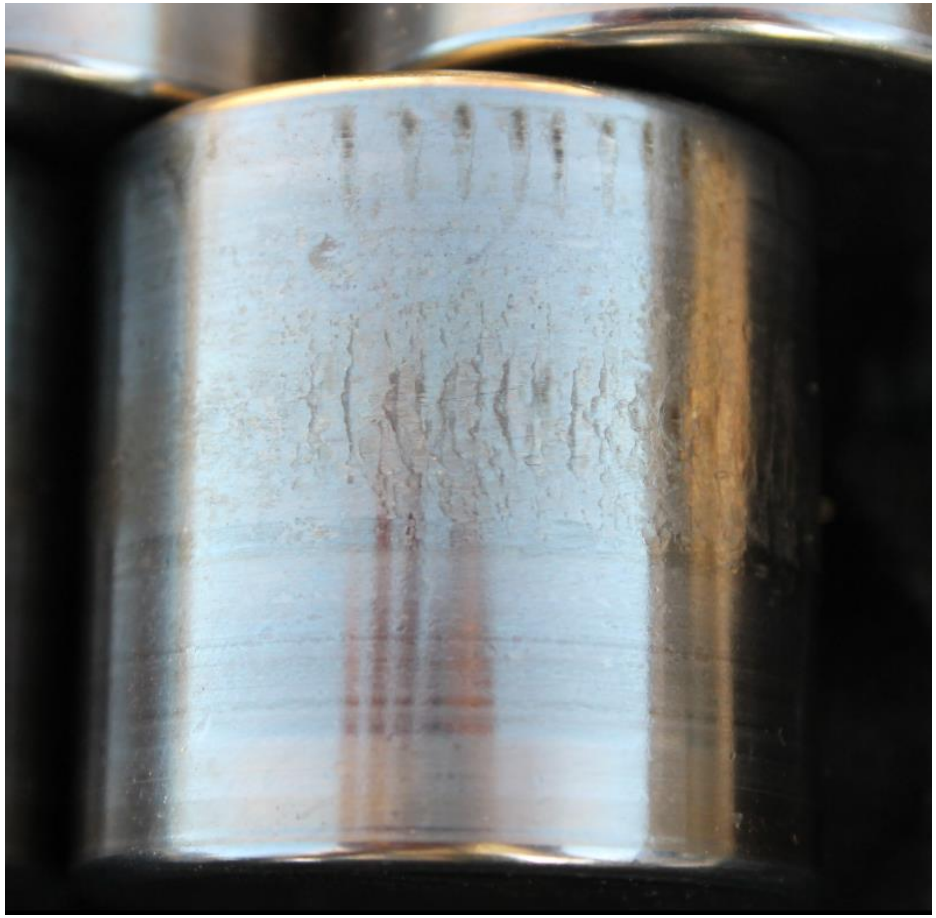
- Larger capacity bearing = longer life
- ‘Extra capacity’ bearings are now ‘normal’ – bigger is better
- Design consideration in ‘sales pitch’ is the ability to ‘downsize’ equipment
- Theoretical ‘bearing life’ calculation often influences bearing selection



# CASE STUDY 2 – Electric Motors

- All rolling element bearings require a minimum applied load
- Excess lubricant (grease) can influence this minimum load
- Normal practice is that equipment is rebuilt and the option of reducing shaft and housing dimensions is not practical

# CASE STUDY 2 – Electric Motors



Material Smearing/melting

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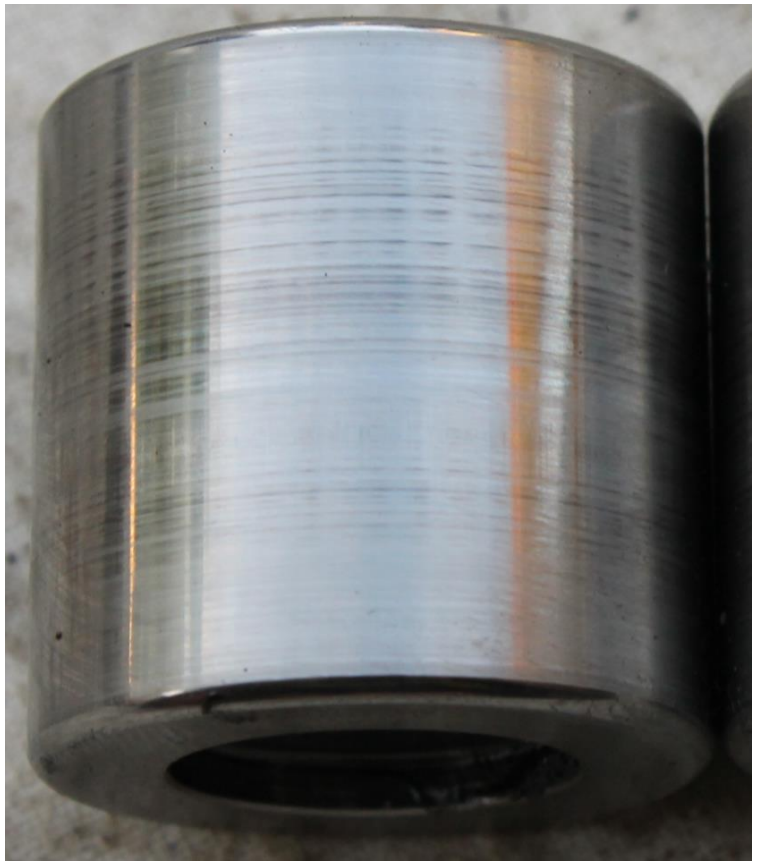

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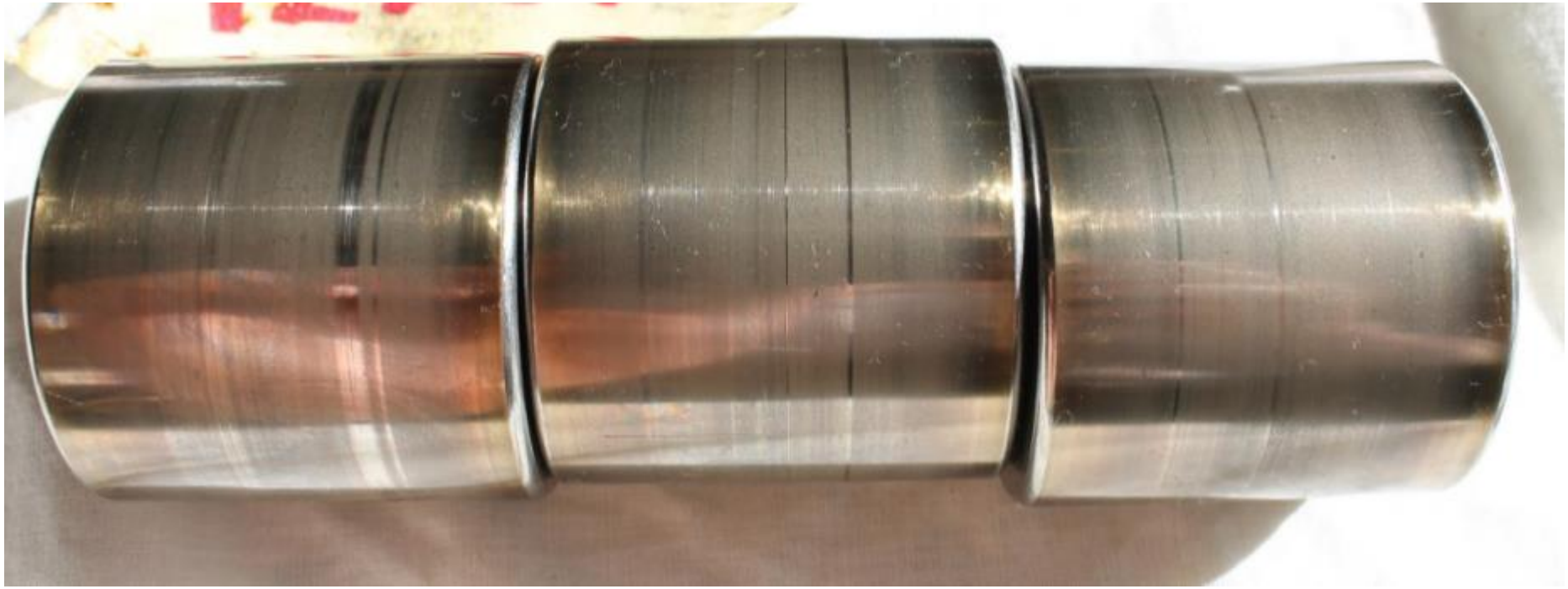

Heat Discolouration/adhesion/circumferential scratching

**UNDER LOADING**

# CONCLUSION

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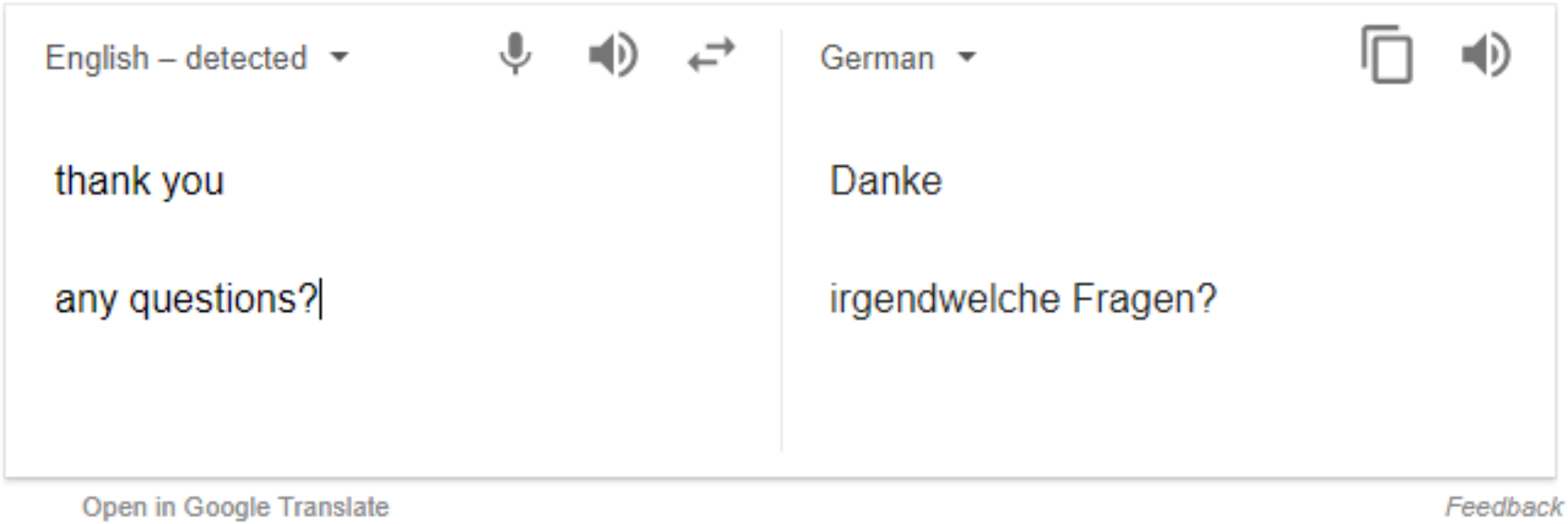
- Understanding the fundamentals of the potential failure modes
- Reviewing and confirming the failure mode(s) provides accurate information for corrective action(s) allowing confidence for IMPROVED PLANT RELIABILITY

# Questions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German
thank you
Danke
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