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BEARING RELIABILITY CONFERENCE & EXPO

Conference:

Making Bearings Reliable

Per Arnold Elgqvist

Director,

TRIBOLOGIA APLICADA, S.A. DE C.V.

proactivo.news@gmail.com

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Bearing Reliability

¡It's very easy to achieve Reliable Rolling Element Bearings! (Specially when you know how!)

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Knowing and applying the

Best Practices

as working methods
most bearing premature failures can be avoided in the industry.

The Best Practices to achieve bearing reliability are very simple and logical and

several of them do not even require extra costs or additional investments.

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¿Which are these

Best Practices

for Bearing Maintenance?

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Some of the very Best Practices for Bearing Maintenance are:

- ***The Right Bearing for each and every Application.***
- ***Keep the Bearings clean (Virgins) until their Mounting.***
- ***Avoid Handling Damages (Impacts on the Balls hurt).***
- ***The Correct Fits and Quality on Shafts and in Housings.***
- ***Avoid Mounting damages.***
- ***The Correct Lubrication for each and every Application.***
- ***Avoid unnecessary Preventive Maintenance through Predictive and Proactive Maintenance.***

Don't Generalize!!!!!

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¿How can we avoid this type of failures?

¡This bearing 241/900 with a weight of 3.3 tons lasted for 105 hours in operation!

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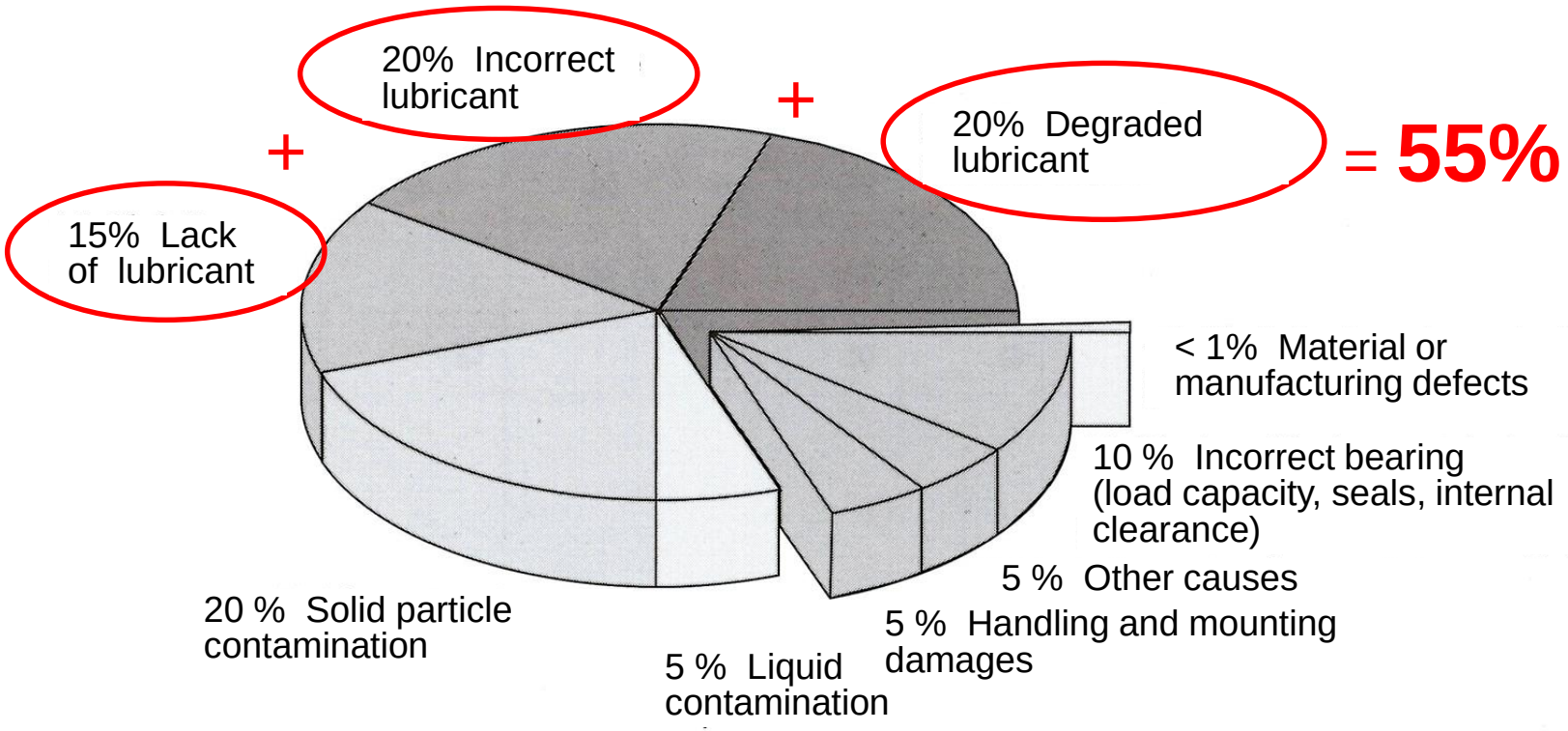
How many failures are caused by incorrect lubrication?



Ref. FAG

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A correct lubrication must include ……

- **The selection of the correct lubricant.**
- **Applied with the correct system.**
- **Applied at the correct point.**
- **Applied with the correct quantity.**
- **Applied at the correct time.**
- **Applied by the correct person, knowledgeable and well trained.**

¿How can we assure the use of the right lubricant?

1. **Selecting the optimal lubricant for each and every application.**
2. **Specifying at least 5 properties, both for greases and oils.**

¡Don't generalize!

The persons responsible for the lubrication must be true <u>TRIBOLOGISTS</u>

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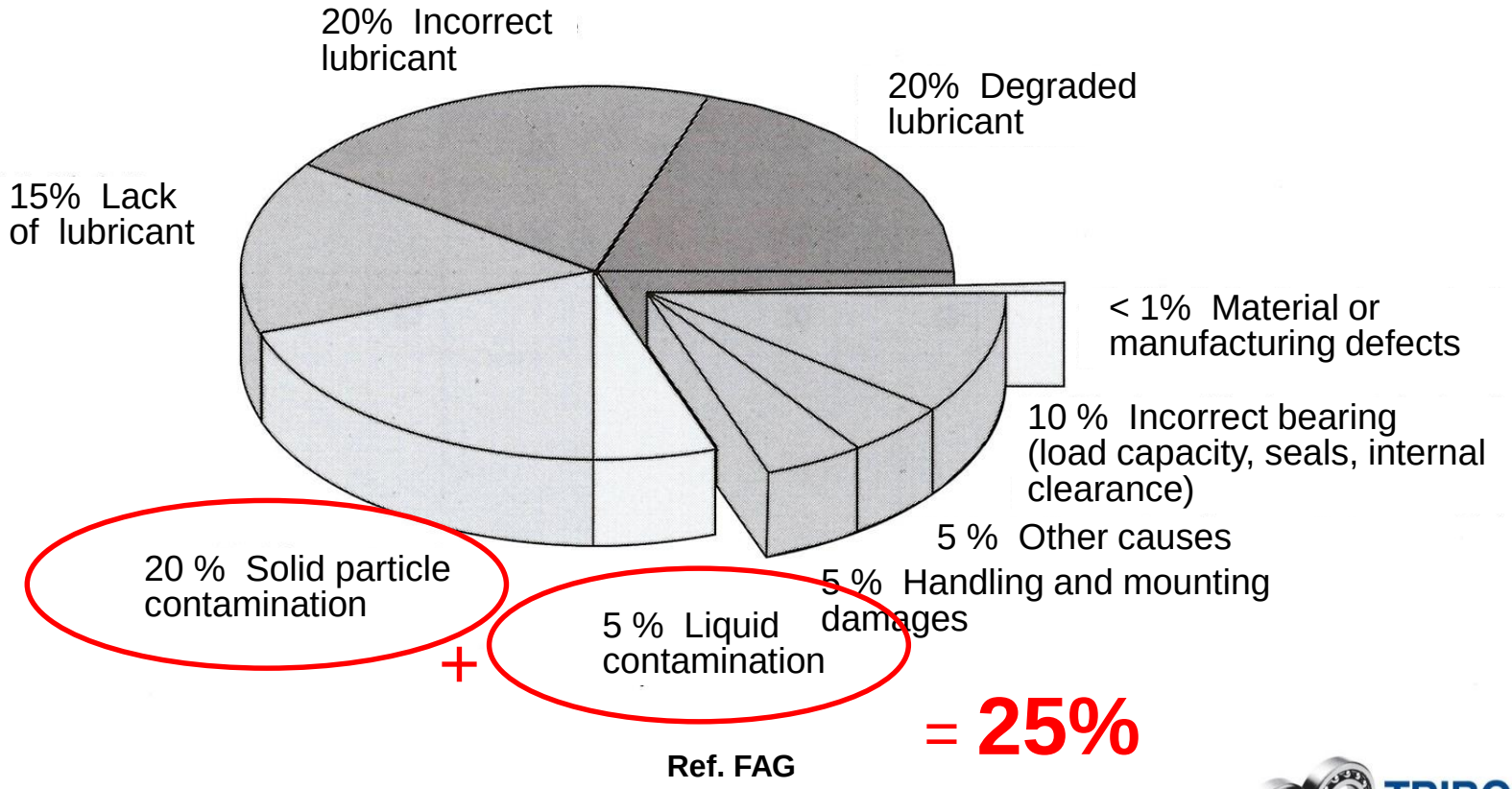
The particle contamination shorten bearing life according to the ISO 281/2 much more than we thought.



Ref. FAG

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The Benefits: Oil Mist vs. Oil Bath in Centrifugal Pumps

Bearing life calculation according to ISO 281/2:2000 utilizing SKF method

Application	CENTRIFUGAL PUMP
Bearings:	7208 BECBM in Back-to-Back arrangement
Loads:	Axial Fa: 7,000 N Radial Fr: 500 N
Speed:	1800 rpm

	Operating Temperature	Contamination Level (Calc. Factor)		Actual Viscosity v	Viscosity Relation v/v_1	Factor a_{SKF}	Bearing Life L_{10nm}
	°C		η_c	cSt	κ		Hours
	OIL BATH LUBRICATION			Mineral Oil ISO VG 68			
~~1~~	~~70~~	~~Normal ISO 18/15/12~~	~~0.5~~	~~20.2~~	~~1.5~~	~~6.3~~	~~32,000~~
2	70	Moderate Contamination ISO 20/17/14	0.2	20.2	1.5	1.7	8,970
3	70	Heavy Contamination ISO 22/19/16	0.1	20.2	1.5	0.9	4,610
	OIL MIST LUBRICATION			Mineral Oil ISO VG 68			
1	60	Normal ISO 18/15/12	0.5	28.7	2.1	8.8	45,400
1	60	Improved Cleanliness ISO 16/13/10	0.8	28.7	2.1	24.7	127,000

Ref: Conference by Per Arnold Elgqvist, May 2005, STLE 2005 Annual Meeting, Las Vegas, USA

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My recommendation:

"Bearings should be kept as Virgins until their mounting"

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¡Wrong Bearing is the 2nd biggest cause for bearing premature failures!

¿Why do I say this?

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The lack of knowledge of bearing designations is the main reason for the usage of wrong bearings:

Examples (Suffixes):

What do the suffix C3 indicate?

Are bearings with the suffix 2Z or ZZ really sealed?

For which bearing types is it indispensable to specify the type of cage?

What indicates CB in SKF or UA in FAG?

¡Wrong Bearing is the 2nd biggest cause for bearing premature failures!

<u>Example</u> (Suffixes):

Which is the importance of the suffixes *CB* for SKF and *UA* for FAG bearings of the type 7 (Single row angular contact ball bearings)?

Simple example of wrong Bearing:

Monophasic electrical motor: Bearing 6203-2Z works perfect.

Automotive alternator: Bearing 6203-2Z won't work!

1760 RPM vs. 16,000 to 20,000 RPM
Mostly clean environment vs. dusty and hot environment (+ motor washings)!

Bearings for alternators therefor need:
Greater internal clearance than Normal +
High temperature grease +
Contact seals.

Look at the real problem: The enormous world of suffixes.

Examples (SKF):

6205-2RS1 NR TN9 / P63 LT20C VB123

23064 CC K / HA3 C084 S2 W33

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Material	Texto Complementario	Ref. SKF
100010463	SKF 7310	7310 BECBM
100010505	SKF 7310BG / ROLLWAY 7310BCB / 7310 BECB	
100010505	SKF 7310BG / ROLLWAY 7310BCB / 7310 BECB	
100010505	SKF 7310BG / ROLLWAY 7310BCB / 7310 BECB	
100010505	SKF 7310BG / ROLLWAY 7310BCB / 7310 BECB	
100010505	SKF 7310BG / ROLLWAY 7310BCB / 7310 BECB	
100010505	SKF 7310BG / ROLLWAY 7310BCB / 7310 BECB	
100010505	SKF 7310BG / ROLLWAY 7310BCB / 7310 BECB	
100010562	SKF 7310 B	
100010562	SKF 7310 B	
100010562	SKF 7310 B	
100010562	SKF 7310 B	
100010562	SKF 7310 B	
100010562	SKF 7310 B	
100010562	SKF 7310 B	
100010586	FAG 7310BUO	
100024093	SKF 7310BG / ROLLWAY 7310BCB / 7310 BECB	
100026265	SKF 7310	
100026265	SKF 7310	
100026265	SKF 7310	
100026265	SKF 7310	
100026265	SKF 7310	
100026265	SKF 7310	
100026265	SKF 7310	
100026265	SKF 7310	
100030353	SKF 7310BG / ROLLWAY 7310BCB / 7310 BECB	
100038446	FAG 7310BJP	
100055771	X TODA MARCA 7310BECBY	
100055771	X TODA MARCA 7310BECBY	
100055771	X TODA MARCA 7310BECBY	
100055789	SKF 7310	
100080937	SKF 7310BEAG	
100080937	SKF 7310BEAG	
100125459	BYRON JACKSON PARTE NO. 7310	

Opportunities for the CMMS Systems

12 different SAP Numbers, but

<u>Not one single is correct</u>!

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How many of You can assure me that the Bearings in your warehouses are:

1. The *Correct* and

2. Are in Perfect Conditions (Virgins)

How shall a Warehouse be administrated?

As a Supermarket:

Package you open =

Product you must take out from the Warehouse

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Does this inspire Reliability?

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And these?

Some Key Messages:

"Bearings have First Name and Second Name"

"The Reliability starts with the Bearings in the Warehouse"

"The conditions of the Bearings in the Warehouse indicate the Bearing Culture in the Plant"

"The Warehouse must be administrated as a Supermarket"

"Bearings must reach their Mounting still being Virgins"

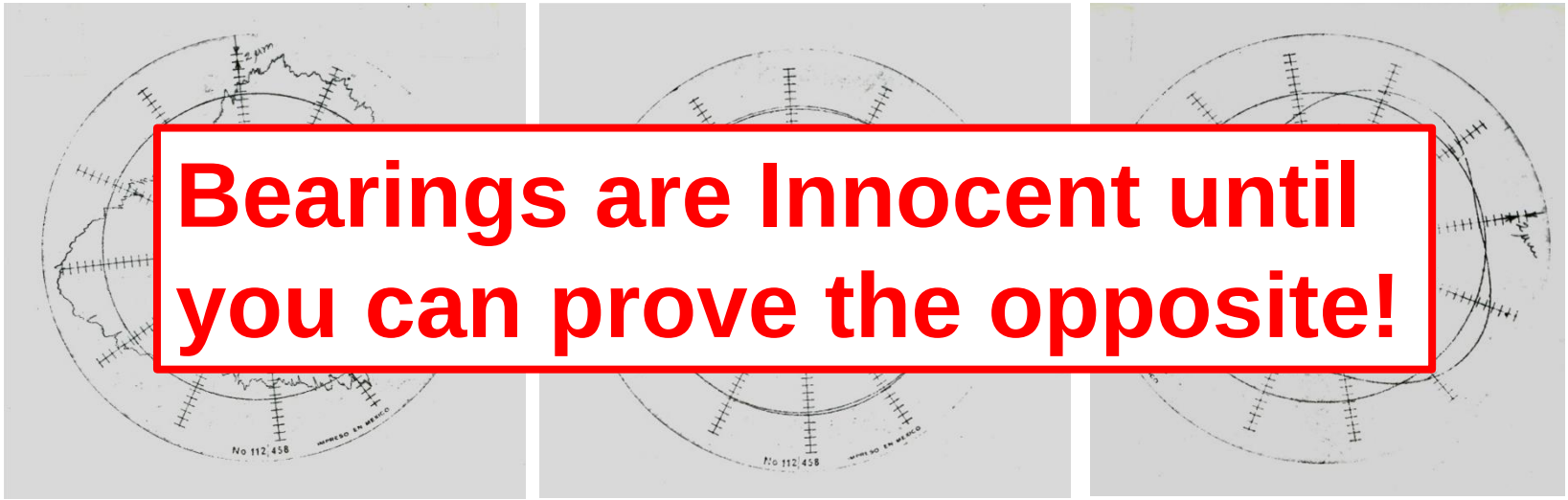
"Bearings are innocent until you can prove the opposite"

Bearing Fits on Shaft and in Housing:

Effects of out of roundness of bearing seating on bearings:

Example: Electrical motor:

Housing roundness	Roundness of the raceway before mounting	Roundness of the raceway after mounting



Bearings are Innocent until you can prove the opposite!

(Talyrond, resolution 2µm)

Bearing Mounting:

Mounting forces must always be applied to the ring you are mounting!

"Impacts on the Balls hurt"

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The Challenge for Maintenance:

"To do the correct job, at the correct moment and to do it correctly"

Result: Increased Efficiency

Advise: Implement Predictive, or even better, a Proactive Maintenance

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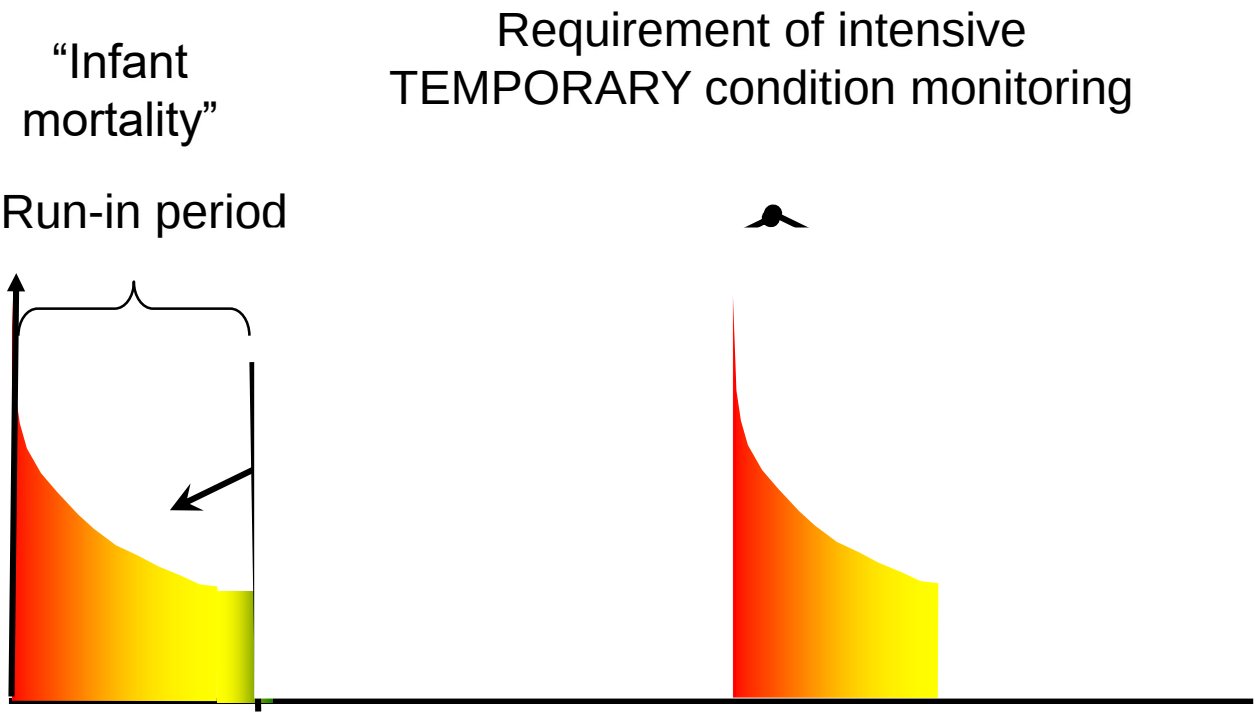
How is the life cycle of an equipment?



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Unnecessary Preventive Maintenance:
Unnecessary spending, new run in period, new risks of totally unnecessary failures!

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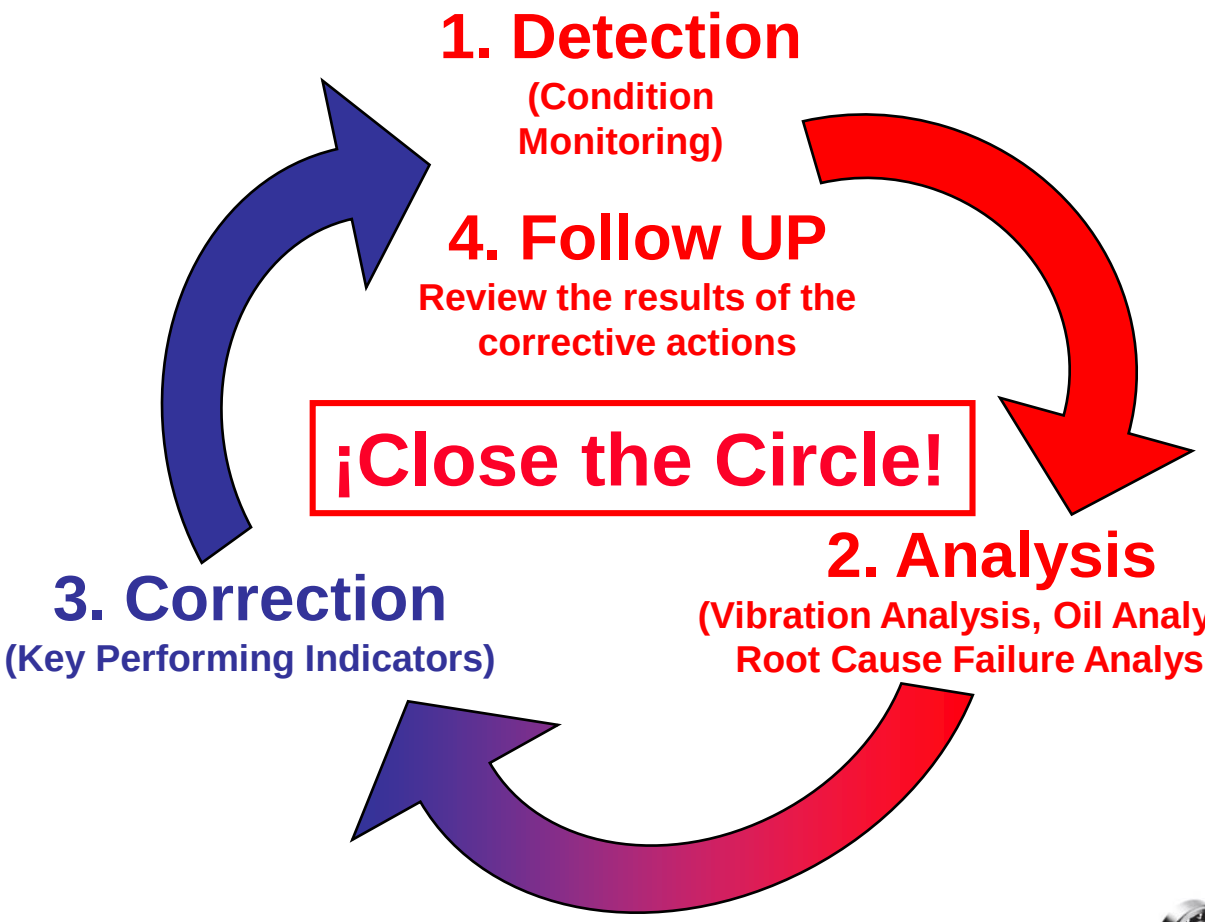
Don't forget to close the circle!



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Opportunity: My workshop Bearing Failure Analysis, tomorrow 10:45 to 11:45

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¡Thanks for your Attention and Good Luck!

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