FLUKE® Reliability

Root causes of lubricant degradation and how to prevent it from harming your machines

Ms. Sanya Mathura, MLE

Accelix™
Webinar Series

Sanya Mathura

Managing Director, Strategic Reliability Solutions Ltd.

- Author: Lubrication Degradation Mechanisms, A Complete Guide (CRC Press)
- ICML MLE certified (first in the Caribbean)
- Several years experience in the Lubrication and Reliability sector
- Master of Science, Engineering Asset Management
- Bachelor of Science, Electrical & Computer Engineering

Strategic Reliability Solutions Ltd.

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Agenda

01 Definition of Lubricant Degradation

02 Methods of Identifying Degradation

03 Lab Tests for Various Mechanisms

04 Dealing with Degradation

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POLL QUESTION No. 1

Which sector do you work in?

(Click only one answer)

- Engineering
- Oil & gas
- Manufacturing
- Other

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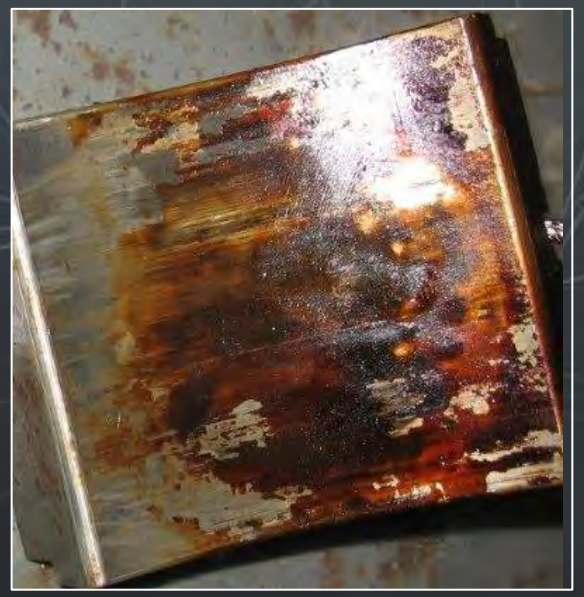
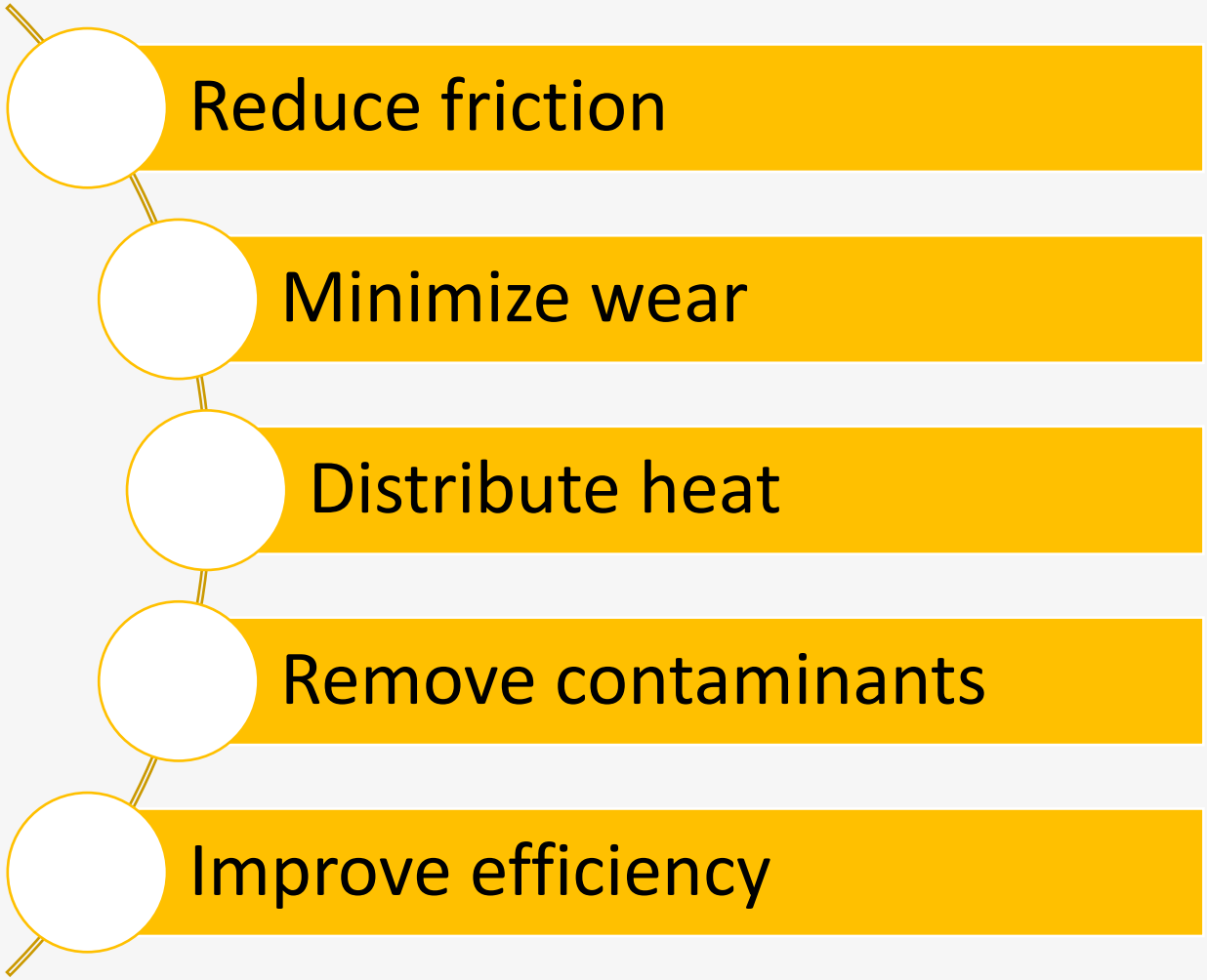
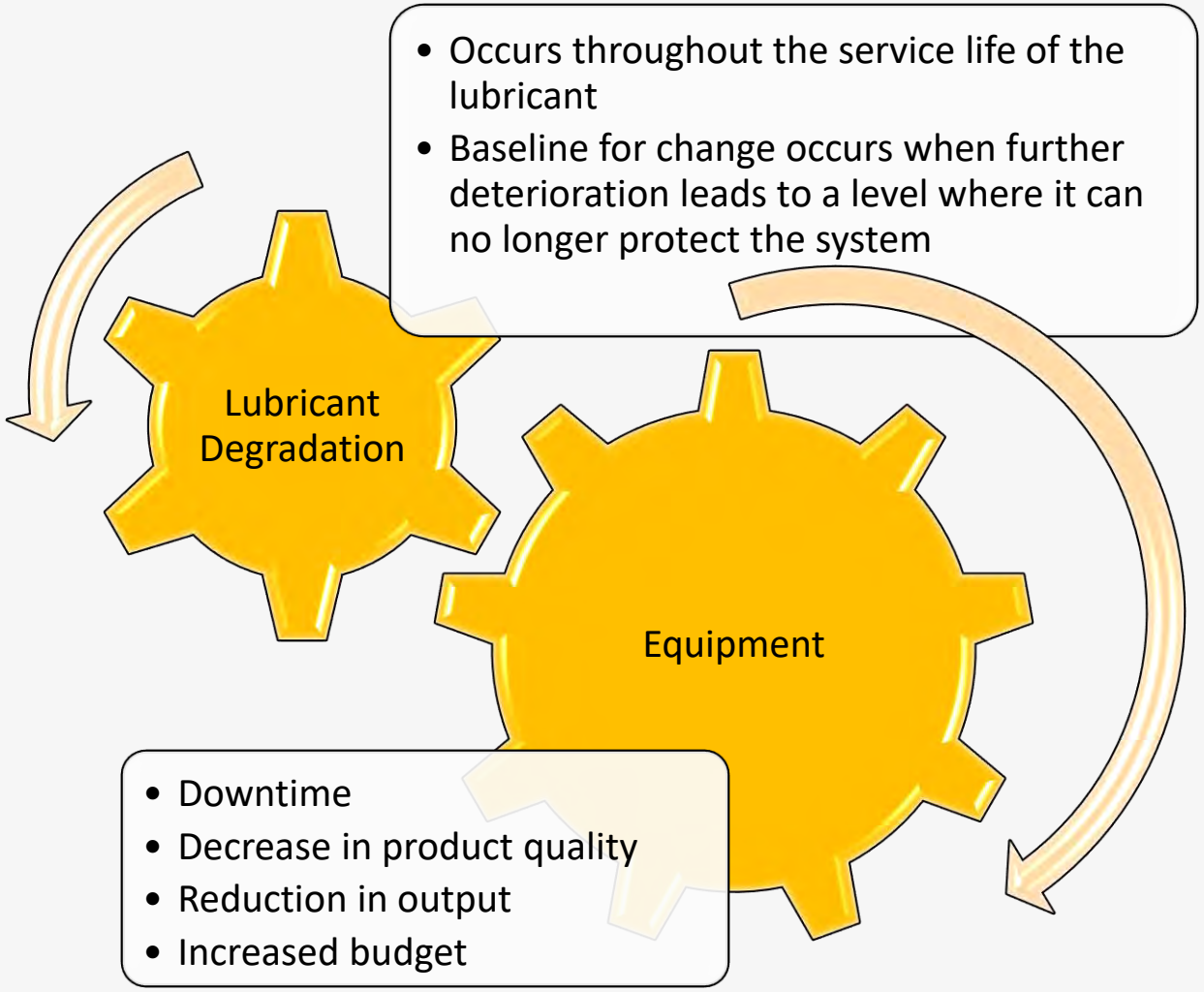


Definition of Lubricant Degradation

What are the functions of a lubricant?

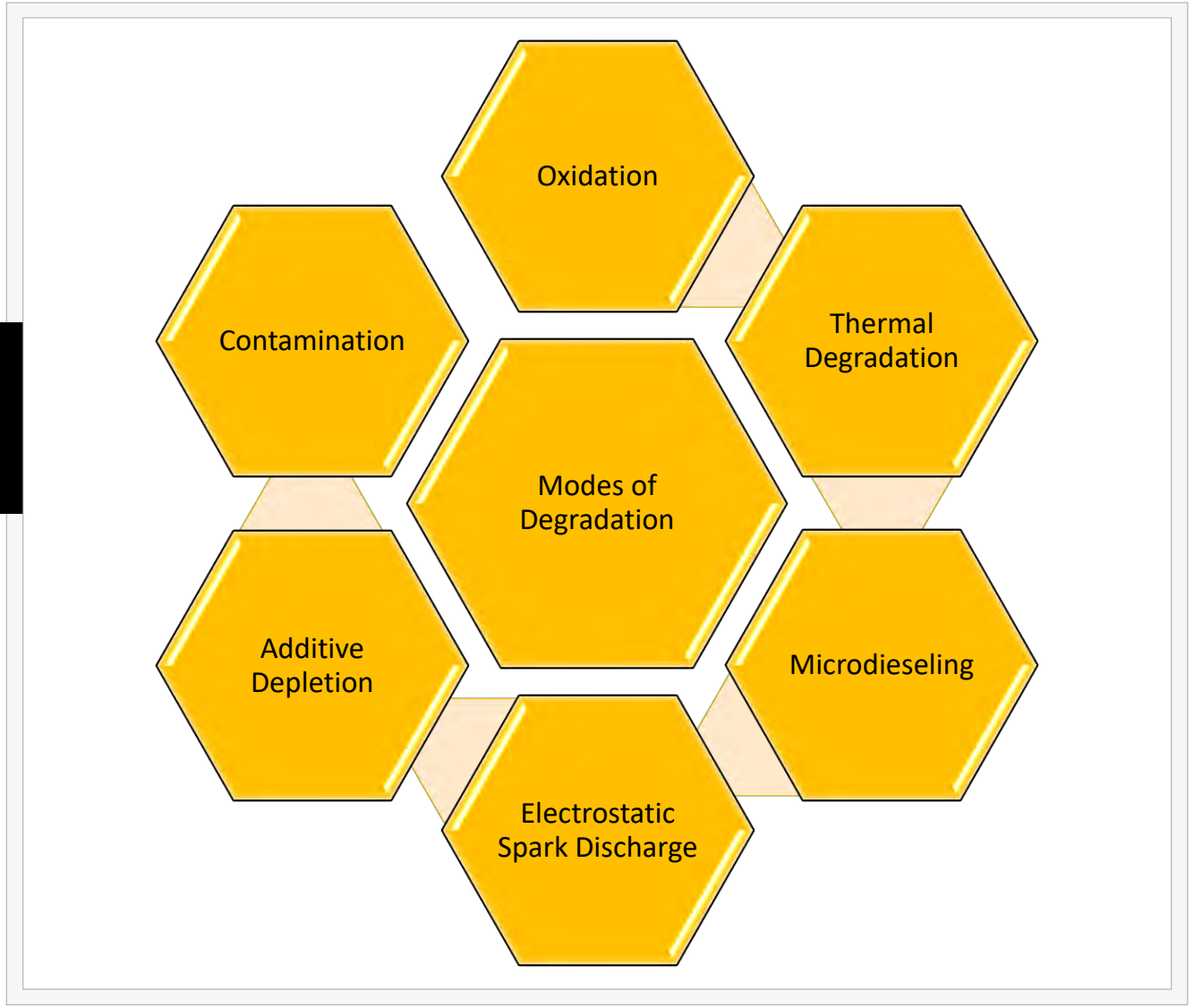


What does lubricant degradation mean for your equipment?



Lubricant degradation modes

These can also be classified by environmental triggers



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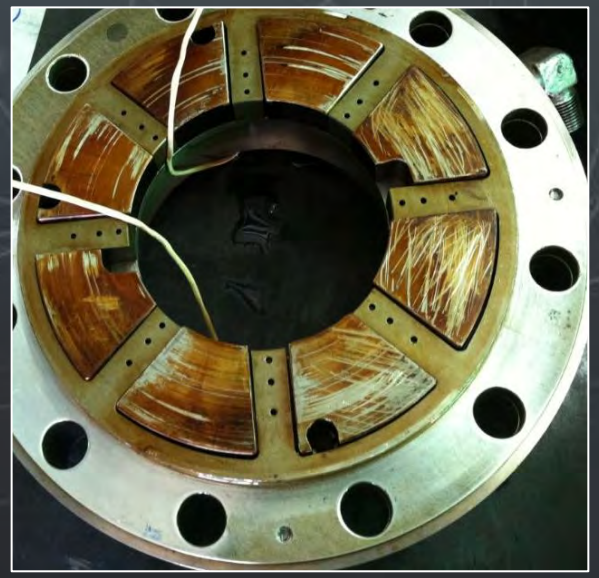
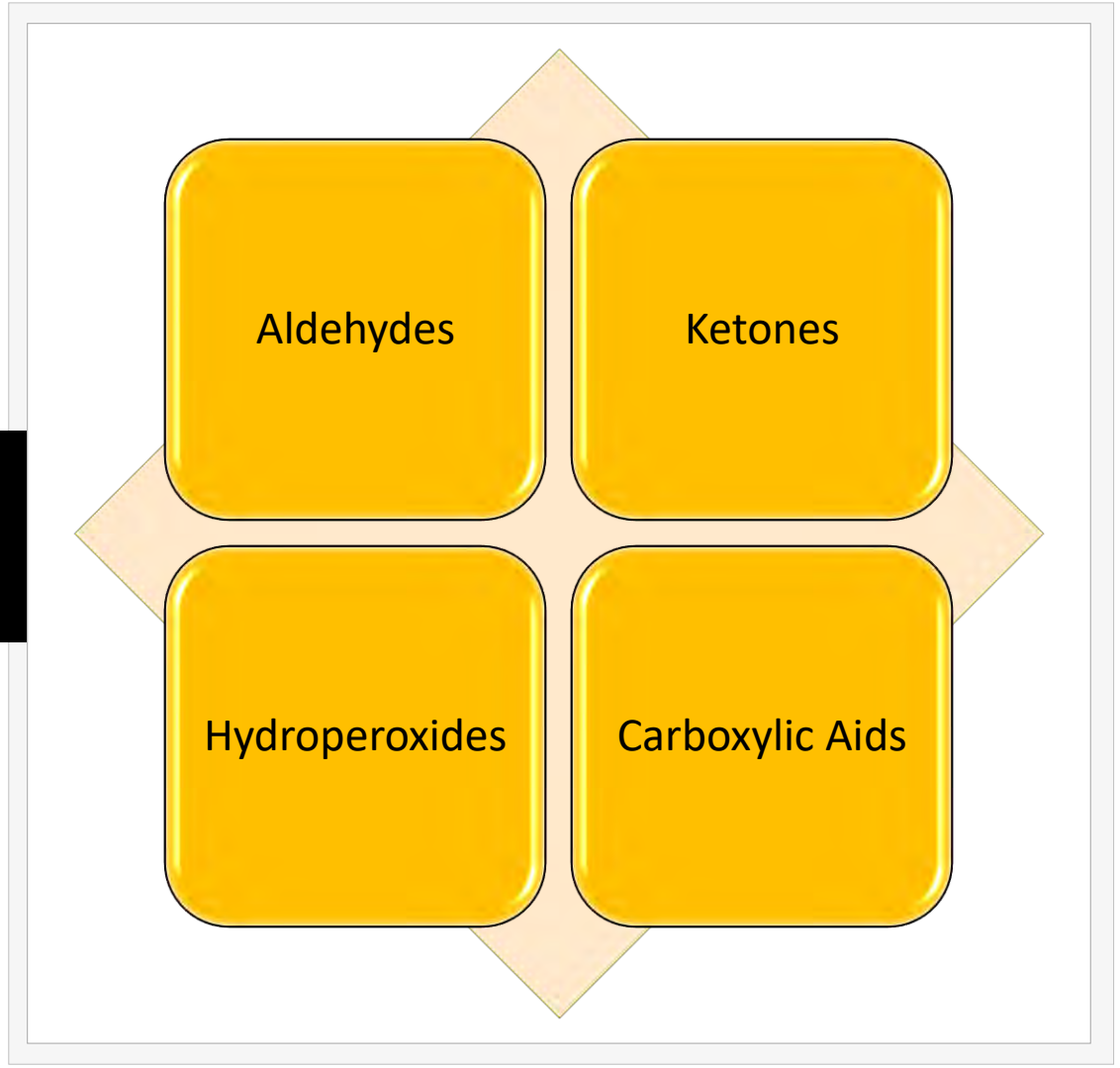


Methods of Identifying Degradation

1. What is oxidation?

Addition of oxygen to the base oil to form:



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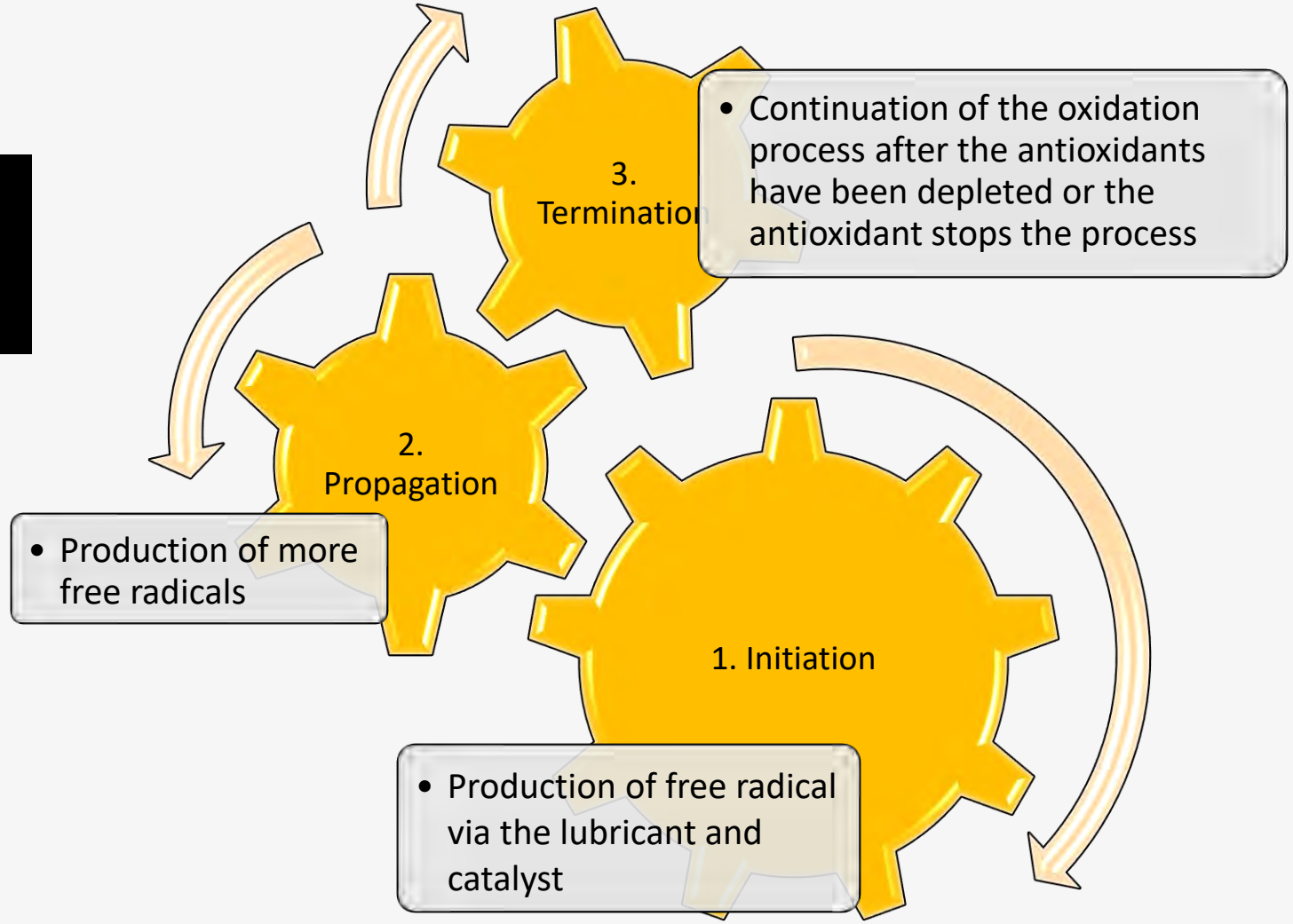
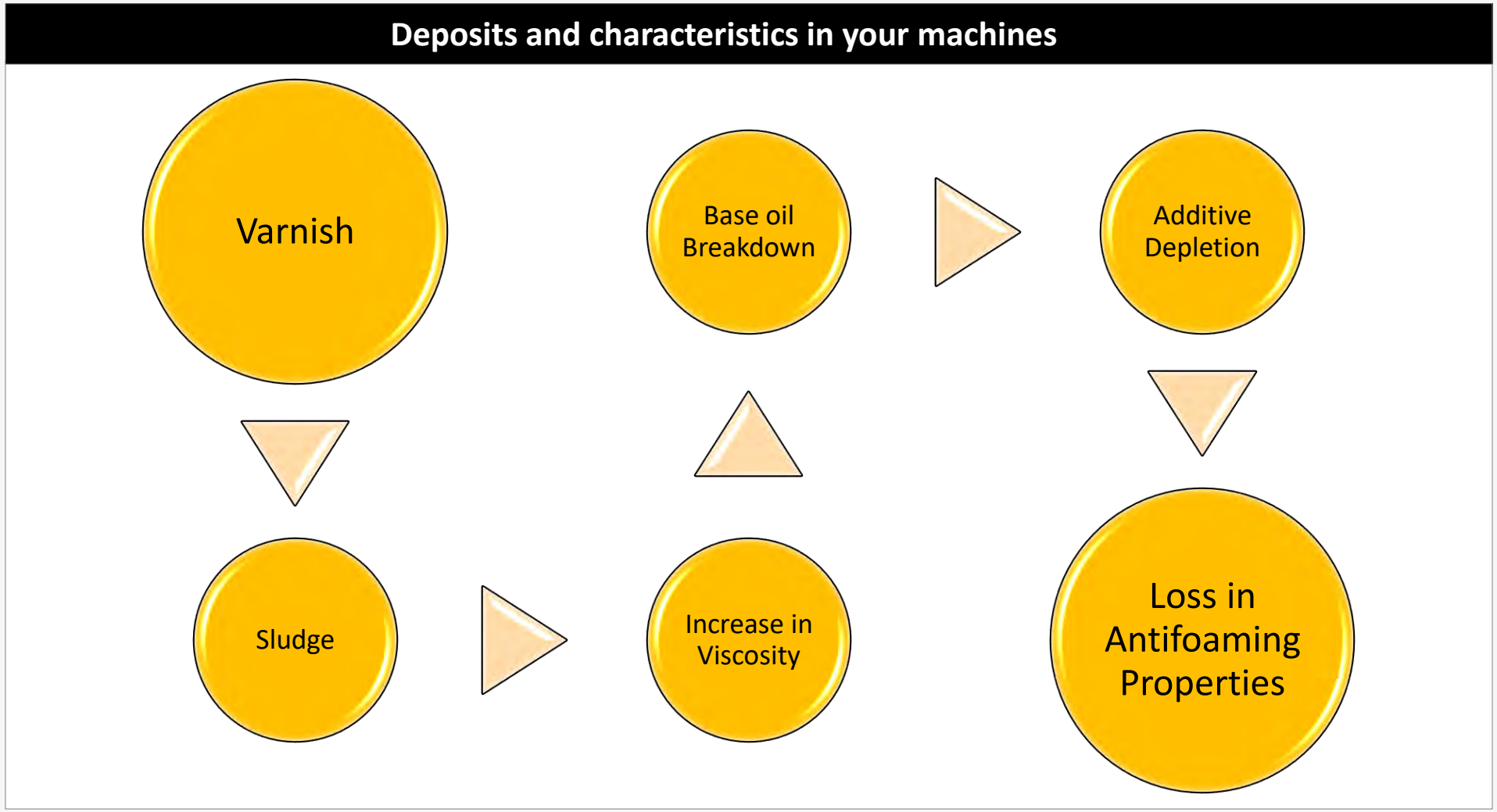
Stages of oxidation

Main causes of oxidation: oxygen and temperature

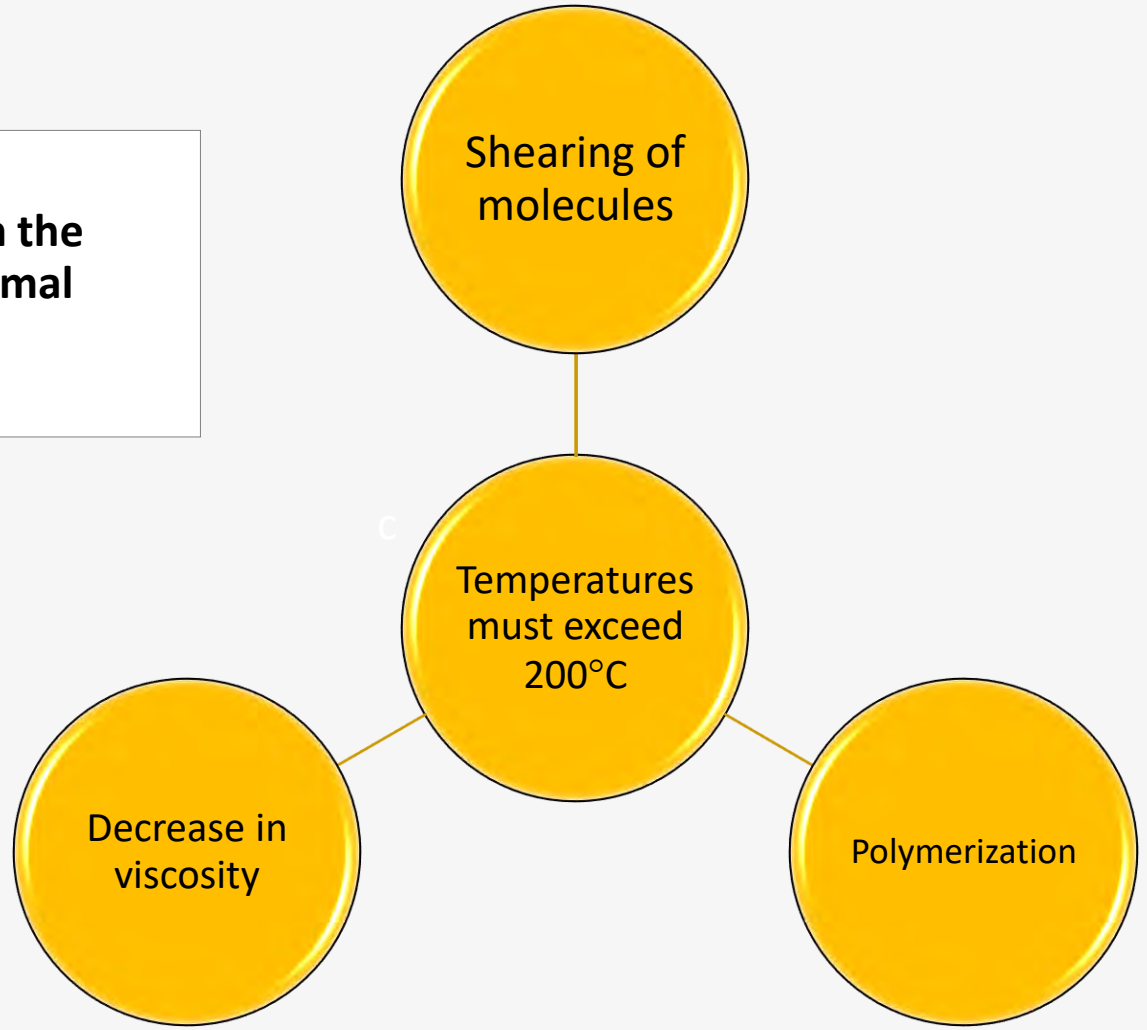


Results of oxidation

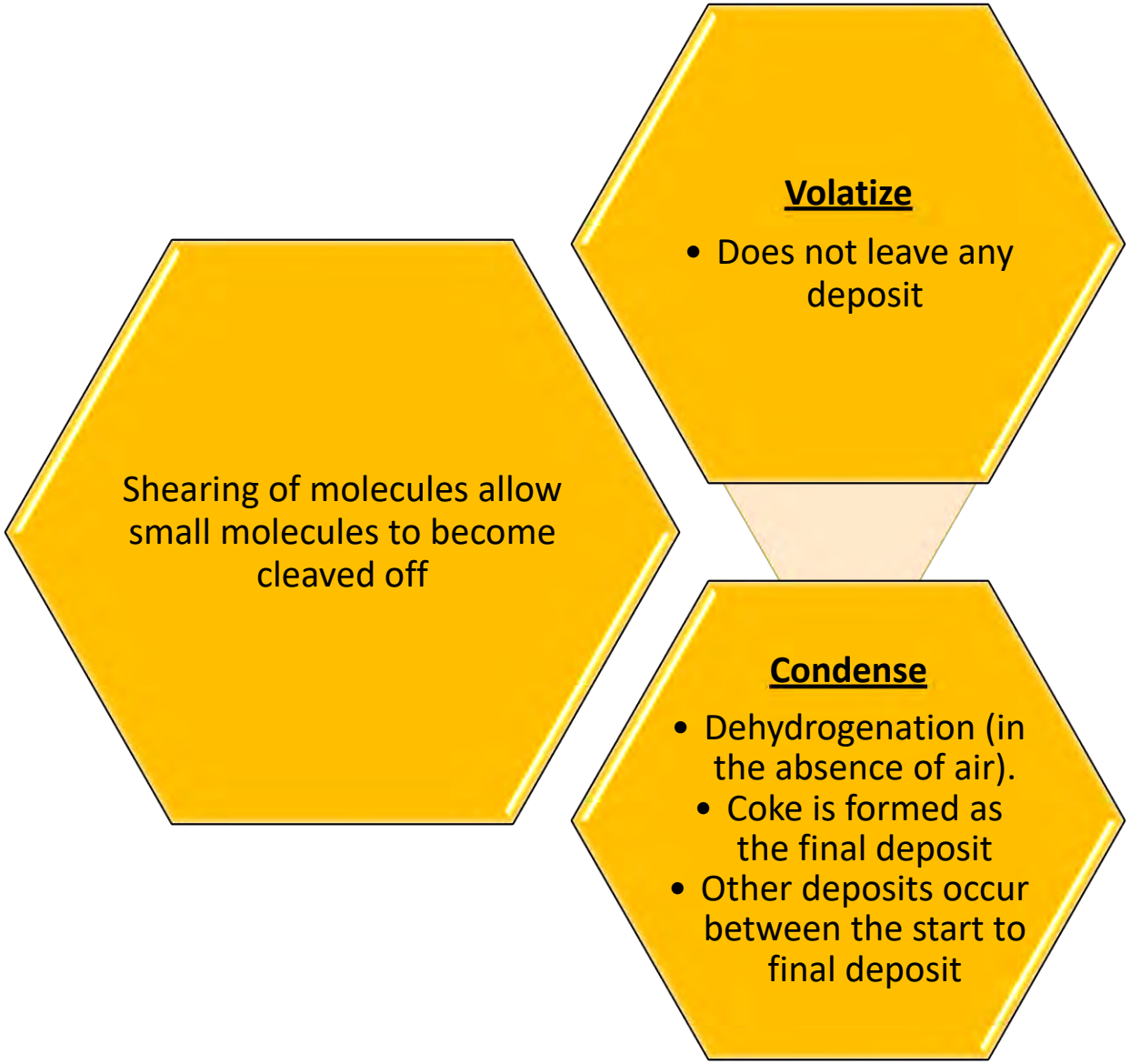


2. What is thermal degradation?

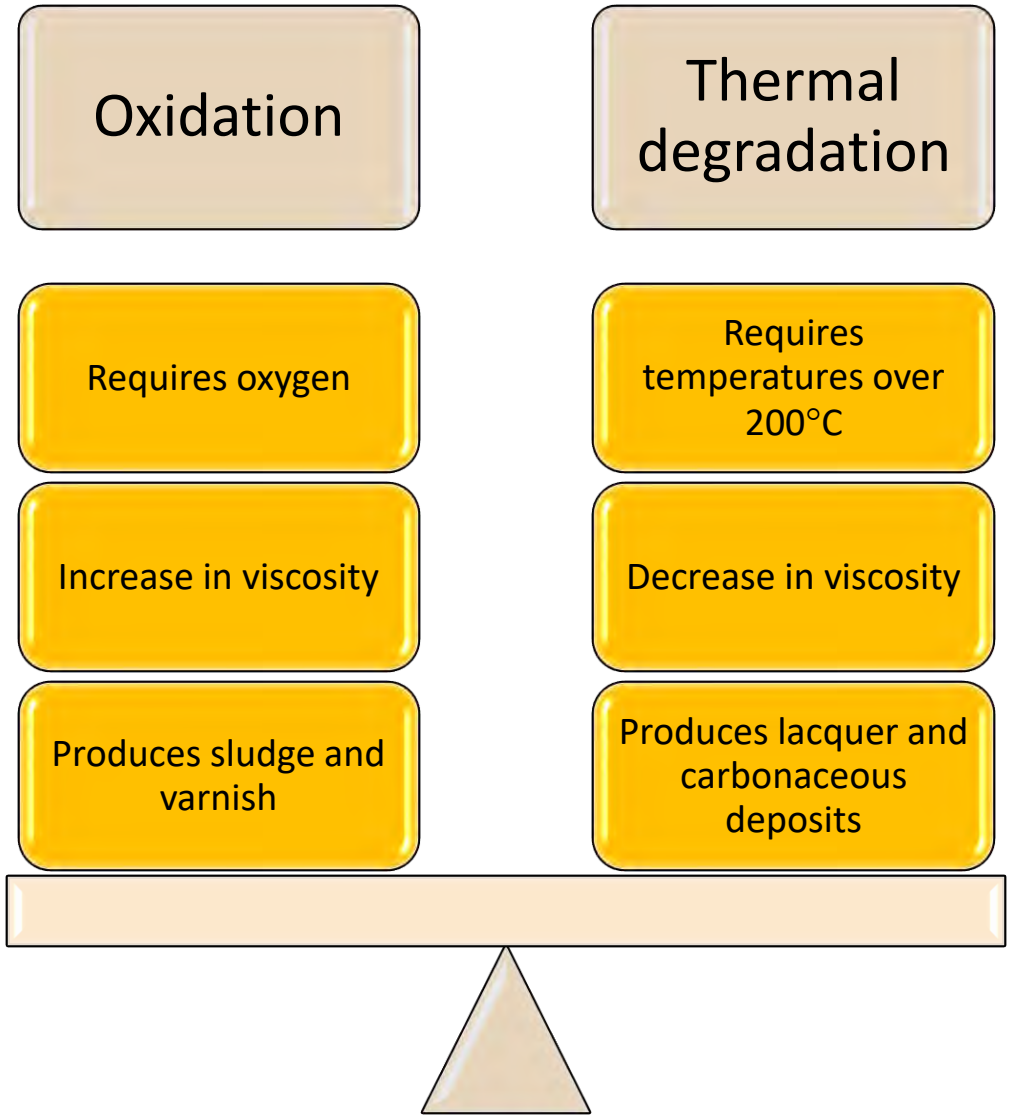
Thermal cracking occurs when the temperature exceeds the thermal stability point of the lubricant



Process of thermal degradation

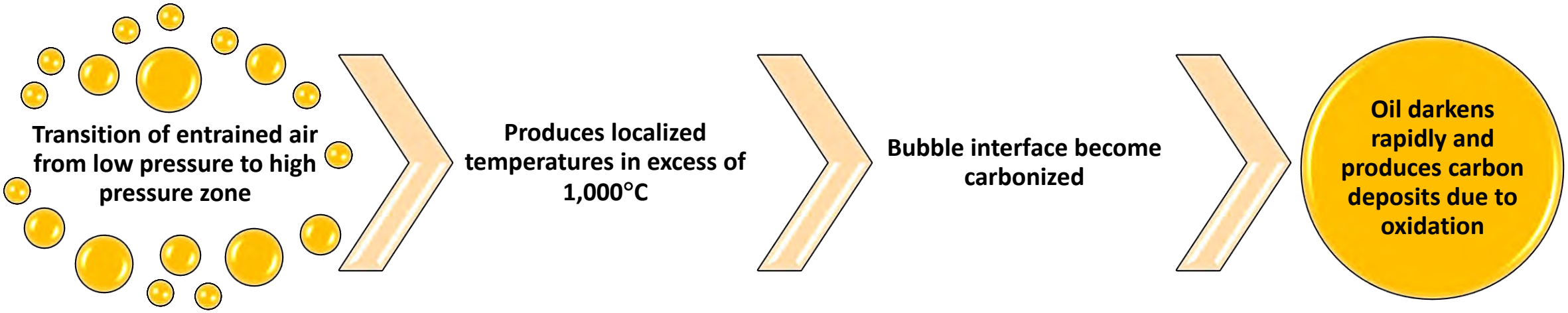


Oxidation vs. thermal degradation



3. What is microdieseling?

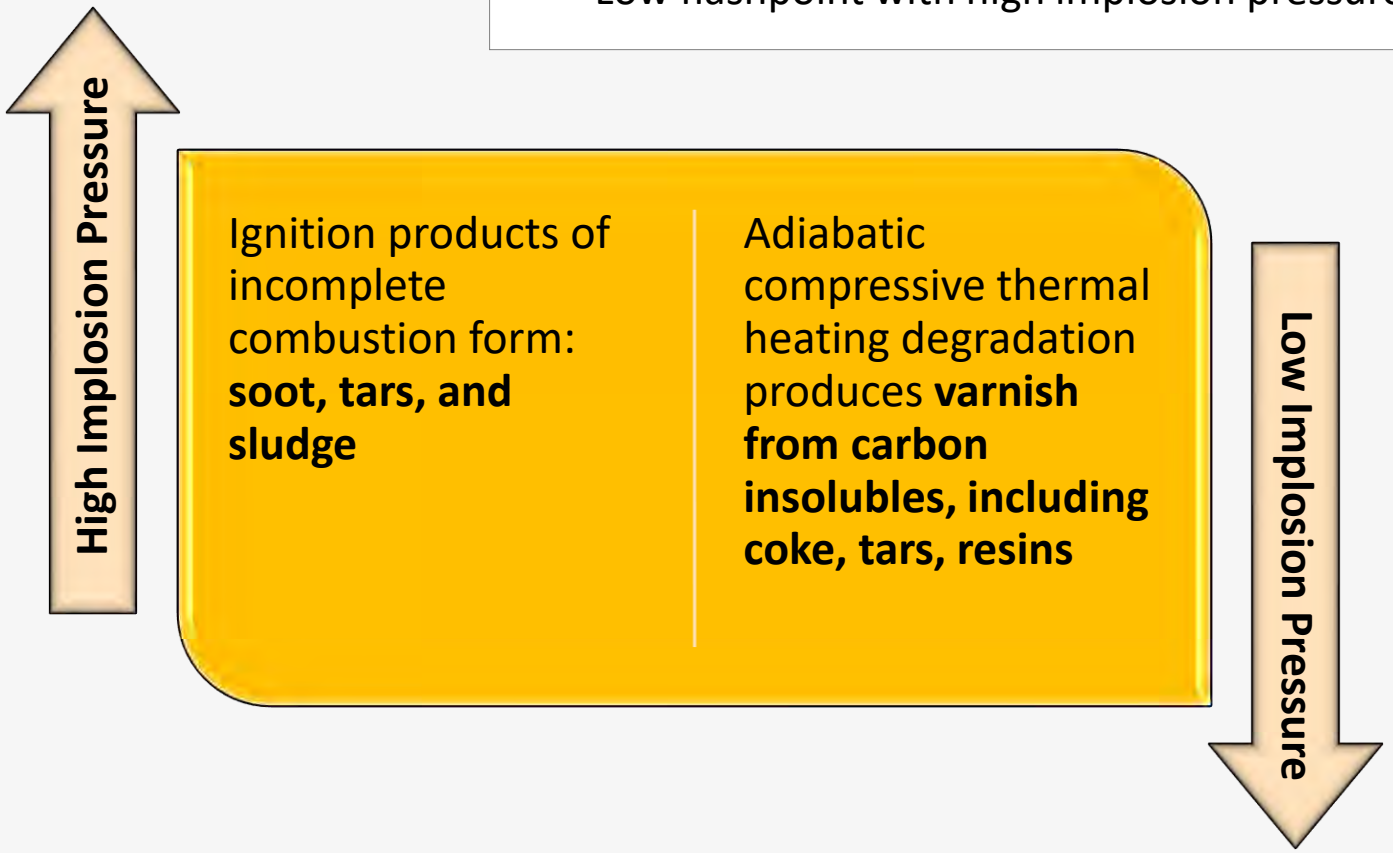
- **Also known as compressive heating**
- **A form of pressure induced thermal degradation**



Results of microdieseling

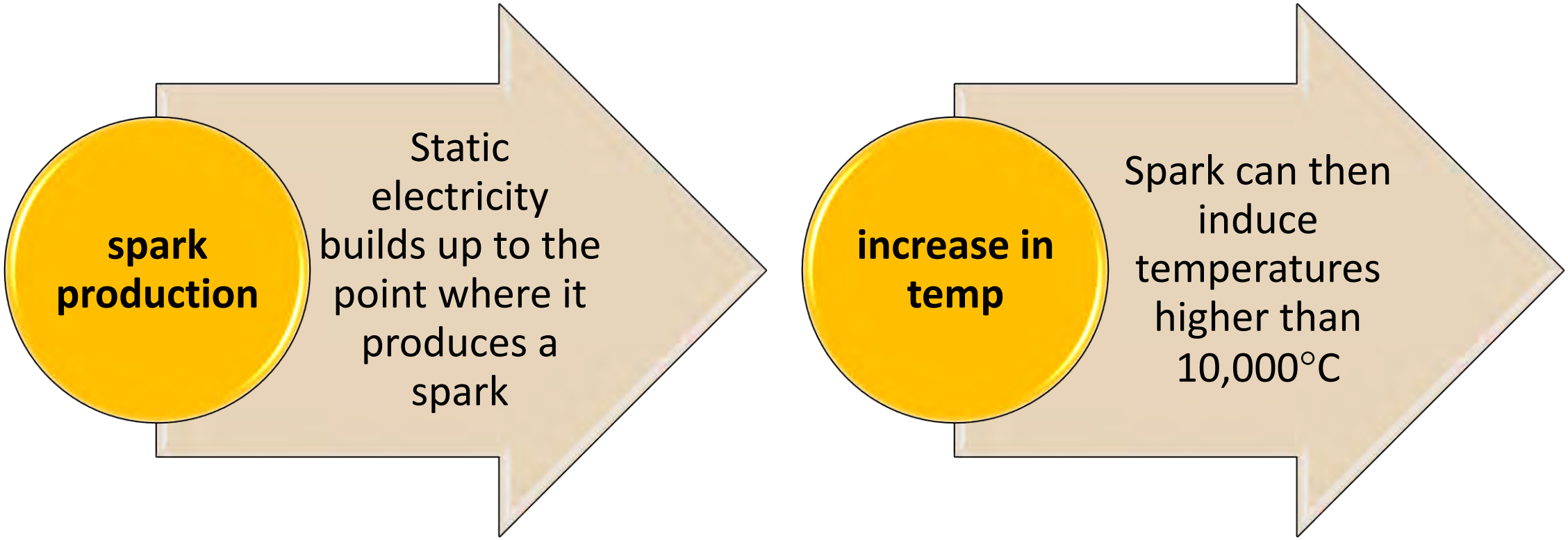
Conditions for microdieseling include:

- Low flashpoint with low implosion pressure or
- Low flashpoint with high implosion pressure

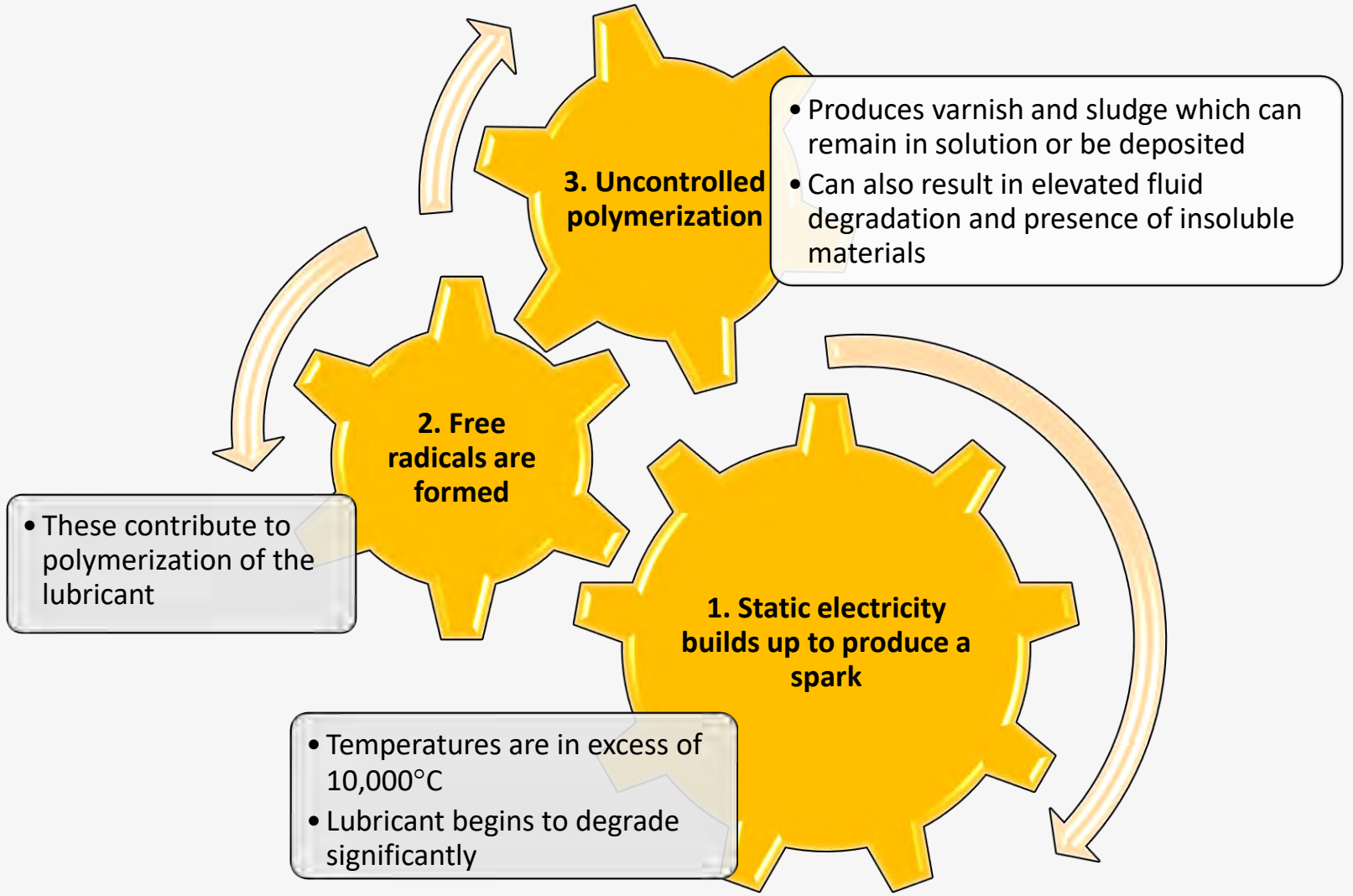


4. What is electrostatic spark discharge?

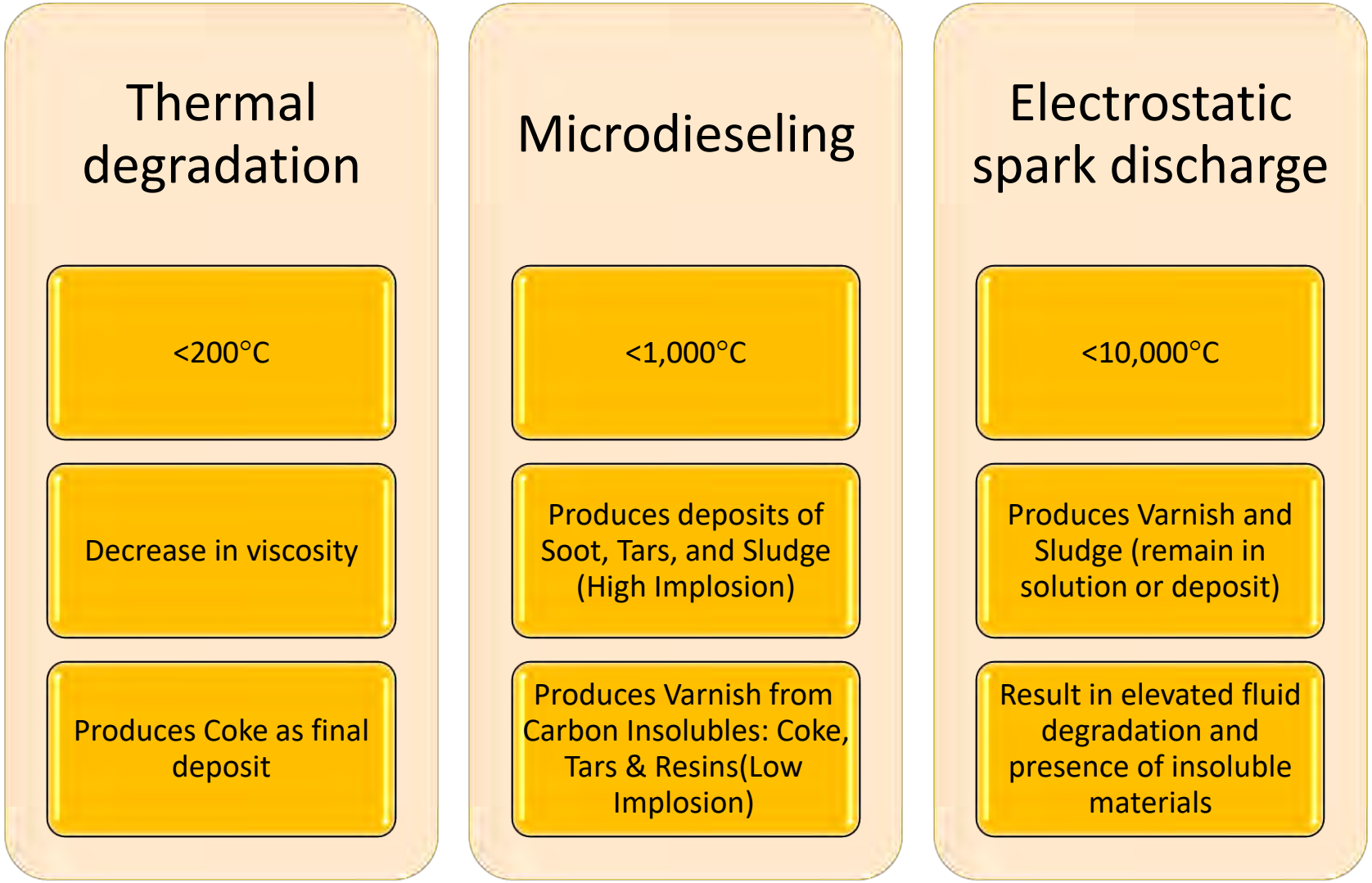
Static electricity occurs at a molecular level when dry oil passes through tight clearances



Stages of electrostatic spark discharge



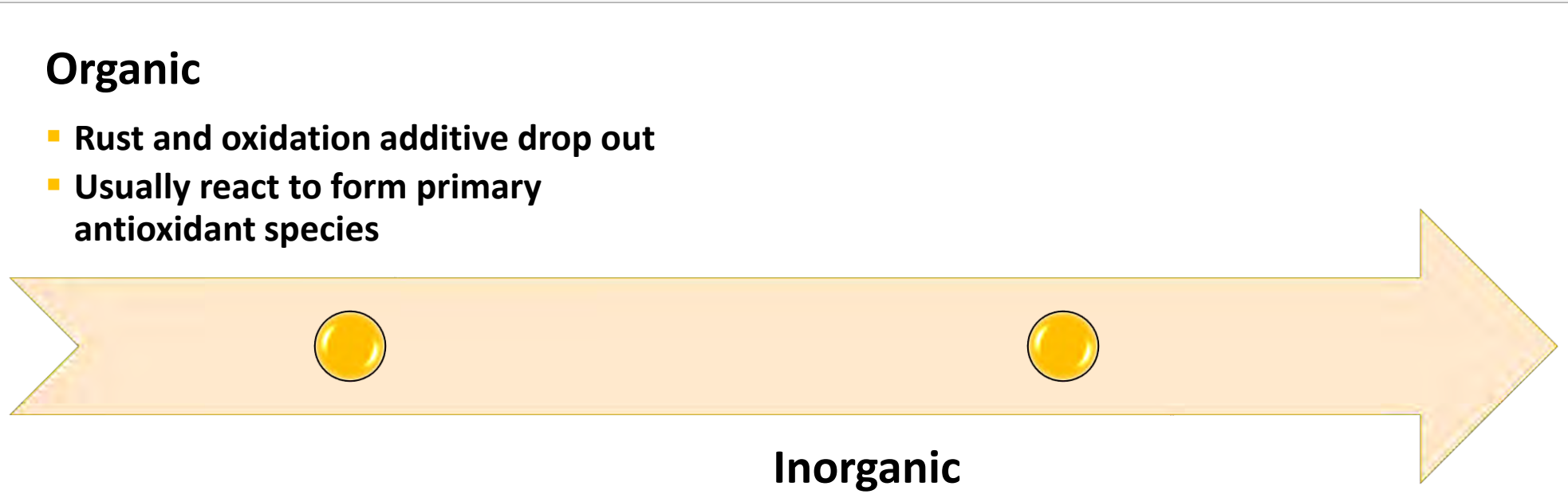
Thermal degradation vs. microdieseling vs. ESD



5. What is additive depletion?

Additives are sacrificial to protect the base oil. The nature of the deposit is dependent on:

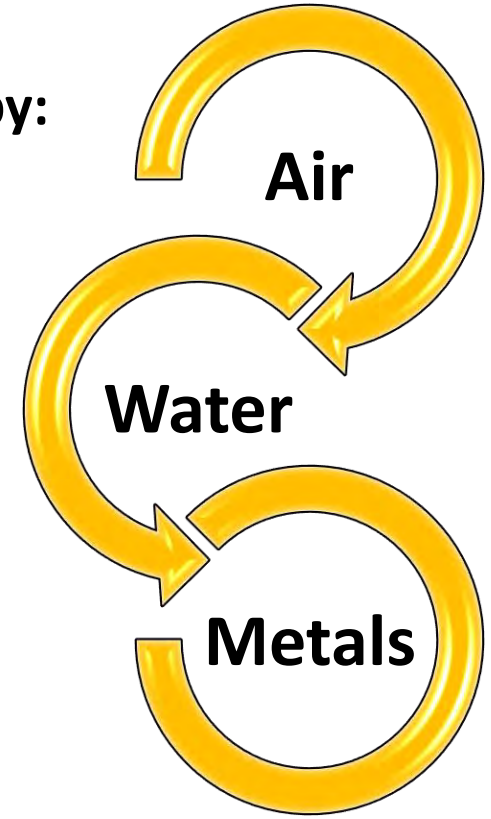
Type of deposit (additive depletion)



6. What is contamination?

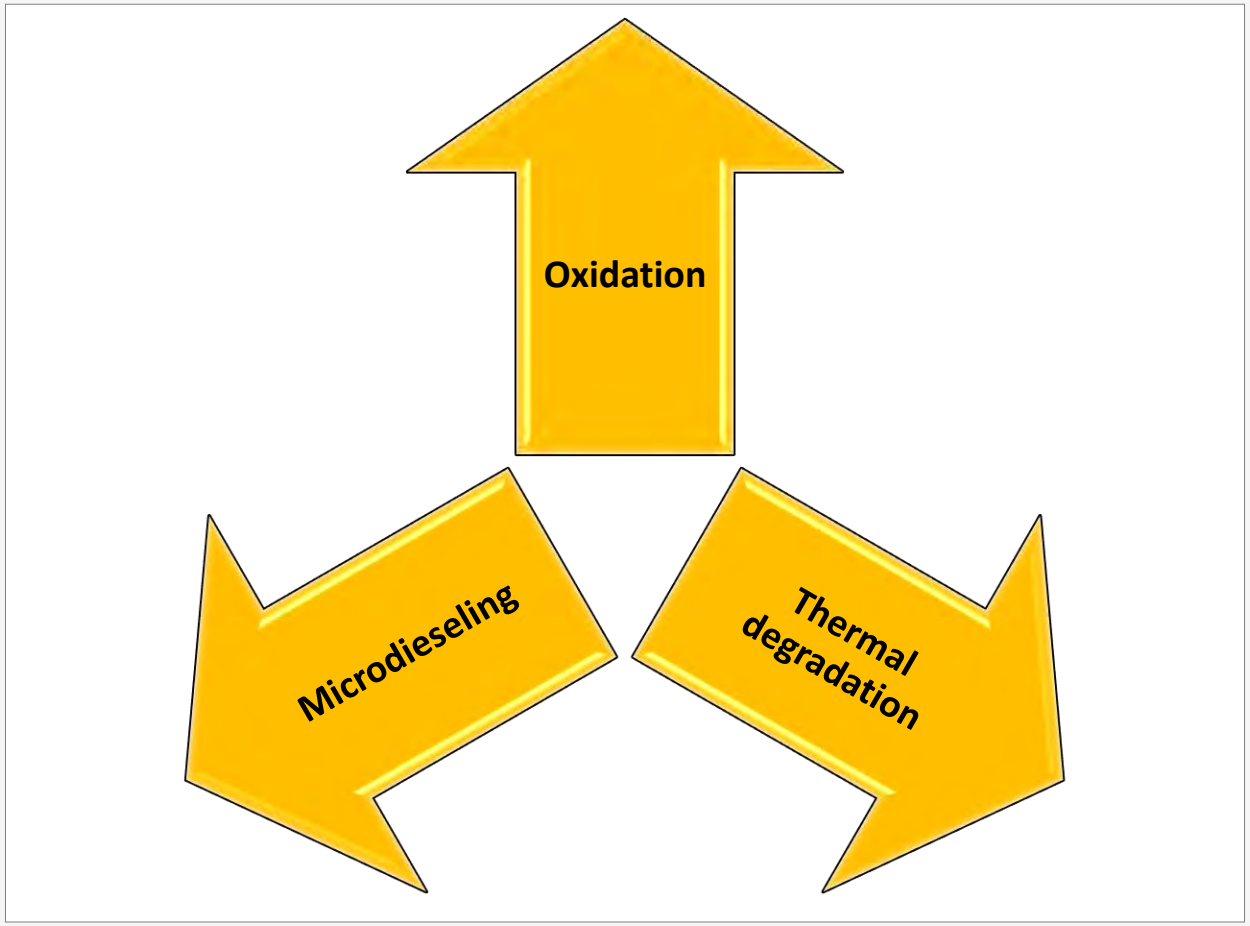
Any foreign material entering the lubricant and being used as catalysts

Can be classified by:



Types of degradation (contamination)

Contaminants can induce various types of degradation such as:



Lab Tests for Various Mechanisms

POLL QUESTION No. 2

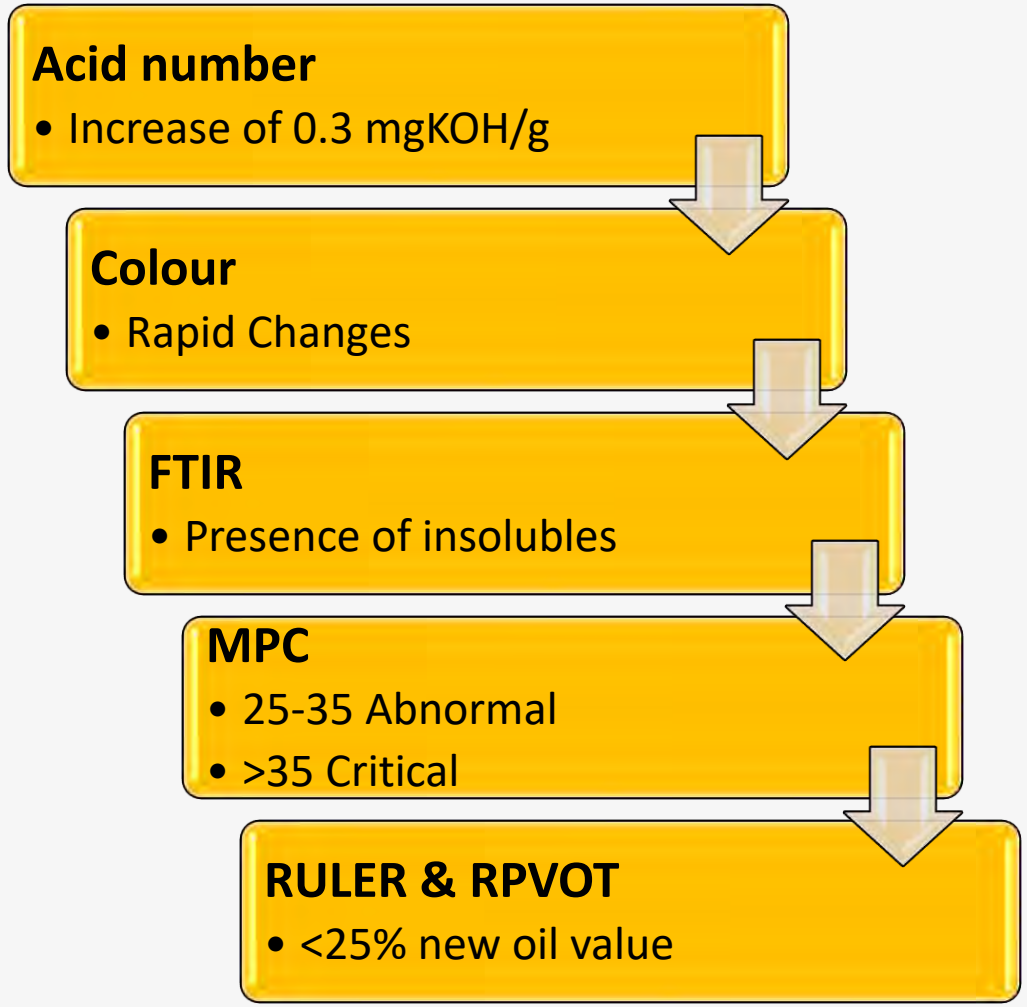
Which practice is most common in how you deal with lubricant degradation? (Click only one answer)

- Change the oil immediately and hope for the best
- Change the oil supplier
- Identify the root cause of the issue
- Bring in external parties to assist
- Something else

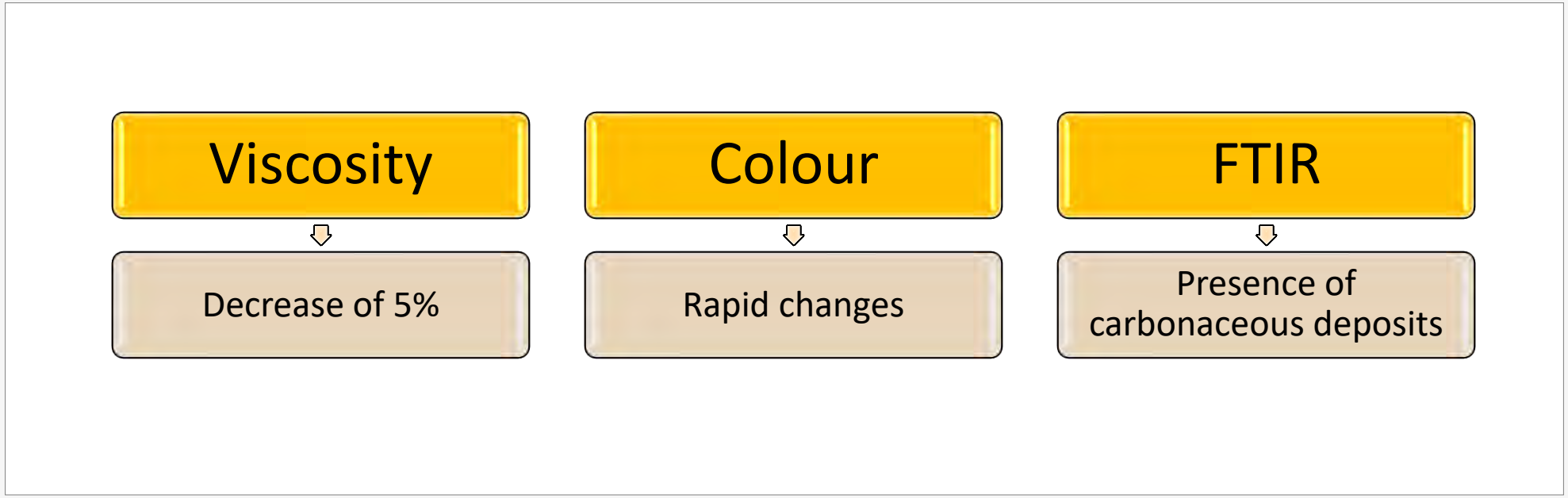
Lab tests for oxidation

Even though viscosity is not mentioned here, it should be used although it cannot verify if oxidation has occurred.

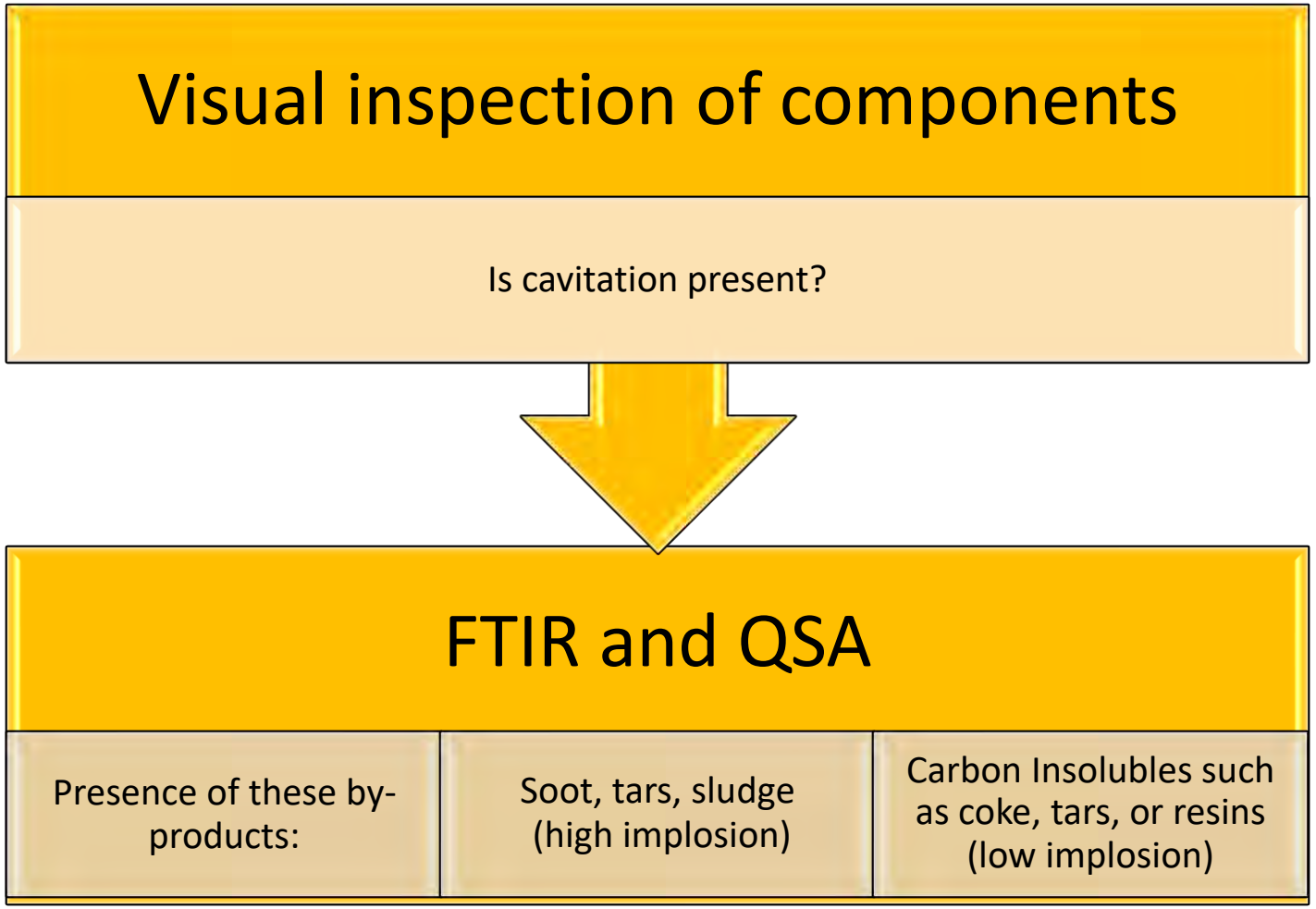
Typically, an increase in viscosity is present during oxidation.



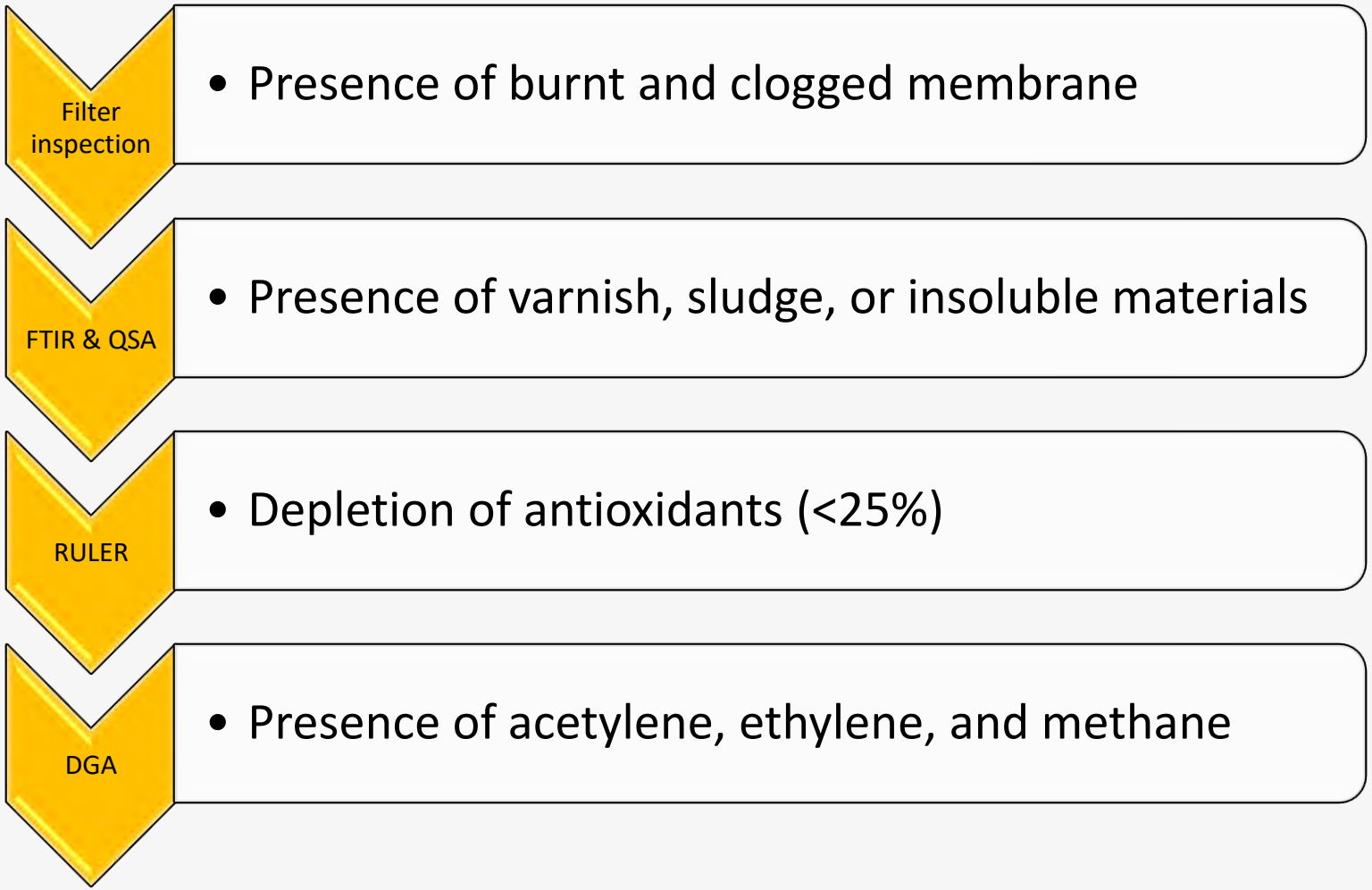
Lab tests for thermal degradation



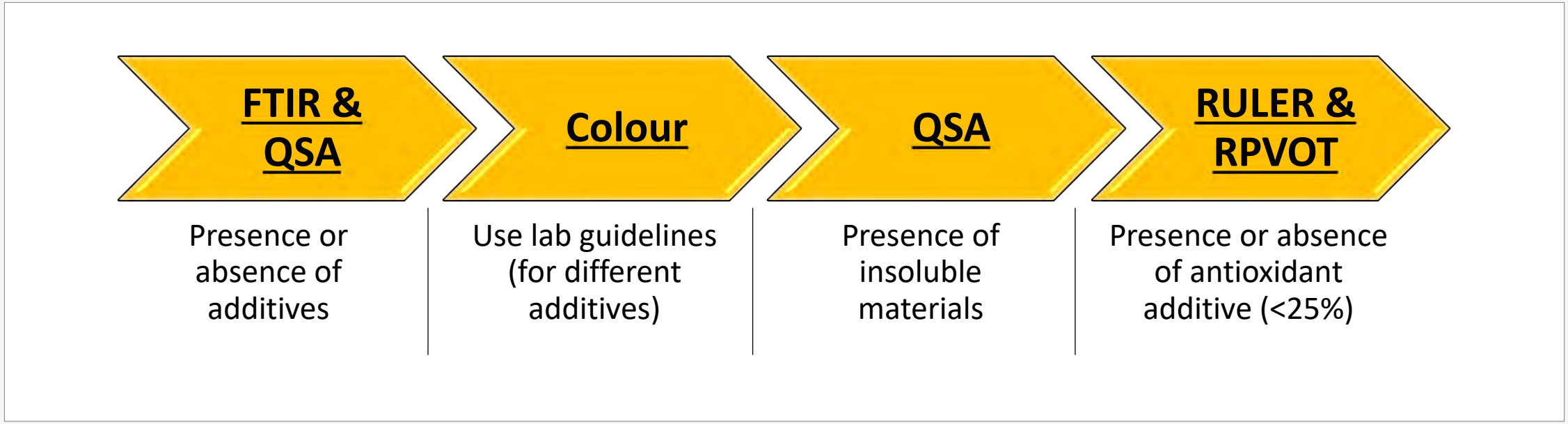
Lab tests for microdieseling



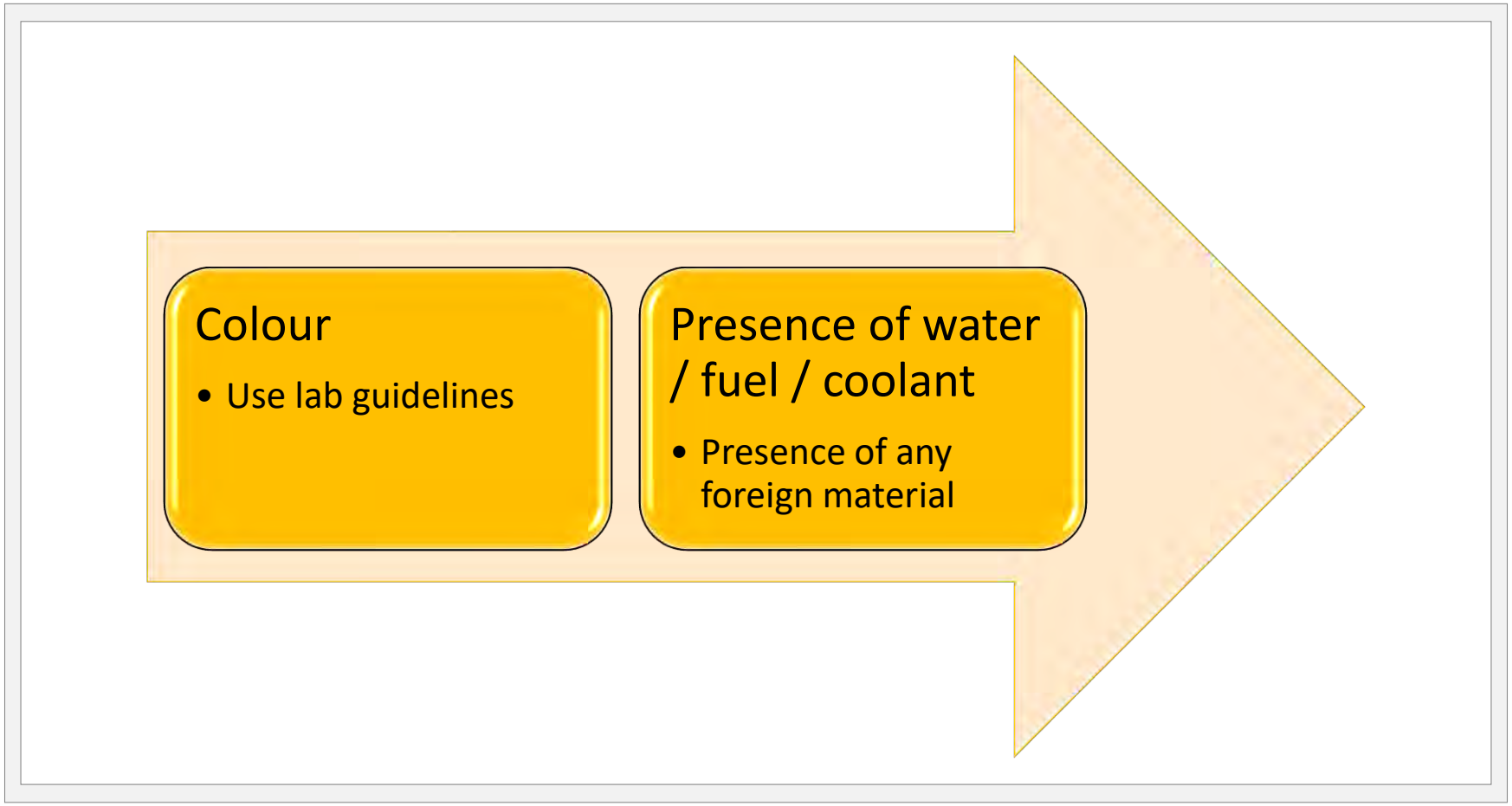
Lab tests for electrostatic spark discharge

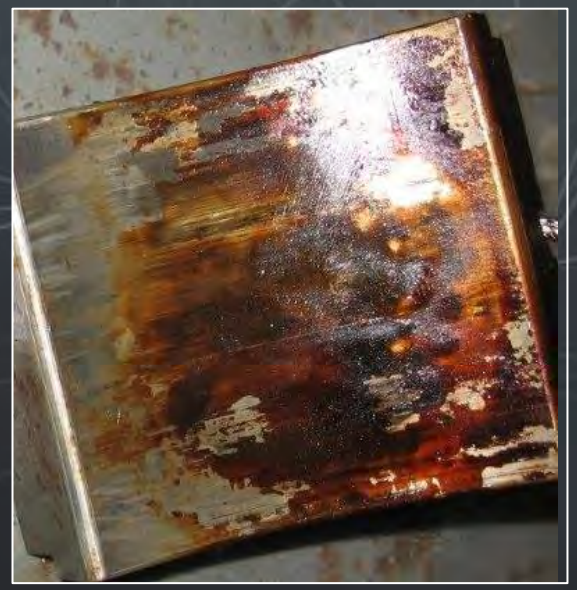


Lab tests for additive depletion



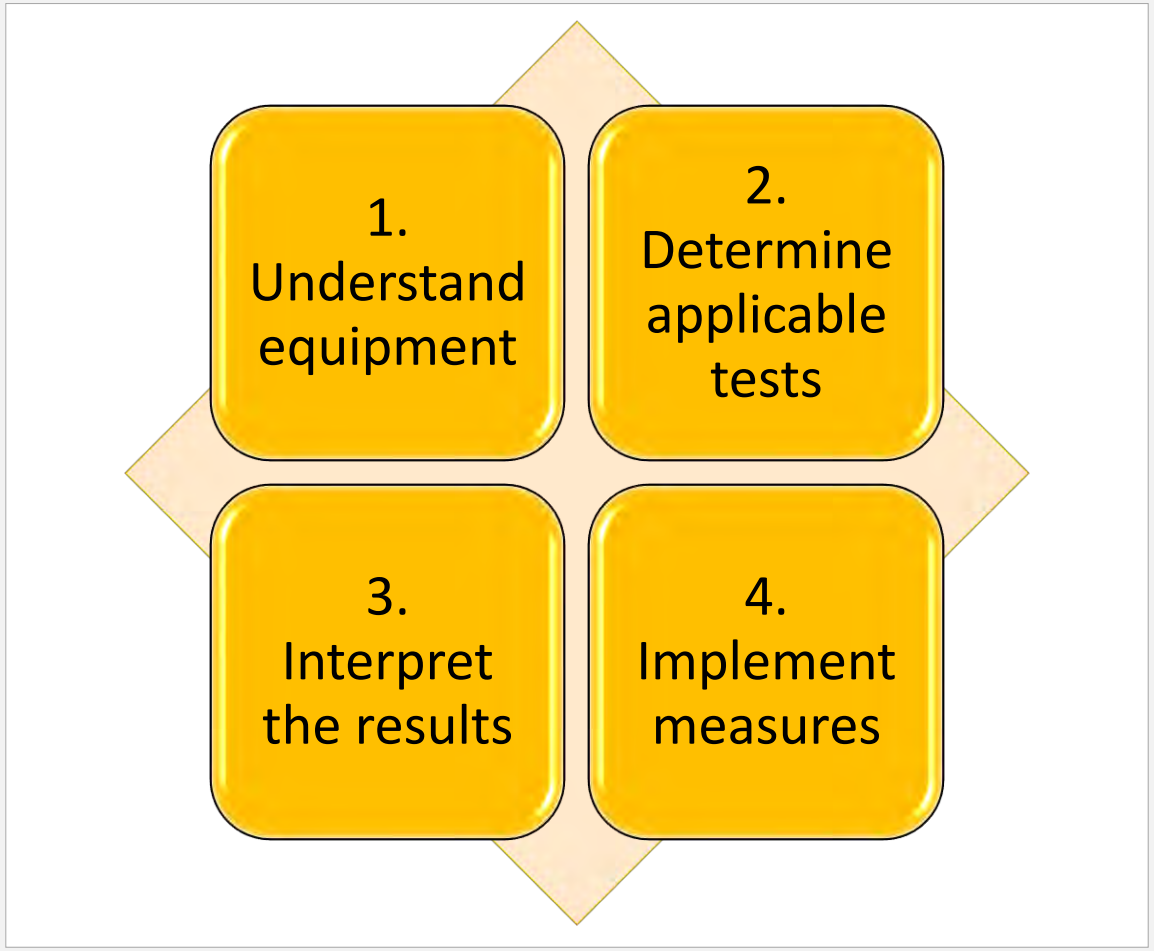
Lab tests for contamination



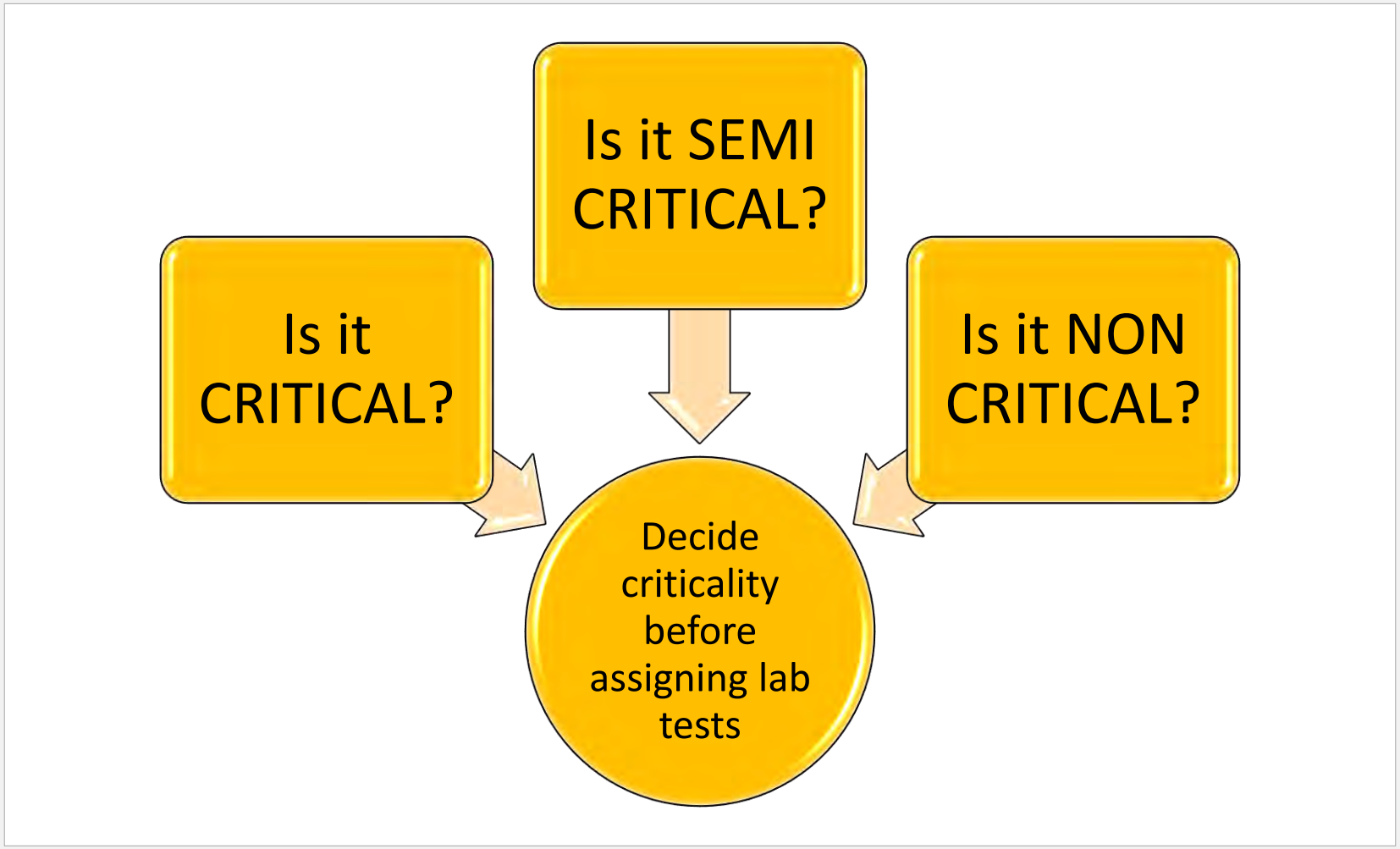


Dealing with Degradation

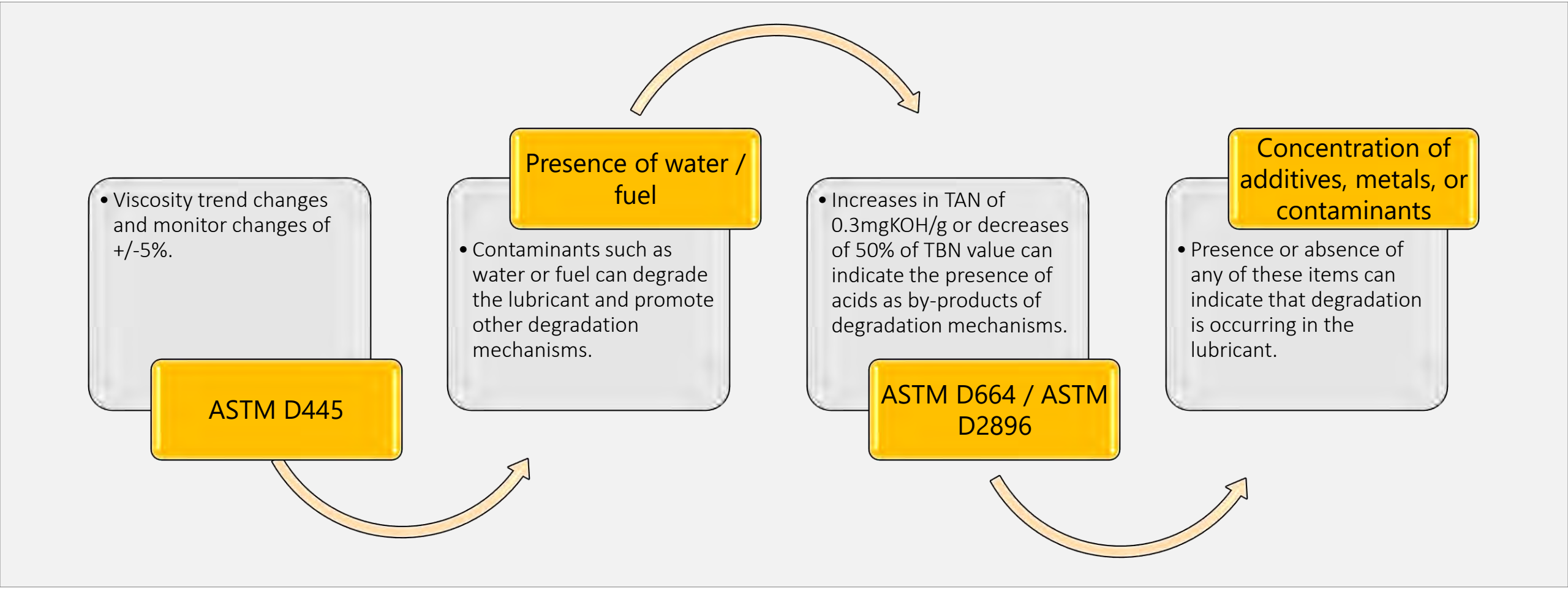
Dealing with degradation



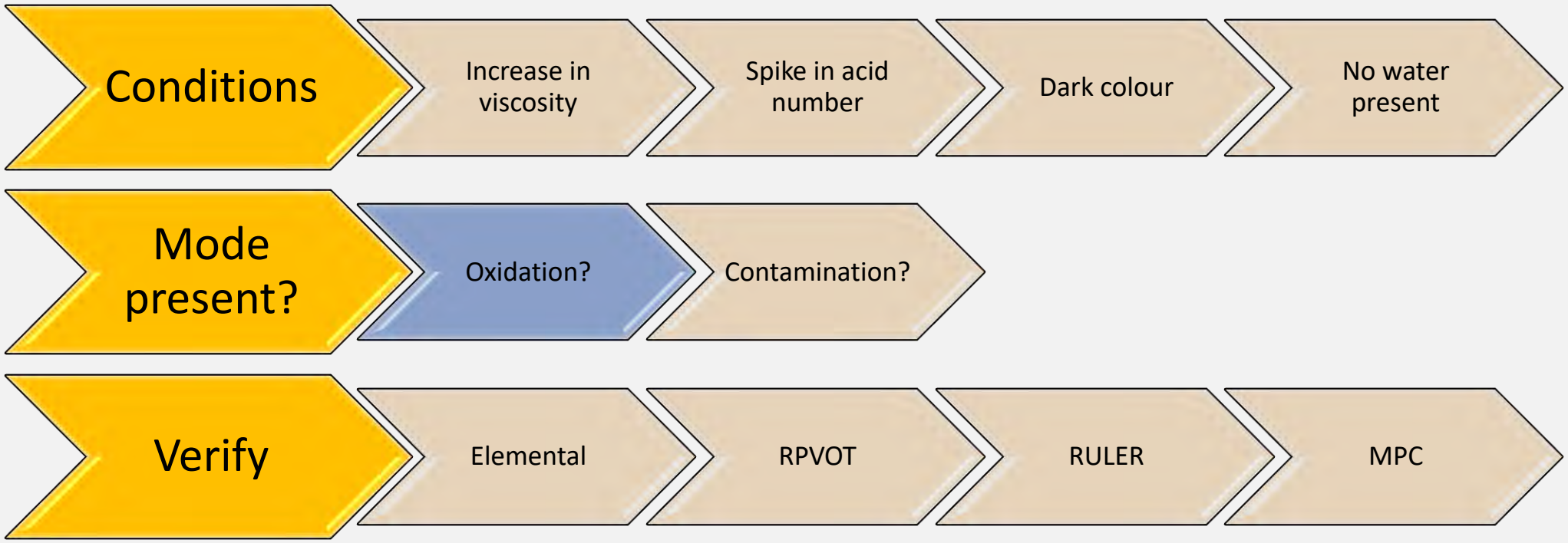
1. Understanding the equipment



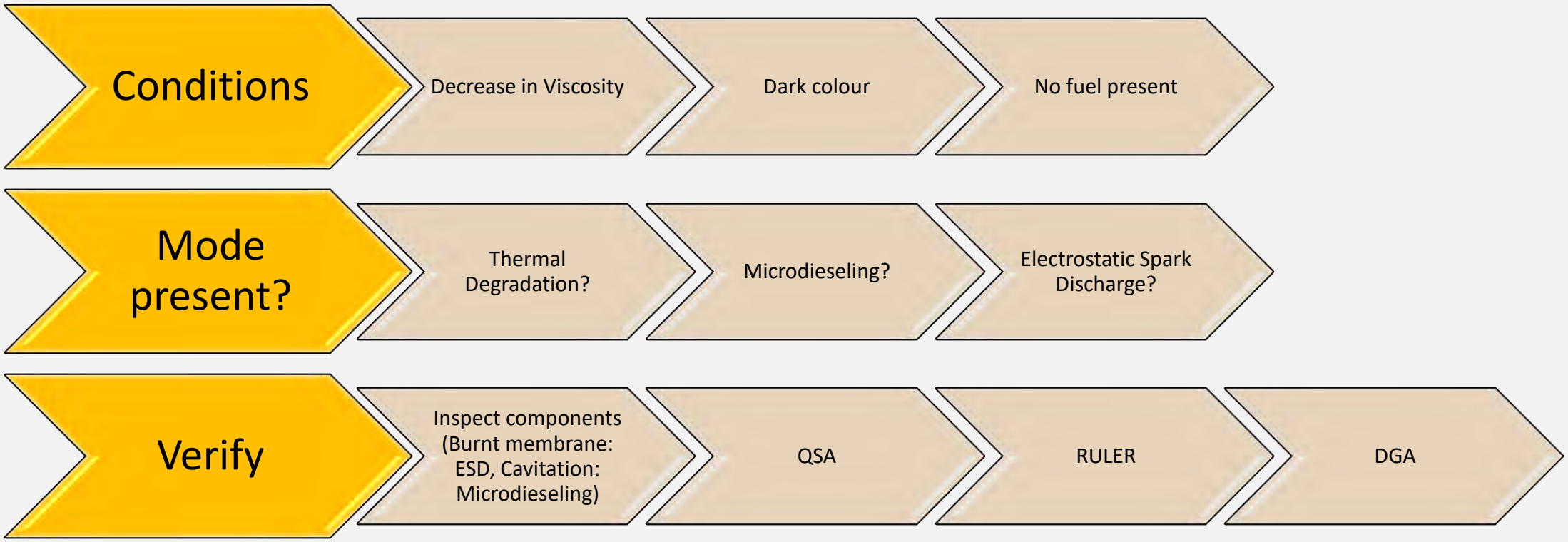
2. Determine applicable tests



3. Interpreting the results



3. Interpreting the results



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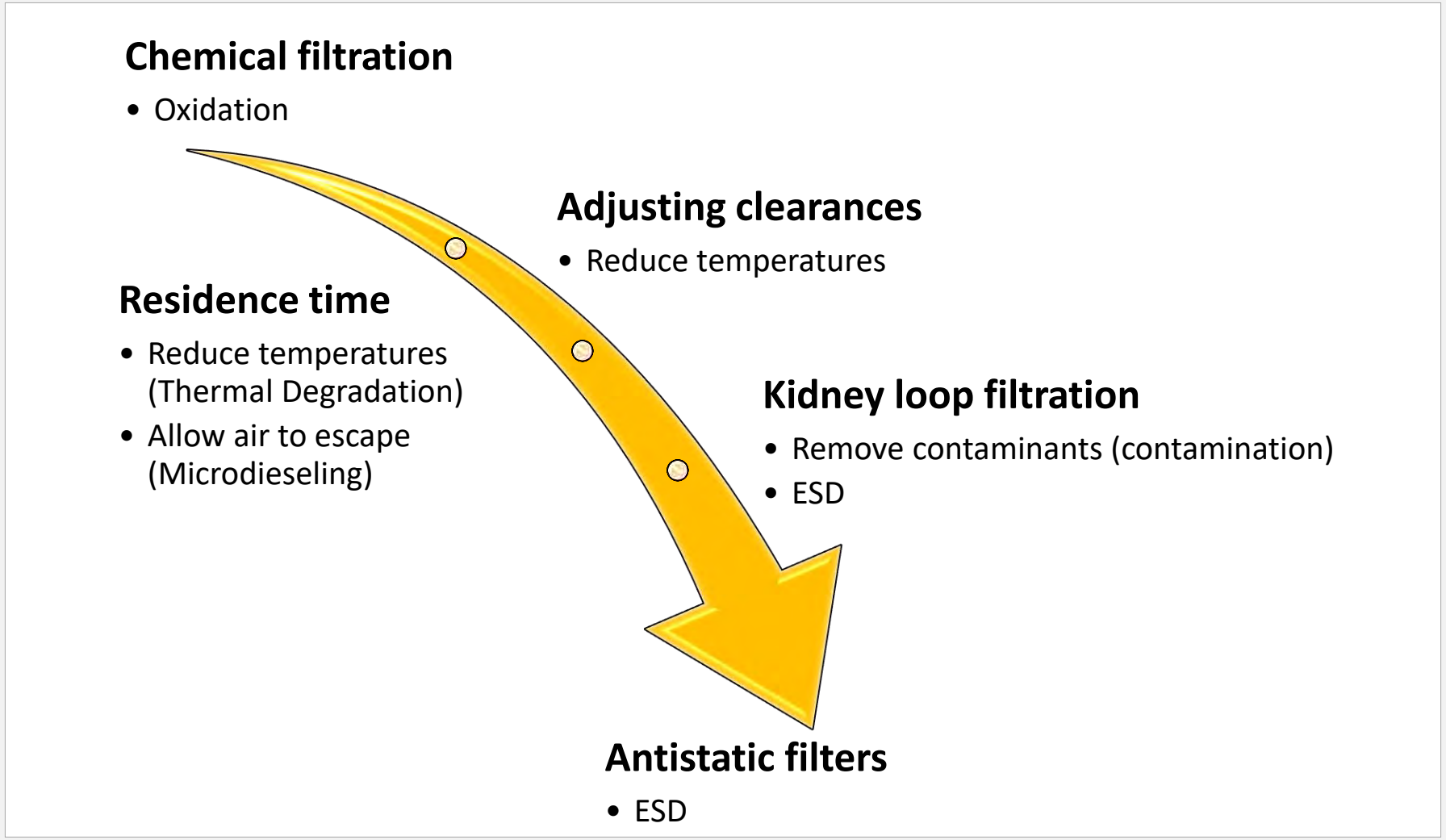
4. Implementing measures



Questions

QUESTIONS?

Thank you!

Sanya Mathura

Managing Director | Senior Consultant
Strategic Reliability Solutions Ltd.

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Next webinar: How today's advanced electric motor testing technologies expose motor failure

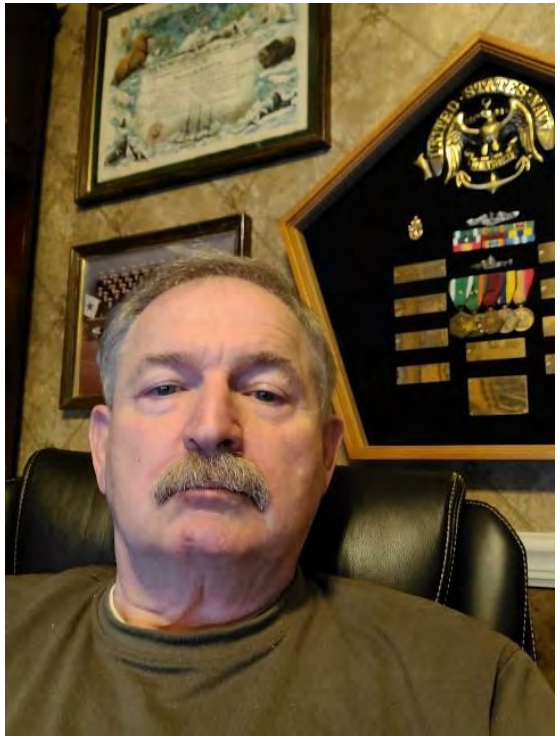
BEST PRACTICE WEBINAR

Wednesday, Feb. 3, 11 a.m. ET

How today's advanced electric motor testing technologies expose motor failure

The increasingly sophisticated motor testing technologies used today quickly identify anomalies and mechanisms leading to motor failure. In this presentation, **Don Donofrio**, veteran instructor and consultant for The Snell Group, an internationally recognized expert in electric motor testing training and research, demonstrates the methods used for de-energized and energized motor testing. These methods are powered by completely different technologies, which he will talk through.

Donofrio also will cover static winding, circuit, and insulation assessment methods, and will discuss power quality, current signature, in-rush, and electrical signature analysis. He will leverage several case studies to illustrate the effectiveness of these advanced motor testing capabilities.



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www.fluke.com 1-800-850-4608

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