USE OF FOOD-GRADE LUBRICANTS

TUESDAY 25/10-2022 AT TIA EUROPE CONFERENCE

MORTEN SCHAKOW

BIO…

Morten Schakow, 46 years, lives in Aarhus Denmark.

20 year in tribology and lubricants

16 years primarily in the food and pharmaceutical industry

Former technical director of JAX European department

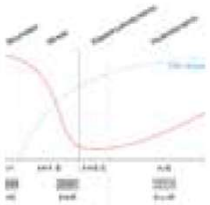
Was responsible and been involved in: Product development, OEM product development and sales, responsible for European distributors, including teaching and training them.

Today, is Technical Director at JIM-TEC and Product Developer at Cibum Lubricants. Serves as lubricant advisor at Ceramic Speed Bearings. In addition teaches in food-grade lubricants, both at Business Academy at Food Technology line and also teaches in the industry (training of technicians, quality personnel and technical managers)

AGENDA

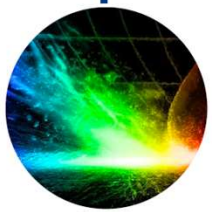
- Tribology
- Why do we lubricant
- What is Food-Grade Lubricants
- Certifications BRC – IFS
- 2017/84 MOSH & MOAH
- What does this have to do with Tortilla Produktion?
- Summary

WHAT IS TRIBOLOGY



Tribology

The study of science and engineering of interacting surfaces in relative motion



Friction

- Coefficient of friction
- Type of friction
- Friction conditions

Wear

- Adhesive shearing
- Abrasive shearing
- Plastic deformation

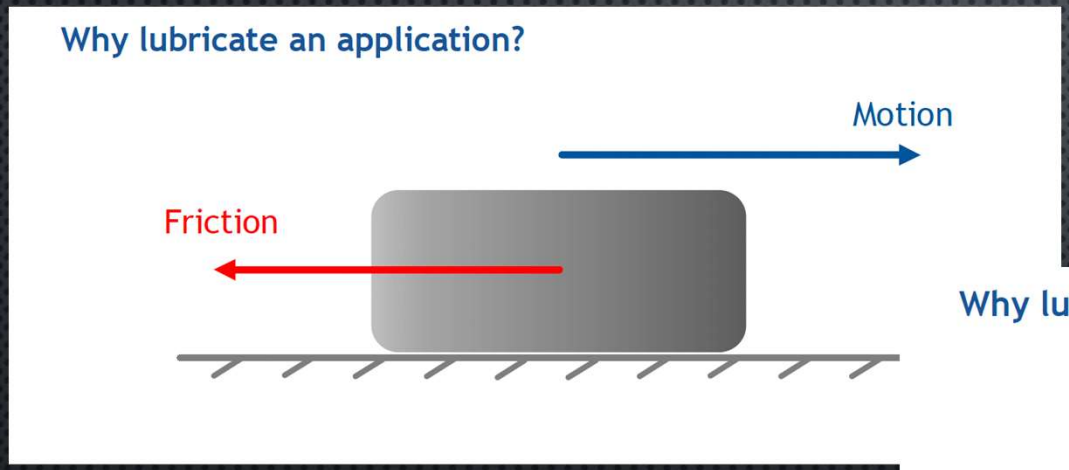
Lubrication

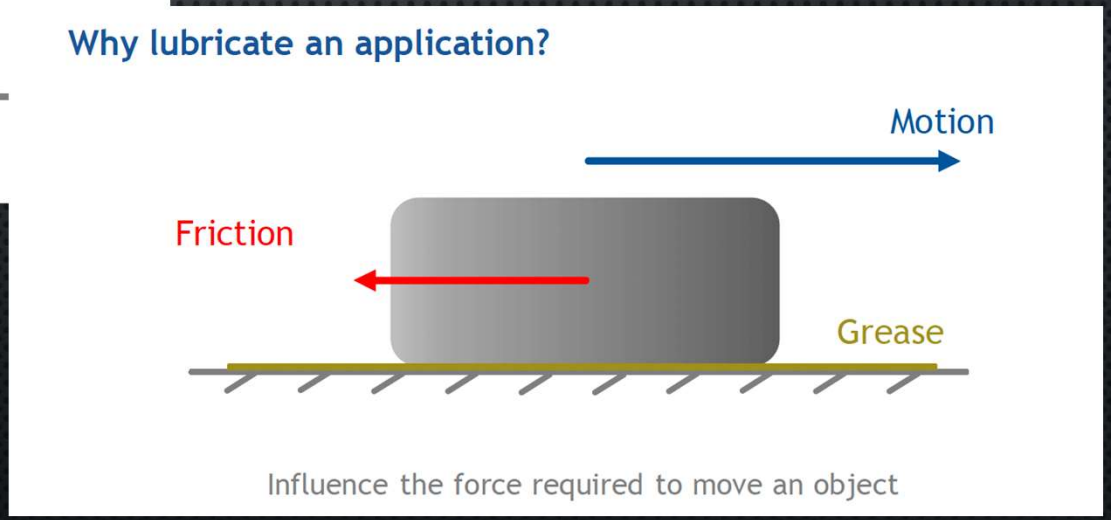
- Oils
- Greases
- Pastes
- Waxes
- Coatings
- Suspensions

WHY DO WE LUBRICATE?

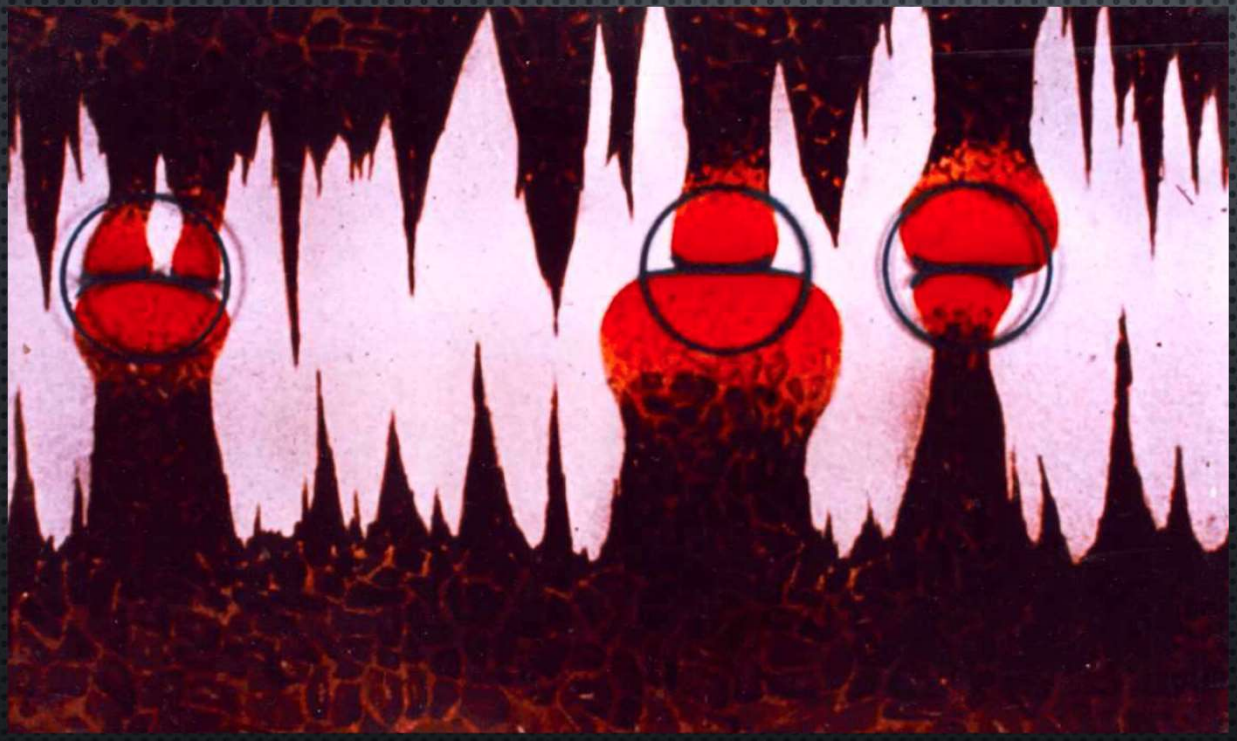
THE PROCESS OF LUBRICATION HAS ONE FUNDAMENTAL PURPOSE:

MINIMIZE AND REDUCE THE ADVERSE EFFECTS OF FRICTION BETWEEN MOVING SURFACES





WHY DO WE LUBRICATE – TO AVOID…



Increasing metal to metal contact which create:

- Increased temperature
- Surface damage
- Creation of wear particulates
- Partial welding
- Increased vibrations
- Summary

THE BENEFIT OF CONTROLLED FRICTION

A CONTROLLED FRICTION ENSURE:

- LOW AMOUNT OF WEAR
- LOWER TEMPERATURES
- IMPROVED ENERGY EFFICIENCY

OPERATIONAL BENEFITS:

- REDUCED OPERATIONAL NOISE
- PROLONGED LIFE OF COMPONENTS
- REDUCED AMOUNT OF UNPLANNED DOWNTIME

WHY DO WE LUBRICATE?

1 – 3 %

OF MAINTENANCE BUDGET IS RELATED TO LUBRICANTION

40 %

OF MAINTENANCE COSTS ARE RELATED TO LUBRICATION ERROS!

SOURCE: SKF WEBINAR 2021

Food-Grade Lubricants

Food-Grade or Food-Safe lubricants is the name given to any lubricant or relase agent that is considered safe for incidental contact or direct contact with items that may be consumed by humans or animals, as long as it does not exceed a certain concentration.

Food-Grade Lubricants are divided in multiple categories:

H2 – No contact at all

H1 – Incidental contact up to 10 ppm

3H – Release Agents – direct contact

BRC AND IFS

BRC ISSUE 9:

4.7.5	Materials and parts used for equipment and plant maintenance shall be of an appropriate grade or quality. Those materials (such as lubricating oil) that pose a risk by direct or indirect contact with raw materials (including primary packaging), intermediate products and finished products shall be food grade and of a known allergen status.

4.16.4: All materials used for maintence and repair shall be fit for the intended use and shall not pose a contamination risks.

IFS VERSION 8:

4.17.2: For all equipment and utensils which could have an impact on the product, evidence shall be documented to demonstrate compliance with requireements. In case no specific legal requirements are in place, evidence shall be available, such as:
Certificate of conformity
Technical specifications
Manufacturer's self-declaration

2017/84 MOSH & MOAH

RECOMMENDATIONS

COMMISSION RECOMMENDATION (EU) 2017/84

of 16 January 2017

on the monitoring of mineral oil hydrocarbons in food and in materials and articles intended to come into contact with food

(Text with EEA relevance)

THE EUROPEAN COMMISSION,

Having regard to the Treaty on the Functioning of the European Union, and in particular Article 292 thereof,

Whereas:

(1) Mineral oil hydrocarbons (MOH) are chemical compounds derived mainly from crude oil, but also produced

MOSH & MOAH TODAY:

- Some German benchmark values have been prepared which are expected to become EU limit values, e.g.
- - Vegetable oils; 13 mg/kg for MOSH and below the limit of quantification, of 2 mg/kg for MOAH. The quantification limit is an expression of how low a concentration you can put a number on. If the concentration falls below the quantification limit, it can only be said that the content has been detected.
- - Bread, biscuits, fine baked goods, cereals, rice, pasta; 6 mg/kg for MOSH and below the limit of quantification of 0.5-1.0 mg/kg for MOAH
- - Confectionery and chocolate (except chewing gum) 9 mg/kg for MOSH and below the limit of quantification of 0.5-1 mg/kg for MOAH
- - Nuts, coconuts, oilseeds, peanuts and dried fruit: 4 mg/kg for MOSH and below the limit of quantification for MOAH.
- For both MOSH and MOAH, this applies to chain lengths of C10-C50.

MOSH & MOAH TODAY:

- The Danish Veterinary and Food Administration works on the basis of EU recommendation 2017/84 with the following action limits:
- - MOSH (mineral oil saturated hydrocarbons): 8 mg MOSH (C16-C45) / kg food.
- - MOSH in ready-made food for infants (e.g. mash and tube food): 2 mg MOSH (C16-C45) / kg food.
- - MOAH (mineral oil aromatic hydrocarbons): 1.5 mg MOAH (C16-C35) / kg Food.
- So there are some concrete limit values to work towards when you do your risk analysis.
- The action limit means that any findings will be assessed according to article 14 of the Food Act (178/2002) – it is the one with food that may not be marketed if;
- - They are dangerous ie. harmful to health and/or unfit for human consumption…
- It is expected that 10% of the food will have content higher than the benchmark level - which should cause concern in the food industry, as there is a risk of expensive recalls that damage your business and the food industry in general…

WHAT DOES THIS HAVE TO DO WITH TORTILLA PRODUCTION?

- DOUGH DIVIDERS
- TORTILLA PRESSES
- OVENS

CONTAMINATION IN DOUGH DIVIDERS

- IN DOUGH DIVIDERS LUBRICANT / RELEASE AGENTS ARE USED TO ENSURE GOOD LUBRICANTION AND ENSURE THE DOUGH DOESN'T STICK TO SURFACES!
- THE DOUGH IS IN DIRECT CONTACT WITH THE LUBRICANT / RELEASE AGENT!

DOUGH DIVIDER OILS

Whats used out there ?

Rapeseed oils or "baking oil" :

Advantage: should be safe use, cost pr. liter.

Disadvantage: The oil polymerizes and sticks, thus the dough sticks - and this will cause a lot of downtimes

WMO or WHITE MINERAL OIL:

Advantage: Leaves a good lubrication film, doesn't stick or polymerizes.

Disadvantage: Does not live up to the European legislation!

TORTILLA PRESSES

THERE IS NO DIRECT CONTACT – BUT BOTH GREASING AND HYDRAULICS CAN PURPOSE A RISK!

TORTILLA PRESSES

HYDRAULICS:

SYNTHETICS MOSH & MOAH FREE

ADVANTAGE: SAFE TO USE

DISADVANTAGE: HIGH COST

MINERAL OIL:

ADVANTAGE: LOW COST

DISADVANTAGE: DOES NOT LIVE UP TO EUROPEAN LEGISLATION!

TORTILLA PRESSES

Greases:

Synthetics based MOSH & MOAH free

Advantage: Safe to use

Disadvantage: Cost

Mineral Oil based:

Advantage: Cost

Disadvantage: Does not live up to European legislation!

TORTILLA OVENS

There is no direct contact or? – the does oil evaporates and will at sometime at some level come into contact with some of the products!

In ovens we need to consider multiple thematics like residue on the chain (which chemistry flashes of clean at which temperature)? – do we have a proper lubrication? How do we apply?

TORTILLA OVENS

Synthetic Esters:

Advantage: Some are safe to use

Disadvantage: Medium to high cost

Comments: is recommenable at flour- tortilla- ovens upto 325°C

PAG's With Boron Nitride:

Advantage: Some are safe to use

Disadvantage: Very High cost

Comments: is recommenable at corn- tortilla ovens from 325 – 500 °C

Mineral Oil with Graphite:

Advantage: Low cost

Disadvantage: Not safe to use at all

Comments: can't recommend to use here in EU!

TORTILLA OVENS

A LUBRICATION SYSTEM IS THE FOUNDATION FOR CORRECT LUBRICATION OF OVENS AND TO AVOID OVERLUBRICATION - WHICH LEADS TO THE RISK OF CONTAMINATION

SUMMARY

In food industri Lubrication is a huge Paradox:

1. 1-3 % of Maintenance Budget have a direct impact on 40% of the Maintenance Budget
2. We use Food-Grade Lubricants to avoid risks in our production
3. In Europe both the certifcation agency and the legislation demands use of Food-Grade prodcts
4. Many Food-Grade lubricants doesn't live up to European standards
5. Like it or not – you do have contamination!