



Hochleistungsprodukte und Service für die Metallbearbeitung

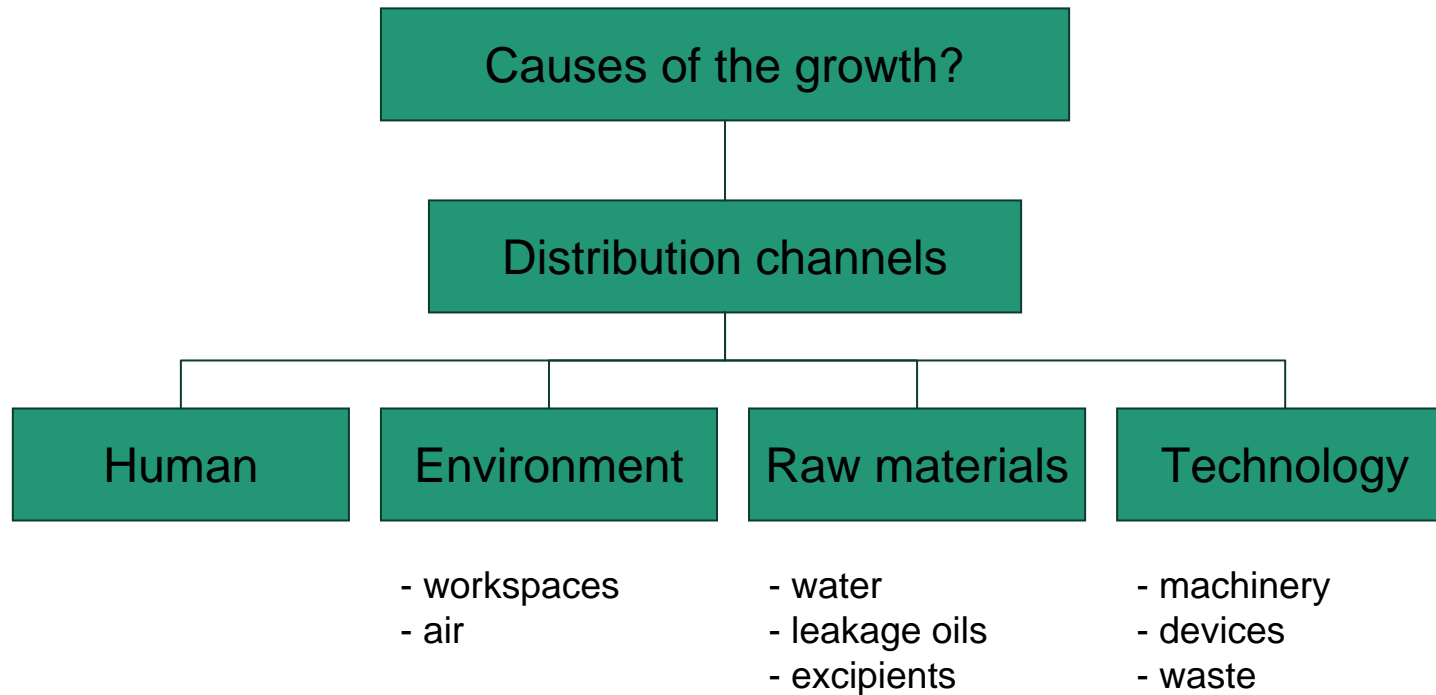
Bactericides in cooling lubricants

Definition according to DIN 51385
Working fluids for cutting of materials



Bactericides in cooling lubricants

- Microbial growth is affecting the quality of the cooling lubricant



Why bacteria grow in cooling lubricants so good...

- many nutrients like
 - N from amines (**N**itrogen source)
 - C from petroleum / emulsifiers (**C**arbon source)
 - P from wear protection additives
 - S from emulsifiers (**S**ulfur source)
- temperatures of 30 – 40 °C
- ideal growing conditions for
 - aerobic bacteria (if oxygen is present)
 - anaerobic bacteria (if no oxygen is present)

Impact on the cooling lubricant



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- degradation of ingredients (emulsifiers)
 - formation of decomposition products such as H₂S or organic acids
 - odor / decrease of the pH-value
 - bad corrosion protection
 - increase of conductance / instability
 - formation of nitrosamines
 - deposition of oil by depletion of the emulsifier
 - blockage of pipes by the biofilm
 - foaming
 - filter problems / greasy filter cake
 - health problems → respiratory / skin
- microbial growth must be avoided!!!
- bacterial count no higher than 10⁴

Possibilities of inspection



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- **Physical preservation by** ultrasound / ozone / irradiation / short-term heating / centrifugation
 - Germ count reduction is given, but not more than 90% are achieved, which means that the remaining bacteria will have more food and grow even faster...
- **The use of chemical preservatives like bactericides is the only way nowadays**

Mixing water



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- no surface-water
 - no rain-water
 - check water from desalination plants to bacterial contamination
 - microbial contamination can occur especially when water is standing in the pipes/system over the weekend
 - contaminated storing tank
 - residues of old solutions can contaminate equipment
 - no protection against bacteria when the replenish amount is applied 1 – 2 % and stands after application
- If the customer complains about bacteria at short emulsion periods, take the above points into account.

What bactericides can be found on the cooling lubricant market?



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- Formaldehyde depot substances
 - O-formals (e.g. (ethylenedioxy)dimethanol → pH-neutral)
 - N-formals (e.g. HHT, MBO)
 - the most widespread in cooling lubricants
 - highly effective
 - water soluble
 - pH-stable
 - MBO is also effective against „Monday morning smell“

What bactericides can be found on the cooling lubricant market?

- Isothiazolinone
 - mainly for re-preservation
 - very effective
 - very problematic to the skin
 - low concentrations
 - against fungi + bacteria
 - decreases itself! (good for use at weekend)
 - new classification see procedural guidelines

e.g. Grotan 14, Densil

What bactericides can be found on the cooling lubricant market?



- Phenols
 - old material class
 - good against fungi / weak against bacteria
 - effective at pH below 9
 - relatively friendly to the skin / problematic to wastewasser

 - Phenoxyethanol ist in boron-amin-free cooling lubricants

e.g. Mergal KM 90

What bactericides can be found on the cooling lubricant market?

Others

- Jodcarbamat
 - Fungicide with a broad application spectrum
- Amine / boron compounds
 - Boron becomes probably less
 - Especially long chain amines give good bacteriostatic properties
- **IMPORTANT: classification since 04.2015**

Summary



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- bacteria and fungi grow basically in cooling lubricants
- contaminated cooling lubricants lead to technical and hygienic problems
- microorganisms are instrumental in the collapse or the becoming unusable of a cooling lubricant
- skin irritation may occur through contaminated cooling lubricants
- the implication of the contamination can be expensive
- microbial problems can be avoided or reduced only by chemical preservatives at the time

➤ **Cooling lubricants must be maintained!**