

Go pro on your spores

“When the bacteria strike back – let us take the blow!”

When bad luck strikes, bacteria in cardboard machines can form tough spores. Nevertheless, it is important to fight them, especially when it comes to paperboard for food packaging!

Bacteria can cause deposits and visible quality defects in the final product, such as holes and stains. Sporulation, on the other hand, is more difficult to detect for operators working on the process.

BIM Kemi offers its customers microbiological control and is then responsible for ensuring that the limit values for the bacteria and their spores are not exceeded.

“Preventing sporulation is the most difficult, but at the same time most important, aspect of microbiological control. It requires a lot of work, presence and thinking,” says BIM chemist Petri Lindqvist.

BIM has extensive experience in microbiological control and brings the understanding and knowledge of how to predict spore growth. BIM’s laboratory in Kouvola, Finland, analyses more than 200 samples every week, and BIM’s experts estimate the likelihood of sporulation.

“We monitor various parameters, such as temperature, changes in redox potential and chemical residues, and use them to assess whether the process conditions are favourable for sporulation,” states Petri Lindqvist.

Bacilli

The board machine’s water system provides ideal conditions for bacteria

to grow: A temperature of about 30 - 40°C, water and nutrients.

Petri Lindqvist explains, *“In the drying section of the board machine, the temperature rises so high that it is enough to kill most of the bacteria. The problem may be bacterial spores of the genus Bacillus, which remain in their spore shell.”*

The genus includes several different species of bacteria, some of which are benign, while others have pathogenic properties that can cause diseases. *Bacillus cereus*, for example, produces toxins in food and is a well-known cause of food poisoning.

Nutrients and oxygen out, spores in

Sporulation is called the bacterium’s adaptation mechanism, which helps it to survive in adverse environmental conditions. The multi-step process usually takes from several hours to just over a day. In practice, it is the habitat of the bacterium that determines whether a spore is produced or not.

In a board machine, sporulation usually begins at a point of process delay. Such points can be water and mass towers from which nutrients and oxygen have been depleted. If the pulp remains in the pulper for a day or two, it is likely that sporulation will begin.

In spore form, bacteria can spread to the finished product. If the right temperature, nutrients, and appropriate humidity conditions are provided, the spores will turn back into a living bacterial cell. While sporulation can take a day, spore awakening occurs within a couple of hours.

Once the spore has turned back into an active bacterium, it continues to grow and divide normally. In a favourable environment, the bacterial population can multiply rapidly.

BIM – the painkiller

However, the bacteria-spore-bacteria continuum is a headache that can be eased for any papermaker who lets BIM Kemi be their partner in microbiological control.

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