BLOG_261007_TMP_ homogenizers and design - Food Safety vs Technology

https://lnkd.in/p/eu2AJJzm

Because It Affects ALL of Us: Food Safety Versus Technology

In our last post on this topic, we addressed the wide variety of regulations governing machinery used in food production.
We ALL depend on our food being produced in a way that ensures food safety.
Depending on the type of food and the production step, the so-called "product-contact" machine parts are made of stainless steel. But that's only part of the requirement. If you want something better than just good, high-quality stainless steel is recommended. In Europe, these are usually the material grades 1.4404 or 1.4571. Older technicians may still be familiar with the designation V4A (instead of V2A for standard CrNi 18-8 stainless steels or similar). In American-influenced engineering circles, the material designations AISI 316L or AISI 304 are frequently used.
If, as is the case with homogenizers, even higher demands are placed on material strength, the materials are refined to an even higher grade. These requirements are met with duplex or even super-duplex steels.

However, simply choosing the right material for the machine is still not enough for food processing! The surfaces must be virtually "mirror-smooth." The so-called surface roughness Ra (where Ra is the arithmetic mean of all roughness values) is of crucial importance in determining whether deposits can accumulate in the tiniest crevices of the machine's metal.
A general overview can be derived based on DIN 11866.
The hygiene classes H1 (basic) through H5 (ultra-clean) are assigned to specific application areas based on the roughness value (Ra) of the stainless steel surface in µm and the surface finish—whether polished or unpolished.

Thus – See attached table:

However, this only describes the basic materials used in a machine for food production.

Now, the machine must also possess particularly good design characteristics.
A machine intended for use in the food and beverage industry should be **CIP**- or even **SIP-capable**.
This means that all models in a specific homogenizer series are optimized for automatic cleaning (Cleaning-in-Place) and sterilization (Sterilization-in-Place)**WITHOUT disassembly**.
Added to this is a so-called **dead-space-free** (**or low-dead-space**) **design**. The goal here is to prevent product buildup and bacterial colonies in the components or on the seals through the design itself.

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The relevant guidelines include, in Europe,
• EHEDG and
• cGMP (GMP Regulation (EC) No. 2023/2006: Guidelines for Good Manufacturing Practice),
and in the U.S. oriented markets,
• the 3-A Sanitary Standard,
• FDA regulations, and
• ASME BPE, which sets the highest standards.

#Hygienic #EHEDG #CIP #SIP #STAINLESS

In accordance with DIN 11866

Hygiene Class	Surface roughness in Ra [µm]	Surface Finish	Requirements tailored to the production process
H2	Ra < 1,00 µm	ground material	This is where the standard processes in the food production sector begin
H3	Ra < 0,80 µm	Finely polished / EHEDG or 3-A Sanitary standard	Food industry **(the standard)**, breweries, cosmetics
H4	Ra < 0,40 µm	extremely finely ground material or electropolished	for the pharmaceutical and biotechnology industries; based on ASME BPE

Electropolishing to improve the surface texture may still be required (depending on the plant operator)