

FLAVORS

Solutions for flavoring manufacturing.



CONSISTENTLY DELICIOUS.

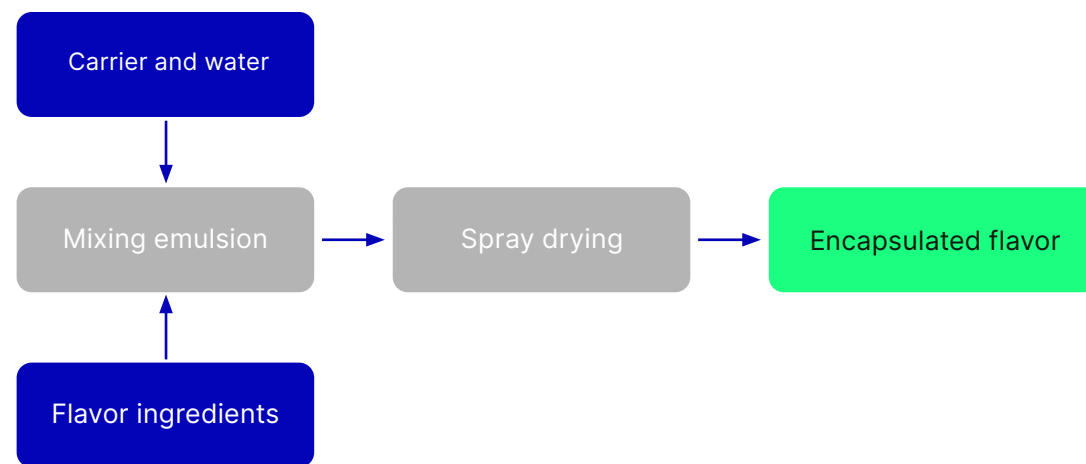
Food and beverage manufacturers expect their ingredients to offer authentic tastes and textures. For more than 50 years GEA has supplied the global industry with equipment, processing lines and complete solutions so that flavor manufacturers can produce innovative ingredients, safely, consistently and efficiently.

Flavors are essential ingredients in a diverse range of food and beverage products, including dairy goods, soups, breads and pastries, ice cream, sauces and dressings, baby foods and beverages. Flavor manufacturers strive to produce top quality ingredients and develop exciting new recipes, while having the flexibility to efficiently switch between products, and increase or decrease capacity to meet changing market demands.

GEA understands the challenges faced by flavor manufacturers. Our technologies are founded on in depth know-how that spans every stage in the production of high-quality flavor products. We use our expertise to configure, supply and support versatile equipment and plants, so that your flavor manufacturing business can succeed and innovate in competitive markets.



EXPERTISE FOR MAKING HIGH QUALITY FLAVORS.



Process steps to formulate flavors

Whether or not you already have a specific formulation, we can support you in defining an emulsification and spray drying solution with optimized process capacity and yield, with particular focus on quality and stability of the final powdered flavor.

GEA experts can help you to reduce the oil droplet size in the flavor emulsion and adjust drying parameters to have effective particle formation and encapsulation inside the spray tower. Further, our mixers are equipped with temperature control, variable shearing, and controlled atmosphere - working under reduced pressure or reduced oxygen levels.

We can help you to develop alternative encapsulation processes based on spray congealing (spray cooling) or fluidized bed coating. As a GEA customer you can rely on our technologies and solutions to give you highly uniform, consistent processing of all your flavor products in every batch, whatever the recipe and production scale.

SOLUTIONS FOR FLAVOR MANUFACTURING.

GEA provides a complete range of technologies, equipment and know-how for flavor manufacturing lines. But we don't just supply equipment. We work closely with our customers at every stage, from design and configuration to equipment delivery and installation of your plant. GEA experts will ensure effective, efficient transfer of knowledge and the seamless handover of your plant on time.

GEA process design & plant integration

- Our capabilities span the supply of standalone equipment and technologies for small scale manufacture, to the configuration, delivery and installation of integrated flavor processing lines for large-scale production.
- We design plants that are adapted to meet customers' requirements for scale, flexibility and product range.

Hygienic design

- All GEA equipment and solutions feature hygienic designs to meet strict regulatory requirements.
- In the flavor industry it is common to have short production runs followed by

a CIP. GEA are working on minimizing the change over time between products. The focus on design of fully automated CIP system can bring the change over time down to 70 minutes.

Plant safety

- Our experts focus on designing and configuring equipment and process lines that will match the required safety level of the plant.
- We offer an integrated fire and explosion safety system according to SIL 1.
- We offer a range of safety features based on product characteristics, local law and customer policy, such as surface cooling technology when

required, fire extinguishing system (can be SIL 2-rated), Visual and infrared camera on spray nozzles, explosion vents, explosion suppression systems and decoupling systems, to give our customers the required plant safety.

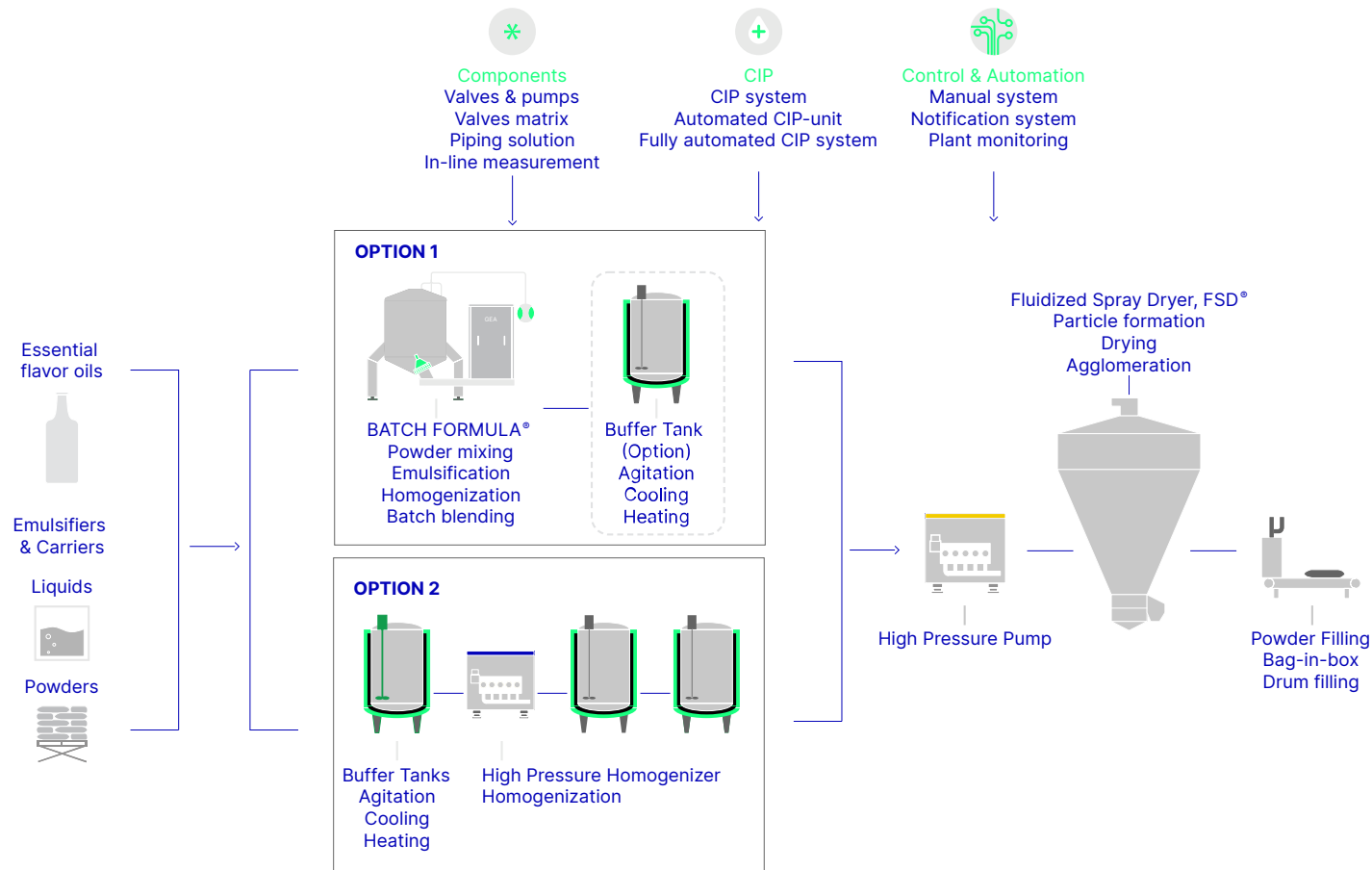
Training and support

- GEA offers training and support to ensure robust plant operation, so our customers can be confident that all their equipment and process lines will offer optimum throughput, reliability and operation, from day one, and for the entire lifecycle of the plant.

Project management

- All GEA customers benefit from our world-renowned expertise in project management. From initial conception and plant layout through to equipment delivery and installation, we undertake all aspects of project execution, including international contract management, installation, commissioning and start up.
- A dedicated team will liaise with 3rd party suppliers, secure utilities supply, and provide comprehensive after-sales support. GEA makes sure that no detail is overlooked, and that every deliverable is achieved on time.

EXAMPLE OF A GEA FLAVOR LINE.



OPTIONS FOR FORMULATION AND EMULSIFICATION.

Gentle mixing for stable, consistent emulsions

Mixing is a key process that affects the consistency and quality of flavor ingredients. Our integrated process control ensures product integrity by monitoring vital process parameters to guarantee that product specifications are achieved.

Key features of GEA's BATCH FORMULA® Mixers include:

- The benefit of using vacuum when introducing ingredients below the surface of the liquid, providing instant emulsification, and avoiding unwanted “fish eyes” and agglomeration.
- Reduced size of oil droplets for stable, consistent emulsion formation.
- Integrated process monitoring and control.
- Use of nitrogen in order to avoid oxidation of the product and enable product to be discharged from the BATCH FORMULA® Mixer.
- Total drainage of the BATCH FORMULA® Mixer between batches to reduce waste and minimize product loss and speed up cleaning.



GEA BATCH FORMULA® Mixer

OPTIONS FOR FORMULATION AND EMULSIFICATION.

Homogenization for consistent, stable and standardized flavors

GEA has developed versatile, high pressure homogenizers for either batch or continuous processes. A range of machines and configurations are available, including hygienic and aseptic, design options to ensure safe, consistent processing.

The benefit of GEA high pressure homogenization for the flavor industry:

- Improved digestion, better absorption of nutritional elements
- Reduced size of oil droplets for stable, consistent emulsion formation
- Improved organoleptic properties, so no taste or color variation
- Product standardization
- Reduced need for additives and stabilizers
- Maximum flexibility for scaling up from laboratory to industrial scale, with flow rates from 10 l/h to 60,000 l/h.



GEA High Pressure Homogenizer

OPTIONS FOR FORMULATION AND EMULSIFICATION.

State-of-the-art spray drying and agglomeration

The GEA Fluidized Spray Dryer, FSD® is an efficient multi-stage dryer with an integrated fluid bed. The dryer is especially well suited to heat-sensitive products like flavors. The FSD® generates coarse, dustless, free-flowing particles and a powder with excellent dispersibility.

Our system enables effective particle formation to preserve the key compounds and constituents that give each flavor its unique taste and aroma. Furthermore, we help our customers to configure an efficient product recovery system, e.g. based on low shear high efficiency cyclones, which will allow for rapid change-over between products while maintaining high production yield.

The conventional NIRO® spray dryer is a cost-effective, single-stage system that is ideal for producing non-agglomerated high bulk density and very fine powders. Simple in design, the NIRO® spray dryer is easy to operate and, compared with more complex spray drying systems, allows for a relatively fast change-over between products. This makes the technology really good fit for some customers in the food flavors industry who may need to process multiple different products over the course of one day.

Benefits:

- Drying and agglomeration in a single operation
- Effective particle formation to preserve key product properties
- Especially well-suited to food applications
- Cleaning-in-place optimized for fast product change-over.



GEA Fluidized Spray Dryer (FSD®)

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