Solutions for flavor 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

Encapsulation of flavors by spray drying starts with the preparation of an oil in water emulsion. This emulsion contains the essential flavor oils, together with ingredients that have emulsifying and encapsulating functionality.

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.

In addition to spray drying of flavor emulsions 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 the strict requirements of the industry.
- Our customers benefit from the highest levels of product safety, together with optimized plant operation and maintenance.

**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.
**Components**

- **Valves & pumps**
  - Valves matrix
  - Piping solution
  - In-line measurement

- **CIP**
  - CIP system
  - Automated CIP-unit
  - Fully automated CIP system

- **Control & Automation**
  - Manual system
  - Notification system
  - Plant monitoring

**Liquids**

- Essential flavor oils

**Powders**

- Emulsifiers & Carriers

**Examples of GEA Flavor Lines**

1. **Buffer Tank (Option)**
   - Agitation
   - Cooling
   - Heating

2. **High Pressure Homogenizer**
   - Homogenization

3. **Fluidized Spray Dryer, FSD®**
   - Particle formation
   - Drying
   - Agglomeration

4. **High Pressure Pump Powder Filling**
   - Bag-in-box
   - Drum filling

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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

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
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.

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
Versatile powder filling

GEA has developed a portfolio of solutions for powder filling to ensure the highest quality, stability and integrity of the finished product. Capable of handling any throughput, our systems can fill flavor powders to high accuracy, into a wide range of packaging formats including bags, boxes and drums.

Benefits:
• Accurate filling via on-head weighing minimizes product loss and maximizes profit
• In-built dust control to reduce losses and reduce potential hazards
• Quick switch between packaging formats for complete flexibility
• Optional cleaning-in-place for wet or dry cleaning between batches to minimize downtime

Cleaning-in-Place (CIP) to save time, resources and costs

Flavor manufacturers need the flexibility to switch easily between products while maximizing product recovery, and ensuring there is no carry-over from one product to the next. Our innovative CIP solutions meet all critical hygiene standards to guarantee product safety at every point of the process.

Efficient CIP ensures fast product changeover and helps to cut costs by reducing downtime, minimizing waste and the use of detergents and water. Tailored solutions configured specifically to meet individual requirements ensure efficient commissioning whilst reducing total cost of ownership. Optimal integration coupled with sophisticated plant automation ensures trouble-free operation and maintenance thereby delivering solid financial benefits.

Benefits:
• Reduced cleaning cycle times
• Integrated CIP solution for fast product changeover
• Guaranteed product safety at every point of process
• Optimized use of detergent and water
• Reduced operator intervention
• Sanitizing ability (e.g. hypochlorite, hydrogen peroxide, ozone) to prevent flavor carry-over
Piping solutions
GEA has developed hygienic valves, pumps and components that underpin our matrix-piped process plants. Matrix-piped plants can be configured to any layout, so you can connect all your systems, make the most of available space and ensure the flexibility to add new equipment and process lines, expand and diversify.

Benefits:
• Smooth production processes
• Design to meet the strictest hygiene standards
• Maximum level of process line isolation, contributing to process and product safety

Process automation for reliable, reproducible manufacturing

Every plant will have different requirements for automation, so GEA offers a broad portfolio of innovative process automation systems and services that range from basic process control to integrated, enterprise-wide network systems with corresponding MES (manufacturing execution system). Our process automation solutions reduce the need for manual tasks and so the potential for manual error, which means that you can be sure of reproducible, consistent processing of your flavor ingredients. Process control software can also be configured with optional recipe management to easily and quickly manage and switch between recipes.
Performance for success

GEA develops equipment and technologies that help to maximize the efficiency, reliability and sustainability of your plants for flavor manufacturing. Our solutions minimize product losses while maximizing plant output and productivity.

We have proven experience supplying small- and industrial-scale flavor process lines to the global flavor industry.

GEA understands that plant yield, efficiency and reliability will impact on your profitability and operating expenses, as well as on your product quality. All GEA systems are designed to provide maximum yield, fast product switches and operational flexibility.

Test facilities for product development

GEA offers laboratory and pilot plant testing facilities for customers to carry out powder property formulation, process development and validation. Whether your products are at the early stage of development or you are ready to carry out the final stage of process refinement, our test facilities and experts can offer an unparalleled range of equipment and know-how.
GEA Service – For your continued success

Working with GEA Service means partnering with a dedicated team of service experts. Our focus is to build, maintain and improve customer performance throughout the entire lifecycle of the plant and its equipment.

**Beginning of Life Services**
Getting you started with seamless support for instant productivity and performance

**Lifetime Services**
Keeping it running with the cost-efficient way of ensuring safety and reliability

**Extended Life Services**
Constantly improving by sharing our knowledge to safeguard your investment

**Consulting & Enhanced Operations**
Together with you by enduring commitment to you and your business
GEA Group is a global engineering company with multi-billion euro sales and operations in more than 50 countries. Founded in 1881, the company is one of the largest providers of innovative equipment and process technology. GEA Group is listed in the STOXX® Europe 600 Index.

We live our values.
Excellence • Passion • Integrity • Responsibility • GEA-versity

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