MIXING FORMULA®

The most versatile mixing system available
Mixing is one of the most demanding unit operations in today’s process industries and a critical step in the production of high quality end products.

Affecting both batch cycle times and total cost of ownership, selecting the most appropriate mixing technology is crucial.

GEA has a wealth of experience in supplying solutions for liquid/liquid and liquid/powder blending. We supply numerous different batch and continuous mixing and blending systems to the hygienic process industries and beyond. Our scope of supply includes both standard units as well as in-house custom designed systems for a wide variety of applications.

Continuous mixing solutions are often the preferred choice when high product throughputs are required or a considerable amount of automation is involved. GEA can also supply the most appropriate and compliant process technology, unit or complete mixing solution.

GEA offers mixing solutions that are versatile, hygienic and also suitable for multipurpose manufacturing, including high shear batch mixing, continuous inline blending, continuous inline mixing and modular or bespoke processing solutions. We also supply a wide range of liquid handling solutions, from components to equipment and complete process lines for use in home care production plants.
The unique and extremely versatile INLINE FORMULA® Mixer can be used to improve an existing production line or replace existing equipment. More than just a vessel with a bottom-mounted mixer, the customizable, multirotor, INLINE FORMULA® Mixer comprises a high shear mixing head for effective homogenization and a centrifugal pump that feeds the downstream process.

Available in two different versions, the INLINE FORMULA® Mixer can be supplied with a heating/cooling jacket, vacuum-induced powder introduction and/or vacuum-based product deaeration.

Typical applications include beverages, such as juice and carbonated water for the production of soft drinks, liquid food and recombined milk.

The advantages of using the INLINE FORMULA® Mixer are among others:

• A continuous process that can run in-line with the downstream process
• Just-in-time production – preparation of the batch at the time needed
• No or only short product storage time of the mixed product before further processing

**Computational Fluid Dynamics**

Wishing to optimize the design and functionality of the INLINE FORMULA® Mixer, GEA scientists looked to Computational Fluid Dynamics (CFD) to create a virtual prototype of the machine. By running simulations of the flow of ingredients within the INLINE FORMULA® Mixer, it was possible to develop a more detailed understanding of the process and analyze certain key parameters required to achieve a product with the desired structure.

Using this information, GEA was able to both increase the performance of the INLINE FORMULA® Mixer — by up to 70% — and reduce its power consumption, making it even more effective and cost-efficient.
In-line Mixing - One Pass Process

In-line Mixing - Multi Pass Process
Placed at the bottom of the vessel, without needing a recirculation loop, the BATCH FORMULA® Mixer facilitates the production of uniform products.

As such, this One-Pot-Processing solution decreases energy use, saves time and optimizes both clean-in-place (CIP) processes and manufacturing profitability.

The BATCH FORMULA® Mixer benefits from
- high shear and no shear in the same vessel
- rapid dissolution of powders into liquids without fish eyes or agglomerates
- stable suspensions
- gentle product handling
- hygienic design and total batch-to-batch drainage
- multiple application versatility for highly viscous products

In the BATCH FORMULA® Mixer, powder is introduced via vacuum below the liquid surface to instantly wet the ingredients. Capable of handling difficult applications such as highly viscous products and/or those requiring micro-bubbles, the BATCH FORMULA® Mixer is extremely flexible and is available with the following features:
- vacuum for the instant wetting and deaeration of powders
- heating and cooling jacket
- direct steam injection
- flash cooling and/or evaporation by vacuum
- a wide range of stators and knives

Typical applications include foodstuffs such as dressings, soups and peanut butter, household products such as detergent and window cleaners and personal care products such as creams, lotions, face masks and toothpaste.
Powder Valve

Both the BATCH FORMULA® and INLINE FORMULA® Mixer can be delivered with GEA’s patented Shut-off VARIVENT® POW Valve. This powder valve prevents the formation of fish eyes and lumps and also provides a number of economic and hygienic benefits:

• full bore opening
• flush mounting
• very limited residual powder in the valve housing
• no elastomers exposed to the powder

SHUT-OFF VALVE
VARIVENT® SERIES

The structure of the VARIVENT® modular system has many optional versions available to best optimize the valve in the process.
Application Overview

Typical application differences between in-line and batch mixing

Mixing of different products requires different ways of mixing. The below indicative list represents examples of production with the INLINE FORMULA® and BATCH FORMULA® Mixer. Please contact us with your specific product requirements for a customized process description.

**INLINE FORMULA®**

Single or multipass mixing of easily dissolvable powders in liquid up to 400 cP.

- Milk recombination
- Juice concentration
- Beverage preparation
- Base slurries
- Nutritional formula

**BATCH FORMULA®**

Batch process mixing of low and high viscosity products.

Results in a unique, homogeneous finished product – ready for filling.

- Fruit juice with pulp
- Coffee and chocolate beverage
- Mayonnaise and ketchup
- Soup concentrate
- Shampoo, cream and ointment
- Process cheese, cream cheese, liquid diet margarine
World Leader in Mixing Process Solutions

GEA is world leader in providing technically advanced mixing process solutions for a wide range of applications. Our knowledgeable staff use good engineering practices and deliver completely integrated and reliable, hygienic mixer systems that meet the most stringent regulations.

Based in Skanderborg, Denmark, our Mixing Technology Center is staffed by some of the most experienced personnel in the process equipment industry. From concept to pilot-scale trials and final analysis in onsite laboratories, our staff are available to consult with customers to determine the optimal process conditions for specific applications on a case-by-case basis.

Optimize Production with the BATCH FORMULA® Test Mixer

Providing an opportunity to optimize specific production processes on a small scale, the BATCH FORMULA® Test Mixer is a cost-efficient option to trial and develop a formulation prior to investing in a standard, full-scale BATCH FORMULA® Mixer.

As such, the BATCH FORMULA® Test Mixer can also help to reduce valuable time-to-market. Small-scale tests can be done to clarify important process parameters, including when to add ingredients, temperature profile and run times, which expedites scale-up and process development.

For some customers, the BATCH FORMULA® Test Mixer may simply be a stepping stone to full-scale manufacturing; for others, it’s the ideal, cost-efficient, small-scale production solution.
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
We live our values.
Excellence • Passion • Integrity • Responsibility • GEA-versity

GEA is a global technology company with multi-billion euro sales operations in more than 50 countries. Founded in 1881 the company is one of the largest providers of innovative equipment and process technology. GEA is listed in the STOXX® Europe 600 Index. In addition, the company is included in selected MSCI Global Sustainability Indexes.