SOLUTIONS FOR KETCHUP PRODUCTION LINES

Complete range of components, technologies and complete integrated lines for manufacturing.

GEA Engineering for a better world.

GEA.com

KETCHUP MANUFACTURING

Food manufacturers must stay agile and adaptable to complete in today's fast-moving global markets. And this is just as true for ketchup producers who may look to develop new flavors for regional tastes or niche applications.

Global view

The tomato-based condiment ketchup is a food cupboard staple, and a favorite accompaniment to burgers, cooked meats, fries and other potato products, as well as a flavoring for sauces. Continued growth in the worldwide market for ketchup has been spurred by widespread adoption of western style diets, increased consumer demand for fast food, and the popularity of frozen and easy-cook ready meals and snack-type foods.

For food producers, staying ahead of the competition in consumer-led markets means offering top quality products that meet demand, while remaining flexible and innovative to develop new recipes in response to changing market expectations.

So, as a ketchup manufacturer you need to keep an eye on local, regional and national trends, and be prepared to respond by developing ketchup variants that may contain different spices, or vegetable pieces.

GEA understands the challenge that producers face, so we aim to offer a complete range of components, technologies and integrated lines for manufacturing just about any ketchup recipe. Our efficient, reliable solutions can help our customers stay productive and flexible to remain competitive, and also support their drive to meet key sustainability goals.

Our focus is on the development of equipment and tools that can help to reduce energy and resource use, recycle where possible, and cut waste and carbon footprint.

Ketchup

SOLUTIONS FOR KETCHUP MANUFACTURING

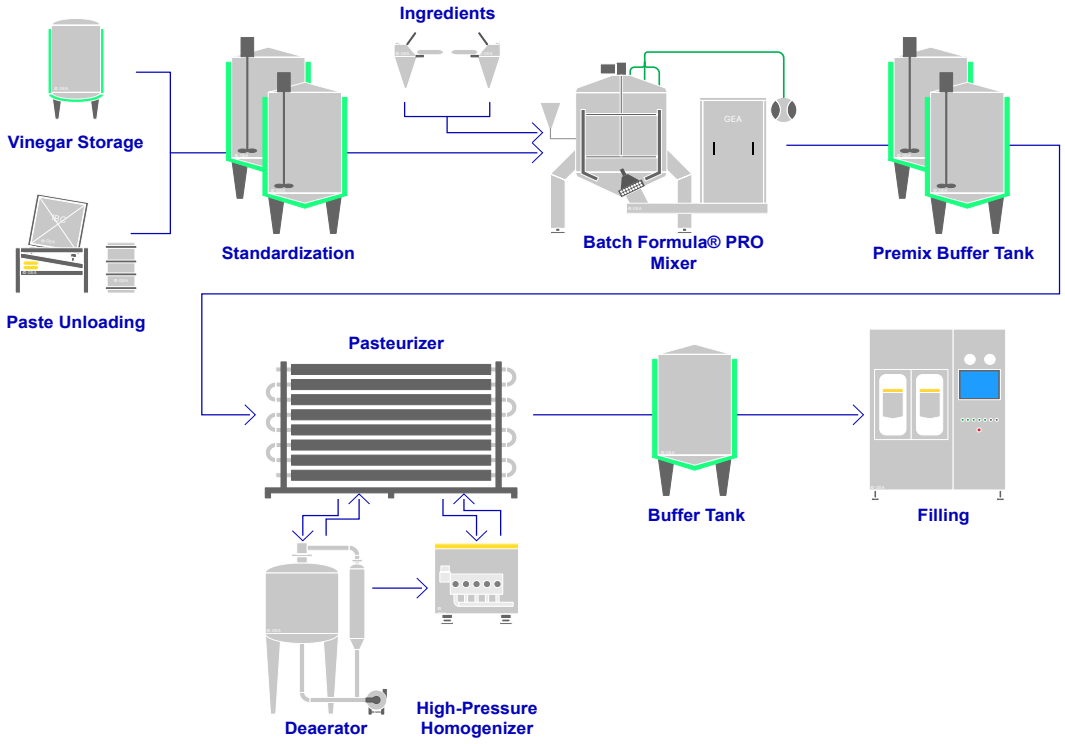
Our expertise

GEA recognizes the complexities associated with designing efficient, versatile plants for liquid food processing. We'll work with you to configure and install equipment and ketchup process lines that will match your needs today, while keeping in sight future growth, expansion and diversification. Whatever your capacity or production scale, our comprehensive portfolio spans components and stand-alone equipment for smaller scale processing, right through to complete solutions for the highest throughput industrial manufacture.

Our solutions for continuous processing are designed to be hygienic, user friendly, and require minimal maintenance. But we also aim to help you achieve more sustainable manufacturing, for example, by primary energy use. For many process lines, engineering heat recovery systems into pasteurizers one way that we can improve that overall energy efficiency. Also heat pump technology is used to make every GEA-system more sustainable.

Tailored automation solutions reduce the need for manual intervention and can help to improve productivity, while fast, efficient cleaning-in-place (CIP) plants reduce down time, help to ensure product safety, and can reduce the use of water and cleaning fluids.

Example of a GEA ketchup process line



TECHNOLOGY OVERVIEW

COMPREHENSIVE PROJECT MANAGEMENT

Global expertise in configuring components, equipment and fully integrated lines for ketchup manufacture.

Project management
All GEA customers benefit from our comprehensive project management expertise. Team up with us and a dedicated team of GEA experts will first take the time to understand your expectations and goals, and get to know your existing and setup. We'll make an initial analysis of your project, and can then propose the most suitable equipment, plant layout, and process control systems. No detail is overlooked, and we aim to achieve every agreed deliverable, on time and to budget.

Select one of our tailored aftercare and maintenance packages and we will stay by your side, supporting you throughout the life cycle of your plant.

Training and support
We want you to get optimum performance from all of your GEA systems. Our certified and experienced service engineers can train your personnel, either on site or at one of our modern training centers. We'll provide your staff with comprehensive operational training and valuable process knowledge, so they can safely and expertly run and maintain your equipment, right from day one.

And of course, all of our training programs are tailored to meet our customer´s needs and expectations.

INGREDIENTS RECEPTION, HANDLING AND MIXING

Complete systems for handling solid and liquid raw ingredients such as sugar, vinegar and spices.

GEA BATCH FORMULA® PRO high shear mixer
Ketchup is a viscous product, and ketchup recipes typically include higher ratios of sugar and spices than other tomato-based products such as liquid tomato paste.

Mixing is a key stage in manufacturing ketchup and other viscous products, and can affect final product consistency and quality. The one-pot GEA BATCH FORMULA® PRO mixer features a high-shear mixing device that is ideally suited to processing stable, homogeneous ketchup products.

The GEA BATCH FORMULA® PRO high shear mixer features a vacuum system to introduce liquids and powders below the liquid surface so wetting is almost instantaneous. This approach results in faster processing times, eliminates air incorporation and foaming, and deaerates the premix, so there may be no need to include a deaerator in the pasteurization process.

The **GEA BATCH FORMULA® PRO high shear mixer** technology is designed to help reduce equipment clogging, which also speeds processing and enables more efficient cleaning-in-place (CIP).

The high shear technology is designed to be energy efficient, and so reduce energy costs. All powder ingredients are scanned and weighed prior to delivery to the GEA BATCH FORMULA® PRO high shear mixer. Slurry can be standardized in a buffer tank before transfer to the mixing system.

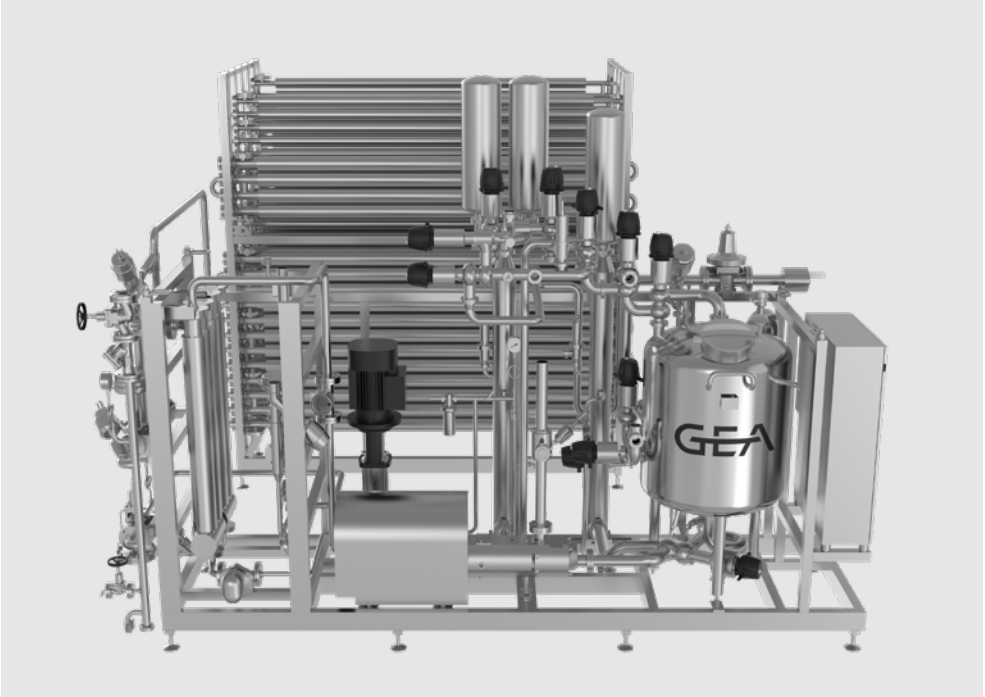
Overall benefits for our customers include higher throughput/capacity and operational efficiency, and less product loss, which can equate to higher profits and faster return on investment.

Key features of the GEA BATCH FORMULA® PRO Mixer
- Versatile design that can handle a range of high viscosity applications, and products with up to 80% total solids
- High shear and low shear mixing are carried out in the same tank
- High efficiency mixing that results in stable dispersion
- Hygienic system design that helps to ensure complete mixer drainage between batches

GEA BATCH FORMULA® PRO high shear mixer

HEAT TREATMENT AND PASTEURIZATION

A wide range of standard and custom-built, multi-purpose indirect and direct pasteurizers for ketchup production.



GEA Indirect UHT module

GEA pasteurizers are designed as modular systems that can be configured to meet just about any ketchup or liquid food product and process requirement. We can add application-specific modules to the basic unit to create solutions that offer a perfect combination of functionality and productivity. All GEA pasteurization solutions are built for reliability, and some configurations can run continuously for several days. Benefits for our customers can include increased yield, reduced losses, and process flexibility.

We can supply both indirect pasteurization units with tubular heat exchangers, and direct steam injection systems, with capacities ranging from 100 l/h to 20,000 l/h.

Indirect heating using heat exchangers

We´ve developed a comprehensive range of GEA VARITUBE® heat exchangers, so we can select the best option for an indirect pasteurization unit configured to match your production scale and recipes, whether creating a smooth ketchups or a product containing vegetable pieces or herbs.

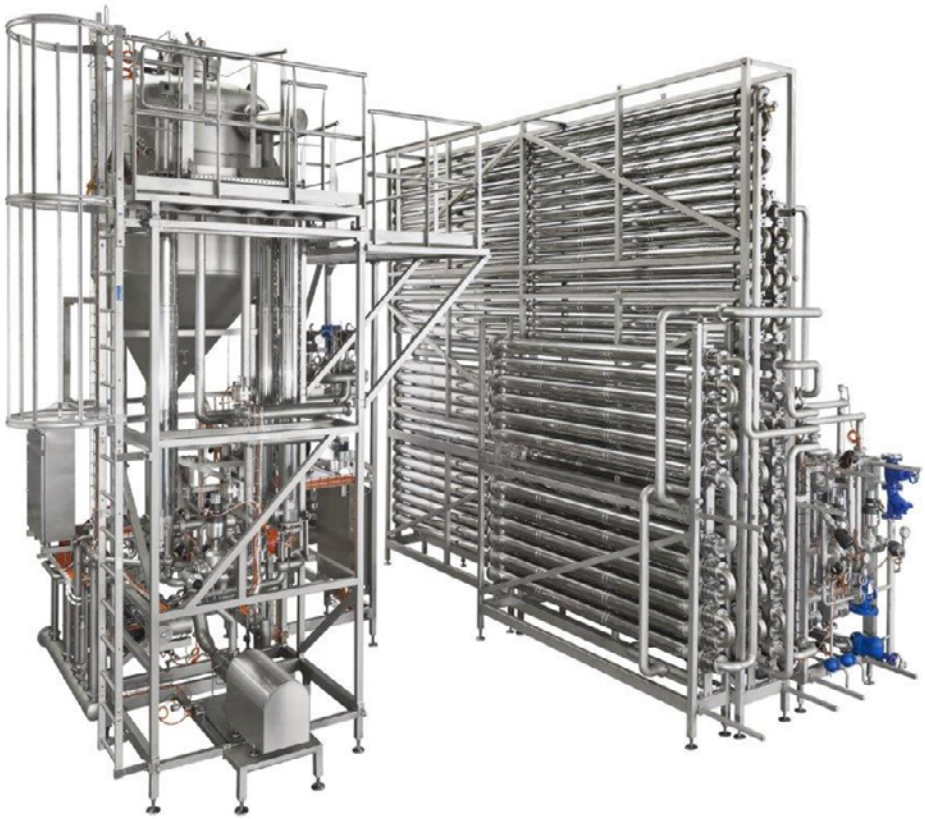
The GEA VARITUBE® modules feature a sanitary sealing system and product flow paths without dead zones, so our customers can be confident that the equipment supports product safety.

The modular design of the GEA VARITUBE® technology also allows for easy installation, extension or modification to accommodate changes to processes or capacity/throughput.

Unlike heat exchangers in conventional pasteurizers, the tubular heat exchangers in GEA pasteurizers have no wearing parts. Maintenance is a case of routine inspection.

The GEA VARITUBE® tubular heat exchangers are also engineered and fabricated in GEA workshops, which means we can provide a wide range of monotube, multitube, straight and corrugated configurations. Strict quality control is guaranteed.

HEAT TREATMENT AND PASTEURIZATION

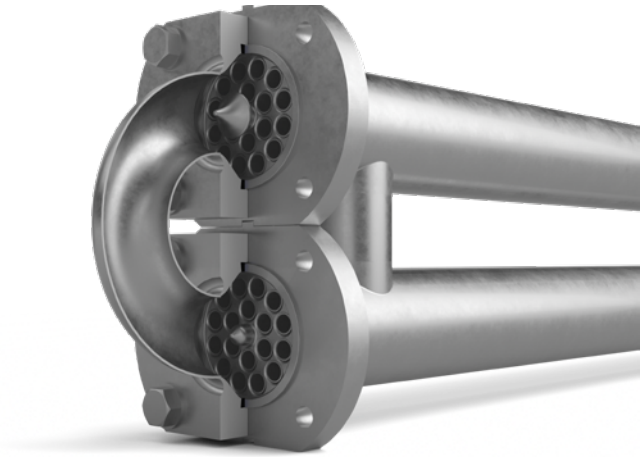


GEA UHT Injection Plant

Direct steam injection

GEA direct steam injection (DSI) pasteurization systems offer an alternative, or addition to indirect heating. Using this approach steam is introduced directly into the product using, so the liquid is heated to the required temperature almost instantaneously. The product is held at high heat for a much shorter time than it is when using indirect high heating.

Pasteurization using a direct steam injection system can offer advantages - such as better color retention - when compared with indirect systems. In GEA's experience, some of the largest end users of ketchup, including major global fast food outlets, now expect that the ketchup they purchase has been processed using direct steam injection pasteurization, rather than by indirect heating methods.



GEA Heat Exchanger

DEAERATION

Deaerator for high-viscosity products.

GEA Deaerator

Deaeration

GEA has designed a highly efficient, cost-effective deaerator that is ideally suited for processing high-viscosity products such as ketchup.

The system features feed flow from the bottom, while deaeration takes place on an inside diversion plate. The thickness of the created liquid layer on this plate will keep constant by a special inlet design to ensure always an optimal deaeration effect, independently of the feed flow.

The deaerator can also be equipped with an aroma recovery system, to help ensure there is no loss of quality during the process.

In process lines, that incorporate a GEA BATCH FORMULA® PRO high shear mixer with vacuum system for premix preparation, it might be possible to leave out a dedicated deaerator, as deaeration can take place during the mixing stage.

HOMOGENIZATION

A family of versatile homogenization systems for hot break and cold break tomato processing.

High pressure homogenization is a mechanical technique that changes the tomato's particle structure, and can help to generate better overall product quality. Homogenization may impact on the product in a number of positive ways, including single cell production, disrupting crystal agglomerates, and cutting effect on fibers.

Key effects of high-pressure homogenization on ketchup:

- Improved product stability
- Increased viscosity, which exploits the tomato's natural pectin
- Improved mouthfeel and taste

GEA expertise spans both hot break and cold break processing for tomato ketchup. We can configure and install hot break systems that carry out homogenization during pasteurization, and cold break solutions that exploit a high shear pump technology, in addition to homogenization.

The hot break method involves rapidly heating the chopped tomatoes to approximately 90°C, which inactivates the natural enzymes. Homogenization during the pasteurization process increases viscosity, without the need for stabilizers.

For cold break processing the chopped tomatoes are only mildly heated, which increases enzymatic activity and yield. The texture results from processing that generally involves the actions of a high shear pump in combination with the use of stabilizers and a high-pressure homogenizer to avoid syneresis. When using cold break homogenization the final product will exhibit very intense color and flavor.

GEA Ariete Homogenizer 3030

PRODUCT RECOVERY

Hygiene by design, to help ensure reliable, repeatable quality for every ketchup manufacturing line.

GEA VARICOVER® Product Recovery System

GEA Turbo SSB

Adaptable manufacturing
Manufacturers today look for flexibility in their equipment lines so they can switch between recipes, incorporate new ingredients into their processes and develop preservative free or other market-led formulations. GEA components have been developed to help you remain adaptable, and have confidence that your processes are safe and hygienic.

Flow components
GEA components meet the strictest requirements for hygiene and food safety. Our comprehensive portfolio spans high-quality hygienic valves, hygienic pumps, aseptic valves and cleaners. Where possible we aim to offer components that can help to reduce waste, and conserve resources and raw materials.

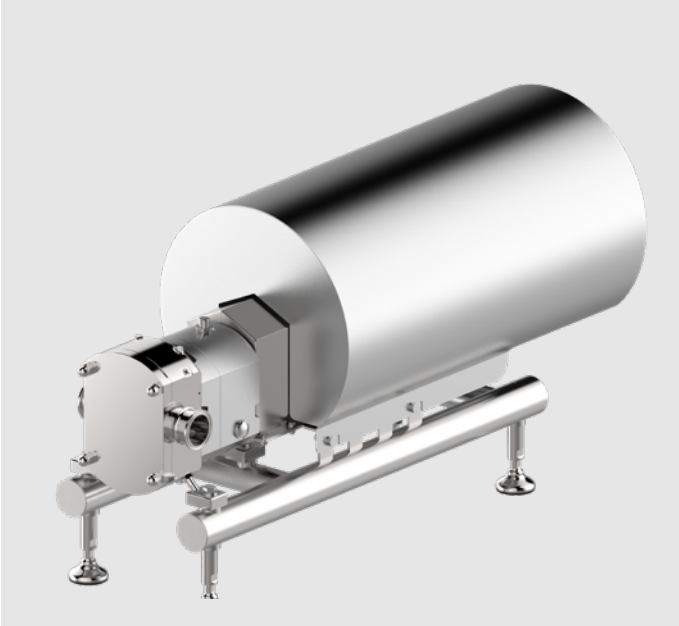
VARICOVER® product recovery systems
Product recovery or pigging systems are important tools in the pipe system, which can easily be removed by cleaning (CIP) Less product in the pipes and more efficient cleaning that help companies reduce product loss, cut waste, and reduce resource use. Our GEA VARICOVER® product recover systems expel residual product from the pipes and return it to the product flow by pigging. This leaves only a thin residual film can significantly cut the wastewater load, and so reduce the use of resources for wastewater treatment.

Efficient cleaning technology
Product safety and quality can be affected if residues are not been adequately cleaned out of tanks, silos or intermediate bulk containers (IBC) that are used to store or process liquid or viscous products. GEA has defined different soiling classes to describe the degree of mechanical force that is required to keep the process equipment clean. We´ve developed **GEA Cleaning Technology** options for a wide range of product types.

Ketchup processing generates stubborn residues with medium tank adhesion, and this requires medium impact cleaning. We think the perfect tool for this task is our **slow rotating cleaner Turbo SSB**. Using this equipment the protracted dwell time of the fan jets cleaning the tank wall results in really thorough, consistent cleaning result for ketchup lines.

HYGIENIC PUMPING

Pumps designed for gentle product handling.

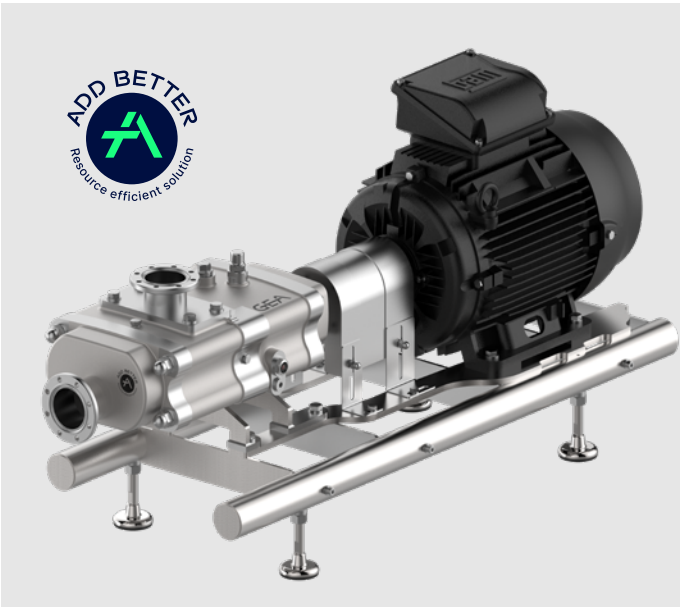


GEA Hilge NOVALOBE

Hygienic positive displacement pumps
Hygienic pumps that can operate in contact with product are key components of ketchup production lines. The **GEA Hilge NOVALOBE** and **GEA Hilge NOVATWIN+** pumps are specifically designed for pumping viscous and lumpy media reliably and efficiently.

The pump design for both types of pump ensures gentle product handling with low pulsation, which makes these GEA pumps capable of handling products with large or delicate particles.

The use of pore-free materials with hardened surfaces make GEA pump technology ideally suited to ketchup manufacturing, enabling smooth transport, even for abrasive and aggressive media. The hygienic pump design also means cleaning is thorough and fast, saving time and resources, and helping to ensure production safety.



GEA Hilge NOVATWIN+

CLEANING-IN-PLACE (CIP)

CIP solutions that support product safety at every point of processing.

GEA CIP Unit

The length of time it takes to switch between products can have a major impact on overall plant capacity. GEA solutions are designed to help maximize that capacity, so our systems feature sanitary, hygienic design, and where possible we offer automation, and integrated cleaning-in-place (CIP) plants to help speed changeover between products.

Saving time, resources and costs

Cleaning-in-place can be considered an essential process for ketchup processing lines, CIP supports equipment hygiene, so reducing the risk of microbiological contamination, and helping ensure product quality. CIP can also help you to reduce equipment downtime and to cut production costs by reducing the need for equipment disassembly and manual cleaning, which can be both time consuming and labor intensive.

The effectiveness of CIP depends on factors such as the concentration and type of chemicals used, temperature, flow rate, and duration. It´s important to put in place - and monitor - cleaning cycles that will thoroughly clean and sanitize equipment before the next production cycle.

Fast and effective CIP for better sustainability

Fully automated CIP systems from GEA are designed to be fast and effective, so you can stay productive and minimize downtime between batches or product changeover.

We design CIP systems that give you thorough, fast cleaning, while minimizing water and detergent use to reduce costs and improve sustainability.

AUTOMATION AND CONTROL

A portfolio of proven systems for process control and data collection.

GEA Codex®

Process automation for reliable, reproducible manufacturing
Here at GEA we know that every plant will have different process automation requirements and we can tailor a solution that matches your needs. Our **GEA Codex®** system is a scalable automation solution that offers basic process control functionality when that´s all you might require.

In contrast, we can configure our modular **GEA Codex® MES** to provide fully integrated, enterprise-wide network MES (manufacturing execution system) capabilities, which allow you to track and manage different stages in their production processes. Install our technology and you might be able to reduce the number of manual tasks and overall need for human intervention.

GEA Codex® automation solutions provide detailed records and analysis of your production processes, to help you plan for changes or troubleshoot, and to help maintain optimum use of resources and secure reliable, consistent product quality.

An advanced recipe application module is designed specifically for the food industry, so that customers can easily create and manage recipes and production scheduling.

We offer global and local support services for maintaining the GEA Codex® platforms at our customers sites, to help ensure you get maximum efficiency and productivity.

PERFORMANCE PARTNERSHIP

Empower your business with a partnership designed to optimize your performance. Together with you, we create services that matter: We focus on your specific goals and help you increase **Availability**, **Productivity** and **Sustainability** – enabled by digitalization.

AVAILABILITY PRODUCTIVITY SUSTAINABILITY

Enabled by digitalization.

Enhancing Availability

Proactively minimize down-time with maintenance strategies and innovative technologies that ensure smooth, uninterrupted operations.

Boosting Productivity

Optimize efficiency with process improvements, staff training, and action-able, data-driven insights to maximize your produc-tion potential.

Driving Sustainability

Reduce environmental impact, improve resource-efficiency, and extend machine lifespans with tailored solutions and expert support.

Enabled by digitalization

- **Optimize and automate** your processes
- **Solve problems early** with predictive analytics
- **Identify untapped opportunities** through actionable insights
- **Make data-based decisions** – anytime, anywhere

Let's talk to unlock your full potential

GEA.com/service

INTEGRATED HEATING AND REFRIGERATION

As a ketchup manufacturer, you need confidence in precise temperature management to ensure top product quality. You also need reliable and increasingly efficient production processes while lowering your carbon footprint—all at the same time. The first step is to examine your largest energy consumers: heating and cooling.

GEA's refrigeration solutions — utilizing natural refrigerants such as ammonia — offer accurate temperature control, and when combined with heat pump technology, can **improve energy efficiency considerably for heating and cooling.**

The power of GEA heat pump technology

Refrigeration plants generate a lot of waste heat, which can be feasibly reused for heating processes such as pasteurization or even in CIP plants. GEA has designed high-temperature heat pumps that capture and amplify waste heat from the refrigeration system, channeling that energy to other stages of the process.

When configured to supply heat to the **heat treatment**, GEA heat pump technology can dramatically reduce the demand for steam to fire boilers, and in some instances, could even replace steam-driven boilers altogether.

A holistic engineering approach

For years, GEA has been at the forefront of food processing optimization with our proven and **TÜV-validated consultancy phase**, **Add Better Consulting**, followed by our holistic engineering solutions, called GEA NEXUS.

An Add Better Consulting report provides a mapped overview of all process streams, a calculated ROI, total life cycle benefits, the effect on TCO, and CO_2 emissions reduction. Additionally, we offer a detailed description of the required cooling and heating systems, and of course, the best-fit heat pump solution.

The next step is the **next-generation upgrade with GEA NEXUS**. This is the implementation phase, where optimization is done in desired or required steps—starting with connecting heat pump technology to manufacturing processes to ensure energy is moving circularly, rather than being wasted. Our GEA NEXUS team will transform the design into reality, building or upgrading plants for customers with reduced energy consumption, CO_2 footprint, and operating costs.

Learn more at GEA.com/nexus

1 Assessment and analysis
Add Better Consulting - Customized optimization and decarbonization strategies

2 Implementation
GEA NEXUS - Implementating the engineering solution within time and budget

3 Service and maintenance
Your GEA NEXUS team is your single point of contact offering all expertise inhouse

TEST FACILITIES

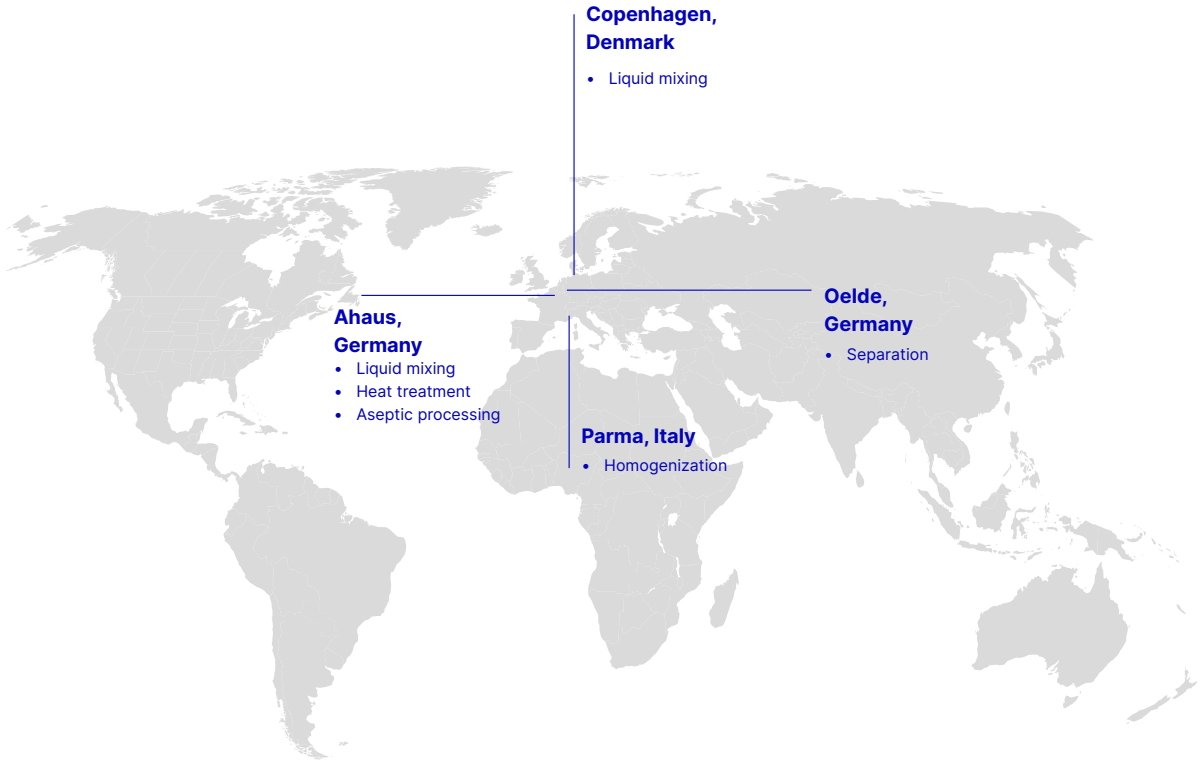
Global test facilities for trialing new recipes, testing processes, and evaluating equipment.

Global centers of excellence
We recognize how important it is for our customers to keep abreast of sector trends, and have the flexibility to develop new processes and recipes so they can bring successful products to market. GEA offers so much than a one-stop-shop for food production technology. It´s our aim to be your true partner for success.

So, at GEA test centers our customers have an opportunity to work with GEA experts to trail new recipes, conduct tests prior to plant design and demonstrate proof of concept for products and processes.

From configuring systems for ingredients handling and mixing to tailoring systems for homogenization and pasteurization, our experts can work with you to optimize existing processes and help design and configure production lines for new products.

Whatever the production scale, we can perform comparative process studies, help devise trails, and conduct product - and customer-specific tests. We aim to help build quality into your processes, so that you can bring new products to market quickly, efficiently and sustainably.



Engineering for a better world.

GEA.com

GEA Liquid Technologies Germany GmbH
Am Industriepark 2 - 10
21514 Buechen, Germany

Tel +49 4155 490
gea.com/contact
gea.com/liquid food

EN 10/2025

© GEA Liquid Technologies Germany GmbH. All rights reserved. Published on 13/10/2025. Subject to modifications. Trademarks shown in this brochure are registered in several countries worldwide.