

SOLUTIONS FOR MAYONNAISE PRODUCTION

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



SMOOTH INDULGENCE

To compete successfully in today's global food and beverage industry, manufacturers must offer high quality products, at the right price, and stay agile to meet the demands of changing market trends.

Global aspect

Mayonnaise is a popular condiment that is enjoyed worldwide in salads and sandwiches, as an accompaniment to a wide range of dishes, and also as an ingredient in other sauces and recipes. Typically made from egg yolks, oil, vinegar or lemon juice and seasonings such as salt, sugar and mustard, mayonnaise production involves the use of several process systems, including mixers and homogenizers.

GEA offers the specialized equipment that is used to process mayonnaise, and we can configure individual plants, or end to end lines for large-scale, and smaller-scale production.

Recognizing the highly competitive nature of this industry, we'll work with you to configure reliable, efficient equipment that will give you the flexibility to meet the ever-changing demands of the market, helping you to stay innovative in this fast-moving sector.



We also offer automation solutions that can boost production efficiency, yield and quality. And where possible, we'll suggest resource and energy saving and recycling systems that could help you to meet your environmental goals for greener manufacturing today, and tomorrow.

Of course, all GEA food systems are hygienic by design, and constructed using certified food grade materials that comply with industry regulations. And as the global demand for mayonnaise continues to grow, GEA will continue developing new technologies and solutions that will support the industry's response to consumer and market demands.

EXPERTISE FOR MAKING HIGH QUALITY MAYONNAISE

GEA expertise at every stage

Building on decades of know-how and experience working with the food industry, we have developed hardware and software systems that can address production challenges and help you to optimize key stage in your manufacturing processes.

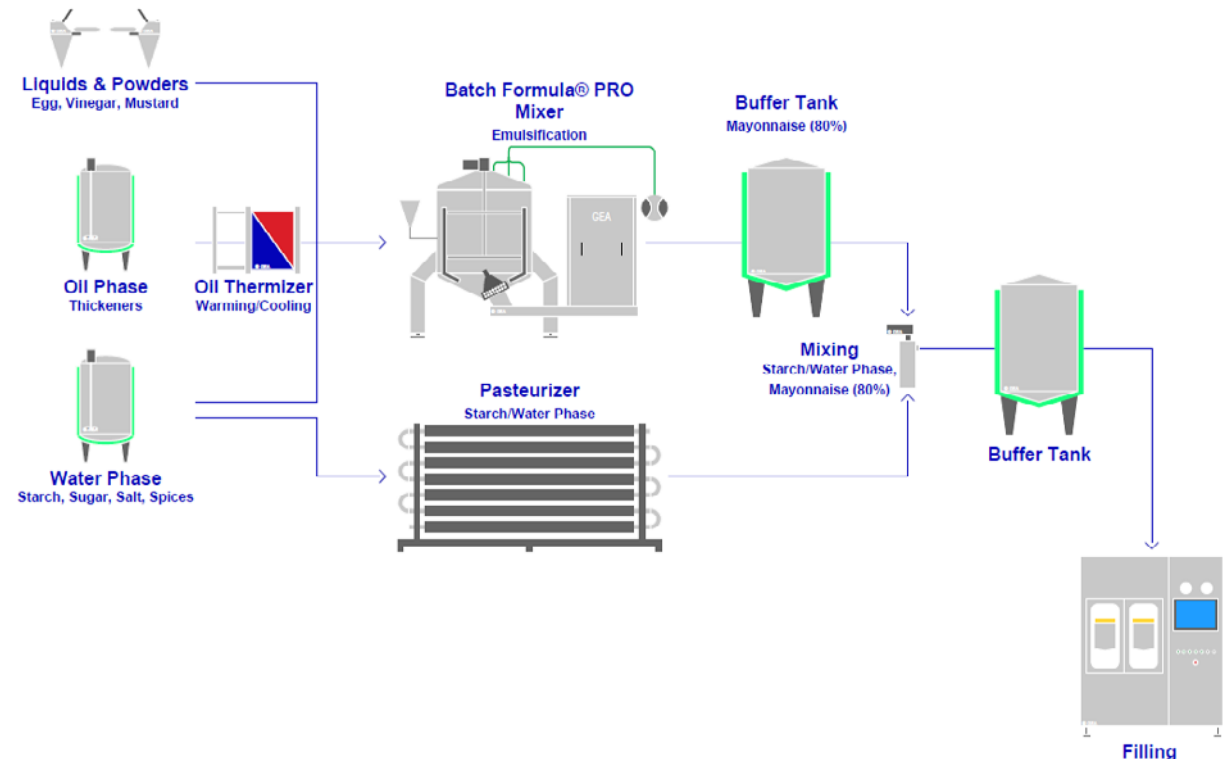
We understand that the ability to manufacture smooth and stable mayonnaise products that have a long shelf life depends on the ability to mix powders and liquids homogenously so that the particles stay dispersed in solution and do not separate during packaging or storage.

We've designed mixing systems that can help to prevent flocculation and sedimentation, to reduce the risk of separation. Our high shear mixing technology facilitates dispersion and minimization of oil droplets, so you can process homogeneous, stable emulsions.

Process temperature can also impact on the final mayonnaise composition, so we've developed an integrated temperature control system that can help to prevent the emulsion from cracking and so give you a more consistent, homogeneous final product.

We also offer a user-friendly automation solution, with recipe management, which monitors and precisely controls key variables in your mayonnaise processing line, so you can expert efficient, reliable production, every day.

Example of a GEA process line



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GEA PROCESS DESIGN AND PLANT INTEGRATION

Global expertise in configuring state-of-the-art technologies and equipment for fully integrated mayonnaise manufacturing lines.



GEA provides a comprehensive range of technologies and equipment for fully integrated mayonnaise manufacturing lines, from raw materials reception through to filling. We'll work with you at every stage, starting with initial discussions and project inception, right through to commissioning and hand over. It's our aim to configure optimized solutions that will match all of your requirements, whatever your ingredients, capacity and level of automation.

GEA process design and plant integration

We can supply preconfigured, standalone equipment that can integrate into existing lines, or tailor, deliver and install complete, fully integrated mayonnaise processing lines for small- and large-scale production.

We understand that while you need solutions and plants for your existing product range, capacity and throughput, you also need the flexibility to be able to develop new

products and processes, and to respond to changing market expectations. So, where possible, we offer options and upgrades that will let you adapt existing recipes and processes, and develop new product lines.

And our expertise spans equipment and systems that operate upstream and downstream of key mixing and homogenization processes, to match your throughput and capacity. Our end-to-end solutions can give you seamless processing, minimizing the likelihood of delays or bottlenecks.

Training and support

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

Project management

We make sure that no detail is overlooked and aim to achieve every deliverable on time.

- All GEA customers benefit from our world-recognized project management expertise. We undertake all aspects of project execution, from conception and layout through to equipment delivery and installation, including international contract management, commissioning and start up.
- A dedicated team will liaise with 3rd party suppliers, secure utilities supply, and provide comprehensive after-sales support and training.

Partner with GEA and you have the security of expert support from day one, with options for flexible service, maintenance and upgrade packages.

INGREDIENTS RECEPTION, HANDLING AND MIXING

All ingredients are scanned and weighed prior to delivery to the GEA BATCH FORMULA® PRO Mixer.

Reception and handling of raw ingredients

Safe ingredients handling and traceability are vital for mayonnaise manufacture. GEA can tailor the right solution for handling all your ingredients, including powdered and fresh eggs. Control systems connected to scanning and weighing equipment check ingredients, and we can also configure oil reception and storage systems with a feed line, equipped with cooling, to our GEA BATCH FORMULA® PRO Mixer.

Mixing for stable emulsions

Mixing is a key process that affects the consistency and quality of mayonnaise. For mayonnaise processing it is important to have a reduced oil droplet size, and to avoid trapping micro air bubbles in the product. GEA's one-pot BATCH FORMULA® PRO Mixer is ideally suited to processing mayonnaise and other challenging products. The GEA BATCH FORMULA® PRO Mixer incorporates a high shear mixing device, sited in the cone at the bottom of the **tank** which is key to the system's ability to generate a highly uniform product without recirculation loop. The high shear technology maximizes energy utilization, so improving efficiency and reducing energy use.

The **GEA BATCH FORMULA® PRO Mixer** uses a vacuum system to introduce liquids and powders below the liquid surface so wetting is almost instantaneous. This approach results in faster processing times, reduces air incorporation and foaming, and deaerates the premix. There is also less equipment clogging, while production capacity and operational efficiency are increased, and cleaning-in-place (CIP) cycles can be optimized.

Our customers benefit from maximum return on their investment, reduced product loss and improved profits.

Key features of the GEA BATCH FORMULA® PRO Mixer

- High shear and low shear mixing are carried out in the same tank
- High efficiency mixing results in a stable emulsion
- Hygienic system design ensures total mixer drainage between batches
- Versatile design for multiple applications with high viscosity up to 80% total solids
- Accurate temperature control



GEA BATCH FORMULA® Mixer

HOMOGENIZATION

High pressure homogenization for mayonnaise



GEA Ariete Homogenizer 3030

High pressure homogenization (HPH) is a new continuous technique for preparation and stabilization of emulsions, by means of significantly reducing the size of oil droplets and improving interactions between emulsifier and fat phase. This allows the production of oil-in-water (o/w) emulsions with reduced fat content. Further, emulsion with reduced number of emulsifiers or completely free of thickeners can be produced.

In the specific case of mayonnaise, the homogenizer is used to break down oil droplets into their smallest possible size, resulting in a thicker, creamier product. Homogenization is suitable and advantageous also for vegan mayonnaise.

Key effects of high-pressure homogenization:

- Micronized emulsion production
- Stability improved
- Organoleptic properties of the homogeneous product enhanced
- Digestibility increased

PRODUCT RECOVERY

Every GEA component is designed to the highest standards of safety and hygiene, to help ensure reliable, repeatable quality for all of your ketchup manufacturing lines.

Flow Components

Manufacturing must be adaptable to incorporate improvements and new ingredients or develop preservative free and other market-led formulations. And we are here to support you! We offer a comprehensive portfolio of innovative, sustainable and high-quality components in the four areas of hygienic valves, hygienic pumps, aseptic valves and cleaners. Our components meet the strictest requirements for hygiene, food safety, and quality-conserving resources, saving raw materials, and providing the highest product quality.

Efficient cleaning technology

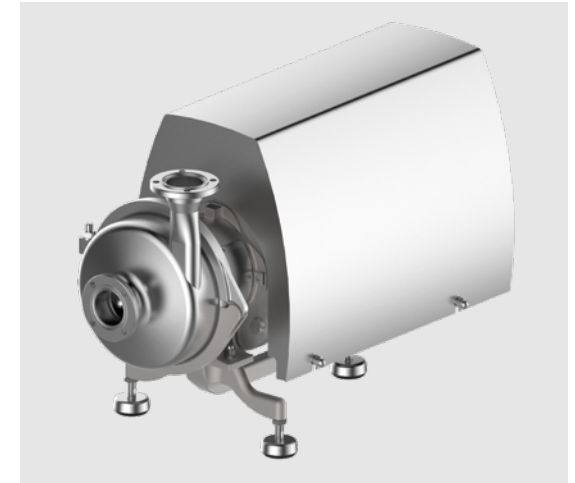
Smart technologies help you to save sensitive and expensive resources and reduce their environmental footprint. Every GEA valve control top T.VIS® A-15 is equipped with the smart LEFF® function. This smart technology has been proven to reduce the necessary CIP fluid and water in the cleaning cycle by more than 90 percent. Furthermore, GEA offers a comprehensive range of cleaners that can be used to create sustainable tank cleaning

solutions for every soiling grade – from easy-to-rinse water-soluble liquids to highly sticky and viscous pastes and cremes.

Recover the value, reduce the waste Product recovery systems

Already a proven technology across several applications, product recovery or pigging systems have become an important tool in helping companies conserve water by ensuring that raw materials are processed with minimal waste and by optimizing water consumption in demanding pipe cleaning processes. This also reduces resource-usage for wastewater treatment.

Using GEA product recovery systems, residual products are expelled from the pipes and returned into the product flow by pigging. This leaves only a thin residual film in the pipe system, which can easily be removed by cleaning (CIP). Less product in the pipes and more efficient cleaning also dramatically reduces the wastewater load.



GEA Hilge HYGIA pump



GEA VARIVENT® mixproof valve with balancer

PRODUCT RECOVERY

The heart of every process.

GEA Hygienic Pumps

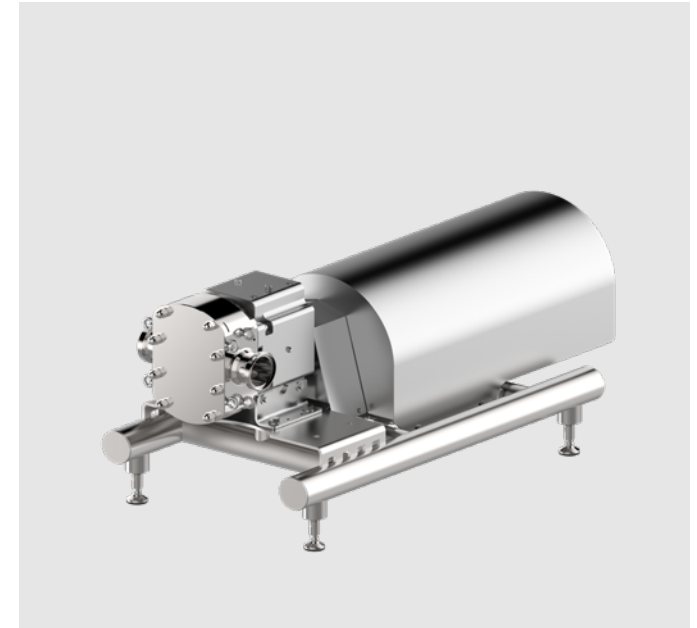
Hygienic pumps that can operate in close contact with product are key components of mayonnaise production lines. The positive displacement pumps **GEA Hilge NOVALOBE** and **GEA Hilge NOVATWIN+** are specifically designed for pumping viscous media reliably and efficiently.

The PD pumps ensures gentle and low pulsation conveying and the use of pore-free materials make the technology ideally suited to mayonnaise manufacturing. The pumps hygienic design ensures quick and safe cleanability, saving time and resources while increasing production safety.

GEA valves

With a flexible valve concept and advanced control and automation functions, our valves offer you maximum product safety and process reliability. Our valves adapt to your process and your product, not the other way round. There are no limits to your product ideas and demands. Globally valid certifications for hygienic safety are available for every valve configuration.

The digital control tops from GEA ensure automatic, error-free activation and monitoring of all valve functions as specified in the central program. For the plant operator, this means streamlined and fully flexible production and cleaning processes that require less staff, time, and energy.



GEA Hilge NOVALOBE



GEA Hilge NOVATWIN+

CLEANING-IN-PLACE (CIP)

GEA's innovative **CIP solutions** meet all critical hygiene standards to guarantee product safety at every point of processing

The amount of time it takes to switch between products can have a major impact on your plant's overall capacity. GEA systems are designed to maximize that capacity, and feature sanitary, hygienic designs and automation, with either integrated cleaning-in-place (CIP) or minimal manual intervention for cleaning, to help speed changing between products.

CIP to save time, resources and costs

Cleaning in place (CIP) is an essential process for mayonnaise systems to maintain proper hygiene, reduce the risk of contamination and ensure product quality. The CIP process is critical in the production of mayonnaise, as it helps to prevent the growth of harmful bacteria and ensures that the final product is safe for consumption.

CIP also helps to reduce downtime and production costs by reducing the need for disassembly and manual cleaning, which can be time-consuming and labor-intensive. The effectiveness of CIP depends on various factors such as the concentration and type of chemicals used, temperature, flow rate, and time. Therefore, cleaning cycles must be carefully designed and monitored to ensure that equipment is thoroughly cleaned and sanitized before next production cycle.



GEA CIP Unit

Fast and effective CIP for better sustainability

We strive to develop versatile solutions that offer the flexibility to switch easily between products, while maximizing product recovery and preventing carryover to reduce loss. Fully automated CIP systems from GEA are designed to be fast and effective, so you can stay productive and keep downtime between batches or product switching to a minimum.

Where possible our systems use less water and detergents, which reduces costs and improves sustainability. All GEA solutions are tailored specifically to fit in with your infrastructure, product and process requirements, which helps to make commissioning seamless and with minimal risk of unpredicted delays. We aim to get you up and running as fast as possible.

AUTOMATION AND CONTROL

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



GEA Codex®

Process automation for reliable, reproducible manufacturing

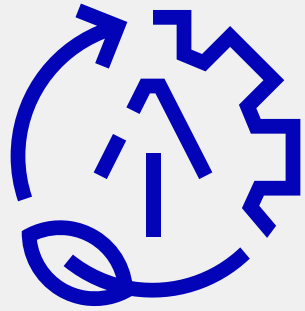
Here at GEA we know that every plant will have different process automation requirements and we can tailor a solution that matches your needs. Our **GEA Codex®** system is a scalable automation solution that offers basic process control functionality when that's all you might require.

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.



Enhancing Availability

Proactively minimize downtime with maintenance strategies and innovative technologies that ensure smooth, uninterrupted operations.



Boosting Productivity

Optimize efficiency with process improvements, staff training, and actionable, data-driven insights to maximize your production potential.



Driving Sustainability

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

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.

Let's talk to unlock your full potential



[GEA.com/service](https://www.gea.com/service)

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

How you can benefit from Performance Partnership



Reduce Total Cost of Ownership



Ensure accountability for delivered performance



Boost sales through optimized capacity and resource utilization



Free up time to focus on core, value-creating processes

INTEGRATED HEATING AND REFRIGERATION

As a mayonnaise 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 CO₂ 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, CO₂ footprint, and operating costs.

Learn more at [GEA.com/nexus](https://www.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

GEA test facilities helps you to achieve greater confidence in the safe and repeatable production of your mayonnaise prior to market release.

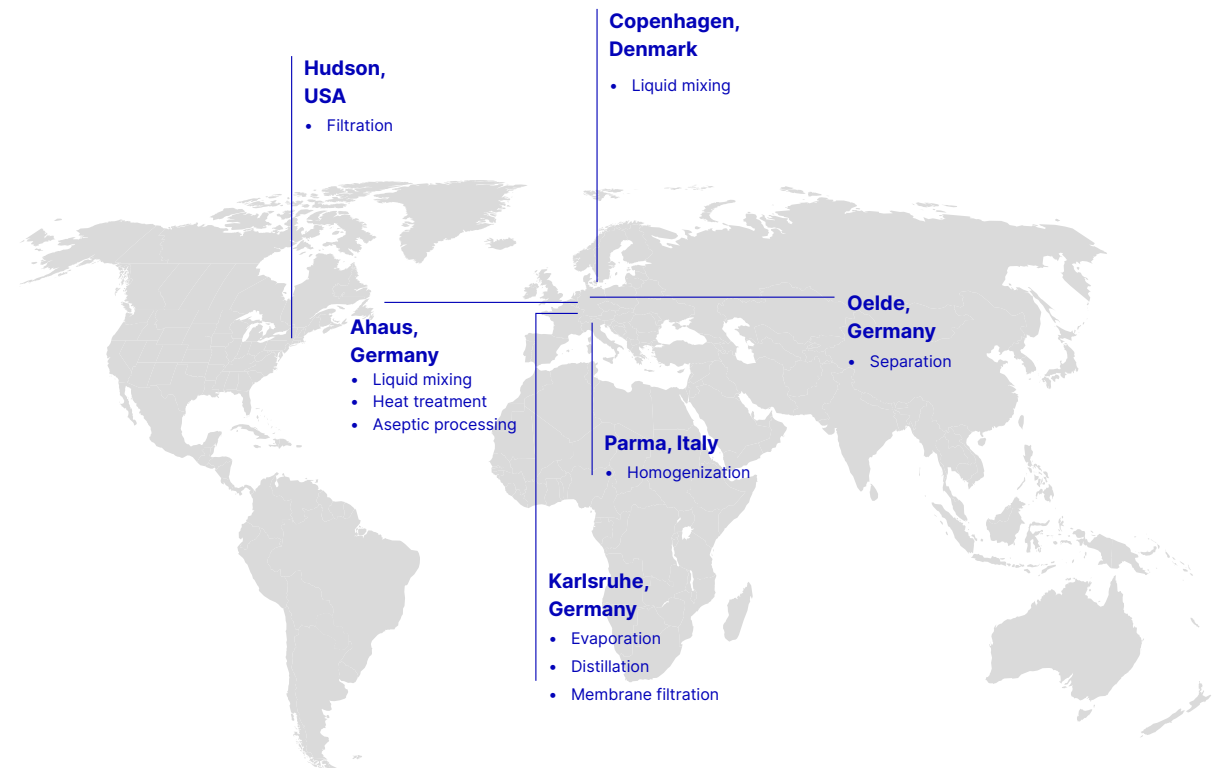
Global centers of excellence

We recognize how important it is for our customers to keep abreast of sector trends, process novel ingredients and bring successful products to market. GEA is more than your one-stop-shop for food production technology, it's your partner for success.

Our test centers provide an opportunity for you to trial new recipes, conduct tests prior to plant design and for us to form collaborative and innovative partnerships.

From ingredients handling and mixing to homogenization and pasteurization, our experts can assist and expedite the development of innovative new products or optimize the production of existing ones.

From lab- to pilot-scale and beyond, including skid-mounted options, we can perform comparative process studies, facilitate customer trials, help with application development and conduct product- and customer-specific tests. We can help you to build quality into your processes, adjust key parameters to drive your critical quality attributes to the required target levels and bring new products to market in a quick and efficient way.



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