



Mechanical separation solutions for the dairy industry

Process stages, systems and
equipment from GEA

A powerful partner to the dairy industry since 1893

Mechanical separation technology from GEA has characterized the dairy industry from the outset. Experiences gained over the course of more than 125 years form the basis for production lines and processes which set new standards.

Whether it's butter, yoghurt or quark: there is hardly another natural product from which as many foods can be produced as raw milk. For dairies, this product variety is coupled with a range of different processes used for raw milk preparation and post-processing. GEA has long been a sought after partner in this respect.

Since 1893, the year GEA Separation was founded in Oelde, Germany, the company has made significant advances to the development of the field as a whole. Today, dairies profit more than ever from the unique experience and innovative strength of the technology leader. Systems, processes and production lines provide valuable impulses for greater efficiency and higher returns under any conditions and in a tough competitive environment.

Process technology from GEA supports the following processes:

- Milk and whey cream skimming
- Clarification of milk and whey
- Bacteria removal from milk and whey
- Cream concentration
- Standardization of milk, cream and whey cream

Special processes for the manufacture and yield increase of:

- Butter / butter oil
- Fresh cheese
- Whey proteins
- Calcium phosphate
- Lactose
- Casein
- Cheese fines

GEA ENGINEERING AT ITS BEST
GEA directdrive separators with integrated GEA proplus system
create sustainability.



Together we get the most out of milk and whey

Process technology from GEA has proven itself at every level because the products' quality is ensured and nothing more is left to be desired with regard to the process economy.

Skimming cream from milk

Raw milk contains around 4 % fat. In order to produce non-fat milk, this cream must first be separated. Here, a differentiation is made between warm milk separation at temperatures between 50 and 60 °C and cold milk separation which takes place at temperatures between 4 and 25 °C. GEA supports both these processes with the GEA **procool** system having been developed as a future oriented element for cold milk separation. The cream skimming separators from the GEA **hyvol® proplus** line set new standards when it comes to product protection and yield maximization. All separators are equipped with the GEA **hydrosoft** system. For your milk this means the lowest possible feed pressure, gentle product intake, the lowest possible shearing forces and therefore the highest possible separation efficiency. The **hydrosoft** system employs no maintenance intensive, mechanical seals and requires no additional cooling water.

Standardization

With the GEA **standomat** systems, GEA offers a standardization unit for milk fat to milk protein. The inline and online system regularly measures and regulates the defined specifications directly during the production process. Limit values are precisely maintained and resources are better employed. Sampling is no longer required – laboratory checks can be eliminated.

Whey clarification and skimming

In order to achieve the greatest level of process technological and economical processing, whey must first be separated from milk fat and cheese fines. GEA separators safely and efficiently perform this task. In doing this they not only perform their underlying separation functions but also increase overall plant yields thanks to their recovery and preparation of contents such as cheese fines or lactalbumin.

Bacteria removal from milk

Bacteria, yeasts and mold spores can heavily contaminate milk products. This makes reliable bacterial clarification of milk that much more important. The range of applications runs from single-stage bacteria removal, across a 2-stage process and up to special bacterial clarification of milk and a targeted bacterial clarification of cheese milk as well as the treatment of whey concentrate. With centrifugal double bacteria removal from raw milk by means of the GEA **prolong** process, dairies benefit from a gentle treatment of the raw milk and a minimal heat treatment that does not exceed the legally required minimum, which is why the vitamin content and the natural taste are preserved.

Fresh cheese

Fresh cheese is among the trend products for health conscious nutrition. GEA enables manufactures to profit from this trend in a particularly economical manner. The company offers a wide variety of complete process lines including all required components for fresh cheese production. In order to extract quark, GEA has developed the so-called "Thermo Quark" process which ensures safe recovery and longer shelf life than the traditional extraction process. GEA also offers a range of separators for strained yoghurt, a very traditional fresh cheese product that underwent a high boom in recent years and exists under different names depending on the regional origin – Greek Yoghurt in Greece, Labneh in Middle East and Skyr in Northern Europe. In addition, a baker's cheese can be produced in an extremely economical manner using complete production lines from GEA.

Milk fats

Milk fats from cows and other dairy animals form the basis of a wide variety of sweet and sour cream butters, anhydrous milk fats (butter oils), ghee and dairy spreads for both consumers and the food industry. GEA offers state-of-the-art, hygienic components, equipment, and turnkey solutions for manufacturing every type of milk fat product. Solutions for butter production are founded on the Fritz process and built around the GEA buttermaking machines, enabling efficient, continuous processing at industrial scale. GEA also configures and supplies complete solutions

for producing AMF, ghee, anhydrous butter oils and butter oils from creams, butters or raw milk.

Lactose

Lactose can be economically produced thanks to concentration, crystallization and washing on the production line. A particularly high yield of up to 80 % can be attained if de-calcium phosphatization based on the GEA principle, is combined with technologies like nanofiltration, electro-dialysis, ion exchange and/or decolorization with active carbon.

Casein

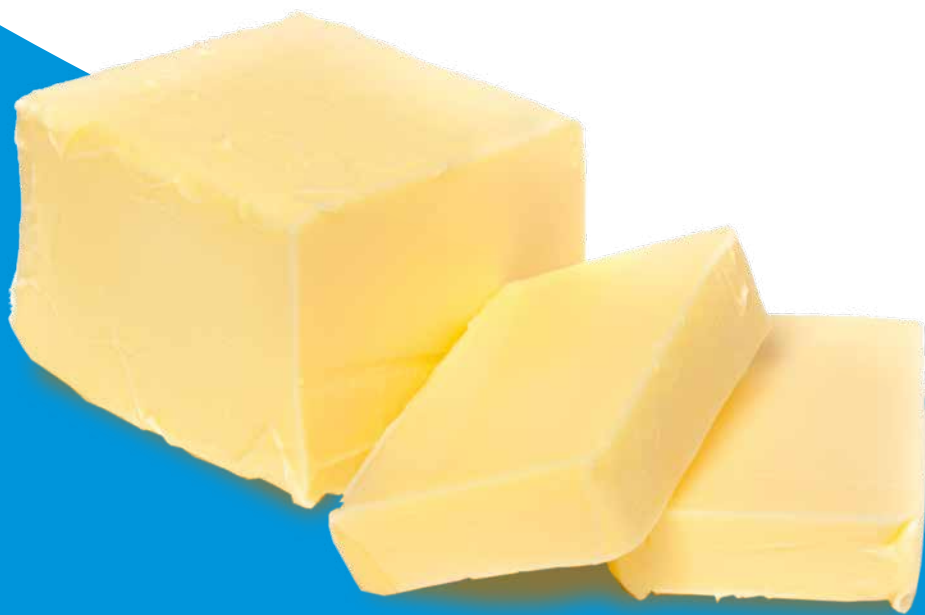
Isolated casein forms a valuable raw material for many industrial branches. The nutrition industry employs casein as a high quality protein. It is also important as a bonding agent to the paint industry, as a photographic covering agent and in the manufacture of adhesives. Process lines from GEA support the recovery through acid or rennet precipitation with a low wash water content.

Special processes

GEA has also developed processes which permit economical processing with unvaryingly high quality for special requirements such as defatting whey retentate, fractionating whey proteins or calcium phosphate separation.

An overview of your benefits:

- Gentle product treatment
- High product quality
- Increased protein yield
- Optimal skimming efficiency
- Standardization according to recognized standards
- Reliable bacteria removal
- High solids concentration
- CIP capability
- Reduction in water consumption
- Lower energy requirements
- 3-A standard



More than just centrifuges

Equipment and complete process lines developed by GEA have proven themselves in a wide variety of applications.

Application	Key equipment incl. control systems	Scope
Milk and whey clarification	Separators	Cold and hot process, on request incl. up- and downstream equipment (tanks, valves and pumps, heat exchanger, CIP, milk reception, pasteurization)
Milk and whey skimming / standardization	Separators and standomat	Cold and hot process, on request incl. up- and downstream equipment (tanks, valves and pumps, heat exchanger, CIP, milk reception, pasteurization, homogenizer)
Milk and whey bacteria removal	Separators	On request incl. up- and downstream equipment (tanks, valves and pumps, heat exchanger, CIP, milk reception, pasteurization, homogenizer)
Cheese fines recovery	Decaners	On request incl. up- and downstream equipment (tanks, valves and pumps, heat exchanger, CIP, pasteurization)
Egg clarification	Separators	On request incl. up- and downstream equipment (tanks, valves and pumps, heat exchanger, CIP, brush strainer, hydrocyclone, pasteurization, homogenizer)

Application	Key equipment incl. control systems	Scope
Fresh cheeses	Separators and decaners	On request complete process lines
Cream cheeses and double cream cheeses	Separators	On request complete process lines
Casein	Separators and decaners	On request complete process lines incl. ring-dryer
Lactose	Decaners	On request incl. up- and downstream equipment (tanks, valves and pumps, heat exchanger)
DCP	Separators and decaners	On request incl. up- and downstream equipment (tanks, valves and pumps, heat exchanger)
Butter	Continuous butter making machines	On request complete process lines
AMF, Butter oil and ghee	Separators	On request complete process lines



GEA directdrive separators with integrated proplus system

More value added through process optimization: increased product yields, reduced costs and increased profits over the entire machine service life. A sustainable environmental benefit is included.

Fewer ejections, more protein

GEA **proplus** extends the ejection intervals of milk separators from 20 – 30 minutes to up to 90 minutes. This ensures added value: a significant increase in protein yields from the quantity of milk used, and a clear reduction in fresh water consumption and waste water creation. Depending on the size of the separator, this means an annual extra profit for you of 30,000 to 100,000 euros*. It also means sustainable protection of the environment due to the conservation of water resources – with savings of up to 160,000 kg per year. This is a benefit which secures

your investment for the future, even in light of environmental regulations becoming stricter.

New installation or modular retrofitting: Flexible investment, optimized operating costs

GEA **proplus** offers two options to make milk processing even more profitable: a new installation of GEA separators with integrated **proplus** system, or specific retrofitting of systems which are already installed. You always benefit twofold. Next to the additional protein and environmental protection, **proplus** also increases productivity.

Cold milk separation with GEA procool

Minimal energy requirements and outstanding product quality – **procool** sets new standards with respect to throughput, skimming efficiency, process safety and economy

GEA procool fully integrates the advantages of cold milk separation:

- Improved bacteriological characteristics of the final product thanks to raw milk being handled while cold
- Energy savings through the elimination of any heat addition
- Reduction in protein denaturation (WPNI ≥ 6 mg N / g)
- Production of specific products based on user specifications

Facts and figures:

- Throughput: 10,000 – 50,000 l/h
- Product temperature > 4 °C
- Skimming efficiency: 0.08 – 1.0 percent
- Fast, problem-free changeover between warm and cold process control in the same separator
- Separator is fully CIP capable

**Based on standard settings for European milk quality. Results are purely indicative and non binding.*



GEA Service – For your continued success

Improve the life cycle cost of your plant and equipment

Getting you started

We start as we mean to go on, a supportive and committed partner for life. We plan and build around individual needs by sharing and developing process knowledge and involving customers in factory acceptance tests. Equipment is installed on site, staff and supporting operators are comprehensively trained by our experienced specialists to get our customers up and running, and to ensure a smooth, seamless on-going operation.

Keeping it running

To ensure our customers benefit from continuous production processes with minimal unexpected downtime, we provide fast, efficient maintenance and best quality original spare part support, whenever and wherever it's needed.

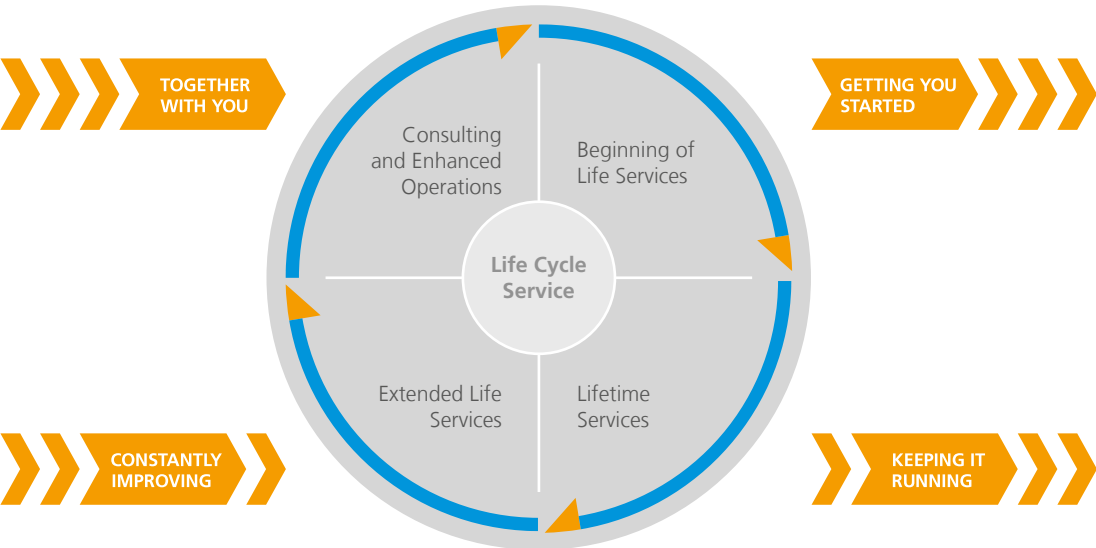
Constantly improving

We safeguard our customers' investment by constantly looking ahead, modernizing and upgrading processes and equipment to meet changing needs and new market demands. Always working to increase production efficiency and ensure peak performance.

Together with you

Commitment to our customers and their business means investing in their objectives, their assets' availability and their future success. We work in closest collaboration, providing scheduled system audits and on-site support, resulting in even better performance through innovative new service models. We offer service packages focused on availability and absolute cost control. Leave inspection, maintenance and condition monitoring to GEA specialists.

Four stages of continued success



We live our values.

Excellence • Passion • Integrity • Responsibility • GEA-versity

GEA is one of the largest technology suppliers for food processing and a wide range of other industries. The global group specializes in machinery, plants, as well as process technology and components. GEA provides sustainable solutions for sophisticated production processes in diverse end-user markets and offers a comprehensive service portfolio.

The company is listed on the German MDAX (G1A, WKN 660 200), the STOXX® Europe 600 Index and selected MSCI Global Sustainability Indexes.

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