

Process Technology for the Fruit Juice and Primary Industries

 Innovative Engineering –
Quality in Line.



GEA TDS ...

... is established on an international level as a specialist for technically and economically optimised process technology in the treatment of milk products, food and juice.

GEA TDS possesses the necessary know-how for the design and manufacture of hygienic, aseptic and sterile plants for the production of liquid products.

For project engineering and customer service, GEA TDS offers international attendance and short reaction times by local presence and, of course, After-Sales-Service. Experienced and competent expert teams deliver technical solutions tailored to the customer's needs.

Your products for the fruit juice and primary industries:

- Fruit juice with and without pulp
- Juice drinks
- Wellness drinks
- Soft drinks, still and carbonated
- Isotonic drinks/sport drinks
- Energy drinks
- Ice tea
- Primary material/concentrates
- Aroma/emulsion/ingredients

Our processing technology for the fruit juice and primary industries:

- complete process lines
- short time heaters
- valves, pumps, components
- deaeration technology
- mixing plants
- tubular heat exchangers
- plate heat exchangers
- CIP plants
- homogenisers
- process automation and integration
- engineering, implementation and service



Process technology for the fruit juice and primary industries:

- concentrate cooling
- heating of mashes
- tank farm equipment
- evaporation plants
- aroma extraction



Plate Heat Exchanger VARITHERM® N40, capacity 24 m³/h



STH Plant (RWT) for fruit juice, capacity 20 m³/h



CIP Plant



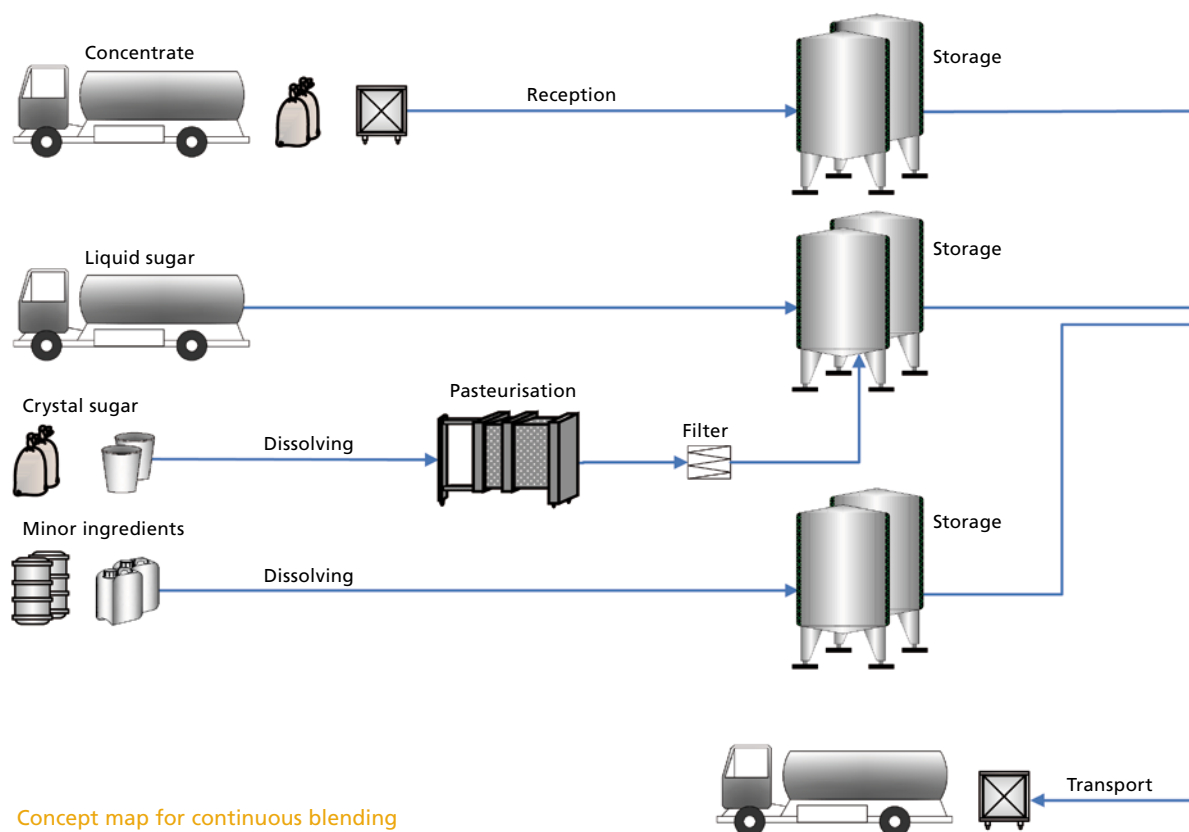
In-line dosing

Process Engineering

Are you planning a complete fruit juice plant or a new processing room or an extension? Whether your project is a new 'greenfield' plant, conversion or modernisation of an existing process plant, GEA TDS engineers, with their complex know-how, are there to back you up with excellent service.

From isometric drawings to pipe class specifications, from detailed engineering to project management, GEA TDS takes charge of the projects on site, on the client's premises or in our technology centre. GEA TDS is now part of the international systems engineering sector of the GEA Group. This provides access to a variety of components and units made by members of the group which can be integrated to create high-quality processing systems.

The use of modern CAE tools for detail engineering is common throughout the company.



Detailed engineering

- layout planning and detailed coordination/clarification of details
- inventory taking on site
- design of pipe layout and instrumentation
- arrangement of components
- calculation of material requirements and technical specifications
- definition of interfaces
- configuration and dimensioning of instrumentation and control equipment
- technical description of the processes
- quality assurance and quality control
- monitoring of time schedules
- cost control

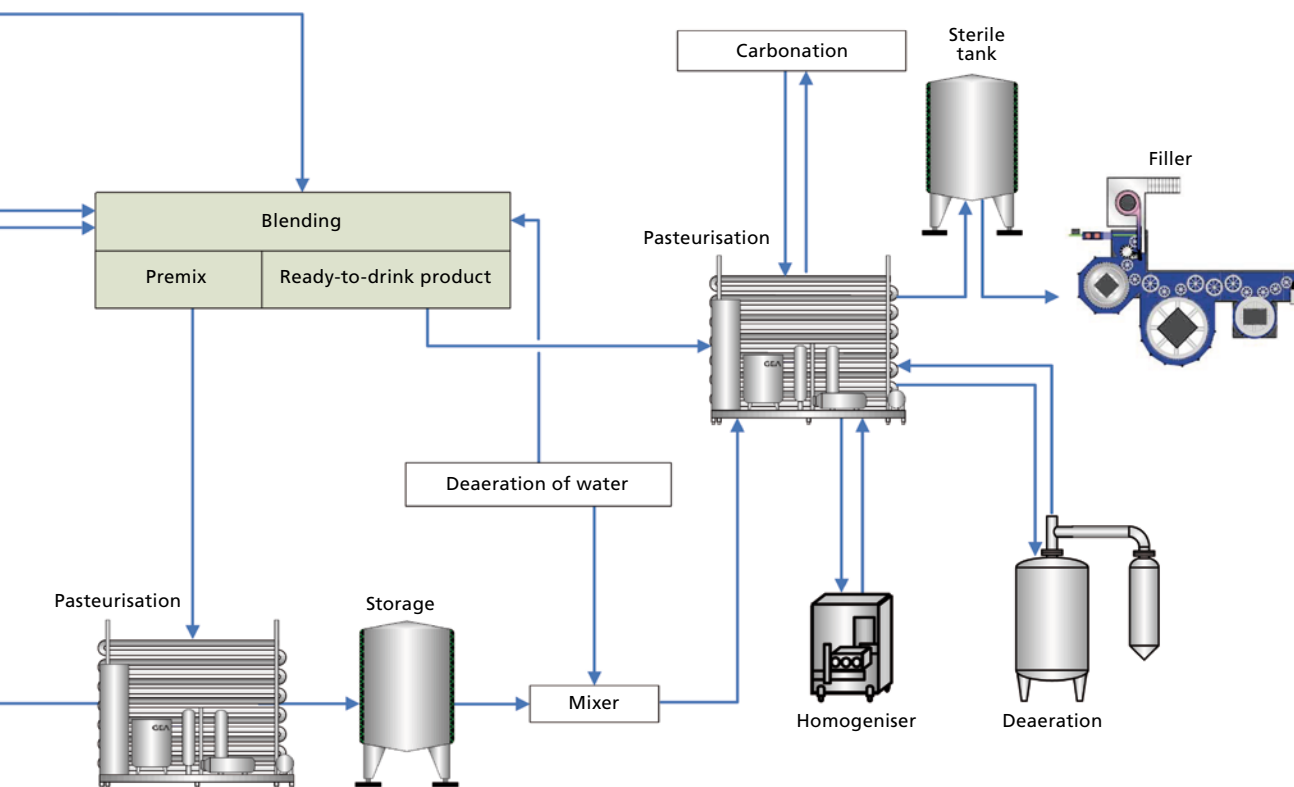
- supervision of construction and installation work
- commissioning of plant components
- supervision of commissioning
- technical support for production
- process optimisation
- documentation

For project planning and engineering the main focus points are:

- preliminary design
- support in approval planning
- preliminary planning and layouts
- selection/dimensioning of process equipment
- production of tender documents for process plants



Heating plant / deaeration / homogenisation



Mix-Processing

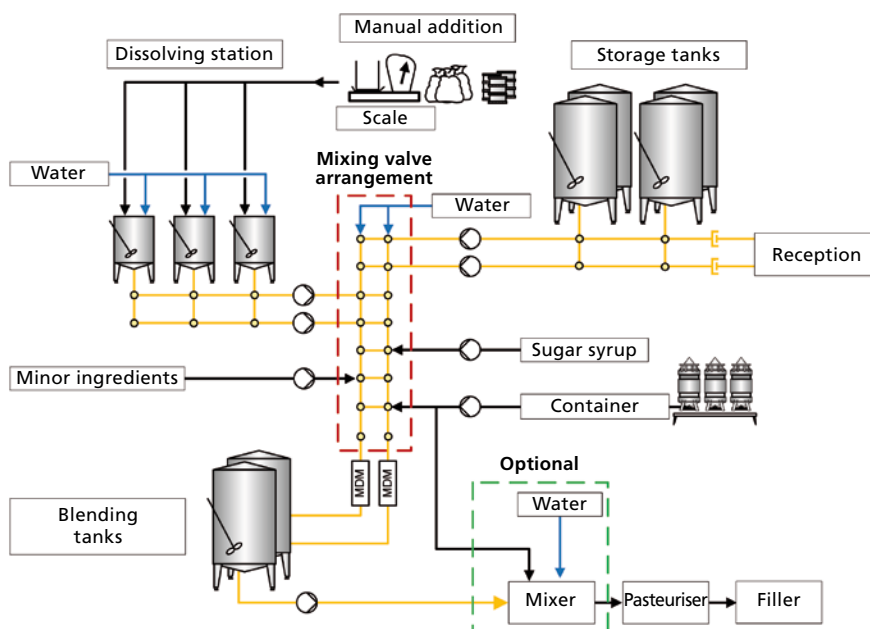
One of the key production steps in the fruit juice and primary industries is product mixing. In the mixing process the individual raw materials are blended in exact proportions with each other, and mixed to form a marketable product.

Basic mixing takes place in batch mode, i.e. a particular quantity of a certain product is manufactured. For exact determination of the weight of the individual components either scale balances or mass flow meters can be used as required – in the fruit juice industry today it is normally mass flow meters that are used. Product mixing using scale balances is normally used in mixing processes where there are many components and the quantities involved are small. GEA TDS offers the ideal equipment for product mixing using mass flow meters in the form of the GEA Varimass System. With the Varimass System the various components are integrated at a valve matrix using a varying number of mixing lines, according to their mixing duty. Their quantities are registered by means of mass flow meters.

The raw materials are introduced to the valve matrix either individually or from a storage tank, depending upon the customer's requirements. Small quantities prepared in advance (solids, flavourings, etc.) are similarly introduced to the mixing matrix exactly in accordance with the recipe, as are the container materials from the container station.

A very high level of flexibility is achieved by constructing the valve matrix using VARIVENT® Mixproof Valves that are secure against impact loads. By means of this design, and by the valves' integrated lifting actuators, cleaning of the component and mixture lines can take place in parallel with the mixing process.

For product mixing using weighing technology the individual component lines, contrary to the GEA Varimass principle, are not integrated at a valve matrix, but at one or more weighing tanks. In the weighing tanks the individual components are weighed one after another and conveyed to the appropriate mixing tanks. In a variant of the mixing process, using weighing technology, the mixing tanks are directly fitted with load cells.



Blending concept map



A further variant of the product mixing process is provided by continuous in-line mixing technology.

In this procedure we blend the individual components or a prepared premix direct prior to the following processing. Using this technology the available capacity of the ingredients or final product can be increased.

A mixing plant that is optimised and matched to customer requirements increases the efficiency and reliability of the product mixing process. This enables customers to react with a high degree of flexibility to the rapidly developing requirements of the market and to achieve considerable cost reductions. Our aim is to create and offer optimised plant designs to meet individual customer requirements.



Tank farm



Small volume mixing system



Valve matrix for mixing



In-line dosing

Pasteurisation plant

Fruit juices as well as beverage bases require a long shelf life. Conservation of the product shall be achieved by efficient processing without affecting the product quality.

This task is achieved by thermal treatment of the product using a pasteuriser. In a short-time heating plant (STHT plant) the product is heated for a short time to the required temperature and rapidly cooled down. Plate or tubular heat exchangers at choice are used to heat the product to the required pasteurisation temperature.

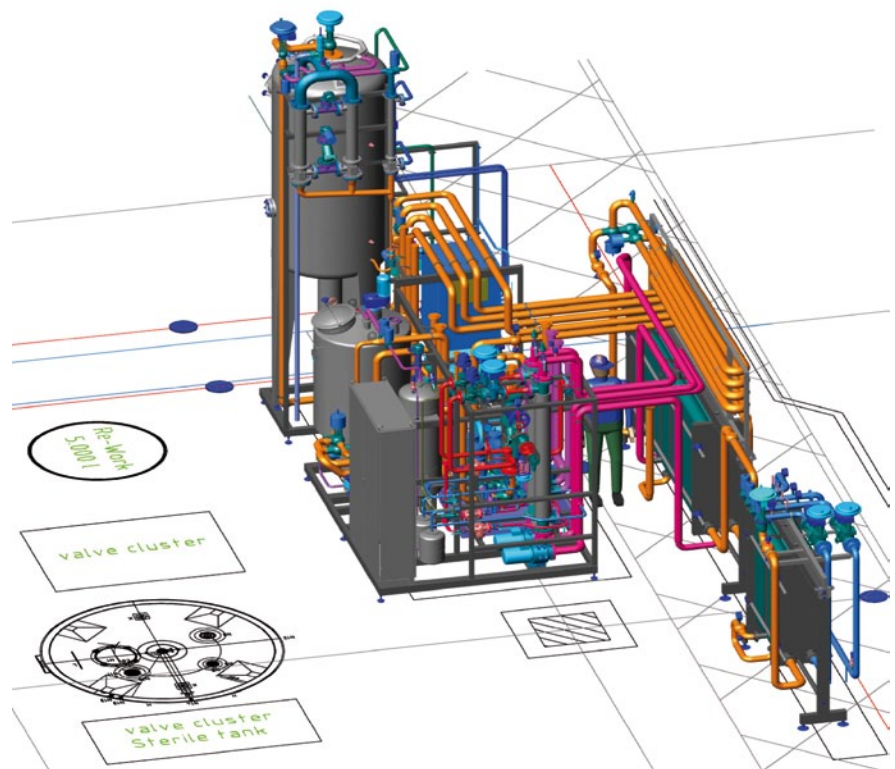
The heat treatment system to be used depends first of all on the properties of the product to be treated. The correct design of the pasteuriser as well as the selection of appropriate components allow the treatment of the following products:

- Smoothies
- fruit juices and drinks with and without cells, pulp and CO₂
- vegetable juices
- primary products
- mashes

Vacuum Deaeration

For not affecting the quality through oxidation, the product undergoes a vacuum-deaeration which partly takes place during the pasteurisation process.

Via an especially designed cascade valve, the product is conveyed at a temperature between 55 and 60 °C into the deaerator vessel where the major part of the total gas amount is removed from the product. The aroma substances entrained by the degassing procedure are recovered in a tubular heat exchanger and returned to the product.



Heating plant 30m³/h capacity



Carbonation

When producing beverages containing CO₂, carbonation is integrated into the overall line concept.

GEA TDS offers carbonation of beverages. Gaseous CO₂ is added to the product. This continuous process can be integrated into the overall process either upstream or downstream of the thermal treatment.



Carbonisation system

Sterile tank

In aseptic process technology, product safety takes top priority. Food processors use sterile tanks as storage or buffer tanks.

Aseptic storage prevents recontamination of the product and helps to ensure a long shelf life and stability.

After pasteurisation, hygienic treatment of the product is required. Sterile tanks can perform a buffer function in the process upstream of the filling line.



Sterile tank

Homogenisation

The GEA Niro Soavi high-pressure homogenisers and microsizers reflect the latest innovative developments and show excellent results in respect to capacity and reliability.

The capacity ranges from 10 l/h to 50,000 l/h at an operating pressure of 1,500 bar max. For special applications, a homogenising pressure of 2,000 bar max. can be achieved. The Ariete series are capable of processing products at temperatures up to 180 °C. Special operating conditions, e.g. adherence to hygienic and aseptic requirements or treatment of abrasive, viscous or corrosive liquids, can be fulfilled with the standard treatment programme.

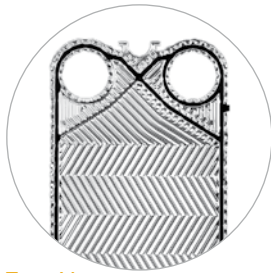


Homogeniser

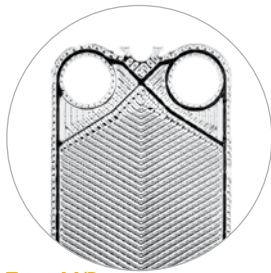
VARITHERM® Plate Heat Exchanger



Type H



Type V



Type M/P



Type Freeflow N

The core piece in process plants are heat exchangers – they are used for cooling, heating, pasteurising or UHT heating. GEA TDS use plate and tubular heat exchangers depending on the plant configuration.

As a central module in thermal process technology, the plate heat exchanger has always been the cornerstone in systems engineering: design and development are continuously adapted to the needs of the changing market and trends in product specifications.

The advantages at a glance:

- thermal treatment of products containing cells and fruit pulp
- efficient heat transfer, i.e. small heat exchange area and thus low investment costs
- high degree of heat recovery (up to 96 %), this means low energy costs
- low space requirements due to large heat transfer surface in a compact assembly
- easy adaptation to changed capacity parameters by expansion or reduction of plates, i.e. high-flexibility
- short dwelling times in the heat treatment section, thus gentle product treatment

Type VARITHERM®

VARITHERM® plates are used for the thermal treatment of:

- clear or turbid products with and without CO₂
- Products containing fibres with a max. edge length of 0,5 mm to 1 mm.

You can choose between various types of heat exchanger plates with different embossed profiles:

- Plate type H with horizontal chevron pattern for high thermal efficiency
- Plate type V with vertical chevron pattern for lower pressure drops
- Plate type M and P with V-shaped chevron pattern for highest differential pressure resistance

Type Freeflow N

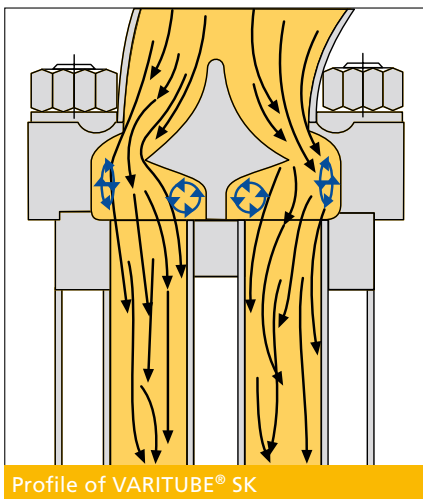
The Freeflow N plate is the right choice for:

- clear or turbid products and products containing fibres
- up to a length of approx. 5 mm and 1 mm in diameter



VARITUBE® Tubular Heat Exchanger

The VARITUBE® Tubular Heat Exchanger is specifically designed for the thermal treatment of low- to high-viscosity products and for products containing particles, pulp and fibres. The VARITUBE® system is mainly used in heating, cooling and aseptic systems.



VARITUBE® S – the single-tube heat exchanger for indirect heat exchange for the treatment of products containing pieces. Product recovery is possible using pigging technology.

VARITUBE® M – the multi-tube heat exchanger for indirect heat exchange is also suitable for products containing particles of approx. 18 mm length.

VARITUBE® P – for the direct product/product heat exchange in all applications.

VARITUBE® SK – for the direct product/product heat exchange of fibre-containing products up to a length of 30 mm.

Functional principle: Patented flow devices installed on the bottom plate provide additional acceleration and generate a transverse flow, ensuring that no fibres collect on the tube bottom. Longer production cycles are thus achieved.

VARITUBE® HS – the multi-tube heat exchanger for indirect heat exchange, suitable mainly for hot water generation and heating of CIP media.

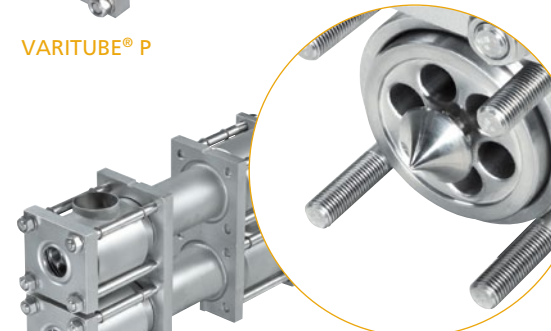
VARITUBE® E – Multitube with indirect heat exchange, suitable mainly for hot water generation and heating of CIP media for medium thermal outputs and volume flow rates of up to 165 m³/h.



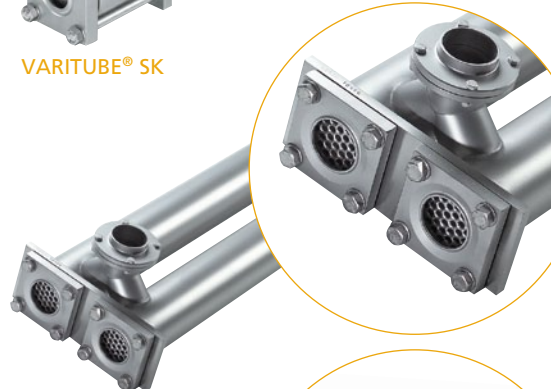
VARITUBE® S and M, corrugated and plain inner tubes



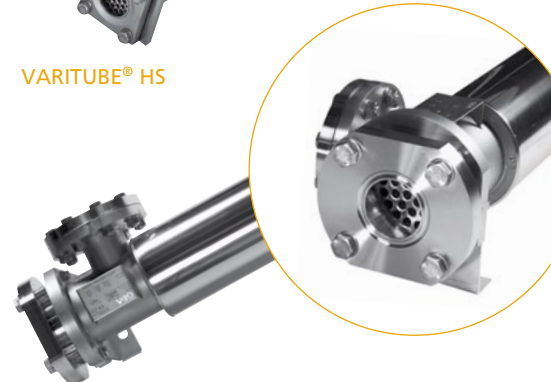
VARITUBE® P



VARITUBE® SK



VARITUBE® HS



VARITUBE® E

Process Automation and Integration

Quality assurance and increased productivity drive the steadily increasing automation of plants and production processes. The advantages are obvious: labour and production downtimes are reduced and operator error is safely ruled out. The plants are upgraded so that all essential parameters relevant for the production processes are automatically controlled, monitored and documented.



GEA TDS offers a wide spectrum of innovative process automation systems and services that range from the provision of electronic process control up to integrated, company-wide network systems complete with the corresponding management information systems. Machine control systems, for separators, homogenisers or filling machines, for example, can be homogeneously integrated into the overall automation system through the bus network.

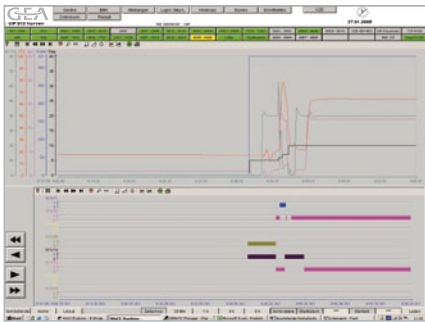
GEA TDS uses the latest industrial standards for all automation projects. In this respect batch processes are automated in accordance with ISA-S88a as an essential factor for a transparent, traceable production.

To adapt existing production plants to new generations of automation systems (e.g. when replacing the visualisation system or upgrading from S5 to S7) migration strategies will be developed for you that allow safe conversion while production continues to run.

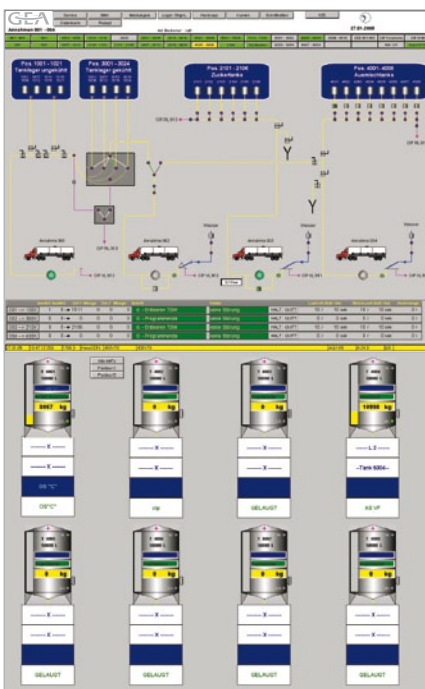
Operation and Process Visualisation

All operator interfaces are designed with logical menu structures that allow intuitive operation of the plant. The operator is comprehensively informed at a glance and guided progressively through the system.

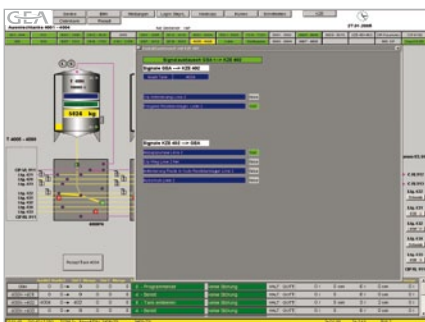




CIP curve



Reception

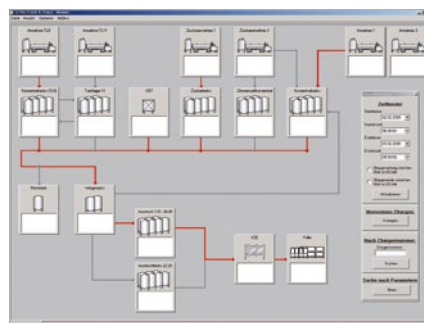


Signals STH

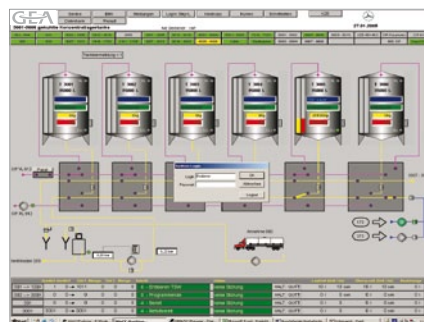
Documentation and Process Optimisation

The supervisory control system allows operators to record measured values and switch status, thus creating the necessary transparency for process optimisation.

Recording of measured data is supplemented by a database-supported event log with practice-oriented evaluation features. This audit trail allows the tracking of individual batches or an entire production.



Track & Trace



Login

Reporting and Batch Tracking

The process data is transferred online to an SQL database extended with powerful evaluation tools:

- the report generator can be customised so you can configure your own application-oriented reports.
- batch tracking in graphical or tabular form helps you to keep track of your products in accordance with the EU regulation 178/2002.

The standardised approach allows you to introduce a batch tracking system in manageable steps at a known cost.

CIP Plants

CIP (cleaning in-place) is the commonly used method for plant cleaning during the production process where hygiene is, of course, paramount.

Using a modern CIP system ensures the optimum quality assurance and increases product quality.

CIP Recovery Systems

These CIP systems consist of various cleaning medium tanks for drinking water, cleaning solution and returned water. The system or tank size is adjusted to the cleaning cycles required. The number of cleaning systems installed determines the cleaning frequency, the simultaneous execution of operations and the number of objects. The systems are technically equipped and configured to meet the cleaning objectives defined.

Single Use Cleaning System with ECOCIP

The system consists of a detergent tank for the ready-made cleaning solution, pre-assembled on a base frame. The cleaning solution is circulated and heated up to the operating temperature. Conductivity measurement and in-line concentrate metering ensure that the required amount of detergent is added. The detergent flow rates are adjusted by the cleaning program. CIP modules are easy to integrate into the process and offer the most appropriate cleaning even for demanding products.



CIP Plant

Variable CIP systems are available for different cleaning procedures. The diversity of products and processes calls for different methods for cleaning process plants. Variable CIP systems are available for different cleaning procedures within the production process where hygiene is paramount.

GEA TDS is always striving to find the optimum balance between chemicals, mechanics, temperature and residence time, with additional focus on environmental protection and down-times.



CIP batch cleaning assembly



Packing technology

With GEA Procomac we respond to the need of the beverage market for an overall solution and can provide competent on-the-spot services. GEA Procomac based near Parma in Italy is one of the world's leading suppliers of cold aseptic filling technology.

Their core business is the engineering, manufacturing and installation of complete filling lines for the beverage industry both for conventional and aseptic applications. The proportion of aseptic filling lines is about 70 % of all the lines delivered.

GEA Procomac supplies complete filling lines for juices, teas, still/carbonated beverages, dairy products and water, in a constantly high quality from the process technology to the packaging technology.



Assembly and After Sales

GEA TDS services also include the assembly of entire plants. A comprehensive range of services is available throughout the entire service life of your plants, all designed to achieve maximum productivity and economic efficiency.

The GEA TDS After-Sales programme includes a permanent support service: taking care of service and maintenance directly after hand-over of the plant. Customer support also includes defined maintenance and individual inspection agreements to ensure fault-free and reliable operation and to keep your plant running efficiently for years.





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Quality in Line.



To find out more about your particular process technology application, contact GEA TDS at www.gea-tds.com

The juice industry produces many different products and this brochure could not possibly describe all the potential process lines available.



GEA Process Engineering

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