1920: Foundation of GEA in Bochum by Otto Happel sen. (Born 1882).
GEA, abbreviated from the original German name of the company “Gesellschaft für Entstaubungs-Anlagen mbH”, was the work of a man who was an entrepreneur with heart and soul, a man gifted with an exceptional technical insight and filled with the desire for pioneering technical innovations.

1922: Happel’s closed-circuit cooling system with elliptical finned tubes. Just two years after setting up his small business he had achieved that objective, and Happel’s closed-circuit cooling system differed from those of his European and overseas competitors in only one – but one very important – aspect.

1925: Renaming to GEA Luftkühler-gesellschaft mbH. On 15 February 1925, Happel renamed his company “GEA Luftkühlergesellschaft mbH”.

June 2013:
GEA announced to sell the HX Segment. The board of GEA Group announced their decision to sell the Heat Exchangers Segment (HX).

October 2014:
In October, GEA Group concludes the agreement on the sale of the Heat Exchangers Segment to Triton.

2015: With the new name, the former GEA Heat Exchangers has been formally split from the GEA Group and is writing its own history as Kelvion.

The name Kelvion pays homage to Lord Kelvin (1824 - 1907). Lord Kelvin formulated the laws of thermodynamics and absolute units of temperature are stated in kelvin, in his honor.
Our markets:

Sales 2015:

937,000,000 €

Our employees:

= 4,500
Kelvion Overview

Global production footprint
No. production sites

Global sales and service
No. sales and service entities and partners
WHY KELVION

► Successor to the GEA Heat Exchangers Group – long history of engineering
► We offer our customers one of the world’s largest product portfolios in the field of heat exchangers – one stop shop
► Quality ‘Made in Germany’
► Long experience of production of Heat Exchangers – we know what we are doing!
APPLICATIONS
## AIR HEATER SOLUTIONS

<table>
<thead>
<tr>
<th>Industry</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Paper Industry</strong></td>
<td>For Air Heating necessary for drying the paper web in paper industry</td>
</tr>
<tr>
<td><strong>Printing Industry</strong></td>
<td>For Air Heating in industry printers.</td>
</tr>
<tr>
<td><strong>Wood Industry</strong></td>
<td>For Air Heating in the production of panels, plywood and countertops</td>
</tr>
<tr>
<td><strong>Textile Industry</strong></td>
<td>For Air Heating in the process of textile drying.</td>
</tr>
<tr>
<td><strong>Automotive Industry</strong></td>
<td>For Air Heating in car painting chambers.</td>
</tr>
<tr>
<td><strong>Tabacco Industry</strong></td>
<td>For Air Heating in the drying process of tobacco.</td>
</tr>
<tr>
<td><strong>Mining Industry</strong></td>
<td>For Air Heating in the mine shafts.</td>
</tr>
</tbody>
</table>
| **Food Industry**               | - For Air Heating in milk powdering process  
  - For Air Heating in the drying of tea, coffee, pasta, potato starch, gluten, maltodextrin, fruit and agricultural crops |
| **Construction Industry**       | For Air Heating in the process of gypsum drying.                                                                                           |
| **Power Industry**              | For Air Heating in combustion in coal-fired power boilers.                                                                                   |
| **Chemical and Petrochemical Industry** | For Air Heating in the process of nitric acid production.                                                                                   |
| **Environment**                 | For Air Heating in waste reprocessing facilities.                                                                                           |
# KELVION PRODUCTS

<table>
<thead>
<tr>
<th>Product lines</th>
<th>Key features</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transformer Cooling Systems</td>
<td>• Forces air/water coolers and cooling units for large power transformers&lt;br&gt;• Transformer Oil Pumps for traction transformers and power converters</td>
</tr>
<tr>
<td>Steam Power Systems</td>
<td>• Surface Condensers for medium to large sized steam turbine power stations&lt;br&gt;• One-site services (refurbishment, revamping and replacement)</td>
</tr>
<tr>
<td>Machine Cooling Systems</td>
<td>• Box coolers for engine cooling on medium-sized vessels (service ship)&lt;br&gt;• Lubrication and hydraulic oil coolers and heaters for heavy fuel oils</td>
</tr>
<tr>
<td>Petrochemical Systems</td>
<td>• Customized large-scale heat exchangers utilized within crude oil exploration and processing in refineries and petrochemical plants</td>
</tr>
<tr>
<td>Double Tube Systems</td>
<td>• Special Double Tube Heat Exchanger safety solution for critical environments, e.g., for safe separation of toxic substances from the cooling/heating media</td>
</tr>
</tbody>
</table>
## KELVION PRODUCTS

<table>
<thead>
<tr>
<th>Product lines</th>
<th>Desublimators</th>
<th>Alternative Power Solutions</th>
<th>Gasketed PHEs</th>
<th>Brazed PHEs</th>
<th>Welded PHEs</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Key features</strong></td>
<td>• Transforming gas directly into solid state</td>
<td>• Special Shell &amp; Tube heat exchangers for nuclear power, process and propulsion systems</td>
<td>• Lower pressure and temperature range</td>
<td>• Medium pressure and temperature range</td>
<td>• GEABloc is available in various corrugation designs and sizes for a wide range of applications.</td>
</tr>
<tr>
<td></td>
<td>• Special application for chemical plants in phthalic anhydride production</td>
<td></td>
<td>• Ease of maintenance/replacement/service</td>
<td>• Compact design, low weight</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Wide range of applications</td>
<td>• Typical applications</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>- HVAC (heating &amp; Cooling)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>- refrigeration systems</td>
<td></td>
</tr>
<tr>
<td></td>
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<td></td>
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<td></td>
</tr>
</tbody>
</table>

- GEABloc is available in various corrugation designs and sizes for a wide range of applications.
- This plate heat exchanger is generally used in the oil and gas industry, in petrochemical and chemical applications, in the automobile and pharmaceuticals industry, as well as in paper manufacturing.
# KELVION PRODUCTS

<table>
<thead>
<tr>
<th>Condensers / CDC</th>
<th>Air Fin Coolers - Alu</th>
<th>Air Fin Coolers - HdG</th>
<th>ACC MASH (extruded or wrap-on)</th>
<th>Air Pre-heaters</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Customized or modular Air Cooled Condenser and Commercial Dry Cooler mainly for commercial refrigeration and Air conditioning applications</td>
<td>• Air Cooler with aluminum fins, mainly for the Oil &amp; Gas industry</td>
<td>• Hot dip Galvanized (HdG) Air Fin Coolers</td>
<td>• Preferred option for air cooled vacuum Condensers in API design code ambience</td>
<td>• Tube bundles to pre-heat air within an industrial combustion process</td>
</tr>
<tr>
<td></td>
<td>• High pressure up to 800 bar Temperature range of -120°C to 600°C</td>
<td>• Industrial applications in challenging environments (e.g., mining, sand and dust, fertilizers, chemicals)</td>
<td>• Especially for petrochemical, Oil &amp; Gas applications</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Fully made to order</td>
<td>• Fully made to order</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• High speed to low-noise fans</td>
<td>• Low-noise fans</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
# KELVION PRODUCTS

<table>
<thead>
<tr>
<th><strong>Product lines</strong></th>
<th><strong>Key features</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Air Dryers</strong></td>
<td>Tube bundles typically with HdG finned tubes to heat air for drying purposes&lt;br&gt;Galvanization provides premier anti corrosion characteristics and long service life</td>
</tr>
<tr>
<td><strong>Machine Cooling</strong></td>
<td>Coolers for diesel / gas engines (&gt;200 KW)  Enhancement of engine performance  Provides special Hot dip galvanization for Compact Systems</td>
</tr>
<tr>
<td><strong>Transformer Oil Air Coolers</strong></td>
<td>Ensures dissipation of heat in oil cooled transformers  Primary application within Power generation and transmission  Provides special Hot dip Galvanization competence for Shell &amp; Tube</td>
</tr>
<tr>
<td><strong>Modular Cooling Towers</strong></td>
<td>Partly or fully factory assembled Cooling Tower for small cooling projects  High degree of standardization  Allows easy expansions</td>
</tr>
</tbody>
</table>
Hospitals, offices, shopping centres, factories and houses – just about any building you could name requires some form of Heating, Ventilation and Air-Conditioning (HVAC) system.

Energy efficiency is now a key requirement for new HVAC installations. Governments worldwide have introduced regulations designed to encourage the take-up of HVAC systems that comply with industry standards for energy-efficient performance.

The HVAC market faces a smart future as a result of advances in intelligent technology. These include systems for monitoring a building's energy consumption and controlling the energy output of a HVAC system.

Whether for heating, ventilation, air-conditioning or cooling, Kelvion has the optimal heat exchange solution. From swimming pools and solar units, to district systems, our equipment ensures the right temperature is achieved.
## SOLUTIONS FOR EVERY APPLICATION

### BRAZED PLATE HEAT EXCHANGERS

- Tailor-made solutions for the greatest possible range of applications
- Compact design and short lead times
- Copper-brazed or VacInox plate heat exchangers depending on the field of application
- Various sizes and diverse accessories available with customized connections

### GASKETED PLATE HEAT EXCHANGERS

- High efficiency at low operating expenses
- Greater application possibilities at lower investment costs
- Maximum economic efficiency
- Service and maintenance charges are kept low

### CONDENSERS

- Available in flat-bed, horizontal or vertical and V-bank configurations fit for a wide range of applications
- 5 tube configurations – including the new 5mm tube system optimised for CO₂ – allow for improved energy efficiency, quieter operation, and greater durability
- Space saving design

### DRY COOLERS

- High performance solution in various applications
- Customized design to meet each and every specific requirement
- Reliable performance in heat transfer and ventilation
- Small footprint

### COILS

- Air coolers, air heaters, evaporators, condensers, heat pipes and high efficiency run around coils – carefully selected and appropriately fitted to our customers’ needs
- The production flexibility of diverse fin tube patterns, materials and additional options enable us to offer the best possible solution
- Can be used in diverse applications like air handling units, fan coil units, data center cooling, air drying systems, chillers etc.
BPHE (Brazed Plate Heat Exchangers)

Max. operating conditions
► Temperature: -195° up to +200°C design temperature
► Pressure: -1 up to 140 bar design pressure

Following directives for pressure vessel code approvals:
► PED (CE), TÜV (Germany), UL, ASME, CRN, CSA, KHK, GOST R
► Lloyd’s Register
► SVGW, KIWA
► VDA 6, part 1
► ATEX, REACH, RoHS, WEEE
► Others on request
**GBE Series**

**Target market:**
*OEM Heating - Wholesaler Hydronic, in large quantities*
- Heating systems (floor and radiator heating, tap water)
- Other Hydronic applications (Snow melting,..)
Later on (after some field experience)
- Low pressure hydraulic systems
- (Small low pressure R134a applications)

**Types:**
- GBE100M, GBE200H, GBE220H, GBE240H
- GBE400H, GBE500H, GKE550M, GKE550H

**Material:**
- Stainless steel AISI 316L (1.4404) + copper

**Performance:**
- -20°C ... +150 °C

**Economy series 16 bar**
- Lowes cost + highest performance
- PED (CE) + UL listed
- Most compact and lightest solutions
- Standardized connections

**GBE Series**

[Image of GBE Series plates]

**10.06.2018**
GBS Series

Standard series for 31 bar

PED (CE)
Optimal corrugation design
Material optimized
Precision-made heat exchanger

Target market:
- Heating and (fresh) tap water systems
- Heat pump
- District heating
- Solar thermal application
- Combined heat and power plant
- Industrial applications
- Oil cooler
- Refrigeration / Air conditioning
- ORC – organic ranking circuits

Performance:
- -200°C ... +200 °C
VacInox - GVH Serie

- Free of non-ferrous metals up to 35bar / (-196°C up to +200°C)
- Preferred for drinking water applications / refrigeration
- Approval: PED, ASME VIII-1
- Applications:
  - corrosive medias
  - laser cooling
  - drinking water / district heating
  - demineralized water
  - Ammonia systems
- Available:
  - GVH100M 35bar/30bar -196°C/+200°C
  - GVH108H 25bar/25bar -196°C/+200°C
  - GVH200H/220H/240H 25bar/25bar -196°C/+200°C
  - GVH228H 25bar/25bar -196°C/+200°C
  - GVH300H/400H/500H 25bar/25bar -196°C/+200°C
  - GVH700L/700M 27bar/27bar -196°C/+200°C
  - GVH800H 25bar/25bar -196°C/+200°C
  - GVH1000H 20bar/20bar -196°C/+200°C
HVAC | SIMPLIFIED PROCESS SCHEME
Installation Example - HVAC

District heating station

Primary outlet 90°C
Primary inlet 130°C
Secondary inlet 70°C
Secondary outlet 90°C
Installation Example - Solar Thermal

Combined floor heating + tap water heating

Solar thermal with storage of the Energy
POTABLE WATER | APPLICATION DESCRIPTION

POTABLE WATER HEATING
Best Solution

Potable water heating are the high efficient system and will used in the areas of renovation as well as new construction.

There are a lot of different domestic hot water stations for multi-family homes and single-family homes in de-central and central systems which are also used in connection with solar.

For all different systems are used Plate Heat Exchangers (PHE). Depending on the requirements can be used Gasket Plate Heat Exchanger (GPHE) and Brazed Plate Heat Exchangers (BPHE).

Without specific requirements of water quality are generally used the copper brazed plate heat exchangers. In case of poor water quality can be used other materials like our successfully stainless steel brazed series VacInox or our special designed gasket plate heat exchanger.

TYPES OF POTABLE WATER HEATING:

► De-central potable water heating
► Central potable water heating
► Solar potable water heating
► Gas boiler – potable water heating
Installation Example – Hot water

Total HVAC market for brazed PHE alone is about 460 Mio.€

- Hot water substations are getting very popular
- PHE becoming more and more state of the art in this applications
POTABLE WATER | SIMPLIFIED PROCESS SCHEME
HEAT EXCHANGERS ARE KEY TO ENERGY EFFICIENCY

Efforts to improve energy efficiency have indeed proved effective, as energy consumption is growing at a slower rate than gross domestic products. In conversion of primary energy to final and useful energy, Kelvion heat exchanger technologies contribute to efficient handling of the resources of our planet.
Key applications

- Fossil: gas, coal
- Steam
- Nuclear
- Solar
- Biomass
- Hydro

Key Products

- Air Cooled Condenser
- Vacuum Surface Condenser
- Plate Heat Exchangers
- Compact Air Fin Cooler
- Heat Recovery Steam Generator
- Shell & Tube / DTSHX
- Cooling towers
HDG-APPLICATION: >>> POWER STATION <<<

combined heat & power plant
# KELVION PRODUCTS – POWER

## Feed Water Heater
Kelvion Feed Water Heaters can be used for every process which includes pre-heating of liquids.

## Steam Power Systems
Kelvion Steam Power Systems provide a solution to improve the overall operational efficiency of any steam turbine cycle.

## Double Tube System
Kelvion Double Tube Heat Exchanger Safety Solutions take care of critical liquids which need to be separated from the cooling/heating media.

## Radiators
Radiators by Kelvion are Dry Coolers used in several power generation and industrial processes.
KELVION PRODUCTS – POWER

AIR PRE-HEATERS
Kelvion Air Pre-Heaters can be used for every process which includes pre-heating of air.

CLOSED CIRCUIT COOLERS
Kelvion Closed Circuit Coolers are designed to cool generation and electrical engines.

MODULAR COOLING TOWERS
The Modular Cooling Towers developed by Kelvion can be individually adapted for smaller cooling projects.
ECONOMIZER

- **Hot gas inlet**: Exhaust fumes, Hot used air
- **Cold water inlet**: Cold water
- **Hot water outlet**: Hot water
- **Cold gas outlet**: Gas after heat recovery, dry or wet
BOILER MANUFACTURERS

This is a group of Kelvion customers for economizers. We provide equipment dedicated to boiler, safe to use and easy to maintenance due to construction with casing and bypass.
SYDNEY AND MELBOURNE PROJECTS

- 1.4 Megawatt electrical trigeneration system comprised of seven 200kW Capstone Microturbines (C600 and C800) is located on the roof of Town Hall House. It will supply power, heating and cooling to both the 40 year old Town Hall House, working with set of absorption chillers, as well as building heating circuit.
- Tower 2 is the third of five towers that use C600, 600 kW micro turbine and HRM. This system can provide up to 870 kW of hot water for building heating, and also is used to feed a hot water fired absorption chiller to further reduce electrical consumption on site.
References – REKUGAVO in waste incineration

Refuse incineration plant "Krefeld"

The SCR of the water and sewage sludge incineration plant in Krefeld is operating since 1994 with three different lines; the lower stage of Hastelloy C-22

Thermal duty 3x8,5 MW
incineration capacity 340.000 tpa
Volume flow 3 x 100.000 Nm³/h
Dirty gas temperatures 80 °C to 290 °C
Clean gas temperatures 320 °C to 115 °C
total pressure drop, incl. cat 30 mbar
thermal efficiency 87 %
Dimensions 3 x (4,6 x 6,5 x 32)m
exchange surface 3 x 11.600 m²
total weight 3 x 330 to.
CONTACT:

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