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## ENGIE Refrigeration Provides Process Cooling for the Plastics Industry.

Up to 50 % energy cost savings with QUANTUM process cooling.

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Fraenkische Rohrwerke is a developer and manufacturer of corrugated pipes, plastic pipe systems and production plants for pipe systems. Founded in 1906 for the production of metal pipes, the company started fabricating the world's first continuously extruded PVC corrugated pipe in 1959. Today a workforce of more than 1,400 employees produces system solutions for many different sectors with locations in Germany, Europe, the USA and China. More than 1.5 million metres of different pipe types leave the production plants daily.

With a new chiller from ENGIE Refrigeration, Fraenkische Rohrwerke was able to halve the energy costs for the chilled water generation although the old chiller already included an energy saving circuit with dry coolers.

### Modern QUANTUM refrigeration technology saves energy

More than 120 extrusion machines are cooled by a central shared refrigeration system at Fraenkische Rohrwerke. As a result of the continuous expansion of production capacities, the existing plant had reached its performance limits.

A new objective was to pay more attention to environmental aspects in the plant design when increasing the refrigeration performance. This concept requires a reduction in energy consumption and in CO<sub>2</sub> emissions. Based on different criteria like economy, security, particularly redundancy and energy efficiency, the refrigeration centre was equipped with two QUANTUM chillers, two Escher-Wyss cooling towers and an energy saving system. The energy saving system ensures the energy-optimised operation of all components of the refrigeration centre for all part load ranges, all air temperatures and all relative humidities.

## Advantages of the QUANTUM Technology

**Convincing results in the part load range.** There is a considerable fluctuation in cooling demand during the day and throughout the year according to the climatic conditions. The part load values of a chiller are hence the main decisive factor for the operators. The QUANTUM technology presents verifiable advantages in comparison to conventional compressors. Compared to the old plant equipped with dry coolers, the QUANTUM chiller in combination with the open cooling towers and the energy saving circuit was able to halve the energy costs for the cold water generation. The recooling capacity is also reduced thanks to the higher part load efficiency. This does not only decrease the operating costs of the recooling plant, but also saves power and water. The overall concept leads to outstanding COP values up to  $> 10$  thereby creating a huge saving potential.

**Redundant Design.** Especially failurecritical applications such as process cooling in the production area need a constant refrigeration availability being ensured by the parallel connected compressors. Even in case of a compressor failure, the other independent compressors continue to operate. This was a particularly important aspect for Fraenki-sche Rohrwerke when awarding the contract.

**Minimal maintenance costs, few wearing parts.** There are very few wearing parts in the QUANTUM due to the magnetic bearing technology employed in the compressors. The fast accessibility to the components allows for a quick replacement. Altogether, service costs are reduced by approx. 35 % in comparison with competing systems.

**Absence of oil.** No precautions for the prevention of oil leakage in accordance with the Water Resources Act were necessary thanks to the oil-free compressor technology.

**Very low sound level and vibration.** The low sound level and the almost vibration-free operation made the on-site construction very easy. No additional costs for noise reduction had to be considered.

### Customer & Location

FRÄNKISCHE ROHRWERKE  
Gebrüder Kirchner GmbH & Co. KG  
87486 Koenigsberg

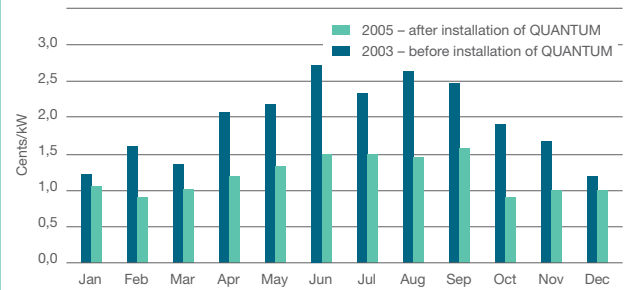
### Refrigeration Technology

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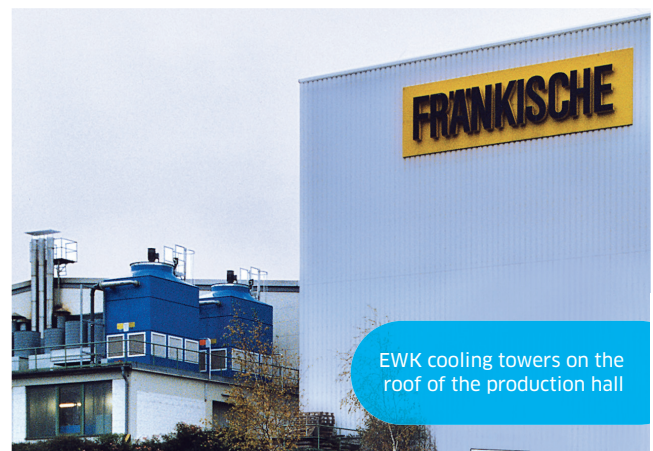
## Technical Data

- 2 × QUANTUM oil-free chillers, each one with two turbo-compressors with magnetic bearings, refrigeration capacity  $2 \times 600 \text{ kW}$
- 2 × Escher-Wyss cooling towers, recooling capacity  $2 \times 680 \text{ kW}$
- 2 × compact cooling water modules with heat exchanger for energy saving operation, reservoirs made of GRP and sand filters for safe operation

### Costs per Kilowatt for the Cold Water Generation



*Cost comparisons per kW of cold water generation for two whole years in EUR cents before and after the QUANTUM installation in August 2004. Seasonal variations are due to the climatic conditions.*



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