

**Bock compressors in action -  
Migros Glattzentrum shopping  
centre (Switzerland)**

## Migros Zurich (GMZ) transforms 30-year old supermarket into showpiece

**In collaboration with partner companies, the cooperative Migros Zurich has modernised its food supermarket that was first established over 30 years ago in the Glattzentrum shopping centre. In view of life cycle costs, the outcome was a European showpiece supermarket.**

Migros AG was founded by Gottlieb Duttweiler in Zurich in 1925 and to date has developed into an association of 10 regional cooperatives and the Migros cooperative society with over 80,000 employees. Besides the established supermarket chain Migros with stores in Switzerland, Germany and Austria, the association also includes around 90 other companies.

The story of Migros began in the city of Zurich. Five sales vehicles were first put into action in 1925 and the first shop opened in 1926. The site in Zurich, home to the Migros cooperative society, the GMZ operations centre and different sales outlets, gastronomy ranges, specialist retailers, fitness parks and education centres, still plays an important role today. In the nearby Glattzentrum shopping centre, Migros Zurich also operates one of the largest supermarkets in Switzerland.

The Glattzentrum opened in 1975 and with a surface area of greater than 43,000m<sup>2</sup> as well as 8.18 million visitors it is one of the largest and most visited shopping centres in Switzerland.

In order to be able to guarantee its customers the best in terms of product quality, product ranges and product presentation, in 2008 GMZ decided to renovate the food hall of the Glattzentrum-based supermarket.

Matthias Brügger, Project Manager Engineering, highlights the importance of refrigeration technology as part of this project. "Refrigeration technology is one of the areas that we have focused on in particular, since both the purchasing costs and operating costs are comparatively high".

When analysing the investment and operational costs, Migros Zurich adopted the life cycle costing approach. This is a comprehensive cost management method that evaluates the respective costs of a product, in this case the refrigerating plant, rather than the purchase price. The method enables all incurred costs to be taken into consideration from the purchase of a product through to its operation and disposal.

For GMZ, the refrigerating plant put into operation in the Glattzentrum currently represents the optimal outcome of a respective analysis.

For example, it includes CO<sub>2</sub> as a cooling agent in the deep refrigeration area, though not in the standard refrigeration area. "We definitely see transcritical CO<sub>2</sub> plant as an opportunity. At present we are looking at it in contrast with subcritical CO<sub>2</sub> equipment, though rather still in a pilot phase", comments Brügger on the current view at Migros Zurich.

Since this property was not suitable for a trial, we avoided using transcritical CO<sub>2</sub> equipment.

By far the greatest challenge to the companies involved in the renovation was the time factor. The entire renovation was to be completed in just ten weeks. However, a number of conditions complicated things further. For example, the maximum floor loading is just 1,000 kg/m<sup>2</sup>, and the ceiling height in the machine room is very low (persons of above-average height are unable to stand up straight). These circumstances led to further problems. "How should the machine racks be arranged?". "How should the delivery and installation of the machine racks be organised and completed?" were the key issues.

To ensure that the project was successful despite these obstacles, the cooperative Migros Zurich enlisted the support of the planning office at SSP Kälteplaner AG. SSP was responsible for designing the entire organisational process and planning the refrigerating systems for above and below-zero refrigerating.

During the renovation phase it was imperative that sales in the Migros supermarket remained unaffected, created an additional complication. This was achieved by setting up an interim solution over a 1,500m<sup>2</sup> area of the Glattzentrum parking deck. This enabled sales to be maintained throughout the entire renovation phase.

Various measures were implemented in order to extend the surface area of the Migros food hall by 380 m<sup>2</sup>, from 5,690 to 6,070 m<sup>2</sup>.

All existing refrigerating plant and equipment were replaced during the renovation phase. This included the counters in the sales areas, the refrigeration cases, refrigeration rooms and deep-freeze rooms. The existing refrigerating plant was replaced by three completely new multicompressor refrigerating systems; two above-zero refrigerating systems (AZ.1 and AZ.2) and a deep-freeze system (DF).

When choosing the compressors, GMZ and SSP opted for those offered by Bock, due to their previous first-rate experience of Bock compressors.

The company Charles Hasler AG, based in Regensdorf (ZH), was commissioned to install the individual multicompressor systems. The on-site plant construction firm was Baumgartner AG from Uster (ZH). The company has many years' experience and has placed its trust in Bock compressors on numerous projects.

### **The AZ.1 above-zero refrigerating system**

Due to the previously mentioned complicated circumstances at the site, the multicompressor systems had to be brought on site in sections where they were later assembled. The systems were transported and installed in cooperation with a specialist company.

Once the systems had been successfully assembled, the entire AZ.1 system controls were then checked. The AZ.1 system was started up on 18th August 2008. Five days were scheduled for starting up and adjusting the entire system. The above-zero refrigerating system is an indirect R134a system that works using a refrigerant system. This system supplies 220m of refrigeration cases and five refrigeration rooms. In the case of the AZ.1, the lost heat is also dissipated from the CO<sub>2</sub> deep-freeze system.

**The DF deep-freeze refrigerating system**

Five days were spent commissioning and adjusting the AZ.1, after which the CO<sub>2</sub> DF system was put into operation. This system works with direct evaporation. The heat lost from the refrigerant system of the AZ.1 system is dissipated. The DF system supplies 45m of deep-freeze cases as well as a deep-freeze room.

**The AZ.2 above-zero refrigerating system**

The third AZ.2 system is operated as an independent R134a direct evaporation system. AZ.2 supplies 55m of refrigeration cases as well as a refrigeration room. Thanks to heat exchangers, the waste heat from the AZ.2 and DF systems as well the condensation heat from the AZ.2 is utilised to heat up water for the supermarket. The waste heat from AZ.1 is fed back into the supermarket via ceiling radiant panels. Below the supermarket is a false floor, the temperature of which is regulated using the recooling system. The advantage of this is that energy is saved by utilising waste heat. However, the largest portion of waste heat from the AZ.1 system is utilised as primary heat by the shopping centre's own heat pumps as and when required. Further energy savings are achieved by controlling the frequency of the compressors in partial load operation for the AZ.1, AZ.2 and DF systems. In doing so, the first compressor of each multicompressor system is regulated by a frequency converter. The other compressors in the compound each have a conventional output regulation. By implementing all these measures, all the refrigerating systems in the supermarket are set up for optimal energy usage.

The fact that the conversion was completed on schedule in just ten weeks despite all the difficulties, and that the supermarket could open as planned on 15th September 2008, speaks for the professionalism of all those involved in the project. The importance that Migros Zurich placed on energy efficiency and operating costs is also reflected in the fact that even after the opening, this project is far from being over for GMZ. The project is now in a two-year optimisation phase, during which the warranty period of the individual component suppliers will be utilised to further optimise the energy efficiency of the systems. This is the first time that Migros Zurich has carried a proven operation of this type. In the meantime a number of separate benchmark tools were developed that have proved worthwhile for GMZ by driving lower energy costs for example.

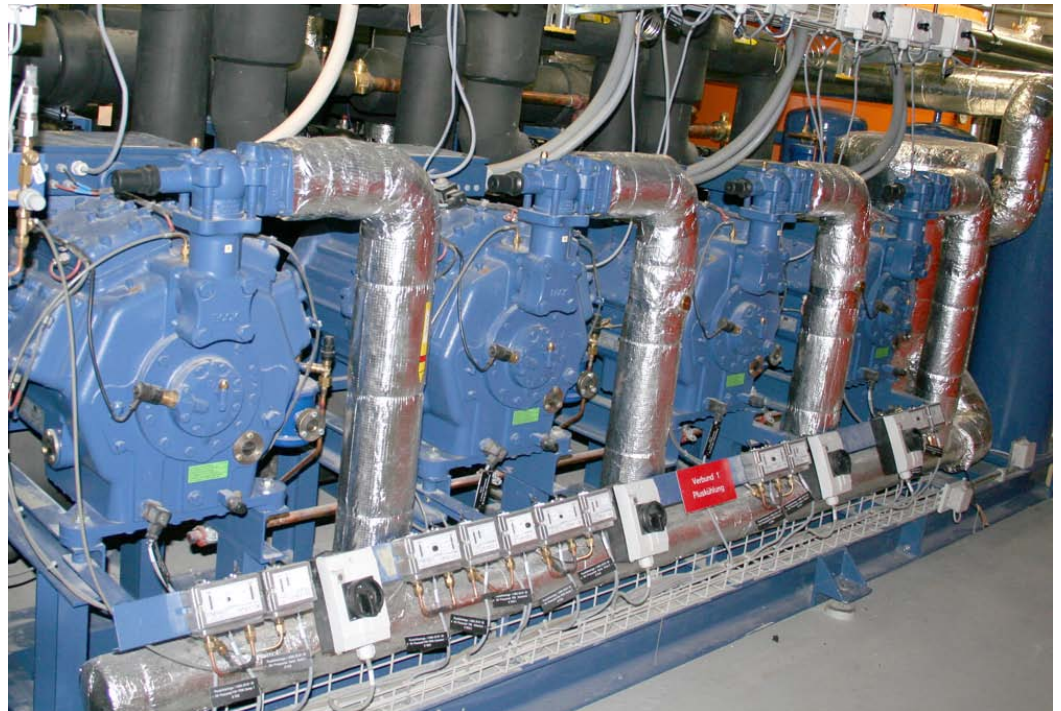
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Frickenhausen, April 2009

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## AZ.1 refrigerating system

Bock compressors: 2 x HGX8/2470-4      mech. output regulation  
2 x HGX8/2830/4      1 x frequency converter  
1 x mech. output regulation

Total displacement: 920.4 m<sup>3</sup>/h  
Evaporation temperature: -10°C  
Condensation temperature: + 34°C  
Refrigerant: R134a  
Refrigerating capacity: 300 kW  
220 m of refrigeration cases  
5 refrigeration rooms  
Waste heat from the CO<sub>2</sub> DF system  
Refrigerant system: Antifrogen N  
Recooling system: Water  
Utilisation of waste heat: Ceiling radiant panels and  
utilisation of false floor through desuperheaters.  
Heat pumps from the recooling system



## AZ.2 refrigerating system

Bock compressors:

3 x HGX5/830-4  
1 x frequency converter  
2 x mech. output regulation  
Total displacement: 216.6 m<sup>3</sup>/h  
Evaporation temperature: -10°C  
Condensation temperature: + 34°C  
Refrigerant: R134a  
Refrigerating capacity: 70 kW  
55 m of refrigeration cases  
1 refrigeration room  
Recooling system: Water  
Utilisation of waste heat: Warm water



## Deep freeze DF

Bock compressors: 3 x HGX22P/125-4 Co2  
1 x frequency converter  
1 x HGX12P/60-4 Co2  
Total displacement: 38.7 m<sup>3</sup>/h  
Evaporation temperature: -35°C  
Condensation temperature: -1°C  
Refrigerant: R744  
Refrigerating capacity: 54 kW  
Recooling system: AZ.1 refrigerant system  
Utilisation of waste heat through desuperheaters: Warm water





*Migros supermarket in the Glatzentrum shopping centre, Zurich*



Photo from left:

Matthias Brügger - GMZ Project Manager Engineering for Migros Zurich,

Marco Bertozzi - Sales and Consultation at Charles Hasler AG Regensdorf,

Berthold Schnase - Application Technology and Sales at Bock Kältemaschinen GmbH,  
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*Migros supermarket - fresh food area with refrigerated cabinets*



*Migros supermarket fish counter*