



» STMicroelectronics – Reliable cooling of a production facility with 2x Unitop® 22BX, 1x Unitop® 28CX and 3 Unitop® 33CX

Client

STMicroelectronics
38921 Crolles, France

STMicroelectronics

is a global independent semiconductor company and a leader in developing and delivering semiconductor solutions across the spectrum of microelectronics applications.

The ST group was formed as a result of the merger between SGS Microelettronica of Italy and Thomson Semiconducteurs of France. Corporate Headquarters is in Geneva, Switzerland.

The group totals more than 45,000 employees, 16 research and development units, 39 design and application centres, 17 main manufacturing sites and 88 sales offices in 31 countries.

Leading edge production facilities

In 2004, ST has five 8-inch fabs in operation in: Rousset (France); Agrate Brianza, R2 (Italy); Crolles (France); Phoenix (Arizona); Catania (Italy); and Singapore. Furthermore, a 12-inch manufacturing facility will commence manufacturing in Catania. In partnership with the semiconductor arms of Philips and Motorola, ST is starting production from a 12-inch pilot line in Crolles. The Crolles 2 operation will also host the joint development program between the three companies to develop leading-edge CMOS process technology.

Environmental responsibility

ST's commitment to environmental responsibility has resulted in substantial reductions in the consumption of energy, water, paper and hazardous chemicals, increased recycling of waste products and a significant cut in CO₂ emissions. In 2000, ST was ranked first in environmental management among 14 semiconductor companies by Innovest Strategic Value Advisors and received the only AAA ranking in eco-efficiency. Most recently, ST was awarded the "Best Industrial Renewable Energy Partnership" as part of the European Commission's "Campaign for Take-Off for Renewable Energy Awards 2003".

Reliable production cooling

The production of ST depends to a high extent on reliable cooling of its manufacturing plants. Failure would culminate in a daily financial loss of about € 1 Mio. Thus, the Unitop® chillers of FrioTherm have been chosen for the cooling of the facility process water. The Unitop® chillers were installed in two steps between 1992 and 1999 – 2 Unitop® 22BX (1992) – 1 Unitop® 28CX (1995) – 3 Unitop® 33CX (1997, 1998, 1999). The heavy indus-

trial design of the Unitops®, their high reliability combined with the outstanding isentropic efficiency made the choice easy for the client.

Hybrid dry coolers

For the heat rejection of the first 3 chillers, open type cooling towers have been installed. With the cooling capacities increasing, the client wished to prevent the forming of swathes, usually seen with standard cooling towers.

Together with the 3 Unitop® 33CX chillers, FrioTherm delivered a total of 12 hybride type cooling towers.

Main features of the Unitop® chillers

- Open-type single stage compressor
- Refrigerants: halocarbon/hydrocarbon
- Planetary or spur type gears
- Tough industrial design with vertically split casing for easy maintenance
- Suited for all drive systems
- High efficiency (COP) over the entire performance range
- Operating temperatures –40°C/+90°C
- Large capacity, small floor space

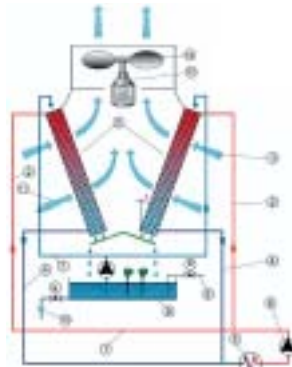




Legend

- 1 STMicroelectronics, Crolles Facility
© STMicroelectronics
- 2 Typical ST Products: System on Chip devices are increasingly being used in equipment like set-top boxes
© STMicroelectronics
- 3 Uniturbo® 33CX-compressor assembly
- 4 The hybrid type dry coolers on the roof of the Crolles Facility © Güntner
- 5 Uniturbo® 22BX-compressor assembly

The hybrid dry cooler combines dry cooling and evaporation cooling. In a closed circuit (1), the warm process fluid is transported by a pump (6) from the heat source (5) to the finned type heat exchanger elements (3). In a cross-over counter-current process, the hot process fluid and the cool air (11), from the air intake of the fan (12) exchange the heat load on the finned heat exchanger elements. Pure dry cooling takes place. With chillers at part load, in cool weather conditions and at night, this process is often sufficient. High ambient temperature causes a loss of effect for which dry cooling cannot compensate. The hybrid cooler uses the principle of evaporation in order to achieve the capacity increase required. A pump connected to the water collector tray (9) conveys water via a "wetting circuit" (7) to the upper end of the cooling element. The cooling element is evenly wetted. The air flowing past causes the water



to evaporate on the finned surface, taking up heat from the process fluid. Thus, the water level in the tray falls. Fresh water is added (8). Due to evaporation and the addition of fresh water, the salts dissolved in the water become more concentrated. In order to avoid an over-concentration, a sludge drain valve (10) is installed. © Güntner

Technical Data

Total cooling capacity	32.8 MW
Evaporating temperature	+2 °C
Condensing temperature	+37 °C
Chilled water temp. in	+8 °C
Chilled water temp. out	+4 °C
Cooling water temp. return	+29 °C
Cooling water temp. supply	+35 °C
Capacity control per unit	10-100 %

Unitop® 22BX , no. of	2
Cooling capacity, each	4.4 MW
Power absorbed, each	0.92 MW

Unitop® 28CX , no. of	1
Cooling capacity	6 MW
Power absorbed	1.2 MW

Unitop® 33CX , no. of	3
Cooling capacity, each	6 MW
Power absorbed, each	1.2 MW

Hybrid dry coolers , no. of	12
Total capacity	21,750 kW
Coolant: Water/Glycol	35 %
Medium Temp. in/out	35/29 °C
Ambient air temperature	35 °C
Rel. humidity ($t_f = 23,2$ °C)	37 % rH
Wet bulb temperature	23.2 °C

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