

Welcome to the world of **Thermal Management**



www.fs-thermalmanagement.com

Transport



Power conversion



Power generation and distribution



Signal processing



Power quality



The Earth is warming... let's get moving!

The dawn of the third millennium has seen an acceleration in global warming, surging consumer demand around the world, rising energy costs, and dwindling stocks of fossil fuels.

People everywhere are realizing that we need to look at growth differently, focusing more on sustainability and meeting new requirements:

- renewables for power generation,
- development of means of transportation that don't release CO₂,
- greater energy efficiency.

It's an issue no one in industry can ignore. By offering innovative solutions to cool electrical and electronic equipment, Ferraz Shawmut helps boost energy efficiency and protect our environment.

Cooling, a mature business



As the new millennium approached, Ferraz Shawmut, the world's leader in electrical protection, conceived, developed and started selling a first series of cooling systems. Today our Thermal Management business has come of age. With a wide range of innovative solutions for better energy efficiency and greater safety for your electrical equipment and systems, it is a full Business Line in itself, just like our Circuit Protection and Power Interconnection activities.

- By equipping processes with drives and cooling them...
we can decrease the power electric motors need to run.
- By cooling power electronics in wind or solar power systems...
we can help develop renewable energies.
- By cooling power electronics on HVDC power lines...
we can cut losses from those lines.
- By cooling IGBT components on industrial-use UPSs...
we can improve power quality.
- By cooling the power electronics on high speed train engines...
we can support energy savings in transport.



The strength of the **Carbone Lorraine** group

Backed up by the worldwide organizations that are the Carbone Lorraine group and its Electrical Systems and Components business line. Ferraz Shawmut Thermal Management now has a scale that enables us to advise and deliver to big manufacturers of electrical and electronic equipment wherever they're developing and producing.

Three plants worldwide, three technologies



Today Ferraz Shawmut is the global leader in cooling solutions and systems. Here's why Ferraz Shawmut Thermal Management stands out as THE cooling partner for the electrical and electronics industry.

Our global standing

Ferraz Shawmut Thermal Management has industrial operations in all three major economic areas of the globe:

- in Europe, at our historic plant in La Mure, in the French Alps;
- in North America, with a plant in Toronto, Canada;
- in Asia, with a brand-new facility in Shanghai, China.

Those three production locations are also sales centers to propose close-to-the-customer supporting services to industries in their area.



La Mure -
France



Toronto -
Canada



Shanghai -
China

A global offering

A whole gamut of solutions meeting all the needs of both OEM's and end users and built on three cooling technologies - air, phase change and liquid - is one more key asset. Ferraz Shawmut Thermal Management owns capabilities for world-class developments: design departments, simulation tools, test labs and on-line R-Tools program.

five markets

Our market focus

Faithful to our strategy of high quality service, Ferraz Shawmut gets involved as early as possible when needs are identified in five major market sectors:



Transport
Projects to build subways, train-trams, electric cars, high speed trains, new generation airplanes with electric controls, and more still, are all proliferating... with specific problems of space and therefore heating to be solved.



Power conversion
Our high performance cooling systems are a perfect match for the drives and UPSs equipping the electric motors used in industrial processes, boosting their efficiency.



Signal processing
The digital revolution has changed the nature of broadcasting and signal processing, whether radio, television, telephone, or defense applications, and all those new emitters, radars and digital amplifiers need cooling.



Power generation and distribution
With the present boom in new forms of renewables to generate wind and solar power, new needs have developed in terms of cooling for power electronics.



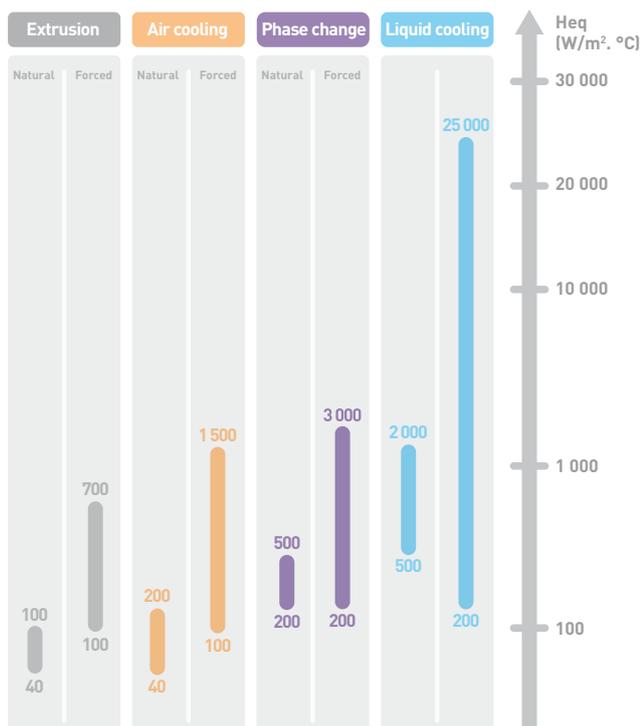
Power quality
To guarantee continuous service at sensitive sites like airports, hospitals and telecommunications centers, UPS is the only solution. Those systems need cooling to ensure their reliability

Solutions for every application

The width of our range

Thanks to synergies within the group that allow us to exploit a number of cooling technologies (air, phase change, liquid), Ferraz Shawmut can meet every need from 40 to 25,000 $\text{W/m}^2 \times ^\circ\text{C}$. That range is complemented by a cooling unit offering that covers the entire thermal loop.

Extrusion¹, air, phase change and liquid cooling solutions / **Cooling performances**



1) Entry-level segment with low performances. Ferraz Shawmut does not seek a position on this segment.



Ferraz Shawmut Thermal Management air, phase change and liquid cooling solutions / **Five markets**

kW/m², °C



Industrial operations at **Ferraz Shawmut**

Already the global leader in circuit protection, backed up by the Carbone Lorraine group, Ferraz Shawmut has decades of experience to support the Thermal Management offering:

- three production facilities that each develop specific expertise and know-how;
- the capacity to design a solution to order, build prototypes, and mass manufacture in compliance with all prevailing standards;
- full facilities for testing in-company, along with quality, safety and environmental approaches;
- global logistics supporting service close to the customer.

Air cooling solution



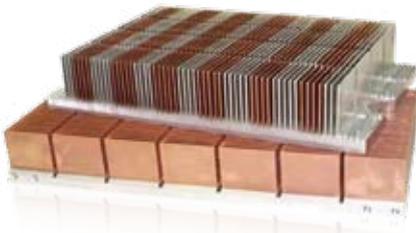
Fabfin®/Hollowfin®

Fabfin® stands out from ordinary extruded heatsinks because of its higher fins, giving it excellent performances; the swaging process means a variety of its higher fins and increased height to space ratio types of fins can be used. The Hollowfin® heatsink uses the same technology but the fins are processed further to increase their density on the baseplate.



Dual Baseplate

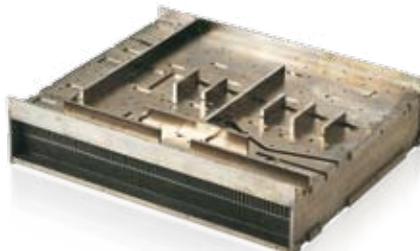
These heatsinks further increase the efficiency of the fin system with mixed assemblies of aluminum and copper. Fins can be of standardized heights, thicknesses and spacing.



Mixed Metals®

The combination Fabfin heatsinks are available with copper baseplates for concentrated heat sources and aluminum baseplates with copper fins for large area heat sources. Optimization is possible by mixing both aluminum and copper fins.

The heatsink was developed to enhance heat spreading for those semi-conductors developing high heat flux and limited allowable temperature rise.



Radiacal® Corrugated

These heatsinks consist of aluminum fins welded onto an aluminum baseplate. This technology allows great flexibility in design and using aluminum for the entire heatsink means solutions can be lightweight.

OUR

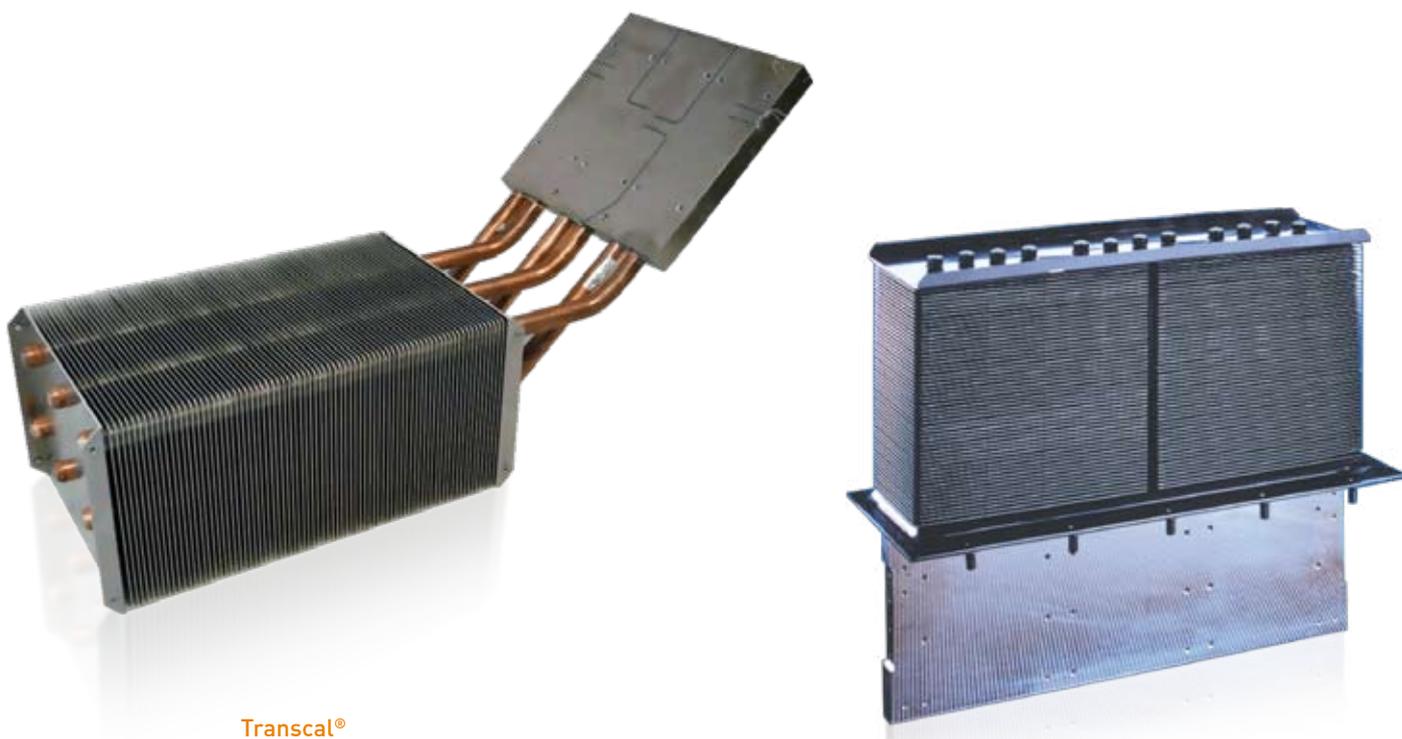


THE SWAGING
PROCESS



Our swaging process was developed and patented by Ferraz Shawmut Thermal Management's Canadian unit R-Theta to boost the efficiency of air cooled heat-sinks: thinner R-Theta Thermal Solutions Inc., longer fins on denser or mixed metals to get maximum thermal conductivity while keeping weight down.

Phase change solution



Transcal®

The high heat losses from press-pack or IGBT power devices can easily be conveyed outward via heatpipe cooling units. A unit consists of aluminum evaporator and condenser sections with copper heatpipes. Working fluids are chosen to suit the application (methanol, water).



OUR  A STAND-ALONE UNIT

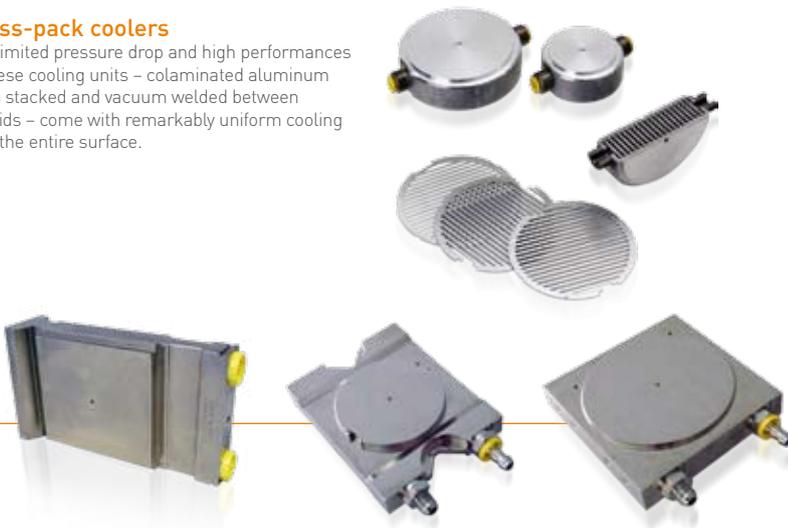
The Transcal heat pipe range

Our heat pipe solutions significantly reduce the footprint of power conversion systems thanks to performances that approach those of liquid cooling technology. That means the unit is stand-alone and offers vital benefits to the user: less space required, lighter weight, easier maintenance, and optimized power dissipation.

Liquid cooling solution

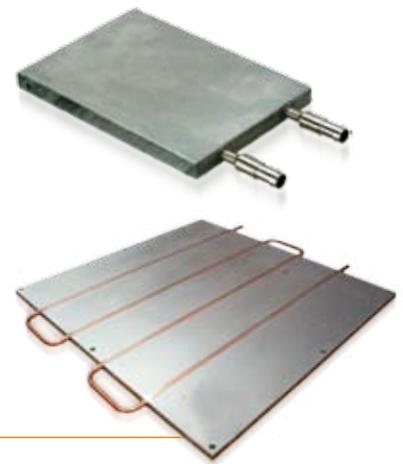
Press-pack coolers

The limited pressure drop and high performances of these cooling units – colaminated aluminum grids stacked and vacuum welded between two lids – come with remarkably uniform cooling over the entire surface.



Embedded pipes

These copper or stainless steel pipes are embedded in aluminum baseplates to achieve the lowest thermal resistance between the power component and the cooling fluid. (any type of cooling fluid can be used)



Custom machined cold plates

This design – a cooling circuit entirely precision machined by digitally controlled equipment, then vacuum brazed under a cover – provides maximum cooling performance and hydraulic connections exactly matching customer specifications.



OUR  VACUUM BRAZING



The maximum thermal performances of our Moducal[®], Multical[®] and Calistor[®] ranges have already made the brand a hit

Power electronics components (IGBTs, thyristors) need a cooling solution that is both effective and reliable, especially when they're installed in a confined space. Liquid cooling systems work perfectly. To ensure maximum reliability, Ferraz Shawmut Thermal Management has mastered vacuum brazing technology to achieve: guaranteed watertightness with no seams, robustness, no corrosion, and excellent thermal performance. Result: a product sure to last 20 years!

Cooling units



Complete cooling systems

In addition to its custom cold plates, Ferraz Shawmut Thermal Management offers also systems covering the whole thermal loop, including the necessary pumps and hydraulic and electrical elements.

Cooling the hot fluid existing a heatsink before recirculating it requires a heat exchanger.



Services to support your development

Ferraz Shawmut Thermal Management is organized to assist customers throughout all the stages in development of the solution they need: from the earliest stages of identifying needs right through to production and logistics at the end of the process. Ferraz Shawmut Thermal Management's engineers get involved in a development project from the beginning and even help in drawing up bills of requirements.



Ferraz Shawmut | Thermal Management

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