Energy to innovate

For 130 years, **Mersen** has been bringing progress to life.

Back to the future

A LOOK BACK OVER TECHNICAL AND SOCIAL INNOVATIONS THAT HAVE MOVED THE WORLD FORWARD

Inside Mersen

THE NEW INDUSTRIAL SITE IN COLUMBIA: TECHNOLOGICAL PROWESS AND PROMISE

In the air

Mersen at the heart of electric vehicles

2021 #1

MERSEN

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130 years of service to industries that drive the world forward

LUC THEMELIN, CEO

What if we looked at innovation differently? That’s precisely what Mersen has decided to do this year with the launch of its first magazine, *Energy to Innovate.* In its 130 years of existence, our Group has actively facilitated countless industrial revolutions. So we thought it would be a good idea to approach the subject differently, to look at our expertise and our solutions in the light of the way society is moving forward and changing.

Because, when all is said and done, what is innovation? To innovate is to have an idea before anyone else, to do things differently, to stand out from the competition, to offer more technology, greater performance or better cost control. But none of that makes sense if it does not serve a vision. In the very singular environment we have had to come to terms with over the past year, and with our planet facing major environmental challenges, we simply have to take a long-term view.

Mersen’s history is dotted with innovations that have marked their day and crossed the years. Over the decades, we have participated more or less directly in the rise of electricity, the advent of aerospace, the transformation driven by railroads and →

“Mersen history is dotted with innovations that have marked their day and crossed the years.”

→ the development of certain segments of the chemical and pharmaceutical industries. Each time, our solutions have been synonymous with reliability, security and performance, allowing others to reach new milestones and improve our daily lives.
Most recently, we have invested in the development of innovative solutions for the renewable energy sector. In fact, sustainable development markets now account for 56% of our sales and are one of the main reasons for the resilience of our business in 2020.
Added to this is Mersen's "glocal" approach combining operations in 35 countries with a range of local expertise matching the specific features of each market or industrial player. We see innovation as a means of allowing our know-how to serve a need, of adapting to a customer's requirements and of creating bespoke solutions out of a single technology.
Our energy to innovate differently lets us look to the future with optimism, despite the crisis and the uncertainty that continues to plague certain sectors.
Our Group continues to grow and take shape, witness the strengthening of our industrial capacities in the United States with the acquisition of the Columbia site. We are also on the front line of supporting the sustained growth of solar energy and the global development of the electric vehicle market. That is the very topic we have chosen for the front page and main feature of this first issue.
In a way, electric vehicles sum up Mersen's markets perfectly: a sector of the future poised to revolutionize mobility for people and goods, but which needs advanced technologies to become structured, stable and profitable. In this and other areas, Mersen's expertise makes it a key innovative force in an industry that is sustainably transforming our societies.

"Sustainable development markets now account for 56% of our sales."

In the air

PROGRESS AND THE MERSEN SPIRIT GO TOGETHER WELL. SINCE ITS ORIGINS IN FRANCE IN 1889, THE GROUP HAS FACILITATED CHANGE IN SOCIETY. WHAT'S NEW TODAY AND FOR TOMORROW?

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Silicon carbide, the game changer in high demand **P.8**
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Why electric vehicles are set to become a permanent fixture

In its infancy just a few years ago, the electric vehicle market is now taking off. Its growth is enjoying traction from technological innovations created by specialists like Mersen.

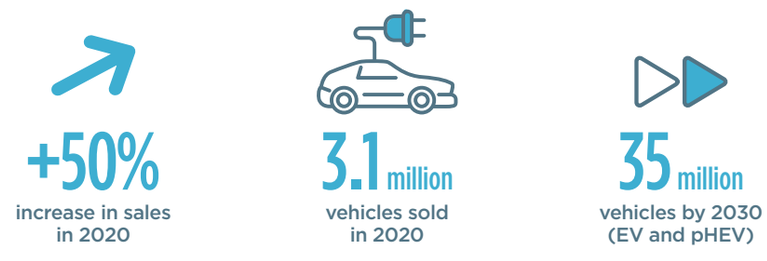
With 3.1 million units sold over the year, the electric vehicle market (all-electric or plug-in hybrid) grew by 50% in 2020, despite the unprecedented context. And its momentum doesn't look likely to stop anytime soon, since sales are predicted to reach up to 35 million units – roughly 30% of the automotive market – by 2030. It must be said that today's environmental challenges will inevitably sharpen appetites for less polluting and more planet-friendly transportation. But the numerous technical challenges have forced manufacturers to take things step by step before embarking on mass production. *"The things that have held back more widespread adoption in recent years are electric vehicles' short ranges and the lack of charging infrastructure, plus, more generally, battery safety issues,"* says Pierric Gueguen, Global Business Development Director – Electric Vehicle, at Mersen.

Mersen has been working to resolve all these issues in recent years. The world expert in electrical specialties and advanced materials works at various points along the production chain, far upstream for the manufacture of the silicon carbide (SiC) chips required for optimized battery operation, and by supplying fuses, capacitors and busbars for battery power management and electrical safety.

"Most of the demand addressed to us concerns electrical protection," says Pierric Gueguen. *"For example, we have developed a bespoke fuse for Marquardt, a German group that ranks among the automotive industry's leading suppliers, to protect the electrical system supporting the auxiliary functions of new generation electric vehicles."*

Going forward, electric vehicles will no longer be confined to small city cars used simply to run errands or take the kids to school. Improved performance means growth among all automakers and all segments, from sports cars to trucks, buses and premium cars in the coming years.

"The increase in performance of electric vehicles opens up a broad range of development prospects."



Electric vehicle market trends.

Silicon carbide, the game changer everyone wants a piece of!

More efficient than silicon and offering better heat resistance, silicon carbide is a key factor in the rise of electric vehicles.

The secret behind the greater efficiency and power of new generations of electric vehicles lies under the hood. Or more precisely, they have what the first generation vehicles were lacking: silicon carbide (SiC). As Christophe Bommier, Mersen's Chief Technical Officer, puts it, *"electric vehicles' automotive batteries have built-in power converters that transform direct current into variable electric current. In the past, these converters used silicon semiconductors. But over the years, SiC has emerged as a vastly more efficient solution, albeit more expensive for the time being."*

One of the advantages of SiC semiconductors is that they help increase switching frequency while capping energy loss at 2% (as opposed to an average of between 5% and 6% for silicon). On top of that, their smaller size and resistance to high temperatures (up to 250°C) make for richer design possibilities. *"Since SiC is heat resistant, it is less demanding in terms of cooling, so the vehicle's energy can be devoted exclusively to making it run,"* adds Christophe Bommier. However, the switch to full-SiC production is not going to happen overnight. Where silicon is produced from 12-inch wafers, SiC is currently limited to – more expensive – 6-inch ones, which obviously makes it less competitive. But the demand is already there, whether for electric vehicles or solar inverters, and great strides have been made in just a short time thanks to the arrival of new SiC suppliers in the early 2010s.

Mersen is playing an active role in the ramp-up, since one of the keys to SiC production is controlling the reaction at 2,400°C, which is where the graphites and thermal insulators developed by the Group really come into play. *"Between 1997 and today, we have gone from 2-inch to 6-inch wafers, and we'll probably soon reach 8 inches. But above all, the quality has improved considerably, with less than 1 defect per square centimeter now,"* concludes Christophe Bommier. *"Automakers all naturally have their eyes on these components."*

SiC semiconductors boost electrical converters

How does it work?

What is a converter? An electrical converter's job is to transforms the voltage, intensity or frequency of the current to adapt it as needed.

DID YOU KNOW?

80%

BY 2030,
80% of electrical energy will be converted in one form or another (vs. 15% today)

THE CHALLENGE

Improve the efficiency of energy conversion

- Less energy consumption
- Less energy loss

SiC
FOR POWER APPLICATIONS

Diode, Transistor, Power Module

Semiconductors, either Si or SiC, **are the key to power converters**

THE ADVANTAGES OF SIC

- Reduced energy losses
- Operation at higher temperatures
- Better heat dissipation

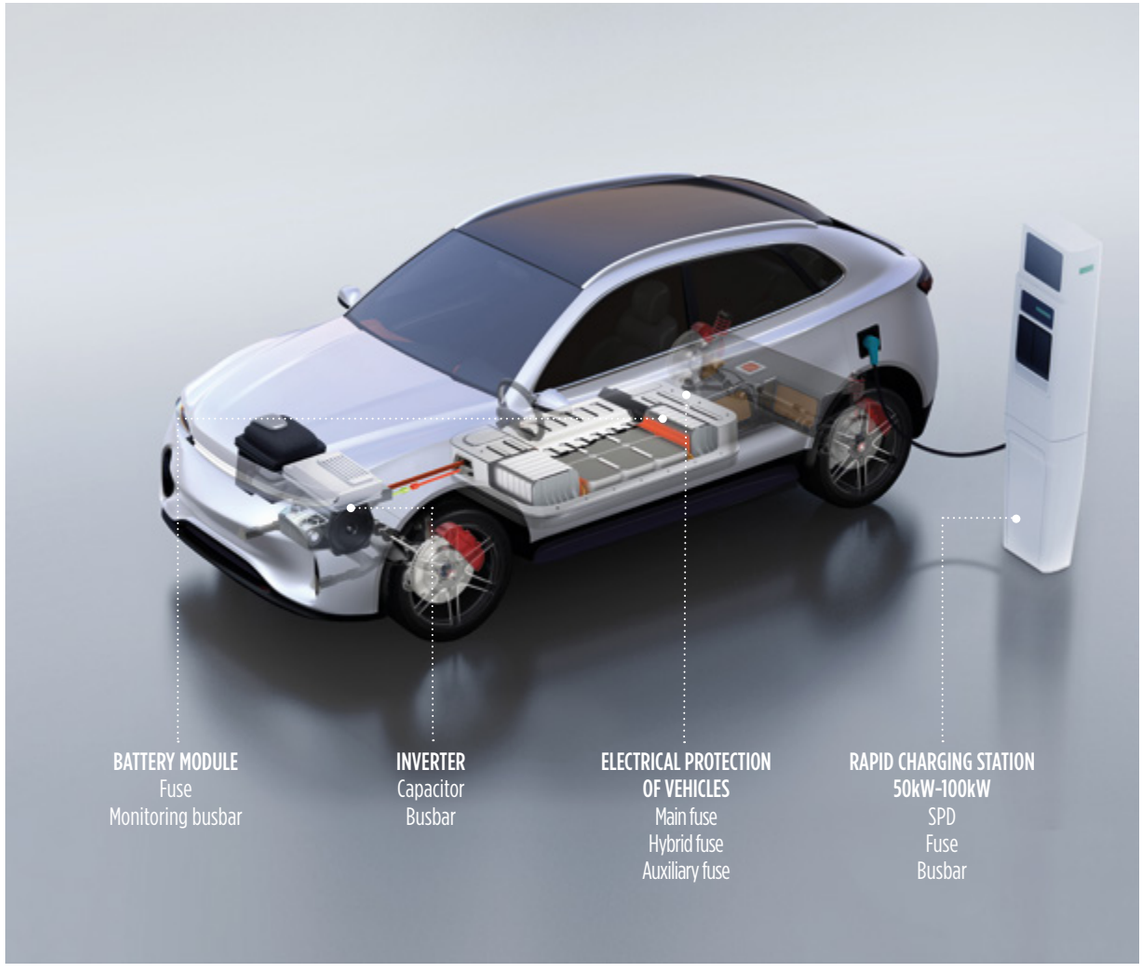
NUMEROUS APPLICATION MARKETS FOR SIC

ELECTRIC VEHICLES

ELECTRIC BUSES

ENERGY STORAGE

RENEWABLE ENERGIES



A specialist on all fronts

Mersen has been developing and adapting its products for several years to meet the battery protection and range requirements of electric vehicles.

From fuses to capacitors and busbars, the electric vehicles of several high-end manufacturers in Europe, Asia and the United States rely on not just one but several Mersen technologies. This reflects the Group's exceptional expertise in these cutting-edge developments, derived from its long experience in sectors that share the same need for electrical protection and energy management – from solar energy to data centers, through telecommunications and rail.

But to meet the requirements and specificities of the automotive sector, Mersen has to work hard to keep its products advancing. This brings several factors into play: while the mounting use of SiC semiconductors allows for increases to higher temperatures, it in turn requires the design of smaller and more thermally resistant busbars with very low inductance. The same goes for capacitors, where the switch from silicon to silicon carbide is not a minor change by any stretch of the imagination.

A high level of technicality is also required for fuses. To avoid creating a potentially harmful short circuit, Mersen has designed a hybrid fuse with very low electrical resistance, placed on the DC circuit going from the battery to the converter.

An IATF 16949-certified Mersen site

The Mersen plant in Angers (France) obtained the very demanding IATF 16949 certification in 2020. This international standard sets out the quality management systems needed to provide high-tech products for the automotive industry, which is the case for this site where Mersen produces a comprehensive range of laminated busbars.

Joint collaboration

In April 2021, Mersen and Autoliv, a Swedish manufacturer of safety equipment for the automotive industry, announced a joint collaboration **to manufacture high-voltage disconnect devices** for electric vehicles (hybrid fuses).

Mersen's technologies aim to limit energy losses so as to offer more capacity to batteries and more range to vehicles.

What is the impact of SiC on sustainable development markets? The Group Chief Technology Officer and the Vice-President, Global Strategic Marketing Power Electronics provide answers.

“If it’s not a revolution, it certainly looks like one”

PHILIPPE ROUSSEL,
VICE-PRESIDENT, GLOBAL STRATEGIC MARKETING POWER ELECTRONICS

“Mersen’s solutions help make the tools used to produce quality SiC.”

CHRISTOPHE BOMMIER

Would it be an exaggeration to describe Mersen as a major player in the development of the electric vehicle market?

Philippe Roussel : What I can say is that we have tripled our sales in this segment since 2016, which is very honorable. It may be a bit early to claim to be a major player, but our solutions for both electric and hybrid vehicles are sparking real interest.

Christophe Bommier: We do play an important role, but carmakers are not necessarily aware of it, because we are usually involved at a very early stage. Our technical contribution is not always direct: we produce capacitors, busbars and fuses of course, but we probably stand out most in the silicon carbide (SiC) semiconductors used for power converters.

How did Mersen come to be at the forefront of SiC semiconductors?

PR: SiC is all but ubiquitous in the renewable energy industry, where it is used to make LEDs and photovoltaic converters, as well as in the rail industry. Mersen has been working in these sectors for many years – and with real success since leading manufacturers rely on us to secure and optimize their manufacturing processes, and to increase the performance and durability of their facilities.

CB: To put it simply, Mersen’s solutions help make the tools used to produce quality SiC. The isostatic graphite and purified carbon insulation materials we supply are among the world’s best. These solutions are essential to produce SiC crystals at very high temperatures (2,400°C). →

CHRISTOPHE BOMMIER,
CHIEF TECHNOLOGY OFFICER

Would you say you've ramped up gradually?

CB: Absolutely. Ten years ago, of the 50 semiconductors produced from a wafer, 90% were unusable because there could be as many as 12,000 defects per square centimeter. Today, we've made enormous progress in controlling the reaction at 2,400°C, and our products allow manufacturers to reach a level of quality sufficient for large-scale industrial production. We are getting closer to the reliability of silicon. And that's opening the door to new prospects despite the obvious extra cost.

PR: Its popularity as a technology is increasing with each technical improvement, because it offers genuine gains in terms of performance, size reduction, flexibility of use, security and other aspects. But make no mistake, SiC will never replace traditional silicon, and its use only makes sense for relatively high-power electronics.

What uses of SiC is Mersen working on?

PR: The electric vehicle market is obviously a growth driver for us, both for cars and for charging infrastructure. More broadly, we are working on issues relating to higher voltage and increasing frequency. Practically, what we want is for each kWh to be usable and for energy losses to be minimal, whatever the use. That is what all sectors are asking for, from electric transportation and data centers to 5G.

CB: Our Mersen Boostec subsidiary is also working on specific uses of SiC for space and astronomy, and for the chemical and pharmaceutical industries. In short, we are pressing ahead with our R&D work on innovative and sustainable solutions with a small ecological footprint. Moreover, we already generate more than 50% of our sales in markets related to renewable energies and energy efficiency, such as photovoltaics, wind power and green transportation.

How is Mersen changing its organization in line with this growth?

PR: We are reinforcing our international supply chain to enable use to support all players in all sectors, without restriction. If the electric vehicle market takes off as we expect it will, we will have to be able to maintain a very high level of quality on large volumes. We have a stellar track record in industry, but the automotive industry is really a world apart, even more demanding and with its own standards. Two of our sites have already been or are in the process of being certified IATF 16949, but it's a very long process.

CB: The electric vehicle market offers other opportunities for Mersen, including the production of fuses for auxiliary circuits. We are creating a whole family of products: while a single main fuse may do for each vehicle in the future, roughly 15 auxiliary ones capable of withstanding several hundred volts will also be needed.

Is the process underway?

PB: For electric vehicles, it certainly is. For SiC, one or two additional major suppliers are probably necessary to reassure sectors that would like to adopt it more massively. The major automakers are simply not prepared to run the risk of a material shortage. But Mersen aims to support the emergence of new players by providing solutions that make production more reliable.

CB: If it's not a revolution, it certainly looks like one. But the real revolution may well turn out to be the autonomous vehicle. In the meantime however, the advent of hybrid and electric vehicles is a major step forward that we are proud to be facilitating.

"We obviously have to adapt our solutions to the needs of electric vehicles, but Mersen has mastered the core technology for a long time."

PHILIPPE ROUSSEL

Back to the future

MERSEN'S HISTORY IS DOTTED WITH INNOVATIONS AND PRODUCTS THAT HAVE ALLOWED COUNTLESS INDUSTRIES TO GROW AND REVOLUTIONIZE THEIR TIMES. KEYS TO THIS SUCCESS ARE A VISION AND A DETERMINATION TO SERVE PROGRESS.

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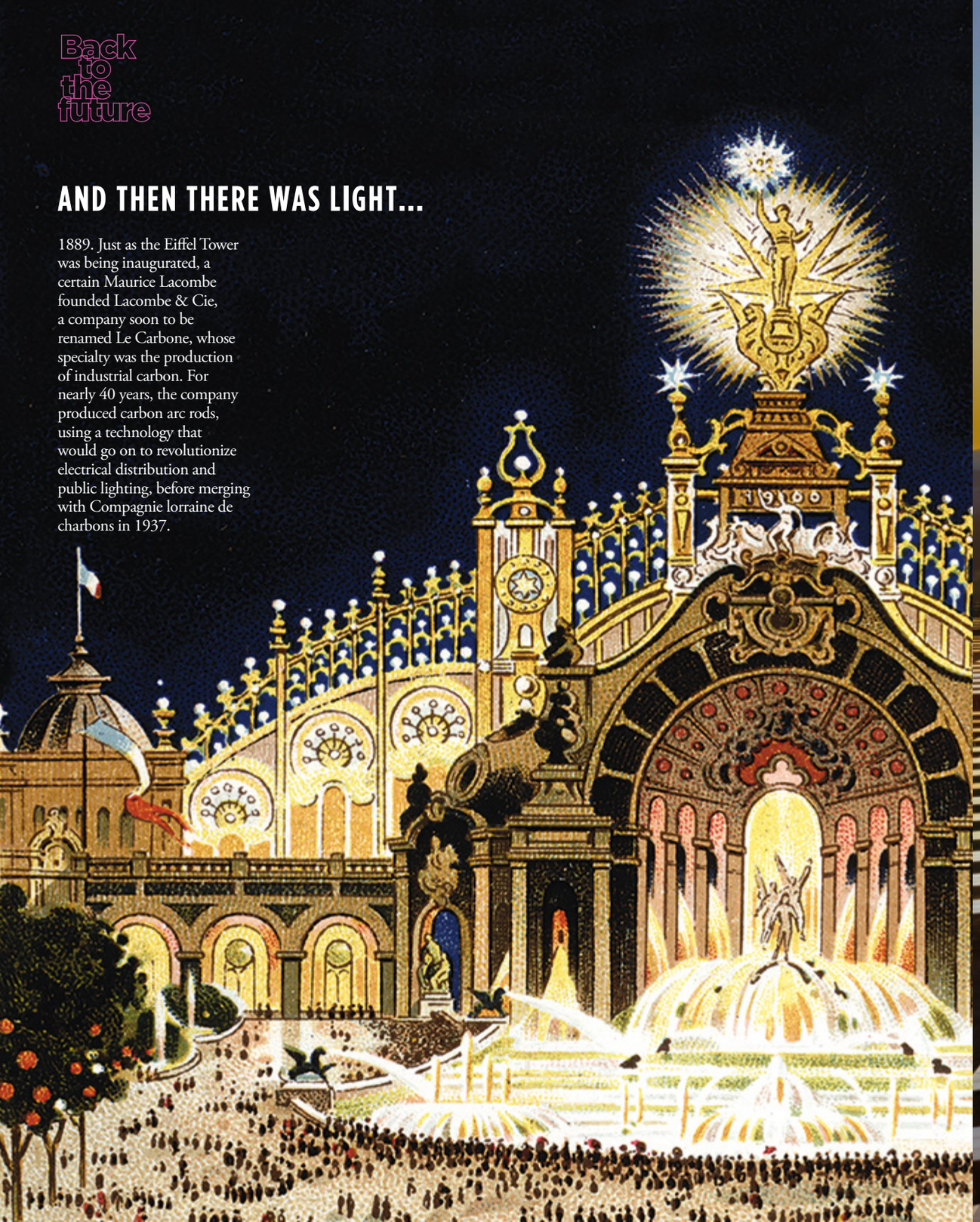
130 years of stories **P.22**

Back to the future

AND THEN THERE WAS LIGHT...

1889. Just as the Eiffel Tower was being inaugurated, a certain Maurice Lacombe founded Lacombe & Cie, a company soon to be renamed Le Carbone, whose specialty was the production of industrial carbon. For nearly 40 years, the company produced carbon arc rods, using a technology that would go on to revolutionize electrical distribution and public lighting, before merging with Compagnie lorraine de charbons in 1937.



Carbone Lorraine went on to provide decades of support for major innovations in the distribution, control and protection of the electricity network. Renamed Mersen in 2010, the Group perpetuated its innovative approach by investing in the development of renewable energies at the turn of the 21st century. Its expertise is now central to the solar and wind energy sectors, where the Group brings performance, reliability and safety.

Back to the future

Columbia, United States


Rochester, United States


Hittisau, Austria


Changxing, China


Bommasandra, India


Pudong, China


Cabreuva, Brazil

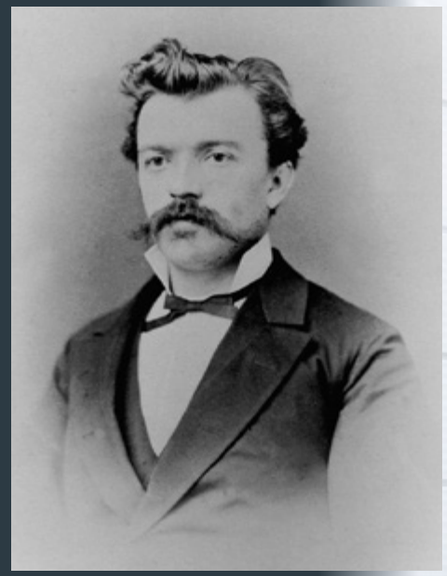

M'Ghira, Tunisia

ALL OVER THE WORLD

Amiens, Holytown, Columbia, Shanghai, Juarez. Although Mersen took its first steps in France, the Group quickly made its mark internationally, at the dawn of the 20th century, with the creation by Le Carbone of subsidiaries in Frankfurt, New York and London. True to the spirit of its founders, the Group is today pursuing its development in North America and Latin America, India, Japan, South Korea and China. Mersen has established offices and production lines on different continents to draw on the expertise of local teams and implement an approach characterized by genuine closeness with its customers.

Back to the future

AT THE ORIGIN OF INNOVATION

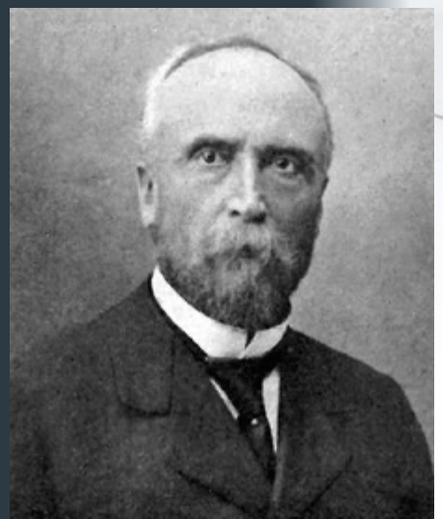


MAURICE LACOMBE
The visionary

An engineer by training, Maurice Lacombe had the intuition very early on that electricity would become a flourishing industry, driven in large part by demand for lighting. He founded Lacombe & Cie to provide support for this industrial force, surrounding himself with specialists.

CHARLES STREET
The technician

Lacombe & Cie's first employee, he became the pillar of its R&D activity. Using a tiny furnace to run electricity through coal, he obtained a stronger, denser and more durable material. Under his impetus, the company registered several patents for the manufacture of carbon arc rods, electric batteries and motor brushes – a field Mersen would dominate for many years.



FABIUS HENRION
The captain of industry

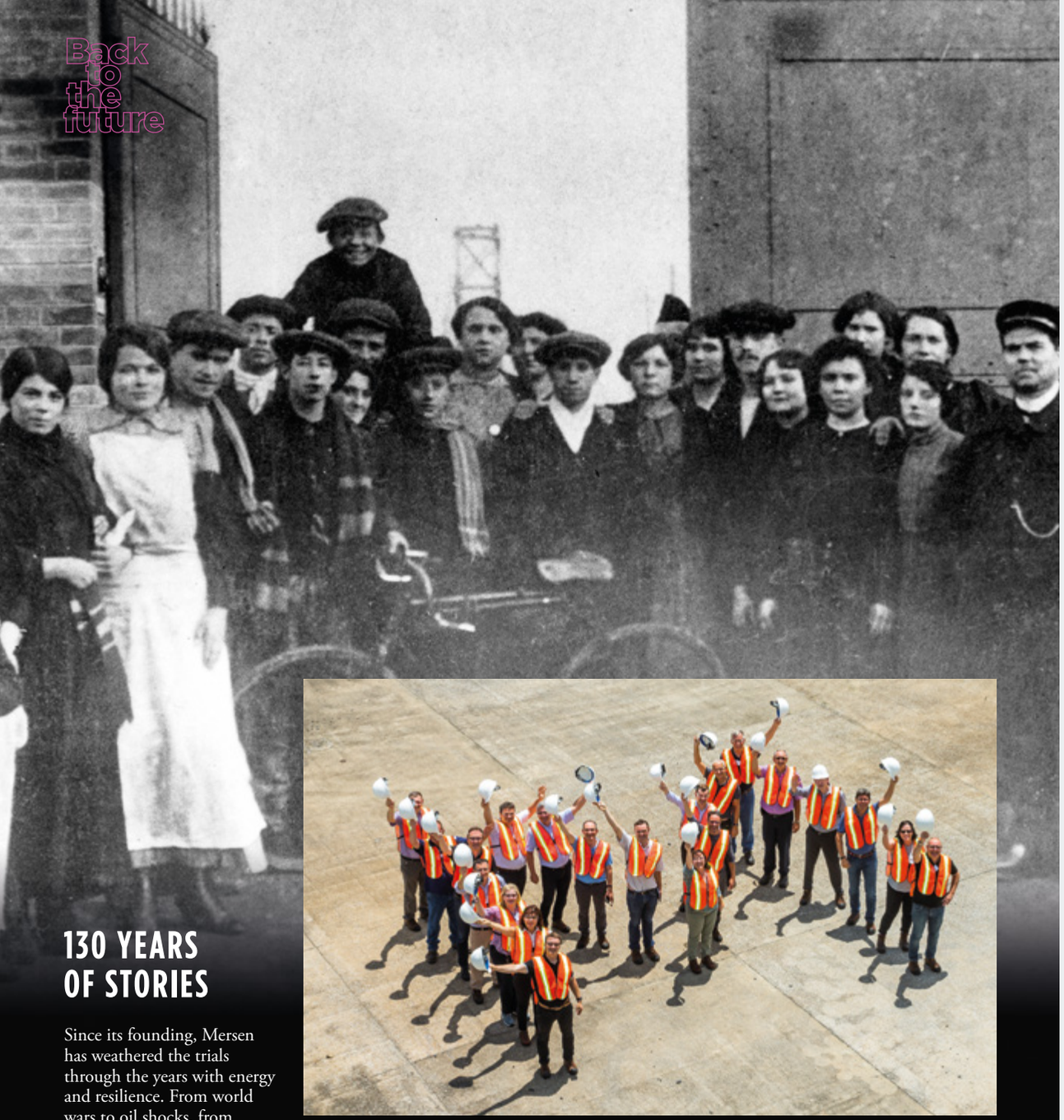
Self-taught and passionate about all things electrical, Fabius Henrion seized on the miracle of electricity at the end of the 19th century. His company, specializing in carbon for electricity, quickly established itself throughout France. In 1893, he built a factory in Pagny-sur-Moselle to produce his own coal. In 1912, he sold his activities to the future Compagnie Lorraine des Charbons, which in turn merged with Le Carbone in 1937.

A PERFECTLY ORDERLY SUCCESSION

Today, Mersen is headed by Luc Themelin, CEO since 2011. Backed by the Board of Directors, the Executive Committee and the Group's employees throughout the world, he keeps the spirit of Mersen's pioneers alive and helps the Group grow through expertise, innovation and proximity.

1 – Jean-Philippe Fournier
2 – Thomas Farkas
3 – Didier Muller
4 – Christophe Bommier
5 – Luc Themelin
6 – Estelle Legrand
7 – Gilles Boisseau
8 – Éric Guajioty
9 – Thomas Baumgartner

Back to the future



130 YEARS OF STORIES

Since its founding, Mersen has weathered the trials through the years with energy and resilience. From world wars to oil shocks, from inflation to recession and from protectionism to globalization, the Group has consistently been able to adapt and continue to grow while remaining true to its values. It owes its success to the commitment of the men and women who have joined it over the decades and who have risen to the challenge of pushing back the limits and boundaries to put their expertise at the service of technologies and industries that change the world.

Inside Mersen

WHAT WERE THE KEY EVENTS FOR MERSEN IN 2020? THE YEAR WAS MARKED BY THE COVID-19 PANDEMIC, BUT ALSO BY REMARKABLE DEVELOPMENT THAT STRENGTHENED MERSEN'S ABILITY TO SERVE ITS CUSTOMERS AROUND THE WORLD, AND BY NUMEROUS INNOVATIONS.

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World expert in electrical specialties and advanced materials for high-tech industries **P.30**

A year on the front lines

Early in 2020, as the pandemic became a settled feature in our lives, the Mersen teams intensified their inventiveness and solidarity to keep going.

GROUP

85% of Mersen plants remained operational

At the height of the crisis, 85% of Mersen plants remained operational. The Group was able to rely on its locations on five continents to ensure seamless continuity of service worldwide, and on its commitment to sustainable development markets to limit the impact of the crisis.

DAY-TO-DAY

New ways of working

To beat the pandemic, each site and the Group as a whole profoundly changed the way they operate: temperatures were taken at the entrance to several plants and special “Covid Kits” were distributed in Amiens (France), Juarez (Mexico) fitted a disinfection tunnel and provided transport on a "health bus", and other sites encouraged people to use webcams for informal discussions to help stave off loneliness among people working remotely.

MERSEN ACADEMY

Providing over 23,000 hours of training

Distance learning was facilitated by the Mersen Academy, the Group’s e-learning platform, which played its role to the full and was a great success in 2020, providing over 23,000 hours of training. Numbers peaked during the first period of lockdown. The most popular subjects among employees in the new environment naturally included good remote working practices and remote team management. Mersen also adapted some of its training courses and set up new virtual classes, led by Group experts and enabling intercontinental exchanges.

MUTUAL SUPPORT

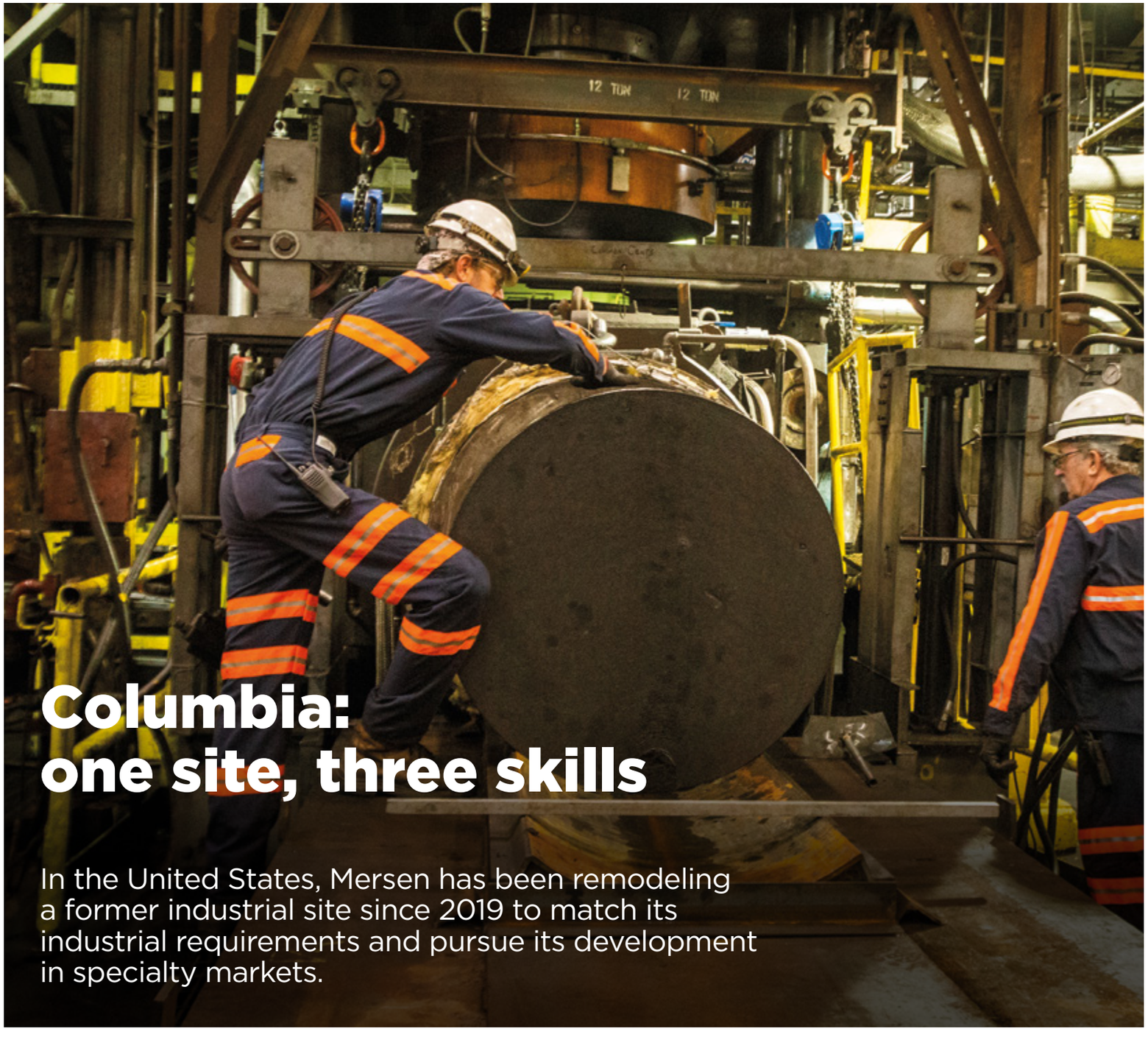
Protective equipment, especially masks, exchanged

While the crisis struck everywhere, it did not hit all countries at the same time and with the same intensity. Solidarity quickly came to the fore at Group level, with protective equipment, especially masks, exchanged between sites and countries to make sure everyone stayed safe. Two central stocks were set up in Europe and North America, and managers at each site regularly exchanged information to ensure that no one was caught out – despite stockouts and requisitions in the spring.

TRAINING

The right attitudes to adopt in workshops or offices

Six minutes to learn all about the right attitudes to adopt in workshops or offices to limit the spread of Covid-19: the educational video produced by the Saint-Bonnet-de-Mure site in France, using golden glitter to illustrate the spread of the virus, was widely shared.



Columbia: one site, three skills

In the United States, Mersen has been remodeling a former industrial site since 2019 to match its industrial requirements and pursue its development in specialty markets.

At first glance, an untrained eye might simply have seen a slightly outdated factory. But Mersen's 2019 decision to acquire several items of land, buildings and equipment in Columbia (Tennessee), was based on their real technological and strategic potential for the Group.

"*The site was of interest to us because it was equipped not only with an extrusion press, but also with an isostatic press and several very high temperature furnaces,*" says Eric Guajioty, Group Vice President Advanced Materials. "*For us, that meant the chance to expand our isostatic graphite manufacturing capabilities in a modular mode at a reduced cost, and to have a specialty extruded graphite manufacturing capability that we did not previously have in-house.*"

While 2019 and 2020 were devoted to getting the site up and running again, and improving its facilities, 2021 will be the year of the plant's ramp-up, especially now that Mersen has chosen to relocate the production of GRI brand insulation there. Last July, the Group acquired the insulation business of Americarb, a company specializing in graphite and carbon fiber insulation.

By bringing together the manufacture of insulation felt and the production of isostatic and extruded graphite, Mersen has created a true center of excellence in America. The plant currently employs nearly 50 people.

ERIC GUAJIOTY, GROUP VICE-PRESIDENT ADVANCED MATERIALS

"Columbia strengthens our industrial capabilities for high-growth markets like solar power and electronics."

Columbia is a multi-activity center of excellence that strengthens our industrial capabilities ready for the ramp-up of several high-growth markets like solar power and electronics. The acquisition is a technological adventure, but also a human one, since we have recruited the site's former director. As Columbia's living memory, he will train a new generation of specialists, because you can't become an "extruder" overnight! Ensuring the continuity of this know-how is essential for us to produce quality materials capable of meeting today's industrial challenges.

Mersen facilities in Columbia

- Production capacities for **extruded graphite,** used in particular for heat exchangers and for certain applications in the process industries.
- **Insulation felt** manufacturing capabilities for the solar, electronics, and process industries.
- Complementary **isostatic graphite** manufacturing capabilities.

At the core of the Mersen ecosystem

In all four corners of the world, Mersen relies on both internal and external experts to grow the industrial footprint and take innovation further.

If you want to go quickly, go alone. If you want to go far, go together, as the saying goes. Playing the collective intelligence card is anything but a damper on innovation and development, quite the contrary. Firmly committed to a partnership approach with its customers, Mersen has chosen to focus on openness in order to move forward, innovate and push back the boundaries. Both internally and externally, the Group promotes skills and surrounds itself with specialists, service providers and suppliers who are experts in their respective fields so that they can challenge each other and make collective progress on the most specialized topics.
Mersen has built up an extensive ecosystem over the years, in terms of both R&D and operations, spanning researchers, technicians, engineers, industrial operators, logisticians, universities and major national research centers. Mersen relies above all on local know-how to devise new solutions that are as close as possible to needs in the field. This approach also provides a foundation for our values, as our partners share our social, environmental and ethical demands and are committed to promoting sustainable development that respects the future.

Collective intelligence fosters performance and efficiency of each member of the team.

PROCESS

AUTOMATION FOR SOLAR ENERGY

To meet the needs of a long-standing Chinese customer, one of the world's largest manufacturers of monocrystalline solar wafers operating in an ultra-competitive market, Mersen Yantai (China) has leveraged its expertise to devise a particularly innovative solution: Mersen has developed a solution to automate crucible production to replace what used to be a manual process. Automating this complex process makes for more stable and higher quality production for the customer, while improving productivity and reducing costs.
This innovation, which is particularly well suited to the large furnaces that are gradually becoming the norm among industry players, gives Mersen a head start.

OPEN EXPERTS

AN INTERNAL NETWORK

Since their creation in 2018, the Open Experts have occupied a special place at the core of the Mersen ecosystem. There are 23 of them today, chosen internally for their strategic technical knowledge and their ability to share it with others. Their work is structured around three areas ("Apply", "Do" and "Sell"), fostering knowledge sharing within the Group and the development of team skills.

ENERGY STORAGE

SUCCESSFUL UNIVERSITY COLLABORATION

Mersen's Holytown team and teams from the University of Strathclyde in Scotland have been working hand in hand to develop electrochemical materials for energy storage applications. The project was conducted within the framework of a company-university partnership aimed at bringing promising innovations to market more quickly. It has reaped several prestigious awards and enabled Mersen to strengthen its competitive position in a growing market.

"Our partnership grew out of a meeting with Mersen at a forum. We talked technology, and one thing leading to another, I came up with a proposal on how to improve the performance of Mersen felt grades for energy storage applications. We worked for two years within the framework of a skills transfer arrangement, with the clear technical and commercial objective of significantly improving the product approach to enable the Group to stand out from the competition. It was this operational dimension that guided us. By matching our research with the needs of Mersen's industrial customers, we were able to significantly improve the performance of the felt while remaining perfectly competitive."

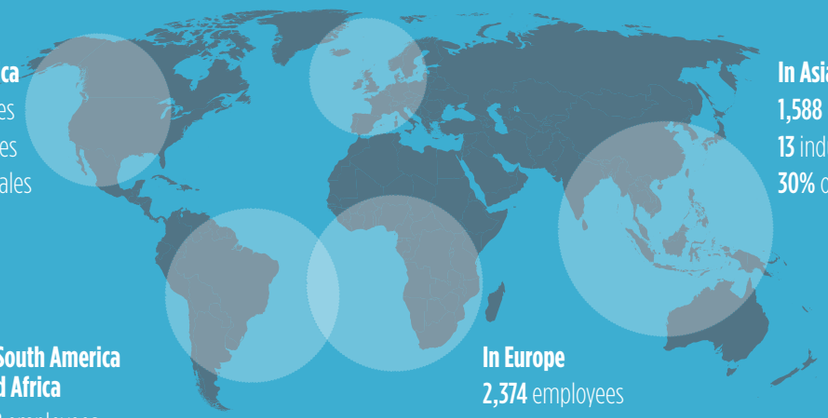
Dr Declan Bryans, Senior Research & Development Engineer

World expert in electrical specialties and advanced materials for high-tech industries

Key numbers

- 6,400 employees
- 35 countries
- 55 sites worldwide
- 16 R&D centers
- €847m in sales in 2020

Balanced operations **across the world**



In North America
1,950 employees
14 industrial sites
33% of Group sales

In Asia-Pacific
1,588 employees
13 industrial sites
30% of Group sales

In South America and Africa
522 employees
5 industrial sites
3% of Group sales

In Europe
2,374 employees
23 industrial sites
34% of Group sales

A leading player in its markets

#1 worldwide
- Anti-corrosion equipment
- Brushes and brush-holders for industrial electric motors
- Passive components for power electronics

#2 worldwide
- High-temperature isostatic graphite applications
- Industrial fuses

Operations for **124 years** in **Germany** — 1897

Operations for **115 years** in **the United States** — 1906

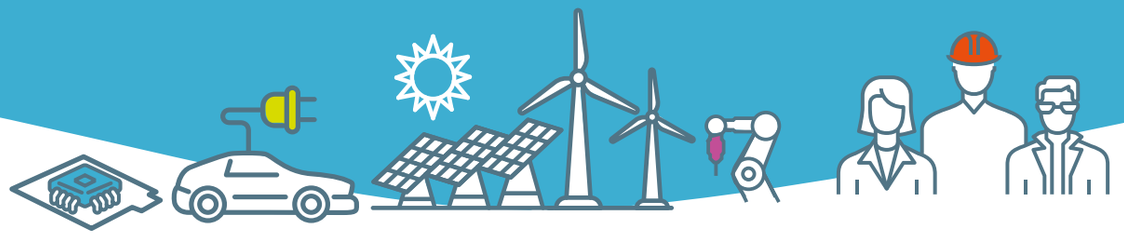
Operations for **82 years** in **Brazil** — 1939

Operations for **40 years** in **Japan** — 1981

Operations for **24 years** in **India** — 1997

Operations for **21 years** in **China** — 2000

A French group with **130 years** of existence, a pioneer on the international market



Increasingly strong development **in the markets of the future**

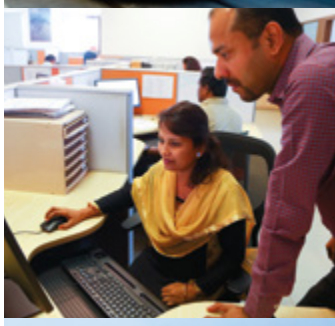
56% of sales in sustainable development markets (renewable energies, electronics, green transportation)

Industrial and R&D sites on a human scale

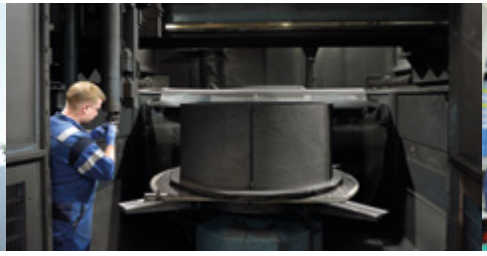
From **10 à 750** employees at each site
92 % of site managers recruited locally



Keep on moving with Mersen



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