



A leap forward.

Ideas and intuitions are not enough to leave an indelible mark in the vast global market. A leap forward is needed. A technology innovation that is, more than ever, open to the future, whose primary objectives are respect for people and the environment, starting from production processes.





6. Production Process

6.1 Designing innovation

The transport sector has to tackle the challenges posed by climate change and air pollution. Through its Research and Development activity, Brembo monitors the continuous evolution of the sector, directing research into the best braking system toward solutions able to meet the challenges of the future such as electrification, autonomous driving and digitalisation.

**3,211**

Patents, utility and designs models

**1,207** FTE

People employed in R&D activities

**100%**³²

Plants with IATF 16949 quality certification

Aware of the environmental impacts generated by the production processes typical of the automotive market, Brembo is committed to strengthening the development of innovative and carbon neutral products, convinced that purchasing decisions will be increasingly driven by environmental impact, but especially by the will to consolidate the change to sustainable mobility and reduce the environmental impact of the Group's entire value chain.

The activities promoted by the Group covers all brake system components (caliper, disc, pad, suspension, control unit) and guide Brembo in testing revolutionary solutions that can improve the comfort and environmental sustainability of products, as well as the application of a design that can combine functionality, comfort, durability and aesthetics. Therefore, the aim of the Group's research and development work is to:

- ▶ **increase braking system performance**, while ensuring maximum reliability and improving comfort through solutions

that can reduce braking action noise, vibrations and harshness;

- ▶ **prolong the life of Brembo's products**, while minimising disc and pad wear, in the framework of circular economy;
- ▶ **reduce the environmental impact** resulting from the use of vehicles in terms of greenhouse gas and particulate emissions into the air, through the reduction of the weight of Brembo's products and the control of the dispersion of braking-related dust, thus contributing to combating the climate change;
- ▶ **reduce the final weight of vehicles** using increasingly lighter alloys to obtain lightweight products;
- ▶ **enhance the style content** so as to offer products that can interpret concepts of prestige and elegance, thus becoming new status symbols.

The operating model, shared with the Environment and Energy area to reduce the impact on climate change by gradually

³² Net of the Zaragoza plant (Spain) and the SBS Friction plant (Denmark) which are ISO 9001-certified. It should be noted that the Carbon Factory will be certified by 2022.



neutralising GHG emissions, is now divided into the following action areas:

- ▶ Understanding of the impact throughout the production chain (Life Cycle Assessment)
- ▶ Definition of the project criteria (Process and Product)
- ▶ Involvement of the supply chain
- ▶ Energy efficiency and transition to renewable energy sources through contractual forms of Power Purchasing Agreements and an increase in the capacity to self-produce electricity

Firmly believing in the collaboration with the value chain and in order to improve its management approach to this issue, Brembo is involved in external initiatives by taking part to workshops, conferences, webinars. The Company participates in the Green Economy Observatory promoted by the Bocconi University of Milan; it also promotes experience-sharing activities among Customers and Suppliers such as meetings on climate change, which are promoted by trade associations such as Assofond, Confindustria, FIRE, ANFIA, and CLEPA.

The operating model rests on the accuracy of impact data gathering, opening up possibilities for developing a software capable of measuring impacts such as those linked to raw materials production.

Brembo reports information on GHG emissions through a special reporting process, in accordance with specific procedures. Furthermore, through the internal communication systems, such as the House Organ and Red Portal, the Group communicates the relevant information to all its employees worldwide, so as to disseminate an internal culture on these aspects. Any requests from stakeholders on the subject in question are referred to the CSR GCF, which deals with them by involving and coordinating the corporate functions concerned and following specific procedures.

Brembo's capacity to innovate and exploit its own expertise as a strategic lever for maintaining its technological and commercial leadership at global level can also be gauged by the patents filed by the Group over time. 3,211 patents, utility models and designs divided into 536 families have already been registered in the world in sixty years since its foundation. In 2021, the Group filed several patent applications for cast-iron brake discs and light brake discs, made possible by research, development and testing of unconventional solutions based on the study of shapes, materials, technologies and surface treatments capable of meeting the needs of next-generation hybrid and electric drivetrain vehicles or conquering new segments of the market. In 2021, 44 patents and 6 design models were filed, for a total of 50, in addition to 30 filed the previous year and 54 in 2019. In 2021, Brembo also registered 9 new trademarks, bringing the total registered since its foundation to 276, divided into 67 families.



3,211
patents, utility and design
models filed by the Group
since it was founded

Continuous innovation is the stylistic approach taken by Brembo to 100% of its products and processes, both existing and in development, with regard to quality and environmental impact, including through prior analysis of the relevant laws and regulations in force in the countries where the product will be marketed.

In addition, the Group uses the Life Cycle Assessment methodology to monitor the entire life cycle of products and processes, with the aim of extending it to all products and processes. Currently, several methodologies and software are



RADEGAST will produce for electric cars

Radegast is the Brembo project that in Ostrava, Czech Republic, is set to debut a new plant for the integrated production of aluminium calipers that is going to support and expand the current site, which has been operating for ten years. With new production standards and new cutting-edge performance in terms of sustainability with “zero emissions” and “paper free” targets, this plant will produce for the new electric platforms of customers such as Audi, Porsche, Mercedes, BMW and Tesla. Once fully operational, about 80% of the calipers produced will be fitted on the electric platforms of the world's leading manufacturers. This is what makes this new plant unique. The production integrated with painting started.





used to quantify environmental impact, including ReCiPe 2016. Innovation for Brembo is also a direct expression of the constant search for beauty and style in its products. Focusing not only on the technological profile, but also on the impact caused by

its shape and aesthetics, means becoming increasingly familiar with, and adaptive to, the various design guidelines of Brembo's customers, while ensuring consistency in the choice of the names and colours of the end product.



Brembo's Digital Lab

Brembo has set up the Digital Lab, in line with the digitalisation process undertaken by the Group to become a "Digital Company". This is a digital laboratory that is responding to the Group's mission to develop a "data culture", increasingly considered as a corporate asset for creating new business opportunities and supporting partners in the challenges of the new mobility.

The aim of the Digital Lab is to design and implement the digitalisation projects in which three new players operate: the "Domain Experts", "Data Scientists" and "Digital Project Managers". The projects will then be evaluated by the Global Digital Innovation Committee (GDIC) which will decide on which ones to implement and identify the priorities. Finally, the digital ecosystem includes the ICT GCF, which has the task of providing support through the entire infrastructure.

The new Brembo AppLogger App, available to all employees who have a company smartphone, is part of the Data Culture project. Once downloaded from the Brembo Workspace PlayStore and associated with the car, it allows to log data on braking, brake use and how brakes are used, completely anonymously. The aim is precisely to create an overall database of information that can be reworked and used in product design, helping to provide the data that feed the innovative processes that are taking shape in the Company.

6.2 Partnerships to improve the environmental impact of products

As indicated previously, innovation, for Brembo, aims to ensure not only increasingly cutting-edge products able to anticipate and meet the new needs typical of the automotive industry, but also products that allow the environmental impact to be improved, through:

- ▶ the design of products involving the use of low-impact materials and protections;
- ▶ the reduction of GHG emissions thanks to the use of light alloys allowing to limit braking systems weight;
- ▶ the reduction of particulates during braking, harmful for human health thanks to the use of technical materials and solutions;
- ▶ the development of smart products such as mechatronic components;
- ▶ the implementation and the development of structured Life Cycle Assessments, both on process and material level.

To improve the effectiveness of research in these areas, and in a perspective of open-innovation, the Group encourages collaboration, through networks and joint work projects, with other players in the automotive sector: Research Centres Universities both at Italian level (including the Milan Polytechnic, the University of Padua, the University of Trento, the Mario Negri Pharmacological Research Institute) and at international level (where Brembo collaborates with the Lund University and continues to partner with the Royal Institute of Technology in Stockholm).

Also important was the collaboration between eNovia and Brembo for electronic development and the development synergies that will allow both facilities to grow in the coming years. eNovia brought to the bicycles market an ABS brake system based on the concept developed and patented by Brembo Performance in 2016, whereas Brembo brought



electromechanical systems in which the electronic component was developed according to its specifications by eNovia to the racetrack.

With regard to the Aeronautics Project, Brembo — that has been certified by the EASA as a qualified developer and designer of complete brake systems and by the Italian Civil Aviation Authority (ENAC) to produce front and rear wheels — at the end of year completed all the activities.

In addition, Brembo subscribes to various coordinating organisations that promote industrial research in the automobile field, including AIRI (Italian Association for Industrial Research), ATA (Technical Automobile Association), Automotive SPIN Italia, CAAR (Automotive Cluster of Aragon Region), CLEPA (European Association of Automotive Suppliers) and the Lombardy Mobility Cluster.

In keeping with the previous year, in 2021 Brembo took part in the following joint research projects:

nPETS: the project with the acronym nPETS - *nano Particle Emissions from the Transport Sector* - has received funding from the European Union's Horizon 2020 Programme in order to understand and mitigate the effects of emerging emissions of unregulated nanoparticles on public health. The story that nPETS aims to communicate is the life of the sub 100 nm emissions from its creation to its potential path to human beings and animals. The nPETS consortium aims to improve the knowledge of transport generated exhaust and non-exhaust nanoparticle emissions and their impacts on health and finally how new public policies can reduce emissions and related impacts.

For further information: <https://www.npets-project.eu/>

SSM-STEEDER: STEEDER is the innovative apparatus that finally allows the market adoption of Aluminium and Magnesium up to 100% from recycle to manufacture high quality light components for a sustainable EU transport sector. The project involves the high-tech SME InnSight aiming at commercialising the innovations, with the SME Veltman and BREMBO.

For further information: <https://www.ssm-steeder.com/>

MODALES (MOfify Drivers' behaviour to Adapt for Lower EmissionS): this project is the clearest expression of Brembo's commitment over the past eight years in the field of non-exhaust particulate emissions produced by brake systems through European Union projects of the calibre of Rebrake, COBRA and LOWBRASYS. This project, in which Brembo takes part as a developing partner, involves analysing driver behaviour, not only as a consequence of the particulates emitted by brake use, but also with regard to tyres, exhaust systems and problems relating to maintenance and tampering. Once the behaviour

that has a negative influence on overall emissions levels has been identified, a strategy will be developed to guide drivers' behaviour to be more respectful of the environment around him.

For further information: <http://modales-project.eu/>

ENSEMBLE: the main goal of this project is to support the adoption of a multi-brand truck platooning in Europe, by working on standardisation, universal communication projects and international legislation. Improved traffic security, productivity, fuel savings and, overall, a direct positive impact on total emissions represent the immediate benefits connected with the implementation of this initiative. These benefits will be demonstrated by guiding up to six trucks of different brands in one or more platoons in real traffic conditions across national borders during the final event.

For further information: <https://platooningensemble.eu/>

EVC1000: the EVC1000 project seeks to further increase user awareness and acceptance of electric vehicles (EVs) by developing components and systems independent of the brand using an integrated in-wheel propulsion architecture and proposing an approach to managing EVs implemented on second-generation electric vehicles. The goal of EVC1000 is to exceed the ERTRAC efficiency targets for EV2030+, demonstrating a range of 1,000 km with a maximum of 60-90 minutes of additional travel time thanks to faster recharging, while also reducing costs by at least 20%. This would also make it possible to achieve greater convenience and comfort in long-distance trips. Brembo will contribute to achieving these goals by developing and supplying a Brake By Wire system that will include brake mixing strategies and other advanced features developed with the consortium to optimise regeneration and





residual resistance, thereby increasing the vehicle's overall efficiency and range by 10% in real working conditions.

For further information: <http://www.evc1000.eu/en/>

IMPROVES: a project to develop and validate high performance electric motors to be used in the next generation of braking and electric propulsion systems for electric vehicles. The project

meets the sustainability goals of the Group that has decided to invest in the production of electric motors with a potential significant impact on the environment, thanks to the reduction in fossil fuel consumption. The project, completed in 2021, achieved the result of having installed in Brembo plants a complete production line for the assembly of electric motors for the first time in Brembo's history.



The carbon-carbon brake system

Regarding the racing world, the “carbon-carbon brake system for racing applications” project (F1, LMP – Le Mans Prototype, IRL – Indy Racing League and Super-Formula) continued to focus on three strategic areas:

- ▶ production of carbon-carbon discs and pads with the new 2022 Formula 1 TNT disc, in addition to discs under production for the other categories;
- ▶ development of new systems — on the basis of the F1 disc — for the other categories as well; launch of new research activity relating to the architecture and fibre used in the F1 discs and pads, with pad research on mechanical, thermal and friction characteristics;
- ▶ development of new carbon ceramic discs for extreme road applications for both cars and motorbikes.

In the area of carbon ceramic discs destined for road applications, production with CCMR carbon ceramic brakes was launched for a specific customer's vehicle that offers racing-like performance. This vehicle will be in production for around two years, for a total of over 2,500 vehicles, with a significant increase on initially forecast figures.

Moreover, the testing approval process was completed both internally and by the customer on a new CCMR braking system conceived for vehicles with extreme “racing-like” performance. The vehicle will enter production in the first months of 2022.

6.3 The results of innovation

The automotive market has embarked on one of the most important revolutions in its history, which could radically alter the concept of the car and its use. A profound transition as a mark of the new electric drive systems, autonomous driving and integration of different vehicle systems, where the car is increasingly more able to carry out independent actions and provide assistance to the driver in real time. In particular, over the next few years we will witness a sharp increase in cars fitted with hybrid and electric motors in response to the new European regulations.

This is a revolution for which Brembo has been preparing for almost twenty years, due to an ever-greater focus and investment

spending on electric braking system and mechatronic product research and development. Over the course of 2021, Brembo continued in this direction with the official presentation of SENSIFY™, the latest development in the research work on the braking system with by-wire technology.

SENSIFY™ is a new pioneering intelligent braking system that integrates the most advanced software based on artificial intelligence with the Company's brake components.

SENSIFY™ is the natural evolution of Brembo's experience and know-how. It combines the design of the best braking components with the integration of a digital control system and sensors that manage each wheel independently. The result is



more precise driving of the car, an increase in performance, confidence and, ultimately, a unique driving experience in total safety.

Thanks to the optimised braking action on each wheel, combined with the absence of resistance between pads and discs that minimises emissions, SENSIFY™ is a more sustainable braking solution.

Accordingly, on the one hand, integration with the regenerative systems optimises energy use in hybrid and electric cars; on the other, in the more “traditional” combustion engine car disappearance of the phenomenon known as ‘residual torque’, caused by intrinsic and unwanted friction between disc and pad outside the braking phase. This causes the car to brake, albeit imperceptibly, increasing its fuel consumption and as a result its emissions. This technology provides car drivers with increasingly higher safety standards, thanks to a significant reduction in stopping distances compared to a traditional system, and unprecedented driving comfort, the result of the system’s capacity to ensure braking that can automatically adapt to the vehicle’s load conditions, whilst maintaining constant stopping distances.

SENSIFY™ combines the current Brembo product portfolio of calipers, discs and friction materials with digital technology and artificial intelligence to create a flexible and revolutionary platform that includes software, predictive algorithms and data management to control the brake system digitally.

With SENSIFY™ the braking system is no longer simply a sum of its parts but an ecosystem, where artificial intelligence and software play an active role. Data collection is leveraged big data to improve the driver experience and allows the system to be constantly updated.

SENSIFY™ comes from the fusion of two words: SENSE, or the ability with which a person perceives an external signal, a stimulus and SIMPLIFY, which indicates the simplicity in installing the product in harmony with the vehicle. Therefore, SENSIFY™ constantly delivers the best of two worlds: driving pleasure and total safety. It is intuitive, responsive, stable and gives the driver the expected performance when needed, combined with exceptional control.

Today Brembo also extends this technology to the motorbike sector and to three markets in the racing sector: from 2024 Formula 1 and Formula E (from 2018, on one customer and from 2023 on all customers) and from 2023 also to the Le Mans

category (LMH). The advanced systems with By Wire technology for racing are characterised by the same safety concept that allows a return to traditional pedal braking in a very short time, performed by the driver if there is a fault on the by wire system.

Brembo’s commitment to increasing its presence in the scooter market has taken concrete form with the launch of six different projects for two important customers, with design work to take place in Italy and manufacturing in India.

The search for new markets in the field of high performance two-wheelers also continued: benchmarking has been carried out with currently mass-produced products thanks to which a product specification has been defined, as well as a market to enter. The design activity is continuing in order to have the first prototypes available by May 2022. In this area, collaboration with the new players entering the electric vehicle sector becomes a strategic priority for the Group which has received a mandate to supply the brake system for a commercial electric vehicle from a major American manufacturer. The planning and industrialisation phase for the production launch has started and the project would result in Brembo being the first company in the world to enter into production in 2022.

Mechatronics and system integration entail the development of new components for Brembo’s products, including sensors, mechanisms and electric motors. Brembo is therefore coordinating a group of companies based in the Lombardy region within the framework of the funded project “Inproves”, with the aim of creating brushless motors based on permanent magnets offering very high levels of performance, specifically designed for the brakes of the future. The first prototypes of motors designed by Brembo for its By Wire actuators were created in 2019, while a prototyping line for these motors was built in 2020. The project was officially concluded, with a view to extend the activities performed to specific future projects for Brembo.

In addition, Brembo continued to conduct R&D activities in cooperation with international Universities and Research Centres with the aim of constantly seeking out new solutions to apply to brake discs and calipers, in terms of new materials, innovative technologies and mechanical and electronic components. The need to reduce product weight is leading the research function to evaluate the use of unconventional materials, such as technopolymers or reinforced light metal alloys, to produce structural components.





Another initiative in this area is Brembo's investment in Infibra Technologies, a spin-off of the academic institution Scuola Superiore Sant'Anna in Pisa, specialised in developing photonic sensors through the use of fibre-optics as the sensor element.

With reference to the Systems GBU, the goal of using the braking system to help reduce vehicle consumption and resultant CO₂ emissions and particulates is being pursued through the development of new solutions. In detail, the use of methodologies to minimise caliper mass for the same performance, the improvement of caliper functionality by defining new characteristics for the pairing of seal and piston and optimisation of a new-concept pad sliding system continue to feature among the main areas of development.

After consolidating the technical solutions for fixed calipers, resulting in the assignment in 2019 of a share of the business relating to a platform of fully electric vehicles created by a major German manufacturer, the Group's focus shifted to the study and application of floating calipers for commercial vehicles. The concept approval phase was successfully completed and the product, which represents the current state of the art, was proposed in the first half of 2020 to a major European customer for the renewal of its range of commercial vehicles.

Overall, the main areas that reflect the Group's capacity to develop new generation brake systems are as follows:

Discs and calipers



In the area of brake discs for cars and commercial vehicles, at the end of 2020 Brembo presented its Greentive[®] disc, the result of the experience it has acquired in the field of brake systems, and particularly of the know-how and expertise gained through the European LowBraSys project.

The Greentive[®] disc is characterised by an innovative coating applied to the cast-iron braking ring, which ensures very low wear and tear, extends disc life and, combined with a friction material specifically developed, also reduces particulate emissions during braking, and hence the impact on the environment. Another distinctive quality of Greentive[®] is its high resistance to corrosion which, in addition to maintain unchanged the aesthetics of the

disc in different situations, is particularly appreciated for the new generations of electric vehicles, characterised by different use of the brake system.

In 2021, application development was intensified with a major German manufacturer for the supply of the Greentive[®] disc paired with brake pads developed specifically by Brembo Friction for high-performance applications, in particular for the premium and luxury segment vehicles. Production is set to begin in 2022, while the development phase continued in parallel with other major car manufacturers.

The Greentive[®] disc encompasses cutting-edge technological solutions and is merely the first step in Brembo's product roadmap for brake discs in pursuit of environmental sustainability, with increasingly green products. The release in the coming years of a European legislation that will regulate the emissions of fine particles from braking systems helps to further strengthen Brembo's activity in the research, development and testing of other solutions to be applied to cast iron discs through the study of materials, technologies and surface treatments in collaboration with European research centres and suppliers.

In line with the automotive market guidelines, the Group has also continued with studies researching into new geometries that would allow a significant reduction in mass and an improvement in disc performance, also from the environmental standpoint, an aspect that has become even more important with the entry into force of the new European regulation on the reduction of CO₂ emissions for car and vehicle manufacturers. 2021 also saw the Group engaged in developing and testing new non-conventional solutions to be applied to cast iron discs and the new generations of "light" discs through the study of forms, materials, technologies and surface treatments in collaboration with research centres and European suppliers designed to meet the needs of hybrid and electric vehicles, which use regenerative braking and thus introduce new requirements for brake discs.

Regarding commercial vehicle applications, Brembo continued to develop a new light disc solution that reduces weight by up to 15%, thanks to the combination of two different materials. In particular, it is due to this solution that Brembo has been chosen as the brake disc supplier for all the new generation rear-drive cars produced by a leading German customer. The new light disc has also been successfully developed for other



important manufacturers, which are already using it in some of their models. The light disc continued to attract the interest of other customers, not only European, including new players who have entered the electric vehicle market.

The development of street motorbike discs made with new materials and new surface treatments continued. In particular, prototypes have been launched for the “lightweight” metal disc and the coated disc is being tested. Both products are currently in the process of concept validation.

For the new product range created for the Indian market, the four-piston front caliper and the handlebar master cylinder were added; their design was defined and the validations for the first prototypes for mass-produced permanent mould casting are ongoing. In addition to its uniform design, the entire new product range has been conceived to be able to be customised according to the needs of motorbike manufacturers, combining, once again, product high quality with an innovative design.

With reference to caliper product range, the product and process improvement work continued in the same way as the search for solutions to reduce mass, optimise performance and improve styling.

Two examples of this continuous improvement aimed at providing solutions that are the reference for the high-performance market

are the Dyadema™ caliper, which was designed with the goal of considerably reducing track operating temperatures, and the Flexira™ caliper, developed to meet the needs of several new market segments.

In keeping with this vision, development continues for the Company’s patented Brembo Semi-Solid Metal (BSSM) casting technology, which maintains equal performance while enabling a reduction in weight of 5 to 10% in relation to caliper geometry. Concept approval is currently underway, whereas validation of small-series production process is expected by the end of 2022.

In the racing market, an F1 team started 2022 season with a new caliper concept with embedded sensors for both axles following the positive feedback during use on the track in several testing sessions conducted in late 2020.

The new caliper with embedded sensors, combined with electronics installed on the vehicle, will allow braking torque to be read continuously.

Finally, the Group continued to invest in the search for low environmental impact materials for the “low emission” line and, accordingly, the approval process for an alloy that uses completely recycled aluminium is underway. Production of fixed calipers using recycled aluminium is expected to begin in 2025 with a major European manufacturer.



Pads



The structure dedicated to the study and production of brake pads, called **Brembo Friction**, is now a well-established, stable reality, in constant expansion and focused on ongoing product improvement in accordance with the company philosophy of innovation and technological development. Friction materials – increasingly flexible and designed to meet individual clients’ various needs – represent a specific, reactive response made possible by the synergy of the work carried out by the R&D GCF and the other CBU and GCF. One example is the joint effort to develop new friction materials suitable for the production of pads for electric parking brakes or to be paired with new applications that involve the use of discs that are much lighter than standard but offer a high level of heat and mechanical

resistance. The search for innovative friction materials also embraces the development of new environmentally friendly solutions with an increasingly limited environmental impact.

The know-how and capability gained within the Brembo Friction project represents a strong point for the Group in achieving the goal of developing the simulation capacity of the complete braking system, including friction material.

Finally, the advanced technology in the automotive field has paved the way for the development of a new brake pad concept with embedded sensors that aims to make the braking system increasingly integrated within new vehicles. Thanks to the use of specific sensors embedded in the friction material, the ongoing tests performed show that real-time measurement of braking torque is possible. At the same time, the industrialisation process of this new brake pad concept has been launched.

Brembo’s capacity to achieve significant results in all areas where the Group is committed to product and process innovation is the result of:



the work of 1,207 Full time equivalent
People engaged in research and development activities



more than 20 years
of refining the **Brembo Project Development System** methodology which structures phases, roles, responsibilities, controls and tools for the innovation management process



To learn more
Greentive®

<https://www.brembo.com/en/sustainability/esg/environment/innovation>



To learn more
Enesys, Energy Saving System®

<https://www.brembo.com/en/sustainability/esg/environment/innovation>





Life Cycle Assessment

Brembo looks to a future in which the Life Cycle Assessment methodology will also be extended to all products and processes, a study that allows the potential impacts on the environment and human health to be quantified, starting from the consumption of resources and carbon dioxide emissions.

Projects such as AFFIDA and LIBRA flow from Brembo's increasingly close focus on the environment.

AFFIDA, the natural extension of the COBRA project (which was part of the European Life+ project), in collaboration with the Mario Negri Institute, seeks to bring to the OE market the innovative technology of inorganic binders, having a key role in reducing volatile organic compound (VOC) emissions, with important positive repercussions for the environment. The new materials reach performances on a par with their traditional predecessors, while also meeting the high-performance standards required by the most challenging sporting applications and guaranteeing low fine particulate emissions and a lower consumption of resources. The innovative technology, completely different from the traditional production technology, has now successfully passed the prototype pre-industrialisation phase, thanks to a press created with ad hoc technology, and the specific improvement activity as regards NVH has been started.

The LIBRA project, which has been ongoing since 2015, eliminated the steel backing plate in brake pads, replacing it with high-performance composite materials. Research of new raw materials and technologies continued to be developed as the advantages are clear: from a lighter pad, with the resulting reduction in the overall brake system's weight, to a shorter production process. In this case as well, an innovative press fully devoted to manufacturing these specific pads was installed as early as at the end of 2019 to prepare for mass production of the product. A new short-term goal is to transfer the innovation and technology applied to these pads, now used for parking, to rear brake pads.

The product life cycle is digitised by the Product Development Methodologies area, which aims to link data from different departments (Digital Thread) uniquely and indissolubly, ensuring traceability and distributing the data securely to all internal stakeholders.

Innovation in Brembo comes through design, becoming the success story of a brand known worldwide.

"Brand reputation" or ("company reputation") is a fluid concept which refers to several aspects such as the ability to attract and retain talented individuals, social responsibility towards the community and environment, the degree of innovation, the quality of products and services, the use of company resources, financial solidity and the value of investments. It is nonetheless possible to identify a common element which connects these aspects to brand reputation: namely customers' expectations towards the brand. Brembo's goal is precisely to consolidate trust in the brand to the extent that consumers expect that the products and services offered will also be of quality.

Product brand and design share the same spirit: innovation. Design innovation means strengthening the identity of a product so that it becomes recognisable even in the absence of the brand, thus conveying a message of innovation and value.

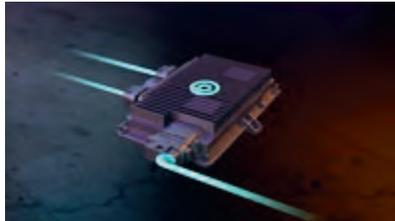
If a car's design is often one of the reasons for purchasing it, then Brembo has a part to play in determining the car's particular character. Brembo is an industry leader also due to its focus on brake system aesthetics. Technology and innovation, excellence in braking performance and style have made it the market leader for 60 years. Technological innovation and design render the vehicle unique and can be summed up in the phrase that accompanied the award of the Compasso d'Oro award in 2004: "If it wasn't a brake, it would be a sculpture worthy of any modern art museum".

In 2019, Brembo reinforced its unique nature and attention to detail by launching Brembo Style, a think-tank where styles, approaches and methods fuse technology, style and design into a new aesthetic language that strengthens the brand's identity.





The product and process improvement work is constantly ongoing in the same way as the search for solutions to reduce mass, increase performance and improve styling.



Brembo presented **SENSIFY™**, a new braking system that integrates the most advanced software based on artificial intelligence with the Company's brake components. Fully in line with the company's "Turning Energy into Inspiration" vision, SENSIFY™ enhances the on-road experience and customises the brakes' response to their driving style, offering driving pleasure and total safety. In fact, the new product combines the design of the best braking components with the integration of a digital control system and sensors that manage each wheel independently. This system, combined with the absence of resistance between pads and discs, minimises emissions making SENSIFY™ a more sustainable braking solution.



Brembo adds to the GP4 brake caliper family the new **GP4-MINI**, designed specifically for motorbikes used on the track by the younger generations, tackling international circuits with the same technologies used in the higher categories.

This new aluminium two-piece, 4-piston, radial mount, billet caliper has an extreme design inspired by some of the styling cues also used on the calipers of large displacement supersport models. It also incorporates the characteristic elements of the prestigious GP4-MS, with ribs between the central bridge, which embrace the pistons and give rigidity to the system, to the benefit of consistent performance on the track. The hard oxidation finish treatment gives strength and performance even at high operating temperatures.

Particular attention has been paid to the study of the internal ducting, to ensure optimal system bleeding. In addition, the amount of fluid inside the braking system has been reduced, resulting in more consistent performance and a very direct and linear feeling of lever travel and braking power. This characteristic is crucial when braking on the track with the bike in the crease.



Brembo has made the new **ventilated disc** available to the teams participating in the 2021 Superbike. This disc's characteristic feature is precisely the ventilation that aims to increase heat exchange and hence improve disc cooling. It is a solution designed specifically so that the teams can use it on circuits that are very hard for the braking system such as Donington, Barcelona and Magny Cours. The adoption of a double diameter option combined with different thicknesses, four in all, will allow teams and drivers to have a wider choice to be able to optimise braking system temperatures and thus performance, depending on the difficulty of the rounds.

Brembo has officially presented the new braking system for the 2021 Moto3 World Championship.

The new monobloc caliper in aluminium machined from billet with a radial mount with two 32 mm diameter pistons and features external radiant fins with the aim of increasing heat exchange. The design recalls the appearance of the new GP4 caliper thus reinforcing the **family feeling** of the product.

The new steel disc is characterised by a reduction in band height that allows a reduction in disc weight with the aim of limiting the unsprung masses and particularly the rotating masses; the braking system weighs 2000g less than last season's system. In addition, one of the great product innovations is the introduction of the wheelbase gearbox system, developed with the RCS master cylinder for road motorbikes and now also introduced in the two-wheel Racing world.





Brembo Stile

“Brembo Stile” was presented at the Frankfurt IAA (International Motor Show) in September 2019 with a large video installation at the Group’s booth. Set up as a part of the Marketing GCF, Brembo Stile acts as a home to the knowledge and experience gained by the Group thus far in the style arena. A key partner for the customers with which Brembo has been collaborating for years in developing new projects, Brembo Stile is the place in which to increasingly define the brand’s identity through product design.

Planning a Brembo Stile project involves a number of activities and divisions: from market to style research, from surveying customer needs to celebrating innovative aspects, from the values and positioning to convey to identifying the language to be used, in terms of colours, offerings and even names. Only in the past two years have the Stile projects managed by the Group involved the Systems GBU (Mazda, Infiniti, Volvo, Lamborghini, Jaguar Land Rover, as well as the specific product Enesys®), the Motorbikes GBU (Stylema, Bybre, Harley Davidson and Ducati), Performance (RCS Corsa Corta and GP4-MS caliper) and the Discs GBU (Jaguar Land Rover, as well as the specific product Greentive®).

In 2020, Brembo received the second ADI Compasso d’Oro award for the rear caliper used in the Formula E championship, in addition to the one already received in 2004. Conceived by Gio Ponti in 1954, the Compasso d’Oro has today become the most prestigious design award at world level. From this year, two Brembo Compasso d’Oro awards are exhibited in Milan at the ADI Design Museum, the new design hub that houses the historic collection of industrial products which received said award.

Brembo carbon-ceramic makes its debut on the new Cadillac

The Brembo carbon-ceramic system also debuts as an option on the new Cadillac CT5-V Blackwing and marks a brand-new innovation for the American company’s V models.

As standard, the new CT5-V Blackwing is equipped with a Brembo braking system with high-performance cast iron discs and uses a 6.2-liter V8 engine delivering 668 horsepower that allows it to reach 320 km/h and be one of the best performing Cadillacs ever. The exclusive new bronze colour of the large calipers, also available in grey, red, blue and visible through the wheels, helps to emphasise its refined look.

A further innovation, which also concerns the CT4-V Blackwing, concerns vehicle parking. On both models it will be enough to press a button to activate the Brembo electric parking brake (EPB), which eliminates the need for the traditional handbrake.

With this project Brembo is continuing along the path of becoming a respected Solution provider, in line with the new mission of the Company, responding to the new paradigms of sustainable mobility and offering the best driving experience.





6.4 Listening to customers for product improvement

For Brembo, the creation of value also relies on collaboration and ongoing discussion with the main manufacturers of vehicles equipped with its brake systems: a daily relationship allows to understand and anticipate partners' future needs and promote the joint development of new solutions in technological areas that have yet to be consolidated.

It is equally important for the Company to establish constant dialogue with the end users of vehicles equipped with its products, in order to understand to what extent Brembo's solutions meet their expectations and what aspects can be further improved, particularly with regard to perceived quality and comfort.

The annual analyses of data relating to issues encountered by drivers in certain key markets during brake use are particularly important tools in this context. The Group uses, amongst others, the "Initiative Quality Study" and "Vehicle Dependability Study" monitoring research, published by J.D. Power. These studies

cover drivers in the first few months after buying a new vehicle, as well as those using vehicles from one to three years old, and reveal the main braking system issues.

In addition to monitoring the quality and comfort perceived by users of Brembo solutions, the Group also involves end customers in its processes to develop new products. In 2021, with the easing of restrictions due to the pandemic, Brembo returned to participate in trade fairs. In particular, the new GP4-MINI caliper was presented during EICMA, the international two-wheeler exhibition. This is specifically designed for the motorbikes used on the track by the new generations, who are racing to become the riders of the future, tackling the international circuits with the same technologies used in the higher categories.

Other important opportunities for making contact and engaging with the Group's clients include its Tech Days, such as the ones held in Brazil, designed to reveal 'another side' to Brembo, which differs from the one clients usually encounter, highlighting



more than
1.5 million fans

for the Brembo brand
Facebook page, who
have generated almost
2 million interactions



over
725,000 fans

for Brembo's
Instagram profile



over
174,000 followers

for Brembo's
LinkedIn profile



over
30,000 followers

for Brembo's
Twitter profile



over
78,900 followers

for Brembo's WeChat
profile (China)



over
25,100 followers

for the Weibo
profile (China)



everything that goes into making Brembo a global leader in braking systems.

In 2018 Brembo also participated in the “ADI Impresa Docet” event cycle, organised by Scuola del Design, in collaboration with the Design Department of Politecnico di Milano, Polidesign and ADI, intended as an opportunity for dialogue and discussion amongst design students, businesses and professionals in Italy. On this occasion, Brembo contributed its experience as a company capable of making product design the foundation of its competitive advantage, presenting the main challenges overcome over the years to turn a project into a successful product. In other developments relating to the association ADI, Brembo was added to the ADI Design Index for the design of its new Formula E caliper, which stands out for its distinctive, dynamic and sporty aesthetics, consistent with the style of the vehicles for which it was designed.

Other important moments in terms of contact and engagement with the Group’s clients included some virtual days and meetings

organised in 2021 via the new Brembo Next platform, designed to share Brembo’s new vision and mission.

Brembo is also in contact with its customers’ style centres and designers, with which it often collaborates to set the design guidelines for its new products. In recent years, this has been accompanied by participation in the prestigious Car Design Award organised by the magazine Auto&Design, a prize bestowed on outstanding projects in the automotive design sector. The winners were given trophies specially designed and manufactured by Brembo: in 2021, the trophies consisted of a section of the Greentive® brake disc, a disc known for its sustainable characteristics and its aesthetic value.

In addition, this year Automobili Pininfarina has also chosen to rely on the innovative design and undisputed technology of Brembo brakes. Through this partnership, the Battista is the world’s first electric hypercar to use Brembo CCM-R carbon ceramic discs, which increase the enormous performance potential of this Italian masterpiece.



Brembo’s commitment to connecting with the new generations

In 2021, Brembo wanted to expand the dialogue with the new generations through an important initiative dedicated to the end users of tomorrow: Brembo becomes official partner for the braking systems of Playstation Gran Turismo™ 7. In fact, this partnership will strengthen the relationship with young people and its brand identity, in line with the “Turning Energy into inspiration” vision.

More specifically, Brembo will make its “upgrade” products available to players in Gran Turismo™ 7’s Tuning Shop, the virtual store where the car’s performance can be boosted. In this environment, gamers can start by replacing the original equipment brake discs with those of the Sport range and, progressing in the video game, develop their car with different Brembo braking systems, until the best performing and distinctive products for road cars, including the Carbon Ceramic brake discs and GT | BM calipers, available in eight different colours.

In addition, players will be able to get to know and take an interest in the Brembo company: in fact, they will find the Company’s profile and values in the Brand Central of Gran Turismo™ 7 and the Brand’s 60 years of history in the Brand Central Museum.



The New G Sessanta caliper: bridge between past and future

The New G Sessanta caliper combines past and future, history and new corporate vision, and is inspired by the first brake caliper produced by the Company, in 1972, embodying at the same time Brembo's new vision of mobility. A solution in dialogue with the new generations that, through light, combines the suggestion of colour with innovation and customisation.

The core of the concept lies in the revolutionary application of LED technology directly on the body of the caliper. This solution is adaptable to every application and type of caliper, and enhances its form and function: it can be both an interface, communicating directly with the user, and an aesthetic choice, adapting to the user's tastes and preferences. The project is a concept designed to be personalisable, by using wireless technology, when the vehicle is at stop, to control the desired shade of light to express mood, enhance the style of the bike, or adapt it to the surroundings. The use of colour and light also has the potential to enable data and information to be sent on the conditions of the vehicle and the caliper itself, or even help localise a parked vehicle by emitting a courtesy light. If the New G Sessanta shapes evoke the first ever brake caliper produced by Brembo, in 1972 for Moto Guzzi, the name wants to celebrate its designer at the time, Gianni Gotti, who joined Brembo in the early days, in 1971, and who then accompanied the company's growth for decades.



The Group is committed to the constant development of digital channels for contact and communication with its customers and end users. The Group's ecosystem of websites and the monitoring of the most popular social network platforms are both important in this area.

The key element of Brembo's ecosystem of websites is represented by the corporate website www.brembo.com that saw further improvements to all the main performance parameters in 2021. The number of unique visitors has grown by 11% compared to the previous year. In 2021, the number of new content postings on [brembo.com](http://www.brembo.com) website — constantly being updated both from a structural standpoint and to enrich the content available — reached 122 new content postings (1 new content every 3 days), thereby increasing the information offered on the site's pages.

It should be noted that website visitors are increasingly "mobile" as 4 out of 5 connected to the website through a smartphone or a tablet. The site seeks to communicate with all stakeholders in

the relevant market sectors (Cars, Motorbikes and Performance), presenting the Group's global activities, product ranges and all market information to users the world over. It also offers a general overview of the Group's history, growth and constant research.

Brembo Group's other sites also grew compared to the previous year, with more than 9 million total unique visitors. The organic growth of the various sites of Brembo's ecosystem has to be added to the traffic generated by two additional sites launched during the year: the Revelia e-commerce website (www.brembostore.cn) and the www.sensify.brembo.com website. Revelia is an e-commerce website dedicated to the Chinese market that, after being launched last spring, registered over a million unique visitors in just 9 months. The Sensify website launched during the month of October, is a site dedicated to Brembo's new pioneering intelligent braking system that combines the best of two worlds: driving pleasure with total safety and totalled over 58,000 unique visitors over the course of just two and a half months of activity.³³

³³ The analysis currently does not include the websites of the AP Racing, SBS and J.Juan foreign companies and brands.



Similarly to what was seen on web channels, Brembo continued its positive performance on social media as well, where the number of its followers on the seven main channels (Facebook, Instagram, LinkedIn, We-Chat, Twitter, Douyin and Weibo) increased by 9% in 2021, although with different trends reported by the individual social platforms. At the same time, 2021 witnessed an increase in content production (+9% compared to 2020) and the overall engagement level (+62%). It bears emphasising that the level of engagement with its followers, i.e. the brand's ability to stimulate conversations and constantly offer a good reason to talk about and interact with the brand, should be considered one of its most valuable intangible assets in the current knowledge economy environment. During 2021, more than 9,000 contents in total were developed and published on all the social platforms on which Brembo is present. Brembo's social profiles are mainly directed at a young audience, distributed uniformly between Europe, the USA and

Asia and with the aim of further increasing communication activities directed above all at GenZ.

The brand follower audience on the most popular platforms, Facebook and Instagram, is divided quite evenly between America (43%), Asia (31%) and Europe (26%). A distribution that reflects Brembo's global approach.

From an age point of view, more than 70% of the Company's followers on Facebook and Instagram are under 34 years old, a figure that suggests that Brembo is also well positioned in the younger generation segment. The aim is to further expand the audience of young and very young people, in line with the Cool Pillar strategy, which aims to attract the future generations to Brembo.

With this in mind, in 2021 Brembo opened its channel on Douyin in China (known outside of China as TikTok) and rapidly saw its follower base grow to over 32,000 units in the matter of just a few months.

| No. of followers in 2021 | | | | | |
|--------------------------|-----------|----------|---------|---------|--------|
| Facebook | Instagram | LinkedIn | Twitter | We-Chat | Weibo |
| 1,545,557 | 725,717 | 174,820 | 30,689 | 78,904 | 37,512 |

| No. of interactions in 2021 | | | | | |
|-----------------------------|-----------|----------|---------|---------|-------|
| Facebook | Instagram | LinkedIn | Twitter | We-Chat | Weibo |
| 1,096,838 | 7,997,183 | 51,142 | 27,143 | 7,295 | 9,955 |



Revelia: Brembo's platform dedicated to end consumers

Revelia is the online platform that allows Brembo to interact directly and in an "informal" way with its customers using a single point of access and end-consumer-oriented content, thereby offering a unique customer experience. Revelia also hosts Brembo's first independent online e-commerce store, which enables end customers to directly purchase the Company's products. Brembostore.cn has been online since 31 March 2021 and targets all automotive and Brembo brand enthusiasts in China who desire to choose on their own the Group's aftermarket products, from brake discs to pads and brake fluid, deciding whether they need the help offered by the platform's "Customer service". Revelia has been conceived with a view to integrating Brembo High Performance Kit and Motorbike AM products, Brembo's innovative services and all that may interest end consumers, thus acting as a Solution provider. The platform marks Brembo's debut on the B2C market. The Group plans to extend this service in the next two years, covering also Europe and Asian-Pacific countries and regions, from Australia to New Zealand, southe-astern Asia and Japan.





6.5 Creativity and method: ensuring product safety

The drive for innovation and continual improvement of its production processes have always been distinguishing features of Brembo's assets. Thanks to the research and implementation of cutting-edge solutions, the Group is able to meet the many difficulties of integration and direct management of all the braking system's main production phases, starting with raw material processing in the foundries, moving through product machining and assembly, and then always ensuring that products are promptly distributed to customers in the various geographical areas where the Group operates.

Following a preventive and proactive approach, Brembo is committed to applying the voluntary technical standards that national and international standards bodies develop to define in detail how to produce excellent products and align its own production processes with best practice, guaranteeing safety, quality, respect for the environment and certain performance. All Brembo products have to pass controls and checks designed to ensure their quality and safety, following a logic of ongoing improvement, which makes an essential contribution to increasing the ability to meet all requirements, as well as process efficacy and efficiency, both within the Group and throughout the supply chain. From this standpoint, every problem identified and resolved for a specific product is then extended, on the basis of a "lesson learnt" approach, to the entire Brembo product range, where applicable.



Family Feeling

Family feeling is recognition at first sight. Creating family feeling in a product means endowing it with visually recognisable elements allowing it to be instantly associated with the brand they belong to. Similarly to what happens in a family, every single member — each product — shares some features with other members, such as the colour and the shape, as well as some common elements of cohesion and quality. Adopting this approach requires the engagement of customers from the very early stages of project development, to decide with them the main features of a product's design, colour and style. Once any product and process-related criticalities which have a potential to impact the product's look and design have been analysed, corrections are implemented just before the beginning of the

start of production. This phase is managed by the R&D GCF in collaboration with the Marketing GCF to ensure that the most significant content is highlighted also during the new product development phase.

> The tests



During the development and technical approval stage, each product is subject to tests, carried out in different operating conditions. These are tests designed to define product quality, performance and efficiency and are performed in type-approved laboratories, as well as on the road and racetrack. This process follows a rigorous sequence that includes static bench tests, dynamic bench test cycles and then on-road tests. These three steps are needed to ensure that the products meet the relevant requirements, to identify any discrepancies with the quality standards pinpointed during the design phase and to test the braking systems in operating conditions similar to actual usage conditions.

The static bench tests represent the moment when design, testing and production come together; in order to check that design requirements are met, the prototypes are subject to load, pressure and braking torque cycles, superior to those physically applicable on the vehicle in various ambient conditions in terms of temperature, humidity and corrosion.

The dynamic benches, by contrast, are used to replicate vehicle dynamics through a combination of mass and speed. The checks carried out regard efficiency, functionality, resistance and duration, and also use loads that are greater than operating ones in accordance with appropriate safety coefficients. To reduce development times, these benches, developed by Brembo, in collaboration with qualified suppliers, operate 24/7 thanks to sophisticated control systems. They are able to simulate all vehicle operating conditions both on the road and racetrack, for any type of vehicle. Comfort is also tested on dynamic benches and is measured based on three characteristics defined in the acronym "NVH" — Noise Vibration Harshness: the lower these three elements, the more silent and vibration-free the braking. In addition, Brembo has two roller benches for cars, motorbikes



and light commercial vehicles, where vehicles can reach 250km/h at temperatures between -40°C and +40°C. These are test booths which simulate road tests in all conditions in terms of temperature and humidity.

However, it is the final on-road vehicle tests that allow Brembo to achieve excellence. In fact, the products approved on the various benches are mounted on car prototypes supplied by the manufacturers. An internal team, consisting of expert inspectors, carries out all the tests necessary for testing brake system performance, comfort and durability. The inspectors trained by Brembo have a broad-spectrum profile that allows them to cover functions ranging from prototype assembly to data analysis, and thereby provide a subjective assessment supported by the measurements carried out. The tests carried out include superfading, which involves a suitable braking sequence, from high speed to speed kept at zero in full load conditions, the subjective comfort and feeling assessment, carried out by drivers who have an in-depth knowledge of the vehicles and products, and the efficiency tests on wet and dry terrain. These tests are shared with the client and logged into a list (DVP – Design Verification Plan). The test procedures used to determine the fulfilment of customers' product specifications are logged by means of the BTS (Brembo Testing Specification). In 2021, there were 501 BTSs in place.

The entire test system falls within the solid Project Management (BPDS - Brembo Project Development System) process, known as "Butterfly". This management system is based on Project Management, a structured method that, focusing on the principles of planning, coordination and control, enables to develop and follow a new project in all phases of its evolution. By planning and managing specific inspection moments (so-called "gates") and handling any recovery plans, the Butterfly system makes it possible to verify the suitability and completeness of the activities carried out, guaranteeing that the mass-produced products fully comply with the set requirements.

During 2021 the Project Development System underwent a



- ▶ The Brembo Group is associated with the **Italian Standardisation Body (UNI)** and complies with the technical standards of the British Standards Institute.
- ▶ The Group also works with the **National Unification Commission for the Automobile** which, in the framework of UNI federated bodies, assists with defining technical standards and instructions for production, testing, the correct use and maintenance of vehicles, motor vehicles, operating machines and related components so as to improve their safety and reliability.
- ▶ Brembo also participates as an expert member on functional safety in the **joint working group in technical commission TC22/SC3/WG16** appointed to improve standard WG 16 ISO:26262 regarding the functional safety of electrical and electronic systems in motor vehicle production.

major renovation. In fact, during the year Brembo dedicated itself to the global updating of its new product development methodology, in order to align it more closely with the growing complexity of the products themselves and the rapid evolution of the market, characterised by ever shorter development times and increasingly challenging specifications. The project, which involved more than 60 resources in the various GBU and in the various countries, focused on upgrading the activities aimed at analysing the technical-economic risk at every control stage. The organisational level for gate approval and escalation will depend on this analysis. To disseminate the new methodology and plan its implementation, specific training sessions have been organised in Italy and abroad, starting from the second quarter of 2022.



Training on the Butterfly system

Given the importance that the Butterfly system holds for Brembo, the Quality GCF, with the support of the Brembo Academy, designed in 2018 the first BPDS training course conceived and taught by certified internal teachers. The main objective of this project is to train new people recruited for platform roles and who are not familiar with this methodology. At the same time, Brembo intends to highlight the strategic nature and importance of this process for the entire company population operating in development platforms. This training campaign, which began as a pilot initiative in 2018, has now seen the involvement of more than 200 people. The training package has a duration of 16 hours.



FMEA/FMECA analysis

To ensure maximum safety and quality of its products, Brembo adopts a preventive and proactive approach enabling the company to anticipate any problems and criticalities along the entire production cycle, so as to take preventive correction measures. In detail, during the **design and development phase**, the Group carries out product and process FMEAs/FMECAs to identify in advance the weaknesses and critical issues that could compromise product reliability and safety, by defining the necessary improvements and priority measures to be taken before the product enters into production. FMEA methodology is used, in particular, to identify product and process characteristics having a potential impact on end-user safety, so that these characteristics can be managed and controlled systematically throughout the entire production chain (product development, internal process and supplier process). These elements represent a fundamental part of Brembo's Quality Management System, compliant with **IATF 16949:2016** technical specification³⁴. This system, characterised by Guidelines common to all the Group's plants, allows best practices to be transferred from one plant to another, as well as all the sites to be managed with the same standards and quality indicators. Like other management systems, in newly opened sites the Quality Management System is implemented when production gets underway and certification audits are normally carried out around twelve months after the plant is commissioned.



100%*
of production plants
are IATF 16949:2016 certified³⁴

Quality monitoring process



Brembo has established a structured internal and external quality monitoring process, which also involves clients and suppliers. In detail, product quality and safety is monitored at all the Group's plants, by using specific indicators. The latter are set out annually by the Quality GCF as part of the Quality Plan, which also sets yearly quality objectives in this field.

From an internal standpoint, the most important indicators involved are those regarding waste, while from an external standpoint, those regarding complaint monitoring and the number of defective items sent out to clients are key, both as regards their level of criticality (in terms of inconvenience for the client) and severity (in terms of their impact on end-user safety). Brembo also monitors any product recalls from the market, or customer's notifications of non-compliance with the pre-defined qualitative standards. The application of these indicators also extends to the monitoring of product quality and safety made by the suppliers.

Should these indicators reveal situations that diverge from the established objectives, action plans are immediately put in place to restore compliance and, where necessary, ad hoc committees are organised in which top managers are invited to take part as well.

In addition, from 1 February 2021, the Quality function has defined the new "Product Regulation" area which will have the task of developing and consolidating skills related to the management of mandatory requirements, ensuring compliance with new product requirements, implementing action plans when needed and constantly liaising with customers, suppliers and national and supranational regulatory bodies on issues related to mandatory product requirements.

³⁴ Net of Zaragoza plant (Spain) and SBS Friction plant (Denmark) which are ISO 9001 certified. It should be noted that Carbon Factory will be certified by 2022.





Eureka: a software to tackle and manage product criticalities

As of 2019 Brembo implemented “Eureka”, a software that enables the company to revolutionise the management of all product issues, both in the development phase and for products that have already entered the mass production phase. This is an innovative project developed by the Quality GCF, ICT GCF and Digital and Innovation GCF, in collaboration with inter-functional and inter-divisional teams and some sites. Eureka is a tool intended to support those who have to face any critical product issues by conveying all the relevant information in a single container. The software allows not only to understand the underlying causes in a more structured and faster way, but it also enables the plants to more easily share solutions, by making such information available to the people involved at the various Brembo offices. The problems, whether internal to Brembo or reported by the client, can then be managed by the relevant teams using a common problem solving methodology. Thanks to Eureka it will also be possible to view similar cases that have already occurred at other sites and to know in real time how and by whom they have been solved. The goal is to use shared knowledge to preventively manage potential problems, prevent the occurrence of the same problem at other plants and / or on similar products. Eureka combines under the same name two basically ‘twin’ software, one dedicated to products under development (Eureka Development) and one to series products (Eureka Production). Finally, the new system allows real-time reporting of problems underway and how they are being managed, resolution times and compliance with the pre-set deadlines, providing a brief overview of the issues underway.

Today, two years on from implementation, customer complaints, reports of anomalies during the development and production phase and related resolutions are tracked in Eureka and increasingly more centralised at Group level, in real time. In order to promote and ensure the systematic application of the new tools, training activities have been carried out in all the plants worldwide involving all functions. In 2021, 100% of problems with customers were managed with Eureka production, irrespective of the type of product and application, car or motorbike, discs or calipers, and positive feedback was also confirmed for the Eureka Development twin software.

Activities guaranteeing product authenticity



For the Group, safeguarding the safety of those who buy and use Brembo equipment also means promoting initiatives aimed at countering product illegal counterfeiting activities and fraud in the distribution channels. The sale of counterfeit braking systems may represent a source of high risk for the end user due to the importance of the braking system as a safety component in vehicles. In fact, it is not uncommon that counterfeit products are found to be extremely dangerous because they are not made with controlled materials and are inadequately tested in the production phase.

It is important to highlight that as of 2020 a rise in counterfeiting was reported, especially in relation to the particular year marked by the pandemic which had a major effect on the market. In particular, in 2021 535 internet domain names were analysed, a significant number compared to the previous years.

The main tool developed by Brembo to counter the sale of non-original products is an “**anti-fraud card**” which allows customers to easily check if their purchase is really “Made in Brembo”. The anti-fraud card is delivered inside a sealed bag in the packing of the product purchased and gives a unique identification code, which — once entered on the website www.original.brembo.com together with the card number, component type and country of purchase — allows its authenticity to be checked. If the check fails to give a positive outcome, the purchaser is invited to enter further information to enable the Group to start investigations about the origin of the counterfeit part. The card also contains the quality control document, another tool for confirming product originality, whilst an external seal guarantees that the purchaser has received the product intact from the factory.

The anti-fraud card is currently available for the Brembo High Performance and Brembo Racing lines, with reference to the following products: Sports discs, Rally discs and GT kits. For





motorbikes, the initiative covers: calipers, discs, brake/clutch cylinders and replacement levers.

The collaborations established by the Group over the years with public institutions, public security authorities and customs control authorities are also fundamental in Brembo's fight against the production of and illegal trade in counterfeit products. In this context, in line with the previous years, Brembo's collaboration with OLAF - European Commission Anti Fraud Office continued in 2021 to prevent the growing presence of counterfeit products.

As Brembo's main products are considered "high-class products", they are copied in many areas and especially in Asia.

It is for this reason that, again in 2021, the anti-counterfeiting fight was part of Brembo's action plan. Many activities and initiatives aimed at limiting and preventing this critical issue have been implemented.

The Group has focused on online, on-site and brand protection. In addition, VICE TV has created a video service on the anti-counterfeiting phenomenon, in which Brembo also talks about different categories of products. These measures, combined with those mentioned above, have resulted in several fake products being blocked.

In 2022, Brembo intends to take new actions to stop fraudulent activities, especially in China.



Brembo check, the new anti-counterfeiting app

To ensure that the product is 100% original, the Company has implemented an anti-counterfeiting programme and launched "Brembo Check", a new app to certify the originality of upgrade products. All one has to do is use a smartphone to scan the unique QR Code shown on the label placed on the purchased component or on the box, to receive immediate confirmation of the product's originality. To avoid tampering, the label is made following a printing and application protocol that prevents its removal. Finally, the QR Code can only be registered once, as an additional protection for the buyer.

6.6 Awards for innovative ideas of employees

The contribution to innovation and the spirit of collaboration within the Group are important qualities for Brembo which enhances the participation of all its collaborators, by rewarding ideas that enable major improvements and progress to be made in terms of quality, process or product innovation, cost reduction, increased productivity and simplified processes.

Best Ideas, which promotes, in all areas of the company's organisation, ongoing improvement projects stemmed from the application of the Brembo Production System's principles.

Among the projects submitted in the Best Ideas category, innovative ideas in the larger areas of Sustainability and Digital Factory have been given particular emphasis with the introduction of the related special mention awards:

- "Sustainability": assessment of the impacts achieved by project results, including aspects such as environmental sustainability, personal growth and the surrounding context;
- "Digital Factory": assessment of the application of new digital technologies to support ongoing improvement and performance-boosting projects.

BREMBO Excellence Awards



Thanks to its Excellence Awards Brembo promotes continuous improvements through the application of the Brembo Production System (BPS) principles, and it rewards the most innovative ideas and solutions put forward by employees in the category:

Participation in the Excellence Awards is open to individual employees or groups of employees from all of the Brembo sites. The 2021 edition saw the participation of 25 global sites, with a total of 131 ideas for improvement submitted in six



different categories: “Safety” (24 projects), “BPS Application” (20), “Cost reduction” (21), “Productivity” (21), “Quality” (23) and “Office Improvement” (22). Innovative proposals have also been formulated with regard to special mention awards “Sustainability” and “Digital Factory”.

BREMBO Innovation Awards



The Innovation Awards have been established by Brembo in order to recognise each year the most innovative ideas relating to the Product and Process areas, with reference to the systems and discs production.

These annual awards are also accompanied by the Brembo **Monthly Innovation Prize**, which every month recognises the best projects developed by Group employees. The evaluation criteria focus on innovative content, possible cost reductions and project added value.

Among all the ideas that get recognised on a monthly basis, the one judged to be the best in product category, and the one voted as the best for process for a given year get the accolade.

In 2021, 35 ideas were presented, comprising 13 product ideas and 22 process ideas: the latter regarded both the systems and the discs. Out of all those submitted, awards were given to 32 ideas: 12 product ideas and 20 process ideas. All areas took part in this year’s edition by submitting their respective projects: in particular, 2021 witnessed the participation of the Digital & Innovation GCF, whose ideas received a positive feedback.

BREMBO Sustainability Awards



“Thinking responsibly, acting concretely”: this is Brembo’s approach to sustainability. In 2019, the new Brembo Sustainability Awards competition was launched. The award now complements the long-standing Brembo Excellence Awards and the Brembo Innovation Awards, and it is awarded to Brembo People who come up with the best ideas in areas such as sustainable development at every level of the organisation.

The categories in which it is possible to submit projects relate to topics linked to the ISO 26000 guidelines and to the 17 Sustainable Development Goals with a special focus on People, Good Management Practices, Governance, Environment, Business Partners and Community Involvement and Development.

In line with the previous year, in 2021 the Brembo Sustainability Awards competition met with excellent results in terms of participation. A total of 71 projects were put forward, in the six categories, mostly in the Environment and People categories, with 122 participants overall and five prize-winning projects³⁵. Countries which submitted their projects include: Mexico, China, Brazil, Italy, Poland, India and Czech Republic.

The Brembo Sustainability Awards made use of the CSR Ambassadors’ and CSR Champions’ contributions, these being people nominated by each Brembo country and plant with the aim of inspiring and engaging all Brembo People into CSR issues and to act as a bridge between the Corporate HQ and the Group’s companies. They are the sustainability spokespeople, and they are tasked with engaging all Brembo employees into adopting sustainable behaviours, as well as with officially representing the Corporate HQ’s CSR Office.

Due to the continuation of the health emergency, in 2021 as well it was not possible to hold the traditional prize-giving ceremony for the Brembo Awards concluded in 2020. Despite this, the assessment process went ahead as usual and the names of the winners were announced on the company Intranet Red Portal and through posters at all plants worldwide.

³⁵ No one was awarded in the Governance category since the projects submitted were merely about the application of corporate guidelines and not about “innovative” ideas. Therefore, it was deemed appropriate not to consider it as valid for assessment purposes.