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PLASTICS
and composites



GAIKER

TECHNOLOGY CENTRE

PLASTICS and composites

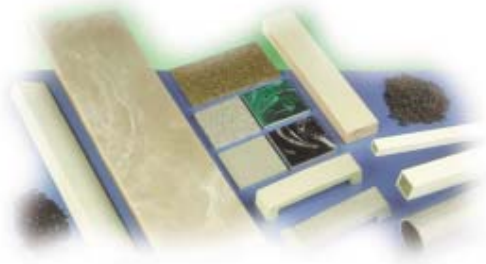
GAIKER contributes with R&D all through the **life cycle** of plastic materials and composites, providing an integral service for companies that transform and use plastics and composites, in such sectors as **automotive, transportation, aeronautics, electricity-electronic, construction and electrical appliances.**

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e are focused on the development of innovative projects via the formulation and improvement of materials and the design of parts, with a compromise to calculate and simulate their behaviour within their final application, as well as through the selection of the materials that are the best.

We carry out a study of the productive process that best suits a definite application, using the most modern simulation techniques, and bearing in mind both the technical-economical side and environmental issues. Additionally, we develop prototypes and study the features and properties of both raw materials and end products. We also act on the product and we reuse and recycle it, drawing an overall life cycle analysis that takes into account the effect on the environment.

We develop innovative projects to improve plastic materials and composites, as well as their processes



Life cycle



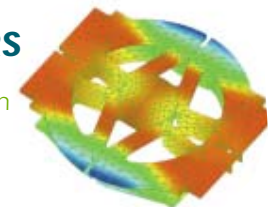
GAIKER provides with **innovation** through the entire life cycle of **plastic materials and composites.**



We are specialised in all life steps of the product, from its design to its recycling and use, through the selection of materials and the development of products, prototyping, production processes and characterisation, highlighting in each of these steps the environmental, technical and economic criteria needed for the improvement and innovation we pursue.

SECTORS

transportation
automotive
aeronautics
electricity
electronic
construction
electrical appliances



Development of PLASTIC COMPOSITES

DEVELOPMENT OF MATERIALS



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e develop a wide range of formulations for thermoplastic and thermoset materials, adjusted to the client's **specific applications**, with the aim to find the best performance possible from the combination of different raw materials and trade additives that are available.

In addition, we offer the possibility to improve particular features of materials to fulfil specific features and ease their processing by means of the appropriate selection of additives. Likewise, we develop materials and regenerate composites' compound properties aided by the conciliation technology, by means of which we are able to obtain materials that present improved properties starting from common polymers.

We have proved experience in the development of:

- Thermoplastic composites.
- Foaming plastics.
- Plastics for active packaging.
- Fireproofed plastics.
- Regeneration of plastic shrinkage through additives.
- Plastic compounds and alloys.
- Loaded plastics (inorganic charges and vegetal charges).
- Reinforced plastics and composites (inorganic fibres and natural fibres).
- Intelligent materials.
- Paints.
- Adhesives.
- Polymer concrete.
- Thermoset pourings with decorative effect. Synthetic marble and granite effect.
- Sandwich panels.
- Plastic-wood and metal-plastic composites.
- New materials and applications based on the use of recycled materials (thermoplastics, thermosets and rubbers).



We pursue the best performance possible from the combination of different materials and trade additives

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e carry out projects to select the most appropriate materials for the development of **new products** and the replacement of traditional materials by polymeric materials in a wide range of applications, for all sectors of the industry. Those materials are used because of their lightness, high mechanical specific resistance, free and flexible design, multifunctional integration of several materials within a unique part, as well as the real possibilities for recycling that they offer.



CHARACTERISATION AND PROPERTIES OF MATERIALS

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n GAIKER we have experience in the **testing and characterisation** of diverse materials and products, supported by a wide network of laboratories that possess an advanced instrumental equipment, ideal to analyse the features both of raw materials and the end product.

Among the properties that we can identify, we have the following:

- Identification of the mechanical and physical properties of the materials.
- Qualitative and quantitative identification of the composition of plastic materials.
- Identification of thermal features.
- Identification of rheological properties of materials.
- Reaction to fire, capacity of self-extinction, density and fume toxicity.
- Ageing and corrosion of materials.
- Identification of physical, mechanical and migration properties of containers and films.
- Properties about paints: hardness, impact, coating capacity, flexibility.

In our **fire** laboratories, we analyse the reaction behaviour to fire of plastic materials, the opacity and toxicity of fumes created in the process of burning, apart from carrying out developments aimed at decreasing both the material's flammability and its fume and toxicity emission by means of the proper additives and formulation.



We have a wide network of laboratories equipped with advanced instrumental tools

Design, calculation



and Selection of materials

We are specialised both in thermoplastic and thermoset materials, in the following working areas:

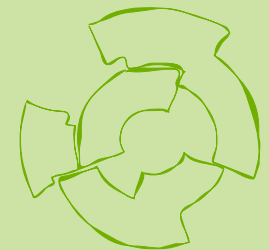
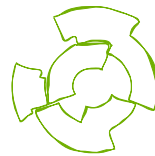
- Computer-aided design (CAD 2D/3D) through IDEAS and SOLID-EDGE® programs.
- Static and dynamic structural calculation of plastic parts by finite elements (FEM). ANSYS® and IDEAS® programs.
- Thermal analysis of parts by finite elements with IDEAS®.
- Simulation of the injection process with C-MOLD® and MOLD-FLOW® :
 - Simulation of filling and post-filling of moulds.
 - Simulation of cooling, shrinking and warpings.
 - Simulation of sandwich injection or co-injection.
 - Simulation of gas injection.
 - Simulation of injection reactive processes (thermostable).
- Design and calculation of parts in thermoset materials.
- Design of parts and products following life-cycle criteria: Eco-design. Design for recycling.

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We help companies to design plastic parts for different applications, taking into account both technical (performance and capacity to be processed), economical and environmental criteria (designing for recycling). We use **quantitative assessment** methods for the design of the parts that are going to be produced, the time that is going to be needed in the production process and the environmental impact, starting from the analysis of the life cycle.

Our facilities are equipped with advanced techniques for the structural design of plastic parts via the application of **simulation programs** in order to calculate structures with plastic parts and for the injection process of plastic materials. Like this, the part's best design is guaranteed, as well as of moulds, and also the selection of the best processing conditions. Therefore, we are able to reduce the time to develop the product and increase its reliability.

The design of moulds and the selection of the best processing conditions are guaranteed





Transformation PROCESSES and development of prototypes

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The experience GAIKER has accumulated over the years in the different transformation processes allows for the selection of the most appropriate processing method, from the geometry of the part that is going to be produced, the necessary production volume and the features and properties of materials used. For each specific need, different methods are offered, by means of which companies can produce the prototypes they need.



For each specific need, different methods are offered, by means of which customers can produce the prototypes they need

Transformation processes of polymeric materials are characterised by their versatility, both regarding formulations and processing conditions (temperature, cycle time, pressures, etc.). In GAIKER, we analyse the influence of parameters or variants essential for each process on the end product's features and price, granting the opportunity to improve and optimise already existing processes, making them more competitive and setting the most influencing factors to be controlled.



We have **pilot transformation plants**, among which we must highlight the following:

- Conventional injection.
- Sandwich injection or co-injection.
- Co-extrusion/Blowing.
- Extrusion.
- Calendering.
- Rotomoulding.
- Composite compression TRE/GMT.
- Laminating.
- Production of hybrid parts: plastic-metal, thermoplastic, thermoset.
- Injection RTM.
- Injection of polyurethanes (RIM).
- Production of prepeg materials.
- Production of SMC.
- Compression of prepeg materials.
- Injection of BMC.
- Filament winding.
- Hand-lay-up of thermosets.
- Vacuum moulding.



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Through the application and combination of these technologies, we are able to respond to the design and development of plastic products. We have a proved experience in the development of sandwich products (multi-layered), containers with high performance (deposits, pipes, etc.) and applications for the automotive, electrical appliances, construction or electricity sectors.



Through Rapid Tooling techniques, we are able to produce functional prototype parts or low series

By means of these Rapid Tooling techniques, we are able to build rapid moulds for the production of functional prototype parts or low series using technologies such as thermoplastic injection, slush moulding, pressing or RTM injection.

We also deal with the finish of plastic parts by applying paints, coatings, and chroming and metallic processes.



Environmental



C O M P L I A N C E

ANALYSIS OF THE LIFE CYCLE

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We try to assess quantitatively the real environmental impact of both products and processes

From GAIKER's Plastics and Composites Department and in close co-operation with the Recycling Area, we take into account the **environmental impact** arising from a process, a product or activity, from the drawing and procurement of raw materials, their processing, transportation, use and reuse, to their final disposal as waste, either through recycling, dumping or incineration. In these researches, all raw materials and energies that have been used are identified and accounted for, as well as solid waste and liquid and gaseous emissions released to the environment all along the product's **life cycle**, in order to assess quantitatively the real environmental impact of products and processes.

GAIKER



R E U S E

O F W A S T E M A T E R I A L S A N D S H R I N K A G E

The economic and environmental problem derived from the increasing volume of different types of waste materials determines the deep interest regarding all activities related to the **recovery and reuse** of those materials. In the Plastics and Composites Area, we offer different ways to recycle polymeric materials, establishing the need for prior treatments over a waste or shrinkage, to incorporate them into specific products through definite transformation processes, integrating them in the virgin raw material or in matrixes as a load, therefore assessing the influence of the recycled material on the end product and on the processing method.

We offer different ways to recycle polymeric materials



R E C Y C L I N G O F M A T E R I A L S

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We develop service systems for the recycling of materials, regenerate materials by means of additives and we make compatible compounds of plastic materials arising from recovered and reprocessed materials in their different forms.

We have a **wide experience in the recycling of thermoplastic waste** for the development of new products, processes to recycle thermostable composites reinforced with glass-fibre, recycling of polyurethane foaming, development of construction materials from recycled material and recycling of containers and packaging.