

SMART TECHNOLOGIES IN
THE
WORLD OF COMPOSITES



5M

5M



The 5M s.r.o. Company operates in the area of the development and manufacture of composite and sandwich materials and the manufacture of products for a wide variety of customers. We specialise in demanding applications and special products, for which the application of these types of materials is excellent. Over the years we have brought to the market a number of new products and key innovations.

ABOUT THE COMPANY

The 5M s.r.o. Company was founded in the year 1992. Its founders followed up on their earlier activities in the area of adhesives, composites and sandwich materials and the company thereby achieved rapid development. Currently the company has its own research & development centre with a laboratory, a modern manufacturing facility for pultrusion lines and a total production area of over 3000 m², with 130 employees.

The customers for the products of the 5M s.r.o. Company are manufacturers of:

- aircraft (transport, training and ultra-light)
 - rail vehicles and their accessories
 - road vehicles (buses, transport and passenger vehicles)
 - electrical equipment and components
 - textile and printing machines
 - sporting goods (skis, hockey sticks, kayaks, paddles, masts for boats)
 - model aeroplanes
 - trolley lines
- and construction companies (reinforcing structures).

The 5M s.r.o. Company has a quality management system certified in accordance with ISO 9001:2008 and many of our products bear the relevant certificates and quality assessments.

In the domestic market, the 5M s.r.o. Company, due to the exclusiveness and quality of its products, was quickly accepted in the top rank in this field and commenced cooperation with established foreign entities. In the year 1998, the Company became the exclusive representative in the CR for the Dutch company SABA.

In the year 2002, the 5M Slovakia s.r.o. subsidiary was established. In order to support our business activities abroad, we have also established offices in Germany, Italy, Bulgaria and Slovenia, countries which are the destination for a significant volume of the goods produced by our Company.

Our trademark LETOXIT® covers wide product range of epoxy resins and epoxy adhesives, which stand for high quality materials in composite industry or for the application in other industries.

5M s.r.o. Company represents trustworthy partner for your business in the field of composites. Our attitude to be reliable partner certifies our membership in a many associations and corporations, such as Czech Chamber of Commerce, Czech Space Alliance or Composed with Composites.



Dear business associates,

I am very pleased that you decided to dedicate your time to finding out about the 5M Company. For this purpose we have created this concise catalogue.

We are a technology and development company specialized in composite materials, sandwich materials, and adhesives. You surely meet our products in your daily lives. Our products are used by vehicle, sport equipment, and electrical equipment manufacturers.

The broad portfolio of our products and the ability to fulfil our customers' most difficult requirements resulted in the 5M Company being considered one of the leading players in the field of business. We are determined to hold this position. We constantly develop new products, production processes, and new applications. Innovation is our day-to-day activity.

Satisfied customer is our topmost priority. Moreover, we make sure to care of our customers, social surroundings, the environment, and fair dealing in all activities.

In the name of the whole company, I would like to thank you for placing your confidence in us and I look forward to future cooperation.

Ing. Antonín Zelinka
managing director

TECHNOLOGY AND DEVELOPMENT

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The vast majority of the products of the 5M s.r.o. Company are based on our own research and development. We maintain a laboratory with modern equipment and with eight researchers. The Company invests about eight percent of its annual turnover in development. We are moving ahead with our plans to successfully initiate development projects in different areas and we also undertake applied research projects financed from external sources.

Based on our drive towards modern technology and our endeavours to continue to apply technological innovations, our company cooperates with a number of universities, scientific institutions and prestigious laboratories.

The R & D department is involved in particular in the development of new types of epoxy adhesives, laminating systems, pultrusion composite sections and sandwich-bonded structures. 5M s.r.o. also holds a patent for a method for the production of composite structures made of foil epoxy resin, which has been given the name LF Technology.



Quality Policy

The 5M Company is managed in a manner fully consistent with the requirements of ISO 9001:2008 and with the regulations concerning environmental protection and work safety. Our top management is always involved in continuing to sustain the Company's reputation and position in the global market for the supply of composites and sandwich materials and for providing a high quality service for its customers. In order that this vision shall be implemented, the Company subscribes to the following principles:

- We promote the performance of work free from any errors and the achievement of a zero level of complaints. We adhere to the principle of prevention rather than the solution of conflicts during the implementation processes.
- We fight against complacency in regard to the quality of our services

and of the technical calibre of our products. Innovation and sustainable development are our long-term goals. This applies to all the processes and all the departments of the 5M Company.

- We have established standards for cooperation and communication in internal management, as well as in relation with customers and business partners.
- We consider as a prerequisite for the successful implementation of our quality policy the competence and proper motivation of our employees. We care about their professional and personal development, about improving their working conditions, about motivating them to a higher level of work efficiency; we guide them towards responsible and proactive conduct.

We work only with reliable suppliers, whom we continually evaluate with regard to the effectiveness of our mutual cooperation.

- The primary objective of our business is the customers' satisfaction. We shall make every effort to fulfil their expectations and requirements. We will create long-term partnerships based on mutual satisfaction.



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COMPOSITE PROFILES



Composite profiles are known under a variety of different names, such as GRP, FRP, FRPC, CRP, fibreglass or carbon fibre profiles. Due to their excellent characteristics, composite profiles are becoming a widely-used material for many applications, when low weight, excellent mechanical properties (high tensile and impact strength), corrosion resistance, outstanding electro-insulating characteristics, low heat-conductivity and low heat-expansion, a long service-life and minimum maintenance are requisite.

Profiles made in 5M are manufactured from various types of resin, using the conventional pultrusion or pull winding technique, according to the customer's requirements. In accordance with the customer's needs, for reinforcement we can use glass (the most common option), carbon or aramid fibres in the form of rovings (straight fibres), a variety of types of mats or a combination of these. As the matrix, most frequently polyester resin is applied, however our technology also permits the use of epoxy, vinyl ester, acrylates or other resins.

The properties of the profile can be optimised for specific applications, not only by the selection of the section size and the shape of the profile, but also by the type of reinforcement chosen and its structure, the reinforcement/resin ratio and the type of resin.

In our production range you can find standard pultruded composite profiles (rods, tubes), but due to having our own R&D department we are mainly focused on the development and production of difficult shapes and profiles, tailored to the customers' requirements.



Composite profiles are commonly used in transportation (buses, trams, trains, lorries), building and construction, aviation, chemical industry, the electricity industry, sports and many other potential applications for which light, non-corrodible and strong materials are required.



EPOXY RESINS

LIQUID EPOXY SYSTEMS

The optimal combination of epoxy resins and hardeners can be chosen for each application and for different production factors, such as mixture, pot life, curing method, technology and the properties of the final laminate part.

Our wide product range permits the choice of the right resin for every application, starting with resins certified for aviation and concluding with water-resistant resins for the boat industry.

As a speciality items, 5M also produces several epoxy foaming systems (the resin foams immediately after application, thereby expanding its volume and filling up any empty space, after that it hardens), epoxy acrylic resin for stereo-lithography or casting resins for the electrical engineering industry.



EPOXY FOIL SYSTEMS

Regarding our strong innovation activities we developed new OOA (out of autoclave) technology for the production of laminated parts. **Patented LF Technology (Letoxit Foil Technology) provides epoxy resin in the form of a flexible foil, which softens at increased temperature and is able to impregnate previously dry reinforcement.** An outstanding feature of the LF Technology is its ability to impregnate reinforcement and to cure in one step. This technology permits the application of various types and different numbers of layers in different areas of the construction. The exact content of resin – as a function of the amount of resin used and the number of layers of reinforcement – is thereby defined at the same time. The products made using the LF Technology are comparable with products made using the prepreg technology.

The main benefits of LF Technology are the carrying out of the impregnation and the curing in one step, the dry manner of lamination that maintain tidiness, out of autoclave technology, no hazardous vapours during the manipulation and curing, saving storage costs (in comparison with prepreg) and the possibility of achieving a perfect ratio between reinforcement and resin (60:40).

LF Technology is commonly used in the production of laminate parts (glass or carbon fibre) in the aviation and automotive fields, in sport and in the health services.



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5M develops and produces epoxy systems for laminate production. The product range of LETOXIT® epoxy resins includes liquid systems with varying properties and viscosity, from extremely liquid to highly viscous and thixotropic. Last but not least, our epoxy resin product range includes our patented foil resin called LF Technology.

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EPOXY ADHESIVES

5M concentrates to a considerable extent on the development and production of adhesives, mainly those that are epoxy based. **This range of glues is the most suitable for making joints with excellent mechanical properties and they are used in the construction of aircraft, transport vehicles or sports equipment.**

Our product range includes unitary, binary and multi-component adhesives, paste-style or thixotropic adhesives and adhesives in the form of a flexible foil. We are specialists in the development of new types of adhesives in accordance with customers' requirements. Special adhesives for high-strength construction bonding are developed in our own laboratory, where our specialists have at their disposal all of the equipment needed for the development and testing of adhesives.

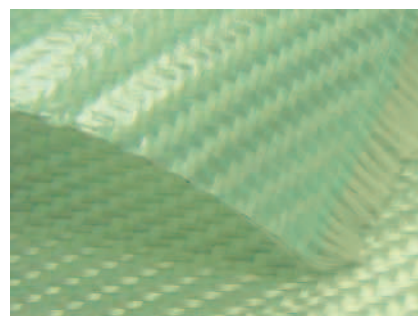
SEMIPREG / PREPREG

In the world of composites, pre-impregnated fabrics generally referred to as prepregs, have been in use for a long time. In regard to the increase in demand for this manner of dry production of laminated parts, we have developed our own alternative, which retains all the advantages of prepregs and adds new ones. We call our product semipreg, because we are speaking about a **fabric impregnated on one side with the epoxy foil resin from LF Technology. The polymer foil matrix is a combination of thermosetting resins with a hardening system and it is latent at room temperature.** The reinforcement content is optional, according to the type of semipreg. The semipreg is cured at an increased temperature under pressure (a vacuum) in a mould.

There are many advantages to be gained in your laminated parts production through the utilisation of our semipreg, such as solvent-free technology, faster production (in comparison with liquid resins), out of autoclave technology and great flexibility in the composition of the structure.

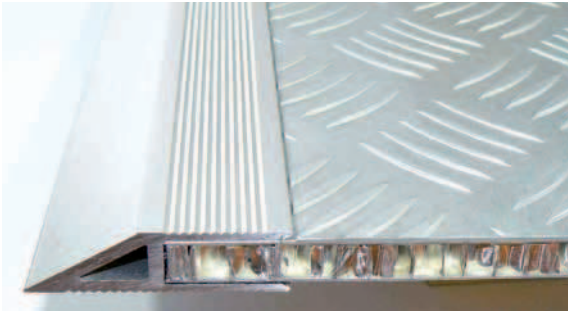
Our production equipment permits the production of semipreg using glass or carbon fabric with different epoxy resins, which can meet all your requirements for mechanical and other properties.

With semipregs you can produce composite sandwich panels, sports equipment, health-equipment tools or laminated aviation or automotive parts.



SANDWICH PANEL CONSTRUCTIONS

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5M produces honeycomb sandwiches in the form of flat or three-dimensionally shaped panels with various types of end, with pasted elements for further assembly and many other types, including complicated custom-designed constructions. **We are able to offer you panels in dimensions, cell sizes or plate quality that meet your requirements.** We have long-term experience with the production of panels with complicated shapes, with inserts inside (for threads for example), with borders or with internal reinforcement.

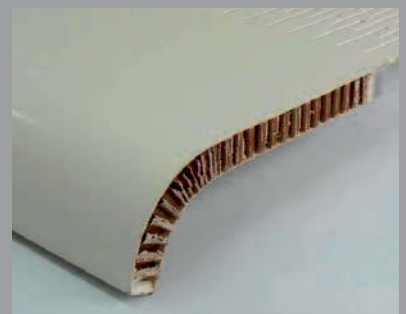
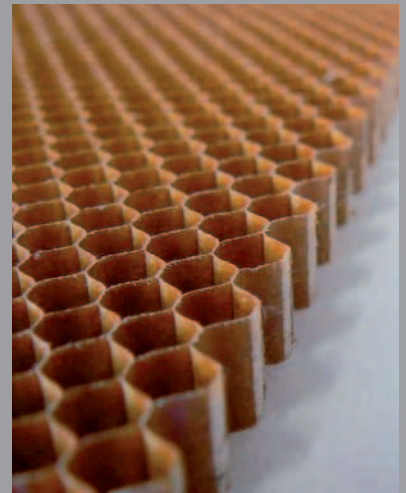
We have well-equipped workplaces and trained employees, and we guarantee top-quality and consistent results. Bonded construction provides both the possibility of both work on a large scale and reproductive precision, combined with regularity of shape and dimension, which makes for the simple

replacement of parts.

Due to our experience and our long-term innovative strategies we received an award from the Association of Innovation Entrepreneurship of the Czech Republic in respect of our accurate sandwich panels for the construction of radio telescopes. You will also find our sandwich structures in aircraft, cars, trains, trams, buses and industrial machines.

5M s.r.o. produces sandwich structures from aluminium, steel or composite materials (glassfibre, Nomex, foams,...).

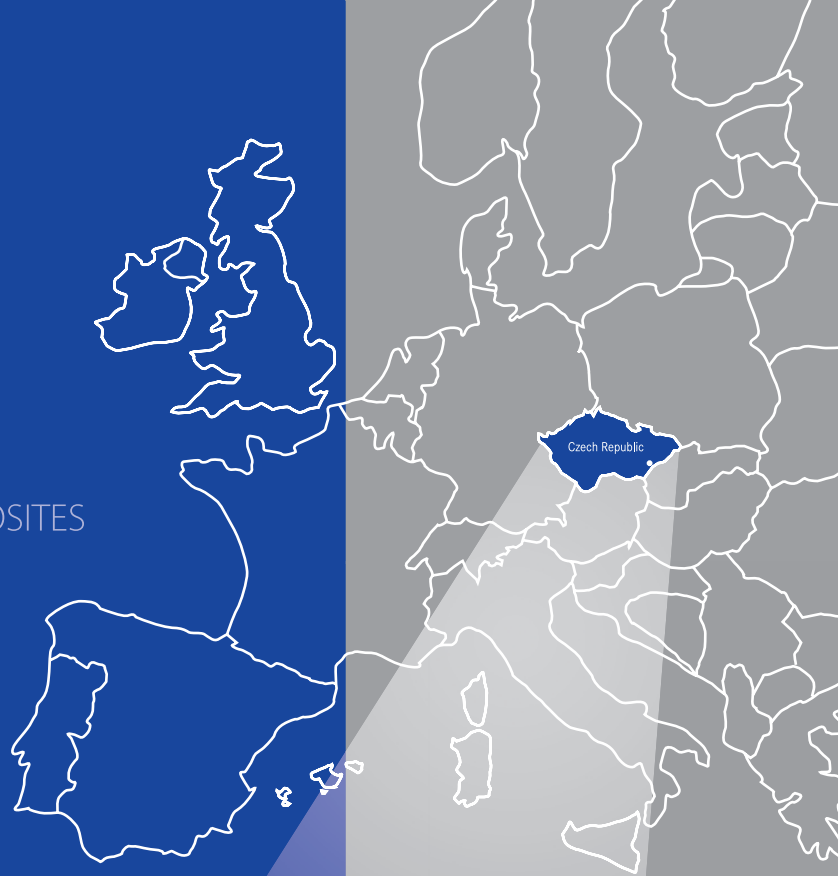
The sandwich construction panels are characterised by their high strength, rigidity and, at the same time, their very low weight. The technology of sandwich constructions comes from the aviation industry, but due to its useful characteristics it is used nowadays in common items for daily use. When a very light panel with great mechanical properties is required, sandwich construction is the right solution for you!



www.5M.cz

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