INDUSTRIEVEREINIGUNG
VERSTÄRKTE KUNSTSTOFFE
FEDERATION OF REINFORCED PLASTICS

The Composites Market in Europe: Market Developments, Challenges, and Opportunities

The fibre composite plastics market in Europe, with a growth of 5.6% in 2007 once more on the increase, is facing new challenges. Changing market conditions and technological developments also influence individual processing techniques and areas of application for the resulting components. Composites companies may take the lead if market participants utilise their strengths proactively and embrace the variety of opportunities that offer themselves.

Fibre-reinforced plastics: market coverage and development in 2007/2008

The German professional association AVK – Industrievereinigung Verstärkte Kunststoffe (Federation of Reinforced Plastics) has conducted a survey to obtain data regarding 2007 production volumes of fibre-reinforced plastics in Europe. As in previous years, the volumes created by individual production processes are once again summarised for all of Europe. A national differentiation would have been difficult at this point in time, considering the availability of data. In addition, however, the total production volume in 2007 was itemised by country, and there are signs of nationally specific characteristics, for instance with regard to the primary areas of application. The total European market coverage as described in this context is limited to countries whose production is explicitly open to the raw material suppliers who participated in this survey. Market data registration in this case pertains to glass fibre-reinforced plastics (GRP), while the development of production volumes based on other types of reinforcing fibres – i.e., natural fibres and carbon fibres – is discussed separately at the end.

INDUSTRIEVEREINIGUNG
VERSTÄRKTE KUNSTSTOFFE
FEDERATION OF REINFORCED PLASTICS

GRP production in 2007: a trans-European view

In accordance with last year's market assessment by the AVK, the entire 2007 GRP production increase of 5.6% was only slightly surpassed by that of 2006 (see Fig. 1). The total European production volume, at 1.195 million tons, almost reaches the 1.2 million tons mark. By comparison, the US-American thermoset composites industry experienced a 10% decline in 2007, with a current volume of about 1.6 million tons (source: ACMA). Thus, in relation to the entire European plastics production volume of 60 million tons in 2006 (source: Plastics Europe), the European GRP segment has gained a market share of about 2%. The composites markets are highly interesting if viewed on the background of the entire plastics industry, especially because of the unprecedented opportunities to tap new areas of application based on specific material requirements.

A differentiated analysis of market developments among fibre-reinforced plastics parts in accordance with the area of application resp. the production process is needed.

	2007 kt	**2007/06 %**
SMC	226.0	3.2
BMC	78.0	0.0
∑ SMC/BMC	**304.0**	**2.4**
Hand lay-up	244.0	5.2
Spray-up	124.0	3.3
∑ Open mould	**368.0**	**4.5**
RTM	**122.0**	**13.0**
Sheets	88.0	2.9
Pultrusion	50.0	8.7
∑ Continous processing	**138.0**	**4.9**
Filament winding	80.0	14.3
Centrifugal casting	66.0	0.0
∑ Pipes and Tanks	**146.0**	**7.4**
GMT/LFT	**99.0**	**10.0**
Others	**18.0**	**5.9**
Sum:	**1195.0**	**5.6**

Fig. 1: GRP production volumes in Europe (itemised according to the process / parts)

SMC/BMC parts

After recording positive growth rates of 8.0% in 2006, the production of thermoset SMC (sheet moulding compound) and BMC (bulk moulding compound) parts – at a high level in 2007 - only managed to increase by a mere 2.4 %. Stagnation of BMC production, which is focused on electro and vehicle headlight reflectors, was particularly noticeable. These markets are relatively saturated. SMC production experienced an upswing at 3.2 % growth. Processors see growth potentials in the primary areas of application – i.e., truck and automobile parts - and especially also in new markets, such as non-European countries.

Hand lay-up and spray lay-up laminates

The bulk of the GRP volume in Europe is still being produced by open-process hand lay-up and spray lay-up techniques. This third share of the entire GRP production is targeted primarily for the building / construction sectors (such as machine housings for wind energy plants, which are currently produced on a large scale), utility vehicles, recreational vehicles and boats, sanitary products, as well as specialised applications, where parts with large surface areas, such as gliders, are produced in limited quantities. The many small and medium-sized processing companies, who, taken together, govern a considerable market share, are still relying on hand lay-up (with a growth rate of 5.2 % in 2007) resp. spray lay-up (with a growth of 3.3%), especially because of the relatively low investment costs and few tools needed.

RTM parts

At a total penetration of about 10% of the entire GRP market by this time, production of parts manufactured by the closed RTM (resin transfer moulding) process in Europe has experienced a far above-average increase of 13%. This is primarily to be attributed to the continuous substitution of open processes in conjunction with the

small-scale production of component parts with large surface areas. The resulting component parts, with their bilaterally smooth surfaces, are targeted, for instance, for the production of recreational boats and – to a considerable extent – also for rotor blades of wind power plants. In this market they have almost entirely superseded the hand technique in recent years.

Corrugated sheets/flat sheets and GRP profiles

While sheets produced by so-called continuous processes increased by 2.9 %, the market for pultruded GRP profiles continued to show above-average growth of 8.7 %, yet failed to reach the growth rate of the previous year. This development – apart from transportation – is primarily influenced by the demand of the building sector. The increase in the profiles market resulted especially from new bridge building projects as well as cable ducts.

Pipelines and tanks

In 2007, GRP pipelines achieved a slightly above-average growth. Enormous potentials may be realised especially in conjunction with sewage systems and sewer system renovations. The annual growth rate among so-called hose liners in the past few years was above 25% on the average, and is likely to continue this trend, while tanks, for instance, achieved only moderate growth rates that were only slightly above stagnation levels. The individual processes of filament winding and centrifugal casting showed considerable differences. It should be noted, however, that the sum total of the growth rates mentioned in this context for filament winding (14.3 %) resp. centrifugal casting (0.0 %) is perfectly consistent, although information provided by the respondents tends to deviate significantly.

Glass fibre - reinforced thermoplastics

In accordance with the development observed during the past few years, growth rates for thermoplastic moulding compounds and semi-finished articles were above average and reached double digits once more at 10.0 % in 2007. Primary areas of application are found in the automotive industry, growth rates being attributed to continuous strand - reinforced thermoplastics (LFT). The future outlook is promising: with regard to the LFT world market, an impressive total growth of about 40% is expected between 2006 and 2010 (source: AVK, EATC market study). Glass mat – reinforced thermoplastics (GMT) are increasingly giving way to direct procedures, their production almost levelling off. They do, however, continue to have a major impact in conjunction with high-performance composites.

An overview of application industries

When considering all of the European countries included in this survey as a whole, the industrial sectors using reinforced plastics show only marginal changes by comparison to the previous year. The distribution is shown in Fig. 2. Individual countries, however, may differ in terms of the primary areas of application for reinforced plastics, depending on the specific economic sectors. Throughout all European countries there are applications that have achieved annual growth rates of 5 to 6% in recent years up until 2007, which is slightly above average. The list includes lorry production as well as boat building, which continues to flourish. Other component parts continuously achieve impressive annual growth rates in excess of 20%. Examples include component parts for swimming pools, wind energy plants, and the above-mentioned hose liners for sewage system renovation.
For comparison, primary areas of application for thermoset composites in the US-American markets in 2007 were found in the building and construction sector (45%), boat building (20%), and transportation at 12% (source: ACMA).

Thus, composite parts are basically targeted for primary applications that are entirely different from those of products manufactured by other European industries or, for that matter, the German plastics industry – approximately 60% of whose production volume is targeted for the packaging sector and the construction industry. Primary areas of application include films and pipes/profiles. At growth rates of slightly below 10% each, the automotive industry – especially with respect to engineering – as well as the areas of electronics and electro articles also play a role in this context (source: Plastics Europe and GKV).

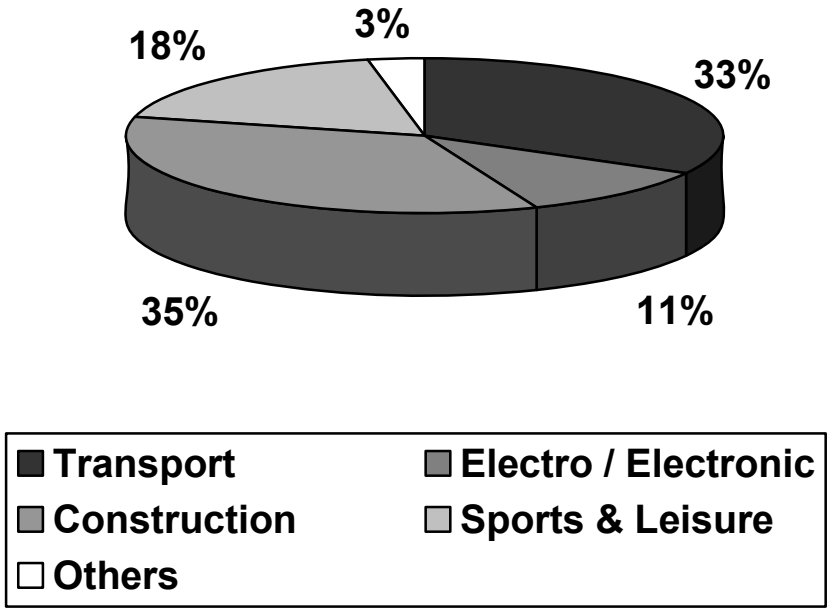

Fig. 2: GRP production in Europe, targeted for different application industries (year: 2007)

GRP production in 2007: individual countries

The total volume of GRP production, which amounted to 1.195 million tons in 2007, pertains to all European countries resp. groups of countries included in this survey,

as shown in Fig. 3, and is distributed as shown. Clearly, leading players in the European market are Spain, Italy, Germany, the UK, and France, together accounting for more than one third of the entire volume. With the future inclusion of additional European countries whose data have remained (largely) elusive up until now - despite their considerable growth potential - this situation may very well change, especially in favour of Central European and Eastern European countries.
Another important facet is the analysis of the estimated future potential, based on the development in recent years. Accordingly, European countries may be categorised in accordance with their growth, which may be either minor, average, or considerable. Countries/groups with minor annual GRP growth rates between 0 and 2% include the UK, Belgium/the Netherlands/Luxembourg, and Finland. Countries/groups with average GRP growth rates of approximately 4 to 8% include Sweden, Denmark, Spain/Portugal, Italy, France, and Germany. Growth rates in Germany also correspond with the inclusion of fibre-reinforced plastics in the official statistics (source: GKV). In France, too, growth rates of 5 to 6% were achieved in 2007 as compared to the previous year. Considerable respectively above-average growth rates of > 10% are to be expected in Eastern Europe in particular – both in countries that are documented as well as those that remain elusive. Those Eastern European countries whose figures were accessible in 2007 revealed the following production volumes: 70 kt in Poland, 23 kt in the Czech Republic, and a remaining volume of 54 kt probably shared by Hungary, Rumania, Serbia, Croatia, and Macedonia (in view of our incomplete market information). There is still no information about volumes produced by other Eastern European countries.
Pipelines and tanks, for instance, offer enormous opportunities to tap new markets in the former Russian states, as well as in the Middle East. Annual growth rates in excess of 20% may be expected in the next few years.
In the Scandinavian countries, the focus in 2007 was primarily on applications in the sectors of boat building (RTM parts, among others) as well as pipelines and tanks, each accounting for approximately one third of the total production volume; followed

by windows with about 15%. In Finland, boat building even governed more than half of the total volume.
In France, SMC/BMC parts account for almost half of the fibre composite plastics production, while the emphasis in Italy is on sheet production, followed by pipelines and tanks. With a market coverage of almost 40%, tanks are the leading area of application for Spanish composites. Vehicle manufacturing as a target sector is generally more prone to considerable fluctuations; SMC and fibre-reinforced thermoplastics have top priority in this area.

Heading the list in Germany are the automotive sector as well as wind energy. Vehicle production is highly dependent on SMC and tends to fluctuate. Besides, utility vehicles and German motor home manufacturers in particular contribute to a considerable increase in GRP volumes. The German wind energy market - a booming industry these days - gives rise to a considerable demand for rotor blades in particular. There is a significant current trend towards collaboration with foreign manufacturers, for instance in conjunction with offshore wind energy projects.

	2007 Kt	
UK / Ireland	144.0	
Belgium / the Netherlands / Luxembourg	41.0	
Denmark / Sweden / Norway / Finland	80.0	of which Finland accounts for 15.0
Spain / Portugal	270.0	
Italy	210.0	
France	131.0	
Germany	155.0	
Austria / Switzerland	17.0	
Eastern Europe	147.0	of which Poland covers 70.0 and the Czech Republic accounts for 23.0
Sum:	**1195.0**	

Fig. 3: GRP production volumes in Europe (itemised by countries/groups of countries)

Natural fibre - reinforced plastics

Natural fibre - reinforced plastics as well as so-called wood-plastics composites (WPC) are considered to be biomaterials, since they are based on renewable raw materials. Primary areas of application include the automotive industry, the construction and building sectors, furniture (such as terrace floor boards), as well as industrial and consumer goods. The attractive energy savings potentials during production and duly reduced CO_2 emissions in particular are factors reinforcing double-digit growth prognoses each year.
The entire European WPC market volume in 2007 is estimated at 120 kt. There is an emerging trend for several new applications, allowing skyrocketing growth rates by comparison to saturated markets. WPC production in China, for instance, increased from 75 kt in 2006 to more than 150 kt in 2007, when these materials were used for the Olympic buildings. In the current German market, applications of natural fibre - reinforced plastics in the automotive industry remain stable albeit stagnating at an annual volume of 30 kt (source: nova Institute).
New areas of application are opened up, for instance, by basalt fibres. Incorporated into concrete for reinforcement, they are used throughout the construction sector and offer specific protection in case of earthquakes, fires, or explosions. This is exemplified by one of the winners of the industrial AVK Innovation Award 2008.

Carbon fibre - reinforced plastics

As in previous years, demand for carbon fibres in 2007 – despite increased production capacities – by far exceeded production volumes. Global annual

capacities in 2007 are estimated at 55 kt. Carbon fibres are really broad in scope, applications including, for instance, the sports sector, wind power plants, the oil industry, automotive and transportation, as well as the construction sector. New developments in this context are observed, for instance, with hydrogen tanks. The main area of application in 2007, however, was the aviation industry; at present, unprecedented volumes of composite materials are used for civil aircraft construction. All in all – despite the expected double-digit increase in production volume – this trend is likely to create some medium-term bottlenecks, and it limits the margins for price reductions. On a value basis, CFK component parts (carbon resp. carbon fibre - reinforced plastics) pull in about ten times as much worth of sales as does the carbon fibre market (source: Kunststoff Information).
While glass fibres continue to dominate today's market for reinforcing materials, followed by a minor share of natural fibres, several processors also observe a medium-term minor yet unequivocal shift of market shares in favour of CFK (source: AVK, EATC market study).

Future perspectives and challenges for the composites industry

All companies in the value chain of the composites market (raw material producers and dealers, processors, machine and technology suppliers, service providers, and application industries) – irrespective of their own specific market positions – are basically facing considerable opportunities as well as risks with regard to the future market.

Market opportunities

Opportunities arise from the pressure the industry is subject to, especially with regard to the necessity of saving energy as well as costs by producing increasingly light-weight structures without affecting the strength. This is exemplified by civil aircraft construction, which is giving rise to quite some growth within this branch of industry,

although the increase in demand is declining throughout the air traffic industry in general. Opportunities are enhanced by the extremely high computerisation potential in the composites sector, which remains promising. This potential may also be considered to be an operational strength. Apart from such process innovations, the above-mentioned broad scope also creates considerable opportunities for product innovations. Despite certain constraints due to saturation effects in existing regional markets, there is an enormous potential in those parts of the world that show a strong industrial development. Examples include transport markets in Asia as well as the construction sector in Eastern Europe.

Market-related risks

The greatest risks - equally relevant for producers as well as processors – certainly arise from the raw materials, energy, and shipping costs, the international competition associated with globalisation, and requirements in conjunction with the pertinent rules and regulations, like the REACh, which is a current issue. Another factor is the lack of acceptance of fibre composite materials, which still prevails in the development departments of the application industries. In addition, time and again, small and medium-sized supplier companies in particular are facing problems because of the considerable dependence on customer industries – especially in oligopolic markets. Last but not least, the shortage of skilled personnel is a bottleneck for the market and for the composites industry, too.
In addition, opportunities and risks are also associated with the economic development of the plastics industry as a whole as well as with the development of individual application industries for reinforced plastics. Generally speaking, after achieving positive results in 2007, double-digit growth rates may be realised in certain sectors in Eastern Europe as of 2008, while there are some stagnation trends in Western Europe. This is currently true of the entire plastics industry (source for the German data: GKV), but also for sectors such as the automotive industry, the building sectors, and the electronics industry. Recent surveys in Germany have

shown that current business expectations for the plastics sector tend to be less optimistic than in previous years (source: Ifo München/ArGez and Kunststoff Information). This tendency is certainly also observed in other European countries and, to a certain extent, in the composites industry as well.
As far as the reaction to these market opportunities and risks is concerned, composites-processing companies – to a varying extent, but generally speaking – typically exhibit the operational strengths and weaknesses outlined below.

Strengths of the companies

The relatively large flexibility with regard to the manufacturing scope is certainly to be considered a definite strength of processors of reinforced plastics. Besides, many companies in these sectors are also highly flexible with regard to the geographic expansion of their operating area. Medium-sized companies, too, are quite willing to invest in global expansion, opening up locations all over the world. The typical investment potential of many small and medium-sized companies in this sector, which is frequently left dormant, is to be considered a great strength as well.

Weaknesses of the companies

Weaknesses arise from insufficient marketing and sales efforts, especially among processing companies that tend to focus on engineering aspects only. Shortage of pertinent skills and interdisciplinary employee qualifications respectively lack of development opportunities will make it difficult to fully utilise all of the market opportunities that present themselves.

The overview of market opportunities and risks as well as the operational strengths and weaknesses of the composites industry, as summarised in Fig. 4, may be used to analyse specific operational conditions and to draw up pertinent recommendations on this basis. Eradicating operational weaknesses in the marketing and sales area by

professional support, for instance by hiring new recruits, may, for instance, help to beat the competition rather than suffer from the risk of lacking material acceptance among developers.

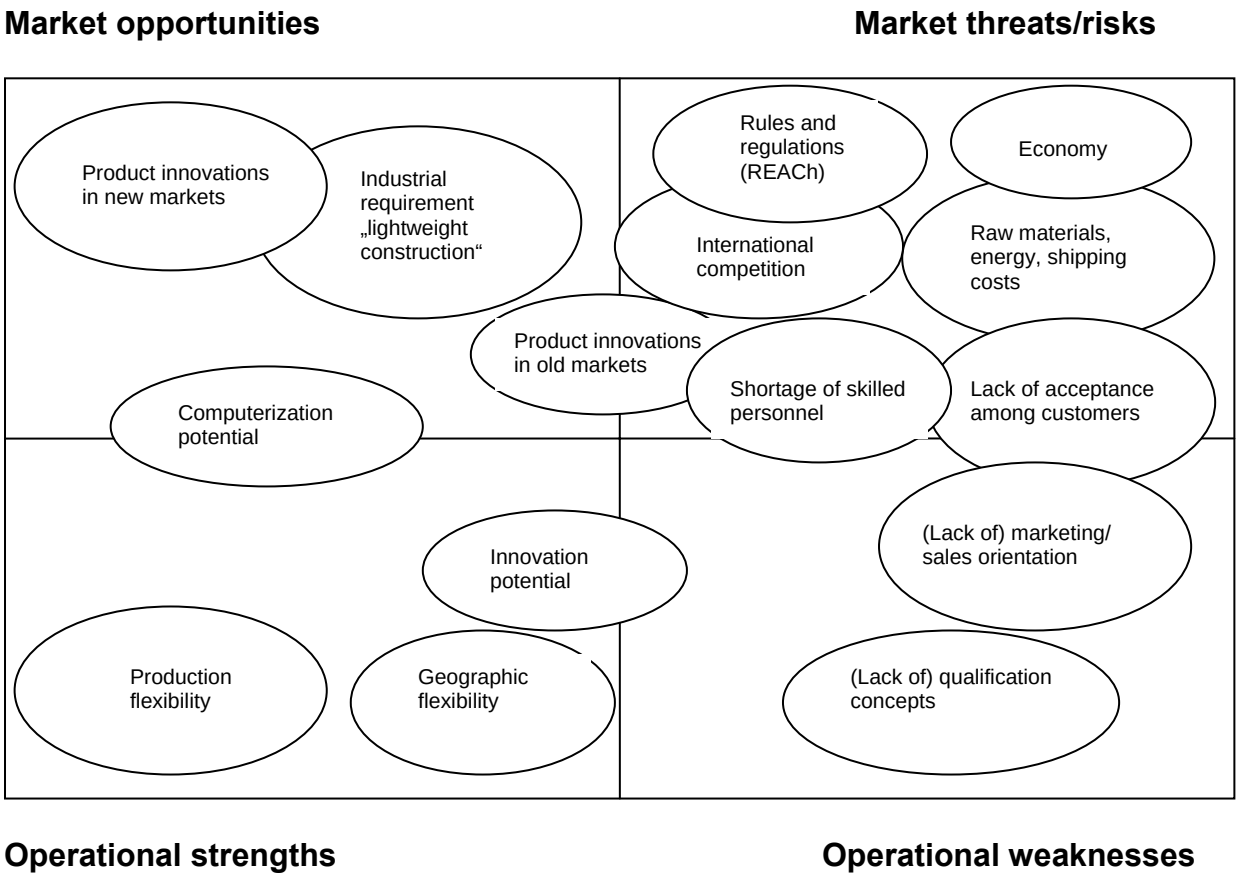

Fig. 4: Opportunities/risks and strengths/weaknesses of the European composites industry

The strategic position of the AVK

In order to improve the ability to rise up to the challenges presented by the composites market, and to quickly and effectively seize opportunities if and when they present themselves, companies are joining forces by uniting in organisations such as professional associations. This joint effort makes it easier to promote cross-company joint interests shared by all companies. Apart from the marketing and sales

efforts pursued by individual companies, such company collaborations may result in concerted marketing efforts (such as advertising, seminars, road shows to visit the application industries, professional articles, etc.) to promote the benefits of composite materials. The AVK is to manage such cooperation efforts and, as a former “national professional association“, to broaden its scope in accordance with changed market conditions.

The AVK as a driving force of the German plastics industry

In the German plastics industry, the AVK is one of the four supporting pillars of the GKV (Gesamtverband Kunststoffverarbeitende Industrie e.V.), the national association of the plastics-processing industry. This means that reinforced plastics are explicitly represented in the leading organisation of the industrial plastics processing sector. The AVK actively supports the exchange with other processing segments for plastics packagings and films, semi-finished articles, and consumer goods, as well as engineering plastics. The German plastics industry is to bundle its joint expertise by the envisaged coalition, which is to be extended in the future so as to also include plastics producers and plastics machine-building companies. Collaboration on a shop floor level has already started in some fields (for instance with regard to market research). The first joint conference is scheduled for June 2009 in order to make an appearance as “The German plastics industry“ and to convince the public as well as the political sector that this is a force to be reckoned with.

The AVK as a driving force of the European composites industry

On a European level, the AVK is a member of the EuCIA – the European Composites Industry Association. The respective national member organisations actively support the joint objective of the composites industry: “We show the world of composites / we know the world of composites / we grow the world of composites“. This includes lobbying in the EU committees in Brussels, as well as organising workshops,

supporting trade fairs, participating in EU promotional programs, and developing marketing strategies to demonstrate the benefits of composite plastics. The AVK actively supports the EuCIA and contributes with its development of the European market coverage as well as the exchange of training and advisory services (such as the REACh checklist or the modular training program granting a certificate as “AVK composites expert“).

The Author

Dr. Elmar Witten is Managing Director of the AVK - Industrievereinigung Verstärkte Kunststoffe (Federation of Reinforced Plastics). The AVK, as a professional association for fibre composite plastics/composites, represents the interests of producers and processors of reinforced and filled plastics on a national and a European level. Nationally, the AVK is one of the four pillars of the GKV - Gesamtverband Kunststoffverarbeitende Industrie and an international member of the European composites confederation EuCIA – the European Composites Industry Association. In these organisations, Dr. Witten represents the AVK’s interests as a member of the extended management (GKV) resp. the board (EuCIA).