

Commercially Highly Attractive

Changes in the Corporate Landscape of Technical Plastics

Klaus Kohlhepp, Frankfurt/Main, Germany

Compared to standard plastics technical plastics are characterised by higher performance and higher prices. In the year 2000 their consumption volume was 5.7 million tonnes. That corresponds to 4% of the total amount of plastic materials produced. With a recent total value of 17 billion EUR the technical plastics market is very attractive economically for a large number of globally active manufacturers.

The following materials belong to the technical plastics group:

- ▶ polyamide (PA 6, PA 66, PA 11, PA 12),
 - ▶ polycarbonate (PC),
 - ▶ polyoxymethylene (POM, polyacetal),
 - ▶ polybutylene terephthalate (PBT),
 - ▶ polyethylene terephthalate (PET, technical injection moulding grades) and
 - ▶ PE-UHMW (ultrahigh molecular weight polyethylene)
- as well as the blends:
- ▶ polyphenylene ether (PPE) as PPE+PS and PPE+PA,
 - ▶ PC+ABS and PC+ASA,
 - ▶ PBT+PET
 - ▶ PC+PBT and
 - ▶ PA+ABS.

The automotive manufacture and electro-technology and electronics sectors domi-

Manufacturers of technical plastics are exposed to increasing change pressure due to their dependence on the globally aligned automobile industry and the electrotechnology/electronics sector. The resulting processes cause a significant change in the corporate landscape that is at present not yet final according to the opinion of many market participants.

nate among the areas of application. The two segments use about 75% of the total quantity of technical plastics (Fig.1) [1].

Quantities and Regional Development

The quantity of technical plastics is increasing rapidly. From 3.69 million tonnes in 1995 world-wide consumption will have increased to 8.25 million tonnes in 2005 (Fig.2) [1]. The specified quantities apply to pellets and compounds. Recycled fractions are not included. The portion of blends in the total quantity of technical plastics is 15%. Here PPE (as PPE+PS and PPE+PA) and PC (as PC+ABS and PC+ASA) dominate as matrix materials (Fig.3) [1].

Quantitatively PA and PC are the leading technical plastics. Consumption of PA will increase to 2.8 million tonnes by 2005, for PC to 2.9 million tonnes (Fig.4) [1]. An overview of the regional distribution of consumption confirms the importance of the Asia-Pacific part of the world. The quantity estimated in this presentation has been reduced by the portions for filler and other additive materials. The portions of blends are generally included, but without the quantities corresponding to PS, ABS and ASA.

Forces of Change

The technical plastics market is subject to cyclic fluctuations. The strong dependence on the application areas automobile and electrotechnology/electronics can serve to explain this. In periods of high demand the prices rise while they sink when the economy is weak (Fig.5) [2]. The influence of regionally available manufacturing capacity is small. Peaks in demand are balanced by supplies from other regions.

This cyclic behaviour can be confirmed also by a comparison of the price development of technical plastics with the industrial production index (IPI) (Fig.6) [2, 3]. While in 1991 still another phase shift between the two measures can be recognised, by 1997 this is no longer present. Because of "just in time" supply of the customer industries and dismantling of expensive storekeeping today the influence of market conditions on the selling price is more direct and noticeable without long temporal delays. Additionally, manufacturers of technical plastics must come to grips with the problem of constantly falling margins [4] and align their firm's structures accordingly.

Manufacturers of technical plastics are exposed to high external pressures, which already today have caused lasting change processes (Fig.7) [5]. However,

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according to the opinion of many market observers the largest changes in the corporate landscape are approaching and are expected to be in the Asia-Pacific region in particular. One point is common to the resulting enterprise strategies: they are expected to bring significant improvements in the competitive positions of the producers.

For many manufacturers of technical plastics global presence as an element of competitive capability is not a topic of political discussion, but reality. In this connection it should be remembered that already now more than half (55%) of the world's population is in the Asia-Pacific part of the world. With Japan the well-known exception, the per capita consumption of technical plastics in the countries of this region have not yet reached the order of magnitude of that of the USA and Europe, but the number of people living there and the expectation of rising gross national products makes this region extremely interesting [6] for manufacturers of technical plastics.

This can be formulated still more clearly: for the next five years the predicted increase in the consumption of technical plastics will be disproportionately large in the Asia-Pacific area where the Chinese market is the centre of attention. Also the technical plastics market is in a state of change [4 to 7]. Thus it is understandable that manufacturers of technical plastics direct a significantly high portion of their development plans and new investments toward the Asia-Pacific region.

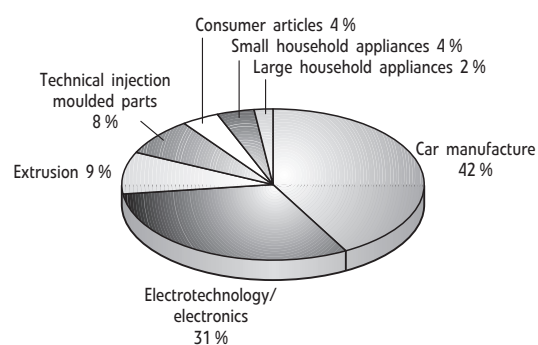


Fig.1. Application areas for technical plastics: In the year 2000 the automotive manufacture and the electrotechnology/electronics sectors used about three quarters of the total

A large part of these investments are made by enterprises that have their roots in the Asia-Pacific countries, that have excellent own technologies, that usually are also very strong financially and that pursue their own globalisation goals self-confidently. Globalisation thus implies an increase in competition in all regions, also in Europe and the USA, and does not only proceed from these two regions, but also affects them.

In the traditional markets of Europe and America lower growth rates are the rule because here growth takes place from a high output level. Technical plastics are used here increasingly in applications that contribute to preservation of the high standard of living with ever lower purchase costs and which increasingly serve the preservation of resources. The fast development of fuel cells is a current example.

E-Commerce

The topic e-commerce, that is electronic purchasing and sales in the comprehensive sense including all transaction processes like sales promotion and marketing measures, was one of the leading topics in our industry between the Düsseldorf International Trade Fairs Plastics and Rubber in 1998 and 2001. The initial overboard euphoria has yielded to sober reality and contemplation of the real elements of successful customer relations. This evaluation has been confirmed by expert opinion in numerous specialised meetings [8].

Electronic market platforms ensure that competition on the Internet is predominantly price driven. In such a context long term customer relations, which can still be one of the crucial factors in the technical plastics market, are built up only with difficulty. On the other hand the Internet is an excellent instrument for establishing contact and for direct ac-

cess to technical product information [9]. Many manufacturers of technical plastics use this platform in appropriate ways, as their sometimes outstandingly well designed Internet sites (home pages) show. To that extent the Internet is a new market level on which competition between the manufacturers of technical plastics also takes place and which contributes to differentiation between the individual suppliers.

The Corporate Landscape has changed

During the period between the K'98 and the K'01 the corporate landscape clearly shifted for manufacturers of technical plastics. The pressure to change led to a multiplicity of consolidations, alliances, restructurings and directed regional investment measures. Here are some examples from the last three-year period:

Asahi...

... took over Compounding-Group Thermofil. Manufacturing plants in Great Britain, France and the USA, overall capacity 110 thousand tonnes. Construction of a new POM installation in Singapore was stopped. A PPE plant, capacity 48 thousand tonnes, is planned at the same location as a joint venture with Mitsubishi Gas Chemical (MGC) (70:30). At present the PA 6 and PA 66-capacities in Japan are being extended to a capacity of 70 thousand tonnes. Together with Chi Mei Asahi operates a PC plant in Taiwan with a capacity of 100 thousand tonnes, realisation in two stages, investment 220 million EUR.

BASF...

... took over the parts of POM production operated together with Degussa. During the next five years total investments amounting to 2,5 billion EUR are planned for the development of plastics activities, of which 900 million EUR will be at Kuantan/Malaysia. There a PBT plant with a capacity of 60 thousand tonnes is also to be built.

Bayer

The enterprise has a global market share in technical plastics of about 10% [1] and continues its forward integration. It took over more sheet PC producers (Sewon, Laserlite, Axxis and DSM Sheffield Plastics). Further it took over the majority share of the sheet manufacturer Makroform. Bayer is on the way to becoming the leading PC producer globally. Its capacities are to be doubled from 0.65 million tonnes to 1,3 million tonnes (Map Ta Phut/Thailand: from 50 to 350 thousand tonnes, Caoijing/China: new 100 thousand tonnes, Baytown/USA: from 170 to 350 thousand tonnes, Europe: from 320 to 500 thousand tonnes) through investments of over 1 billion EUR. Investment emphasis is on Asia. Bayer recently founded a joint venture with DuPont for production of PBT.

Dow ...

... increased PC capacities at the locations Freeport/USA and Stade/Germany, from 55 to 105 thousand tonnes. The activities in South Korea are to be developed further. There Dow has a joint venture with LG Chemicals. The latter is taking over marketing the PA manufactured by Solutia. Solutia is the former chemical and petrochemical part of Monsanto.

DSM ...

... brought a PA6 plant in Emmen/Germany with a capacity of 85 thousand tonnes into production. This supplements the plant in Augusta, GA/USA, whose capacity amounts to about 50 thousand tonnes. The PA46 capacity is being developed. DSM took over the copolyester business of GE (Lo-mod). There is a joint venture with Owens Corning for production and marketing of long-fibre-reinforced thermoplastics (Sta-Max). DSM sold the business field of semi-finished material and composites to Quadrant.

DuPont ...

... has a global market share in technical plastics of about 15% [1]. The enterprise brought a PBT plant in Cooper River, SC/USA, with a capacity of 40 thousand tonnes into production.

Formosa Plastics Group ...

... is planning a joint venture with Idemitsu for PC production with a capacity of 50 thousand tonnes.

GE Plastics ...

... is the global market leader in technical plastics. An acquisition from Honeywell for the further development of market leadership was not approved by the European cartel authorities. The portion of the total value of technical plastics production is estimated at over 20% [1]. PPE production at the locations Selkirk, NY/USA, Bergen op Zoom/Netherlands and Moka/Japan was increased. Thus an additional capacity of 40 thousand tonnes is available. A PC plant in Spain was brought into production. Its capacity is to be doubled (from 130 to 260 thousand tonnes) by a second line. The investment amounts to about 1.2 billion EUR. Also PC capacity in the USA was increased by around 70 thousand tonnes. A strengthening of its position in India was achieved through acquisition of GE Plastics India Ltd. Compounding of PC and PPE will be carried out locally. There is a joint venture with Bayer (Exatec) for marketing PC autoglapping.

Hoechst ...

... divested itself of technical plastics. These were combined with Celanese. Ticona runs the technical plastics business as a part of Celanese.

LG Chemical ...

... built a PC plant with a capacity of 130 thousand tonnes in South Korea in a joint venture with Dow (LG Dow Polycarbonate).

Mitsubishi Chemical Corp. (MCC) ...

... began building a second PBT plant with a planned overall capacity of 80 thousand tonnes in Japan. Construction of a PC plant with a capacity of 20 thousand tonnes is planned.

Mitsubishi Gas Chemicals (MGC) with Mitsubishi Engineering Plastics (MEP)

MEP is planning a joint venture with Asahi for building a PPE plant in Singapore. The POM capacity in Thailand will be increased by around 25 thousand tonnes and the overall capacity will then amount to 45 thousand tonnes. MEP is a common subsidiary company of MCC and MGC.

Polyplastics ...

... is bringing a POM plant in Malaysia (30 thousand tonnes) into production. Together with Teijin WinTech Polymers the enterprise is founding a joint venture for producing and marketing PBT.

Shell ...

... has found no buyer for Carilon (aliphatic polyketone, PK) and cancelled the PK business under expansion. The enterprise announced construction of a plant for production of PTT (polytrimethylterephthalate), capacity 115 thousand tonnes.

The plans were later revised and construction of the plant was stopped.

Sumitomo ...

... extended a plant belonging to the Japanese PC joint venture with Dow by 10 thousand tonnes. The enterprise wants to create a holding company with Mitsui in which all business activities will be combined. This should be finalised in 2003.

Teijin ...

... planned an increase of PC production in Singapore by around 100 thousand tonnes. The overall capacity will then amount to 180 thousand tonnes.

Ticona ...

... has a global market share in technical plastics of about 10% [1]. The enterprise operates a COC plant in Oberhausen/Germany (capacity 30 thousand tonnes, investment 60 million EUR) and has increased PE-UHMW capacity in the USA by around 30 thousand tonnes (investment 45 million EUR). After an increase in POM capacity in Kelsterbach/Germany to 100 thousand tonnes (investment 25 million EUR), Ticona has increased its world-wide POM capacity to 186 thousand tonnes.

Ticona/Celanese, Hyosung

From Hyosung Celanese acquired 50% of KEP, a Korean POM manufacturer. Joint owners are MCC and MGC.

Ticona, DSM ...

... operated a joint project for founding a PBT production plant.

■ Global markets arise

- Regional markets lose importance
- Asian markets move to the centre of activity
- New investments with priority in Asia

■ Focus on core competencies and critical success factors

- Requires reconsideration of product portfolios
- All encompassing product portfolios lose their economic attractiveness

■ New installations are world size

- Require high investment sums
- The goal is cost leadership
- Measures are rationalisation and cost reduction

■ Margin reduction

- Some producers could not meet the competitive pressure
- Some producers have sold business areas
- Remaining businesses feel a need for higher "critical masses"

■ New groupings, alliances and mergers arise

- Strategic decisions lead to new business models
- Realisation of the most project based strategies will be transferred to networking partnerships and virtual enterprises

Fig. 7. Change processes in the segments of operations of technical plastics manufacturers

Toray ...

... took a POM plant in South Korea (25 thousand tonnes), a joint venture with Kolon, into production.

In conclusion the statement that technical plastics still represent an interesting material class characterised by high efficiency, interesting markets, growth, development of the manufacturers and a multiplicity of new application and development possibilities remains true. The forthcoming K'01 offers an opportunity to get an overview.

The Author of this Article

Klaus Kohlhepp, born in 1943, is responsible for market research and market intelligence with Tico-

na GmbH, Frankfurt/Main (Germany).

Contact: kohlhepp@ticona.de

Fig. 2. Estimation of world-wide consumption of technical plastics up to 2005 (including compounds and blends): the growth rate, more than 8% per annum, is clearly higher than in other branches of industry Verbrauch Welt = World-wide consumption; Mio t = million tonnes

Fig. 3. Estimation of world-wide consumption of blends of technical plastics up to 2005: PC blends grow at 10% per annum Verbrauch Welt = World-wide consumption; Mio t = million tonnes

Fig. 4. Estimation of consumption of technical plastics up to 2005 according to products and regions (including that required in blends but without blend

components such as PS, ABS and ASA that do not belong to the technical plastics group) Verbrauch Welt = World-wide consumption; Mio t = million tonnes; % p. a. = % annually; Andere = Others; Asien/Pazifik, ohne Japan = Asia-Pacific without Japan; Amerika = America; Europa = Europe

Fig. 5. Average prices for technical plastics in the European market (non-reinforced standard types) Preise = Prices

Fig. 6. Comparison of market prices for PA 6 (blue) with the European Industrial Production Index (IPI; red) Preise = Prices; Dez. = Dec.