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Plastics innovations for the upturn in the construction sector

Few customer industries have been hit as heavily by the 2009 economic crisis as the construction sector. Sales of pipes, profiles and boards have fallen dramatically. Since the end of 2008, manufacturers of semi-finished products, plastics processors and machine manufacturers have experienced a significant drop in business, introduced short-time working and in some cases even throttled back their capacity. By the time of K 2010, manufacturers of pipes, profiles, boards and insulating materials are hoping for a revival of business.

The current market situation is difficult to assess. Although few precise figures are available, it looks as if the crisis bottomed out in mid-2009 and the market then stabilised at a low level. If the US market, where the housing market totally collapsed in 2007/08, is taken as an indicator, it even seems conceivable that there may be a slight upturn for plastics in the construction sector. Grounds for this assessment are supplied by a study published by the **Freedonia Group** market research institute from Cleveland, OH, USA, at the beginning of 2010. The recovery of the market could give a boost particularly to such products as claddings, pipes, windows, doors, trim, fencing and decking.

Nevertheless, say the market researchers, global growth in the construction industry from 2008 to 2013 will fall well short of that from 2003 to 2008, averaging 2.9% per year compared to the previous period's annual average of 7%. Only insulating materials are not expected to drop as sharply, with an average projected growth of 3.8% to 2013 compared to the 4.4% over the previous five years. For both of the above periods, there can be no doubt that the markets of strong growth are neither in the USA nor in Western Europe. Quite the opposite, in fact: according to KI Kunststoff Information, a moderate decline is expected in Western Europe for 2010, with recovery not on the horizon until 2011.

If one considers the market situation for certain products, it is noticeable that business with profiles has slumped to a greater extent than with pipes and both are much worse off than business with panels for insulation. Against the background of the growing shortage of resources and increasing energy awareness combined with many government grant programmes for thermal insulation projects, it is understandable that there is still demand for expanded foam board – specifically in the developed countries of Western Europe and the USA. For the production of so-called XPS board (board made of extruded polystyrene), combinations of two extruders have proven effective. While the first extruder is responsible for the mixing and homogenisation, the second serves as a cooling extruder. For this, **KraussMaffei Berstorff,** Munich and Hannover, Germany, offers a combination of a twin- and a single-screw extruder. By using its **Schaumtandex** lines, thermal insulating board foamed with CO2 rather than CFCs can also be produced. This process is becoming increasingly established as a result of its eco-friendliness.

There are two main reasons for the nosedive in the profile markets where insiders have reported falls of up to 70% for 2009. Unlike the pipe sector, where products are spread across many fields of application, the profile sector is strongly dependent on a single product, the main profile for windows. If, as in the current crisis, the demand for this drops, profile extruders have little scope for compensating for the slump with other products. Furthermore, the window profile sector has flourished in recent years on the developing markets in Eastern Europe, particularly Russia, and in the Far East. In both regions, demand has now dwindled almost to nothing. The reasons for this, among others, are that China is currently working off the considerable surplus capacity built up over recent years; and that in Russia renovation and construction work has collapsed due to serious difficulties with financing.

PVC remains the top choice of material

After protracted and in some cases polemical debates about PVC as a material, it has not only become established for the production of profiles but also undergone rehabilitation. Instrumental in polishing up the image of PVC, which is better suited than any other material for window profiles, has been the Bonn-based **PVC und Umwelte.V. (AgPU)** study group. In many different projects, AgPU has demonstrated PVC's recyclability. In Germany today, about 80% of all used windows are collected and recycled by **Rewindo,** a scheme organised by leading German manufacturers of window profiles. According to AgPU, about 70 companies are now engaged principally in PVC-recycling. This integrated approach offers the PVC industry and PVC applications in the construction sector new opportunities for the future, not only in Germany and Europe.

Overall, European manufacturers of window profiles processed over 1.6milliont of PVC in 2008 and generated sales of over EUR4billion with their over 20,000-strong workforce. The industry's latest developments include coloured profiles, profiles with more than five chambers and installation depths of over 80mm, and profiles with a core layer of recycled material. While in Eastern Europe demand is mainly for standard white windows, in Western Europe there is fast-growing interest in coloured profiles. **RenolitAG** from Worms, Germany, has developed **Solar Shield Technology (SST)** especially for hotter climate zones. This innovative technology exploits the reflective properties of colour pigments to reduce heat irradiation and enables film-laminated profiles to take exposure to temperatures exceeding 70°C in their stride.

The demand for main window profiles with six and more chambers and installation depths of over 80mm is being fuelled by the high standards of energy-saving demanded in Western Europe and especially in Germany. Such profiles are used particularly in passive houses. By introducing a new window profile with a core layer containing 50% recycled material, **profine GmbH,** Berlin, Germany, is making an active contribution to environmental protection. This profile is a fully mature product and comparable to any conventionally manufactured profile.

Despite the high acceptance of PVC profiles, the last year and a half have been strongly affected by the recession, with extruder manufacturers experiencing plummeting sales. Wolfgang Studener, longstanding General Manager of **Battenfeld**

Extrusionstechnik GmbH in Bad Oeynhausen, Germany, outlined the prospects for his sector in an interview in 2008: “In the medium term, we expect high investment requirements in housing because existing houses and flats will have to be modernised to offset rising energy costs. Machine manufacturers will therefore have to maintain high standards if they are to stay competitive.” This is also the goal pursued with the strategic mergers and alliances in the industry. In mid-2009, for instance, **HTI AG** merged the Austrian companies **Theysohn, Technoplast** and **Topf** specialising in high-tech extrusion for the PVC sector. KraussMaffei Berstorff and **Greiner Extrusion GmbH,** Nussbach, Germany, and **Cincinnati Extrusion GmbH** in Vienna, Austria, are now cooperating with **Gruber & Co. Group GmbH,** Pettenbach, also in Austria, in the field of profile extrusion and also collectively offering complete production lines. In 2008, Cincinnati and Gruber launched a high-performance line with a double-strand die which has broken through the 1,000kg/h barrier in the production of five-chamber profiles. In addition to their good price-performance ratio, complete production lines usually provide the customer with a well-balanced, single-source machine solution. Battenfeld Extrusionstechnik also specialises in complete lines as well as offering very attractively priced standardised lines for various applications in the profile sector. These are **winBEX** for window profiles, **techBEX** for technical profiles and **miniBEX** for small profiles.

WPC profile market continues to grow

Wood-plastics composites (WPCs) are still undergoing major further development and showing potential for growth. According to **nova-Institut GmbH** in Hürth, Germany, these alternative products are enjoying growing quantity sales even in the crisis. Today, it says, over 1.5milliont of WPCs are already being produced worldwide, above all in North America (roughly 1milliont), China (200,000t), Europe (170,000t) and Japan (100,000t). In Europe, Germany at 70,000t is the leading producer and also the leading machine manufacturer, nova-Institut reports. Ulrich Reifenhäuser, Managing Director of **Reifenhäuser GmbH & Co. KG Maschinenfabrik,** Troisdorf, Germany, also estimates the interest in “quasi-wood products” to be very strong. In Germany, Eastern Europe and Russia in particular, WPCs are much in demand, although this strong interest has not yet manifested itself in a matching volume of orders for machines.

While in the USA WPCs are mainly used as construction products for decking, fencing, railing and siding, their applications in Europe also extend to the automotive industry and other sectors. Here, too, however, the main product is the floorboard (decking) which, because it requires no maintenance and is resistant to weathering, is making its mark as an alternative to tropical timbers above all outdoors, i.e. on terraces and in public places. Sales of decking profiles are achieving double-digit annual growth. An example of WPC decking is the **Relazzo** premium terrace system developed by **Rehau GmbH** for which the profile manufacturer has developed the compound itself. **Tech-Wood International Ltd.** in Kent, UK, has launched an entirely new WPC product by the name of **simply housing** on the market. This is a modular system for the simple and swift erection of whole houses made of wood-fibre-reinforced plastic profiles.

For the production of WPC profiles, Cincinnati Extrusion, for example, has its **Fiberex** conical twin-screw extruder series with adapted downstream equipment. Reifenhäuser recently unveiled its **BiTrudex** direct extrusion line with a combination of a single-screw and a counter-rotating, parallel twin-screw extruder which achieves a haul-off speed of 2 m/min. An entirely new machine concept, which is also suitable among other things for the production of WPC compounds, comes from **MAS Maschinen und Anlagenbau Schulz GmbH** based in Pucking, Austria. The **New Conical Technology** extruder is a conical co-rotator that combines the advantages of the two machine technologies.

Multi-layer set to become the standard for pipes

“Even where there are no window profiles, there’s always water,” says Walter Häder, Managing Director of Cincinnati Extrusion GmbH, Vienna, Austria, explaining why the pipe sector has been less severely hit by the crisis than profiles. 16milliont of plastics were processed into pipes worldwide in 2008. Here, again, PVC is the preferred raw material with a share of about 65%, followed by PE and PP. With rising raw material and energy costs and increasingly tough requirements in terms of pipe functionality, there is growing demand for multi-layer pipes, says Battenfeld Extrusionstechnik. About half of the pipe extrusion lines leaving its plant in Bad Oeynhausen are designed for multi-layer pipes. Typical multi-layer pipes are HDPE pressure pipes with an external PP layer as protection from shock and impact loads, PEX pipes with an internal EVOH layer as an oxygen barrier, PP drain pipes with a foamed middle layer as sound insulation and to reduce weight, and HDPE cable protection ducts with an internal anti-frictional silicone layer. Thanks to their high functionality and adaptability to various process tasks, plastic pipes have been conquering more and more fields of application over the years and are steadily displacing conventional metal pipes from the market.

In their further development work, suppliers of pipe extrusion lines attach importance, firstly, to always satisfying changing requirements and coming up with the matching equipment for new products and materials. Secondly, however, they also respond to the desire for energy-saving and efficient lines so as to offer their customers highly cost-effective solutions. The latest projects at KraussMaffei Berstorff include an extrusion line for multi-layer PP pipes for well construction and a complete installation for the continuous production of PU-insulated pipes for hot and cold media. Cincinatti Extrusion recently launched a tailor-made extrusion solution for glass-reinforced PP-R 3-layer pipes with a special version of a **Talos** series extruder.

Output in pipe production is often restricted by the cooling of the semi-finished product. This is why machine manufacturers have recently been developing cooling systems. In 2008 Cincinnati Extrusion introduced its **KryoSys** system – a line strategy for halving the cooling section or doubling production capacity. The key component is the **KryoS** pipe head that cools the melt in the die and thus not only boosts output, but also prevents sagging. Battenfeld Extrusionstechnik has also developed its **Efficient Air Cooling (EAC),** an internal cooling system to increase output while simultaneously improving pipe quality.

K 2010, the world’s leading trade fair for the plastics industry, will be presenting a complete overview of production equipment for plastic pipes, profiles, boards and insulating materials for use in the construction industry from 27October to 3November2010 in Düsseldorf. On show will be innovations in application-optimised plastic materials for enhanced energy efficiency and production machines such as extruders, foaming lines and downstream equipment, plus the full complement of dies for extrusion.