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AN OFFICIAL ORGAN OF INDIAN PLASTICS FEDERATION

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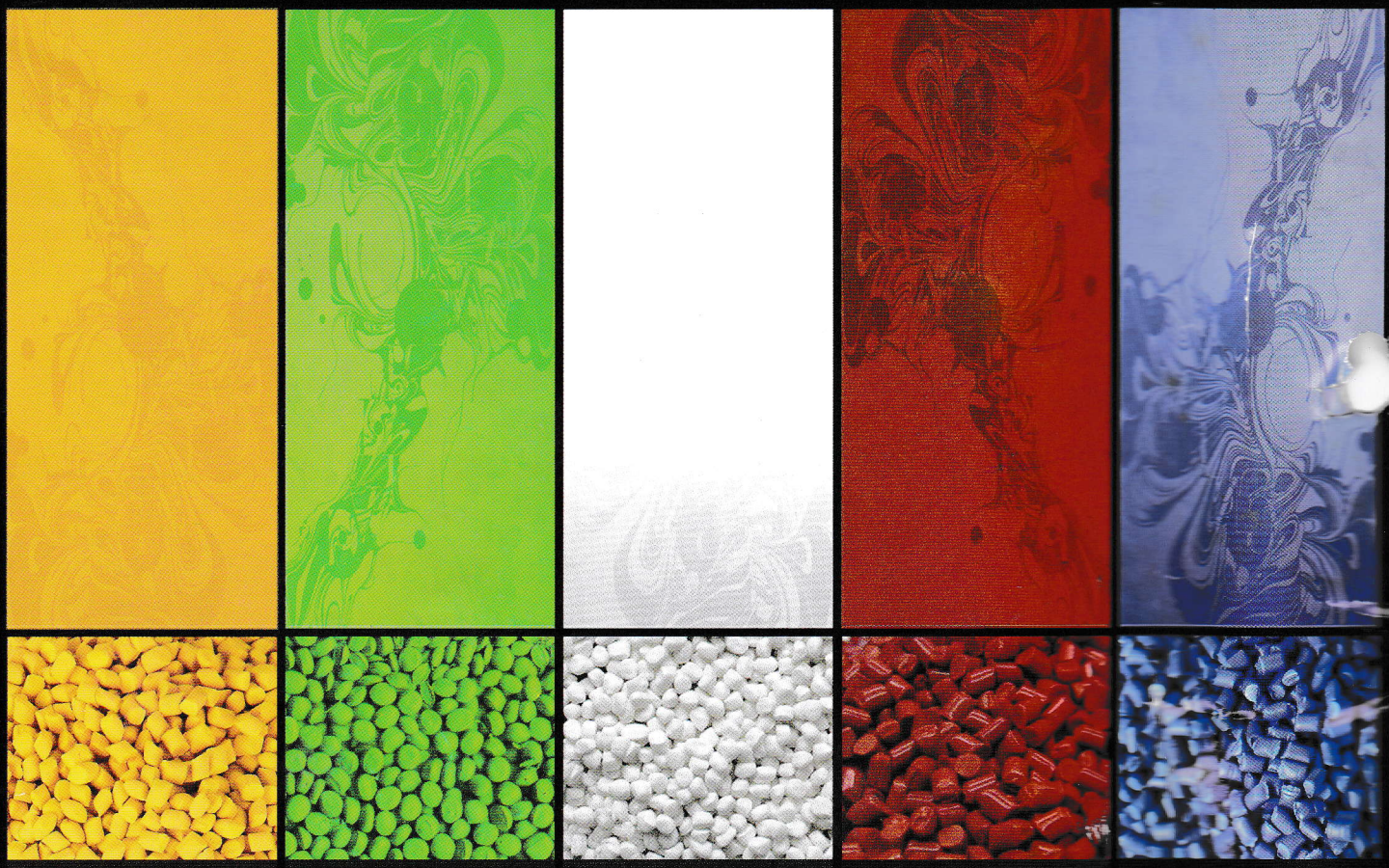

Products Details

Colour Master Batch • White Master Batch
Calcium / Talc Filled PE Compounds
Additive Master Batch • Any Other Plastic Compounds

User Industries

Woven Sacks (Raffia) • Films / Tarpaulines • Water Tanks
Non Woven Fabrics • Plastic Carry Bags

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PLASTICS INDIA

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Editorial

Dear Members,

Good day!

We are going to say Goodbye to 2011 and Welcome 2012. At this juncture let me wish you all a **MERRY X'MAS AND A HAPPY AND PROSPEROUS 2012.**

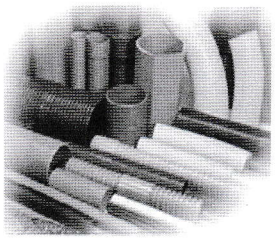
In this December issue I would like to deviate from my past issues and say a few lines about the 'PAST'. I think December would be the right time to talk about past since a few days are left to say goodbye to a year and welcome a New Year.

Past needs no introduction as we are all experienced it. The past consists of our experience, learned beliefs and all our good deeds and mistakes. Life cannot truly begin until we are able to say goodbye to yesterday at will. Like a hard disk of a computer, or a pen drive or a filing cabinet, the past is a resource of information for learning, but it is not a place to live. In the work place we do not spend our time in the filing cabinet. If we look at the past and spend our valuable time we will definitely be out from the present. So let us think how often will you/did you spend your day in the filing cabinet? Say goodbye and make it final saying farewell to yesterday, last month and last year is the sign of a person who wants to live for today and is truly alive to all the possibilities of 'the moment', while fully aware that all they think, say and do right now, creates tomorrow.

Our success in any field is the result of our own action. Hence, put in your best effort without craving for the result thereof. Anxiety for the future result disturbs the equanimity and contentment of our mind. If we are not content with what we have today, we will never be the content later, because it is the same mind we carry throughout. The mind goes on creating desires. We have to maintain a sense of contentment now and at the same time we have to aspire for higher things. Contentment does not mean a state of inactivity and inertia. It is not a state of complacency. We need to have a purpose and a goal in life. In the pursuit of that goal, we maintain equanimity while we are acting. We will get the right result. Thus, the place to be happy is here and the time to be happy is right now.

So, I hope, for a better tomorrow you are all will rise to the present, leaving behind the past.

Pradip Nayyar
Editor



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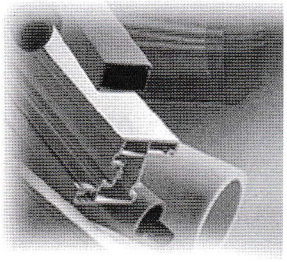
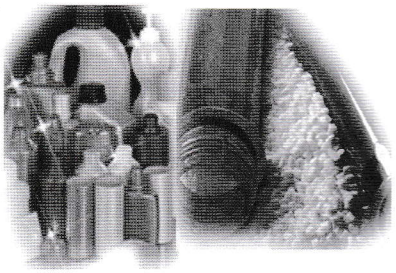
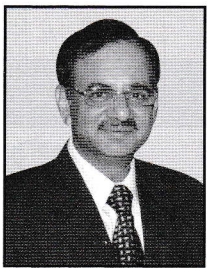




PRESIDENTIAL ADDRESS



Dear Members,

The year 2011 has almost come to an end. The year has witnessed its ups and down. Slowing of economic growth, volatility in the market, inflation, suspension of FDI in retail, Lokpal bill and many others were the hot topics in the media. The market is uncertain as to what 2012 has in store.

Will the crisis in Europe and America prevail? The quicker they recover from the crisis the better it will be for the Indian market since up's and down's in their market affects us. In the midst of this pessimism the plastics industry was perhaps the least affected and continued to grow.

IPF is participating in Plastindia 2012 exhibition to be held from February 1 - 6, 2012 at **Hall No. ODPA, Stall No. 3**. The Federation has decided to hold its National Launch Function of Indplas'12 exhibition on 3rd February 2012 at the auditorium above Hall No. 8 at Pragati Maidan, New Delhi. Special Indplas'12 Calendar is being prepared for this purpose and it will be distributed to participants at Indplas'12 launch as well as to exhibitors in Plastindia 2012 and IPF members. Members are requested to book their stalls in Indplas'12 as early as possible to avail of Early Bird Discount facility being offered to exhibitors.

I take this opportunity in wishing **A Merry Christmas** and **Happy New Year** to all of you.

With warm regards

Rajesh Mohta
President

SECRETARIAL REPORT

Dear Members,

Preparations for holding All India Launch Function of Indplas'12 at Pragati Maidan, New Delhi is going on in full swing. IPF Committee members, who are associated with promoting Plastindia 2012 exhibition in neighbouring countries – eastern region hosted the launch function of Plastindia 2012 at Hotel Pan Pacific, Sonargaon, Dhaka on 7th December 2011. The launch function was well attended.

Work on updating of our Memorandum and Articles of Association of the Federation has started and a Company Secretary has been appointed to carry out the work.

The Federation participated in the First Advisory Board Meeting of MSME-TC held in the Conference Room of their Centre on 2nd December 2011.

Wishing all members and their families a **MERRY CHRISTMAS** and a **HAPPY AND PROSPEROUS NEW YEAR.**

With best wishes

(Pradip Nayyar)

Hony. Secretary

Advance in Extrusion

Part I

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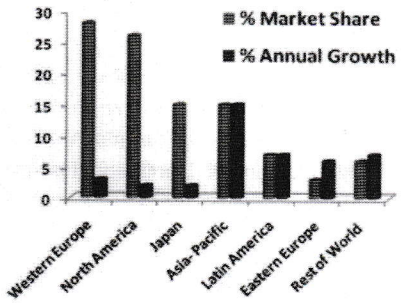
Enhanced consumption appetite of the Indian middle class, ability to spend on modern lifestyle products, increasing dependency on ready to eat snack food products and the 'trend of small' in retailing has given impetus to the demand of specialized resins & machine technology for imparting specific properties to the flexible packaging films to offer best quality and add shelf appeal. Next generation machine can help the film converters to address the challenges related to film properties, life, appeal & cost economics simultaneously.

Packaging Industry: Global

- Size of Packaging Industry Worldwide (est.) : USD 1200 Bn. (2010-11) (excluding machinery)
- US packaging market accounts for about 24 %
- Western European packaging industry is dominated by Germany, France, Italy & U.K
- Paper & Board leads with 36% of the world market followed by Plastics
- World packaging industry has been growing at a rate of 4 - 5 % per annum

World Packaging Market by Region: 2010



Region	Market Share (%)	Annual Growth (%)
Western Europe	28	2-3
North America	26	1-2
Japan	15	1-2
Asia- Pacific	15	10-15
Latin America	7	7
Eastern Europe	3	6
Rest of World	6	7
Total	100	6-8

Indian Packaging Industry

India's strong economic growth over the past few years is fueling growing consumerism and demand for better products. Consumption pattern has changed due to marked shift in the spending behavior of growing middle class; and especially the younger generation which has an increased bias towards spending and consumption versus saving as in the past. The strong economic growth has led to an increase in the working population and rise in disposable income. This coupled with easier financing options is feeding consumer spending. Growing work and time pressure in today's nuclear family is leading to changes in food behavior. There is an increasing acceptance of Ready to Eat (RTE) and Ready to Cook (RTC) foods. The modern working class generation opts for branded products that offer better quality and hygiene. Daily use commodity foods such as rice, flour, cereals, sugar, salt etc, which were earlier sold loose, are now sold in packed form under various brands. There is a gradual shift from traditional small stores to modern retail. Further, even the traditional small stores are moving from selling products in loose form to packaged form.

- The Indian market for all types of packaging materials is estimated variedly between Rs. 900 & 1200 billion per annum.
- Of this, the consumer packaging market has been estimated at around Rs. 540 billion.
- Consumer Packaging is highly fragmented, with only a small percentage of companies above Rs.1 billion sales revenue mark.
- Bulk packaging is primarily in the small scale sector, mainly on account of the

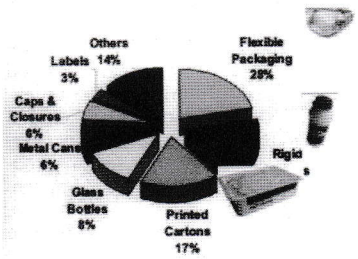
Government's reservation policy for the SSI sector.

- In the packaging sector, there are very big Indian players, Indian MNC & foreign firms operating in India on a JV basis or as subsidiaries.
- eg: Amcore, Uflex, Positive Packaging, Paper Products Ltd, Essel Propack Ltd, and Betts India Ltd, Bilcare.
- On the packaging machinery side, while a wide range of manufacturing, the industry also imports machinery, especially at the high end with more sophistication.

Growth Drivers for Indian Flexible Packaging Industry

- Strong economic growth
- Consumption boom from growing middle class
- Rise in working population and income levels
- Increasing nuclear family & changing food behavior
- Profusion of brands
- Changing retail

Market Share of Packaging (by value)



Indian Packaging - Notable Developments

- Metal cans and glass bottles have lost large markets to flexible plastics.
- Flexible packaging has replaced all forms of rigid packaging; the flexible packaging segment has seen many new innovations – the concept of the single use unit pack is now globally acknowledged as a marketing first.
- Laminate tube has almost entirely replaced the aluminium collapsible tube for toothpaste packaging, now making inroads into the pharmaceutical sector.

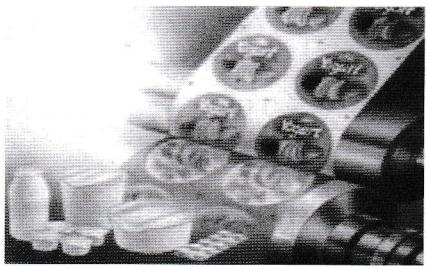
Indian Flexible Laminate Market

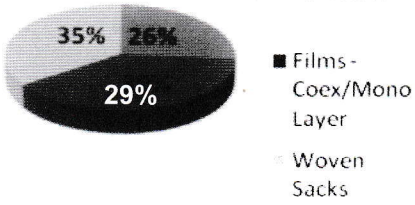
- Total Flexible Packaging Market ~4,300,000 MT
- Comprising 3 broad packaging types
- 400 flexible packaging converters in India
- Flexible laminate organized Sector India market (800,000 Tons)

  Organized National ~ 300000 MT

  Organized Regional ~ 200000 MT

  Un Organized ~ 300000 MT
- Estimated addition in capacity in 2011 ~ 30000 MT.

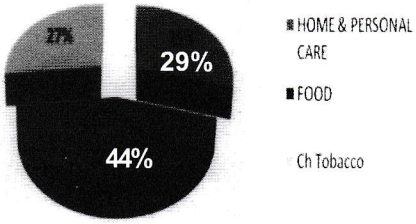




- Specialty Laminate- 26%
- Films -Coex/Mono Layer -39%
- Woven Sacks- 35%

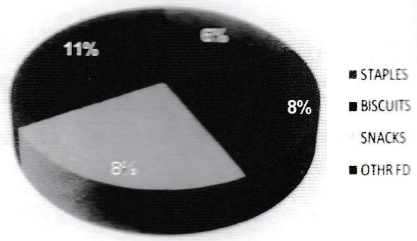
(The figs. are industry estimates)

Key Segment in Laminated Flexible Packaging (Sources: Indian Institute of Packaging)



Food Segments

The rise in organized retailing in India's second-tier cities made for a competitive packaging market since 2008-2010.Companies catering to FMCG became very aggressive in this period, and packaging became a big tool for launching new, India-specific products in different shapes and sizes.. The review period witnessed a flux of partnerships and joint ventures, with many foreign packaging players entering the scene to gain a slice of the large pie. Due to lower manufacturing costs, India is fast becoming a preferred hub for packaging production. The Indian packaging industry has made a mark with its exports that comprise flattened cans, printed sheets and components, crown cork, lug caps, plastic film laminates, craft paper, paper board and packaging machinery. The fastest growing packaging segments are laminates and multi layer flexible packaging, especially BOPP, BOPET, Woven sacks & Multilayer films/Barrier packaging films.



The economic boom in India has given momentum to such sectors as packaging, agriculture, infrastructure and health care – all of which use polymers for packaging, and therefore rely on the plastics process technology. This will result in a great demand for plastic processing machinery and ancillary equipment, consequently creating a huge opportunity for business development in the plastics packaging industry. This is the simple reason why a lot of imported advance extrusion machinery players, including India, are keen on investing in the Indian extrusion film business. Furthermore, a lot of joint ventures are expected to take place in the Indian plastics processing & machinery sectors.

On the global scene ruled by the World Trade Organization, it is imperative for India to upgrade its packaging standards through innovative technologies in order to be on a par with the world's best practice. Almost all the major players were seen to expand their existing capabilities & technologically advancements to tap into the fast growing competition and emerging needs for export quality market for Indian packaging products.

Environmental concerns are fast catching the attention of all the stake holders in the Indian packaging industry. The expansion of packaging as a profitable industry in India, dragged along by that of the retail and FMCG sectors, has brought with it environmental concerns. Customer are actively seen promoting awareness in this regard in order to promote the packaging industry and make people aware of the real concerns about the environment & packaging cost optimization.

Plastic packaging will make further inroads in India. Plastic is expected to increase its share of the market to 49% (in volume) in 2014 as it makes further inroads into paper applications. The percentage understates plastic's share since less plastic is required than paper in most applications due to its lighter weight. In addition, plastic has greater ability for light weighting than paper. Plastic has made the greatest gains in primary packaging but remains much less significant than paper and paperboard in secondary packaging and shipping containers. Plastic packaging growth by volume is expected to outpace that of paper packaging through 2014 in nearly all competitive markets and is forecast to expand 2.3% pa through 2014.

Advances for plastic processing technologies will be the result of its competitive cost and performance advantages, including light weight, moisture resistance, enhanced barrier properties and puncture resistance. Plastic has continued to expand its share in a number of markets despite the sharp spike in resin prices in recent years. More moderate resin pricing through 2014 and the development of new applications for biodegradable plastics with advance processing extrusion machineries should make plastic even more competitive against any other substitute for paper ,Foil ,Glass & metallic packaging substrates.

Opportunities in the foodservice and protective packaging markets will also reflect improved outlooks for consumer spending in advance technology machines and manufacturing activity. Moreover, increased emphasis on packaging sustainability will enhance the competitiveness of films in some applications based on environmental advantages including recyclability, renewability and biodegradability. Flexible packaging demand in competitive markets will expand at a slightly faster pace than that of other packaging based on above-average growth for other plastic containers. However, plastic will continue to gain ground in competitive rigid packaging. Flexible packaging gains will be aided by above-average growth for protective packaging and pouches. Improved manufacturing output & advancements in machine technologies and global sales will bode well for products such as air pillows and bubble packaging, foam packaging, which provide cost-effective options in the protection of goods from shock, vibration, abrasion and other damaging effects of shipping and handling. Pouches will make further inroads into rigid packaging and other types of flexible packaging based on attributes of cost effectiveness, enhanced barrier properties, space savings, lighter weight, aesthetic appeal and source reduction capabilities. Agricultural films will boost the crop productivity in near future with advance green revolution techniques.

As per packaging.indiabizclub.com India's flexible packaging market has accelerated on account of several factors including:

- A growing middle class of over 300 million.
- The conversion of the more traditional rigid packaging into flexible forms.
- A favorable government tax structure, reduction in excise duty.
- Globalization and the influx of multinational companies.
- Modern plants and equipment available to the flexible packaging industry.
- Most advance converting technologies made inroad to replace metal, glass, paper & foil based packaging.

Despite many hurdles, advance machineries have sensed that the scenario is slowly changing, with the majority of processors choosing automated machinery with advancements for better productivity when they see the high cost savings and higher production rates.

It is also observed that a mere 20% of the population in India consumes 80% of the packaged production. There exists an exceptional gap in India between the necessary and actual demand for packaging of essential commodities and this is one of the major reasons why the growth of flexible packaging is not an alternative here but is rather an imperative. The consumer market dominates the global packaging industry and accounts for an estimated 70% of sales, with industrial applications taking the remaining 30% of the share. The food industry is the single largest end-user market, valued at around US$145 bln, followed by the beverage industry at approximately US$75 bln. A high degree of potential exists for almost all user segments in India which are expanding like Processed Foods, Mouth Fresheners (panmasala), Beverages, Confectionery, Bakery Products, Spices, Edible Oils, Soaps and Detergents, Drugs and Pharmaceuticals, Cosmetics and Personal Care, Chemicals and Fertilizers, Office Stationary, Engineering Products.

The Indian packaging industry is a combination of organized large Indian and International companies and the unorganized small and medium local companies. The organized sector of the industry may be less than 5% of the companies in the overall industry but it nevertheless controls over 70% of the market by volume. The organized sector operates in the laminated product segment such as form-fill-seal pouches, Tetra packs, Retort pouches, Specialty barrier packaging films and lamitubes.

According to industry experts, annual flexible packaging consumption per capita in various parts of the world is roughly as follows: • N. America: US$45, Japan: US$31, West Europe: US$25, South Korea : US$15, Thailand : US$3, China : US$2, India : US$1.It is clearly emphasize that there are lots of scope to capture packaging applications in India with tremendous business scope in packaging film segments.

Packaging consumption in India- volume wise

There are around 13,000 converters in India with majority in the small and medium sector located in all parts of the country. It is estimated that there are more than 300 flex-pack (flexible packaging) converters in India – 100 units in the organized sector constituting 40% of the Indian flexible packaging industry and about 200 in the unorganized sector that make up the remaining 60%. Most small operations have processing capacities of less than 250 tons a month and produce over wraps, co extrusion films, and polysacks. At least 20 flex-pack converters process more than 4,000 TPA and are

Years	1990	1995	2000	2005	2010
Converted Flexiable Packaging Demand	63	153	295	595	1125
By Material					
Plythylene	19	54	100	190	340
Polypropylene	5	20	60	160	360
Other Plastics	19	35	60	105	175
By Market					
Nonfood	16	39	74	146	270
Paper and Foil	20	44	75	140	250
Food	47	114	221	449	855

Source:packaging.indiabizclub.com (Volume in KT)

on par with leading international operations.

India makes most of the equipment needed by the converting industry, including rotogravure printing presses, laminators, slitters, and pouching machines. A full range of semi-automatic to fully automated & advanced machine technologies available in multi layer film machines, filling, sealing and wrapping machines which are manufactured in India. These machines are of high quality and are very competitive in price and are exported in a big way to developed countries as well. There are some 600 to 700 packaging machine manufacturers, 90% of which are in small and medium sector and located all over the country.

Multilayer films plants have been catering to the needs of co-extruded films for flexible packaging industries. All types of flexible packaging applications like Semi-cooked or cooked food, Edible Oils, Vanaspati, and Milk, Water etc. for different barrier, aesthetic and heat sealing properties are met for higher shelf life. Multilayer films apart from food packaging have market in pharmaceuticals and cosmetic. Shrink Wrap and stretch cling wrapping are few of the bulk consuming applications.

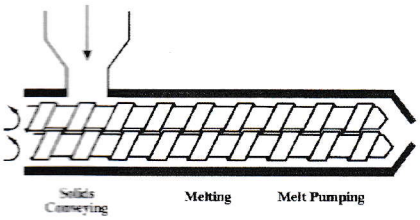
Post production operations for quality packaging is being important part, and machines technology for producing films which run trouble free on 'FFS' machines. Sealing, printability is more important than any other operations. Packaging substrate also require, contact clarity, impact resistance and most important blend ability of various raw materials to meet the most demanding packaging requirements - which cannot be obtained from just one polymer - are being obtained through multilayer advance technologies & manufacturing techniques. Hence, multi layer films plant technology become functionally important for the most cost effective manufacturing for various combinations of polymers.

.....to be continued in the next issue.

Modified Plastics by Compounding

Compounding consists of preparing plastic formulations by mixing or/and blending polymers and additives in a molten state and finishing a homogeneous stock in the form of free flowing dry-blend or pellets, ready for conversion. Compounding is an essential step when a rector resin or physical blends of resins cannot be directly processed to make molded or extruded plastic products that have to meet specific application requirements.

The first step in most plastic fabrication procedures is compounding, the mixing together of various raw materials in proportions according to a specific recipe, developed to meet end-use requirements in terms of mechanical properties, heat & weathering resistance, electrical properties, flammability, aesthetics, dimensional accuracy, and so on. In order to achieve a homogenous compound, accurate dosing of raw materials and very good dispersion and distribution of all ingredients is the key to the compounding process. Mixing liquids with other ingredients may be done in conventional stirred tanks, but certain operations demand special machinery. Dry blending refers to the mixing of dry ingredients prior to further use, as in mixtures of pigments, stabilizers, or



reinforcements. However, polyvinyl chloride (PVC) as a porous powder can be combined with a liquid plasticizer in an agitated trough called a ribbon blender or in a tumbling container. This process is also called dry blending, because the liquid penetrates the pores of the resin, and the final mixture containing as much as 50 percent plasticizer, is still a free-flowing powder that appears to be dry. The workhorse mixer of the plastics and rubber industries is the internal mixer, in which heat and pressure are applied simultaneously.

The Banbury mixer resembles a robust dough mixer in that two interrupted spiral rotors move in opposite directions at 30 to 40 rotations per minute. The shearing action is intense and the power input can be as high as 1,200 kilowatts for a 250kg batch of molten resin with finely dispersed pigments and additives.

In most cases, mixing can be integrated with the extrusion as in co- rotating twin-screw extruders. The development of high RPM & high output extruders integrated with multi-feeders in controlling the feed rates has become the choice of compounders in modification of Polyolefins, Polyamides, Styrenics and Engineering Plastics.

Twin screw extruder is used extensively for mixing, compounding, or reacting polymeric materials. The flexibility of Twin screw extruder two screws, side by side, are placed within the extruder barrel; they are either counter-rotating or co-rotating. Counter-rotating twin screw extruders are used primarily for processing PVC products such as pipe, siding, sheet, pellets, and film. The co-rotating units are used for compounding materials where thorough mixing and high output rates are important.

Twin screw extruder unit resembles a positive displacement screw pump. It conveys the material at low speeds with controlled shear. The positive action assures that all portions of the material experience a uniform residence time. Twin screw extruder allows this operation to be designed specifically for the formulation being processed. For example, the two screws may be co-rotating or counter-rotating, intermeshing or non-intermeshing. In addition, the configurations of twin screw extruder themselves may be varied using forward conveying elements, reverse conveying elements, kneading blocks, and other designs in order to achieve particular mixing characteristics. We shall now discuss types & role of additives in modification of Plastics.

Additives

In many plastic products, the polymer is only one constituent. In order to arrive at a set of properties appropriate to the product, the polymer is almost always combined with other ingredients, or additives, which are mixed in during processing and fabrication. Among these additives are plasticizers, colorants, reinforcements, and stabilizers. These are described in turn below.

Plasticizers

Plasticizers are used to change the T_g of a polymer. Polyvinyl chloride (PVC), for instance, is often mixed with nonvolatile liquids for this reason. Vinyl siding used on homes requires an unplasticized, rigid PVC with a T_g of 85 to 90 °C (185 to 195 °F). A PVC garden hose, on the other hand, should remain flexible even at 0 °C (32 °F). A mixture of 30 parts di(2-ethylhexyl) phthalate (also called dioctyl phthalate, or DOP) with 70 parts PVC will have a T_g of about 10 °C (15 °F), making it suitable for use as a garden hose. Although other polymers can be plasticized, PVC is unique in accepting and retaining plasticizers of widely varying chemical composition and molecular size. The plasticizer may also change the flammability, odour, biodegradability, and cost of the finished product.

Colorants

For most consumer applications, plastics are coloured. The ease with which colour is incorporated throughout a molded article is an advantage of plastics over metals and ceramics, which depend on coatings for colour. Popular pigments for colouring plastics include titanium dioxide and zinc oxide (white), carbon (black), and various other inorganic oxides such as iron and chromium. Organic compounds can be used

to add colour either as pigments (insoluble) or as dyes (soluble).

Reinforcements

Reinforcements, as the name suggests, are used to enhance the mechanical properties of a plastic. Finely divided silica, carbon black, talc, mica, and calcium carbonate, as well as short fibres of glass, wolestonite variety of materials, can be incorporated as particulate fillers. The use of long or even continuous rovings as reinforcement, especially with Polypropylene is fast developing (described below in Fibre reinforcement). Incorporating large amounts of particulate filler during the making of plastics such as polypropylene and polyethylene can increase their stiffness. The effect is less dramatic when temperature is below the polymer's T_g.

Stabilizers

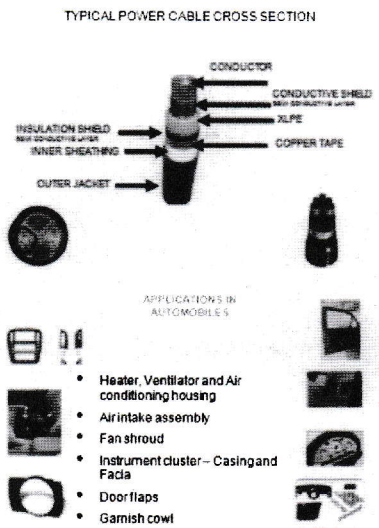
In order for a plastic to have a long and useful life in any application, the properties of that plastic should change as little as possible with time. Stabilizers are added, usually in small quantities, to counter the effects of aging. Because all carbon-based polymers are subject to oxidation, the most common stabilizers are antioxidants. Hindered phenols and tertiary amines are used in plastics in concentrations as low as a few parts per million. For example, butylated hydroxytoluene (BHT) is used in polyolefin packaging films for foods and pharmaceuticals. PVC requires the addition of heat stabilizers in order to reduce dehydrohalogenation (loss of hydrogen chloride [HCl]) at processing temperatures. Zinc and calcium soaps, organotin mercaptides, and organic phosphites are among the many additives found to be effective. Other stabilizers are designed specifically to reduce degradation by sunlight, ozone, and biological agents.

Markets for Thermoplastic Compounds

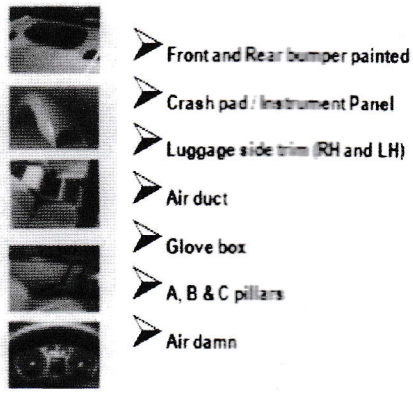
Typical Markets in India for significant compounds are given in Table-1.

Table- 1

COMPOUND TYPES	DESCRIPTION	MAJOR END-USE
Polyethylene Compounds	Black Sheathing Compound	Jacket for telecom Cables
	Black Sheathing Compound	Jacket for Power Cables
	Sioplast	Insulation layer
	Semi conductive layer	To prevent heat build up in power cables
	Medium density PE	IV bottles & squeeze bottles in Medicare
	Power cable sheathing	Electrical wires & cables
PVC Compounds		
Dry blends are not considered	Low Voltage insulation	
	Flexible compounds	In Footwear, Medical bags & tubing
Modified PP Compounds	For Automobile & Appliances	Bumpers, Interiors & Housings
Additive & Color Masterbatches	For Films Sheets & Moldings	BOPP, Houseware, Toys
Filler Masterbatches	Highly filled with Ca CO3	For Raffia, Synthetic Paper & Films



Applications in Automobiles



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Additives for Flexible Polyurethane Foam

ABSTRACT

Raw materials for flexible polyurethane (PU) foam can be divided into two groups: main raw materials like polyols or isocyanates and additives, typically used in much smaller quantities. These additives are indispensable to produce flexible polyurethane foam or to achieve certain foam properties. Typical additives include catalysts like tin components or amines, stabilizers, flame retardants and a huge variety of special additives for certain effects. Polyurethane flexible foam stabilizers are among these additives of special importance. They influence the properties of the resulting foam to a remarkable extent.

Flexible foam stabilizers chemically consist of polyether siloxanes. They are highly efficient in stabilizing polyurethane flexible foam during production. The chemical structure is explained and the consequences for the performance are indicated. Processing latitude, nucleation, VOC content and performance in burning tests are different aspects to differentiate stabilizers.

INTRODUCTION

Polyurethane flexible foam is produced with a small number of different raw materials. Foam stabilizers are used to improve the emulsification, nucleation and stability of the foaming mixture during production. The amount of the stabilizer is relatively small. Typical amounts of raw materials to produce 1 m³ of flexible PU foam are displayed in Fig. 1.

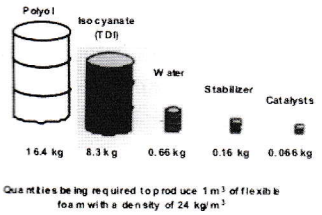

Fig. 1: Amounts of raw materials to produce 1m³ of flexible PU foam

Despite the relatively small amount, foam stabilizer is an essential raw material. It is also an additive which determines or at least influences many of the properties of the final PU foam. Choosing the right stabilizer allows the tailoring of the PU foam quality and enables a higher efficiency of flexible PU foam production. The selection of suitable stabilizers requires detailed knowledge about the performance of stabilizers as well as foam parameters affected by the stabilizer. The aim of this paper is to mention important factors in selecting stabilizers.

RESULTS AND DISCUSSION

Tasks of a Stabilizer in Flexible PU Foam Production

PU foam stabilizers are indispensable additives for the production of flexible PU foam. Without any stabilizer, a collapse would be observed in nearly all cases due to insufficient stabilization. Flexible foam stabilizers have additional tasks during the expansion of the foaming mixture. Due to the reduction of surface tension, they support the emulsification of different raw materials and improve the nucleation of very small gas bubbles in the initial stage. Furthermore, the coalescence of growing gas bubbles is reduced during the expansion of the foam and the foam is stabilized. In the final stage

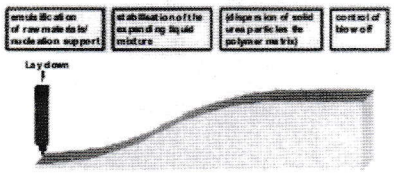

Fig. 2: Tasks of a flexible polyurethane foam stabilizer during production.

of foam expansion, the precipitation of urea particles starts. These aggregates destabilize the foam by causing cell window ruptures. The foam stabilizer has to prevent the collapse by dispersing these urea particles and allow the cell opening at a certain point of time to yield open celled PU foam.

Control of the blow off is one of the most striking features of a flexible PU foam stabilizer. Fig. 2 summarizes the different tasks of a flexible foam stabilizer.

It is evident, that very different tasks have to be managed by the stabilizer during foam production. Typical flexible foam stabilizers are a compromise between different requirements.

Chemical Structure and Performance of Stabilizers in Flexible PU Foam Production

Stabilizers for flexible PU foam contain polyether siloxanes as active ingredients. Polyether siloxanes are typical amphiphilic molecules consisting of two opposite parts in one molecule. Such molecules are called surfactants (= surface active agents) due to their tendency to aggregate at interfaces. Polyether siloxanes consist of a hydrophilic polyether part, being highly compatible with polyols, and a siloxane part, which is incompatible with all liquids except silicone oils. The siloxane part tends to move to interface with gases to lower the incompatibility with liquid phases. An orientation of the polyether siloxane takes place during expansion of the polyurethane foam, as displayed in Fig. 3.

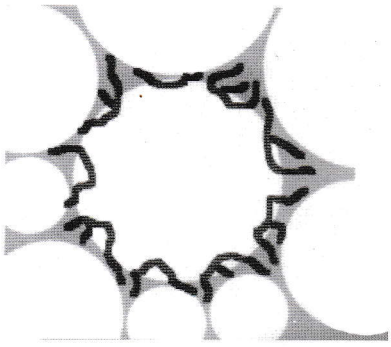

Fig. 3: Orientation of polyether siloxanes in expanding polyurethane foam. The siloxane part is marked in red, thepolyether in blue.

The siloxane part is exposed to the gas and the polyether branches are anchored in the PU matrix. The enrichment of the surface with surfactant strongly lowers the surface tension between polyurethane reaction mixture and gas.

The synthesis of polyether siloxanes consists of the separate production of the polyether block and the siloxane part. In the final step, a covalent bond between both parts is produced to yield the polyether siloxane. Two linkages between the siloxane backbone and the polyether are technically of interest. One consists of a Si-O-C linkage and the other of a Si-C-bridge. Fig. 4 displays the general structure of a Si-C-type polyether siloxane.

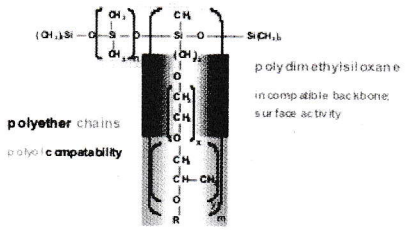

Fig. 4: Chemical structure of Si-C type polyether siloxanes used as flexible foam stabilizers.

Si-O-C stabilizers are medium active and offer a broad processing latitude. Si-C type stabilizers are highly active and offer advantages in flame retardant PU foams. The polyether part is made from propylene oxide and ethylene oxide. The ratio between both monomers tailors the hydrophilicity of the polyether part in the polyether siloxane. The ratio should reflect the polarity of the polyol to enhance the compatibility with the PU reaction mixture. Some other types of surfactants for polyurethane foam exist beside the polyether siloxanes used for flexible foam production. Organic emulsifiers are used for ester foam types as well as for the emulsification of incompatible liquids (natural oils for example). HR surfactants consist of unmodified siloxane oils. Rigid foam surfactants contain a higher share of ethylene oxide in the polyether and are subsequently more hydrophilic. Fig. 5 summarizes these chemical parameters in a triangular diagram.

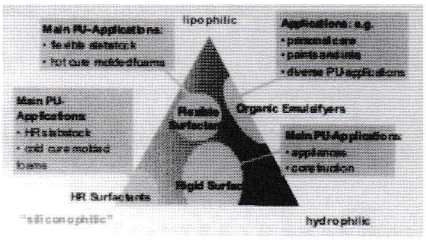

Fig. 5: Characterisation of different types of PU foam stabilizers in respect of their chemical composition.

Flexible foam surfactants can be found in the middle of the triangle. They are very efficient in lowering the surface tension, more than any other stabilizer type. Flexible foam surfactants are tailored to achieve a high surface activity and subsequently, high potency in stabilizing expanding polyurethane foams. Other foam stabilizers for applications such as rigid foam don't need such high stabilization potency. A ranking of different PU foam stabilizers regarding the potency is displayed in Fig. 6.

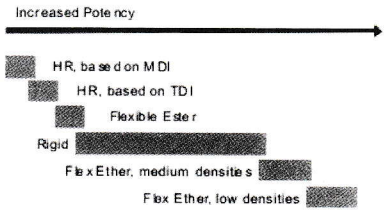

Fig. 6: Comparison of different PU foam stabilizers in respect of the stabilization potency

It is obvious that foams using MDI need less potent stabilizers. Flexible foam stabilizers have the highest potency. Lower foam densities require stronger surfactants due to a larger internal surface and stronger precipitation of urea. Overall, the stabilization of an expanding polyurethane foam results from two major sources. One factor is the chemical stabilization obtained from the foam reaction including polyol, isocyanate, cross linkers and catalysts. Especially the viscosity build-up during the reaction is of great importance. The second factor is the physical stabilization influenced by the foam stabilizer mainly due to a reduction of the surface tension. The sum of chemical and physical stabilization has to match the requirements of a certain foam type. In case of too much stabilization the foam is too closed and in case of too little stabilization, strong settling or even collapse is observed. The ratio between chemical and physical stabilization is not constant for different foam types. Ester foams, for example, have high chemical stability due to the high viscosity of the ester polyols. HR polyols often contain primary OH groups and are highly reactive. Ester as well as HR foam needs weaker stabilizers. In this case the usage of standard flexible foam stabilizers would result in an over stabilization. Fig. 7 summarizes these aspects.

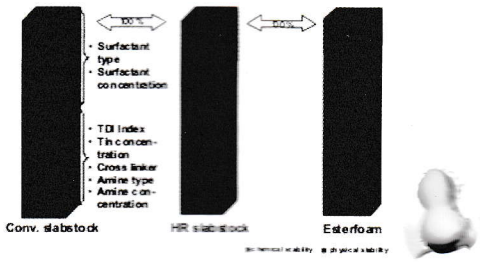

Fig. 7: Schematic drawing of the ratio between chemical and physical stabilization.

By using different amounts of stabilizer and tin catalyst, it is possible to tailor the overall stability of a foam formulation. The extent to which the change of concentration of both additives influences the stability of the formulation is reflected by the processing latitude. Small deviations of processing conditions like variations of air pressure are inherent in flexible foam production. In practise it is therefore advantageous to have the processing latitude as wide as possible. The processing latitude describes the concentration window where acceptable foam properties are obtained. Different stabilizers result in different processing latitudes. In general, the processing latitude is smaller for highly potent surfactants. The processing latitude can easily be measured by screening the foam properties (settling and foam porosity) at different stabilizer or tin catalyst levels. Fig 8 visualizes the processing latitude.

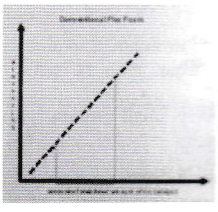

Fig. 8: Schematic drawing of the influence of stabilizer and tin concentration towards the processing.

The processing window is limited by shrinkage and collapse. Both limits correspond to certain additive concentrations defining the processing latitude. The concentration of the stabilizer is varied during such a screening and the settling is recorded. A typical curve like in Fig. 9 is obtained. A standard 18 kg/m³ test formulation was used in this case for the screening. The absolute values depend on many factors like density or filler content. At high concentrations almost no settling is observed, but the foam is also tight. Lowering the stabilizer concentration results in slight settling and the foam is open celled. This would be the preferred window for foam production. Lowering the stabilizer concentration even further yields very open foam structures, but the settling is also increased. The increase of settling is not a linear function, but is becoming stronger at lower concentrations. Finally, the strong settling is turning into collapse.

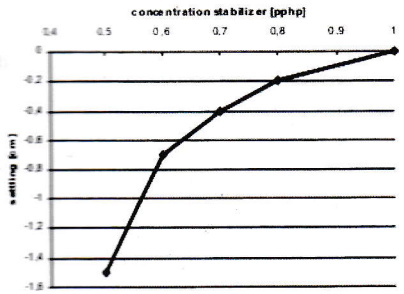

Fig. 9: The settling in a test formulation in respect of the stabilizer concentration.

Selection of Suitable Flexible Foam Stabilizers

Beside the stabilizer concentration, the selection of the right stabilizer is an important issue. By choosing optimized foam stabilizers, foam producers can profit

Fig. 10: Different factors influencing the selection of a suitable flexible foam stabilizer.

In many ways. Several different technical requirements have to be taken into account when selecting a stabilizer.

Fig. 10 mentions some technical factors which determine the selection of a suitable stabilizer. The different aspects are discussed separately.

Impact of the required Cell Structure towards the Selection of Flexible Foam Stabilizers

The cell structure of the PU foam is displaced by the cell size and the porosity of the foam. The cell size is influenced by the nucleation properties of the stabilizer. Especially for low density foams, a high nucleation efficiency of the stabilizer is of great importance. In liquid CO2 foaming the need for sufficient nucleation is even more important due to fast frothing. The nucleation efficiency of a flexible foam stabilizer can be tailored. State-of-the-art stabilizers for liquid CO2 processing offer the highest nucleation level and subsequently, the finest cell structure. Fig. 11 illustrates the difference between two stabilizers in respect of nucleation in a liquid CO2 blown foam. An unsuitable stabilizer results in an irregular cell structure with many large cells.

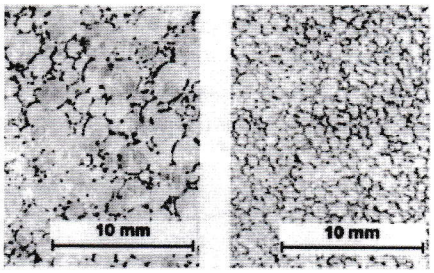

Fig. 11: Flexible PU foams made with liquid CO2 by using a surfactant not suitable for CO2 processing (left) and a surfactant optimized for CO2 technology (right).

Structural modifications of the polyether siloxane allow the optimization of nucleation properties. These modifications might be disadvantageous in respect of other stabilizer properties. Subsequently, different stabilizer types are available.

The porosity of the foam is typically controlled by the stabilizer and the tin level (the total stabilization level). Additionally, higher air flow can be achieved by using cell openers like cell opener polyols or special incompatible oils (ORTEGOL® 500 for example).

Impact of Foam Density towards the Selection of Flexible Foam Stabilizers

Density is a crucial point because it determines the optimum potency level of the stabilizer. A broad spectrum of differently active stabilizers is nowadays available. Lower the foam density, higher the potency of the stabilizer.

Impact of Different Raw Materials towards the Selection of Flexible Foam Stabilizers

Standard flexible foam polyols have secondary OH-groups and contain an excess of propylene oxide in the polyether chain. Highly reactive polyols need less physical stabilization. The usage of different polar polyols for viscoelastic foams, for example, may require alternative stabilizers with different polarity. Such stabilizers are available as well. Stabilizers with a higher hydrophilicity have typically a higher cloud point.

The functionality of the isocyanate contributes significantly to the chemical stability of the formulation. MDI types have a functionality higher than 2. This supports cross linking and provides additional chemical stability. Lower potency stabilizers are ideal for such formulations.

The incorporation of filler particles like calcium carbonate or melamine destabilizes the expanding foam and makes the usage of high potency stabilizers necessary. Sometimes the usage of dispersing agents is advisable in this case to avoid sedimentation as the dispersing properties of flexible foam stabilizers are limited.

Impact of the Demand for Low Emanation Flexible Foam towards Selection of Stabilizers

Volatile Organic Compounds (VOC) became an important topic in the last few years especially in the European market. Emanations from indoor products like mattresses are under the focus of non governmental organisations and retailers. Flexible foam stabilizers contain small amounts of unmodified, low molecular weight siloxanes as by-products. Especially cyclic siloxanes like D4 and D5 (Fig. 12) are often found to some extent.

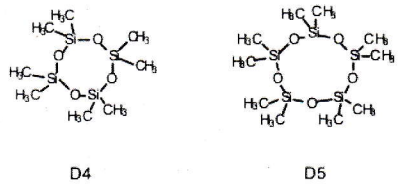

Fig. 12: Chemical Structure of the cyclic siloxanes D4 and D5.

These volatile siloxanes enter the foam formulation with the stabilizer and are subsequently released from the cured foam. Despite low toxicological impact, they contribute to the overall value of volatile organic compounds. The pressure to produce mattresses and furniture according to eco-labels led to the development of low emanation flexible foam stabilizers. The sum of all volatile siloxanes in flexible foam stabilizers is typically 0.3 to 1.2 %. Low VOC or low emanation stabilizers are purified by an additional production step and should have a content of volatile siloxanes below 0.1 % to avoid any conflicts with eco-labels and certificates. Fig. 13 displays the different levels of the volatile siloxanes content.

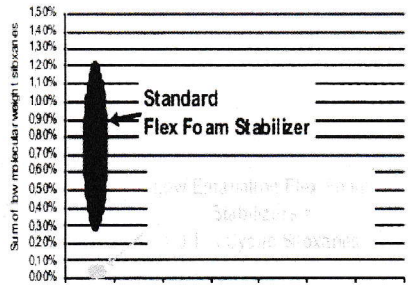

Fig. 13: Difference in VOC content between standard and low emanation flex stabilizers.

Evonik Goldschmidt offers a broad range of low VOC stabilizers. Also low emanation catalysts for various applications are available as well.

Impact of Flammability Requirements towards the Selection of Flexible Foam Stabilizers

For many applications flexible polyurethane foam has to meet certain flammability requirements. Due to the organic nature of the flexible foam, it is needless to mention that the material itself is flammable. Therefore, special measures are required to reduce the flammability of the foam. They include the use of additives such as flame retardants, modified polyols and also proper surfactant. Generally, silicone surfactants have a negative impact on flammability. Nevertheless, polyether siloxanes are indispensable additives for the production of flexible PU foams. It is, therefore, not possible to avoid their usage during production of flexible PU foam, but it is possible to modify the chemical structure of polyether siloxanes. The difference between conventional surfactants and FR optimized stabilizers in burning tests is remarkable. Fig. 14 displays two photographs of foams made with the same formulation, but with different stabilizers. Both foams were tested in a demanding FR test (BS 5852, Crib 5).

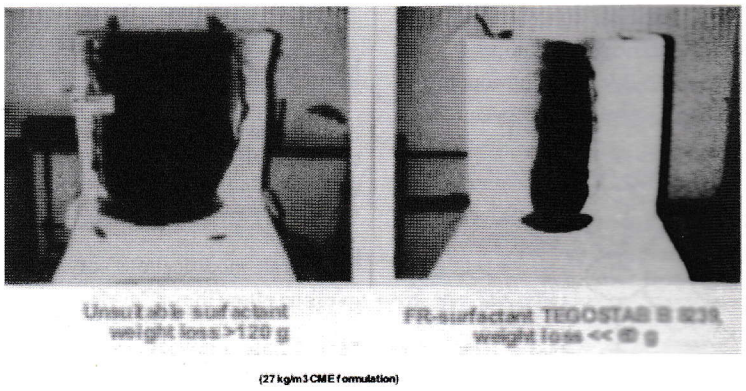

Fig. 14: Result from BS 5852 testing using the same formulation with a non FR suitable and a FR optimized surfactant

Only the sample with the FR optimized surfactant fulfils the requirements of this test. The different contribution of stabilizers towards the burning behaviour of flexible polyurethane foam results in the split of flexible foam stabilizers into three categories. Fig. 15 shows the different stabilizer groups.

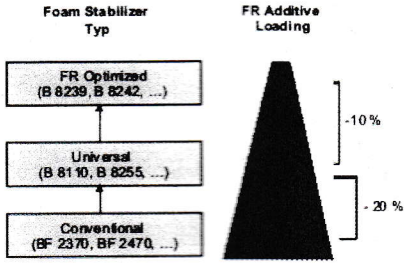

Fig. 15: Different types of PU foam stabilizers.

Conventional foam stabilizers have a negative contribution towards the flammability of polyurethane foam and should not be used for any flame retardant foam grade. Universal stabilizers are significantly better in terms of flammability impact and are suitable for standard burning tests like the California 117 test. The usage of FR optimized stabilizers is essential for demanding burning tests such as the BS 5852 (Crib 5) test. Standard burning tests also profit from the improved FR performance and a reduction of the flame retardant level of roughly 10-25% depending on the formulation and the foam density is typically possible. Overall, the usage of optimized FR surfactants allows foam producers to cut the cost of a formulation.

Contd. to Page - 21

IPF PARTICIPATION IN POLY INDIA 2011 AT HYDERABAD

Indian Plastics Federation participated in 'Poly India 2011' - an International Exhibition and Conference on Advanced Application of Polymers and Plastics organized by Dept. of Chemicals and Petrochemicals, Govt. of India, Central Institute of Plastics Engineering & Technology, Govt. of Andhra Pradesh in association with FICCI from 9 - 11 November 2012 at Hitex ground, Hyderabad. Poly India 2011 was supported by Indian Plastics Federation. Poly India 2011 was an exhibition followed by conference in challenges in achieving vision 2020 in polymer sector, Emerging business opportunities in Andhra Pradesh in the plastic sector, Export potential of plastics industries, new developments in plastic sector, and other Seminars. Around 100 participants from different plastic fraternity had participated in the exhibition. Indian Plastic Federation took a stall for promoting 'Indplas12' - an International Exhibition on Plastics from 5 - 8 October 2012 at Science City Ground, Kolkata. Indian Plastics Federation distributed Brochures and leaflets of Indplas12, Membership forms and other related activities on IPF. From IPF Mr. Amar Seth, Chairman Indplas12 and Mr. Jayanta Bandyopadhyay, Executive Secretary represented. IPF also distributed leaflets of Indplas'12 to every stall at the exhibition and gained mileage.

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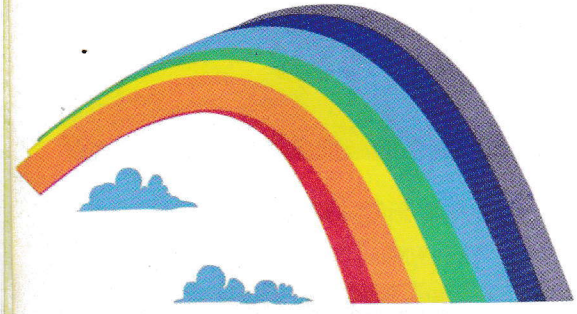

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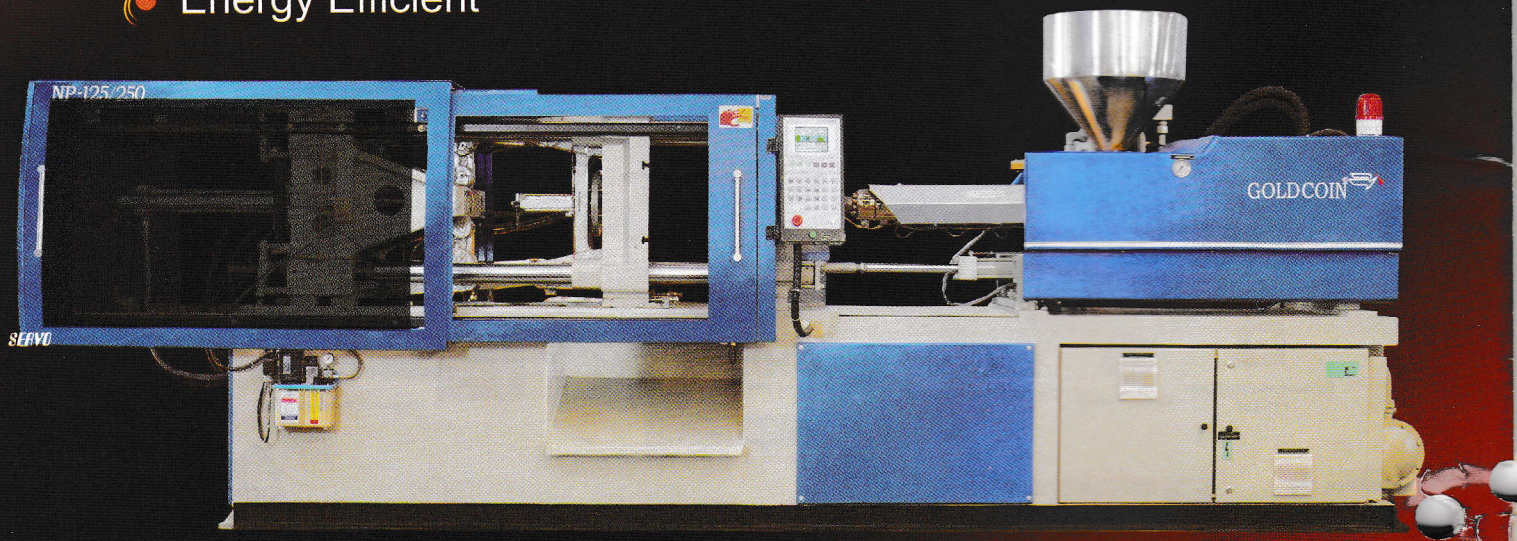

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Application of Dithiophosphates in Silica Reinforced Elastomer Compounds

Abstract

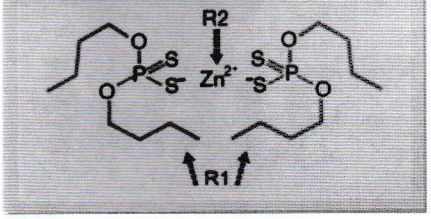
The application of dithiophosphates as either accelerators or sulphur donors during diene rubber vulcanization has been well established for many years. Numerous advantages of this group of accelerators versus well-known standard accelerators (i.e. reversion resistance, heat stability of vulcanizates, non-nitrosamine generating accelerator systems, good covulcanization in rubber blends) established dithiophosphates for common use in a wide variety of rubber applications. In tire tread model compounds, dithiophosphates were found to be a suitable secondary accelerator, powerful enough even to replace DPG, which is under permanent discussion for workplace hygiene reasons[1] as well as for its tendency to increase reversion tendency of compounds[2-4]. The present paper gives an overview and a summary, underlined by examples, of all known advantages dithiophosphates can offer in compounding. It shows in detail the application of dithiophosphates with different modifications in chemical structure. They are applied to solution SBR-based highly filled silica formulations and contain natural rubber as used for tire tread or other dynamically loaded elastomer products.

Introduction and Review

Technological improvement in processing and performance enhancement is a continuous effort in the rubber industry and closely related to economical feasibility in silica filler technology. Obviously, mixing and processing silica-filled compounds is more sophisticated for the polarity of the filler and an involved chemical reaction of silica and silane. Unwanted scorching of the silane system restricts industry in its flexibility in mixing and compounding. Many achievements in recent silane developments, in mixing and in extrusion equipment over the last decade have helped to overcome several of those difficulties. The everlasting challenge to optimize the magic triangle of wet-grip, abrasion and rolling resistance drives compounders and process engineers to improve technology on a continuous basis. Whichever new additive is introduced, it needs to support either dispersion quality, thermal process stability, co-cross-linking between the different (incompatible) rubber phases or general performance. Reversion under curing conditions shall be minimized and aging properties enhanced. Last but not least, a careful look at the dynamic performance (tan δ) of test compounds indicates whether the alternative accelerator will support rolling resistance and wet grip.

Until recently, the interaction of dithiophosphates in silica/elastomer systems was not fully understood. First studies demonstrated a synergistic effect of dithiophosphates with other components of silica compounds. Indeed, they can positively affect the aging characteristics of tires which was proven by the tire industry in the early 90s [6]. Dithiophosphates, however, are surface-active liquid substances. Therefore, their application in polar/nonpolar systems will always have some effect, not only on the curing characteristics and network properties, but also on the phase morphology and the state of dispersion of solids. A certain range in polarity and molecular weight results in specific migration behaviour in rubber compounds. Nowadays, the carbon chain length in dithiophosphorous metal salts as well as the sulphur chain length in dithiophosphoryl polysulfides are close to tailor-made. However, all commercially available products, as well as newly invented products, show the base structure given in Figure 1.

Figure 1: Basic chemical structure of dithiophosphates

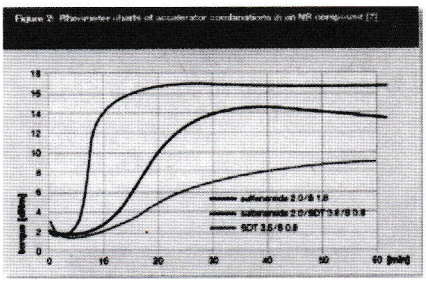


Polymer-bound dithiophosphates available from Rhein Chemie suitable for silica applications are:

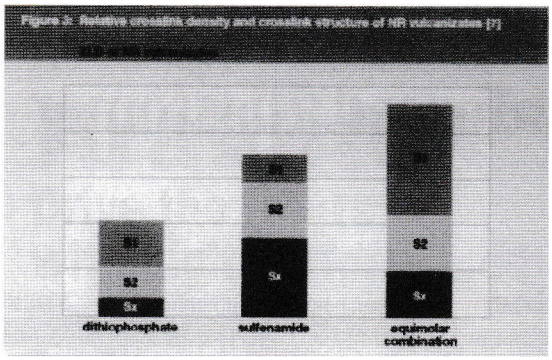
- Rhenogran® SDT-50
  = dithiophosphoryl polysulfide
- Rhenogran® TP-50
  = zinc dialkyl dithiophosphate
- Rhenogran® ZBOP-50
  = zinc dialkyl dithiophosphate
- Rhenogran® ZDT-50
  = zinc dialkyl dithiophosphate

The materials listed above are also available as silica-bound dry liquid concentrates (Rhenocure®).

From earlier studies, dithiophosphates are known to be synergistic co-accelerators, particularly when combined with sulfenamide type accelerators. They meet the requirements for fast cure and high plateau modulus, and suppress the reversion tendency of all sulfenamide class accelerators when added at low to moderate levels to an NR compound as shown in Figure 2.



The analytical explanation for the outstanding heat performance of those compounds was given by the determination of the crosslink structure of these networks. Compounds that contained only sulfenamide type accelerators generate a high yield of polysulfidic crosslinks at a high yield of total bonds. Dithiophosphates produce a high yield of monosulfidic bonds at a low yield of total



bonds. The combination of both results in a synergistic yield of a high portion of monosulfidic and disulfidic bonds at high levels of crosslink density (XLD) (Figure 3).

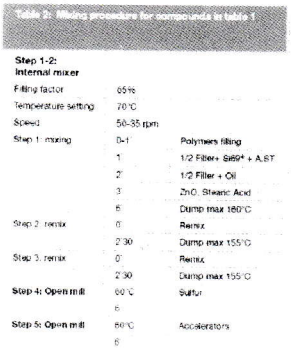
The multiple effect of curing characteristics, network stability, surface activity and silane interaction, when using dithiophosphates in silica compounds, shows an unexpected influence on curing characteristics, dynamic properties and rheological behaviour which is described in the following paper.

Experimental

This study was performed by using an SSBR, NR, BR blend as a simplified model compound for a silica tire tread containing natural rubber (Table 1).

Table 1: Rubber formulations silica tire tread compound

Compound		1	2	3	4	5	6
SSBR	Buna® VSL 5025-0	30	30	30	30	30	30
BR	Buna® CB 24	40	40	40	40	40	40
NR	SMR 20	30	30	30	30	30	30
Silica	Ultrasil® 7000	80	80	80	80	80	80
Carbon black	N 115	10	10	10	10	10	10
Silane	Si 69®	7,5	7,5	7,5	7,5	7,5	7,5
Stearic acid		2	2	2	2	2	2
ZnO		3	3	3	3	3	3
Processing prom.	Aktiplast® ST	4	4	4	4	4	4
Wax	Antilux® 654	2	2	2	2	2	2
TMQ	Vulkanox® HS/LG	2	2	2	2	2	2
6PPD	Vulkanox® 4020/LG	2	2	2	2	2	2
TDAE oil		8	8	8	8	8	8
S		2	2	2	2	2	2
CBS	Vulkacit® CZ	2	2	2	2	2	2
DPG	Rhenogran® DPG-80	2,5	0				
Sulfur donor	Rhenogran® SDT-50			2			
Accelerator	Rhenogran® TP-50				2		
Accelerator	Rhenogran® ZBOP-50					2	
Accelerator	Rhenogran® ZDT-50						2



Mixing and testing was performed by utilization of the equipment in Table 3.

Table 3: Mixing and testing equipment

Equipment	Type
Internal mixer	W&P GK 5E
Mill	Rubicon MT 6" x 13"
Press	Agila PE 100
Stress, strain	Zwick T1-FR010TH.A50
Moving disk rheom.	Alpha MDR 2000 P
Rubber process analyzer	Alpha RPA 2000
Mooney rheometer	Monsanto 1500 S

Compounds were prepared as described and tested according to DIN or ISO methods.

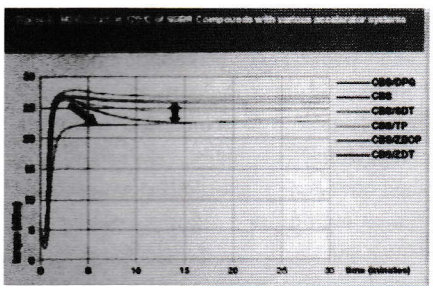
Results and Discussions

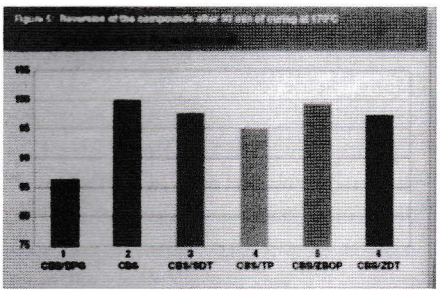
Studies of dithiophosphates · Replacement of DPG

The above described compounds (Table I) were tested according to their curing behaviour and their physical properties after vulcanization.

Reversion resistance and heat build-up

Uncured properties were characterized by Mooney and MDR rheometer. The comparison of rheology of the various compounds shows that the system -1- CBS/DPG results in high cross-linking and strong reversion after 5-10 min of curing at 170°C. System -2- which contains no co-accelerator (CBS only) is more stable in reversion, however the curing rate is slow and the torque level is reduced, indicating insufficient cross-linking. System -3- contains SDT, a dithiophosphoryl polysulfide, which is a sulfur donor and replaces DPG. This system establishes the highest curing level and is rather stable concerning reversion. All other systems are co-accelerated by zinc dithiophosphates of various carbon chain lengths (TP, ZDT, ZBOP) and also result in high curing rates, high torque levels and stability towards reversion (Figure 4).





All dithiophosphates show synergistic effects with CBS and considerably better

reversion resistance than DPG (Figure 5). This supports a homogeneous cross linking pattern across the diameter of the tread.

General Physical Properties

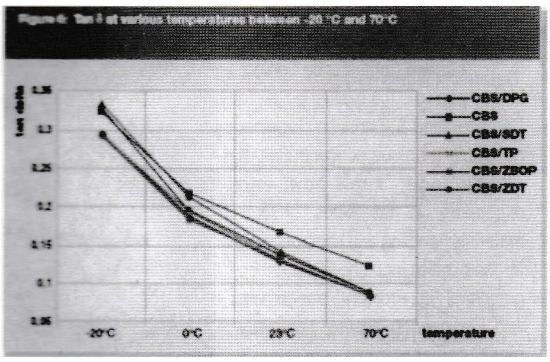
Physical testing after curing of samples resulted in the following physical properties:

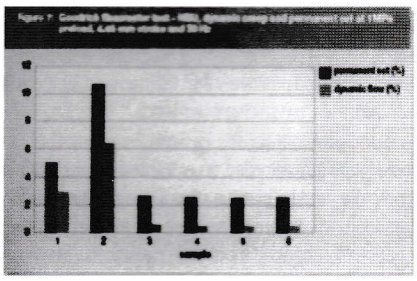
Table 4: Results of standard physical testing

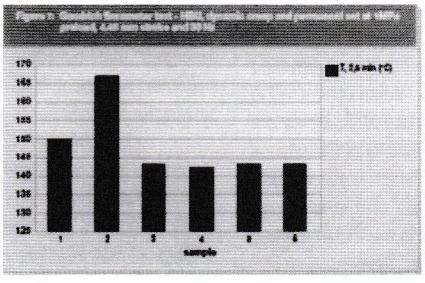
	CBS/DPG 1	CBS 2	CBS/SDT 3	CBS/TP 4	CBS/ZBOP 5	CBS/ZDT 6
Shore hardness A @ 25°C	73	68	74	73	73	71
Shore hardness A @ 70°C	71	64	71	70	70	70
Rebound res. (%) @ 25°C	46	43	47	47	47	47
Rebound res. (%) @ 70°C	62	55	63	63	63	63
Modulus-50% (MPa)	2.2	1.8	2.3	2.3	2.3	2.2
Modulus-100% (MPa)	4.2	2.9	4.5	4.5	4.4	4.2
Modulus-200% (MPa)	11.5	7.3	12.3	12.3	12.2	11.8
Tensile strength (MPa)	18.9	19.6	17.4	16.9	17.9	16.8
Elongation at break (%)	297	412	260	256	269	259
DIN Abrasion (mm3)	111	113	112	111	118	113
Mooney-ML (1+4) 100°C	76	85	82	79	80	81

Dynamic Properties

Dynamic data was evaluated and is shown in Figure 6. The slope of tan δ gives a first indication as to whether damping properties (wet skid) at low temperatures (0°C) and hysteresis loss at service temperatures (70°C) are suitable for tire use. Under dynamic load the system -2- (CBS only) shows an expectedly higher tan δ at 70°C. This is most likely a consequence of a lower cross-linking level. The hysteresis loss can be expected to be inferior. Systems containing dithiophosphates have generally slightly higher tan δ at lower temperatures compared with the control system -1-. This would be of an advantage for wet skid optimization. At high temperatures all dithiophosphate systems match the tan δ level of the control system. Thus, an adequate or improved dynamic (rolling, skid) performance of dithiophosphate systems can be expected. The systems were also tested in Goodrich flexometer to evaluate an impact of the crosslinking structure on heat-build-up properties.



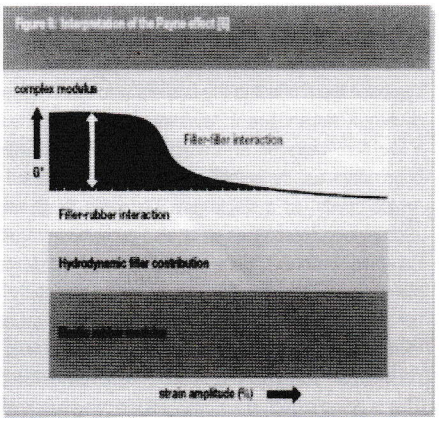




A significant improvement of dynamic network stability indicated by much lower dynamic flow, permanent set and heat build-up is the result of substitution of DPG by any of the applied dithiophosphates (Figure 7). The particular resistance of diene rubber compounds cured with the addition of dithiophosphates is based on the high yield of monosulfidic and disulfidic sulphur bonds in the final rubber network. Retarded dynamic aging and network degradation is expected if a dithiophosphate system is applied for this purpose.

Surface Activity

Since this does not fully explain the phenomenon of the extraordinarily high positive effects of dithiophosphates on the general physical properties when applied to silica rubber compounds, further studies in the future will focus on the role of dithiophosphates in silica surface activation. Dithiophosphates are considered to be dipolar zinc soaps which would partially be attached to the polar silica surface during mixing and processing. A first indication of unusually high surface activity is given from the fact that zinc dithiophosphates (Rhenocure® TP/S) can offer an opportunity for partial replacement of silane without loss in coupling intensity as described in [5]. This can be either interpreted as a (unlikely) coupling reaction itself or higher efficiency of coupling by a higher filler-rubber crosslink yield during vulcanization. It was found that the surface activation effects by the addition of zinc dithiophosphates also lead to a homogenization of the compound during mixing.



The strain-induced reduction of complex modules (Figure 8), is known as the "Payne effect". In our trials, the Payne effect was reduced to a significantly lower level after addition of dithiophosphates when compared with the other compounds as shown in table 5. An interpretation of the ineffectiveness of SDT in the system -3- can be explained by the missing Zinc ion in SDT in comparison with the higher surface activity to the zincdithiophosphates. This effect will be subject of further studies, however.

Table 5: Payne effect (RPA 2000, 80°C, 1Hz), G(1%)- G*(300%) [MPa]

Delta G*	497	561	526	433	455	442

Conclusion

Dithiophosphates are a suitable product group for obtaining SSBR/NR-based silica compounds with a high performance level. This group of accelerators is synergistic with sulfenamide type accelerators. It is possible to eliminate or to reduce DPG by substitution with dithiophosphates, without sacrificing physical key properties. Dithiophosphates will improve reversion resistance in silica compounds based on SSBR, NR and BR and out-perform standard curatives in terms of dynamic heat stability. The dynamic properties are matching tire tread requirements on a laboratory scale of trials. The surface-active properties of highly soluble, dipolar and liquid dithiophosphates may have an impact on filler dispersion and silane coupling efficiency which will be a subject of further studies. Dithiophosphates have considerably less environmentally hazardous potential, they do not form N-nitrosamines during vulcanization and are non-toxic and non-irritable to the skin.

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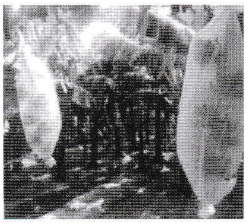
* * *

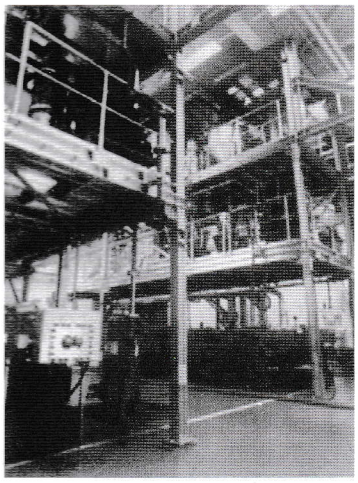
PP Non Woven for Banana Covers

PP Non woven, the wonder material, has become an integral part of human life today. From packaging to single use medical wear, it touches all walks of life 24 x 7. Yet the market is growing and many more new applications are emerging. One such new application is 'Banana cover'. Historically, India is one of the largest producers of Banana in the world. However, its exports are minimal due to various reasons. One such limitation is the non uniformity in size and presence of black spots on the skin. Farmers have been addressing these issues for quite some time, but in vain. They have been looking for a cover which prevents the insect attack and at the same time allows water and air to pass through, yet at an affordable cost. PP Nonwoven has come in handy in addressing all the needs. To check the efficacy of the product, large scale trials were conducted across the country under different climatic conditions. The results were encouraging. The next important task is how to introduce the product to the farmers who are in large numbers cutting across the country. Kisan and Krishi Melas were targeted. In one such Krishi Mela at Kolhapur, a live demonstration of a banana tree covered with PP Nonwoven around the bunch attracted thousands of farmers. This resulted in enquiries to the extent of 15 lac covers on a single day. Thus, the much awaited product was unveiled successfully. Responses were also received from other Agri Melas conducted in Baramati, Vellore, Tiruchi, Valsad, Anand etc. More and more such Melas are planned across the country. The estimated potential of banana cover is 10,000 tons per annum. The value addition is Rs 200/kg as of now, which was hitherto unimaginable in other co-sectors. This is one such example on the untapped potential of PP Nonwoven, which is relatively a new product in the Indian market. This is being explored for other fruits such as Guava, Grapes, Pomegranate etc. Contact V Kannan, RIL, Mumbai, Cell : 09987048023.



Coperion 3D Simulation of a Turnkey Compounding Line Turnkey plants as a strategic aim

Coperion GmbH has set itself the strategic aim of strengthening its position in the market for complete turnkey plants for the plastics industry. Its two Competence Centers Materials handling and Compounding & Extrusion together constitute a unique concentration of competence, know-how and experience in the fields of bulk materials handling and compounding for the plastics industry. Experienced personnel in Project Management and Engineering ensure that every plant comes up to customer's expectations in terms of delivery, cost and performance. The resulting synergies that benefit Coperion's customers have been received by the market so positively that the demand for them is growing more and more.



Visitors to Coperion's Stand at Dusseldorf were afforded an extraordinary insight into the design and construction of a complete turnkey plant: a compounding line which in reality would be a good 150 meters long, will be presented in a 3D simulation using augmented reality technology. Coperion experienced more than satisfactory business in terms of firm orders at K 2010.

Ms Poorvi C. Desai,
Sr. Manager,
Business Development Polymers,
Reliance Industries Limited

"Polyethylene Geomembrane For Water Proofing In Vertical & Horizontal Walls Of Buildings To Increase The Life Of Buildings"

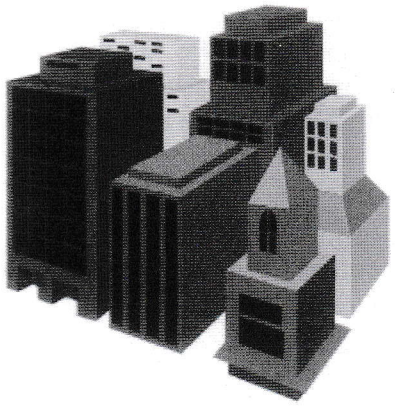
Plastics For Entrepreneurs

Plastics, with its versatility, bring in new products as new projects are born each day. Plastics is the future of building and construction industry. Plastics encourages creativity amongst people which has led to it being one of the leading material in building and construction. Plastics, help in new developments for entrepreneurs, for achitects and builders and for common man. Plastics processing involves extrusion, injection moulding, blow moulding, thermoforming, rotational moulding and calendaring. Amongst extrusion, film extrusion which started with films for packaging would propagate to new end-use and innovations such as polyethylene geomembrane as a waterproofing membrane for building and construction industry.

Plastics, is commonly used in polyethylene flexible packaging laminates protecting the packed contents from moisture. It could also be used in vertical and horizontal walls of building and construction preventing each building from water seepage leading to longevity of each building. In vertical walls polyethylene geomembrane could be inserted in each brick so that this polyethylene film stands in a vertical position embedded in the vertical walls of each building. Polyethylene film is an impermeable membrane preventing seepage of water in buildings.

Plastics are long lasting products which help buildings last longer. Lining the walls of buildings with plastic geomembrane leads to damp free walls. This prevents leakage in buildings which leads to collapsing of structures. Plastics, has helped in developing green buildings in numerous ways.

High Density Polyethylene Geomembrane as a waterproof membrane in Vertical & Horizontal Walls of buildings to increase life of buildings



Cost Benefit to Enduser

Life of Building Increases by 20% reducing the corrosion of steel rods

1 kg of Polyethylene 3 layer Geomembrane of 250 microns in 70 sqft of wall Selling Price of PE Geomembrane is Rs 145/kg(including Excise Duty)

(Source: Trimurti Plastic Industries, Pune)

Payback for Enduser

1. Cost of Building & Construction – Rs 2000/sqft

2. Assuming 1000 sqft area of home – 1000 * 2000 = Rs 20,00,000

3. Assuming life of the building – 60 years

4. Rs 20,00,000 for 60 years

5. Rs 33,333 for 1 year

6. Rs 6,66,660 for 20 years

7. Assuming 1000 sqft area of home with dimensions of 35 ft * 30 ft =1050 sqft

8. 35 ft(Outer Wall of the building) * 15 ft (height) = 525 sqft

9. 30 ft(Outer Wall of the building) * 15 ft (height)= 450 sqft

10. Total Area = 975 sqft

11. Material Cost – 70 sqft = Rs 145/kg, 1 sqft = Rs 2/kg, For 975 sqft = Rs 2000, Rs 2000 * 5 = Rs 10,000(Assuming Rs 2 per sqft, 5 times the material cost for inserting the geomembrane between 2 bricks in vertical walls of buildings)

12. Manpower Cost for Building & Construction without PE Geomembrane = Rs 10/sqft

13. Manpower Cost for Building & Construction with PE Geomembrane = Rs 15/sqft

14. Manpower Cost for Building & Construction with PE Geomembrane = Rs 14,625 or Rs 15,000 (Rs 15/sqft for 975 sqft)

15. Total Cost = Material Cost + Manpower Cost = Rs 10,000 + Rs 15,000 = Rs 25,000

16. Savings for 20 years = Rs 6,66,660

Net Savings = Rs 6,66,660 – Rs 25,000 = Rs 6,41,660

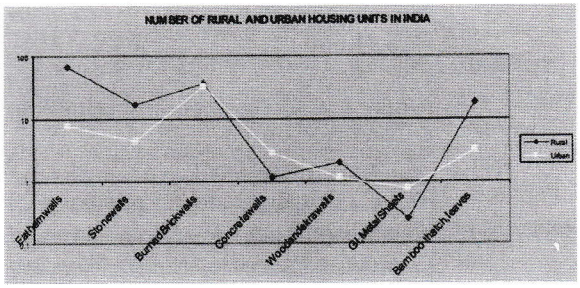
(Source : Civil Engineer from Building & Construction)

HDPE Geomembrane as a waterproof membrane in each building could be of thickness 0.08 mm to 2.5 mm & width of 2 to 7 mts. HDPE Geomembrane has • excellent stress resistant cracking performance. • Excellent performance of chemical erosion resistance. • Big scope of application temperature and long service life. Geomembrane is produced by three layer coextrusion process and processed at 2000 C.

Recommended properties of PE Geomembrane – Tensile strength >17 Mpa, Elongation at break > 550%, Right angle tearing strength >110 N/mm, Puncture Strength > 550 N, Chemical Resistance – At 80 deg, marinated at 5 g/L Nacl for a long time, it will not erode or swell, Permeability Coeffecient < 1*e-13 g cm/(cm2 S.Pa)

Cement is needed for building & construction, geomembrane is needed for waterproofing. Polyethylene film acts as a leakproof material, a mirror reflection of the versatility of the product made up of linear low density polyethylene or low density polyethylene.

Wide films for PE Geomembrane need to be looked at by entrepreneurs. Focus should be on High output machines for achieving higher volumes of business and lowering the costs of conversion. Membrane, a film which separate two layers of cement and sand act as a waterproofing membrane. Polypropylene geotextiles act as a separation fabric between layers of stone and sand, polyethylene geomembrane acts as a separation film between 2 layers of cement and sand.



(Total Housing units = 195 million)

(Source : http://209.85.175.104/search?q=cache:ujBEjp9Nd0YJ:tejas.serc.iisc.ernet.in/curr)
(Census of housing 1991)

Seepage of water through cracks is prevented by this polyethylene geomembrane. Collapse of structure could be prevented by this polyethylene geomembrane, thereby saving lives.

Plastics in the form of a film is versatile in innumerable applications, mulch film in agriculture, three layer film for milk and edible oil, carry bags and now in polyethylene geomembrane for water proofing.

Unbound are these benefits, unbound are the enduses.

Building and construction activity is safe with products like HDPE Monofilament Construction nets as well as PE Geomembrane. If PE Geomembrane could be used in each building in the country, this would lead to a high volume business for entrepreneurs in the country.

Plastic films are versatile with leak proof characteristic. Leakproof and waterproof are properties of these plastics films.

Manufacturing Process of 3 layer PE Geomembrane

The manufacture of 3 layer composite film requires 3 extruders feeding resin through hoppers into a single die. Each extruder processes specific material and is fed through a common spiral, mandrel and the layers are brought together in the die.

The film passes through a common sizing calibrator into collapsible boards to the top nip roller, which is water-cooled.

The platform on which the extruders are mounted may be rotated or the nip roller which is water-cooled.

The platform on which the extruders are mounted may be rotated or the nip roller rotated to minimize thickness variation. From the nip roll the film made is passed through a corona treater to the turret winder station.

Conclusion

This product would help existing processors of PE Multilayer film in increasing product mix, average selling price, capacity utilisations, net profitability by higher volumes of business. This would make the product cost competitive vis-a-vis existing Water proofing materials such as fibres. Eg if only 20% of production is used for manufacturing PE Geomembrane, the selling price of PE Geomembrane could be lowered, balance 80% of the project could be run with a higher selling price. Increasing the life of each building is the aim of each builder. Additionally, Retention of paint takes place if there is no leakage. Polyethylene waterproof geomembrane plays a role of preventing collapse of the building and can save lives of innumerable people in the country

PE Geomembrane in vertical and horizontal walls makes a building a leakproof one.

For more details :
www.emeraldgroupe.in

Innovation

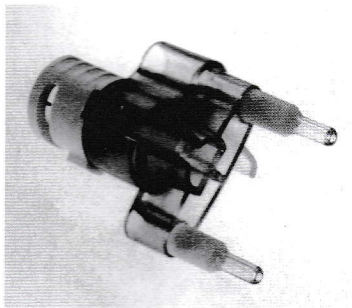
Nypromold Aggressively Pursuing External Business In Healthcare Industry

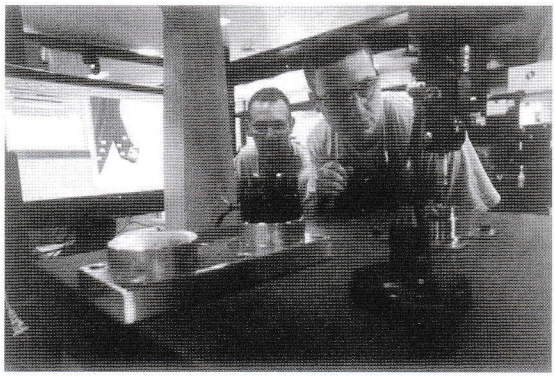
NyproMold will exhibit independently for the first time at a major exposition at the MD&M East exposition in New York, being held June 7-9 at the Javits Convention Center in New York City.

In business since 1988, NyproMold is 50% owned by Nypro Inc. of Clinton, MA. The company started as a moldmaker focused on supplying molds to Nypro's worldwide locations. In the last 7-10 years NyproMold's business has shifted from being a moldmaker to a start-to-finish mold solutions provider, not only to Nypro, but also to many market-leading companies who need a full service mold solution with the capability to execute globally. Today, NyproMold is aggressively pursuing external business, according to Jennifer Raymond, Business Development Manager at the company. "We are one of the largest, high precision moldmakers in the USA, but many people are not aware that we supply molds to many companies, not just Nypro," said Raymond. "We are working to change that perception."

Medical – a Key Market

MD&M was chosen as the venue for NyproMold's first exhibit because medical/healthcare is a key market for the company. Approximately 50% of NyproMold's sales are to the healthcare industry. "Our three top markets are healthcare, packaging, and consumer electronics," said Raymond. "While we are experiencing strong growth in all three, we felt that the time was right for us to exhibit at MD&M to further show our capabilities to the healthcare industry."





NyproMold works with top market leaders, both molders and brand owners, delivering mold solutions in a variety of segments within the healthcare market. These include drug delivery devices (i.e. inhalers, syringes), pharmaceutical packaging (i.e. closures, containers), medical devices, diagnostic, and medical/surgical tools.

Up-Front Involvement and Technology

NyproMold promotes the concept of 'early supplier involvement' ('ESI'), getting involved with customers at the earliest stages of their project. "Continuous improvement is quite difficult in the healthcare market place," said Bill Muldoon, President of NyproMold. "The high cost of change and long lead times to validate changes after the product has been initially approved drives the need to optimize and develop thoroughly on the front end. Optimization costs go up and the ability to change is reduced each day the project progresses. For NyproMold , this is a great opportunity to deliver value to our customers." Utilizing the latest technology in design and simulation tools, NyproMold's engineering team can assess overall customer needs and offer expert advice on the moldability of the product design. Once product design has been approved, the NyproMold team develops high-performance mold solutions to meet and exceed objectives, and work as an extension of the customer's team until the project is fully executed and the product is successfully delivered to the end-user. "Innovation delivering value is NyproMold's focus whether it's a more robust part, faster cycle time, reduced material content, longer mold life, or something else that is our customer's highest priority, to in turn deliver value to their customers," said Muldoon.

Company Growth

With two locations (Clinton, MA and Gurnee, IL) NyproMold has over 100,000 ft2 of manufacturing space and employs over 150 people. The company has experienced strong growth over the past two years and is aggressively hiring, adding 12 people in the past year alone. NyproMold continues to bolster their capability to deliver mold solutions globally and has exported over 500 molds from their U.S. operations."We have invested over $4 million in the past 18 months in new equipment and technology," said Bill Muldoon, President of NyproMold. "In addition to our moldmaking capabilities, we have numerous molding machines in-house, from 50 – 500 tons, that we use to develop, test, and qualify customer molds."

For more details:
www.nypromold.com

Material Update

VICTREX PEEK Polymer Specified In New High-accuracy Low-cost Ultrasonic Flow Meter

VICTREX® PEEK™ polymer has been selected by Titan Enterprises Ltd, for use in its unique, high-accuracy and low-cost ultrasonic ATRATO flow meter, which is predicted to be a breakthrough product in small bore flow metering. Titan Enterprises, a UK based manufacturer of flow meter devices and solutions, developed this innovative new product in conjunction with one of the UK's most well respected fluid engineering establishments, Cranfield University. Titan also worked closely with Victrex Polymer Solutions, a division of Victrex plc, the world's leading manufacturer of high performance polyaryletherketones, on material selection, looking closely at chemical resistance, molding sources and processing requirements.

Trevor Forster, founder and managing director of Titan said, "After designing flow meters for more than 40 years, I am delighted to bring The ATRATO to market. I believe it is truly a global contender in the challenging world of conventional flow metering!" He added, "Material choice has been critical in enabling us to develop this new generation of flow meters. We worked closely with Victrex Polymer Solutions who provided invaluable advice and supplied materials that met and even exceeded the stringent requirements of The ATRATO".

Accurate and cost effective flow measurement is increasingly important to many industries such as pharmaceuticals, industrial engineering and food and beverages. The ATRATO flow meter leverages Titan's patented technology enabling the direct-through meter to handle flows from laminar to turbulent.

The device deploys the 'time of flight' measurement system where a signal is passed along the pipe with the flow and back up the pipe against the flow, the difference in these signals produces the flow rate. Until now, this technology has been considered expensive and not always accurate. However, Titan believes that The ATRATO flow meter's fully symmetrical, concentric signals coupled with the ability to achieve desired timing accuracies make it a new market leader.

For the development of The ATRATO, Titan Enterprises required a high performance polymer that would enable the thread forms which attach the flow meter to the flow pipes to be molded. This was not possible to achieve using traditional metal thread forms. The polymer also needed to be chemically resistant and have the capability to operate at high temperature up to 130ºC.

Dave Adkin, Market Development Manager UK and Ireland for Victrex Polymer Solutions concluded, "The excellent inherent physical and chemical properties of VICTREX PEEK polymer made it an ideal material of choice for Titan's innovative ATRATO flow meter application". He added, "The unique value of Victrex Polymer Solutions lies within our ability to tailor high performance VICTREX PEEK-based polymers for our customer's best advantage. Working with companies such as Titan to help accelerate application development and thoroughly understanding their engineering requirements from the end user point of view is at the core of everything we do".

The vast majority of VICTREX PEEK grades are safe for repeated use in food contact applications and conform to government statutory directives such as those stipulated by the FDA and the European Commission as well as initiatives introduced by industry bodies such as REACH (Registration, Evaluation and Authorization of Chemicals) and RoHS (Restriction of the use of certain Hazardous Substances).

For more details:
www.victrex.com

Material News

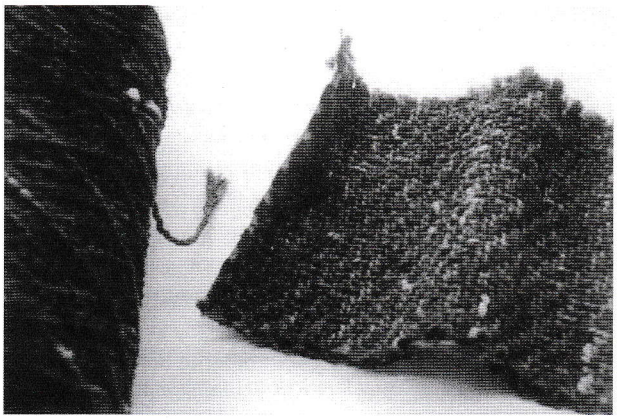
Project Develops Low Cost Blended Carbon Fibre Yarns And Fabrics

A multi-partner UK project, Fibrecycle, has developed a new generation of high performance, low cost co-mingled carbon fibre yarns and fabrics, with funding support from the Technology Strategy Board.

The yarns and fabrics are blended carbon/PET, manufactured from virgin recovered carbon fibre that would otherwise have gone to landfill. These new materials have almost 100% of the stiffness of virgin materials, but they can be offered at a lower cost than similar products currently available on the market. They are also beneficial to the environment and retain the traceability of virgin materials.

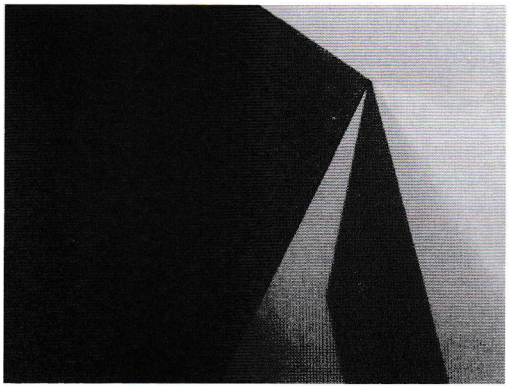
In common with other co-mingled and blended materials, the fabrics are simply placed in a mould tool under pressure and passed through a heating and cooling cycle.

As worldwide carbon fibre composite usage grows, there is concern about the potential tonnage of waste from manufacturing processes and end-of-life products. The waste related to carbon fibre products will quickly reach a significant level to become an important environmental issue, so there is a strong interest in developing processes for recovering and recycling carbon fibre from waste materials.



Fibrecycle is a UK funded research project composed of six partners: Advanced Composites Group Ltd (ACG), part of Umeco Composites Structural Materials (UCSM) – a Division of Umeco plc (Lead Partner), Tilsatec, Sigmatex, Exel Composites, NetComposites and the University of Leeds. The aim of this project is to develop long and continuous yarn, based on carbon fibre recovered from waste streams, to allow the manufacture of technical fabric for the composites industry.

The project is nearing the end of its four year programme and has made excellent progress against its objectives of developing low cost, high performance carbon fibre materials from waste streams. Yarns, sliver and tape have been produced, together with both woven and non-crimp fabrics. Composite laminates have been press-moulded, showing that the carbon/PET (50:50 weight ratio) composites offer at least 50% of the tensile strength and 90% of the tensile modulus of an equivalent composite based on virgin fibres. The partners are now working towards low cost carbon/epoxy materials using recovered carbon fibre, as well as other thermoplastic matrices such as PP, PA and PPS.



Project Manager Dr Sophie Cozien-Cazuc of ACG said "The materials that have been developed have a significantly lower environmental impact than virgin carbon fibre, because they divert materials from landfill and do not consume the energy needed to produce new fibres. The properties achieved mean that it is suitable for many Project Manager Dr Sophie Cozien-Cazuc of ACG said "The materials that have been developed have a significantly lower environmental impact than virgin carbon fibre, because they divert materials from landfill and do not consume the energy needed to produce new fibres. The properties achieved mean that it is suitable for many applications especially in the automotive, aerospace, sports and leisure, medical and energy sectors".

The partnership is now starting to tailor the material towards applications in each of these areas, working with companies who are interested in using these lower-cost blended carbon fibre materials. They are looking for additional companies to join this process and help assess the suitability of the material for these different applications and markets.

For more details:
www.innovateuk.org

Automotive-News

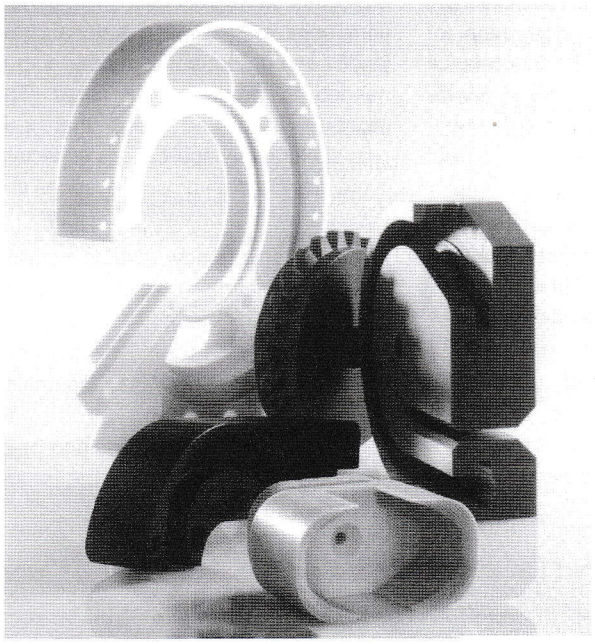
Röchling Group Expanding Worldwide

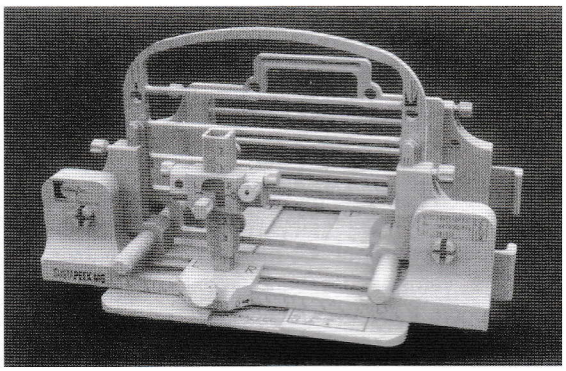
The Röchling Group got off to an outstanding start in 2011. It increased sales in the first quarter by 22.8% to a total of EUR 293.9 million (previous year: EUR 239.4 million). The sustained good outlook for the future was driven by 22.2% growth in incoming orders to EUR 313.8 million (EUR 256.7 million in Q1 2010). In the Automotive Plastics division, sales improved from the previous year's quarter by 14.6%, and in the High-Performance Plastics division they rose by as much as 30.9%.

"We are in the midst of a growth spurt," said Georg Duffner, CEO, explaining the good start to 2011. "The Röchling Group is benefiting from strong demand, particularly in China and other newly industrializing countries. In order to continue to benefit from opportunities, the topic of international expansion has highest priority." For example, this year the Group commissioned its fifth plant in China, located in Chengdu, the capital of the southwestern Chinese province of Sichuan, and its seventh manufacturing facility in the USA (Akron, Ohio). The Röchling Group is currently building an additional manufacturing facility in Pitesti, Romania. Duffner: "Whereas the Röchling Group still generated 67% of its sales in Germany ten years ago, we expect to derive two-thirds of our sales from other countries in 2014."

2010: Sales Grew to EUR 1 Billion

Following the year of recession, 2010 represented dynamic growth for the Röchling Group. Good demand prevailed not only





in the automotive market but also in the capital goods industry, particularly the chemical industry and medical technology. Sales rose by 20.6% to EUR 1,002.8 million. Incoming orders, which increased by 26.8% to EUR 1,044.4 million, performed even better.The growth engine was the unexpectedly rapid recovery of the global economy, driven by a surge in China and other growth markets. As a result of the upturn, the Röchling Group increased investments in tangible assets by 34.2% to EUR 35.9 million. Among the most important projects in 2010 was the first assembly line for the flexible production of six different intake manifold models in the Röchling Automotive plant in Changchun, China, with an annual output of 737,000 units.

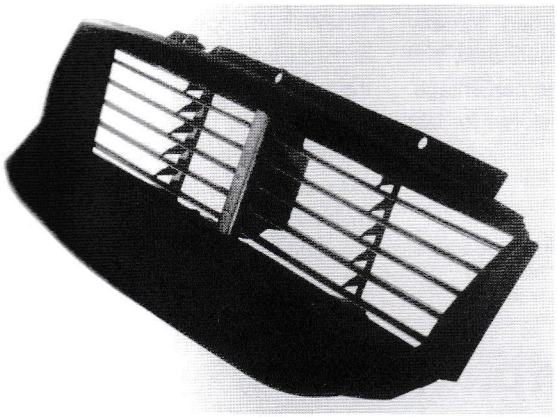
High-Performance Plastics Grew by 25 Percent

The High-Performance Plastics division recorded a sales increase of 25.9% to EUR 529.6 million. All important sales markets experienced good demand. "In particular, the area of renewable energies has developed into an important business field for us," stated Röchling COO Ludger Bartels, who is responsible for this topic. In the wake of the economic rebound, the High-Performance Plastics division nearly doubled its investments. They climbed by 84.1% to EUR 19.7 million. Focal points were the expansion of production at sites in Haren/Ems and Lahnstein, Germany, as well as extensions to production facilities in Singapore and China. An additional element was the expansion of manufacturing of injection-molded plastic parts for medical technology through cleanroom production in Brensbach, Germany. All Company groups increased their staffing in response to the rising workload. As a result, the number of employees rose by 8.3% to 2,763 (previous year: 2,549).

Among the extraordinary projects in the 2010 fiscal year was the delivery of six-meter-long slide rails for the lock gates of Europe's largest canal lock project, the "Kaiserschleuse" in Bremerhaven, Germany. The guides of the 55-meter wide gates require a combination of extreme wear resistance and outstanding glide characteristics. The plastic Polystone® M-slide, a specially modified polyethylene from Röchling Engineering Plastics, sets the standard in this ambitious

application area. Extraordinary material properties are also needed at Cape Town, South Africa's new landmark, Greenpoint Stadium, which overlooks the Atlantic Ocean. So that the 11,000 glass panels do not slip loose from the roof even in high winds and still have 40 mm of leeway, the glass panel holders are made from SUSTARIN C (POM) from Röchling

At the K 2010 international plastics trade fair in Düsseldorf, the Röchling Group once again presented its entire product range under the motto "Ideas become reality." The extraordinary exhibition stand designed after the drawings of Leonardo da Vinci challenged the customers to engage in an intensive discussion about implementing innovative ideas with plastics.



Automotive Plastics Division Benefits from a Rapid Market Recovery

The international automotive supplier industry recovered from the severe economic decline in 2009 with astounding speed. Thus the industry's global sales in 2010 nearly matched the pre-crisis level. As a result of the good market development, the Automotive Plastics division increased sales by 15.8% to EUR 473.7 million. The growth rates were particularly high in China and the USA.

The investments of the Automotive Plastics division, which totaled EUR 16.1 million, remained nearly at the same level as in the previous year (EUR 15.9 million). The emphasis here was particularly on expanding capacity. A new production hall was constructed in Worms, Germany, for example, for the manufacture of lightweight parts. As the business in China is operating at full speed, the Chinese subsidiary in Suzhou expanded its capacity and moved into a new production hall.

An order for the Audi A8 confirms the technological leadership of the Röchling Group in plastic underbodies with outstanding acoustic properties. As previously with the BMW 7 Series and the Porsche Panamera, the components are made from Seeberlite II. Röchling Automotive has again proven itself as a successful newcomer to the commercial vehicle market with an additional order for Mercedes-Benz. Beginning in September 2011, the Actros and Axor truck series will be equipped with body undershields that reduce carbon dioxide emissions. Röchling achieved another sales success in the market for commercial vans, which is also largely new territory for Röchling. The Company now supplies air flaps with emissions-reducing controls for the Ford Transit Connect.

In addition, Röchling Automotive strengthened its presence in all important automotive markets. Thus the division has supplied engine undershields to General Motors for the Insignia and Astra models as well as body undershields for the Epsilon II "Insignia" platform and the Chevrolet Cruze since last year. In addition, it has supplied air flaps for the Chevrolet Cruze Eco and the Ford Focus since the end of last year. Volkswagen ordered charge-air tubes and intake manifolds for the new 1.0 and 1.4 liter engines, among other items. Furthermore, the GAIC automotive manufacturer became Röchling Automotive's eighth Chinese customer by ordering intake manifolds.

the Chevrolet Cruze Eco and the Ford Focus since the end of last year. Volkswagen ordered charge-air tubes and intake manifolds for the new 1.0 and 1.4 liter engines, among other items. Furthermore, the GAIC automotive manufacturer became Röchling Automotive's eighth Chinese customer by ordering intake manifolds.Despite the good trend, the outlook for the future is not untroubled, as the industry sees itself exposed to new risks. Although China's enormous automotive market is rapidly gaining in importance, many suppliers complain of financial tension caused by the high costs of expansion necessary to augment their presence in this market. In addition, the industry is suffering from rapid price increases for raw materials. Although the Chinese government has maintained its economic stimulus program since the beginning of 2010, at the end of the year it announced restrictions on the registration of new private cars beginning in 2011.The remaining regions of the Automotive Plastics division similarly recorded sharp increases in incoming orders and sales. Here also, the sector is worried about the increasing scarcity of raw materials as a result of rising demand.

Company's Largest Investment Program Launched

Notwithstanding these risks, Röchling still sees itself well positioned and views the future with optimism. In view of the very promising outlook for growth, the Executive Board launched the largest investment program in the Company's history. In total, more than EUR 80 million are to be invested in the expansion of existing plants as well as new plant construction. In the first quarter of 2011, therefore, the Group increased expenditure on fixed assets by more than 100% from EUR 6.7 million to EUR 13.8 million. The Executive Board expects the upward trend to continue in the second quarter of this year. Duffer: "However, it is too early to make a forecast for the entire year of 2011. The economy's development after the summer break will be decisive for business performance. Thus we must await the impact of various risks on the year, particularly the further development of prices for raw materials and energy, the consequences of the natural and nuclear disaster in Japan, lingering problems surrounding the highly-indebted eurozone countries, as well as the situation in North Africa."

For more details:
www.roechling.com

Product - Up date

New Blender Controls From Conair Offer Three Choices To Molders And Extruders

Bringing together control technology developed for its TrueBlend™ family of gravimetric polymer blenders, and the TrueBlend EXT extrusion-control system, Conair is now offering three distinct blender-control options for both extruders and injection-molders.

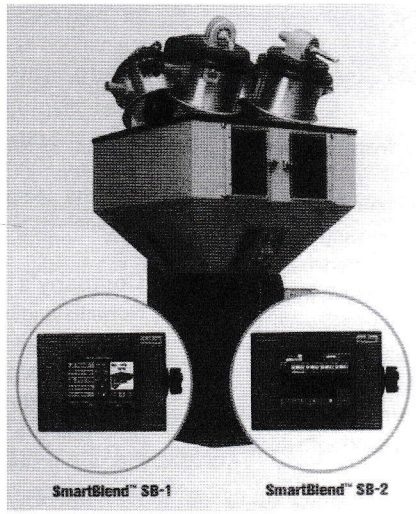
SmartBlend™ SB-1 and SmartBlend SB-2 offer, respectively, standard and high-performance control for either process. The SB-2 platform can also be supplied with a software upgrade to add adaptive control of extruder throughput and finished product dimensions in mono-layer extrusion applications.

SmartBlend SB-1 is the standard control on Conair TrueBlend blenders and it represents the best choice for rapidly changing processing jobs and general-purpose molding and extrusion. Automatically calibrating itself to material flow rates, the SB-1 uses direct-to-target dosing and generally hits ingredient targets in one shot. Its control algorithm, improved by Conair, intelligently analyzes dozens of weight readings in a matter of milliseconds, filtering out electronic noise and the effects of vibration to yield accuracies that are considered the industry standard. When accurate dosing of a single critical ingredient is required, precision ratio control (invented by Conair) can be used, feeding the critical ingredient first and then adjusting subsequent dispenses of other materials accordingly to maintain accuracy of the ingredient relative to its target.

Set-up for rapid job changes is made quick and easy. Once the percentages of each component in the blend are entered the control takes over. Any bin can be assigned to any ingredient. Feed order is automatic and driven by material type and percentage. Up to 50 recipes can be stored for fast recall.

Premium Control

The SB-2 control ensures repeatable,



finely tuned precision dosing of multiple ingredients in either extrusion or injection molding. Many of the set-up and operation features are the same as in the SB-1, but it is based on an entirely different "feed forward" learning algorithm. Instead of making a single dispense and then adjusting for errors in subsequent batches, the new system uses incremental dispenses in each batch to hit the target weight more accurately.

Adaptive Extruder Control

The SB-2 platform can be supplied with a software upgrade that allows it to accept inputs from a TrueWeigh™ gravimetric weigh hopper mounted between the blender and the extruder feedthroat. The TrueWeigh hopper incorporates a highly accurate load cell that constantly reports the loss-in-weight of blended material as it flows out of the hopper and into the extruder. The SB-2 automatically makes extrusion line control adjustments to maintain a consistent throughput over time (to within 0.5% of the extruder output).

R

The Conair Group is the world's leading supplier of auxiliary equipment for plastics processors, including resin drying systems, blenders, feeders and material-conveying systems, temperature-control equipment and granulators. Extrusion solutions include line-control systems, film and sheet scrap-reclaim systems and downstream equipment for pipe and profile extrusion.

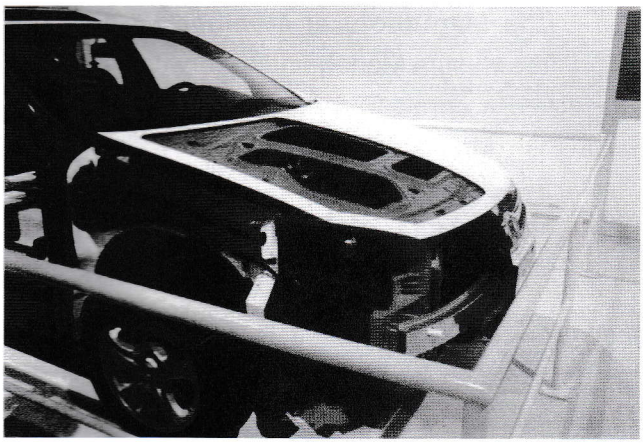
Over 450 individual products solve problems, save energy, cut waste and are easy to use. With long-standing operations in Europe, Asia and South America, Conair is also an international company. More than 300 employees worldwide bring together 50 years of manufacturing experience and youthful creativity to break down barriers to innovation and harness new technology to give customers meaningful, bottom line benefits. The industry's most complete product line, top-flight engineering and unbeatable service, all combine to give processors the confidence they need to succeed in today's competitive global marketplace.

For more details:
www.conairgroup.com

Material News

First All-Plastic Front-end Module on Chinese Developed Vehicle Using STAMAX

The first Chinese-developed model vehicle with an all-plastic front-end module (FEM) using SABIC Innovative Plastics' STAMAX® long glass fiber polypropylene (LGFPP) resin was displayed at the recently concluded 14th annual Shanghai Auto Show. Chang'an Automobile Co., one of China's largest automakers, featured the all-plastic FEM at the show in a stripped down version of its CX30 model. This major application



uses STAMAX LGFPP resin from SABIC Innovative Plastics to replace steel, cutting part weight by up to 40 percent and total vehicle weight by about four kilograms.

In addition to weight reduction for improved fuel economy and lower emissions, the all-plastic FEM solution reduces overall system costs for Chang'an by enabling modular assembly for improved efficiency on its production line. This recent work with Chang'an illustrates SABIC Innovative Plastics' ability to support automotive OEMs as they strive to develop lighter vehicles for improved fuel economy and lower emissions while also lowering overall costs.

"We take a great deal of pride in having worked closely with Chang'an to advance both the design and production of the new CX30," said Lisa Tang, general manager for China, Automotive, SABIC Innovative Plastics. "This project exemplifies the technical competency of our team in China and the ability to apply our expertise to help automotive OEMs innovate and take advantage of opportunities for reduction in both weight and cost by using our STAMAX LGFPP resins."

In addition to the front-end module – which fully integrates the radiator, headlamps, lock bridges and bumper beams – Chang'an's CX30 model uses SABIC Innovative Plastics' Noryl GTX* resin for the fuel-filler door or tank flap. Molding the part from Noryl GTX resin enables it to be painted online along with the rest of the body in white. Typically, the part must be molded and painted by the component supplier, which can potentially cause color mismatches with the body.

Key Development Role

The SABIC Innovative Plastics team delivered comprehensive technical support, training, advanced computer analyses and engineering design services on request to help Chang'an meet its goals.

"We are delighted with the support we received from SABIC Innovative Plastics," said Wang Xiao, R&D director of interiors and exteriors for Chang'an Automobile. "Drawing on their materials and application leadership and technical know-how, we achieved significant improvements in quality and productivity. Integrating 22 metal components into one injection-molded part has greatly simplified the front-end structure of the CX30 model for lighter weight, easier assembling and overall cost reduction. This leap forward, combined with other advancements, helped us to produce high quality, world-class vehicles that will greatly please our customers."

Ms. Xiao added: "As a leading Chinese auto brand, Chang'an Automobile continues to invest significant resources in the field of non-metallic materials and in advanced technologies to provide our customers with increasingly innovative and high quality vehicles."

Growing Demand for STAMAX® LGFPP Resins

More and more automotive OEMs are using STAMAX LGFPP resins in structural applications because the material delivers high-quality performance that can replace steel, reduces weight and lowers system costs. In addition, SABIC Innovative Plastics is able to provide local support with its substantial global reach.STAMAX LGFPP resin grades support the design of semi-structural automotive applications that combine light weight with functional integration, such as front-end modules, door modules, instrument panel carriers, tailgates and seating systems.

For more details :
www.sabic-ip.com

MONTHLY CIRCULAR OF THE FEDERATION

CIRCULAR NO. 53/2011 :

Sub: Membership of the Federation

The Federation has received the following applications for membership of the Federation :

1.	a) Name & Address of the Applicant Firm	:	**M/S. SWISS WRITING PRODUCTS** 29B, Zakaria Street, 1st Floor Kolkata - 700 073
	b) Class of membership	:	**Life Manufacturer Member**
	c) Proposed by	:	M/s Kusum Management Services Pvt. Ltd.
	d) Seconded by	:	M/s Orient Plastics
	e) Name of representative	:	Mr. Sanjay Kanodia
	f) Items of manufacture	:	Manufacturer of Ball Pen, Pencil, Reffil and Sketch Pen etc.
2.	a) Name & Address of the Applicant Firm	:	**M/S. TIRUPATI POLY INDUSTRIES** 155, C. R. Avenue, Ground Floor Kolkata - 700 007
	b) Class of membership	:	**Life Manufacturer Member**
	c) Proposed by	:	M/s Kusum Management Services Pvt. Ltd.
	d) Seconded by	:	M/s Accurate Turners Pvt. Ltd.
	e) Name of representatives	:	1) Mr. Rajesh Shroff 2) Jatan Sethia
	f) Items of manufacture	:	Manufacturer of Poly Propylene Tube/Sheet, BOPP Bags, Non-Woven Fabrics Bag etc.

(Circulated in terms of Article 15 of the Articles of Association of the Federation)

CIRCULAR NO. 54/2011 :

Sub: Consumer Price Index Number for Industrial Workers for Kolkata for the months of January 2011 to October 2011

Month	Consumer Price Index	
	Base (1982 = 100)	Base (1960 = 100)
January, 2011	922	4370
February, 2011	911	4318
March, 2011	911	4318
April, 2011	922	4370
May, 2011	927	4394
June, 2011	937	4441
July, 2011	952	4512
August, 2011	983	4659
September, 2011	988	4683
October, 2011	978	4636

MALSONS POLYMERS PVT. LTD.

MFRS. OF : MASTERBATCHES AND COMPOUNDS.

MALSON™

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MALSON MASTERBATCHES, YOUR ROAD TO HIGH PROFIT AND QUALITY

PRODUCT RANGES

- Calcium/Talc filled PP Compounds
- Calcium / Talc filled PE Compounds
- Black, White and Colour Masterbatches
- UV, Optical Brightner, Anti-block, Masterbatches.
- Consumers specific Masterbatches.

USER INDUSTRIES

- Woven Sacks
- Films/ Tarpaulins
- Containers
- Non Woven Fabrics
- Carry Bags
- Moulded Goods
- PP/PE Pipes

RNI No. : WBENG/2011/37860 Postal Registration No. KOL RMS / 431 / 2011-2013

Demand Machinery

SSPT
Machines & Auxillaries
ISO 9001 - 2008 Certificate Company

Flow Controller

Mould Clamps

Mould Racks

GREEN URJA Technologies

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