

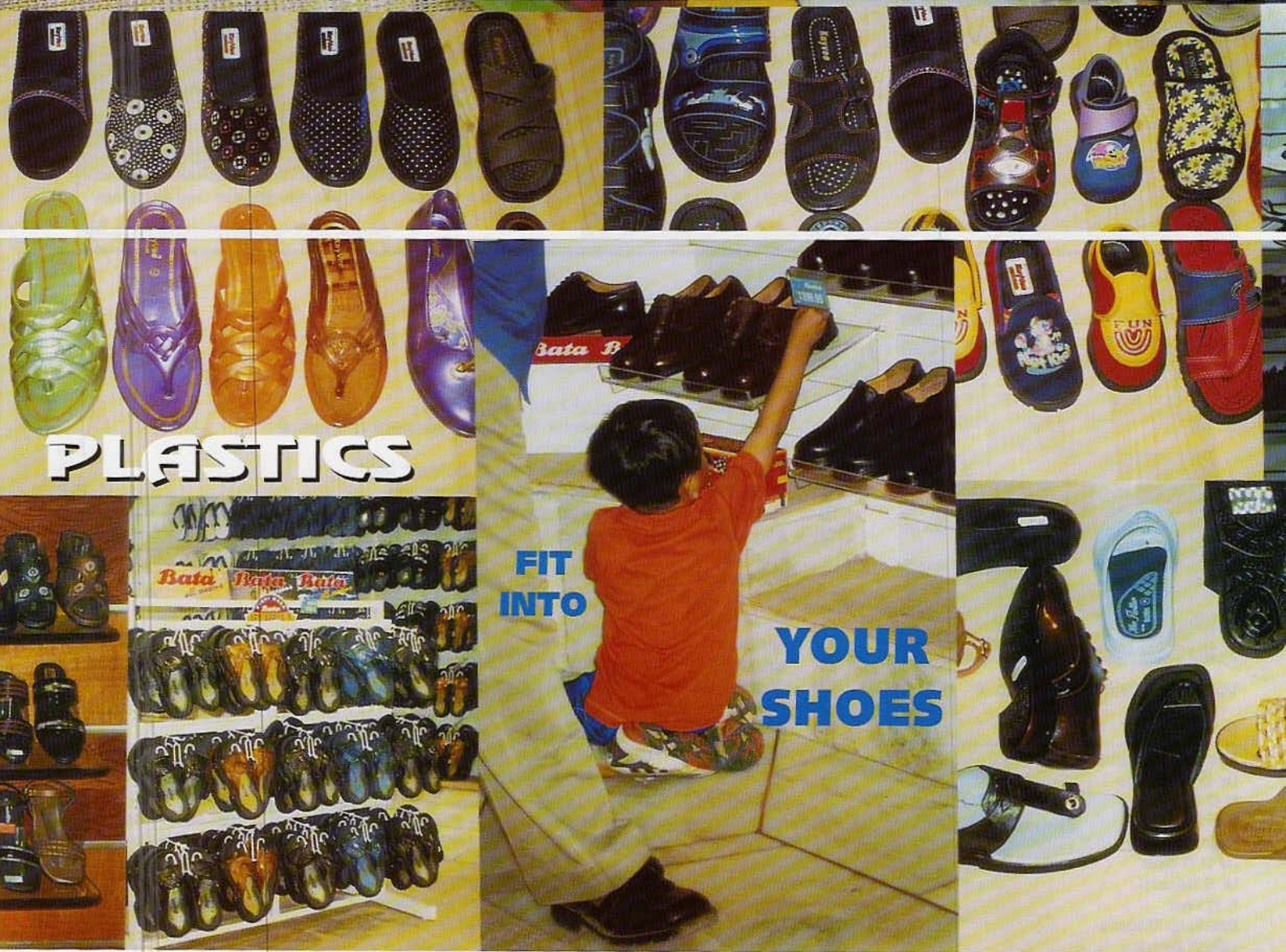


# Eco-Echoes

Vol 3, July/Sept. 2002, No. 3

ICPE NEWSLETTER

Quarterly Publication of Indian Centre for Plastics in the Environment



The Indian Association of PET Manufacturers (IAPM) has designed A PET Bottle Crusher. This Crusher, which is portable, can be placed in a restaurant or catering establishment, and the used PET bottles collected around can be crushed to facilitate baling and volume reduction for transportation to recycling centers.



Protection from rain with Polyethylene sheet as used by Rickshaw pullers in Kolkata.

Courtesy : THE HINDU BUSINESS LINE, July 23, 2002



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Cover: Plastics are the Soul of Footwear Industry

(Material assistance derived from All India Federation of Plastic Industry, Kayvee Plastics Works, Mahabali Bajrangbali Industries, Action Shoes, Bata India Ltd., Liberty Footwear, New Delhi, & FDDI Noida; PWMI, Tokyo; Chlorine Chemistry Council; Cornell News Service; The Hindu Business Line; Vijay Merchant, Mihir Banerji, and Govind Sharma is gratefully acknowledged)

Readers are invited to send their contributions in the form of short notes/news items, new products development, case studies relating to Plastics and the environment, recycling technology, waste management, etc. for Publication in the Newsletter.

All correspondence regarding ICPE Newsletter should be addressed to the Editor Eco-Echoes ICPE, Vijaya Building, 10th Floor, 17, Barakhamba Road, New Delhi-110 001, INDIA. Material published in the Newsletter may be freely reproduced, but its due acknowledgement will be appreciated.

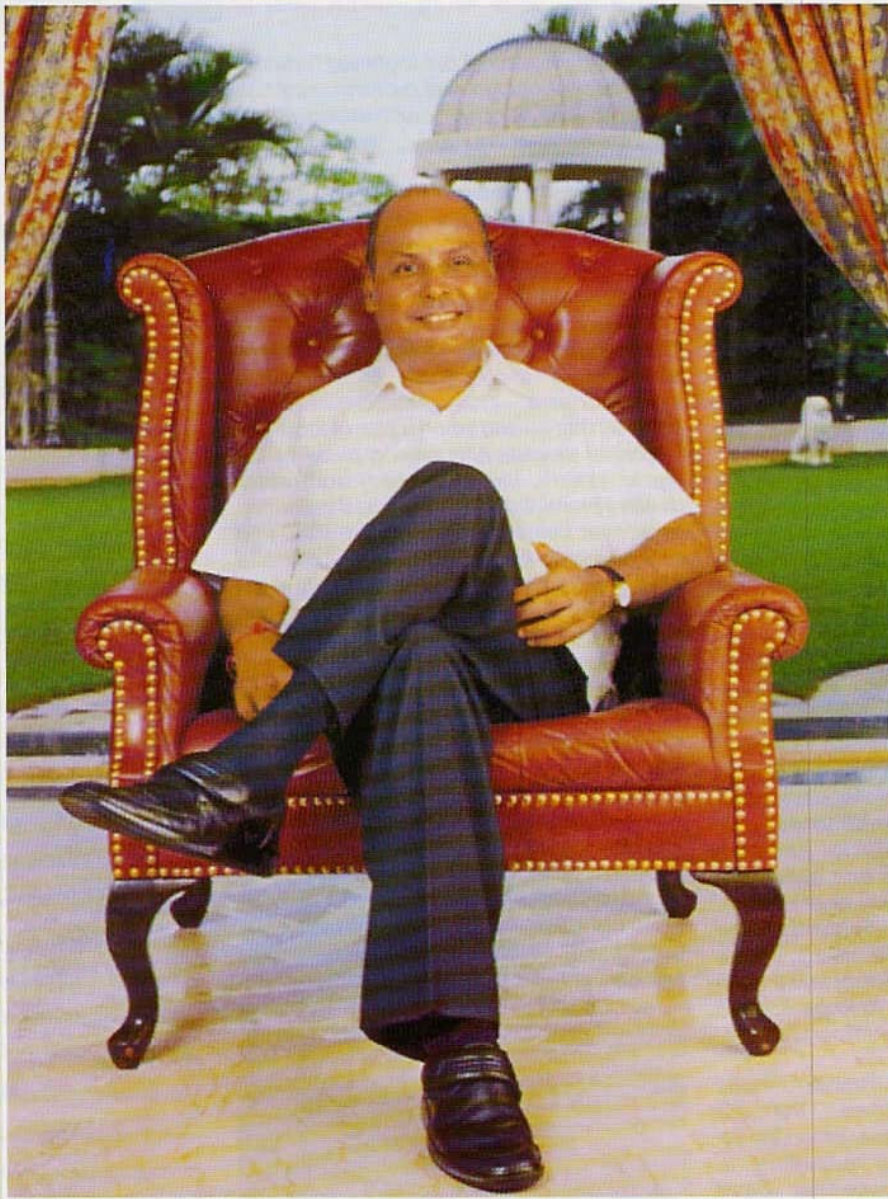
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Founder Members  
**Chemicals and Petrochemicals Manufacturers' Association, New Delhi**  
**Plastindia Foundation, Mumbai**

A TRIBUTE



**Dhirubhai Hirachand Ambani**

28-12-1932 - 06-07-2002

**THE WORLD, THEY SAY, STEPS ASIDE**

for the man who knows where he is going

Truly, men like Shri Dhirubhai Ambani are rare. They come gifted with the power and the vision to change the destiny of nations, to alter the course of corporate history. They are the empire builders, the stuff that legends are made of. The legend called Shri Dhirubhai Ambani will never die. His spirit will live on forever.

The Indian Centre for Plastics in the Environment pays its tribute to this legend.

# PLASTICS

## FIT INTO YOUR SHOES



The Footwear Industry has had a sea change during the past four decades in respect of designs, materials selection and techniques of manufacture. Gone are the days when one used to take pride in having a pair of shoes labelled "leather shoes". Those days the designs were restricted so was the material selection and the technique of manufacture was termed as expert Mochi (cobbler) who belong to an altogether separate caste and class. Though this Mochi caste still survives mostly for undertaking repairs of shoes. The famous *Jaipur jooti and Kohlapuri chappals* continue to depend on leather and the traditional designers-Mochi.

The major share of the footwear industry is mechanized and there are expert designers and a host of new and sophisticated materials other than leather, several brand names have come on the market and variety of shoes keeping in view the comfort, economy and performance that has multiplied for use by all age groups.

Among the new materials for the footwear industry are a range of polymers among these, PVC - Polyvinyl Chloride has been the major one since late 60s in India. PVC moulded chappals and shoes have been on the market now for over 40 years.

Recycled PVC shoes industry has also grown and such chappals and shoes are seen regularly in the weekly market, rural and remote areas in the country. The formulation of PVC and the designs have upgraded the footwear industry and it is on firm foundations catering to large section of population both lower-middle and upper-middle class.

Other new materials like Thermo Plastic Rubber (TPR), Polyurethanes (TPU) and Ethyl Vinyl Acetate (EVA) have joined the list of materials, each one excelling in performance. These materials have contributed significantly for designing soles for shoes for use under different conditions. Density and water resistance have played an important role in the selection of polymeric materials keeping in view their applications for particular type of shoes.

Today, leather soles are particularly out of the footwear industry because of performance, time consuming process of fabrication and inconsistency of materials (leather). The shoes uppers have also not lacked behind and there is something like synthetic leather, in other words PVC supported film, which has altogether revolutionized the design concepts. The familiar sports shoes have their soles molded out of PVC both foam as well as compact.

The diversification of the footwear industry in respect of design and performance has been through the contributions of polymeric materials, which are environment friendly.

The Plastics footwear industry is spread all over India. The major production centres are Delhi, Mumbai, Kolkata, Kanpur, Daman & Silvassa. The Recycled PVC shoes industry is primarily concentrated in Delhi and around.

The PVC and EVA are recyclable and there are known techniques of recycling polyurethane. The plastics industry ensures that as and when a pair of footwear becomes useless and finds a place in the waste stream, the rag-pickers and waste dealers immediately look for their collection to recover valuable materials like PVC and EVA and soon it is going to be Polyurethane also, whether as soles or completely worn out moulded shoes.

Research, development, testing and evaluation have been given a prominent role for polymeric materials as also designs for performance and user comfort. Among the major pioneers in the footwear industry who have made significant contributions in this direction include Bata India Ltd., Action Shoes, Liberty Footwear besides the role played by FDDI. In the following pages, an attempt has been made to bring home to the consumers and users at large the environment friendly acceptance of polymeric materials by the footwear industry ■

— Editor



## LEATHER VS PLASTICS

"..... I cannot but share with you today a common question asked of me by people who are introduced to me for the first time. They ask me whether a natural product like leather can survive in this world dominated so strongly by plastics and other man made materials. They wonder whether there is anything unique about leather that modern day plastics cannot do. Some raise the question as to whether leather will remain relevant in future.

In fact, many of you may often hear that there is a lobby against the use of leather, pleading that man made plastic materials form useful alternatives. They want all of us to shun the use of leather, because the animals from which the skins and hides are obtained are not being treated ethically when they are alive. They are protagonists for the use of plastics. Under such conditions, I am having to present a contrasting argument in favour of leather."

"I used to argue that life is never so simple that we can treat it as if it is Boolean algebra using only zero or one term. Arguments cannot be totally in favour or against any material or a product. As for example, leather and plastics or preferably leather with plastics."

..... DR. T. RAMASAMI, DIRECTOR, CENTRAL LEATHER RESEARCH INSTITUTE, WHILE INAUGURATING A SEMINAR ON PLASTICS AND ENVIRONMENT, AT CHENNAI ON 27 July 2002.

## POLYMERS - THE SOUL OF FOOTWEAR INDUSTRY

Shoes are required for defense against the natural environment and for aesthetic attraction. Till the early part of 20th century, leather was the only material used for shoe making. Shoe making and the foot wear industry has passed through different phases from leather to synthetic polymers. However, the growth in the world population and increased consciousness of individuals for wearing shoes put a lot of pressure on consumption of leather.

Keeping in view that production of leather could not cope with its demand, the shoe makers looked for alternatives to leather and as a consequence vulcanised rubber was found to be the first synthetic material used for shoe soles in the thirties of last century. As of date, a large number of high performing and eco-friendly materials have inundated the footwear industry. Synthetics are used in the shoe soles, leather cloth, vamp lining, counters, socks, laces and as variety of adhesives and nylon threads. It is believed that had the synthetics not been invented cost of footweares would have shot up to beyond the reach of common man, so much so that many of us may have been roaming barefooted. Due to limitation in production the percentage consumption of leather in shoe has come down and is now used only in special type of footweares.

Use of leather for production of footweares has been an age old tradition. The leather was being produced from the cattle hides, goat/sheep skins or from calf skin. In the absence of suitable alternatives, the leather was lavishly used for shoe soles and shoe upper as well. For the production of finished leather, the hides had to undergo various steps of treatment involving, soaking, liming, pickling, chrome tanning, shaving, dyeing, setting, conditioning etc, requiring large volumes of precious water and highly toxic chemicals. Effluents from these industries require extensive treatments before safe discharge.

Use of natural rubber for the production of sheets and shoe soles was practised quite early in last century. Due to the high abrasion resistance and other mechanical properties the rubber soles were extensively used by the shoe industry. Further the rubber soles had the advantages of water resistance and poor heat conductivity due to which rubber soled shoes became highly favoured materials in cold climates. However due to cumbersome processes of

mastication and vulcanisation in rubber processing it was gradually replaced by more convenient materials as PVC, PU, TPR/TPE and injection moulded EVA in the production of shoe components.

Use of PVC in footwear industry started around sixties and registered a thumping success due to several favourable factors. Some of the favourable factors included low cost, easy processability, density adjustment with foaming agents and its easy amenability for producing compounds of various hardness levels. Though complete PVC shoes can be injection moulded predominantly PVC is used for moulding of shoe soles. Soles are in turn used for producing variety of shoes by fixing shoe uppers on to the soles by adhesives.

In addition to the shoe soles, PVC is also extensively used in producing synthetic leather cloth. Leather cloth is used as substitute for leather in uppers and various other applications. One of the major reasons for proliferation of PVC applications in shoe industry is that it is recyclable and therefore all the factory rejects and rims are reground and reprocessed in production upto 10%. Actually the average percentage of rejects is only 2% and therefore much lower than 10%.

Thermoplastic polyurethanes (TPU) and reaction injection moulded (RIM) products of polyols and isocyanates find extensive use in the shoe industry. The TPU's are used in production of sports shoes and particularly of ski shoes for ice hockey and soccer shoes.

Flexible integral foams of PU have found application as shoe soles principally because of the properties of good abrasion resistance, flex cycling properties, excellent tear strength and elasticity. Further hardness and density can be varied over a relatively wider range to suit the requirements. The low weight of shoes as a result of low densities of the shoe soles add to the wearing comfort. These days the high fashion ladies and gents shoes are produced by using PU soles and soft leather for shoe uppers. PU foams for the soles may be manufactured using polyether or polyester types of polyols. Perhaps the most important innovation of polyurethanes is the production of PU based synthetic leather which is material of choice, in place of leather, in several types of shoes.

Thermoplastic rubbers (TPR) are the

polymeric materials which encompass properties of synthetic rubbers and can be processed as thermoplastic materials. These materials are largely based on block copolymers such as styrene-butadiene-styrene (SBS) copolymers. TPRs are used extensively in producing soles for high performance shoes.

EVA compounds are composed of Ethylene-vinyl acetate resin in which the vinyl acetate content varies from 15-25%. EVA is synonym for the light weight material that combines extremely low specific density with excellent mechanical properties and can be formulated at varying levels of hardness. EVA foams have very regular, closed cell structure.

Conventionally, the EVA along with cross linkers and fillers is masticated and then compression moulded into sheets of varying thickness. The sheets are then cut with the help of punch into shoe soles which are then used to produce variety of chappals, sandals and sports shoes.

Crosslinked foamed injected EVA based shoes appeared on the market with the advent of nineties. Production of crosslinked injected EVA requires delicate production and transformation technologies, but this process represents an important and increasingly more valid alternative to the sheet compression process. The most exciting feature of foamed EVA products is that they are available in lowest specific density range materials being used in footweares. Injection moulded EVA has specific density of 0.18-0.25

EVA is processed on the injection moulded machines expressly designed for the purpose. In this process the expansion of piece takes place during mould opening phase and when the cross-linking of the material has almost completely finished. Mould cavities are, therefore, proportionally smaller than the final dimensions of the product.

Synthetics have established themselves as the main materials for footwear industry and are considered an element of extra value for shoes rather than a makeshift alternative to the natural materials ■

— Dr V P Malhotra  
Head - Research & Development  
Micro Industrial Corporation  
New Delhi

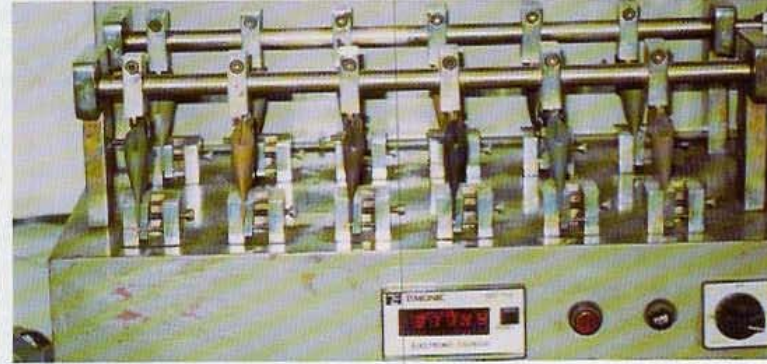
## FOOTWEAR DESIGN & DEVELOPMENT INSTITUTE (FDDI)

Established in 1986 as a society under the Ministry of Commerce, Government of India, FDDI received a major boost in 1991 with support from the National Leather Development Programme (NLDP) and the Ministry. The Institute has one of the best footwear R&D and training facilities in the world, equipped with a sophisticated array of laboratories and machines, and manned by highly qualified professionals.

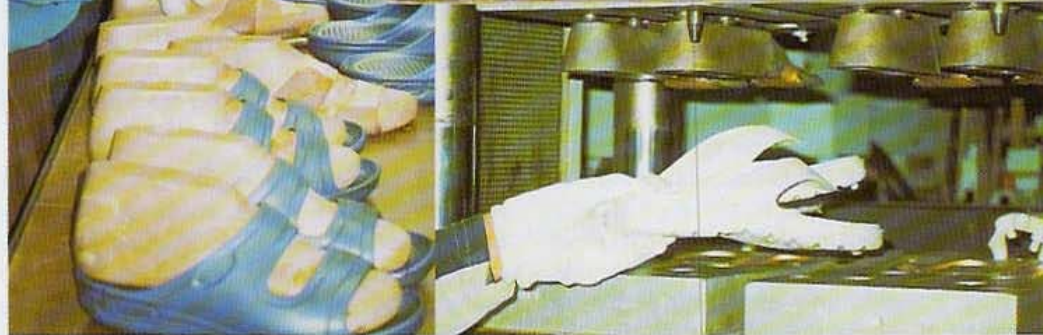
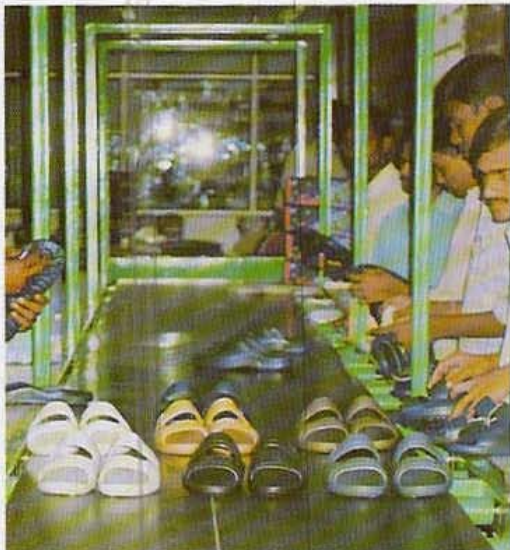
An ISO 9001 & ISO 14001 organization, FDDI is one of the premier institutions in India in the area of the human resource development and infrastructure development for the footwear industry. At FDDI, is available a complete range of hi-tech, high quality services - from design, development and training to productin and support systems - efficiently, economically and effortlessly ■



— FDDI



— ACTION SHOES



— Used reject shoes for recycling and recovery of polymeric sole materials. This activity which engages over 200 persons, is familiar in Delhi.

## DHINDSA HAILS PLASTICS SECTOR FOR QUALITY PACKAGING MATERIAL

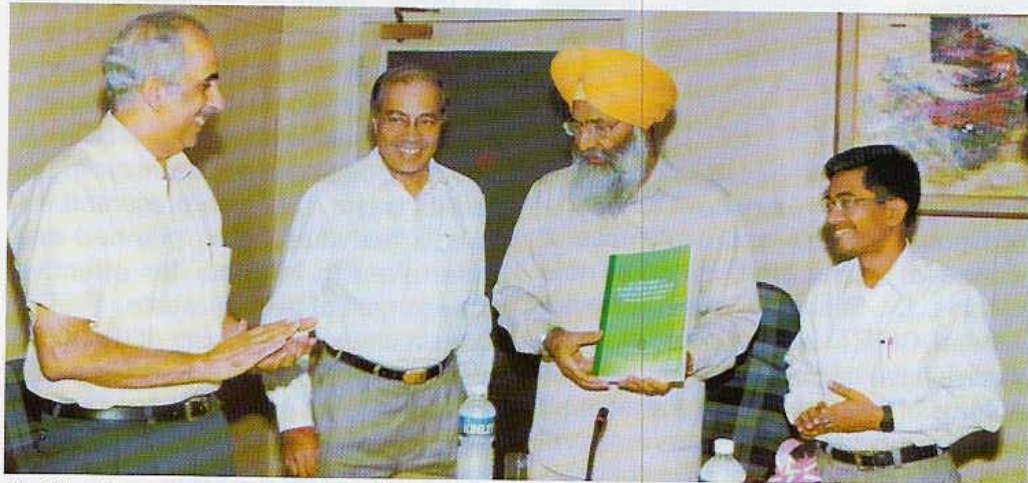
**New Delhi:** Amid the controversy over plastics vis-à-vis jute as a packaging material, Chemicals and Fertilizers Minister Sukhdev Singh Dhindsa hailed the plastics processing sector for providing “**quality and cost effective**” packaging material.

“We feel proud that the plastics industry has been able to meet the packaging requirements of the ever-increasing industrial and agricultural production in the country,” he said after releasing a report, “life Cycle analysis of HDPE/PP Woven Sacks vis-à-vis Jute/paper Sacks”.

The Minister, however, added that, in the recent past, there has been a vigorous campaign by environmentalists demanding a ban on the use of plastics. “The adverse publicity to plastics has been mainly due to the littering habits of the people and ineffective collection of waste”, he said.

Among other things, the report has recommended that the government withdraw compulsory use of any form of packaging saying “use of jute in packaging under Jute Packaging Materials Act, 1987 should be repealed immediately”.

On the study report by the Centre for Polymer Science and Engineering of the Indian Institute of Technology, Delhi,



Hon'ble Minister Mr. S S Dhindsa seen releasing the Report. Also seen in the picture are Mr. Ashok Chawla, Joint Secretary, Dept. of Chemicals & Petrochemicals, Mr. K G Ramanathan, President, CPMA, (L), and Dr. A K Ghosh, IIT Delhi.

Dhindsa said it would “enlighten the public to understand the relevance and importance of plastics as packaging material”.

The report points out that though jute is a natural product, its cultivation requires fertilizers, insecticides and chemicals that involve a number of other energy intensive process and related “health hazards”.

*The report, sponsored by the Indian Centre for Plastics in the Environment (ICPE), New Delhi, said jute may be biodegradable but one must note that this bulk packaging material does not go into*

*landfilling and hence biodegradability is a “weakness for jute sacking”.*

On the other hand, crude oil, which is the basic input to the PP-HDPE woven sacks, is not processed only for making PP-PE, the report said, adding it has to be fractionated anyway for the generation of various fuels and feedstocks for the interests of consumers mostly for transportation and energy generation.

“Moreover only two per cent of the total crude oil processing is required for the generation of feedstock for PP-HDPE woven sacks”, it said ■

(Source : The Economic Times July 18, 2002)

## SEMINAR ON PLASTICS & ENVIRONMENT

**A** Seminar on Plastics & Environment was jointly organized by Central Institute of Plastics Engineering & Technology (CIPET) and Indian Centre for Plastics in the Environment (ICPE) on 27 July, 2002 at Chennai. The theme of the Seminar was to provide the factual information on the role of plastics in conservation of natural resources and protection of environment and modalities for plastics waste management.



Lighting the ceremonial lamp.....

The Seminar was attended by

representatives from Exnora (an actively involved NGO) in Chennai for Municipal Solid Waste Management, Lions Club, Rotary Club, Academicians, Environmentalists, officials of municipalities in and around Chennai, Government officials, and others from the plastics industries, IPI, TAPMA, AIPMA, etc.

The Seminar was inaugurated by Dr. T. Ramasamy, Director, Central Leather Research Institute (CLRI), Chennai. In his inaugural address Dr. Ramasamy



Dr. T. Ramasami addressing the inaugural function.

highlighted the role and usefulness of plastics for the mankind. In his key note address, Dr. Sushil K. Verma, Director General, CIPET said that over the years, plastics have become wonder materials by virtue of their own merits and inherent superiority over the conventional materials. He outlined few mis-concepts and facts about plastics and dioxin.

Dr. A.N. Bhat, Director General, ICPE emphasized the suitability of plastics



materials for numerous applications and informed that plastics are safe materials and environment friendly. He also indicated advantages of PVC in various applications, WHO guidelines on PVC, which are followed throughout Europe. Dr. Chandrani Chandrasekharan, Director,



Dr. A.N. Bhat, addressing the seminar.

Ministry of Environment & Forests (MoEF), Government of India, in her address, endorsed the views for early implementation of Task Force recommendations for the management of

plastics waste and the adoption of scientific methods of recycling of plastics in line with the recycling standard of BIS. Mr. Ajit Kumar Jain, IAS, Senior Advisor, All India Institute of Local State Government, Mumbai, in his key presentation described the initiatives taken up by Municipal Corporation, Mumbai in association with NGOs for collection, segregation and recycling of plastics waste. He also presented the various activities being planned and undertaken in Mumbai for effective management of plastics waste. Prof. T. Swaminathan, Department of Chemical Engineering, IIT, Chennai in his paper described the importance of environmental protection and adverse effects of plastics disposal.

Other eminent speakers who spoke in the Seminar were, Dr. A.K. Banerjee of Inventa Technologies and Mr. S. Subramanyam, Director, Protech Consultant who concentrated on technologies and machineries available for scientific recycling of plastics waste ■

## MISPLACED FEARS ON PLASTICS SHOULD BE CAST ASIDE : DHINDSA

**MUMBAI:** Union Minister for Chemicals and Fertilizers Sukhdev Singh Dhindsa said there is a concerted effort to launch a crusade against growing misconception about plastics and its effect on ecology.

Addressing the 18<sup>th</sup> Annual General Meeting of the Organization of Plastic Processors of India here on 31 August 2002, Dhindsa said environmentalists, ignoring the eco-friendly and energy efficient properties of polymers, are advising against extensive usage of polymers but "such misplaced apprehensions on plastics need to be cast aside."

"The awareness should be spread especially in the Indian context where consumption is very low and there is a high degree of recycling," he said.

However, he said, "We should also take cue from the problems being faced by the developed countries in disposal of plastic waste and initiate suitable measures now itself so that we are able to effectively handle the challenges of disposal of plastic waste when the country attains higher consumption."

Referring to the plastics processor sector's emerging opportunities, he said there are about 19,000 plastics processing units, of which 70 to 80 per cent units are in the small-scale sector.

The plastics processing sector is relatively more labour intensive, he said, adding that for catering to export market, it is important to deploy efficient and sophisticated machines and change the industry mindset to compete in the global market ■

(Source : [www.economictimes.com](http://www.economictimes.com))

## Recycling methods for Polyurethanes

Polyurethanes are used as an important sole material by the Footwear Industry. According to an estimate, around 7100 tonnes is the market share of polyurethanes for the footwear industry, out of 65650 tonnes of polyurethane which may appear insignificant. However, when the shoes come to a state of rejects or waste, the worry of disposal of polyurethane soles is uppermost on the minds of the environmentalists. In other words, polyurethane can be recycled for the recovery of energy, material, and chemicals by various known methods. It becomes necessary to save valuable materials and reduce the pressure on landfill disposal sites to go in for polyurethane recycling thus creating symbiosis between ecology and economy.

Courtesy: Mr. V.B. Parvatikar, Addl. Director (Technical), FDDI



## INTERNATIONAL SYMPOSIUM ON FEEDSTOCK RECYCLING & OTHER INNOVATIVE PLASTIC RECYCLING TECHNIQUES - BRUSSELS SEPTEMBER 9-11, 2002.

ICPE participated in the International Symposium jointly organized by European & Japanese experts supported by APME, ECVM, PWMI (Japan) & Universities & Polymer Research Institutes from several parts of the world. Leading institutions & managers of international petrochem corporations besides research scholars attended this symposium. In all 24 papers were presented during the three-day programme and 40 Technical Poster



(L to R) Mr. Fredy Marechal (APME Director), Mr. K G Ramanathan & Mr. Vijay Merchant (ICPE), and Dr. Neil Mayne (APME-Head Environment).

Sessions. Represented by Mr. K. G. Ramanathan, President, GC and Mr. Vijay Merchant, Member GC, ICPE made presentation in the opening session on Environmental Position & Plastics in India.

Broadly the following subjects were deliberated upon, new technologies and extensive details of commercially operating Recycling Plants for plastic waste recycling were explained and discussed.

The important subject groups covered by different experts in the symposium sessions were as under:

- 1) Pyrolysis & Thermal Cracking Processes
- 2) Catalytic Cracking Processes
- 3) Gasification

- 4) Hydrolysis & Solvoysis
- 5) Process of Dehalogenation
- 6) Mechanical Recycling
- 7) Biodegradable packaging
- 8) Management issues of Plastic Waste

The major focal points in this symposium were various technical processes in feedstock & mechanical recycling, studies with findings of laboratory scale plants in different countries & operating details of various commercial scale recycling plants. The presentations explained recovery of monomers, feedstock, fuel and polymers from waste streams in different parts of the world.

Highlights of remarkable recycling efforts of different products were explained by experts from ECVM (Europe) VEC-(Japan) New Vinyl loop process by Solvay, Waste Plastic Liquification by Toshiba Corporation and Recovery of Chemical Products from Mixed PVC Waste. Besides the experts explained latest trends & technologies in recovery and feedstock recycling in the automotive industry, electronics & electric sector, telephone & telecom sector.

The Japanese experts presented new ideas for Hydrogasification of polyethylene waste & coal mixtures as also Decomposition of mixed plastics of PP & PET converting same into oils. The Japanese experts presented an Integrated PET post consumer bottles to Thermoformed food trays Project. The Department of Waste Management from Germany presented findings of a pioneering project in a German city of Kassel where Compostable Packaging has been forced on the city for a year as a pilot scale demonstration. This is being continuously monitored to see the extent waste disposal problem of traditional packaging can be overcome safely.

### Interaction with APME & ECVM Directors & officials in Brussels

ICPE was able to hold meetings with the Directors and senior officials & experts in Brussels & discuss various environmental issues on plastics relevant to the current developments in India. Several reports on technical studies conducted by leading institutions have been made available to ICPE as also legislations on health, safety, disposal of waste etc. by European countries & the European Commission, which should be valuable reference for ICPE in India in the near future. Finally these meetings have made it possible for ICPE to project it's position to the west and come much closer to APME & ECVM and also with research bodies from Japan. An assurance from the Directors at both the institutions in Belgium APME & ECVM has been received that they would be equally interested in working closely with ICPE hereafter for sharing reports & information on Plastics & Environment and continue dialogues further in the coming years.

ICPE has also established contacts with Fechiplast- the Belgium Plastics Association and PLARAMEC

The newly formed Belgium National Recycling Institution Plaramec has very high targets for recovery from waste. Being a nation with the highest per capita plastic consumption in the world, the Belgium associations have been active in addressing issues of Plastics & Environment and initiating novel measures in recycling and waste recovery and influencing government policies and public opinions. The contact with PLAREMEC opens up a new avenue for exchange of ideas for ICPE.

Apart from the educational content, it was clear from the papers and discussions that:

- (a) Usage of plastic, per se, is not questioned any longer



Dr. K Endo, Osaka University addressing the participants at the concluding session.

- b) Mechanical recycling is at the bottom-end of recycling options
- c) Technologies for feedstock recycling, recycling back to original products (PVC to PVC, PET to PET etc.) are now fully in place
- d) Recycling technologies for getting hydro carbon from plastic waste in an economic fashion are underway
- e) Incineration for energy recovery is fully developed and practised worldwide
- f) Producers (particularly PVC manufacturers) and packers have taken major responsibilities in recycling programmes of European Community

The above are important lessons for the Indian plastic industry while dealing with the problem of waste.

**While interacting with participants and experts from various countries, following information was made available:**

- Not a single country stated that their governments had issued any directives to ban plastics as each and every govt. was fully convinced that the environmental benefits of using plastics far outweigh the burdens of waste after use.
- Each and every country seemed to take for granted that Segregated Waste Collection by municipalities was an accepted responsibility of local governments.
- Almost all countries wanted to build up more and more techniques and processes with help from their scientists to Recover value from waste of used plastics. The emphasis, priorities etc. differed country to country depending on the

main sectors using plastics and type of waste generated as also social culture prevalent.

- While Japan was more into chemical and oil recovery with almost 30 to 40 novel projects, many of which were on commercial scale since 2 or 3 years, Belgium was more into material and chemical recovery reaching high percentage year after year. Denmark was more into Energy from Waste and had considerable data to offer with Coal substitution projects. Germany was doing intensive work on waste from Automobile sector, whereas Swedish experts were working on Recovery from huge waste from Telecom products and Electronic goods. The Netherlands had Small Scale Waste Gasification technology from Polyolefinic wastes. Finally each country has to decide which of the recovery options best suit it's economy based on the nations priorities, peoples habits, resource availabilities, the industry and scientific community need to work very closely so that post consumer waste gets the highest returns by optimal recovery techniques, at the same time growth in use of polymers for a better and better quality of life at affordable costs is assured ■



A model displays a hat made of recycled cardboard and plastic during a fashion show at Ubuntu (Humanity in Zulu) village in Johannesburg.  
Courtesy : THE HINDU BUSINESS LINE, August 31, 2002

## REGIONALLY BASED ASSESSMENT OF PERSISTENT TOXIC SUBSTANCES (RBA PTS) : PRIORITY SETTING MEETING



The Confederation of Indian Industry - Environment Management Division (CII-EMD) organized a Regional Priority - Setting Meeting in partnership with Ministry of Environment & Forests, Industrial Toxicology Research Center and UNEP on September 18- 21, 2002 at New Delhi. The objectives of this meeting were to:

- (a) assess priorities presented in the draft Regional Reprot ;
  - (b) collect additional and missing information about sources, levels and "hot spots" of PTS ;
  - (c) arrive at a consensus on the threats and damages caused by the PTS ; and
  - (d) utilize the priorities assessed to guide GEF and other multi-lateral funding agencies for corrective actions.
- Representative from 15 Indian Ocean Region countries in Middle East and South-East Asia attended this meeting. Their included Bahrain, Bangladesh, Bhutan, India, Iran, Kuwait, Myanmar, Maldives, Nepal, Oman, Pakistan, Qatar, Saudi Arabia, Sri Lanka, United Arab Emirates and Yemen.

Representing ICPE, Dr. A N Bhat and Mr. O P Ratra, participated in the meeting ■

# AWARENESS PROGRAMMES

In its endeavour to communicate widespread message on Environmental benefits of plastics to the consumers at large, the ICPE has engaged itself in organizing Awareness Programmes through schools and colleges in different parts of the country. Initiated during first quarter of 2000 in New Delhi, the ICPE has matured itself in changing the mindset of environmentalists, consumers, students and local authorities through these programmes.

During the past three years, ICPE has covered over 50 schools, in Delhi (30), Kolkata (10), Mumbai (5), Hyderabad and Bhopal (5), thereby benefiting over 100,000 students in appreciating the technological and environmental aspects of plastics as group of materials. While the ICPE would continue its efforts to reach the larger section of society through schools and the media by organizing Awareness Programmes, the response has been very encouraging.

During the period July-September 2002, ICPE organized programmes covering,

- Umang Festival, 24 August, and
- Pahal Paryavaran, 26 August in Mumbai
- DTEA Sr. Secondary School, New Delhi on 20 August
- Golden Jubilee Air Force School, Gurgaon on 9-11 September
- DAV Public School, Gurgaon on 12-13 September
- Kendriya Vidyalaya, Air Force Station, Gurgaon on 18-20 September

A video film 'A success story of Plastics waste management in India', and a film on CD 'PET-Yes Recycle No Litter', were shown to the students.

All along, the participants – the students were enthusiastic and vocal in their presentations, and open house discussions. Cash prizes were distributed to the winners as also plastics bins were contributed to the schools by ICPE.

**Reproduced below are the views of the students:**

**D.T.E.A Sr. Secondary School, Mandir Marg, New Delhi**

It would be very difficult to try to imagine our lives without plastics. Plastics versatility allow it to be used in everything from car parts to doll parts, from soft drink bottles to the refrigerators they are stored in, from automobiles to medicine.

..... Archana Wadhawan X - C,

Plastics are a part of life. It cannot be avoided but can be restricted to some extent. But where they cannot be avoided, laws may be passed for recycling under strict quality of standard parameters.

..... Praveena T.K XI-B,

- People think that plastics cause pollution but they are unaware of the realities. In fact, plastics prevent pollution by protecting the trees, the lungs of the city by offering of wood

substitutes.

- By means of nursery bags, drip irrigation etc. plastics also help in afforestation.
- Then, what about the plastic films, the protection of crops, vegetables, flowers etc. Apart from this, plastic films are used for harnessing solar energy and the role played by plastics in the advanced satellite and telecommunication is worth mentioning.

..... B. Lavanya X-C,

**Kendriya Vidyalaya Air Force Station, Gurgaon.**

Whenever any hawker refuses to give items in plastic bags, we simply get angry. But why should we be angry? We must support his move to discourage the use of plastic bags because those are very harmful to our health as well as environment.

Environment is polluted by large number of deaths of animals after consuming plastic bags, as these are very hard to digest.

Moreover, since plastic bags are non-biodegradable and insoluble, these give a dirty look. Today, the Government has enacted law to control the use of light plastic bags but with no success. It is our duty as good citizens to support the Government and enlighten our friends against the use of plastic bags.

..... Prema Phogat

प्लास्टिक हमारी जिंदगी में महत्वपूर्ण चीज़ बन चुकी है। इससे हमें लाभ और नुकसान दोनों हैं। पहले हम कहीं आते जाते थे तो हमें लोहे के बक्से ले जाते थे। पर आजकल VIP कम्पनी और आदि कंपनियों के बैग इस्तेमाल में लाते हैं। जहाँ हम पहले लोहे की बाल्टियाँ इस्तेमाल करते थे वहीं आज हम प्लास्टिक की बाल्टियाँ इस्तेमाल करते हैं। चीन ने तो सड़क बनाने के लिए तारकोल के स्थान पर पोलिथीन प्रयोग किया है।

अनील कुमार छठी सी,

आज विश्व के हर एक अंश को जरूरत है पोलिथीन की मानव जीवन में पोलिथीन का बहुत अधिक महत्व है। इसके कई दुष्प्रभाव भी हैं परन्तु इनके गुणों के आगे इन दुष्प्रभाव की गिनती श्रौण पड़ जाती है।

—कनिका शर्मा  
सातवीं सी,

हम आजकल प्लास्टिक की अनेक वस्तुएं उपयोग करते हैं. .... हमारे पैन कलम इत्यादि में भी प्लास्टिक विशेष स्थान है...

—रिंकी शेखावत —सातवीं सी

प्लास्टिक पर सरकार ने रोक भी लगा दी थी परन्तु इसकी आवश्यकता को देखकर ये रोक हटा दी।

हम यह नहीं कहते कि आप प्लास्टिक की चीज़ें इस्तेमाल न करें, करें परन्तु कम से कम और इसका प्रयोग करने के बाद इसे ठीक जगह पर रखें

—अनु कुमारी, सातवीं सी

**Golden Jubilee Air Force School, Gurgaon**

Can we live without plastics? The answer is an emphatic no. The association of plastic with human life begins from the moment a baby is born.

Plastic-clips are applied before the baby's umbilical cord is cut. Soon after, the baby is administered tetanus vaccine and antibiotic injection contained in plastic vials through plastic syringes. Also the Polio-drops are given through droppers made of plastic only.

..... Sakshi VI – A,

I want to say that we should throw the waste plastic bags in the dustbin so that it can be recycled and may not pollute the areas. In the end I must say,

"Plastic is Employment generator,  
It is not an Environment Polluter".

..... Amit VI-B,

We cannot say no to plastics because plastics have become integral part of our lives. Can you say no to computer because computer is made of plastics? It is easy to speak in favour of paper and jute but these materials will lead to deforestation. It is not possible for us to carry a jute bag and any other sort of bags every time we go to the market to buy the simplest of things. So the use of plastic is very useful to carry the things and easily available in any shop.

..... Ravi VI-B,

.....मैं यही कहना चाहूंगा कि प्लास्टिक का उपयोग करो और जीवन सुखमय बनाओ। जनता को भड़का कर कुछ लोग आन्दोलन करवाते हैं और कहते हैं 'Say no to Plastics' मैं आपसे ये पूछना चाहता हूँ कि क्या यह आन्दोलन चलाना उचित है। हम एक और कहते हैं कि प्लास्टिक का उपयोग नहीं करेंगे और दूसरी ओर उसका प्रयोग करने से चूकते ही नहीं। "करो प्लास्टिक का सदुपयोग मत भूलो इसका उपयोग"

सौरभ देसवाल पाँचवीं ए

मेरा शीर्षक है – प्लास्टिक....

'सूखा गीला कचरा मिला के होंगे बीमारी के शिखर वरगीकरण करके पाएँगे सुन्दरता का उपहार प्लास्टिक नहीं है खलनायक यह तो है

सबका नायक जो उसका करे सदुपयोग उसके लिए यह बन सकता है उद्योग

स्वाती आठवीं बी,

“प्लास्टिक है हमारे मित्र  
 फैलाओ इसके सदुपयोग के इत्र  
 -प्रीती, पाँचवीं ए.

दुनिया भर में प्लास्टिक का उपयोग व्यक्तिगत देखरेख की चीनी खाद्य पदार्थों और दवाइयों के पैकेजिंग के लिए किया जाता है। प्लास्टिक शत प्रतिशत पुनारावास हो सकता है।

माधुरी, आठवीं ए

**DAV Public School, Gurgaon**

We the future of India need to join hands to inform people that plastic is not harmful. But the way we use it makes it harmful. I hope you will no say 'not to plastic but we will say no to paper bags.' The revolution has just begun.

..... Hardik Tiwari VIII F,

So, in the end I would just like to say, plastics are essential but the management of plastic is more important. Remember, its only you and me, who can change the opinion about plastic. Remember, if mother nature's face is to be preserved and beautiful learn, teach proper management of plastic.

..... Mansi Bhat IX-C,

The tide of 20<sup>th</sup> Century brought about a revolution in the history of mankind with the invention of plastics. This wonderful material has now become an indispensable part of our life.

..... Ishaan Gupta X-B,

“Do not say no to Plastics  
 Say thanks to Plastics.”

..... Nidhi X-B,

There has been a lot of hue and cry about the non-biodegradable nature of plastics. But what we forget is that they are recyclable. Plastics waste is a social and environmental challenge, when we generate waste we must manage it.

.....Varsha X-B,

All plastics are not harmful, may be some important ones can be recycled. Today all of us have developed a negative feeling towards it. Now a dasy we see banners saying 'Say no to Plastics'. But why? If plastics are essential, why should we stop using them? At this moment, we might get reminded of pollution. But who causes this pollution. We, the people cause this pollution. It is all in our hands

..... Neha Mehrotra IX – E,

**D.T.E.A. SR. SECONDARY SCHOOL,  
 MANDIR MARG, NEW DELHI**



Mrs. Shashi Sharma, Vice Principal introducing the programme.



The debate in action.....



Students receiving the prizes.....



Students receiving the prizes.....



Students receiving the prizes.....



The Vice Principal being presented a litter bin by Mr. Ratra

**DAV PUBLIC SCHOOL,  
 GURGAON**



A student making her presentation.



Mr. O P Ratra introducing the presentation.



Students receiving the prizes.....



The School being presented a litter bin.



The prize winners with their teachers.



The prize winners with their teachers.



The prize winners with their teachers.

GOLDEN JUBILEE AIR FORCE SCHOOL



Students making their presentations.



A student receiving his prizes.



The Principal Mrs. Poonam Chawla addressing the students assembly during prize distribution ceremony.



The Principal being presented a litter bin.

Mr. O P Ratra addressing the students assembly.



The prize winners with Principal and the Teachers.

KENDRIYA VIDYALAYA, AIR FORCE STATION, GURGAON.



Top (Right) Mr. O P Ratra addressing the students assembly, (Left) Students making his presentation. Bottom (Right) Mrs. Seth, Vice Principal addressing the assembly, (Left) The prize winners with the School Principal and the Teachers.

Prize winning student making his presentation.



## Umang Festival

Mumbai :

Plastics are not harmful, but littering plastics is...!!! This sounds like a slogan coined by ICPE in favour of plastics..... Right?



WRONG!!!

These are the words of the winner of the "Plastics Day Contest" organized by ICPE with the help of [www.plastemart.com](http://www.plastemart.com) on 24 August 2002, at the UMANG festival organized by Narsee Monjee College in Bombay. Prizes were sponsored by Cello Writing Instruments.

Over 20000 students across the state participated in this 5-day festival, spread across 5 venues in Juhu Scheme. ICPE participated in the festival and had stall presence in Yashoda Rang Mandir.

For the first 3 days, students were invited to participate in the Plastics Day Contest. A very simple contest wherein the only rule was "The participant would not use plastics in any form on 24 August 2002, right from the minute he/she got up till 1500 hours on the same day." Nobody managed to actually accomplish the feat, but nevertheless 3 winners were announced on the basis of minimum usage of plastics.

The idea was to spread awareness among the younger generation regarding the various ways in which plastics are used in our lives.



The objective of such a competition and the message spread is obvious from the quotes of the winners.

The winners were called on stage and this is what they had to say:

The first prize winner, Anupreet, "ICPE has made me realize that plastic is not harmful, but littering plastic is...!!! Since that day, I have been very cautious about the things that I use and was amazed to know that every second thing that I use is made up of plastic! And now if we say that plastic is harmful, life is going to be really tough! Plastic has become one of the most essential part of our lives and now if we try to replace plastic with any substitute, environment will suffer a lot! So instead, we should try to make proper use of the resources available to us and take care that we do not harm the environment in any way. I have started contributing to make our environment clean in my little ways like for example while traveling by the train, I make it a point to keep the wrappers in my bag and then dispose them off in a dust bin provided on the railway station. I think these are the little things that matter so much and I am sure I am contributing my bit in making our city clean, and this was all possible by the awareness created by the members of ICPE at NM College. If they wouldn't have dragged my attention to this, I think I would have been one among the crowd who do not even care to give it a second thought while littering. I think ICPE has made us aware about all this in a very sporty way, and I hope they will continue to spread this awareness among everyone else. And on my part, I am always ready to help ICPE and would like to help making our nation a better place to live in.

Gaurav Arun Thakur, "Firstly, I would like to tell you that your concept was excellent. My friend told me on the first day of Umang that why don't we try our luck in the competition. I saw a madam sitting there. She asked me 'why don't you register yourself and try winning the contest. I agreed



Mr. M P Taparia, Chairman EC, ICPE (Centre) seen flanked by Mr. Rajiv Tolat, (R) & Mr. Kabra (L), of ICPE

and accepted the challenge. I made up my mind that I would win the prize. So for that I went home and took off the buttons of my t-shirt, which were made of plastic. Then I went to the market & brought a neem stick to brush my teeth. Now the next morning I got up and brushed my teeth with the neem stick. Then unwantedly I did not take a bath, wore my clothes and came for Umang by train, because I thought that there would be lots of plastic items that I would come across. I reached Umang at 11:00am, where they had given me a form to fill. But unfortunately I could not fill it up with a pen because it was made of plastic nor did I have a pencil with me. After asking many people I still did not manage to get a pencil, so I had to write out the form with something else. After searching a lot I got a carbon paper and a iron nail, with which I filled up the form. The experience was great cause it was really sporty. But only one message I would like to say that you wouldn't stay without touching plastic for a day because each and everything is made of plastic.

## ICPE LAUNCHES 'PAHAL PARYAVARAN' ENVIRONMENT AWARENESS PROGRAMME IN MUMBAI SCHOOLS



Hon'ble Mayor lighting the ceremonial lamp.

Mr. Mahadeo Deole, the Mayor of Mumbai inaugurated 'Pahal paryavaran', a campaign organized by the Indian Centre for plastics in the Environment (ICPE) in 5 schools at Bhandup, a suburb of Mumbai, on August 26, 2002 to inculcate bin culture and the practice of segregation of solid waste for recycling and reuse.

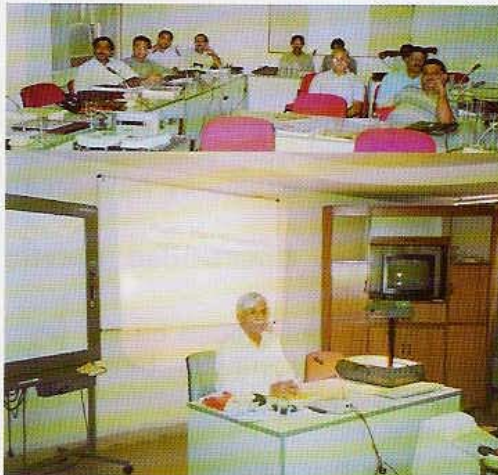
"Every day morning you sweep your house and push out the garbage. You don't think twice before throwing the garbage on the road. Think now, treat Mumbai also as your home. Unless your city is clean, you cannot live a health life", said the Mayor addressing a large gathering of school students.

"Mumbai generates 7000 metric tonnes of garbage every day. 35,000 municipal workers are engaged in clearing the trash. They are also human beings like us. We the people have to help them clear our garbage effectively by segregating it as wet and dry", exhorted the Mayor and got a resounding 'yes' in chorus from the large gathering of students. He emphasized on recycling of plastic waste, which is causing a major pollution problem.

Over 500 children, 25 teachers and 5 principals of schools are participating the Pahal Paryavaran programme that is to last for a year. The teachers will train the students in waste segregation and

## URBAN WASTE MANAGEMENT

Human Settlement Management Institute (HSMI) of HUDCO, organized one-week workshop on **Urban Waste Management : Issues in Waste Recycling and Recovery**, in New Delhi during September 16 -20, 2002, for the benefit of senior officers of local authorities.



In all 23 participants attended the workshop, these included, Health officers, Civil Engineers, architect Planners, Sanitary Inspectors, Sanitary Food Inspectors, representing, Nagar Nigam, Ghaziabad, Halol Municipal office, U.P Housing and Development Board, M.P. Housing Board, Nagar Nigam Ujjaini, Municipal Councils Sirsa, Mandi, State Urban Development Agency, Lucknow, Nagar Palika Parishad, Mussoorie, Kanpur Nagar Nigam, Municipal Council, Hamripur, H.P., Panchayati Raj Department, Jaipur.

Mayor, Hubli Dharwad Municipal Corporation, and Municipal Commissioner, City Municipal Council Bellary, Karnataka, also participated in the Workshop.

Mr. O.P Ratra, representing ICPE, was invited by HSMI to address the participants on Plastics Waste Management ■

## WORLD ENVIRONMENT DAY CELEBRATION AT IPCL-MCGG, NAGOTHANE



World Environment Day is a reminder to each and every one of us that we have the knowledge, the power and technology to address and even solve many of the environment ills faced by our planet. Pertinent to this year's theme of 'Give Earth a Chance', IPCL-MGCC conceptualized and designed programmes highlighting the eco-friendly, energy efficient nature of plastics on June 5, 2002.

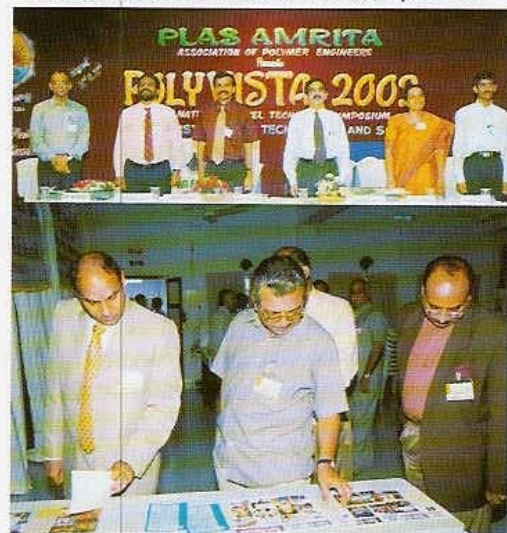
A lecture session on 'Plastics-An Environmental Friendly Product' was planned with the help of Indian Centre for Plastics in the Environment (ICPE) at Nagothane. Shri A.B.Kulkarni, GM (O) graced the occasion as Chief Guest.

As part of the programme, Shri Rajendra Naik, Director (ICPE) made a presentation on 'Integrated Solid Waste Management' (Case studies of Mumbai). The presentation was well attended and well appreciated by all the members including Shri A.H.Selukur,DGM(HSE), Shri Rajiv Bansal, DY.Manager(E&E),Shri A.B.Kulkarni and Shri S.Ravikumar, ED(NC) ■

## POLYVISTA - 2002

Plas Amrita, the Association of Polymer Engineers at Amrita Institute of Technology and Science organized a National Level Technical Symposium, POLYVISTA - 2002 during 2-3 August 2002 at Amrita Institute Campus, Ettimadai, Coimbatore.

The Symposium was inaugurated by Dr. N.G. Nair, former Head, Composite Technology Centre, IIT-Madras. Dr. Nair spoke on the Current Indian Scenario of Plastics and Composites.



Dr. Sushil K. Verma, director General of Central Institute of Plastics Engineering and Technology delivered the Key Note Address on the "Future Prospects of Plastic Industries in India".

The Symposium was well attended with large participation of students from various engineering colleges in India. Sixty students presented 30 Technical papers on various topics related to polymer engineering/technology/science. Twelve students presented six projects, and the Computer Based Technical Quiz attracted forty participants.

Dr. N. N. Pillai, Director of Amrita Institute of Technology and Science presided over the Inaugural Session and Dr. t.R. Padmanabhan, Principal has presided over the Valedictory Session ■

## FOOD PACKAGING EMERGING TRENDS



The continuous growth of urbanization, emphasis on standard quality, the demand for convenient mode of vending and enhanced accent on time saving has led to continuous search for newer packaging materials and innovative designs to satisfy the customer's demand.

Packaging of food has to ensure preservation of quality and withstand handling of the package during distribution from the production centre to the ultimate consumer at an affordable cost.

The trend in packaging in the last few years could be classified in three distinct stages.

During 1950-1970 traditional and rigid packaging materials like paperboard, aluminium, tin plate container, glass container, commodity plastics like Low Density Polyethylene (LDPE) and paper bags were used for packaging of meat, eggs, fruits and vegetables for retail market.

In the second stage, during 1971-1980, to cater for self-distribution system, the commodity plastics gradually replaced application of paper, aluminium, tin plate and glass bottles etc. Rigid plastic containers substituted tin plate containers for packaging of ghee, edible oils, etc. Need emanated for a shift and search for lighter, thinner, easily openable/peelable, economical and marketable packaging material.

1980s, however, witnessed a complete change in packaging materials and technology. The emphasis was more on synthetic materials. The trend is to develop innovative design in combination with traditional packaging materials for greater economy and convenient packaging. Packaging systems like form-

fill-seal technology led to application of a variety of new materials and development of packages and brought into packaging fold more materials, hitherto sold loose. Multilayer composites for packaging of edible oil is a case in instance. In the packaging of processed foods, the flexible packaging media has acquired a major share due to number of advantages offered. Some of the specific systems for food packaging are:

### 1. Laminated and Coextruded Flexible Pouch

Depending on the nature of the food to be packed and requirement of shelf life, different types of laminates and coextruded structures have been developed.

### 2. Multilayer Coextruded Plastic Bottles

Multilayer coextruded barrier resin incorporated plastic bottles for packaging of tomato ketchup, milk, sauce, etc.

### 3. Aseptic Brick Filling

The sterilization of the entire packaging systems packaging materials, product and forming/filling part, ensure that the packaged product is not infected at the ambient condition for a predetermined shelf life. Fresh fruit juices, milk and other non-carbonated beverages are currently packed in aseptic packs. The packaging materials commonly used as gas barrier layer is aluminium foil as the middle layer and paperboard in combination with other barrier plastic material like LDPE or LLDPE or Surlyn. Composed of such combinations, the composite structure enables preservation of the contents for periods ranging to 15 to 90 days or even more at the ambient conditions.

### 4. Retort Package

Retort Package is a flexible, laminated pack with sufficient strength and heat resistance as a replacement to metal can for high heat processing and packing of food products. The package are normally made up of Polyester as an outer layer for strength, aluminium as middle layer for moisture, light and gas barrier and inner layer of cast Polypropylene as heat seal and food contact material. Products are either hot field, sealed

and the filled package boiled in water prior to consumption. The filled and sealed packages are sterilized in a close pressurized chamber i.e. Autoclave and processed at desired temperature similar to canning method in order to increase the shelf life of the content.

### 5. Controlled Atmosphere or Modified Atmosphere Packaging (CAP or MAP)

Controlled atmosphere or modified atmosphere means addition or removal of gases resulting in an



atmospheric composition surrounding the commodity that is different from that of air (78.08% N<sub>2</sub>, and 0.03% CO<sub>2</sub>). Usually, this involves reduction of Oxygen (O<sub>2</sub>) and/or elevation of Carbon dioxide (CO<sub>2</sub>) concentration inside the package. The difference between MAP and CAP is only the degree of control of concentration of gas mixture. The advent of barrier film (as/PA/PE, PE/PVDC, PE/EVOH/Metallised PET) have helped the growing market for CAP and vacuum packaging. This technique has been adopted to increase the shelf life of fresh vegetables, red meat chunk and salad etc.

Due to rapid advancement of food technology, there is an urgent need to revive the present status of food packaging industry is all aspects i.e. availability of raw materials, processing, packaging equipments, cost economics and standards. For the overall growth and promotion of the Indian Food Packaging Industry, considerable team work is called for from resin producers, processors, users and approving authorities ■

— N.C. Saha, Jt. Director & Head of Northern Region, Indian Institute of Packaging, Delhi



## DO YOU KNOW

### IN LAND AND AT SEA - RECYCLED VINYL BENEFITS THE ENVIRONMENT

Recycling materials into second-generation products has emerged as an important method for waste and resource management, especially in the plastics industry. Companies are continuing to develop innovative ways to recycle chlorine-based plastic, commonly known as vinyl, to benefit businesses, consumers and the environment.

While recycling directly benefits the ecosystem by diverting millions of pounds of scrap from landfills and incinerators, these second-generation products can also add value to the environment through their strength, durability and other attributes.

Recycled vinyl products, for example, have proven to be an economical and lasting solution to the challenges of soil erosion, food control, overfishing and reckless boating.

#### Vinyl Habitat for Sea Life

As populations grow, the state of Florida alone is now expected to demand about 320 million pounds of seafood by the year 2000. However, as demand increases, stocks are decreasing. According to the National Marine Fisheries Service, worldwide fisheries peaked in 1988 and have been declining ever since.

Fishing companies are finding themselves investing further out to sea. Overfishing, reckless boating and man-made pollution are destroying food stocks, ocean habitats, sport fishing and diving opportunities. The social, cultural and economic prosperity of ocean-side life is in danger because of the decline of ecosystems, specifically coral reefs, which directly affect fish populations and the beauty of the underwater landscape.

Recognizing this phenomenon, the Artificial Reef Company of America (ARCOA) is using recycled vinyl to create artificial underwater reefs in an attempt to enhance fishery resources and diving opportunities. Research has shown that the diversity and productivity of a reef are proportional to its food-gathering ability.

ARCOA purchases the recycled vinyl from Centwood Industries of Reading, Pa., which produces recycled vinyl (supplied by Klockner-Entaplast of America in Gordonsville, Va.) in a honeycomb shape suitable to attract organic molecules, an important factor in attracting fish species. ARCOA's vinyl product, BIOreef®, can be placed in coastal waters to create a realistic habitat for fish, game and other sea life where natural reefs may have been damaged or destroyed. The material is also used on sandy-bottom areas

to attract fish activity.

Successful reef growth depends upon creation of the food chain foundation. The vinyl-based material attracts microbes and nutrients, which serve as a food source for fish, and provides shelter from predators. The original material is eventually covered with deposits, and settling results in a reef structure virtually identical to a natural reef.

Impressed with a similar system that has been in place off the coast of Pensacola, Fla., since 1989, the Florida Department of Natural Resources with the help of ARCOA recently constructed a BIOreef® off the coast of Lee County (Ft. Myers), Fla. There, the submerged structures - designed to mimic habitats provided by natural reefs - are now providing sustainable, renewable resources serving Fort Myers residents and visitors. Fish now have a place to live and a food source to sustain them, where, in many cases, no natural reef had previously existed.

#### A Vinyl Solution for Waterfronts

Around the country, marina and waterfront home owners face major soil erosion problems from boat traffic, wave action and rain, which can undermine sod at the water's edge and around bridge pilings. In many cases, bridges and land are falling into the water. While wood, metal and concrete-based materials have traditionally been used as bulkheads and barriers against soil erosion, people are now looking for stronger, longer-lasting products.

One company, C-Loc® Retention Systems, Inc., of Utica, Mich., has been manufacturing barriers from recycled vinyl for shoreline bulkheads, wave breakers, water flow directors, footbridge piling protection, soil erosion control and landscaping since 1985. According to C-Loc® President Larry Berger, strength and durability are the primary reasons why his company uses 89 percent recycled regrind from vinyl siding and window profiles.

"It doesn't leach and is easily UV-stabilized - an important quality for products constantly exposed to the sun," Berger said. "It has no problem taking blows from our 3,000-pound drop hammers." While other landscape protection materials may wear over time, vinyl will not rot the way wood does, rust like metal or crack or crumble as concrete might.

Bill Smith, owner of a Sylvan Beach, N.Y., company called House Healer, installed the vinyl barrier to protect a waterfront home in the area. The vinyl barrier "is a great product, easy to handle and work with," he said. "Once installed you can forget it."

In addition to being a barrier against natural and man-made erosion, this vinyl product benefits the environment by recycling vinyl window frames and siding profiles from construction uses. The vinyl scrap, which either did not meet color specifications for its intended use or was scrap from finished vinyl products, is diverted from incinerators and landfills into this useful product.

(Source: Progress Report Chlorine

Chemistry Council, Courtesy: Vijay Merchant)

### FROM CARPETING TO COMPUTERS - PVC RECYCLES

During the past decade, recycling has gained an increasingly important role as part of the solution to today's waste and resource management challenges. Along with many other plastics, polyvinyl chloride (PVC), also known as vinyl, is experiencing a growing recycling market and, in some cases, providing a more economical recycled alternative.

PVC represents the world's second most used plastic material. In 1995, 9.5 million pounds of post-consumer vinyl were recycled in the U.S., and approximately 300 million pounds of pre-consumer PVC scrap were recycled.

The following report describes three individual recycling programs, which divert millions of pounds of PVC waste from landfills or incinerators. Not only do these efforts benefit the environment, but they also have a positive economic impact. According to the companies involved, the total recycling cost in these applications is competitive with the use of virgin materials, and recycled PVC can deliver the high performance demanded by customers at an economical cost.

#### A Ground-Breaking Venture

This program, the floorcovering industry's first fully operational, closed-loop recycling effort, turns worn floor coverings into a variety of PVC products. Collins & Aikman takes worn vinyl-backed carpet from its customer installation sites, breaks it down and transforms it into recycled carpet backing, industrial flooring, highway sound barriers and marine bulkheads.

The Infinity process, operating throughout the country, chops worn carpet into fluff, adds polyethylene pellets and melts the mixture into a thick rope of moldable material. Using a method long used in the wallpaper-manufacturing business, the company then sends the material through two giant steel rolling pins. The result is a sheet of carpet backing containing 75 percent post-consumer recycled carpet.

By "mining" worn carpeting to make new

floor covering, Collins & Aikman not only eliminates disposal costs and saves landfill space, but reduces the need for virgin materials made from natural resources. This economical recycled product is also one of the fastest growing markets in the commercial carpet industry.

### **PVC Resurfaces as Flexisurf**

With an average of 3.5 billion pounds of carpet landfilled each year - at a cost of \$350 million - the floorcovering industry recognizes its contribution to the waste stream. But one company - Collins & Aikman Floorcoverings of Dalton, Ga., a leading manufacturer of high-performance, commercial floor coverings - can divert more than 75 million of pounds of discarded carpeting from landfills each year through its Infinity Initiative program.

Because the new product contains 10 percent polyester strands from the original materials, its rigidity and physical strength are equal to or better than the original PVC. Moreover, by granulating the scrap and forming it into flat sheets, the properties of both original materials are preserved.

Before Flexisurf, swimming pool covers, industrial roofing membranes and tons of vinyl automobile dashboard cut outs were landfilled. Yemm & Hart plans to recycle more than 34,000 pounds of plastic by the end of 1997. While the product was originally planned to be used for industrial flooring, it has found its way into a variety of other applications, such as computer mousepads, self-healing cutting surfaces, coasters and trivets. It is also used in furniture components such as ladder treads, table top surfaces and other laminate applications.

The company collects and sorts post-consumer PVC waste, granulates and mixes PVC materials and polyester fibers, adds color to the mixture and feeds it into a machine that produces a sheet of material used to make new PVC products.

### **PVC Makes the Circuit**

There are now more than 100 million personal computers (PCs) around the world, and with constant upgrades available, more and more PCs are winding up in the waste stream. For years, the computer industry has been looking for ways to recycle the PVC waste from used computers without sacrificing any of the stringent performance characteristics found in virgin materials.

Recently, IBM of the United Kingdom, Hydro Geon and the Mann Organization devised a recycling process that closes the loop in PVC computer keyboard and keyboard cover manufacturing. Believed to be the first of its kind in the information technology industry, the project will recycle more than 400,000 pounds per year of PVC into new computer equipment.

The process starts at IBM in Gree-nock, Scotland, where the company collects used computer equipment and sends the materials to the Mann Organization in Ross-on-Wye, Scotland. Mann, an expert in high-volume material separation and quality identification, disassembles and recycles electronic equipment from computer chips to Walkmans to main computer frames. It separates the equipment, screens it for quality control and granulates the materials for shipment.

After the careful screening process, the granulated PVC is sent to Hydro Geon - a leading PVC manufacturer. Hydro Geon makes the pelleted PVC into a recycled grade suitable for IBM, which buys the PVC for computer keyboard base cover manufacture. The new equipment meets all of IBM's requirements for performance, durability, resistance to scratching, color change and fire retardance.

The trio has set the stage for future expansion of the process to include additional quantities of recycled PVC in a process that can be adopted world-wide. In addition to diverting hundreds of tons of PVC waste from landfills, this process uses less energy than manufacturing virgin grades and requires less additives. And with IBM buying its own product back, PVC is truly part of an economical, closed-loop recycling process.

*(Source: Progress Report Chlorine Chemistry Council, Courtesy: Vijay Merchant)*

### **Recycling of Packaging materials saves Austria nearly EUR270 million per year**

Separate treatment and recycling of waste packaging materials in Austria is saving the country EUR269 million every year, according to a cost-benefit analysis published by the Austrian Federal Environment Agency.

The report, according to Edie news service, assesses a combination of economic and some ecological costs and benefits, although it does not include those that cannot be expressed in monetary terms, such as noise, smell, and effects on the landscape.

The analysis concludes that the separate collection of paper waste, from both packaging and non-packaging uses, is at a high level, and is producing large economic advantages. Such practices should be increased, says the report.

On the other hand, the separate collection of plastic packaging and drinks containers should be reduced from its current level to around 50 per cent of that produced. Drinks cartons collected separately from other packaging waste and recycled should be given up completely in order to produce positive economic benefits, says the research.

However, recycling commercial plastic packaging has a slightly positive economic effect when factors such as the restoration of landfill, carbon dioxide avoidance costs, and landfill investment costs are taken into consideration, and could be increased.

However when the alternative would be incineration, it becomes less profitable to recycle this waste.

### **Biodegradable reinforced plastics could replace landfills with compost heaps, Cornell fiber scientist believes**

Instead of landfills clogged with computer and car parts, packaging and a myriad of other plastic parts, a Cornell University fiber scientist has a better idea. In coming years, he says, many of these discarded items will be composted.

The key to this "green" solution, says researcher Anil Netravali, is fully biodegradable composites made from soybean protein and other biodegradable plastics and plant-based fibers, developed at Cornell and elsewhere.

"These new fully biodegradable, environment-friendly green composites have good properties and could replace plastic parts in the interiors of cars and trains, in computers and in packaging materials and other consumer products," says Netravali, a professor of fiber science in the College of Human Ecology at Cornell. "They also provide excellent insulation against heat and noise for use in applications such as cars. Although the plant-based fibers may not be as strong as graphite and Kevlar®, for example, they are low in cost, biodegradable and replenishable on a yearly basis," he says.

Netravali's findings are published in the September 2002 issue of the *Journal of Materials Science*.

He presented his research on green composites made from ramie fibers (which have a feel similar to silk) at the International Conference on Composites Engineering in Denver two years ago and in San Diego this summer. Ramie fibers are obtained from the stem of an Asian perennial shrub and the resin made from a soy protein isolate-polymer. He did this work in collaboration with Preeti Lodha, a graduate student who received her master's degree from Cornell in 2000, and Sunghyun Nam, who completed her master's in fiber science earlier this year.

Netravali points out that composites technology is not new — he cites primitive bricks and walls made of straw mixed with mud as examples.

Plant-based green composites, however, could, he says, become inexpensive alternatives for many mass-produced items. "They will be made from yearly renewable agricultural sources and would be

environmentally friendly”.

Netravali's research group is working with a number of fibers, including those obtained from kenaf stems, pineapple and henequen leaves and banana stems. The resin materials he is researching include commercial resins, such as polyvinyl alcohol and polylactones, and those derived from microorganisms. He currently is manipulating the composites to improve their mechanical properties, such as stiffness and strength, and to decrease their water absorption, which could start premature degradation.

The new composites could also substitute for wood in such applications as crates or building studs. "Trees take 25 years to grow; fibers we use, however, come from plants that grow to maturity in a year," Netravali points out.

Netravali agrees that green composites are likely to be more expensive than non-biodegradable plastics, but as they gain acceptance and the volume increases, they will become less expensive.

(Source: Cornell News Service, September 2002  
Courtesy: Govind Sharma)

### War against waste begets more waste

WHILE discussing the fate of the world at the Earth Summit this week, delegates produced 85 tonnes of waste, one-fifth of which will be recycled, organizers have said.

Every day, the Johannesburg convention was producing an average of 17 tonnes of waste and gobbling up 583,000 litres of water and 118 megawatts of electricity, United Nations officials said.

The UN and the South African hosts have measured the "ecological footprint" of the largest ever UN conference and encouraged participants to "reduce, reuse, recycle".

Source: The Hindu Business Line;  
Sunday, September 1, 2002

### EU raises recycling targets for Waste Directive to 65% by 2006

By Chris Smith

5 September - Members of the European Parliament this week agreed amendments that toughen up the European Commission's Packaging and Packaging Waste Directive. The key changes, which were voted through by a majority of more than 400, included raising the minimum recycling target by weight for packaging materials contained in packaging waste from the Commission's proposed 55% to 65% by 2006.

Individual member states now have the opportunity to re-examine and modify the

amendments before the directive returns to Parliament for its second reading.

MEPs also voted through an amendment stating that from 1 January 2004 new packaging should only be put on the market where the producer "has taken all necessary measures to minimize its environmental impact as far as possible without compromising the essential functions of the packaging." However, the Commission's proposed goal of 60% of packaging waste going to energy recovery and its 20% recycling target for plastics remain unchanged.

### Sainsbury's to sell Remarkable (Pencils) stationery range

By Chris Smith

6 September 2002 - UK supermarket group Sainsbury's will this month begin sales of the Remarkable (Pencils) range of recycled stationery, which includes products made from scrap vending cups, computer parts and tyres, in its flagship Savacentre stores this month.

The company is the second UK supermarket group to market the Remarkable Recycled range of products; Tesco announced in July that it was introducing the products in 45 of its stores.

London-based Remarkable (Pencils) manufactures pencils from scrap PS vending cups, mouse mats and pencil cases from scrap tyres, rulers from scrap computer printers, and notepads from waste paper. So far this year, it claims to have used two million cups and 24 tonnes of tyres.

A key feature of the Remarkable Recycled products is that they are manufactured in bright colours, which the company says moves away from the traditional image of recycled stationery.

(Courtesy: Mihir Banerji)

### New concept in polyvinyl Chloride separation technology

The NKK Keihin Works developed this technology in cooperation with VEC and PWMI with the support of the New Energy and Industrial Technology Development Organization (NEDO). This technology separates highly concentrated polyvinyl chloride into hydrocarbon and hydrogen chloride in a rotary kiln under a nitrogen atmosphere.

NKK began development of this technology in 1997 and conducted trials in March of this year. The results obtained confirmed expectations.

### Rotary kiln born of a novel idea

In NKK's process, post-use polyvinyl chloride is first placed in a crushing machine

and then dried by hot air at temperatures from 100 to 120°C. This dried polyvinyl chloride is then directly introduced into a compactor and made into fist-size pellets using the heat generated by the friction of dual-axes screws.

This palletized polyvinyl chloride is now transported by conveyer into a rotary kiln having an original NKK design.

The originality of this rotary kiln has several aspects. First, to achieve efficient thermal breakdown of polyvinyl chloride, the pelletized polyvinyl chloride is introduced into the rotary kiln together with coke, a raw material of steel, and subjected to thermal processing. In addition, a rotary kiln that is heated from the outside is adopted, and a completely nitrogen atmosphere is employed inside the rotary kiln.

Thus, in the rotary kiln, the pelletized polyvinyl chloride is heated in a nitrogen atmosphere by a hot blast of air from the outside to temperatures from 300 to 350°C, and is then thermally broken down in this baked state into hydrocarbon and hydrogen chloride. An efficient system is achieved by re-circulating the hot air used for heating and using surplus exhaust gas to heat nitrogen.

### Why nitrogen, external heating, and coke?

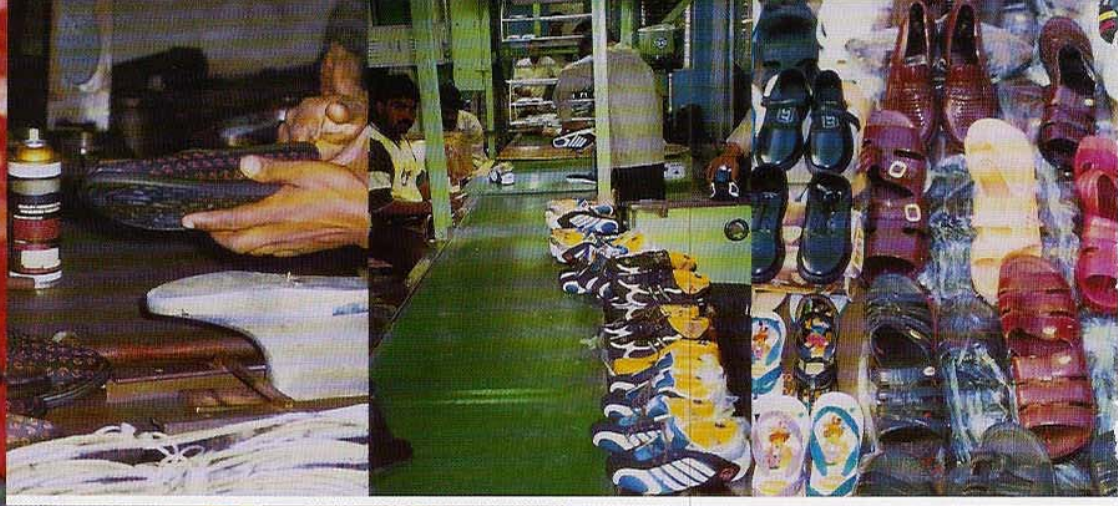
This rotary kiln is cylindrical in shape with diameter of 2 m and a total length of about 20 m, and has an annual processing capacity of 5,000 tonnes. With this kiln, why is a nitrogen atmosphere, an external heating system, and coke used? The reasons are give below:

- (1) Nitrogen gas is inert (i.e. stable; it does not react with other substances), which means that secondary reactions do not occur.
- (2) An external heating system enables the decomposed gas and heating gas to be separated making for more compact facilities.
- (3) On the other hand, an external heating system is not good in terms of heat transfer efficiency. To therefore improve heat-transfer characteristics, coke is also introduced. Coke, which is coal in a bake state, has high heat-transfer efficiency.

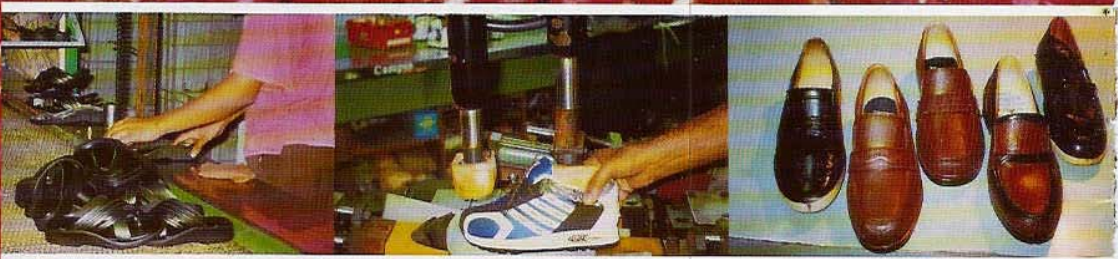
Furthermore, with the aim of maintaining stable operation, coke plays the role of a dispersing material that prevents the generation of large lumps of polyvinyl chloride during thermal breakdown. It also helps to scrape off polyvinyl chloride that has become attached to the inner wall of the rotary kiln.

(Source: PWMI Newsletter; No. 25, 2002.9)

# ES L S A E



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