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LohiaCorp

TIMES

Journal for Raffia Professionals.

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FROM THE CHAIRMAN'S DESK



Raj Kumar Lohia Chairman - Lohia Corp Ltd.

Our endeavor to disseminate knowledge to various stakeholders through Raffia Times has been a continuous process, and now the third edition is in your hands.

While humankind is passing through an unprecedented difficult time ever, the repercussions of COVID 19 have been felt across the petrochemical industry with the result the global economy is facing the greatest uncertainty than any time in the living memory.

As the industry moves into the second half of 2020 renewed lockdowns and ongoing pandemic present a challenging general outlook. The gravity of this crisis is worse than the two World wars when only some parts of the globe were directly affected.

But this greatest adversity has also thrown up some opportunity, and the inevitable and desirable role of Plastics has been appreciated. This has resulted in the enhancement of specific sectors, like disposable medical items and packaging.

In the present crisis also, the Raffia Industry has helped mankind to contribute to food security by providing an effective packaging system for food grains when traditional jute bags have been in short supply due to lockdown. This has resulted in the enhancement of urgent demand in Raffia sector which if sustained, will spur the growth in the coming days auguring well for the industry. Despite overall brisk demand, not more than 82% of the present Indian installed capacity is operational, when compared with the Pre-COVID-19 situation. This is due to the problem of migrant labourers resulting in machines running at lower speeds. In certain sectors, the lower demand is also contributing to lower capacity utilization.

Continuing our endeavor to provide the knowledge pool, we have decided to have a far greater reach to our readers across the continents, and the magazine is now available in seven languages. I convey my gratitude to the contributors and also the readers who have provided us with constructive and valuable feedback.

I am an optimist and hope that mankind in general and our industry, in particular, will weather the storm of COVID 19 and regain the glory very soon.

Once again, I would like to convey my best wishes to all the stakeholders and pray you to stay safe and healthy.

AGAINST CVID 19

BEST WISHES



Prof. (Dr.) S. K. Nayak Director General - CIPET Dept. of Chemicals & Petrochemicals Government of India

I would like to convey my heartiest congratulations to Shri Raj Kumar Lohia ji and the editorial team of Raffia Times to bring out a quarterly newsletter which is quite informative for the Plastics Woven or Raffia or Technical textile sector. I have gone through the previous two editions of the Magazine and now I believe this is the third edition to be released soon.

I am sure that this publication would serve as an effective platform for the dissemination of knowledge to various stakeholders involved in the Raffia Industry.

Raffia Industry in India has shown tremendous resilience and innovations to serve the Industry and society at large. The value-added product manufacturing companies like FIBC have made our country proud by attaining the status of the largest Exporter of such products across the globe.

I understand that Lohia group has been employing a significant number of CIPET trained graduates in different positions & across technical domains like Manufacturing, R&D, Sales & Marketing, who are also contributing to the growth of the Lohia group, has emerged as the global machinery manufacturer with footprints in 90 countries. The success of the Lohia group in recent years with the increased share in the global market reminds us of Vision of our Hon'ble Prime Minister to promote "Local" enterprises to become major "Global" entities in the years to follow & facilitate in steering the Nation towards " Self-reliant" or "Atmanirbhar Bharat".

Lohia Group has established a specific Skill training centre, known as TTRC & am happy to note that Lohia's TTRC & CIPET have jointly been conducting Skill training programs to support Raffia industries.

I extend my appreciation to all the contributors of Technical articles in this publication & also advise Editorial Team to continue with the knowledge sharing activities through the collation of relevant Technical articles, research accounts in the Raffia Times. Hope this issue will further set the global standard for the Raffia Industry.

I wish all readers, Industry fraternity & family members to stay safe and healthy with great hope the pandemic ends very soon.

EDITORIAL



Dr Upender Krishen Saroop Editor - Raffia Times VP - Product Development, Lohia Corp Ltd.

"When things do not go your way, remember that every challenge, every adversity contains within it the seeds of opportunity and growth -Roy.T.Bennet."

The last edition of Raffia Times was launched when the world had entered into the unprecedented phase of COVD-19. The effect of this pandemic has been continuing since then to be felt across the world with the greatest adverse impact on the global economy than any time in the living memory. The last four months have seen continuous lockdowns with a steep slide in demand presenting a bleak outlook around the world. In such circumstances, the petrochemical Industry has also been adversely affected. Oil prices have seen continuously slashing even though some stabilisation has been observed in the last few weeks.

Despite the adversity of unimaginable scale, some opportunities have also been thrown up. If there is one product that has become almost indispensable during the pandemic is Plastic. While there has been weak demand from automobiles and building construction, the demand in PP non-woven products in the healthcare has increased manifold. Masks, Gowns and PPE have become the most sought after Plastic products. Also there has been preference over packaged edible items over non packaged ones.

When going gets tough, tough gets going. Storms hit your weakness, but unlocks your true strength. Raffia Industry has a history of accepting the challenges and working assiduously to convert them into opportunity. In India, there has been bumper food grain production this year, exceeding 300 Million MTs. Non availability of Jute due to various reasons has spurred the demand for HDPE/PP woven bags. Government procurement of summer crops has resulted in massive demand for these bags and the trend is likely to continue for winter crops also. Despite Jute Packaging Materials Act (JPMA) the use of Plastic Woven bags has become inevitable.

Because of lockdown the demand for FIBC has reduced in the construction and mining sectors but there are huge orders in FIBC for food, agriculture, sugar and flour etc.

As oil prices plummeted, the lowering of prices of polyolefins has been inevitable. The initial price delta between HDPE and PP which was supposed to narrow down. It will be interesting to watch this trend in coming months. Because of the diminished demand in some sectors, PP prices are likely to remain stable ,resulting in the higher consumption for packaging in general and Raffia/FIBC in particular. To revive the economy government is a laying lot of emphasis on Infrastructure thatmay result in growth in both woven and nonwoven PP Geotextiles.

Raffia products have established their role in sustainability and circular economy. Reuse of Raffia bags and the capability to replace jute has been key to sustainable development. Lohia Corp Service team continued its support to Raffia Customers globally during the ongoing pandemic with remote guidance. Start-up of Machinery with due Maintenance Procedures and Real time monitoring for Machine Optimization are being extended to customers. Even those customers who had received new machinery were guided to Install & Commission with remote guidance. NEW NORMAL- team Lohia constantly strives to provide 24 x 7 service support globally using all the latest in digital technology

The third Issue of RAFFIA TIMES is in your hands. We have introduced a new feature News Round up to share some interesting developments in the petrochemical Industry, besides topics on Raw materials, novel additivation, quality evaluation, and end applications from various eminent contributors from industry and research institutes. This will enable the Raffia processors to select the material of the specific requirement. We have also tried to provide a glimpse about the feedback from our esteemed readers.

I am hopeful that humanity will come out soon from the Covid-19 ordeal and I take this opportunity to wish you all the best and pray you and your families stay Safe. I look forward to your suggestions, advice and contributions for our forthcoming issues.



NEWS ROUNDUP

Global PP Raffia consumption is increasing YOY with CAGR 6.4% from 2011 to 2019 and expected to grow CAGR of 5% from 2020 to 2026. Whereas total PP CAGR for 2011 to 2019 is 4.8% and expected CAGR for 2020 to 2026 is 4% only.

PP Raffia share is 20% of global PP consumption as of 2019. China holds 1st position with 54% share, followed by India and Vietnam with 13% & 4% share respectively. **(IHS Markit)**

China's Bora- lyondellbassel Petrochemical, a 50:50 joint venture of Liaoning Bora Enterprise Group and lyondellbasell Industries NV, is ramping up production of injection grade high density polyethylene and linear low-density polyethylene from its new plants in Panjin. Operations were expected to stabilize by September'2020.

The 450,000 MT/year LLDPE and 350,000 mt/year HDPE units are linked to a new cracker that can produce 1 million mt/year of ethylene, 500,000 mt/year of propylene and 302,900 mt/year of mixed C4. The company also has a 600,000 mt/year polypropylene unit and a 102,800 mt/year of butadiene unit at the same site. (**Platts 21.08.2020**)

- The outlook for Indian polyethylene market is bullish amid an expected recovery in packaging consumption post monsoon and towards the arrival of Diwali festival. However, the demand might not rise to the levels it used to in previous years as the pandemic has hurt the festive cheer, but it is likely to improve from current levels. (Platts 21.08.2020)
- Stavrolen, a major producer of polyolefins in Russia, resumed its polypropylene (PP) production after a prolonged shutdown. The plant's clients said Stavrolen had resumed production after the forced outage due to technical issues. It didn't produce PP for almost one month, with the forced shutdown began on 16th July.

Stavrolen's annual capacity of PP and high density polyethylene (HDPE) production is 120,000 and 300,000 tonnes respectively. Tomskneftekhim, Ufaorgsintez and Poliom will shut down their production capacities for scheduled turnarounds in September. The outage at these plants will be short, expected to last for around two weeks. **(ICIS 19.08.2020)**

- The H2,2020 with renewed lockdowns, prolonged recession and ongoing pandemic do not present an optimistic outlook for Global Polymer industry. Demand for Polyethylene has been more resilient. Some campaign against Single use plastic like bags have taken a back seat for the time being. (Global Polyolefin Outlook Platts August 2020)
- PE market is facing strong demand as consumers continue to purchase Single use plastic out of Covid fear ICIS Zachay Moore 29.7.2020
- PP is experiencing weaker demand from Automobiles and consumer durables. But PP demand has risen due to need for Nonwoven medical products. "The impact of Covid 19 on global PP market is expected to last beyond next quarter, with ongoing uncertainty on the demand outlook for Automobiles, but healthier demand for Medical and Hygiene products and Packaging." However demand for Auto sector may increase especially in Europe as factories will open on easing of Lockdown in the second half of 2020. (Platts H2 2020)

- Braskem is continuing with construction activities and plans to start-up its new 450,000 tonnes/year polypropylene (PP) plant in La Porte, Texas, by Q3 2020. Braskem currently operates five PP plants in the US, in Texas, West Virginia and Pennsylvania, with a combined capacity of 1.589m tonnes/year, according to the ICIS Supply and Demand Database. (ICIS 01.06.2020).
- Latin America Q2 supply was reduced slightly as feedstock propylene availability was limited by reduced refinery utilisation rates amid lacking transportation fuel demand resulting from quarantines and isolation measures. Reductions occurred in Chile and Argentina where lockdowns have been more restrictive.
- Latin America's PP demand from industrial, automotive, appliances and electronics sectors was lower in Q2. Consumption of non-woven and film applications for food packaging, hygiene and medical products maintained its momentum amid the pandemic, but overall demand was low. (ICIS Commodity Intelligence Service, August 2020)
- Russian PP production rose in the first half of 2020 by 24% year-on-year to 905KT. New producer ZapSibNeftekhim started production. Sibur posted output 13% lower output than first half of 2019.

Uncertainty, slide in demand leads to sentiment into PP for 2020 for PP. Chinese capacity up by 10%, Expected Auto sector improvement.

Significant polypropylene (PP) capacity expansion in Asia could squeeze the market share of Middle East suppliers in the region. (ICIS Commodity Intelligence Service July'29th 2020)

- In the coming three years, 80% of the global PP expansion is concentrated in Asia, where capacity is expected to increase over the period by more than 8m tonnes/year, more than twothirds of which will be in China.
- On the other hand, capacity expansion in the Middle East is limited, with only Orpic's 300,000 tonne/year unit in Oman expected to come on stream in the first quarter of 2020, and Borouge's 450,000 tonne/year unit in the UAE due to start up around 2022. (ICIS, Independent Commodity Intelligence Service, Aug 2020)
- The Middle East has been the largest PP net exporting region in the world, with more than 40% of shipments flowing into Asia, according to the ICIS Supply and Demand database (ICIS Singapore Aug 2020)
- Polypropylene capacity in North America is expected to increase from 8.72 MTPA in 2019 to 11.55 mtpa in 2024 at an AAGR of 5.6%. The US is forecast to be the top country in the region with capacity additions of 1.75 MTPA by 2024.(Global Data, Oil and gas Intelligence Service June'18 2020)
- Reliance Industries Ltd., controlled by Asia's richest man Mr Mukesh Ambani, toppled ExxonMobil Corp. to become the world's largest energy company after Saudi Aramco, as investors piled into the conglomerate lured by the Indian firm's digital and retail forays. (IBEF 27.07.2020)

Haldia Petrochemicals (HPL), a flagship company of The Chatterjee Group (TCG), along with its international partner Rhone Capital has acquired US-based Lummus Technology at an enterprise value (EV) of \$2.725 billion (around Rs 20,590 crore) from McDermott International.

Lummus Technology is a master licensor of proprietary technologies in refining, petrochemicals, gas processing, Steam Cracker, coal gasification sectors, as well as a supplier of proprietary catalysts, equipment and related engineering services. It has about 130 licensed technologies and more than 3,400 patents and trademarks. Lummus technology portfolio included diverse line of Chemical technologies as Styrenics, phenolics, light hydrocarbons C3 (Propene) to C5 dehydrogenation and butadiene extraction. Lummus is leader in Ethylene technology licensing about 40% of global capacity. Novolen Technology licenses the gas phase PP process on Ziegler – Natta and metallocene catalysts for full range of Polypropylene resins.

In the joint acquisition, HPL's share is at 57%, the balance 43% would be held by Rhone Capital. (**Business Standard** 01.07.2020)

- Raffia sector in India is having impact from demand in the Cement segment. Till July'2020 Cement companies were offering incentive on supplies of bags from Raffia Processors for pillow type cement bags. This helped processors with good orders and Cement companies as well in filling up their warehouses, in these uncertain times. However, on the onset of Monsoon overall demand in Pillow type cement bag segment has taken a hit by 40-45% vis-à-vis last month. Meanwhile demand of Block Bottom cement bags continue to be good. (Indian Raffia Industry Source)
- Union Minister of State for Chemicals and Fertilisers Mr. Mansukh Mandaviya has asked the Indian plastic industry to be prepared for manufacturing top quality raw material for the medical devices sector which the government is promoting to reduce import dependence.

The minister also said the government will do everything possible to protect the plastic industry from the impact of Covid-19.

They also emphasized that in the post-Covid period, there is a need to step up recycling of these products. The secretary also said it is high time the domestic industry should gear up for the challenges, and design and develop quality products as a substitute for imported goods.

Currently, the plastic consumption in India is about 11 kg per person, which is one-tenth that of the US. It is estimated that polymer consumption is likely to grow in 2017-22 due to rapid increase in urbanization, making it an essential material of choice. (Deccan Herald 16.07.2020)

 Iyondellbasell and SABIC continue to supply PP in the range of USD 900 TO 920. Indian suppliers are more competitive at 880 USD. Same trend is expected in the next few months also.
(Industry source CPMA, India August 2020)

ROUNDU

- India has a bumper Food grains production in 2020. Traditional packaging material Jute was not able to meet the demand because of Lockdown. Government procurement of Rabi crop packaging resulted in huge demand in HDPE/ PP Raffia bags . Demand for Kharif season is going to be more than 1.9 lakh Bales (All India Flat tape manufacturers Association, August 2020, Ministry of Food Govt of india)
- Because of heavy slowdown in Construction and mining Industry worldwide the demand for FIBC has reduced in these sectors. But there are huge orders for FIBC Bags for Food and Agricultural products, Sugar, Flour and Pasta Powder.
- FIBC Sector underwent a production loss of almost 30% mainly due to shortage of labour. But the situation is likely to be eased by October to December 2020 (Source : Indian Flexible Intermediate Containers Association IFIBICA , Aug 2020)
- The government has come out with norms for the enforcement of 'rules of origin' provisions which have been framed with a view to checking inbound shipments of low quality products and dumping of goods by a third country routed through an FTA partner country. The Department of Revenue has notified the 'Customs (Administration of Rules of Origin under Trade Agreements) Rules, 2020' which would"come into force on September 21, 2020".

Under this provision, a country that has inked an FTA with India cannot dump goods from some third country in the Indian market by just putting a label on it. It has to undertake a prescribed value addition in that product to export to India. Rules of origin norms help contain dumping of goods. **(The Gazette of India August'2020)**

Nova chemicals declared a plastics recycling agreement with Merlin

NOVA Chemicals plans to offer 100% Post consumer recycled polyethylene and PCR blended with its virgin grades, including high-quality LLDPE, LDPE, and HDPE. NOVA Chemicals' funding will expand the equipment in the Delta facility and enhance Merlin's processing of recyclates for food packaging applications. Recycled PE is mainly used in non-food applications like plastic lumber and detergent bottles. This partnership will turn HDPE plastic recyclate into resin for use in everyday products and packaging including food applications. (WWW.packaginggateway.com 2nd September '2020)



S&P GLOBAL PLATTS

UNCERTAINTY, SLIDE IN DEMAND **LEADS SENTIMENT INTO H2 2020 FOR PP**

The impact of the coronavirus pandemic on the global polypropylene market is expected to last beyond the summer, with ongoing uncertainty on the demand outlook from automotive and healthier demand for hygiene applications.

ASIA SUPPLY TO INCREASE

Asian polypropylene fundamentals are likely to remain bearish amid expected new startups, although overall demand should gradually improve with coronavirus concerns easing in the second half of 2020.

Total Chinese PP capacity is expected to increase by 2.7 million mt/vear, or around 10%, in H2 2020, according to S&P Global Platts data and market sources. With the new capacities and demand destruction due to COVID-19, Asia is estimated to be net short of PP by 0.4 million mt in 2020, down from 2.3 million mt in 2019, Platts Analytics data showed.

Nevertheless, market sentiment is mixed, with some sources citing potential bullish upstream propylene and production losses from refinery cuts. As a result, the room for polypropylene prices to fall further is limited with prices already at record lows, a source said. Asian prices hit \$680/mt CFR FE Asia for raffia grade in early April, a record low, before recovering to the high \$700s/mt and low-\$800s/mt in May, according to Platts data.

In the automotive sector, China — the world's largest auto market — will be supported by the gradual recovery of domestic demand in H2, as exports accounted for only a small percentage of the total automotive production - 4% in 2019, according to China Association of Automobile Manufacturers. However, Japan and South Korea's automotive sectors will face greater uncertainties in the global environment, with tie-ups and consumer bases straddling both developed and developing countries.

S&P Global Ratings' credit team projected in are cent analytical report that global light vehicle sales will fall below 80 million units in 2020, a year 15% decline from the 90.3 million units produced in 2019.

EUROPE TO BENEFIT FROM EASING LOCKDOWN

Demand for European PP is likely to see an improvement heading into the second half of the year as government lockdown measures are eased and key sectors restart operations.

Demand from the automotive sector in particular will improve as car factories reopen alongside easing lockdown restrictions, with supply in the second half of 2020 likely to be fed by imports from Russia, where prices are expected to be competitive, participants said.

European demand for PP collapsed in the first half of the year as







ABDULAZIZ EHTAIBA

the coronavirus pandemic hammered the key automotive and construction industries and brought them to a near standstill across the continent.

As consumption slumped and propylene prices went south, European polypropylene was sent tumbling in the first half. European PP spot prices fell 15% fromEur960/mt at the start of 2020 to Eur810/mt in early May, according to Platts data. However, some participants said they thought prices were bottoming out in May, with some signs of recovery in upstream naphtha prices.

Some of the lost demand was offset by a surge in demand from the food packaging and hygiene sectors, driven by consumer panic buying of food and sanitizer products, partially mitigating the price drop. Converters were running at full capacity to meet the spike in demand, which continued into May.

Meanwhile, demand for hygiene and medical applications will remain strong in the second half of the year, with demand for food packaging expected to return to pre-pandemic levels as consumers panic buying diminished.

US MARKET PARTICIPANTS BRACE FOR ROCKY H2

US polypropylene for domestic and export use also face looming uncertainty as several stalled sectors including auto manufacturing threaten to further diminish demand amid ongoing corona virus concerns, sources said.

The first half of the year grappled with an unprecedented crisis that pressured pricing to historic lows despite initial firm demand from the medical industry.

A heavier-than-usual turn around season was also heard to be contributing to the tightness of material for medical supply, sources said.

US spot export pricing rose \$143/mt or nearly16% from January 2 to March 31, Platts data showed. Still, as coronavirus fears grew and manufacturing slowed, pricing trended to its lowest in over 11 years and was assessed at \$816/mt on April 29, down 26% year on year. Weaker contract monomer was also attributed to the fall.

Market participants are taking a wait-and-see approach as the country continues to ease restrictions and states re-open for business. Traders and distributors said the challenge lies in balancing inventory amid an expected upcoming slowdown.

From an export standpoint, the sentiment is more bearish. Exports to key markets have been difficult, including to Latin America, which have been propped up by cheaper polypropylene from the Middle East and Asia.

There is talk that certain grades will remain strong, including grades for medical applications, as the world deals with the aftermath of the pandemic.



BRASKEM

POLYPROPYLENE AS RAW MATERIAL FOR RAFFIA

BRASKEM OFFERS THE MOST COMPLETE PORTFOLIO

Natalia Verdelli and Fredrico Akira Campos Braskem, Sao Paulo Brazil & Braskem SA Singapore





Polypropylene (PP) is the ideal raw material for varied applications and has surpassed the consumption of 77 Million Tonnes globally per year. For oriented PP products, which include Raffia Bags and FIBC (flexible intermediate bulk container), the global volume consumption per year is more than 20 Million Tonnes. In 2019, PP consumption in South America was 2,5 million tonnes, with 1,5 million tonnes was in Brazil. South America has much higher production capacity in PP than the demand, therefore good export potential.

The growth in PP is inevitable and many new developments are going on aiming to improve performance of this material. The present article describes the choice of wide range of PP Grades for Raffia applications based on their performance criterion to serve as the guidance to the processors to choose the appropriate grade. Our company offers a wide range of PP grades from its portfolio.

The Raffia segment is a highly technical demanding market and therefore, need high performance resins. With a strong focus on understanding customer's needs, there has to be a complete range for the segment, with grades for extrusion of Raffia tapes, coating and differentiated grades with anti-UV additives. This entire portfolio and the continuous search for excellence in new solutions, places Braskem at the leading edge of resins for the Raffia segment.



KEY TRENDS

High speed extrusion tapes machine:

Raffia fabric producers are always looking for ways to improve process efficiency. The main route is through gains in extrusion speed, better combination of mechanical properties (Tenacity and Elongation) of the tapes and saving in energy consumption in the extrusion lines. All the resins which have this brand, has a great potential to bring significant efficiency gains in manufacturing processes, in product designs and environmental appeal, reducing impacts at the whole process.

In order to meet this demand, Braskem has the Maxio[®] Seal.

Maxio® PG480 and PG35L was developed to meet the high level of customer demands regarding the mechanical properties of raffia tape and to guarantee benefits of increased productivity in the extrusion process.

The PG480 Maxio when applied to the applied packaging on high speed liens resulted in:

15% faster final line speeds



higher productivity

450 tons per year in high-speed extrusion line



deliver greater stability in mechanical properties and tape thickness, reducing standard deviation by up to 40% at maximum



SEALING BAGS ARE PREFERRED OVER STITCHING:

Random Copolymer of PP has proved to be an effective solution for sealing characteristics. Presence of Ethylene is discreet ratio in the PP Chain results in better sealing characteristics than Homo polymers. High MFI PP Random Coplymers have been found quite successful.

In order to provide new solutions for the Raffia fabric producers, Braskem has innovated and developed the material RP 144, a Random copolymer of polypropylene with MFI 40g/min, especially for the Bag segment. Due to the low sealing temperature in the conversion machine, when compared to PP homo or PP copolymer, this resin is recommended for extrusion coating to make sealed bags. RP 144 is used in a formulation with 15-20% of BC818 (LDPE) to achieve a bag with excellent sealing, without quality problems related to lack of sealing or burning of raffia fabric.

PACKAGING LIGHTWEIGHT: KEY TO RESOURCE CONSERVATION

The weight reduction in the packaging is key to resource conservation and saving of cost per unit and can be achieved through better stability of the mechanical properties and tape thickness. Braskem has products to support the customer in this trend. One of our best solution for raffia segment is Maxio[®] PG480, this homopolymer with MFI 4,8 g/min gives a better stability during extrusion process, allowing the processors to produce lightweight packages. This grade has the dual advantage of producing low denier tapes with high strength and elongation. This grade has a significant potential weight reduction and is suitable for making block bottom bags.

RESINS AND APPLICATIONS:

RAFFIA:

WIDE RANGE OF MFI IN RESIN IS IMPORTANT TO CHOOSE THE APPROPRIATE GRADE FOR SPECIFIC APPLICATION.

Braskem has products with MFI ranges from 2.1 to 4.8 g/10min. We understand that this range of MFI is able to attend all customer's requirements for productivity, Raffia's mechanical properties and machine technologies (Machinery Park). The portfolio also includes a grade for the production of polyethylene raffia, He150.

EXTRUSION COATING:

PP HOMOPOLYMER WITH VERY HIGH MFI IS KEY TO INNOVATION IN EXTRUSION COATING ONTO FABRIC ESPECIALLY AT LOW THICKNESSES.

- H 130 and H 107 are PP homo polymer with MFI 40 and 80 g /10min respectively, with excellent processability and was developed to meet the demand for low coating thickness.
- CP 144 is a PP heterophasic copolymer with MFI 47g/min. This resin provides a much more flexible coating layer when compared to the PP homopolymer. This flexibility ensures good performance in applications that require a raffia fabric with higher malleability, such as agricultural curtains. CP 144 is also indicated for coating packages that store fine powders such as mineral powder and flour, as it reduces product losses during packaging and packaging handling.

SPECIALTIES:

Many raffia products are subjected to outdoor exposure, such as FIBC. To protect the raffia from this exposure, one method used is to incorporate anti-UV additives to the resin. However, if in situ addition of UV Stabilizer in PP resin will have better performance and customers have not to put inventory for resin and additives separately.



Braskem has a portfolio of products with anti-UV additives developed for applications with high exposure to weathering and for short cycle applications.

Contact us for more information: singapore@braskem.com https://www.braskem.com.br/products





| | GRADE | APPLICATION | MELT INDEX 230°C/2,16 kg) | MELT INDEX 190°C/2,16 kg) | |
|-----------------------|---------|----------------------------------|------------------------------|------------------------------|--|
| | H 503HS | Industrial bags | 4 | | |
| | PG480 | industrial bags | 4,8 | - | |
| FIA: | PG35L | Elevible containers geotextiles | 3,5 | - | |
| RAF | H 612 | Trexible containers, geotextiles | 2,1 | _ | |
| | H 501HC | Carpet backing | 3,3 | - | |
| | HE150 | Raffia PE | - | 1 | |
| RUSION COATING | HE130 | Bags or flexible containers | 40 | - | |
| | H 107 | Bags or flexible containers | 80 | _ | |
| | RP 144 | Welded bags | 40 | - | |
| | CP 144 | Higher puncture strength | 47 | - | |
| ЕХТ | BC818 | Improve neck-in stability | - | 8,3 | |



FOCUS ON SUSTAINABLE SOLUTIONS:

With a global vision focused on the future and sustainability, Braskem, the largest resin producer in the Americas and the world's leading biopolymer producer, works every day to improve people's lives by creating sustainable solutions in chemicals and plastics.





Braskem's Polyethylene I'm greenTM bio-based is made from sugarcane ethylene, a renewable resource, which makes a significant contribution to reducing the level of greenhouse gas emissions throughout the chain. This polyethylene is a renewable alternative to fossil polyethylene and does not require investments in new plastics manufacturing or recycling machinery

For raffia segment, it is possible to make a package with 100% of polyethylene I'm greenTM bio-based using SHE 150 (HDPE) for raffia tapes and SBC 818 (LDPE) for extrusion coating

With the advent of the transition from the linear to circular economy concept, Braskem positioned itself on the market on two fronts:

1. Structural waste solutions through reverse logistics programs for demanding markets and postconsumer packaging from Braskem.



2. Production of post-consumer resins from reverse logistics for the market.

In the raffia segment, Braskem brings cases of reverse logistics with its FIBC's and acts as a partner for brand owners seeking reverse logistics solutions.

Braskem makes possible to offer market solutions that include bio-based and recycled materials in the same final product. In addition, it is possible to achieve a carbon neutral solution, balancing the carbon footprint between recycled and bio-based materials.



and Green Polyethylene

ABOUT BRASKEM

With a global vision of the future oriented towards people and sustainability, Braskem is committed to contributing to the value chain for strengthening the Circular Economy. The petrochemical company's almost 8,000 team members dedicate themselves every day to improve people's lives through sustainable chemicals and plastics solutions. Braskem has an innovative DNA and a comprehensive portfolio of plastic resins and chemical products for diverse segments, such as food packaging, construction, manufacturing, automotive, agribusiness, healthcare and hygiene, among others. With 40 industrial units in Brazil, the United States, Mexico and Germany, and net revenue of R\$52.3 billion (US\$13.2 billion), Braskem exports its products to clients in more than 100 countries.







ASTRA POLYMERS

NOVEL ADDITIVATION FOR ENHANCED PERFORMANCE OF PP RAFFIA/ FIBC INDUSTRY







CO Astra Specialty,

BALANAGENDRAN Astra Polymers.

RAJESH JHA India Head

Rami Zubaidah, Balanagendran Ramaswami & Rajesh Jha, **Astra Polymers, Saudi Arabia**

INTRODUCTION

Polymers have become indispensable with mankind in usage and sustenance. Globally polymer consumption is presently close to ~ 280 MMTA valued at USD 850Billion. Among various polymers PP & PE are the largest consuming polymers. It is estimated that the global consumption of PP is ~ 80 MMTA and that of PE is ~ 102 MMTA. Indian Polymer consumption is ~ 19 MMTA and that of the PP & PE is ~ 5.08 MMTA & 5.3 MMTA respectively.

Despite many outstanding properties there are limitations in the usage which has been overcome by additivation which maximises it value and fulfills the protection requirements against environmental vagaries such as heat, sunlight, moisture, oxygen etc, causing the degradation of the material and loss of mechanical and physical properties. The degradation process can be retarded and the useful life of plastics can be prolonged, by the suitable additivation of the polymer mass.

POLYPROPYLENE

There are a whole lot of stresses that act on the most commonly used Polymer, Polypropylene, such as mechanical, environmental, biological, usage etc, which put the enduring polymer to severe test and its resistance to failure :



The most common reason causing degradation of PP is the UVradiation . In much the same way as our skin can be prone to damage when it comes into contact with harmful ultraviolet (UV) rays. The energy carried by this radiation initiates or accelerates chain chemical reactions in the polymer's molecules, causing chain-scission and/or cross-linking. As a result, product loses its properties and becomes brittle. The time taken to result in failure is directly proportional to the absorbance of Incident Light, by following Beer's Lambert Law :



Therefore, the challenge for the Polymer Chemists is to address quantum of UV Absorbance which is the most prominent degradant for Polypropylene, particularly, due to its pendant methyl group (there by formation of tertiary carbon atom). The tertiary carbon atom is most unstable bond in the hydrocarbon chain). In the presence of Oxygen and residual transition metal catalyst, the free radicals generated by UV light degrade the polymer (photooxidative degradation) by hydroperoxides as initial reaction and subsequent formation of carbonyls etc which has been detected in the IR Spectroscopy as shown in the following exhibit.





The extent of degradation is measured by estimation of Carbonyl Index (Cl), which is the ratio of Area under Carbonyl curve (Ac) visa-vis Refrence Curve (AR).

CI = AC/AR

Higher CI indicates higher degradation.

The carbonyl functional groups oxidises further to break the polymeric chain, resulting the reduction in the molecular weight and cracks starts to grow in the region, which is in direct exposure of the sun light. The plastics that has been affected by ultraviolet rays, can be noticed by:

- a chalky appearance the component surface
- becoming brittle
- a colour change on the surface of the material

The UV Rays, as an electromagnetic radiation can be classified into three categories, based on its wavelength. They are UVA, UVB & UVC. UVA has a wavelength range of 320-400 nm, while UVB has a range of 280-320. Meanwhile, UVC's range stands at around 100-280. If we take skin as an example, UVA may result in a tanning of the complexion, while UVB may mean it burns. The common effect of UVC IS germicidal. Polyolefins specially PP & LDPE are susceptible to all the three range of UV Rays and if not designed for UV Stabilization, can lose 70% of its mechanical properties within six days of exposure to sunlight.

GLOBAL MAP OF HORIZONTAL UV IRRADIATION





Polypropylene based bulk packaging products such as FIBC and Woven sack needs the UV Stabilization as a general product design. The PP Tapes, being in highly oriented & crystalline state, undergoes chain rupture, leading to failure.



ORIENTED PP AFTER UV EXPOSURE



The FIBC industry in India, is estimated to be about half million tons annually. Moreover, the Foodgrain packaging may add another half million ton Polypropylene consumption. Therefore, it is a good reason to address this need to stabilise 1 million MT of PP for the critical application.

UV STABILIZATION SYSTEMS

Technically, the degradation caused by UV Light can be controlled by coating, screening, absorption, stabilization, quenching, and scavenging systems. Coating on non polar substrates is temporary in nature. However, the other two are widely used. Screening can be done by either loading the polymer Carbon Black, Titanium Dioxide or by calcium carbonate. These pigments impart colour and has selective application. Absorption of UV by adding some colourless, odourless, organic compounds are possible and besides imparting a colour selectivity, they also impart longer life to neat polymer by neutralizing the UV energy within the compound and dissipate it harmlessly as heat energy. Benzophenones are normally used with Poly Olefins as a UV absorber. Stabilisers usually act by inhibiting the bond rupture by chemical means or dissipate the energy to lower levels that do not attack the bonds. Quenchers reduce the UV energy by means of deactivating metal ions, specially Nickel (in LDPE). In effect, they intercept the energy before it can break any molecular bonds, but in a different way from absorbers. Scavengers act by inhibiting the free radicals generated by UV light, so stopping any further decomposition.

The most important are hindered amine light stabilizers (HALS). They are efficient scavengers and function by inhibiting the degradation of a polymer which has already formed free radicals. Other advantages offered by them are, compatibility (with Polymer & other additives), low volatility (while processing), resistance to extraction and its additional role as thermal stabilizer.



There are three main kinds of HALS used in polyolefin applications:

- Low molecular weight HALS
- High Molecular Weight HALS
- NOR HALS.

High Molecular Weight HALS are more compatible with polymers, have lower volatility and migration behaviour, better extraction resistance and better contribution to heat stability. NOR HALS are normally used as a potent solution where Sulphur, Acids, Insecticide and Flame Retarders have been used. So based on the end uses, addition of UV and thermal stabilizers are considered.

Astra Polymers understands the need to circumvent the problem of UV degradation and thus has developed exclusive range of UV masterbatches, with selected heat and light stabilizers, specially for FIBC. Having a rich experience of over 25 years, Astra Polymers, a part of \$3.5b, AIG Group, Saudi Arabia, has commenced production in India and manufacturing a whole range of selected categories of White and Additive masterbatches. Supported by state of the art R&D units in Saudi, Turkey and India, Astra has a capability to design and develop highly customised solutions for the Indian Polymer Industry.

Major advantages of Astra UV Masterbatches for FIBC application are :

- Careful selection and balanced formulation of different additives.
- Excellent dispersion of the additives in the base resin.
- Easy processability without affecting the mechanical properties of the end products.

In short, Astra Polymers offer a range of UV stabilizer masterbatches to suit different requirements based on end use applications. These UV masterbatches can be offered for Food and non food contact requirements for PP & PE in their respective carriers.

ASTRA UV STABILIZER SYSTEMS

ASTRA offers the following portfolio of UV Stabilisers for PE& PP Raffia Industry specially FIBC.

| ASTRA Grade | Description | Carrier Resin | Food contact |
|-------------|---------------------------|---------------|--------------|
| AS 3210 | 20% HALS | LLD /LD | NO |
| AS 3029 | 20% syn. HALS combination | LLD /LD | NO |
| AS 3050 | 20% HALS | LLD /LD | YES |
| AS 3022 | 20% syn. HALS combination | LLD /LD | YES |
| AS 3012 | 20% HALS | РР | YES |
| AS 3141 | 20% syn. HALS combination | РР | YES |
| AS 3142 | 15% cost effective MB | PP | NO |



Based on the above offerings from ASTRA, various studies have been conducted on PP Raffia Tapes, having 50 micron, and would cherish the reports on :

- The UV Exposure duration for retention of 50% Tensile Strength
- No of days it takes for embrittlement &
- Change in the water Carry over behaviour in Polypropylene Tapes.

It is very important for us to share that no single test can be employed to conclude the impact of UV Stabiliser, in the polymer matrix. ASTM D 4329 - Standard Practice for Fluorescent Ultraviolet (UV) Lamp Apparatus Exposure of Plastics was employed as per the ISO Protocol 21898, in accordance with Apparatus ASTM G 154-98. As per the protocol the test specimens are exposed to a fluorescent UV Lamp for at least 200 hours, using a test cycle of 8h @600C with UV radiation alternating with 4 h at 500C with condensation. Eventually, the values of Tensile/ Elongation are compared with unexposed samples to arrive at the extent of degradation. The results have been annexed graphically as under

Universal Weatherometer, Exposure: Florida 45° South, Test Criteria: kLys to 50%











FACTORS AFFECTING UV STABILITY ON PP TAPES

- Tensile strength and Elongation at Break retention is proportional to the Denier/ GSM of the Fabric in FIBC.
- Therefore, lower GSM Fabrics require higher doses of UV Stabilizer (4000 to 5000 PPM) and vice versa (UV Stabilizers 3600 to 4000 ppm).
- Retention of Elongation equally critical as Tensile Strength.

CONCLUSIONS

Since PP is an engineering polymer with in the ambit of commodity polymers. PP as a Polymer needs stabilization against UV to address the need of commodity and bulk packaging during its service life. The Cost Benefit Ratio offered by PP post UV stabilization offers affordability and packaging suitability. Specific Molecule with low volatility and lower solubility, lower extratables, lower migration behaviour etc. of HALS provide the effective additivation in PP & PE to prevent degradation to meet the commercial requirement.

ROLE OF ASTRA

In with advanced technology of compounding/extrusion, ASTRA polymers is uniquely positioned to serve the customers in creating the best end products for longer service life, by using the most efficient inputs and production systems, supported by state of the art R&D labs. Unique blend of various inputs have been developed with tested performance in torturing conditions of African and Arabian regions. With limited product portfolio, ASTRA being present in more than nine countries directly and many more through its associates/ agencies, it is possible for us to deliver larger quantities of high end products at globally competitive prices.



QUALITY EVALUATION

TESTING AND QUALITY EVALUATION OF FLEXIBLE INTERMEDIATE BULK CONTAINERS

Prof Dr N.C.Saha Former Director, Indian Institute of Packaging & Chairman, Textiles Sectional committee (Tx-23), Bureau of Indian Standards

A Flexible Intermediate Bulk Container (FIBC) commonly termed as 'bulk bag', 'big bag' or 'tote' is an intermediate bulk container having a body made of a flexible woven material, typically polypropylene (PP), which is handled mechanically by forklift trucks, cranes or hoists when filled. This container is designed in such a manner that it can be lifted from the top by means of integral, permanently attached devices (lift loops, stevedores or sleeves). FIBC is intended for shipment of solid materials like powder, flakes or granular form. More importantly, FIBC does not need any further packaging as it can be directly shipped as transport package. In other words, FIBC can be considered as another form of transport package.

FIBC, widely known as jumbo bags, have gained great prominence when it comes to the bulk transportation of food grains, cement and Chemicals etc. These bags are durable and lasting, even in the toughest of weather and environmental conditions and are also economical to use. These bags are manufactured from woven polypropylene fabric, which are safe and hygienic in nature and can be reused multiple times. An FIBC bag comes in various types and each type has a unique function.

As per Bureau of Indian Standards (IS: 15875:2009), the flexible Intermediate Bulk Containers (FIBC) is defined as a container having the body made of a flexible materials such as woven fabric, plastics film or paper, designed to be in contact with the contents either directly or through an inner liner and easily foldable when empty. However, there are different types of FIBC based on its application. The different types of FIBC are given below:

- Heavy duty reusable Flexible intermediate bulk Containers: These are designed and intended to be used for a multiple of filings and discharges.
- Standard duty reusable Flexible intermediate bulk Containers: These containers are designed and intended to be used for a limited number of fillings and discharges. An FIBC of this category cannot be reused if damaged, that is not repairable.
- Single-trip flexible Intermediate bulk Container is an FIBC designed and intended to be used for one filling only.

FIBC or the 'jumbo bag' is similar to the plastic woven sack made of polypropylene (PP) or high density polyethylene (HDPE), but that of a larger dimension. These packages can be formed both, from tubular and flat polypropylene (PP) woven fabric. In fact, jumbo bags are one of the most cost-effective and perfect types of wrapping material for shipping, and for creating a pile of dry products. The dimension of FIBCs vary which depends upon the type of application. The dimensions, handling, filling, discharging and barrier features of an FIBC can be customised based on the needs of the customer. FIBCs typically hold anywhere from 500 to 3,000 kgs of the product.





The FIBC are manufactured in different types by considering the construction as well as its application. In general, FIBC's of like design manufactured by using like materials and methods to the same nominal cross-sectional dimensions within type, by comparison with the samples successfully passing the type Tests where the circumferences may be increased by upto 10 percent provided the same geometry is maintained. The design vertical dimensions may be increased to achieve a series of different volumes. Where the type has a base discharge spout, smaller diameter discharge spouts of like design may be used. The presence or absence of liner does not constitute a Change of type.

The term " Quality" refers as the totality of features and Characteristics of a product or service that bear on its ability to satisfy stated or implied needs. And Quality Control is the operational techniques and activities that are used to fulfill requirements for quality whereas Quality Assurance defined as all planned and systematic actions necessary to provide adequate confidence that a product or service will satisfy the given requirements for quality. But Quality Evaluation is the process of examining and passing a judgment on the appropriateness or level of quality or standards. Quality evaluation may be undertaken internally or externally. External evaluation is a process for undertaking and independent evaluation.

The quality evaluation of Flexible Intermediate Bulk Containers (FIBC) is carried out by conducting different types of tests in the laboratory. In general, there are two kinds of tests are conducted to evaluate the quality of FIBC.

- **Type Test**: A test or series of tests conducted to determine whether the FIBC meets the requirements of these standards.
- **Performance Test:** A test or series of Test conducted to determine the functional properties of FIBC in terms of load bearing capacity and also the mechanical strength of the lifting devices.

The FIBC has got lifting devices which are an integral and /or fixed lifting devices and forms the part of the FIBC and are tested with it. The different types devices are given below:



EACH LIFTING DEVICE FIXED AT TWO POINTS EACH LIFTING DEVICE FIXED AT ONE POINTS





LIFTING DEVICE FORMED

OUT OF THE WALLS

TWO TUBULAR LIFTING DEVICE





TWO LIFTING DEVICES BASE FIXED ON SIDE WALLS

TWO LIFTING DEVICES FIXED ON BASE

Under Performance Test, all types of FIBC's shall be subjected to the following Tests as per IS: 14738:2017

- Cyclic Top lift test
- Compression/ stacking Test

In order to conduct these test, there are two important terminology needs to be understood.

Safe Working Load (SWL): The maximum load which the FIBC should carry in service, as certified.

Safety Factor (SF): The integral quotient between the final test load in the cyclic top lift test and the SWL value rounded at lower side. Safety factors are illustrated as follows:

| | ILLUSTRATION 1 | ILLUSTRATION 2 | |
|--|-----------------------|-----------------------|--|
| Designated SWL | 500 kg | 500 kg | |
| Final Load, cyclic test | 2400 Kgf | 2600 Kgf | |
| Quotient | 4.8 | 5.2 | |
| Integer quotient rounded Lower side | 4 | 5 | |

In order to evaluate the FIBC, at least three specimens of FIBC shall be taken for testing.

- Specimen 1 : Cyclic top lift test using the FIBC having the shortest vertical dimension.
- Specimen 2 : Cyclic Top lift Test using the FIBC having the greatest vertical dimension.
- Specimen 3: Compression testing the FIBC having the greatest vertical dimension.

One sample of FIBC shall be taken for each test. An FIBC which has passed one test may be used for other test.

Preparation of Test specimen:

For both the Top lift test and Compression /stacking tests, the FIBC shall be filled up to the filling level recommended by the manufacturer with a tolerance \pm 5/0 percent of that height. The FIBC shall be filled with Plastic granules having bulk density-0.5 to 0.9 kg/l and mesh size-3 to 12 mm and angle of repose: 30-35°

Conditioning of Test specimen:

The filled FIBC shall be conditioned before testing at ambient temperature and relative humidity. However, in general, the test specimens are conditioned at $27\pm2^{\circ}$ C and $65\pm2\%$ RH.

Test requirement:

- Heavy duty reusable FIBC: This contains 70 cycles at 6 times of SWL and a final cycle at 8 times of SWL.
- Standard duty reusable FIBC: This contains 70 cycles at 4 times of SWL and a final cycle at 6 times of SWL.
- Single trip FIBC: This contains 30 cycles at 2 times of SWL and a final cycle at 5 times of SWL.

CYCLIC TOP LIFT TEST:

The filled FIBC is suspended from a frame and a flat pressure plate is positioned on top of the contents. The flat plate is restrained either from above or below. An upward force is applied progressively to the frame lifting the FIBC against the resistance of the flat pressure plate. The filled FIBC is subjected to a repeated loading, unloading and dwell cycle. The force is recorded and the FIBC is observed for breakage of any lifting device, other damage or leakage of contents.



Top lift Test Equipment.

COMPRESSION/ STACKING TEST:

The test is applicable for all kinds of FIBC. The test procedure is same as top lift test where the filled FIBC is suspended from a frame. In this test, the load to be placed on the FIBC shall be four times the SWL of the FIBC. The load shall be applied for a period of 6 hours. After the test, there shall be no loss of contents and no deterioration of the body of FIBC which renders the FIBC unsafe for transport or storage.

However, while the FIBC is used for the transportation of dangerous or hazardous substances for export, in such case, the quality evaluation is little more stringent and the test specimen of FIBC is tested per the procedure of International Maritime dangerous Goods (IMDG) code, published by expert group of United Nations. The International Maritime Dangerous Goods or IMDG Code was adopted in 1965 as per the SOLAS (Safety for Life



at Sea) Convention of 1960 under the IMO. The IMDG Code was formed to prevent all types of pollution at sea. The IMDG code also ensures that the goods transported through seaways are packaged in such a way that they can be safely transported. The dangerous goods code is a uniform code. This means that the code is applicable to all cargo-carrying ships around the world.

The Expert Committee of Hazardous Goods of United Nations has formulated the common regulations for the transportation of hazardous materials either by Sea, Road or Air within the United Nations member countries without any hurdles. The United Nations has implemented different regulations like International Maritime Dangerous Goods Code (IMDG) for sea transportation. International Civil Aviation Organization (ICAO) for air transportation. Every member country of the United Nations has got the controlling authority for the transportation of hazardous goods.

In India, the Directorate General of Shipping (Ministry of Surface Transport, Govt. of India) and Directorate General of Civil Aviation (Ministry of Civil Aviation, Govt. of India) are the Controlling authority. Both the organisation have authorized the Indian Institute of Packaging, an autonomous body under the Ministry of Commerce & Industry, Govt of India as a nodal agency to conduct the various performance tests on bulk packages and also to issue the UN Certificates along with UN markings. The Institute has been providing these services to a large number of industries across the country and thus, promoting the export of hazardous goods. As per IMDG code, Chapter 6.5, the following important tests are carried out for FIBC which are intended to be used for the carriage of hazardous goods for export.

- Top Lift Test
- Stack Load Test
- Drop Test
- Tear Test
- Topple Test
- Righting Tes

In case of Hazardous goods, there are 4 additional tests on FIBC, the details are given below:

DROP TEST:

The ends of a filled FIBC are closed by tying with a rope and then lifted to a height of 4.5 meters by means of pulley. Allow the FIBC to remain in suspended condition by adjusting the specified drop height. Then the filled FIBC is dropped by opening the release mechanism on a hard, non-resilient surface. After the test, there shall be neither any breakage of FIBC nor any loss of contents which renders the FIBC unsafe for transport or storage. The drop height for conducting test is considered as per the degree of danger of the hazardous goods intended to be carried in FIBC. Based on the degree of danger of hazardous goods, Packing groups are designated as I,II and III for High, Medium and low danger of hazardous goods respectively.

The drop height is decided based on the packaging group and accordingly, UN marks to be printed on FIBC are also designated either as X, Y, or Z. The details of drop height, Packaging group, UN symbols and Maximum Volumes are given below:

| Packing Group | Drop Height | UN- Symbol | Max. Volume |
|---------------|-------------|------------|--------------------|
| I | 1,80 m | х | 1,5 m ³ |
| II | 1,20 m | Y | 3,0 m ³ |
| | 0,80 m | Z | 3,0 m ³ |



TEAR TEST:

Drop Test

The FIBC specimen shall be filled to not less than 95% of its capacity and to its maximum permissible gross mass, the contents being evenly distributed. Once the filled FIBC is placed on the ground, a 100 mm knife score, completely penetrating the wall of a wide face, is made at a 45° angle to the principal axis of the FIBC, halfway between the bottom surface and the top level of the contents. The FIBC shall then be subjected to a uniformly distributed superimposed load equivalent to twice the maximum permissible gross mass.

The load shall be applied for at least five minutes. An FIBC which is designed to be lifted from the top or the side shall then, after removal of the superimposed load, be lifted clear of the floor and maintained in that position for a period of five minutes. The cut shall not propagate more than 25% of its original length.

TOPPLE TEST:

This test is applicable for all types and designs of FIBC. The FIBC shall be filled to not less than 95% of its capacity and to its maximum permissible gross mass, the contents being evenly distributed. The FIBC shall be caused to topple on to any part of its top on to a rigid, non-resilient, smooth, flat and horizontal surface. The topple height will be as follows:

| Packing Group | Topple Height (mt) | | |
|---------------|--------------------|--|--|
| I | 1.8 | | |
| II | 1.2 | | |
| II | 0,8 | | |

RIGHTING TEST:

For all kind of FIBC designed to be lifted from the top or side, as design type test. The FIBC shall be filled to not less than 95% of its capacity and to its maximum permissible gross mass, the contents being evenly distributed. The FIBC lying on its side, shall be lifted at a speed of at least 0.1 m/s to upright position, clear of the floor, by one lifting device or by two lifting devices when four are provided. After the test, there's no damage to the FIBC or its lifting devices which renders the FIBC unsafe for transport or handling.

In addition, there are few important tests related to fabrics like Breaking Strength and elongation and UV resistance tests are also carried out to evaluate the quality of fabric materials used for the construction of FIBC.

CONCLUSION:

Testing is always considered as the "tool" for the evaluation of quality of any goods. In the same line, this is very important to carry out different tests of FIBC as per the prescribed test method laid down in the national as well as International Standard to assess the quality of FIBC to transport the goods safely.



RELIANCE

POLYPROPYLENE BASED WOVEN GEO TEXTILES FOR DEVELOPMENT OF A SUSTAINABLE INFRASTRUCTURE

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INTRODUCTION

Geotextile can be defined as a planar, permeable, polymeric (synthetic or natural) textile material, which may be woven, nonwoven or knitted, used in contact with soil/rock and/or any other geotechnical material in civil engineering applications. They belong to the family of geo synthetics and are a part of technical textiles covered under the segment Geotech by Ministry of Textiles, Govt. of India. The primary functions of geotextiles are separation, filtration, reinforcement and / or drainage. Geo textiles when used in building modern day infrastructure, helps us to achieve higher efficiency and better performance of the structures built, reduce usage of conventional aggregate materials, have higher benefit to cost ratios, and develop more environment friendly and a sustainable infrastructure.

GLOBAL SCENARIO

| INDUSTRY | USD 8.412 Billion | |
|-----------------------|-------------------|--|
| | | |
| GEOSYNTHETIC PRODUCTS | 8037 Million Sq M | |
| | | |
| RESIN CONSUMPTION | 3000 KT | |

Globally it is an USD 8.4 Billion Market and over 8000 million sqm of various kinds of geosynthetics products are manufactured and consumed.



WOVEN GEOTEXTILES





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PRODUCT TYPE VS MARKET SHARE



60% of the geosynthetic products consumed globally are geo textiles and out of which 35 to 40% are of woven type. Woven geotextiles are manufactured by extruding and weaving together monofilaments, tapes (flat or fibrillated), multi filament yarnsetc. They exist in a wide range and vary in terms of physical, mechanical, hydraulic and endurance properties. Denier of the flat / fibrillated tapes used for manufacturing PP geotextiles may vary from 1000 to 4500 and the weight of PP woven geo textiles range from 100 to 1100 gsm or more.

TYPES

WOVEN GEOTEXTILE TYPES



TYPICAL RANGE OF PROPERTIES FOR CURRENTLY AVAILABLE GEOTEXTILES

PHYSICAL PROPERTIES

Specific gravity Mass per unit area Thickness Stiffness

MECHANICAL PROPERTIES

Compressibility Tensile strength (grab) Tensile strength (wide width) Confined tensile strength Seam strength Cyclic fatigue strength Brust strength Tear strength Impact strength Puncture strength Friction behavior Pullout behavior

HYDRAULIC PROPERTIES

Porosity (nonwovens) Percent open area (wovens) Apparent opening size (sieve size) Permittivity Permittivity under load Transmissivity Soil retention: turbidity curtains Soil retention: silt fences

ENDURANCE PROPERTIES

Installation damage Creep response Confined creep response Stress relaxation Abrasion Long-learn clogging Gradient ratio clogging Hydraulic conductivity ratio

DEGRADATION CONSIDERATIONS

Temperature degradation Oxidative degradation Hydrolysis degradation Chemical degradation Biological degradation Radioactive degradation Sunlight (UV) degradation Synergistic effects General aging

0.9-1.7 135-2000 g/m² 0.25-7.5 mm nil-25,000 mg-cm

- nil-high 0.45-4.5 kN 9-180 kN/m 18-180 kN/m 50-100% of tensile 50-100% of tensile 350-5200 kPa 90-1300 N 14-200 J 45-450 N 60-100% of soil friction 50-100% of geotextile strength
- 50-95% nil-36% 2.0-0.075 mm (#10-#200) 0.02-2.2s⁻¹ 0.01-3.0s⁻¹ 0.01-2.0 x 10⁻³ m⁻²/min m.b.e m.b.e

0-70% of fabric strength g.n.p if <40% strength is being used g.n.p if <50% strength is being used g.n.p if <40% strength is being used 50-100% of geotextile strength m.b.e. for critical conditions m.b.e. for critical conditions 0.4-0.8 appear to be acceptable

high temperature accelerates degradation m.b.e. for long service lifetimes m.b.e. for long service lifetimes g.n.p. unless aggressive chemicals g.n.p. g.n.p. unless high level major problem unless protected m.b.e. actual record to date is excellent

Abbreviations: m.b.e.-must be evaluated: g.n.p.-generally no problem



RAW MATERIALS FOR WOVEN GEOTEXTILES

The polymeric raw materials /resins which are commonly used in manufactring geotextiles are Polypropylene and Polyester

COMMONLY USED GEOSYNTHETIC POLYMERS AND THIER APPROXIMATE WEIGHT FORMULATIONS

| POLYMER TYPE | RESIN | FILLER | CARBON BLACK OR PIGMENT | ADDITIVES | PLASTICIZER |
|--------------------------|-------|--------|----------------------------|-----------|-------------|
| Polyethylene (PE) | 95-98 | 0 | 2-3 | 0.5-2.0 | 0 |
| Polypropylene (PP) | 85-96 | 0-13 | 2-3 | 1-2 | 0 |
| Polyvinyl chloride (PVC) | | | | | |
| (unplasticized) | 70-85 | 5-15 | 5-10 | 2-3 | 0 |
| Polyvinyl chloride (PVC) | | | | | |
| (plasticized) | 30-40 | 20-30 | 5-10 | 2-3 | 25-30 |
| Polyester (PET) | 96-98 | 0 | 2-3 | 0.5-1.0 | 0 |
| Polyamide (PA) (nylon) | 96-98 | 0 | 2-3 | 0.5-1.0 | 0 |
| Polyamide (PS) | 96-98 | 0 | 2-3 | 0.5-1.0 | 0 |
| Chlorosulphonated | | | | | |
| polyethylene (CSPE) | 40-60 | 40-50 | 5-10 | 5-15 | 0 |
| Ethylene propylene diene | | | | | |
| terpolymer (EPDM) | 25-30 | 20-40 | 20-40 | 1-5 | 0 |

(Note: All values are percent on the basis of weight measurement)

MACHINERY USED FOR MANUFACTURING PP WOVEN GEOTEXTILES

The machinery required are tape extrusion / spinning lines, beamers and circular or flat weaving looms. Speed and rate of Production .



SOME PHYSICAL PROPERTIES OF SYNTHETIC FIBERS (STANDARD LABORATORY COBDITIONS FOR FIBER TESTS: 20°C AND 65% RELATIVE HUMIDITY)

| | Breaking Tenacity (g/denier)* | | Specific | Standard Moisture | Coefficient of Thermal Expansion | |
|---|----------------------------------|---------|--------------|----------------------|---|---|
| Fiber | Standard | Wet | Gravity | Regain (%) | (x 10 ⁻⁵ per 1 ⁰ C) | Effect of Heat |
| Polyethylene (high-density) | — | — | 0.96 | 2.0 | 13 | Melts at 110-140°C |
| Polyethylene (filament and staple) | 4.8-7.0 | 4.8-7.0 | 0.91 | 3.0 | 6 | Melts at 160-170°C |
| Polyester Regular-tenacity filament | 4.0-50 | 4.0-50 | 1.22 or 1.38 | 0.4 or 0.8 | 4-5 | Melts at 250-290°C |
| High-tenacity filament | 6.3-9.5 | 6.2-9.4 | 1.22 or 1.38 | 0.4 or 0.8 | 4-5 | Melts at 250-290°C |
| Regular-tenacity staple | 2.5-5.0 | 2.5-5.0 | 1.22 or 1.38 | 0.4 or 0.8 | 4-5 | Melts at 250-290°C |
| High-tenacity staple | 5.0-6.5 | 5.0-6.4 | 1.22 or 1.38 | 0.4 or 0.8 | 4-5 | Melts at 250-290°C |
| Nylon Nylon 66 (regular- tenacity filament) | 3.0-6.0 | 2.6-5.4 | 1.14 | 4.0-4.5 | 5.5 | Sticks at 230°C Melts at about 260°C |
| Nylon 66 (high- tenacity filament) | 6.0-9.5 | 5.0-8.5 | 1.14 | 4.0-4.5 | 5.5 | Same as above |
| Nylon 66 (staple) | 3.5-7.2 | 3.2-6.5 | 1.14 | 4.0-4.5 | 5.5 | Same as above |
| Nylon 6(sfilament) | 6.0-9.5 | 5.0-8.0 | 1.14 | 4.5 | 5.0 | Melts at 210°C and 220°C |
| Nylon 6 (staple) | 2.5 | 2.0 | 1.14 | 4.5 | 5.0 | Melts at 160-220°C |

Source: Modified from Shreve and Brink (26).

*Denier is equivalent to the grams per 9000 meters of the thread used to make synthetic fabric. The higher the denier, the heavier the fabric.

APPLICATIONS OF PP WOVEN GEOTEXTILES

Woven geotextiles are / can be predominantly used in construction of roadways, erosion control, ground improvement, dewatering works and as silt fences and ground covers etc. Geotextiles are used in many forms viz., planar, bag, container, tube etc. and one can easily access the National and International standards, codes and guidelines available for product specifications and for usage in various application sectors.

FORMS









APPLICATIONS















INDIAN STANDARDS / CODES ON GEO SYNTHETICS FOR USAGE IN VARIOUS APPLICATION SECTOR



COASTAL & RIVER SECTOR



FUTURE OUTLOOK OF WOVEN GEOTEXTILES

There is a very good demand for woven geotextiles in International market and large volumes of geotextiles manufactured in India are also being exported meeting all the technical parameters and quality standards and norms. As the production process is very labour intensive, it is giving an edge in many ways to our domestic processors in the export market. With the government's thrust on developing a sustainable infrastructure, off late the demand has also started picking up for these products in domestic market and there is a need for increasing the existing and developing new capacities for catering to the domestic and export market requirements. Further, Cabinet Committee on Economic Affairs has given its approval to set up a National Technical Textiles Mission with a view to position the country as a global leader in Technical Textiles and is expected to give the desired boost to the sector.

ROLE OF RIL IN PROMOTING GEOTEXTILES

Word wide geo synthetic products are in use for the past many decades and first introduced in our Country for more than twenty years now. But there was a huge gap between the market potential and actual demand for these products in Indian sub-continent due to various reasons, viz., lack of awareness among user agencies / departments, non-availability of Indian standards, codes & guidelines, non-existence of production facilities covering the entire range of products, authorities not taking into consideration the life cycle cost of the projects and many more. To bridge the gap and to help India build a sustainable infrastructure, for the past many years, our activities in this Sector are directed towards -Creating Awareness among all Stakeholders - Developing Pilot Projects - Establishing Benefit to Cost Ratios / Performance Reports - Facilitating Nodal Agencies in developing various Standards, Codes & Guidelines -Incorporation in SORs of various State PWDs/ Project DPRs - Facilitating Customers to set up production lines catering to both domestic and export markets etc. and are continuing to do so. Over the period, production capacities covering volumes and product range got built up (at processors end with many more in pipeline), products are being exported to western countries meeting all International standards and quality norms, Indian standards, codes & guidelines got formulated and in place facilitating usage in most of the application sectors and many more developments have taken place and we also acknowledge the initiatives / support of Ministry of Textiles and other stakeholders in this regard.



PRASAD GROUP

THE PERFECT SOLUTION FOR RAFFIA INDUSTRY GRAVIMETRIC DOSING MIXING AND DRYING SYSTEM

Sanjiv Parikh – General Manager (Sales & Marketing) Prasad Group, Ahmedabad, India

INTRODUCTION

The trend in raffia industry has significantly changed over a period of time. A decade back the 250 to 300 kg/h tapelines with basic raw materials like PP/HDPE were common. Now, the trend is moving towards high output lines (upto 750 kg/h) with complex recipe of raw materials to achieve desired tape properties and cost feasibility.

This change has necessitated even and accurate mixing of material recipe for these high output lines which is not possible by manual mixing. Now processors have to use dosing and mixing unit. Gravimetric Dosing Mixing and Conveying System (GDMCS) have been developed to achieve complex mix of various raw materials accurately.

GDMCS series makes it easy to dose and weigh, monitor, correct and analyze – in one cycle. Accurate, repetitive dosing is essential for the quality of tapes. If raw material, filler and other components are not accurately dosed and weighed, the characteristic features of tapes including denier cannot be achieved. It is working on GAIN IN WEIGHT principle giving highly accurate material composition in $\pm 0.05\%$ accuracy irrespective of difference in bulk density of various materials.

The functional principle of the GDMCS: Individual components, such as polymer, filler, UV stabilizer or other additive, can be dosed into the weighing container with a slide valve or alternatively using chamber volume dosing for minor component. The load cell registers the actual weight of the individual component and communicate the values to the control unit, which compares them with the set value and do correction if require. Each filling is weighed every time in succession to balance out any variation and do continue correction. Here an agitator homogeneously mixes the dosed batch before it is processed on Tapeline.

FEATURES OF DOSING SYSTEM

GDMCS is equipped with below mentioned features & benefits which are not limited though,

- Up to 6 Components dosing, mixing & conveying & throughput up to 1200 kg/hr.
- High dosing accuracy of $\pm 0.05\%$
- · Suitable for Online as well as Offline installation
- Fully automated PLC control with printing interface, Industry 4.0 compatible
- Ethernet connectivity and 2 USB ports for printing various reports
- Password protection to prevent an unauthorized access

BENEFITS OF DOSING SYSTEM

- Consistent quality of tapes
- No. of recipes can be stored, password protected and recall any time with single key
- Multiple Number of materials & recipes one can play with
- User friendly control makes it very easy to operate the plant in fully automation
- Drastic reduction in spillages of raw material compare to manual material handling
- Monitor individual material consumption, repeatability and very high consistency
- Single control for dosing & conveying for entire system makes it very easy to operate
- · Can be easily accommodated in existing infrastructure



Online - GDMCS









DRYER

Filler is hygroscopic material and need to remove moisture before mixing with polymer. It has surface moisture content which can be removed by the use of Hot Air Dryer (HAD). HAD can be integrated with GDMCS in closed loop and it is highly recommended to use for consistent tape quality and throughput.



Hot Air Dryer

MOST ENERGY EFFICIENT AND ENVIRONMENT FRIENDLY CHILLING PLANT THE PERFECT HEAT TRANSFER SOLUTION FOR RAFFIA INDUSTRY

Cooling is another main influential part in the Raffia industry. It is recommended to provide continue cooling in tape line at various points like gear box, grooved feed, water bath and godets.

Controlled heating and cooling arrangement highly affects on quality and strength of tapes, achieve rated output and increase life of a few important components of a tape line.

Due to environment protocol now a days chilling system in green gas like R134a refrigerant is the need of an hour.

Latest technology in cooling is, screw compressor chillers with refrigerant R134a. Screw compressor is one of the widely accepted compressor in the chiller industry.

Range of features provided by the Screw compressor over other technology like reciprocating or Scroll are:

- Screw compressor provides 25% to 100% step-less capacity control, Energy efficient.
- Less moving parts, less maintenance and the best compressor for the long run.
- Very less noise while functioning.
- It creates much lower vibration compared to reciprocating compressor.
- Refrigerant R134a is low pressure, environment friendly and energy efficient.
- Most suitable for high ambient temperature.

ROLE OF CHILLERS -

- Improves production and reduces overall costing.
- Enhances mechanical property of the final product.
- Improves aesthetic of final product.



Water Cooled Screw Chiller



Air Cooled Screw Chiller

We at Prasad Gwk, manufacture screw chillers to remove heat from water bath through gasketed plate heat exchanger as well as remove heat from other part of the tape line which helps to run the machine at higher line speed and ultimately result in higher output.

Screw chiller is equipped with below mentioned features & benefits which are not limited though,

FEATURES:

- First in segment touch screen HMI makes it most user friendly to operate while monitoring & controlling all important parameters.
- Energy efficient air/water cooled compact chillers with Screw Compressor 40 to 350TR capacity (Indoor and Outdoor installation type).
- Step less capacity control 25 to 100%
- User friendly touch screen PLC control compatible with Industry 4.0. All digital function and fault display.
- Necessary safety interlocks to safeguard major components.
- Electronic expansion valve in refrigerant circuit to control precisely suction gas superheat and improve chiller efficiency.
- Large size shell and tube type heat exchanger made from inner grooved copper tubes.
- Centralized chiller can be connected with multiple tape lines.
- · All materials used in water contact are corrosion proof.



PRASAD KOCH TECHNIK PVT. LTD.

A joint venture with Werner Koch Maschinentechnik GmbH – Germany

PRASAD GWK COOLTECH PVT. LTD.

In Co-operation with Gwk - Germany

Prasad Group of Companies – started its operations in 1984 for manufacturing post extrusion equipments for the plastic industry. Now, Prasad has India's largest and most sophisticated infrastructure for manufacturing Plastic Auxiliary Equipments.

Automation, sophistication and upgradation of technology are the need of the hour and the company keeps itself fully updated to provide the same. Responding to the ever growing demand of automation solutions, the people at Prasad are always focused on customer satisfaction, operational excellence and above all design innovation.



WORDS THAT INSPIRE



Dear Mr Raj Kumar Lohia ji,

On behalf of Omya we would like to thank you for giving us an opportunity to highlight the technical benefits of calcium carbonate in your wonderful new magazine.

The Lohia group and in particular Dr Saroop should be applauded for generating such an informative magazine for the raffia industry.

We have already had excellent feedback from our own staff on the merits of such a magazine, and we are confident that they will show this to our customers and your customers within the region.

Thank you for persevering to publish the magazine in such difficult global circumstances.

We hope Omya can provide support to your magazine in the future.

Best regards,

Richard Waters

Director Sales - Printing Writing & Packaging Australasia Head of Market Development Innovation Packaging Asia Pacific

' I congratulate the editorial team of Lohia Newsletter Raffia Times to bring out the 3rd issue. Earlier two issues have been quite informative in sharing the knowledge with all the stakeholders of Raffia and FiBC Industry. FIBC sector in India is making earnest efforts to fulfil the needs of our customers despite the Covid 19 challenge. We are committed to serve their needs. I would like to extend my best wishes for the forthcoming issues ."

Best Regards,

Ravish Kamath CEO BIG BAGS International Pvt. Ltd. Mangalore, India







Congratulations Lohia Group on the publication of Raffia Times Newsletter. Lohia Group has been a pioneer in Raffia Machinery Industry in India and the world, supporting the Polymer Industry with one of the best technologies, advantageous training programs, and invaluable industry in information. Raffia Times Newsletter is one such effort which will not only guide young technocrats but also support other (small and big) industries (suppliers of additives and other products) by providing platform to introduce their product that can help improve end-product performance as well as most importantly reduce cost. Raffia Times is also an important initiative to update industry on latest technology developments related to the raffia industry.

I have been in the polymer industry for over 25 years. It's been a privilege to have worked and learned from Dr. Saroop before joining OQ. Dr. Saroop has been a mentor for many like me who are now successful polymer professionals around the world. Through this excellent publication, Lohia is providing an opportunity to learn something new. At OQ, we have a young and talented team. It is my pleasure to share the 'Raffia Times' edition with them.

We at OQ has recently introduced Luban HP1102LC, a high tenacity raffia grade for FIBC and Geo-textile applications. This high flow grade is capable at relatively lower processing temperatures and high-speed lines. The grade is expected to exhibit improved tenacity values which are desired for its intended applications. We are working closely with Lohia Group to evaluate the performance of our high tenacity raffia grade on Lohia tape lines. We believe that this is the beginning of our long-term partnership with the highly esteemed Lohia Group and we specially look forward to a positive contribution to Raffia Times from the OQ technical team.

Dr. Manish Desai Product Development Specialist Orpic OQ, Sultanate of **Oman**

COVID 19 TURNS US TO BE SPIRITUAL

COVID-19 pandemic, has revealed many of the mysteries and most of us who were so busy before have been impacted by an extremely small organism with a huge and unfathomed amount of power. Indian scriptures like Upanishads had delved deep and this wisdom had dawned upon the sages to put forth a truth of अणोरणीयान् महत्तो महीयान् 'Smaller than smallest

and bigger than the biggest". This seemed to be an illogical fallacy, because a thing can be either big or small, it cannot be both. Even though the concept of probability in Quantum Physics and Nanotechnology reinforced this belief, but Corona Virus has made human beings accept the reality of three folded logic how the smallest of the smallest organism can impact the whole might of the human beings. One gets subsumed by this thought and man has started looking inwards with a quest for something beyond mind and intellect.

Response to COVID-19 has been on three levels viz physical, mental, and spiritual. Physical level has been through medical help, isolation, social distancing etc. The mental aspect has been to go for meditation, yoga, relaxation techniques to find joy. Meditation is a very potent anti-stress technique and it has been proven many times that it even results in a better immune system.

The spiritual effect has been known to evoke, concern for our soul and the improvement of life, in totality. It enhances our self-esteem, inner peace, joy and service to others. Spirituality gives us control over life - we get closer to our deeper self. We start showing kindness, appreciation and help the needy to find placidity of mind. Our COVID warriors have virtues in the real sense and they are close to being spiritual. The spirit of silence gives us strength and discovers a spiritual awakening and divine love that will overpower any real or imagined quarantine we will experience. People are helping people. The Sewa bhav, feeling to help has become a way of life for us that each day is precious.

COVID-19 has given many of us a different lens with which we see the world and realize that each day is precious. The time that was once taken for granted now is seriously reconsidered. Viewing our time as a single day gives us a chance to absorb and manage the daily demands. As the world continues to slow down, we can assess how the moments reflect the delicate balance of who we are. Our days take on a different meaning.

When we live one day at a time, we put energy into knowing that a divine force guides us. We can breathe and reason, and manage our lives in a more orderly fashion. Being spiritually intent gives hope and we can be a light to others who need hope. We can offer support to those who are depressed or fearful. Our stress lowers when we give our days ahead to a spiritual presence that will be with us — one that never leaves. Leaning into one's faith allows room for building a stronger sense of peace.

Let us connect with the wisdom of spiritual sources in service, prayer and meditation and get the blessings that were previously unseen are new each day.

A GAME CHANGER THAT IS CHANGING WIDE WIDTH WOVEN TECHNICAL TEXTILE PRODUCTION FOR GOOD.

INTRODUCING nova 12.

Thanks to Lohia Corp's nova 12, a 12-shuttle circular loom, the production of wide width fabric for technical textiles, is never going to be the same again. The 12 shuttle loom, oers numerous advantages over conventional at looms. It is capable of producing 5.9 meter width at fabric of upto 250 GSM at speeds of upto 560 ppm. With dierent versions for weaving light and heavy density fabrics, nova 12 is all set to become a game changer in the production of geo-textiles, agro-textiles, wrapping fabrics, lumber covers and tarpaulins etc.

> For further enquiries please get in touch with us: Tel: +91 512 3045100 email: sales@lohiagroup.com | www.lohiagroup.com

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