TI news

Taghleef Industries

January 2014_n.11

Packaging everyday foods

- New BoPP Capacities in Egypt
- Aligning with the Evolution of Russia
- Films with barrier against migration of mineral oils

Dear Readers

Just in time and as planned, the teams involved with the construction of our new high capacity line in Egypt have completed their task. The credit for this achievement goes to our Egyptian colleagues assisted by their Italian counterparts, to our central engineering specialists and to our esteemed suppliers. I could not have dreamt of a better conclusion for 2013, the proof that under ever changing conditions and in all environments, Taghleef delivers as promised. In addition, there has been ample planning work with our customers and I am now counting on the field forces to take the "baton" and deliver.

Our company continues to make strides in the Food, the Labels and the Technical films markets. The Food applications remain an area of intense investment and strong focus. On the front of the product portfolio, we have reengineered a number of film grades, improved quality and meet the best industry standards. We are benefitting from the cross-fertilization of our R&D centers from the Americas, Asia Pacific, Europe and the GCC. We are experiencing new resins, new extrusion parameters and new secondary processes. With EXTENDO™, our high barrier solutions, now we offer better and cost effective protection and longer shelf-life. With NATIVIA™, our BoPLA range of products, we stay on course building hands-on experience for the years to come when sustainability becomes an effective priority.

We are taking a keen interest to Russia and the Commonwealth of Independent States. Russia, the most spacious country in the world, is undergoing enormous transformation from a centrally planned to a market based economy. The Russian Federation is Ti's newest frontier for its range of applications for the food, beverage, cosmetics and pharmaceutical industries.

For 2014, we will continue to pursue ambitious internal and external growth programs. And I am looking forward to the 2014 Interpack Edition, where we will meet our customers with news of our global footprint reinforcement.

Please receive my best wishes for another exciting year.

Dr Detlef Schuhmann
CEO Ti Group

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Egypt: Line 3 Opening

Taghleef Industries is pleased to announce the commissioning of a new BoPP line at its Egyptian production site in 6th of October City. Taghleef Industries S.A.E. (Ti Egypt) until 2013 has had a BoPP net extrusion capacity of around 20 kt/a. With the new extrusion line, the capacity will more than double to reach around 48 kt/a, although one older BoPP line has been decommissioned already during the year 2013 as planned, due to cost cutting measures. The new machine is a 8.7 m wide Brückner stretching line with state-of-the-art technology to produce a wide range of BoPP films at high manufacturing speed.

In addition, a new centralized recycling facility has been installed, in which PP scrap from the whole plant will be regranulated for reprocessing on the extrusion lines. The investment also includes a roll handling system with conveying of slit reels from 2 primary slitters into a new centralized packing area.

T*i* commissions a new 8.7m BOPP line in Egypt

Soon after the production site became part of the T*i* group in 2006, the need to expand the BoPP production capacity in the medium term became clear. While the country went through some turbulent times, Ti took the decision to strengthen the unit and invest close to 50 mil. US$ for new production equipment, buildings and site infrastructure.

The strategic location of the country justifies this investment: Egypt bridges Africa, the Middle East and Europe. Egypt is a hub for maritime traffic with commercial ports on the Mediterranean and Red Sea. With the site location near the capital, Cairo, the revamped plant will cover the growing demand of BoPP films in Africa and in Europe. Being the Arab country with the highest population, local demand for BoPP has been historically strong. The domestic market has been quite robust over the years, and Ti has always had a strong position serving local customers. With the new production facilities, T*i*'s aim is to further increase production flexibility, shorten lead times, and bring product quality and consistency to an even higher level.

As part of the overall strategy of the Ti Group, T*i* Egypt is fully integrated with the European operations, and benefits from the established sales and distribution structure already in place to better serve customers, not only in Europe, but worldwide.

With the expansion, the production site has been specifically tailored to supply transparent and metallized BoPP films with a focus on lower gauges, for which demand is growing. While providing a strong coverage of this segment of standard and value added films from Egypt, T*i* will continue to supply its customer base with a complete range of specialty BoPP films from its other dedicated sites.

D408 Film for Dried Food

T*i* launched and started supply of the newly developed film named D 408, a BoPP transparent film, with both sides heat sealable, high COF and treated. This film responds to the rise of requests from the Middle East and North African converters for the packaging of pasta, rice, couscous, etc. D408 film offers a competitive advantage to customers. The high COF leads to cost savings for pasta manufacturers by sacrificing the use of corrugated carton boxes that usually pack final products or by replacing the PVC Shrink Overwrap for each multiple Pasta Packs. The D408 film plays a major role in preventing the final packs from sliding from the overwrapping PVC shrink unit resulting from higher machine speed and improves the production efficiency. This is why our film is known commercially and internationally as "Sticky" film and is available in both 20 and 25 micron. Printed on the standard COF side, with reverse print technology, and then laminated with Cast PP, the external surface becomes the High COF Side (0.5).

Sunbites Arabia

In October 2008, Sunbites was launched by Chipsy Co. (PepsiCo) under the brand name Twistos. At the time, these baked snacks came in two delectable flavors, Olive & Oregano and Cheese & Herbs.

In 2012, the brand changed its name to Sunbites to be consistent across the Middle-East. The following year, 2013, saw the introduction of two new flavors, Butter & Garlic and Labneh & Red Chili. The packaging is made of Ti BoPP Matte 20µ laminated with Metalized film 30µ. The Matte film gives a silky soft touch finish, with a paper look to the pack, which is very appreciated by the consumer. The metalized film ensures excellent barrier, maintaining the freshness of the bread bites.

Clear CPP Film for High Speed Packaging

DC001 is Taghleef Industries latest innovation of high speed CPP Transparent film. DC001 has improved heat sealing range from 105°C - 140°C in comparison with normal T*i* transparent CPP films (CTSS, CTOS); it also has good sealing strength with characteristics of a low COF value of < 0.20 on the non treated surface. DC001 is a film of good optic characteristics with high clarity and high gloss. The treated surface is receptive to adhesives with excellent machinability on packaging lines. DC001 is available in 20 & 30 micron thicknesses.

Typical applications of the DC001 are:

- Lamination and single ply applications
- Can be laminated with reverse printed BoPET & BoPP
- Direct food contact packaging (Pasta, Bakery) applications on high speed packaging machines.

DC001 is currently being successfully used in the Middle East for Pasta & Bakery packaging. DC001 film complies with EC and FDA regulations.

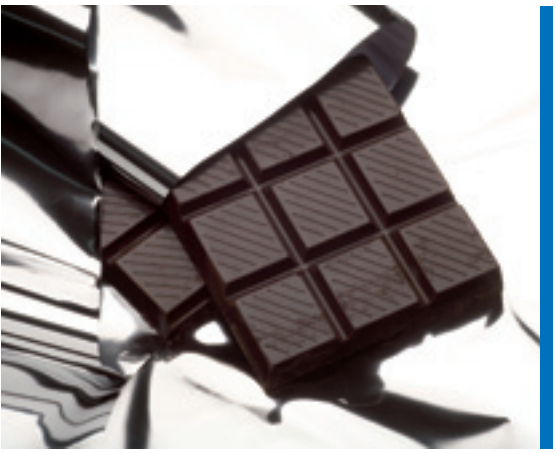
ZXV The Power of 3 in 1

T*i* produces a variety of barrier Metalized films, tailor-made to specific end user requirements. However, the recently launched ZXV combines three critical properties for a powerful, yet cost effective, laminate structure, which guarantees high barrier against light, gases, moisture, and high seal integrity coupled with a wide heat seal range and excellent hot tack properties.

Products packaged with ZXV will stay fresh longer with maximized shelf life, safeguarding optimum product quality. The film, specially designed as a two layer laminate, is able to replace traditional three layer laminate structures, which are being used in many markets for packaged potato chips; resulting in significant cost savings and plastics reduction. The film works well for extrusion and adhesive lamination, and the packets made of ZXV are ideal for gas flushing due to excellent seal integrity. Yes, the heat seal strength of ZXV film is as good as CPP! Due to its low SIT of 80°C, packaging machines can run at higher speeds contributing to a significant amount of energy savings, and less heat degradation of the food products packaged.

The ZXV film is an ideal solution for the packaging of “heat sensitive” products. Thus, ZXV provides a wider seal range and operating window, resulting in minimal rejections for weak or distorted seals. ZXV is available in 18µm and fully complies with EC and FDA regulations.

ZSC for Cold Seal



ZSC is a metalized BOPP film that is specially designed for cold seal applications. The non treated surface of ZSC grade film is suitable for anchoring of cold seal adhesive and provides excellent seal strength. The metalized surface is suitable for surface printing by "rotogravure printing" processes. The surface energy of the metalized surface depends on the ambient conditions.

It is recommended to use either the corona treatment or a special primer on the metalized surface of the ZSC grade film for printing. A release lacquer should be applied, or a release film should be laminated over the printing ink to achieve a good release effect. The "very High Gloss" on the treated surface of ZSC grade film provides excellent printing quality and smooth release of cold seal. ZSC is available in 20 & 30 micron thicknesses.

ZSC has improved moisture barrier (0.5/mtr2/d), very good Oxygen barrier (50cc/mtr2/d) and a high light barrier property. The main application of ZSC film is in the confectionery industries. It is used in the packaging of heat sensitive products like chocolate bars and ice cream, with a higher speed in the packaging machine.

Ti keeps the PACE in Asia

Taghleef Industries top executives Patrick Desies -Chief Sales & Marketing Officer *Ti* Group, Elie Jarrous -CEO Ti Pty and Abhijit Ghosh -Group Technical Service Manager, attended The Packaging and Converting Executive Forum (PACE) in Singapore on the 5th to the 7th of November 2013.

The audience consisted of senior packaging executives who shape the direction and strategy of the packaging industry, specify, recommend and authorize tomorrow's packaging today.

The event was designed to provide a unique interactive and informative forum to the top decision makers of the packaging industry featuring visionary keynote presentations, workshops and one-to-one private business development meetings. *Ti*'s executives had successful meetings with the key packaging industry senior executives.

Patrick Desies, Elie Jarrous and Abhijit Ghosh

Printpack Helps Burton's Biscuit

Company launch into Savoury Biscuit Market

Printpack has collaborated with design agencies and repro houses alike to print a stunning range of packaging for leading biscuit manufacturer Burton's Biscuit Company, as they launch a new beacon brand in the savoury biscuit market - Cathedral City Baked Bites - through an exclusive licensing agreement with Dairy Crest.

The new range of savoury biscuits will utilise the iconic Cathedral City brand, and is being made using real Cathedral City cheddar.

Printpack has proved to be an important partner in the launch of Burton's new Cathedral City Baked Bites. Their flexibility and customer focus produced striking packs under often tight deadlines, without compromising on quality or service. To support this unique, high-quality proposition that will extend Cathedral City, the nation's number one cheese brand*, outside the dairy category and into the savoury snacking market, the packaging needed to meet certain criteria. T*i*'s MUS matte BoPP was chosen as a part of the laminated structure, as it provided a consistent matte appearance and excellent machine run-ability throughout the range of pillow packs and quad bags.

Printpack's exceptional gravure print, and technical expertise, perfectly complements the material benefits to produce a highly attractive pack that replicates the existing Cathedral City design concept, which requires the packaging to have a paper look and feel.

**Nielsen 52 weeks to Aug 2013*

Ti Films are a proud supplier to Australian Icon, Arnott's Biscuits Limited

Arnott's Biscuits has been Australia's leading biscuit brand since 1865. The most popular Arnott's biscuit in Australia is the chocolate coated Tim Tam. One in every 2 Australian households contains a packet of Tim Tams and around 35 million packs are sold each year – that's nearly 400 million biscuits! Since 2004, Tim Tams have been sold into more than 700 stores in China.
In Chinese, Tim Tam or "Tian Dian" in Mandarin, translates as "give me more, have some more". T*i* Australia is very proud to be a film supplier for Tim Tams packaging, a package made with a Ti white voided film as

Discovering Taghleef in the Supply Chain

Discovery Flexibles are one of the UK's leading flexible packaging converters, specialising in gravure print and conversion. With a fifty year history of packaging manufacture, Discovery Flexibles are recognised as the chosen supplier of packaging films to an increasing number of high profile UK manufacturing and FMCG businesses. Taghleef Industries are a vital supplier to Discovery Flexibles and provides a regular source of biaxally orientated polypropylene grades.

Their close working partnership is paramount to Discovery's success as a reactive supplier offering customers improved lead-times, flexibility, and product diversity to maintain their high status in the ever demanding flexible packaging market. One example of how a Taghleef supplied material emerges at consumer level is the grade of matte polypropylene (MUS) used to form part of a high quality triplex coffee pack. Whilst the triple structure provides excellent barrier properties to preserve aromas and guarantee the shelf life, the Ti supplied matte film provides the premium finish and feel, which furnishes the products with a prominent on-shelf presence. Whilst Discovery remains dedicated to their core products, they are also constantly striving to develop packaging solutions that will make a difference and give added value to their customers.

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part of a laminate. Arnott's Procurement Catagory Manager – Packaging, Michael Bolt, says "Tim Tams are not only enjoyed in Australia but are now exported to over 40 countries".
Michael adds, "BOPP films supplied from Ti Australia plant in Wodonga, Australia since 1982, continue to contribute to the success of the Arnott's Quality image".

Wrapping the Central Europe confectionery and pastry products

I.D.C. Holding, JSC is the largest Slovak producer of confectionery and pastry products with annual production and sales exceeding 31.000,00 tons of products, and with annual turnover 98 million EUR. The company's history is based on traditions of more than 100 years of production in the Figaro Trnava plant and 60 years of pastry product manufacturing in the Pečiváre Sereď plant.

They produce several popular product's with traditional recipes, and have the most modern facilities with regard to all quality requirements within their manufacturing process.

Certainly their best-known products are Horalky, Tatranky, Mila, Mäta, Lina, Kávenky, and Kakaové rezy. The packaging of these wafers is BOPP, and in several cases produced by Ti and printed by the biggest Slovak printing house, Chemosvit Folie a.s.

Chemosvit has several printing facilities for rotogravure and flexo technology. The packaging of the above mentioned products are printed with roto technology on our BOPP films, among these products we have ZES 20my/MUS 20my structure in case of Mila.

High speed packaging and freshness for Oreo cookies

In 2012, the Brand Oreo celebrated its 100th birthday – a Global taste of the World's favorite Cookie. Taghleef Industries Inc., one of the main suppliers of Mondelez, has been selected to provide a new OPP packaging solution of the Oreo Duo Cookie for the South American market.

T*i* offered an OPP package which would keep their cream Oreo cookies fresh and at the same time run in high speed packaging machines: a lamination of MVT/T523-3 which ran above 400 packages per minute while keeping the cookies fresh for weeks.

MVT has an OTR less than 23 cc/m2/24hrs at 23C and WVTR 0.16 gms/m2/24hrs at 38C 90%RH. The case of Oreo cookies is a clear example of how T*i* cooperates well with converters, end users and packaging equipment manufacturers.

New High Friction Matte Film

Today there is a BoPP alternative solution to the application of a Matte lacquer to obtain a paper effect on other plastic substrates for flexible packaging. MHF is a newly developed Matte film, both sides heat sealable, with increased COF. The high friction nature of this film is particularly suited for those applications in which too much slip can cause several problems, especially in the end-user's process. For example, in the stabilization of the empty food pouches/bags stacked before they are filled up.
From an aesthetical point of view, this Matte film increases the graphic design's impact and its texture attracts consumer's attention. At present, MHF is particularly appreciated in the pet food converting industry. For the customers who search for a packaging film that combines functionality and decoration, MHF is the right answer.

Easy "peel" opening a new trend in the snack packaging

Mondi Solec is a state-of-the-art converting plant located in central Poland (around 25 km from Warsaw) that specializes in the manufacture of high-quality printed monofilms and laminates.

They produce for their customer, KiMs Norway (part of Orkla Group), an innovative laminate of reverse gravure printed, transparent coex BOPP against white voided metalized barrier film type ZYL.

KiMs, Norway has chosen ZYL for the inside, main part of their chips, due to the delicate appearance of the white inside and controlled opening properties.

ZYL offers excellent light protection, moisture barrier, a wide heat seal range on the non-metallized side, and an easy "peel" opening that does not destroy the package.

Keeping intact the flavor of chocolate

ELD's low density allows a wide range of applications with heat seal as well as cold seal. It's high opacity and glossiness brings a catchy appearance and adds extra value to the Galaxy Cake Bars (baked under license by McVities Cake Company).

With a reduced "show through" the ELD allows for good light protection of the food. Pilenpak, the Turkish flexible packaging converter, commented they rely on their supplier Taghleef Industries to provide them with continuous quality and service.

T*i* films replace polyester

for powdered juices and soups in Latin America

One of the primary functions of a flexible packaging structure is to provide low permeability to gases, vapors, oxygen, to light and to flavorings. The foil was a widely accepted barrier substrate, however, it is costly and it is difficult to print or laminate without tearing or creasing it. In addition, there are few suppliers with long lead times. With the metallized PET, there is a similar situation with its conversion process, mainly when it is laminated to other stiff substrates such as other clear PET. The stiffness of the PET itself makes adhesive film applications and wetability very difficult, with the consequent reduction of the line speed, and deterioration of the final lamination appearance.

The Tagheef Industries high barrier metallized films (MPF, MXT, and MVT), and transparent films (UHX, HXB, and HBTX), are a viable alternative in terms of performance and cost to the substrates mentioned. As a foil and met PET replacement several applications have been developed in Latam (e.g., for Nestle Mahler soups the original structure was clear-PET / foil / PE and now it is clear-PET / 55MPF / PE). The converter confirms the easy machinability and Nestle confirms good performance, and it meets the shelf life required.

Other similar applications already developed are sachets for ketchup, instant coffee, powdered milk and shampoo.

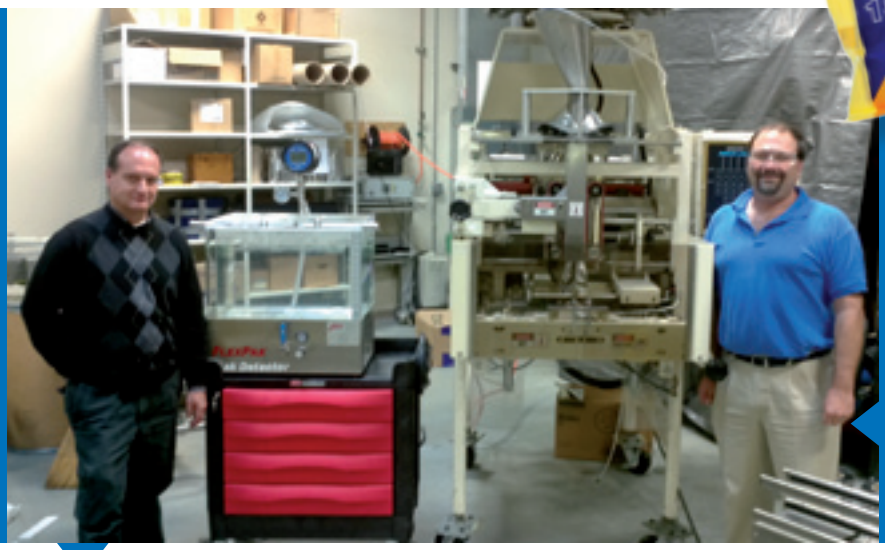
In all these applications the high barrier met BoPP gives converters and end-users a real performance option to foil and met PET, with good availability and cost advantanges. Now, if we need clear high barrier films, T*i* has released a new transparent high barrier film, UHX, at 22 mic. , sealable on one side, with a WVTR of 2.8 g/m2/24 hr and an OTR of 2.6 cc/m2/24 hr. UHX provides aroma and grease barrier when used as a reverse printed outer web, but it could be used as a sealable inside web in lamination too.

The UHX is having an excellent performance in Guadalajara Mexico, which one customer is using this for a “Nachos Chips” package. The high barrier of this special white film permits these products to be exported to the USA and some countries of Asia.

Clear Barrier
development

Barrier development programs have been a strong focus of Ti Inc. in the last several years. In 2014 we will be experiencing some of the rewards of this developmental work, mainly in the clear barrier market.

As with any successful product development culture, it all starts with market intelligence and the building of relationships at our key customers, who ultimately use our films on their products. In North America we refer to these customers as end users.



Andrew Wilkie,
Senior Research Associate

Bryan Bellafore,
Packaging Applications Engineer.

These customers give us the knowledge, opportunity, and evaluation of our new products. Chip Auerbach has developed excellent relationships at our key end users, who have helped us develop our new products.

Once we gain this information, our R&D center, under Christiane Tardy, Senior Director of Product Development, develops these films using their vast experience and knowledge of film design to achieve our customers specifications. Their hard work has generated a patented UHX film, showing growth in our market.

This effort will be paying off this year in the form of increased clear barrier sales of HXB and UHX. HXB is a nonmetallized clear, high moisture barrier film (3.7 g/m2/d). UHX is a nonmetallized clear, high moisture and oxygen barrier film (WVTR 2.8 g/m2/d and O2 2.6 cm3/m2/d). The total sales increase for both products will be 125% from 2013 to 2014.

RosUpack RUSSIA

Serving the packaging market in Russia

Russia has undergone significant changes, moving from a centrally planned economy to a more market-based and globally integrated economy. In late 2008 and early 2009, Russia went through the first recession after 10 years of experiencing a rising economy, until stable growth resumed in late 2009 and 2010 (CC). With a population of approx. 143 million people, the Russian Federation is among the most important sales markets for the food, beverage, cosmetics and pharmaceutical industries.
Returning after a long break, Taghleef Industries took part in the annual exhibition ROSUPACK in Moscow. ROSUPACK is the most significant exhibition for the packaging industry, not only in Russia, but in the entire East-European region.
The fair organized between 18th and 21th June 2013, with 700 exhibitors, attracted 21,000 visitors. With a European plant producing BoPP specialty films, and a Middle-Eastern and North African plants producing BoPP standard films, T*i* firmly believes to have all the assets to supply the growing markets of Russia and the Commonwealth of Independent States *(CIS* countries is a regional organization whose participating countries are former Soviet Republics)*.

T*i* unconcealed objectives are to maintain a strong partnership with existing customers, meet new companies, network with the packaging community, present innovative solutions on the market and strengthen its presence in the region. With the capacity of a new production line with start-up in Egypt, T*i* will be able to serve better this large market. Strong in offering an extensive product range, T*i* flagship products are the In-Mould and the Self-Adhesive label films, the high barrier EXTENDO™ and the bio-based NATIVIA™ films. Based on the very good turnout of the exhibition, as well as the positive business results afterwards, T*i* confirms its participation to ROSUPACK next year, 17-20th June 2014.

COUNTRY	POPULATION (2012)	GDP per capita (2012) in USD
Belarus	9,460,000	6,710
Kazakhstan	16,856,000	11,700
Kyrgyzstan	5,654,800	1,100
Russia	143,369,806	14,240
Tajikistan	8,010,000	900
Uzbekistan	29,874,600	1,800
EAEC total	**62,932,500**	**213,223,782**
Azerbaijan	9,235,100	7,500
Georgia	4,585,000	3,400
Moldova	3,559,500	2,100
Ukraine	45,553,000	3,870
GUAM TOTAL	**284,598,122**	**4,200**
Armenia	3,274,300	3,500
Turkmenistan	5,169,660	6,100
GRAND TOTAL	**284,598,122**	

The data is taken from the United Nations Statistics Division& CIA

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Transparent Capabilities with a Metalized Film

The ZSS is a standard metalized film which can be used in direct mailings. Cirepa, a Belgium converter of OPP films/coated films/ LDPE/specialties, prints and de-metalizes the ZSS film to create an eye-catching postal envelope. In other words, Cirepa strategically removes the metal from specific zones, thanks to a chemical-physical process.

In this case, the transparent zone is used to show the recipient's address whereas the rest of the envelope is "privacy protected". This technique is also employed in food packaging to make see-through windows to display the packaged food.

ISSC PLUS Certification now available for NATIVIA™ made of Ingeo PLA.

ISCC PLUS is a new certification system for applications in the technical-chemical fields such as bioplastics. ISCC PLUS is based on the ISCC certification system, which has been used successfully for biofuels for more than two years. More than 1,200 original ISCC certifications have been issued and the certificate is acknowledged by the European Commission and is supported by the German Federal Ministry of Food, Agriculture and Consumer Protection via the Agency for Renewable Resources (FNR).

ISCC-certified biomass cannot be sourced from land with high biodiversity value (such as primary forest, areas designated for the protection of endangered species, or highly bio-diverse grassland), nor from land with high carbon stock (such as wetlands and continuously forested areas), or peat lands.

The biomass must be produced in an environmentally responsible manner; this includes the protection of soil, water, air, and the application of good agricultural practice. The observance of human rights, labor laws, and good land use practice must be guaranteed. Independent auditors working in cooperation with ISCC provided a thorough assessment before the certificate was issued to NatureWorks LLC for their Ingeo PLA. ISCC PLUS certification for NATIVIA ™ films is available on demand. Should you be interested in this option, please contact your Ti representative. For further information about about ISCC certification scheme, please visit **www.iscc-system.org/en/**

BOPP and BOPLA films with barrier against migration of mineral oils

A recent study conducted by the European Food Safety Authority (EFSA - www.efsa.europa.eu) reports that exposure to mineral oil hydrocarbons (MOH) via packaging and some foods may pose a human health hazard, and suggests to implement measures to assess and monitor the risk from these substances.

For the moment, this statement has not led to dedicated regulation by the European Commission, although the risk assessment body confirmed that recycled paperboard in food packaging without barrier liners is likely to be a major source of exposure to MOHs.
In order to have a clear picture of the situation, Taghleef Industries has commissioned a comparative test to the Fraunhofer Research Institute, comparing the barrier performance of various packaging films against different mineral oil substances. Here's a summary of the work done and results.

The Fraunhofer Institute for Process Engineering and Packaging IVV develops and optimizes products and processes in the area of foods, food ingredients, functional materials, and product safety. The institute develops concepts for utilizing biogenic raw materials for food and non-food applications, processes for recycling plastics and automatic processing procedures.

SCOPE: The purpose of the test was to show the different behavior of selected films with respect to the permeation of selected mineral oil components. The samples were tested with respect to their potential to act as functional barrier against mineral oil components under typical conditions for food-packaging contact and compliance tests (40°C).

This summary concentrates on 7 mineral oil substances and four selected films, namely BOPP (sample A), NATIVIA™ BOPLA (sample C), a multilayer BOPP film with EVOH barrier layer (EXTENDO XFWL, sample D), and an acrylic/PVDC coated BOPP film (sample K). BOPET film has been used as a reference.

SAMPLE	FILM	BARRIER	TICKNESS (µm)
Sample A	BOPP standard	BOPP	20
Sample C	Nativia NTSS 25	BOPLA	25
SampleD	Extendo XFWL	EVOH	20
Sample K	coated BOPP	PVDC/acrylic	26

It has to be said that, at the present state of the art, only the permeation rates of the samples against the selected substance can be given. The indication of a single value of a lag time, as presently done by several other researchers, is highly questionable, also considering that lag times can only refer to single permeating substances, not for mixtures of different substances.

TEST SUBSTANCES:
Out of the 15 substances which were tested, the following list represents the most relevant ones and, at the same time, allow for a good quantification of the permeation rates under stationary conditions.

Substance	CAS-Nr.	Formula	mw	mp	bp	density
			(g/mol)	(°C)	(°C)	(g/ml)
Dodecane (C12)	112-40-3	$C_{12}H_{26}$	170,33	-9,6	216	0,7487
Naphthalene	91-20-3	$C_{10}H_8$	128,17	80	218	1,1400
1-Methylnaphthalene	90-12-0	$C_{11}H_{10}$	142,20	-31	245	1,0200
Tetradecane (C14)	629-59-4	$C_{14}H_{30}$	198,39	6	254	0,7628
1-Ethylnaphthalene	1127-76-0	$C_{12}H_{12}$	156,22	-15	260	1,0080
Hexadecane (C16)	544-76-3	$C_{16}H_{34}$	226,44	18	287	0,7733
TXIB	6846-50-0	$C_{16}H_{30}O_4$	286,41	-70	280	0,9400

TXIB= 2,2,4 - Trimethyl - 1,3 - pentanediol diisobutyrate
mw: molecular weight - mp: melting point - bp: boiling point

METHOD FOR THE PERMEATION TEST

The films were placed in special permeation cells and stored at the selected temperature. In the lower part of the cells, an intentionally contaminated cardboard sample was placed. This cardboard was spiked with the test substances in a way that their concentration was around 750µg of substance per g of cardboard. The test films were in direct contact with the cardboard. The upper part of the cells was separated from the lower part by the samples. This part was purged with a flow of pure nitrogen. The nitrogen flow transported the permeated substances into the detection unit. Calibration was performed with injections of know amounts of the substances.

Permeation rates in (µg/d*dm²)	Dodecane (C12)	Naphthalene	1-Methylnaphthalene	Tetradecane (C14)	1-Ethylnaphthalene	Hexadecane (C16)	TXIB
SET 1							
Sample A	5081	707	1584	1372	992	240	249
	4721	679	1602	1408	1013	237	239
SET 2							
12 µm PET			<0,006		<0,006		0,010
	0,010	0,011	<0,006	0,008	0,007	<0,006	
Sample C			<0,006	<0,006	<0,006	<0,006	<0,009
	0,010	0,008	<0,006	<0,006	<0,006	<0,006	<0,009
Sample D				0,020	<0,006	0,014	<0,009
	0,011	0,009	<0,006		<0,006	0,020	
Sample K	1,51	0,39		4,99			0,30
				5			
DL Set 1	0,218	0,191	0,225	0,243	0,221	0,256	0,368
DL Set 2	0,006	0,005	0,006	0,006	0,006	0,006	0,009

Green highlighted fields: permeation in qequilibrium
Yellow highlighted fields: observed maximum of permeation rate (no equilibrium)

Continue...

Continue...

BOPP and BOPLA films with barrier against migration of mineral oils

Where possible, permeation rates are reported as their values under stationary conditions, i.e. when they achieved a constant value over time. In the case of highly permeating films (i.e. sample A), the onset depletion of the contaminated cardboard already occurred during the measurement period, resulting in a maximum of the measured rate. In this case, the maximum of the observed permeation rate is reported. This means that the permeation rate that would be measured under true stationary conditions might even be higher.

RESULTS OF THE PERMEATION TEST: All samples were measured in duplicate. For the reasons explained above, sample A was measured at a lower sensitivity for a period of 19 days. The other samples (medium and high barrier) were measured at a higher sensitivity for a period of 47 days. The preceding (p.17) table shows the permeation rates of the tested films at 40°C. The last two lines show the detection limits (DL) of the measuring unit.

CONCLUSIONS: EXTENDO XFWL, NATIVIA™ NTSS and BOPET (reference) show permeation rates close or even below the detection limit and they can be rated as being equivalent.
Sample A – standard BOPP film – shows very high permeation rates. They reach a maximum already within some hours for C12 and naphthalene and then decrease as the concentration of the substances is the contaminated card board decreases. With regard to sample acrylic/pvdc coated BOPP film, depending on the permeating substance, the permeation rate is higher by a factor between 25 and 1000+ vs. the three films above.

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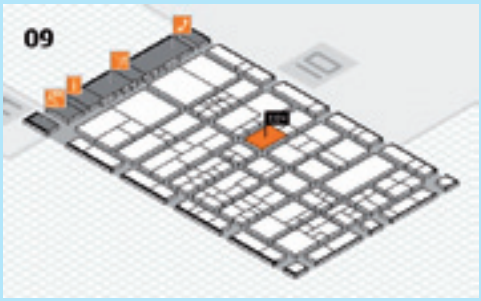

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