2007 PLACE Conferene
9/16/2007 - 9/20/2007
Hilton at the Ballpark
St. Louis, MO

9/17/2007 8:00 a.m. – 10:00 a.m.
Session 1 Opening and New Technology Showcase
Session Moderator – Louis W. Piffer, Davis Standard LLC, Egan Machinery

9/17/2007 10:30 a.m. - 12:30 p.m.
Session 2 PLACE Fundamentals
Session Moderator – Louis W. Piffer, Black Clawson Egan-Davis Standard, LLC

2-1 10 30am **Additives Primer**
Prakash R. Patel, Ampacet Corporation, Speaker

2-2 11:00am **Purging Theory & Techniques**
John D. Vansant, E. I. du Pont de Nemours & Co., Speaker

2-3 11:30am **Gel Troubleshooting**
Louis W. Piffer, Davis Standard LLC, Egan Machinery, Speaker

2-4 12:00pm **Troubleshooting Corona Treatment Issues**
Rory A. Wolf, Enercon Industries Corporation, Speaker

Time is money. But much more so a down production line in an increasingly competitive global economy. This paper presents critical troubleshooting and preventative maintenance advice to get corona treating equipment back on-line quickly to generate value-adding product for converting lines. Possible maladies such as backside treatment and surface over-treatment will also be addressed.

9/17/2007 10:30 a.m. - 12:30 p.m.
Session 3 AIMCAL Exchange
Session Moderator – Jim Lush, Celplast Metallized Prod. Ltd.

3-1 10 30am **Optimizing the Shear Slitting Process**
Peter Wood, Tidland Corporation, Speaker

3-2 11:00am **Metal Adhesion on PET Film**
Edwin C. Culbertson, Mitsubishi Polyester Film, Inc., Speaker

This paper will examine the mechanism of adhesion of vacuum deposited metal to PET film. It will discuss techanical and chemical aspects of this adhesion. In addition, the mechanism of adhesion of chemically coated (primed) films will also be addressed. The paper will also look at the barrier data of these metallized films, the film surfaces, and some new adhesion promoting coatings (metal adhesion over the 1000 g/in mark).

3-3 11:30am **Nano-Composite Polymer Optical Coatings**
Tom Faris, Vampire Optical Coatings Inc., Speaker

3-4 12:00pm **Basics of Web Tension Control Summary**
Darrell Whiteside, MAGPOWR, Speaker

9/17/2007 2:00 p.m. – 4:00 p.m.
Session 4 PLACE Fundamentals (Continued)
Session Moderator – Scott Marks, DuPont Packaging and Industrial Polymers

4-1 2:00pm **Challenges in Winding Flexible Packaging Film**
R. Duane Smith, Davis-Standard LLC, BC Converting Machinery, Speaker

Every Flexible Film Producer is faced with the challenge of producing quality rolls of film products. This paper will assist in overcoming the challenges in winding flexible packaging films. It addresses the definition of a quality roll of film and the importance of inwound tension in consistently producing good quality rolls. It then

discusses the winding principles used on all winders to control inwound tension or roll hardness. It explains how to determine the proper amount of web tension for various types of films and the principles of nip and gap winding. Then the basic types of center, surface and combination center/surface winders will be compared with the advantages and disadvantages of each. After the discussion of how roll hardness is achieved, methods of measuring roll hardness are presented. Finally, other roll defects to avoid in producing quality rolls of film will be listed and the book "Roll and Web Terminology" will be brought to the audience's attention for them to learn more about the causes and cures of common roll and web defects.

4-2 2:30pm **Blown Film Bubbles Stabilization & Collapsing**
M.C. Andrews, Battenfeld Glouchester, Speaker

4-3 3:00 pm **Barrier Measurement Techniques**
Joel Fischer, MOCON, Speaker

4-4 3:30 pm **Active Packaging and Barrier**
Tom Powers, Mulitsorb, Speaker

9/17/2007 2:00p.m. - 3:30 p.m.
Session 5 SPE & Antec Exchange
Session Moderator – Gary Oliver, Cloeren, Inc

5-1 2:00pm **Determining the Processability of Multilayer Coextruded Structures**
Joseph Dooley, The Dow Chemical Company, Speaker

5-2 2:30pm **Effect of Material Properties and Processing Conditions on PP Film Casting**
Kenneth Aniunoh, Clemson University, Speaker

5-3 3:00pm **Flow Surging in Single-Screw, Plasticating Extruders**
Mark Spalding,The Dow Chemical Company, Speaker

9/17/2007 4:30 p.m. – 5:30 p.m.
Session 6 Keynote Presentation: Rob Peck – Keeping All the Balls in the Air
Session Moderator – Bruce Foster, Mica Corporation

The keynote address “Keeping all the balls in the air” is a metaphor for how to meet the challenges you’re faced with each day and still stay focused. In this light-hearted, humorous presentation, Peck helps multi-tasking professionals re-discover a life-balance which links learning with laughter.

9/17/2007 5:30 p.m. – 6:30 p.m.
Session 7 Table Top Reception

9/18/2006 8:00 a.m. - 10 00 a.m.
Session 8 Equipment
Session Moderator – John Pennias, DuPont Packaging Ind.l Polymers

8-1 8:00am **Use of Dimensionless Numbers in Analyzing Melt Flow and Melt Cooling Processes**
Natti S. Rao, Plastics Solutions International, Speaker

Dimensional analysis is a powerful tool in analyzing the transient heat transfer and flow processes accompanying melt flow in an injection mold or cooling in blown film, to quote a couple of examples. However, because of the nature of non-Newtonian polymer melt flow the dimensionless numbers used to describe flow and heat transfer processes of Newtonian fluids have to be modified for polymer melts. This paper describes how an easily applicable equation for the cooling of melt in a spiral flow in injection molds has been derived on the basis of modified dimensionless numbers and verified by experiments. A second example deals with analyzing the air gap dynamics in extrusion coating by means of dimensional analysis and comparing the analysis with the experimental results. .

8-2 8:30am **New Thin Film Single Screw Venting Mechanism Tested On 30% Wood Flour/Pellets, 35% Calcium Carbonate/PP Pellets and Undried PMMA**
Keith Luker, Randcastle Extrusion Systems Inc., Speaker

A new single screw mixing/venting element was tested. This element combines unique properties and extends the utility of single screw extruders by allowing more vents in a shorter axial length than conventional screws; it allows for degassing even during the melting; it creates a large thin film for efficient degassing in each element; it is a high output melting mechanism and a melt separation element. Finally, it showed compounding of wood and calcium carbonate at 30% and 35

8-3 9:00am **What We Know (That Just Isn't So) – Myth Busting in Web Handling**
David R. Roisum, Finishing Technologies, Inc., Speaker

This paper proposes a metric of how far the unfolding science of web handling has penetrated the industry. This metric is the extent of misunderstandings, myths if you will, that are common in plants. The origin of the myths is not important or in most cases even determinable. What is important is their replacement with a better understanding that is solidly based on modeling and verification by measurement. One example of a very common myth is that spiral taping or grooves spread the web. However, there are many more in the areas of tracking, traction, tension control and winding that have even more damaging misconceptions. The paper lists these myths, their possible arena of correct application, the dangers of assuming validity in applications where they are not correct and the references for our current best understanding.

9/18/2007 8:00 a.m. - 10 00 a.m.
Session 9 Panel: Packaging Regulatory Issues in a Global Environment
Session Moderator – Roger Kaas, Gehrke, Kaas & Associates LLP

Panelists:
Joan Baughan, Keller and Heckman
Suzanne Matuszewski, Sonoco Consumer Products
Tom Dunn, Printpack
Mark Itzkoff, Olsson, Frank and Weeda

9/18/2007 10 30 a.m. - 12:30 p.m.
Session 10 Sustainability in Plastic Packaging
Session Moderator – Bruce Foster, Mica Corporation

10-1 10 30am **Using Eco-Efficiency Analysis to Measure the Sustainability of Packaging Materials**
Christopher Bradlee, BASF Corp, Speaker

The sustainability of packaging materials can be measured using Eco-efficiency analysis that evaluates the environmental and economic impacts of products and processes over their life-cycle. Energy, emissions, toxicity, health effect potential, resource consumption and land use are assessed to gauge the environmental impacts, and for economic impacts, the total cost of using the packaging materials are assessed for materials, manufacturing, wastes, energy and EHS program costs. The methodology was created in partnership with an external consultant, has been further developed by BASF, and is based upon the ISO14040 standards for life-cycle analysis with some additional enhancements that allow for expedient review and decision-making at all business levels. Since its inception in 1996, more than 260 analyses have been completed on products ranging from vitamins to building materials and packaging systems.

10-2 11:00am **Biodegradable Flexible Packaging- What is it and how can it be used**
Stewart Richards, Innovia Films Inc., Speaker

The presentation will set the environment that is causing the biggest potential shift for materials that are used in flexible packaging. An explanation of what constitutes biodegradability and sustainability will be given. Consideration will then also be given to conforming to the current leading standards to which material biodegradability is measured, ASTM D6400 in the USA and EN13432 in Europe. The different techniques for composting will also be explained and why not all current biodegradable films fit all types of composting techniques available. The currently available biodegradable films will be discussed and current issues with trying to substitute current non biodegradable films will be highlighted. Then a more in depth view will be provided with respect to cellulose based films and their development to meet the biodegradability standards. Explanation of how these cellulose films are manufactured, degrade, the elements required for them to degrade and a visual presentation showing the rate of degradation will be given. The next section of the presentation will look at specific applications where these cellulose films have been introduced and the benefits that they have brought in addressing the issues of waste generation and also an example where they can be used to extend the shelf life of fruit and vegetable produce. This will be followed by a section that will

consider a laminated structure to replace a currently non sustainable and non biodegradable laminate structure.

10-3 11:30am **Case Studies for Improved Sustainability in Packaging**
Jeffrey J. Wooster, Dow Chemical Conpany, Speaker

Sustainability has grown to be a top priority for many businesses. Many packaging producers struggle to understand how they can positively contribute to sustainability, especially given limitations of resources and the stringent performance requirements they are being asked to meeting. This presentation will provide an overview of sustainable packaging and will present numerous case studies illustrating the performance and sustainability advantages of various flexible package alternatives.

10-4 12:00pm **Packaging Trends & Sustainability**
Tom Egan, PMMI, Speaker

9/18/2007 10 30 a.m. - 12:30 p.m.
Session 11 Adhesion in Extrusion Coating
Session Moderator – Kelly Frey, Chevron Corporation

11-1 10 30am **Modifying Surface Features - Extrusion Coating & Lamination**
Rory A. Wolf, Enercon Industries Corporation, Speaker

Extrusion coating, lamination and film lamination give rise to complex manufacturing techniques which allow a converter to make high-performance packaging films. The physical properties and the related performance characteristics of composites obtained by extrusion coating and lamination can be comparable to that produced by film lamination. This is not surprising since many of the major components involved by these techniques in the production of the final composites are also the same. The paper examines how the use of ozone combined with corona discharge compares to ozone combined with atmospheric plasma relative to seal strength for these composite film constructions, and suggests a direction for future improvements in seal strength.

11-2 11:00am **A Model to Predict the Ability of a Flexible Package to Contain Materials**
Richard B. Allen, Mica Corporation, Speaker

Testing the ability of a flexible multi-layer package to hold or “contain” a material is cumbersome and subjective. This model qualitatively predicts the outcome based on the rate the contained material permeates the sealant and the ability of the contained material to disrupt the adhesive bond. Key factors which affect permeation and bond disruption are discussed as well as the role of the sealant and the robustness of the adhesive or primer.

11-3 11:30am **Understanding Why Adhesion in Extrusion Coating Decreases with Diminishing Coating Thickness, ` Part III: Analysis of Peel Test**
Barry A. Morris, DuPont Packaging and Industrial Polymers, Speaker

It is well know that in the extrusion coating process, peel strength to aluminum foil and other nonporous substrates decreases with decreasing coating thickness. The peel strength is found to be more sensitve to changes in thickness as the adhesion between the coating and substrate improves. An analysis of the peel test shows that changes in the critical dimension of the deformation region at the peel front may be responsible.

11-4 12:00pm **Flame Plasma Surface Treatment - What's it all About?**
Joseph D. DiGiacomo, Flynn Burner Corporation, Speaker

9/18/2007 2:00 p.m. - 3:00 p.m.
Session 12 Product Security
Session Moderator – Bob O’Boyle, Sun Chemical Corporation

12-1 2:00pm **Using DNA to Prevent Counterfeiting and Product Diversion**
James Hayward, Applied DNA Science Inc., Speaker

Botanical DNA encryption, embedment and authentication solutions can help protect companies, governments and consumers from counterfeiting, fraud, piracy, product diversion, identity theft and unauthorized intrusion into physical locations and databases. Our Program provides a secure, accurate and cost-effective means for our potential customers to incorporate DNA Markers in, and then quickly and reliably authenticate and identify a broad range of items including financial instruments, identity cards and other official documents. Having the ability to reliably authenticate and identify counterfeit versions of such items enables companies and governments to detect, deter, interdict and prosecute counterfeiting enterprises and individuals.

The Program first involves our design and manufacture of a highly customized and encrypted botanical DNA marker. In creating this unique DNA Marker, we use DNA segments from one or more botanical sources, rearrange them into unique encrypted sequences, and then implement one or more layers of anti-counterfeit techniques. The DNA Marker is then encapsulated and stabilized so that it is resistant to heat, organic solvents, chemicals and most importantly, ultraviolet or UV radiation. Once it has been encapsulated, our DNA Embedment system can be used to embed the DNA Marker directly onto products or other items or into special inks, threads, and other media which in turn can be incorporated into packaging or products. Once it is embedded, our DNA Encryption Detector pen can instantly show the presence or absence of any of our DNA Markers and our PCR Kits can provide rapid forensic level authentication of specific DNA Markers.

Because the portion of DNA in a DNA Marker used to identify the marker is so minute, it cannot be detected unless it is amplified. This amplification can only be achieved by applying matching strands of DNA or a primer and PCR techniques to the DNA Marker. The sequence of relevant DNA in a DNA Marker must be known in order to manufacture the primer for that DNA. As a result, we believe the effort required to find, amplify, select and clone the relevant DNA in a DNA Marker would involve such enormous effort and expense that DNA Markers are virtually impossible to copy without our proprietary systems. The Program can be applied either independently or to supplement existing systems in order to allow for a forensic level of authentication of the sources of a broad range of items.

12 - 2 2:30 pm **General Overview of Overt and Covert Security features for Brand Protection in Inks and Coatings**
Rakesh Vig, SunChemical, Speaker

International trade in counterfeit goods is growing at an alarming rate and, according to the International Chamber of Commerce, is worth $650 billion.
The most economical way to incorporate a security feature to a valuable document, package is through inks and coatings. Most effective approach is to to build layers of Overt and Covert security features in a single ink or coating.
First layer of security is handled by Overt effect inks. These inks allow visual verification of package authenticity and include Color shift inks,Thermochromics, Metachromics and other specialized solutions.
More robust security options include Covert coding for authenticity and covert coding using variable data, these include UV, IR responsive inks.

9/18/2007 **3:00 p.m. - 5:00 p.m.**
Committee Meetings

3:00 – 4:00 Extrusion Coating
3:00 – 4:00 Film Extrusion

4:00 – 5:00 Flexible Packaging
4:00 – 5:00 Barrier & Active Packaging

9/19/2007 **8:00 a.m. - 10 00 a.m.**
Session 13 **Additives**
Session Moderator – Amy Rode, Westlake Chemical

13-1 8:00am **Enhancing Productivity in Blown Film: A New Perspective on Additive Interactions and OptimizingPolymer Processing Additive Efficiency through Process Parameters**
Paul Neumann, Dyneon L.L.C. - a 3M Company, Speaker

To understand the impact on polymer processing additive (PPA) performance, the effects of interactions from hindered amine light stabilizers (HALS) and antiblock and the combined effects of extrusion temperature and shear rate were investigated. PPA performance was significantly affected by both temperature and shear rate,

and also depended on the type of HALS present in the formulation. The effect of temperature was more significant than the effect of shear rate with respect to interactions involving antiblock. A new perspective concerning the temperature dependence of PPA performance in formulations containing antiblock is presented.

13-2 8:30am **A Novel Nucleating Agent for Polyethylene**
Darin L. Dotson, Milliken & Company., Speaker

Polyolefins are the most widely consumed plastic materials in the world. Their wide ranging versatility and cost competitiveness has lead to continued growth in recent times. Polypropylene has been modified through the use of nucleation for a number of years. Nucleation, of which clarification is considered a subset, has led to improvements in optical properties, physical properties, warpage control, and processing speed of polypropylene across many different processing techniques (injection molding, blow molding and extrusion). Nucleation of polyethylene has been studied over the years but there has never been commercial adoption of nucleation as a technique for modifying polyethylene properties. This is generally owing to insufficient performance enhancement achievable through nucleators typically designed for polypropylene. This paper presents a new chemistry that shows breakthrough performance in polyethylene nucleation and describes interesting property enhancements realized through its use.

13-3 9:00am **Phenol vs. Phenol Free Stabilization and the Impact of Selected Grades of TiO_2: Can we make non-discolored white LLDPE film by adding phenol-free masterbatch to phenolic AO stabilized resin?**
Yijun Ye, Ciba Specialty Chemicals, Speaker

The preservation of physical properties and aesthetics are two key measures for film products. As such, one needs to be selective in terms of choosing the polymer and stabilization systems that are used to derive robust and attractive film products. For most applications, traditional stabilization systems provide the appropriate level of physical property retention, good processability, and long term thermal stability without compromising the overall aesthetic appearance of the film product. In selected applications, however, it is desirable to have film products that do not discolor during processing; and more importantly, while the product is kept in storage. Under a selected set of circumstances, certain types of phenolics have been shown to be susceptible to discoloration, due to various factors; some of which can be controlled, others not. For example, inadequate stabilizer concentrations, harsh processing conditions, improper selection of white pigments (TiO2), and/or prolonged storage of the films in an environment containing oxides of nitrogen (pollution). To deal with these discoloration issues, a phenol free stabilization concept was developed and studied extensively.[1,2,3,4,5] Overall, “phenol free” stabilization systems are highly recommended for color critical polyolefin film applications. However, there are only limited numbers of film grade resins that are phenol free. Some film manufacturers are attempting to solve the discoloration issues by adding phenol free stabilization masterbatches to minimally phenol stabilized resins. We will examine the effectiveness of this approach in this paper. We will first review the effectiveness of phenol free stabilization in comparison to the traditional phenol based stabilization systems. The mechanisms of discoloration will demonstrate how this stabilization concept can be used to solve day to day problems associated with discoloration. We will then report the experimental results by using the masterbatch approaches to prevent discoloration.

13-4 9:30am **Control of Dispersed Polymer Domain Size Formation in Melt Processing**
Eldridge M. Mount, III, EMMOUNT Technologies, Speaker

During the formation of cavitated films the cavitating agent needs to be completely dispersed and controlled in average particle size. When producing cavitated films with mineral based cavitating agents this is done with particle size reduction and dispersive mixing. However, when using incompatible polymer blends are used, the size of the dispersed phase will impact the quality of the final film and needs to be controlled. Control of the domain size is possible be the proper selection of the individual polymers melt viscosity, the relative compatibility of the pair in combination with the processing conditions combine to control the domain size of the dispersed phase. Correlations between the dispersed domain size and the capillary number can be developed.

9/19/2007 8:00 a.m. - 10 00 a.m.
Session 14 Barrier Films
Session Moderator, Norman D. Aubee, NOVA Chemicals

14-1 8:00am **PVdC – Past and Current Barrier Material**

Thomas R. Mueller, Rohm and Haas, Speaker ^T

14-2 8:30am **PVdC – New Developments, New Opportunities**
Kirk E. Paisley, SolVin, Speaker

Polyvinylidene chloride (PVdC) resins and coatings have been a part of the flexible packaging world for more than 50 years, with a unique combination of functional characteristics that has found numerous applications. According to 2004 estimates, approximately 160,000 metric tons of PVdC are used annually around the world in extruded, coextruded, coated and laminated structures.
According to a study of high barrier packaging films released in late 2005 , PVdC remains the leading barrier polymer in high performance packaging films. For dry food packaging, PVdC-coated BOPP films hold a 53% share of barrier films used to package dry foods. Forecasted growth for PVdC-coated PET films is a healthy 9% per year, driven primarily by new applications including lidstock for prepared foods, retort applications, and clear, stand-up pouches.

14-3 9:00am **Clear Barrier at Atmospheric Pressure - The Second Phase**
Rory A. Wolf, Enercon Industries Corporation, Speaker

The barrier properties of transparent layers deposited on flexible plastic substrates are of interest to many in the packaging industry. Numerous methods have been used to manufacture transparent barrier coatings with varying degrees of success to address evolving environmental laws requiring the reduction or elimination of volatile organic compounds (VOCs), which are the byproduct of curing liquid topcoats. There is also a consumer preference to visually inspect packaged products through packaging prior to purchase. This paper will present new evidence since the 2006 TAPPI PLACE Conference of the potential for clear barrier at atmospheric pressure through the use of plasma processing as integral steps in a composite process for deposition and polymerization of functional barrier coatings. XPS analysis of polymerized film showed presence of silicon, carbon and oxygen in ratios different from the monomer, and in fact approaching a Si:O atomic ratio of 1:2 confirming cross linking effects, and the plasma polymerized organo-silicon films displayed good functional barrier properties without the environmental concerns of VOCs.

14-4 9:30am **Oxygen Permeability Enhancements in Octene LLDPE Films Affected by LDPE Blending and Crystalline Orientation**
Daniel R. Ward, NOVA Chemicals Corporation, Speaker

The permeability of films made from Zeigler-Natta and single-site catalyzed linear low-density polyethylenes blended with branched low-density polyethylene was studied. At thinner film gauges, oxygen and moisture permeation rates of certain blends were significantly higher than the expected values obtained by weight averaging the permeation coefficients of blend components. This increased permeability corresponds with decreased crystallinity and crystalline domain size in the film surface. This decreased surface crystallinity is expected to increase the adsorption and desorption of oxygen or moisture vapor from the film surface resulting in higher permeation rates. To optimize or control the surface film crystallinity, key morphological and rheological properties of the LLDPE base resin, LDPE blending resin must be considered along with film processing characteristics.

9/19/2006 10 30 a.m. – 12:00 p.m.
Session 15 Extrusion Coating Troubleshooting
Session Moderator – Allen Guy, OMYA, Inc.

15-1 10 30am **High Speed Priming**
Lee A. Ostness, Black Clawson Converting Machinery, Speaker

As extrusion coating lines begin to run at higher and higher line speeds, the quest for good adhesion of extrudate to substrate becomes more and more challenging. One method for achieving good adhesion is use of a low-solids water-borne primer. However, direct gravure and direct smooth roll systems have severe limitations as application speeds exceed 1000fpm.

In this work, we examine the effects of key priming station design variables on the following results:
1. Coatability while running at speeds up to 2000fpm.
2. Drying requirements at high speeds.
3. Uniformity of the primer distribution on the substrate.

The results demonstrate the optimum design(s) for priming at high line speeds.

15-2 11:00am **Internally Deckled Coating Dies**
Gary D. Oliver, Cloeren Inc., Speaker

15-3 11:30pm **Solving Adhesion and Die Buildup Problems in Extrusion Coating**
Bruce W. Foster, Mica Corporation, Speaker

Poor adhesion and die buildup are common problems in the extrusion coating industry. In the case of polymer systems requiring stabilization packages (e.g.: polypropylenes, linear-low density polyethylenes, and metallocene grades), such problems can sometimes be caused by a mismatch between the resin supplier's stabilization package and the customers' needs. This paper, based on "real-life" examples, shows how a simple lab test-oxidative induction behavior-can be used to optimize additive packages to solve such problems.

9/19/2006 10 30 a.m. - 12:30 p.m.
Session 16 New Barrier Materials
Session Moderator – Roger Kaas, Gehrke, Kaas & Associates LLP

16-1 10:30am **The Effect of Barrier Materials on Salmon Quality and Retort Pouch Properties Stored Under Elevated Conditions**
W. Scott Whiteside, Clemson University, Speaker

Aluminum foil has traditionally been the functional barrier material used in retort pouches. However, it is not suitable for microwave heating. Several non-foil barrier materials are available to food processors desiring a microwaveable package. There has been little work done in comparing the effect of barrier materials on the shelf life of shelf stable food products.

The objective of this study was to measure the effect of functional barrier materials on salmon quality and retort pouch properties stored under elevated conditions following thermal processing. Four different retort pouches structures were used; CPP, AlOx-coated PET/Nylon/CPP (AlOx), PET/ SiOx -coated Nylon/CPP (SiOx), PET/Al-foil/CPP (Foil). Salmon was thermally processed for 23min at 250°F to reach F0 values of 6. Retorted pouches were stored at 90°F, 32%RH during 2 weeks. Lipid oxidation of salmon was measured using TBARS.

Color (a value) of the salmon was measured. Salmon in SiOx (6.52 at retort to 6.11 at 2nd week) was higher than others. AlOx decrease from 5.33 to 3.91, CPP from 5.52 to 3.18, and Foil from 3.65 to 3.64. Color, aroma, and acceptability were evaluated by sensory analysis. Salmon in SiOx (7.40a) had the highest redness value and followed AlOx(5.40b), Foil(4.80c) and CPP(5.00c). There was no significant difference in aroma evaluation between pouch materials. Salmon in SiOx (6.20a) had most acceptable value and followed AlOx (5.40b), Foil (4.90c), and CPP (4.30d) at 2nd week. TBARS of salmon in CPP (0.159 to 0.296) was higher than others (0.138 to 0.173). Tensile strength (TS) and elongation at break (%E) of AlOx and SiOx were not significantly different. TS and %E were sharply decreased for Foil. TS for CPP was not significantly different, however %E decreased. Results for this study indicate that non-foil barrier materials can be an effective alternative to traditional aluminum foil.

16-2 11:00 am **Barrier Coatings of Bio Films**
Robin P. Cooper, Michelman Inc., Speaker

It is possible to use conventional water based barrier coatings on both the new and more traditional bio films to improve their barrier properties and allow them to compete with conventional flexible packaging films. this could allow a potentially greater use of bio films to replace unsustainable polymer films.

16-3 11:30am **One-Side Clear Active Barrier Packaging for Moisture Sensitive Medical Devices**
Rick Johnson, Alcan Packaging – Medical Flexibility, Speaker

A new, one-side clear, active, ultrahigh barrier, peelable package is described for moisture sensitive medical devices that will provide revolutionary advantages over current peelable all foil constructions. The new products run on higher speed, continuous, roll fed, equipment. The clear peelable lidding eliminates the complexity of matching the outer label print copy with redundant product identification cards typically inserted

inside the packages. Breakthrough technology provides a transparent ultra high barrier film, together with an active moisture barrier to provide a 5+ year projected shelf life at real-time conditions, based on laboratory tests.

16-4 12:00pm **Medium Performance Acrylic Waterborne Laminating Adhesives**
Thomas R. Mueller, Rohm and Haas, Speaker

In the past, temperature and chemical resistant laminations were only possible using two component polyurethane adhesives. New acrylic technology has been developed that gives the heat and chemical resistance of medium performance polyurethane adhesives. A brief description of the route to higher performance waterborne acrylic adhesives as well as comparative data to polyurethane adhesives will be presented. Life cycle inventory (LCI) comparing solvent borne and these new medium performance waterborne adhesives demonstrate the benefits of waterborne adhesives for sustainability and environmental impact.
The scope of this study includes the initial oil/gas extraction to the lamination process. The functional unit in this case was the lamination ream (3000 sq. ft.) and commercial solvent borne and waterborne adhesives were applied at typical converter application weights. From proprietary process data the energy consumed in the manufacture of the adhesives were determined per ream. The drying energy required for both solvent and waterborne adhesives was determined from industry data available. Finally, transportation costs of raw materials to the manufacturing facility and finished material to the customer was determined utilizing truck load quantities. The resulting LCI results including feedstock, transportation, electricity generation, drying oven and other direct fuel use was quantified and totaled. The differences in the energy and resource impacts of alternative adhesives is caused primarily by the amount of organic material applied per ream and the need for drying ovens. Environmental and sustainability concerns make waterborne acrylics an attractive alternative to solvent borne polyurethanes.

9/19/2007 2:00 p.m. - 3:30 p.m.
Session 17 Product Safety
Session Moderator - Greg Armstrong, Capri Division of Schreiber Foods

17-1 2:00 pm **Product Safety and Security Program**
Greg Armstrong, Capri Division of Schreiber Foods, Speaker

This paper will cover the need, importance, criteria and benefits of creating and implementing a Product Safety and Security Program. Key components that will be discussed include: • Proof of the Need • Key criteria of a Product Safety and Security Program • Program in action • Positive consequences of having a Product Safety and Security Program • Negative consequences of not having a Product Safety and Security Program • How to get management support for having a Product Safety and Security Program The events of September 11, 2001, and subsequent events, have placed a high emphasis on having a Product Safety and Security Program in place. The customer and consumers are demanding it to the point where government legislation is mandating it. While there is a cost to implementing and monitoring a Product Safety and Security Program, benefits, peace of mind, and consumer safety far outweigh the costs. The Product Safety and Security Program should be viewed as a strategic goal of the business with clearly-defined tactical objectives that can measure and communicated. All elements of the Product Safety and Security Program should be aligned with all members of the value stream. The Product Safety and Security Program can be created and implemented internally or with the help of outside experts. Validation of the Product Safety and Security Program can also be performed internally of by a 3rd party institution. Periodic validation of the Product Safety and Security Program is integral to its success. Not only is the creation and implementation of the Product Safety and Security Program a Good Business Practice, in certain industries Federal Law mandates it. There is legal precedent where courts have punished organizations for the absence of an effective Product Safety and Security Program. Key examples will discussed that demonstrate the benefits of the Product Safety and Security Program. Examples will also be given of the consequences of not having a Product Safety and Security Program. The Product Safety and Security Program must be a living process that is maintained via assessment, conformance, and performance. Merely having manuals and forms is not sufficient. While many converters have already implemented a Product Safety and Security Program in their business, Tier 3 suppliers have not. Emphasis will be given to the paper, film, adhesive, wet goods, and transportation industries to assess their status. Key points of the Product Safety and Security Program and process will be discussed that will allow the audience to take away a template for implementation. Discussion will include input from the audience relative to if they have a Product Safety and Security Program in place. Examples of current practices of a Product Safety and Security Program will include photographs of the Product Safety and Security Program in action. Major criteria of the Product Safety and Security Program will be given that

include: • Pest Control • Allergen Awareness • HACCP • Product traceability • GMP's • Glass control • Foreign object control • SSOP's • Security threats • Control of raw materials Key to the success of any Product Safety and Security Program is Upper Management support. Examples of how to demonstrate this and put it into a metric that Upper Management understands will be explained. Wrap-up will include a Q&A session and areas where additional support and information can be obtained.

17-2 2:30pm **HACCP Revisited – Have you checked your hazard analysis lately?**
Suzanne Matuszewski, Sonoco Consumer Packaging, Speaker

Your Hazard Analysis and Critical Control Program is more important than you may realize. Did you know you can use this as a tool to discuss your food safety performance with customers and gain their respect? Your hazard analysis can speak for itself… as long as it is done correctly and kept current. Aside from your process flowchart, your hazard analysis is the most important piece of your program. It shows that you have analyzed your plant and determined your risk to chemical, physical, and microbiological hazards at each step. It can also show that there is a history of safety if you use your customer complaints to help prove your point. The way to go about your hazard analysis and make it bullet-proof is to take a team approach to HACCP "science". Form a team of people at the plant who can think out of the box. A cross functional team is best and make sure to get people involved who will speak up. Then, look at your flowchart and brainstorm chemical, physical, and microbiological hazards at each step. Write down every possibility but limit them to the things that would endanger the public from a food safety perspective. REMEMBER: If it makes it "ugly" or non-functioning for the customer's process, then it's a quality issue and needs to be outside of HACCP. When trying to determine the feasibility of the instance you've brainstormed, rank each instance using a 3 point scale (1 being the lowest and 3 the highest). Then use this simple and popular formula … Severity x Likelihood = RISK The severity would be what the outcome would mean. Take for example glass pieces (physical hazard). The severity to the food chain would be high – a 3. Then look at the likelihood of the hazard. You can use your quality reports as a historical example of the likelihood. Look back for 2 years and see if you had any complaints relating to glass. OR you can talk with your team and determine that glass is unlikely to occur because there is no glass over production or you convey your product seamed side up, etc. The likelihood would be low – a 1. So your overall risk would be a 3. Use the chart below to determine your control measures, documentation, and reasoning. L = Likelihood of the Occurrence x S = Severity of the Outcome = Risk Level 3 = High 3 = High 2 = Medium 2 = Medium 1 = Low 1 = Low Risk Level Actions 1-3 = Low risk (establish quality control measures if appropriate) 4-6 = Medium risk (establish quality control measures) 7-9 = Substantial risk (Critical Control Point) Remember to have one team member take notes regarding discussions around this activity. You need to create a history for the next time you do your hazard analysis – which should be reviewed yearly at a minimum or the next time you change your process, add new machinery or change machinery. Keeping it active and reviewing it annually shows your customer that you are mindful of how your actions will impact the food chain. We are only a few steps away from a consumers mouth.

17-3 3:00pm **FPA-SAFE Audit**
Greg Armstrong, Capri Division of Schreiber Foods, Speaker

Are You at Risk of Not Playing it Safe? If audits conducted on your suppliers are only providing you, the customer, with superficial and subjective results, how can you guarantee the best items on the market? It has been said "you're only as good as your weakest link." Many food processing, retail and food service customers are starting to realize that typical certification and scored audits have become that "weakest link." By playing it safe, customers develop more confidence in suppliers via an audit report tailored to their individual needs. The FPA-SAFE program was designed by leading food companies to meet the global food industry's audit needs. FPA-SAFE provides a reliable comprehensive assessment of a company's entire food quality and safety system while reducing the time and expenses associated with redundant supplier audits. Setting the Score With scored audits, the only focus is on the sore. They are inherently subjective, based only on the auditor's opinion of whether the facility's systems are "in compliance". Plus, customers do not know the auditor's frame of reference when determining if the facility was in compliance. The SAFE audit is not designed as a scored audit. Instead of providing a rating and then leaving readers to assume that the rating is accurate, the SAFE audit provides an objective, narrative-description of what is actually taking place in the facility. These descriptions are accompanied by an assessment of the facility's effectiveness and a rationale of how the auditor arrived at that assessment. Customers then have the ability to weigh each audit comment and category according to their own standards. The result is a unique, personalized audit based upon the customer's expectation, not those of the auditor. Requirements and Due Diligence Audits that use a generic set of requirements do not take into consideration a supplier's unique systems or a customer's unique expectations. Both are then forced to rely on a checklist of arbitrary quality indicators that may not match anyone's specific standards. SAFE auditors do not judge suppliers by a list of arbitrary requirements or

standards. Instead, the SAFE audit provides a “virtual tour” of the facility, so that readers can decide for themselves whether their requirements have been met. Even though audits serve a great purpose within the food industry, crises still occur, no matter what type of audit was performed. Many customers believe they will not be held responsible when their supplier has a crisis, especially if the supplier was “certified” or received a high score on their audit. Instead, these customers feel that the auditing firm will be liable. Realistically, auditing firms within the food industry do not accept liability. SAFE audits reduce the risk of undetected negligence because of their “in-depth” structure. SAFE auditors are typically on site for three to four days, gathering a wealth of information. While this amount of time may seem rather long, especially when compared to the typical one day scored/ certified audit, it is crucial. After all, SAFE auditors need more time in order to get “below the surface” and provide customers with greater confidence in the facility’s actual activities. With other audits, it’s easy for a facility to put on a superficial “good face” for a one-day inspection. With SAFE, it’s difficult to keep poorly developed systems hidden. Reports with YOUR Level of Detail Critics argue that a SAFE audit report is too long and time consuming to examine. Since customers may not have time to read the entire document, the SAFE audit report contains various viewing options, each displaying different levels of information detail. Level One displays the most detailed information, including the auditors narrative comments on all of the items reviewed. It caters to the customers who prefer to know all of the details. Level Two includes only the auditor's summaries and judgments and the facility’s responses. This format gives customers an abridged version of the results, if they don’t have the time or interest to go through all of he details. Level Three is a table of just the auditor’s judgments. This snapshot view allows customers to quickly scan the auditor’s judgment in all sections. Level Four, a custom scoring option, provides customers with an opportunity to develop a personalized score based on their own standards. While these condensed versions can help readers navigate the audit, and quickly get to the information important to them, the full Level One report remains available should the reader want to know “what did the auditor actually see”. These different levels of detail are beneficial because they account for various management preferences, without requiring customers to spend their own time formatting the audit. Certification and scored audits do not offer such variety and flexibility and unfortunately don’t include as much in-depth information. Since they are structured to produce simple scores or “pass/fail” results, the customer gets only a brief level of detail. In each of SAFE’s viewing options, the full report remains accessible, allowing the customer to quickly locate important information. Saving Time and Money Safe’s approach of describing in-plant systems and practices save customers both time and money by making I unnecessary to send their own employees to audit suppliers. These “in-house” auditors are often burdened with the task of completing hundreds of supplier audits each year. Since the SAFE audit is so comprehensive in detailing a facility’s actual practices, the details of interest to customers have already been gathered and presented in the report. This alleviates the need for customers to be physically present during the audit, thus saving them both time and money from being out of the office. Another primary goal of the SAFE program is to reduce the number of audits that a supplier faces each year, a financial value more easily seen by the supplier. The fewer audits a supplier needs to have, the more time and money saved. More specifically, if a SAFE audit replaces more than three or four typical one-day supplier-paid audits, the facility experiences a time and cost benefit. Because SAFE was designed to cover virtually all quality system audit needs, suppliers may be able to reduce their burden to one audit a year, if their customers accept the program. Streamlining The Process After a SAFE audit has been performed, the report is conveniently available to customers through the Internet. Access to the SAFE report is online and instantaneous, requiring only the access code and password provided by the supplier. The actual report can then be imported into the customer’s database or stored in a “web library,” a secure section of the SAFE website, where customers can access it at anytime.

9/19/2007 2:00 p.m. – 3:30 p.m.
Session 18 MDO Enhancing Film Properties
Session Moderator – David Timm, Charter Films

18-1 2:00pm **Some of the Important Design Requirements of a Machine Direct Orientor (MDO) Machine**
Eric Hatfield, MDO Engineering Inc., Speaker

Machine Direction Orientation (MDO), has been practiced, with varying success, for decades. The dramatic improvements in film clarity, stiffness, barrier, and tensile strength has been documented since the 1950’s. In the past few years’ companies have begun to commercialize this technology in an ever-increasing rate. Until recently, the machine used to MDO the film has changed very little. In this paper, a short overview will be presented discussing some of the import facets of the MDO machine, and how they effect the orientation process, and ultimately, the final film properties.

18-2 2:30pm **Economic Benefits of Utilizing MDO Films in Flexible Packaging Applications**
D. Ryan Breese, Eclipse Film Technologies, Speaker

Machine direction orientation (MDO) greatly enhances film properties, namely the modulus, tensile strength and optics. By utilizing MDO films, a converter can significantly reduce packaging costs by downgauging and/or replacement of less desirable materials. Doing so effectively reduces the amount and types of material sourced for a given package. In this paper, a brief overview of the enhancements in physical properties from MDO processing will be presented, with the objective of demonstrating economic drivers for utilizing MDO in flexible packaging. General examples will be given that show the economic benefits associated with utilizing MDO films in flexible packaging.

18-3 3:00pm **Higher Tie Layer Adhesion in Machine Direction Oriented (MDO) Barrier Films**
Chun D. Lee, Lyondell Chemical Company, Speaker

Machine Direction Orientation (MDO) is a post-extrusion process used to enhance film properties such as barrier, stiffness, and clarity. Orienting coextruded films containing EVOH or Nylon presents the special challenge of maintaining adhesion at the tie layer - barrier interface after orientation. When conventional tie layer resins are used, the post-oriented adhesive bond force can decrease by up to 90% of the initial or pre-oriented levels. This decrease is due to a reduction in surface bond population as the interfacial area expands and a loss of interfacial strength as the film is stretched in the solid state below melting temperature. Why does the tie layer, which is primarily PE, lose interfacial strength between tie layer and barrier materials when the other PE film layers are getting “enhanced film properties?”
To address this challenge, a new tie resin for MDO-processed barrier film has been developed. This paper investigates the effects of orientation on crystalline morphology, clarity, stiffness and adhesion in these coextruded oriented films. Correlations are drawn between the morphological and structural changes occurring during the orientation and the resulting improvements in clarity, stiffness, and interlayer adhesion.

9/19/2007 4:00 p.m. - 5:30 p.m.
Session 19 Film Extrusion
Session Moderator – Bill Bode, Battenfeld Gloucester

19-1 4:00pm **Optimisation of Production Output and Film Quality from Blown Film Extrusion Systems**
M.C. Andrews, Battenfeld Glouchester, Speaker

In our quest to increase production capability we generally tend to concentrate our efforts to increase the most influential parameter of extrusion throughput to achieve our production goals. In blown film extrusion systems we tend to give significant attention to the influence of cooling systems in our quest for higher throughput levels. However, while this is an important factor in the blown film process it must be remembered that this is one component in what should be regarded largely as a sequential process. In this situation subsequent processes are dependent on the optimization of the preceding element. One interesting function in the blown film process is the functionality of the collapsing geometry employed to form a flat tube. This is one area that can influence both upstream and down stream conditions. It has also been recognized that film winders are often at the mercy of upstream conditions. It is the intention of this paper to highlight key elements of a blown film extrusion system and process that can have a significant effect on the opportunity to maximize the output, efficiency and film quality.

19-2 4:30pm **Back to Basics in Blown Film Technology Through New Advancements in Surface Contact Properties**
Bob Tewksbury, Pearl Technologies Inc., Speaker

19-3 5:00pm **Polypropylene - Building Blocks for Blown Film Applications**
Spencer Hirata, Basell USA Inc., Speaker

A common question posed by many application and development engineers is “What type of film should I propose for my customer’s application?” When formulating a plan to answer this question, which often includes making a list of potential materials and structures, some materials may be overlooked or dismissed as potential candidates. Often this is the case for polypropylene when structures for blown film applications are developed. This is unfortunate because some interesting features and opportunities may be missed.
Rather than focusing on the manufacturing techniques, structure or inherent properties of polypropylene this discussion provides examples that compare the properties of several blown polypropylene films. The experimental examples include the following: composition effects of two component blends, comparison of blends to co-extrusions, comparison of polypropylene and polyethylene co-extruded films, and an application

example – making a clear, tough film. The goal of this paper is to provide sufficient incentive for applications and development engineers to reconsider PP for blown film applications.

9/19/2007 4:00 p.m. - 5:30 p.m
Session 20 Nanotechnology in Flexible Packaging
Session Moderator – Brad Kramer, Kraft Foods

20-1 4:00pm **Case Studies of Organoclay Nanocomposites in Flexible Packaging**
David Jarus, PolyOne Corporation, Speaker

Development and commercialization efforts have been underway to take advantage of the benefits of using organoclay nanocomposites in many systems. Flexible films and packaging was one area from which significant learning was obtained. The physical performance advantages of using these composites in various polyolefin films was investigated in both polyethylene and polypropylene resins. These multiple performance benefits were contrasted with several key additional attributes necessary for successful, broad commercialization of the technology. Non-limiting examples are traditional performance requirements such as FDA compliance, sealability, and EHS, the latter of which included both real issues and perceived psychological issues. It has been demonstrated that this technology has significant advantages only if the additional aforementioned attributes were not necessary or compromised and multiple not single physical performance enhancements were required.

20-2 4:30pm **New Transparent High-Barrier Film for Advanced Retort Applications**
Tatsuya Oshita, Kuraray Company, Ltd., Speaker

Packages for sterilized food have traditionally been metal cans, glass bottles and aluminum foil pouches. Recent pouch structure developments which include transparent plastic barrier films are expected to show growth as replacements for the older materials thanks to their improved properties. Among these properties are “Microwaveability”, “Metal Detection Capability”, and “Reduction of incinerated residue”. Against this background, a new nano-technology, transparent high-barrier film “KURARISTERTM” has been developed to meet the requirements of these applications and is already being produced on a commercial scale.

20-3 5:00pm **Nylon Nanocomposites in Flexible Packaging Applications**
Ying Liang, Nanocor, Inc., Speaker

Toyota researchers invented the first patent on polyamide 6 nanocomposites1 nearly 20 year ago. Their invention created a revolution to plastic industry with potent nanoclay additive technologies. Recently, a great progress has been made to produce the polyamide 6 nanocomposite at commercial scale. It is well known that the exfoliation level of Montmorillonite is essential to produce high quality nanocomposite. However, in practice, how to get the best dispersion has always been a challenge. This paper will compare nanocomposite made from different methods and discuss the dispersion level by XRD, TEM and their performance properties. In-situ polymerization has been proven to be the most effective method to make PA6 nanocomposites. Nanoclay can be incorporated into polyamide 6 at different loading levels. The nano reinforcement does not follow a straight line that is proportional to the percentage of Nanoclay. Optimized nanoclay loading level in PA6 has been achieved. Commercial PA6 nanocomposite resins are being produced with optimized nanoclay loading and easy processability during production.
With designed nanoclay modification chemistry, our PA6 nanocomposites have been approved for direct food contact applications under FDA/EU regulations. This enables its applications in food packaging. The rheological behavior and process window allows PA6 nanocomposite for both cast and blown film processes. Barrier enhancement has been achieved for oxygen, water vapor and helium. Film haze level was reduced due to the nucleating effect from the nanoclay. Also observed was the increase of film mechanical properties. In addition, there are several PA6 resin producers that are able to produce PA6 nanocomposite with our Nanomer® nanoclay products on a commercial scale without modification on their current production equipment. Thus flexible packaging converters can incorporate the nanocomposite into their smart packaging design with confidence of product supply and consistent performance.
Currently, in situ polymerization has only been achieved for PA6. Melt compounding has been attempted to produce nanocomposites for other polyamide resins. Nanocomposites prepared with melt compounding do not have the nanoclay dispersion level and the scale of property enhancement of those the PA6 nanocomposite made via in situ polymerization. However, we should challenge ourselves and to apply what we learned from PA6 nanocomposite to other polyamide systems. To push the limit, we investigated the highest possible loading of Nanoclay in PA6 from in-situ polymerization route. We were able to get up to 30 wt% Nanoclay loaded PA6 nanoMax (nanocomposite master batch). Letting down of this nanoMax™ NPC in

different polyamide helped the dispersion and boost reinforcement on properties.
Polyamide MXD6 nanocomposites (Imperm®) have been made successfully on a commercial scale. The unique chemistry of polyamide MXD6 and its nanocomposite provides excellent barrier properties and superior processability. Combining PA6 nanocomposite with Imperm gave converter freedom to cherry pick the best combination to meet the cost-performance requirement. On the same token, PA6 nanocomposite could be mixed with amorphous PA to alter its rheology and barrier properties for various applications. With different polyamide nanocomposite in hands, we offer customers great freedom to incorporate them in their smart packing design. Reference: 1) Composite Material and Process For Manufacturing Same. US patent # 4,739,00718