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Japan’s converting industry has brought about major economic growth in two main industries, which has in turn led to the highest revenues in history for the related equipment manufacturers. The first of these is lithium-ion batteries, where-in the demand for lithium-ion batteries for automobiles is expected to continue growing particularly fast in China and Europe. In this case, rapid growth has led to a greater number of orders for electrode slurry coaters, separator coaters, and slitters, but the key driver for converting equipment manufacturer revenues in Japan has been the demand for safety. In fact, some Japanese equipment manufacturers are so busy that their backlog of orders has increased delivery wait times to more than a year. Despite this existing growth in electric vehicle production, however, the development of new power sources that will serve as the key to further driving the use of electric vehicles is likely to have an effect on converting companies whose work is related to batteries.

The second industry is flexible packaging printing. As an essential part of our daily lives, the food packaging market is considered to be a stable source of revenue for converting equipment manufacturers. Flexible packaging printing equipment can operate flawlessly for 20–30 years if maintained properly. But with the large number of equipment built several decades ago now approaching the end of its useable life, printing equipment manufacturers in Japan have been receiving an increasing number of orders for replacement equipment.

In today’s food market, however, both high volume foods produced by large-scale companies and low volume foods produced locally are seeing strong internet sales. This change from the past has led to a greater demand for short run production and created shorter product life-cycles. In this way, another area of interest from the flexible packaging industry is the digital, inkjet, and offset printing equipment that is more suited to high-mix, low-volume runs than gravure printing.

On a different note, we visited ProPak Vietnam, a food packaging related exhibition held last March in Ho Chi Minh City. Although one the things that stood out most was the huge numbers of bikes weaving between the cars on the crowded city streets, from the stance of Japan, it was the young age of the drivers that was striking. It is clear that the traffic in Southeast Asian cities brings about huge economic loses, so it is imperative that transportation infrastructure investments be made for further growth. This is particularly true when we consider that Bangkok is the only capital city in Southeast Asia with a subway. Japanese equipment manufacturers have participated in the event over the past few years given their expectations that Southeast Asian converters will eventually begin to focus on product quality over price. For example, local converters will need to make this change when they expand from working entirely with domestic food producers to working with international brands. The important factor here, however, is whether these equipment manufacturers can accurately judge the timing that local converters will make this move and link this judgement to business.
## Table of Contents

**May/June 2018**

<table>
<thead>
<tr>
<th>Page</th>
<th>Feature</th>
</tr>
</thead>
<tbody>
<tr>
<td>57</td>
<td>ProPak Asia 2018 Preview</td>
</tr>
</tbody>
</table>

4  THINK LABORATORY Unveils Water-based Inkjet Printed PET Shrink Film at the Converting Technology Exhibition  
THINK LABORATORY CO., LTD.  

8  Digital Printing Primes the Pump for Gravure Printing Cylinder Making Work  
Towa Process Co., Ltd.  

13  Using Sensor Equipped Undergarments to Aid Research in Postpartum Depression  
Tohoku Medical Megabank Organization - Tohoku University,  
UNION TOOL CO., Toyobo Co., Ltd.  

16  Key to Digital Flexible Packaging Printing Is Achieving Market-responsive Quality, Cost, and Productivity  
2017 Digital Printing Market  
Japan Federation of Printing Industries  

20  Miyakoshi Liquid Toner Electrographic Printers Challenge Offset Resolution  
Miyakoshi Printing Machinery, Co., Ltd.  

24  The Future of Gravure in a Changing World of Regulation and Packaging Demands  
Gravure Research Group 11th Mini-symposium  
The Japanese Society of Printing Science and Technology  

30  Inkjet Printing Reduces the Environmental Burden of Color Proofing  
Altavia Japan K. K.  

34  Inkjet Models Equipped With ULTRASTREAM Slated for Release in 2020  
page2018  

36  Shifting From Baseless Feelings of Complacency to a More Data Backed Approach to Improving Plant Safety  
Asahi Kosoku Printing Co., Ltd.  

40  Technology Development Is an Unwavering Policy in Providing Reliable Winding Performance  
FUJI TEKKO CO., LTD.  

46  Functionalizing Automotive Interiors and Exteriors With TOM Decoration Technology  
Fu-se Vacuum Forming Ltd.  

50  High Durability MIGUSA Gives a Japanese Flavor to Western Style Rooms  
Sekisui Seikei, Ltd.  

---  

### May/June Advertisers:

<table>
<thead>
<tr>
<th>Company</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>THINK LABORATORY CO., LTD.</td>
<td>59</td>
</tr>
<tr>
<td>YAMABUN ELECTRONICS CO., LTD.</td>
<td>67</td>
</tr>
<tr>
<td>TAIYO ELECTRIC INDUSTRY CO., LTD.</td>
<td>71</td>
</tr>
<tr>
<td>HIRANO TECSEED CO., LTD.</td>
<td>81</td>
</tr>
<tr>
<td>NIRECO CORPORATION</td>
<td>105</td>
</tr>
<tr>
<td>OKAZAKI MACHINE INDUSTRY CO., LTD.</td>
<td>111</td>
</tr>
</tbody>
</table>
52 Functional Building Materials Provide the Appearance of Real Tile and Transform Window Glass Into Displays

Architecture + Construction Materials 2018

62 Proposing New Aseptic Filling Lines and Paper Cartons for Beverages Containing Fruit, Jelly, and Other Solids

Dai Nippon Printing Co., Ltd. and SIG Combibloc Group

66 Firm, Long-life Silken Cooking Tofu Developed Especially for Home Delivery

Morinaga Milk Industry Co., Ltd.

68 Freshness Preservation, Laser Marking, and Microwave Cooking

Japan Food Packaging Association

72 Electronic Tags, Invisible Printing, and Repurposed Cardboard Respond to Societal Needs and Improve Convenience

The Society of Packaging Science & Technology, Japan

76 Using Piezoelectric Film-based Micro-hydro Power Generators to Restore the World’s Coral

Hydrosphere Disaster Laboratory, Faculty of Societal Safety Sciences, Kansai University

82 Working to Reverse the Increasing Danger of Marine Litter and Ocean-borne Microplastic

12th Marine Litter Countermeasure Experts Conference

84 Big Data, AI, and Automated Driving Expected to Drive Semiconductor Sales

Semiconductor Equipment Association of Japan

87 FPD Production Area to Grow 5% Annually Through 2024

34th IHS Markit Display Japan Forum 2018

90 Tokyo Business Design Award

Grand Prize Goes to Customizable Transfer Sheets

2017 Tokyo Business Design Award

94 The Potential of Screen Printing, Session 5

Lack of a "Standard" Makes Screen Printing Seem Difficult

Only Four Printing Parameters Are Variable

Most Parameters Are Standardizable "Preconditions"

Yasushi Sano

102 PSA Labels for Oily Surfaces, Session 9

PSA and Cutting-edge PSA Applications

Kohyoh Kusuda

106 Coating Theory and Phenomenon for the Plant, Chapter 4, Session 5

Nanotechnology and Coating

Professor Akira Kawai

112 Revolutionary Next-generation Batteries and the Role of Their Separators for 2020 to 2030, Session 3

Secondary Batteries and Electrical Storage Devices as Seen From the Separator

Dr. Katsuhisa Fujiwara

116 Pressure Sensitive Adhesive Tape Science and Industry, Session 1

PSA Tape Adhesion Mechanism (1) Adhesion, Pressure-sensitive Adhesion, and Dry Adhesion

Yoshiaki Urahama
Bourbon Corporation, a Japanese foods company, has begun testing an approach to shorten the lead time from order to delivery and to minimize the time required to package ultra-short run products, thereby supplying products in a more timely manner. Having first revealed the concept on January 29th, Bourbon is now utilizing the FXIJ flexible packaging inkjet printer being developed by THINK LABORATORY CO., LTD. and the LUNAJET water-based inkjet pigment inks developed by Kao Corporation to print the shrink films used on the specially designed bottle-type snack packages the company uses to sell snacks in its automatic vending machines. This is the first example in Japan of a brand owner announcing the use of water-based inkjet printing for food packaging. On February 3rd, Bourbon began demonstration sales at some of the major train stations in Tokyo, Haneda Airport, and Narita Airport. On January 4, 2018, the FXIJ was awarded the Small and Medium Business Award as part of the 60th Ten Best New Product Awards organized by Nikkan Kogyo Shimbun. Together, these announcements led to strong interest in THINK LABORATORY at the Converting Technology Exhibition, held at Tokyo Big Sight From February 14–16.

Reducing Drying Energy Loads

Including the first prototype model, THINK LABORATORY now operates four FXIJ units at their main plant in Chiba, Japan, to investigate higher printing speeds, better drying and energy efficiency, long-run inkjet printhead print quality, and ink anchorage on film. The No. 4 Unit on display at the show is designed to print on 600 mm wide substrates (540 mm max. print width) at a speed of 40m/min (no anchor coat, 5-color (KCMYW) printing) and handle a maximum unwinding and rewinding roll diameter of 600 mm. As a new development,
Using Kao Ink for Thermal Transfer Printing

THINK LABORATORY has also been moving forward on applying Kao Corporation’s water-based pigment inks for thermal transfer printing. In this case, they first print the ink onto PET film using the FXIJ and coat the film in an adhesive to make the transfer film. This film is then formed onto a curved surface, for example, and heat used to transfer the ink as a way of transferring images and text to the product. THINK LABORATORY is also progressing on talks with a brand producer to put this approach into use.

New FX High Cell Freedom

As part of their display for their New FX fully automated laser gravure cylinder making system, the company’s primary area of business, THINK LABORATORY promoted the system’s ability to make different cell geometries, and displayed printing samples and panels to show the printing results of the different cell geometries (detailed below). Specifically, the samples and panels showed how the New FX enables shallow cells of 10–13 μm for solvent inks and of 5–10 μm for Kao’s water-based inks.

- Sample 1 - Reverse Printing (2 types)
  Cylinder Specifications:
  250 lpi, 10 μm C cell depth, 12 μm MY cell depth, 13 μm BW cell depth
  Ink:
  Belle Color HS High-solid solvent gravure ink (SAKATA INX CORPORATION)
  Film:
  FOR-AQ OPP film (Futamura Chemical Co., Ltd.)
  Printing Speed:
  200 m/min (ORIENT SOGYO CO., LTD. printing machine)

- Sample 2 - Reverse Printing
  Cylinder Specifications:
  250 lpi, 5 μm CMY cell depth, 8 μm B cell depth, 10 μm W cell depth
  Ink:
  VOC-free water-based gravure ink (Kao Corporation)
  Film:
  FE2001 PET film (Futamura Chemical Co., Ltd.)
  Printing Speed:
  100 m/min. (ORIENT SOGYO CO., LTD. printing machine)
  Printing Company:
  Chukyo Kagaku Co., Ltd.
The future of digital printing is an area of intense interest for flexible packaging converters, and necessarily arises as an option when managers consider the future of their companies. Likewise, when Towa Process Co., Ltd., a Japanese gravure cylinder making company, was considering its future, they looked to digital printing and six years ago became one of the first companies to install an HP liquid toner digital Indigo WS6600 in the cylinder making industry. As of now, Towa Process sees digital printing as a secondary business, and with many of its customers being gravure printing companies, and thus potential competitors in this area, Towa Process has been faced with the need to deploy its Indigo in ways that differ from other digital printing equipment operators. As a result, Towa Process has accumulated a depth of knowledge in digital printing and now claims to have test printed more types of substrates than almost any other company in the world. Moreover, their work in taking on the short run printing jobs passed over by gravure printing companies has ultimately helped to prime the pump for their primary gravure cylinder making business. More recently, they have developed connections that go beyond the gravure printing industry and have undertaken niche digital printing work.

**Lead Up to Challenging Digital Printing**

Towa Process first installed its WS6600 in January 2013, some seven months after Jun Fukushima, president of Towa Process, returned from drupa 2012 (Düsseldorf, Germany) where he first saw the HP digital printing machine in action. Mr. Fukushima had already previously been interested in the Omnis digital printing machine, the predecessor of today’s HP Indigo machines that was released to the market during the latter half of the 1990s by Israel-based Indigo. However, he says, the machine was expensive, yet was only suited to color proofing or mock-up work at the time. When he heard that two machines needed to be installed because they would often breakdown and other such negative rumors, he felt that the return on investment would be poor and lost interest in the machine.
As part of their research into postpartum depression, Professor Hiroaki Tomita and his research group at the Tohoku University Tohoku Medical Megabank Organization (ToMMo), recently teamed up with UNION TOOL CO. and Toyobo Co., Ltd. to develop a smart textile as a means of monitoring the mental health of pregnant women. Using Toyobo’s COCOMI conductive material and UNION TOOL’s myBeat heart rate sensor, the clothing made of the smart textile is able to directly measure heart rate and the autonomic nervous system (heartbeat) of subjects in a more natural manner. By measuring these data during pregnancy, the team hopes to discover ways to prevent the onset of postpartum depression and make early prognosis. Toyobo exhibited the concept during the Wearable Device & Technology Expo, held this past January.

Directly Monitoring the Autonomic Nervous System

During pregnancy and after birth, a woman’s environment and hormonal balance changes, which can result in stress and insufficient sleep that can often lead to emotional and mental instability, known as postpartum depression. In fact, the condition affects about 10% of new mothers. In addition, research has shown that the risk of onset is even higher when a new mother is affected by a disaster, such as a major earthquake. Even in such cases, however, it is difficult for those directly involved in the mother’s life, and the mother herself, to recognize that the cause of depression is mental stress. In this light, research in the field of psychiatry has aimed to monitor the autonomic nervous system based on heart rate measurements as an effective method of helping to objectively evaluate stress and depression. Likewise, interest has been placed on wearable sensing.

According to the research group, measuring amylase taken from saliva samples is the current approach used to monitor daily stress and the consequent imbalance in the sympathe-
Key to Digital Flexible Packaging Printing Is Achieving Market-responsive Quality, Cost, and Productivity

2017 Digital Printing Market

Japan Federation of Printing Industries

The Japan Federation of Printing Industries, Digital Press Promotion Council, held a meeting this past March at the Japan Printers’ Institute in Tokyo to report on the results of a survey the organization conducted regarding the current status and outlook for digital printing in Japan. In addition to acquiring a better understanding of the degree to which digital printing machines and the related equipment are already being used in Japan, the survey also aimed to promote the greater use of such equipment by asking respondents about what needs to be done in order to expand the applicability of digital printing.

153 Companies Operate 608 Digital Presses

The survey was provided by mail to 707 companies selected from among the members of nine printing industry organizations (Japan Federation of Printing Industries, the All Japan Printing Industries Association, the Japan Business Forms Association, the Graphic Communication Japan Industry Association (GCJ), the Japan Graphic Services Industry Association, the Japan Federation of Label Printing Industries, the Gravure Cooperative Association of Japan, the Japanese Screen & Digital Printers Association, the Japan Association of Graphic Arts Technology), of which 180 companies responded. As shown in Table 1, 153 (85%) of the respondents own a total of 608 digital printing machines (10 more units than in 2016). The average number of units per company is 4.22 (3.86 units in 2016).

Of those companies owning a digital printing machine, 40 companies own five or more units, where the greatest number of units owned by any one company is 30 (color dry toner: 5 units, monochrome dry toner: 15 units, color sheet-fed inkjet: 7 units, color rotary inkjet: 3 units).

In terms of operational rates, more than half of respondents owning a color digital printing machine responded that they operate the machines five or more days per week.

In terms of digital printing machine profitability, nearly three times as many respondents answered “Profitable” for dry toner units than “Unprofitable.” In terms of wide format units, the majority of companies responded “Unprofitable,” showing no change from the previous year.

Post-printing Equipment Is Highly Profitable

Table 2 shows the number of units owned, the operational rates, and the profitability for digital post-printing equipment (hot stamping, varnish coating, die-cutting, etc.). Based on these results, although the operational rates for both surface processing and die-cutting equipment is low given the low market awareness, half of respondents indicated that the profitability of surface processing equipment is high. In this table, “Other” refers to perforators, business card cutters, slitters, bag making equipment, and other such equipment.
With the arrival of digital printing and its target of meeting the needs of printers and brand owners faced with an increasing amount of low-volume high-mix work, industries ranging from standard commercial printing to publishing and label and package printing have started to show interest in the technology. In this light, Miyakoshi Printing Machinery, Co., Ltd. held a sneak preview of 10 digital printing related equipment models at its OPEN HOUSE 2017, a private show organized by the company’s POD Business Unit this past November. During the event, Miyakoshi Printing Machinery explained the features of each model and demonstrated the equipment. Of particular interest were the MDP4000 liquid toner electrographic B2 digital press, which was unveiled for the first time in Japan, the MDP8000 B2 sheet fed press, the MDP5000 double-sided rotary press, the MDP2500 rotary press for film printing, and the MJP20AX full-color, high-speed double-sided inkjet press.

Main Specifications of the Four Liquid Toner Electrographic Digital Press Models

<table>
<thead>
<tr>
<th>Model</th>
<th>Sheet-fed/ Rotary</th>
<th>Substrates</th>
<th>Max. Paper Size or Substrate Width</th>
<th>Max. Printing Size or Printing Width</th>
<th>Printing Resolution</th>
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<tbody>
<tr>
<td>MDP4000</td>
<td>Sheet-fed</td>
<td>Paper</td>
<td>788 × 600 mm</td>
<td>765 × 580 mm</td>
<td>1200 × 1200 dpi</td>
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<tr>
<td>MDP8000</td>
<td>Sheet-fed</td>
<td>Paper</td>
<td>520.7mm</td>
<td>487.0mm</td>
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<tr>
<td>MDP5000</td>
<td>Rotary</td>
<td>Paper</td>
<td>520.7mm</td>
<td>487.0mm</td>
<td></td>
</tr>
<tr>
<td>MDP2500</td>
<td>Rotary</td>
<td>Film</td>
<td>520.7mm</td>
<td>487.0mm</td>
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</table>

<table>
<thead>
<tr>
<th>Model</th>
<th>Max. Printing Speed</th>
<th>Colors</th>
<th>Paper Weight Range or Substrate Thickness Range</th>
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</thead>
<tbody>
<tr>
<td>MDP4000</td>
<td>Single-sided: 4,000 sheets/hr. Double-sided: 2,000 sheets/hr. 4-color (single-sided/ double-sided)</td>
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<td>64 - 450 g/m²</td>
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<tr>
<td>MDP8000</td>
<td>6,000 sheets/hr. 4-color (single-sided)</td>
<td></td>
<td>64 - 360 g/m²</td>
</tr>
<tr>
<td>MDP5000</td>
<td>60 m/min. 4-color (double-sided)</td>
<td></td>
<td>64 - 157 g/m²</td>
</tr>
<tr>
<td>MDP2500</td>
<td>50 m/min. 5-color (single-sided)</td>
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<td>12 - 15 µm</td>
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Main Specifications of the MJP20AX

<table>
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<tr>
<th>Printing Method</th>
<th>Rotary Inkjet (water-based pigment ink)</th>
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<tbody>
<tr>
<td>Max. substrate width</td>
<td>520.7 mm</td>
</tr>
<tr>
<td>Max. printing width</td>
<td>508.0 mm</td>
</tr>
<tr>
<td>Printing resolution</td>
<td>2400 x 2400 dpi: 50m/min</td>
</tr>
<tr>
<td></td>
<td>1200 x 1200 dpi: 200 m/min</td>
</tr>
<tr>
<td></td>
<td>1200 x 1200 dpi: 254 m/min</td>
</tr>
<tr>
<td>Colors</td>
<td>4-color (single-sided)</td>
</tr>
<tr>
<td>Paper weight range</td>
<td>64 - 157 g/m²</td>
</tr>
</tbody>
</table>

Using a newly developed water-based pigment inkjet ink, one of the MJP20AX’s major features is its ability to directly print on the coated paper substrates used in offset printing. According to the representative, the new ink frees the MJP20AX from the need for the expensive coated paper specifically made for inkjet printers typically used to print at high resolutions. Given the greater range of available paper types and the wider variety of items that can be produced with greater costs advantages, Miyakoshi Printing Machinery feels the MJP20AX will make it easier for customers who use the model to set themselves apart from their competition. In addition, the 1200 dpi printhead nozzles clog at a far lower frequency, which reduces the burden of maintenance work on the operator while at the same time enabling higher operational rates.

Miyakoshi Printing Machinery also manufactures various paper converting and finishing machines, including die-cutting and perforating equipment, folding equipment, sheet outfeed units, and book binding lines. By combining the MJP20AX with these units, Miyakoshi Printing Machinery is able to configure integrated lines that feed the paper from a roll and output a finished product in a single pass. Equipping the MJP20AX with the optional anchor coating unit further increases the resolution and variety of available substrates.

Contact Type Desk-top Film-Sheet Thickness Measuring System

**TOF-4R**

- **Measurement length:** 10-10,000 mm
- **Power supply:** AC 100-240V ± 10% 50/60 Hz
- **Temperature/Humidity:** 10-40 °C / 35-80 % (no condensation)

**TOF-5R**

- **Resolution:** 0.5 μm
- **Accuracy (at 20°C):** ±0.8 ±0.1 μm
- **Measuring force:** 0.6±0.1 N
- **Measurement pitch:** 1 mm
- **Measurement range:** 0.03-3 mm

**TOF-6R**

- **Resolution:** 0.1 μm
- **Accuracy (at 20°C):** ±0.2 μm
- **Measuring force:** 0.8 N or less
- **Measurement pitch:** 1 mm
- **Measurement range:** 0.02-0.2 mm

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Exhibit

9th Film Tech JAPAN
Date: December 5-7, 2018   Venue: Makuhari Messe
The Future of Gravure in a Changing World of Regulation and Packaging Demands

Gravure Research Group 11th Mini-symposium
The Japanese Society of Printing Science and Technology
www.jspst.org

Despite the inroads digital printing has made into the offset printing industry, Gravure printing continues to maintain its dominance in Japan’s flexible packaging industry. Part of the reason for this dominance is the activities of the Japanese Society of Printing and Science Technology (JSPST), Gravure Research Group. Formally established in 1994, when water-based gravure printing technology was first gaining attention as a potential flexible packaging printing method, the Group has played a significant role in supporting the growth of gravure printing from that time on. Since 1996, the Group has also held regular research meetings covering a wide range of topics, from electron beam curing technology to biodegradability, short-runs, VOC reduction, excessive quality, and web handling. This past December the Group held their 11th mini-symposium to commemorate the 25th anniversary of their founding. Under the concept of updating some of the more interesting seminar topics of the past 25 years, the symposium tackled some of the more essential aspects of understanding the application of gravure printing to flexible packaging, including resin and ink safety regulations, new packaging materials and packages, laser gravure cylinder making, the environmental awareness of packaging, and production (monozukuri) analysis. In this way, the symposium reinforced the understanding that flexible packaging gravure printing requires more than just knowledge of printing.

Where Did Japan’s Presence Go?
Although construction materials and optical films are an important market for gravure printing, the sector where it best competes is food packaging. As such, the inks and substrates must be safe for human contact, in addition to being printable. Given that tight budgets require converters to use cheaper imported films, however, converters must question the safety of these materials. In this light, Hideki Nishi, one of the leaders in the health and safety of plastic containers and packaging in Japan, spoke on the latest trends in domestic and overseas food packaging laws and printing ink regulations.

According to Mr. Nishi, there are no specific regulations for gravure, flexo, and other types of printing ink under Japan’s Food Sanitation Law. Article 16, however, does state that “Apparatus or containers and packaging which contain or are covered with toxic or harmful substances and involve a risk to human health, or apparatus or containers and packaging which touch food or additives and have a harmful effect on them and involve a risk to human health shall not be sold, nor be produced or imported for the purpose of marketing, nor be used in business.” In short, printing inks and paper, for example, that violate the provisions of this Article are illegal. Even so, there are no clear safety and health standards in the law regarding the resins of which plastic films used in flexible packaging are made.

Article 18 of the Food Sanitation Law, however, does mention regulations and standards for containers and packaging, as well as their raw materials. Specifically, milk and milk products are strictly regulated in terms of their packaging, containers, and the constituent raw resins under the Ministerial Ordinance on Milk and Milk products Concerning Compositional Standards, etc. In terms of other foods, although standard regulations and 13 specific regulations for synthetic plastic packaging and containers are provided under the Standards and Criteria for Food and Food Additives, etc. (for example, apparatuses, packaging, and containers made of synthetic plastics primarily consisting of polyethylene or polypropylene must...
Inkjet Printing Reduces the Environmental Burden of Color Proofing

Altavia Japan K. K.
www.altavia.co.jp

Using production printing equipment for color proofing will not necessarily reproduce the colors exactly as specified in the design data, resulting in changes in these color specifications that lead to the need for redesign, reproofing, and reprinting. In Japan, especially, production printing equipment and the actual product media are often used for color proofing, so unlike in the US and Europe, where this approach is less commonly used, repeated color proofing can result in a significant amount of wasted time and media. As a means of reducing the waste generated during color proofing in Japan, Altavia Japan K. K. is now offering its color management solutions (CMS) often used among European printers who must meet the high ecological standards demanded by their clients. Already, five companies in Japan have adopted this service for 20 brands, but to further spread the use of CMS, Altavia Japan held a private seminar at the French Embassy in Tokyo this past march.

One of the Largest Paper Users in Europe
Established in 1983, ALTAVIA is an independent advertising agency headquartered in France that has expanded to realize annual revenue streams of approximately 700 million euros today. With 48 subsidiaries in 27 countries in Europe, North America, and Asia, the group employees 2,000 individuals and has more than 350 clients ranging from large-scale retailers to luxury brands. In addition to Japan, ALTAVIA also has five Asia locations in China and one in Korea.

“As an advertising agency,” says Stepane Joly, executive vice president of Altavia Asia, “we are one of the largest consumers of paper in Europe, so have a major impact on the environment. Therefore, under the concept of responsible creative leadership, in 2008 we acted as an altruistic member of society and joined the United Nations Global Impact, an initiative that is working to create a global framework for sustainable growth. In 2010, we became the first advertising agency in Europe to receive Forest Stewardship Council (FSC) certification and Programme for the Endorsement of Forest Certification Schemes (PEFC) certification, whereby our basic approach is to work with environmentally-focused suppliers that undertake aggressive corporate social responsibility (CSR) activities. Altavia Japan also received FSC certification in 2017. In addition, we utilize CO2 emissions calculation tools to set our own standard for ecological printing.”
China Is Ahead of Japan

As mentioned above, color proofing using the actual media and printing equipment takes seven days when Altavia Japan works with luxury brands. In contrast, digital proofing has served to shorten the proofing process for clients that have chosen to go with CMS, which in turn has increased the speed these clients are able to release products to market. Digital proofing has also greatly reduced the burden of production, which has made these clients happy. “It is important for large companies to reduce their environmental burden,” says Mr. Joly. “Which is exactly what our solutions help do. In some cases, our clients would use the same data in France and Japan, but until we proposed our solutions, printers were not able to reproduce the same colors that had been accepted in France here in Japan, even when using the exact same data. In this way, our CMS can accurately reproduce colors and help unify brand images. Three of the most color focused industries are fashion, cosmetics, and automobiles, but CMS has also been used in the US and Europe in the mass retail industry.”

Yukiko Inoue, CEO of Altavia Japan, adds “unlike most advertising agencies who are not necessarily experts in printing, Altavia has accumulated advanced technology and know-how in the field. There are few production companies that can produce data for immediate use in printing because these companies are primarily in charge of the creative process, so naturally this is an area in which few advertising agencies are skilled. In our case, however, we actually create the design and printing data files simultaneously, so we can send the data directly to the printing company as soon as we receive the go-ahead. In this respect, we offer services that include design and related data production workflows, color management, digital proofing, Japan Color and European standard based output, and color management consulting.” Currently, five staff members are in charge of data processing for Japan, two of whom are located in France. Altavia has also begun offering CMS for packaging printing and fully paperless soft proofing services.

In closing, Mr. Joly says that clients that have adopted Altavia CMS do not go back to the old ways. And as if to generate a sense of urgency among those from Japan in the audience, Mr. Joly states that Chinese companies are adopting CMS at a far greater pace than companies in Japan.
Despite offset, and digital printing rarely being used for flexible packaging printing in Japan, the Japan Association of Graphic Arts Technology organized the page2018 exhibition this past February under the concept of applying these printing technologies to flexible packaging printing. The exhibition was also attended by many of those in the gravure printing industry, hinting at the desire for gravure converters to discover new business potential in other printing fields. Of particular interest were the inkjet printing and flexo printing proposals made by Kodak Japan Ltd. (Kodak) and FUJIFILM Global Graphic Systems Co., Ltd. (FFGS).

During the event, Kodak exhibited its Stream Inkjet Technology, which produces a continuous flow of ink drops from which it recovers and reuses any ink drops that do not fall to the substrate. This approach improves drop control for higher resolution printing. Kodak also presented information on its ULTRASTREAM technology, which was first unveiled at drupa 2016, as the latest generation of its Stream Inkjet Technology and showed how the technology compares to offset printing.

Stream Inkjet Technology generates small and large drop sizes, thereby allowing larger drops to fall to the substrate and smaller drops to be blown aside using a tiny burst of air. These smaller drops are then sucked up at the other side of the head, which prevents smaller drops from falling to the substrate. In contrast, ULTRASTREAM only produces one drop size of 3.75 pL (p stands for pico, where pL is one trillionth the volume of a liter). The pressurized manifold controls the drop speed to 20 m/s and enables each nozzle to produce 400,000 drops per second. In this case, the ink drops that are allowed to fall onto the substrate are not charged, whereas those drops that are to be recovered and reused are positively charged. This binary approach to inkjet printing results in a more even distribution and smaller particles, and thus provides a resolution of 600 × 1,800 dpi and a printing speed of 150 m/ min.

The inkjet printhead consists of modules with an 8 inch printing width, whereby several of these modules can be combined in a staggered configuration to print a maximum seamless width of 97 inches (2.46 m). A separate module configuration is required for each color.

This year Kodak plans to begin providing evaluation units to OEM partners with a target of equipping ULTRASTREAM on actual production models two years later.
Shifting From Baseless Feelings of Complacency to a More Data Backed Approach to Improving Plant Safety

Asahi Kosoku Printing Co., Ltd.
www.ag-media.jp

During the 33rd GP Plant Exchange Conference held this past January in Tokyo, Tatsuya Oka, president of Asahi Kosoku Printing Co., Ltd., presented on his company’s efforts to visualize and respond to volatile organic compound (VOC) emissions from their offset printing plant. Specifically, by updating their understanding of VOCs, visualizing the resulting problems, and implementing risk assessment strategies, he revealed how the company has ensured employee health and a safe working environment. Since its establishment in 1964, Asahi Kosoku Printing has grown to employ approximately 100 employees and now primarily works in the commercial and publishing printing fields. Although the area around their plant was originally a business district when the company was founded, recent urban development trends in Japan have created a greater mix of living and working environments in the area. As such, the population has grown, and there is now a studio type apartment building located right next door. In this light, Mr. Oka says that they are concerned that noise, odor, and fears about bile duct cancer among local residents will prevent them from remaining in their current location. In addition to undertaking various environmental and occupational health activities in the past, including acquiring FSC Forest Certification (2008) and Green Printing Plant Certification (2009), as well as receiving the Japan Federation of Printing Industries (JFPI) Superior Environmental Plant Chairman Award (2016), Asahi Kosoku Printing has begun taking occupational health measures based on clearer evidence and working to create a better workplace environment.

From a Baseless Sense of Complacency to VOC Monitoring

Until recently, Mr. Oka says that their basic approach to occupational safety and the environment was to observe their competitors and copy highly-aware companies. As such, their only response to questions about the actual level of safety from their employees was “probably.” Although this approach meant they were considered safe as far as the industry was concerned, their status evaluation was in fact baseless. Therefore, Mr. Oka says they investigated the actual situation of their plant and discovered that they also used some Type 2 organic solvents, but did not know specifically what they needed to do next.

Following this discovery, they acquired the offset printing plant organic solvent control manual published by the JFPI and realized that those working in offset printing plants are continuously exposed to different types of mixed organic solvent vapor. More importantly, they realized that the concentration of VOC is far greater during roller and blanket cleaning. Mr. Oka says that when he first saw the graphs showing how VOC concentration during roller and blanket cleaning increases even though VOC concentrations in offset printing plants are not very high during regular operations, he knew they need to take measures aimed at these peak periods.

*In May 2012, it was discovered that 17 former employees of a printing plant in Osaka, Japan, had been diagnosed with bile duct cancer, of which 9 had died. In this case, the organic solvents used during operations were believed to be the cause of the cancer.
COATER & LAMINATER
Ultra-clean, Ultra-precision World-class Technology

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101-1 Kawai, Kawai-cho, Kitakataura-ku
Nara, Japan 638-0051
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Tokyo Branch
Hirui Kanda Bldg, 3rd floor
1-16 Kanda-sudacho, Chiyoda-ku
101-0041 Tokyo, Japan
TEL: +81-3-5289-8834 FAX: +81-3-3251-7999

www.hirano-tec.co.jp
Technology Development Is an Unwavering Policy in Providing Reliable Winding Performance

FUJI TEKKO CO., LTD.
www.fujitekko.co.jp

On December 4, 2017, FUJI TEKKO CO., LTD. announced the appointment of Takuto Matsumoto as president and CEO of FUJI TEKKO CO., LTD. and Kimio Matsumoto, the former president and CEO, as Chairman and CEO. We spoke to Takuto and Kimio Matsumoto on this occasion about the transition and the future direction of FUJI TEKKO as a technology oriented equipment manufacturer of take-up machines, rewinders, slitters, automatic roll packaging equipment, and other rewinding technology reliant machines.

Handing the Reigns Over to a Younger Generation

—Tell us about the reasons and timing for the transition.

Kimio Matsumoto, Chairman and CEO of FUJI TEKKO

Kimio Matsumoto: Although the new president is still young, our younger employees have grown significantly and we had a positive outlook for the future, so we felt that we were in a good position to hand the reigns over to the younger generation. Personally, I feel that top management should be younger and that those over 70 should not remain in charge forever. Along with our own internal situation, there were also changes in the times that led to this move. For example, today email is a standard communication tool, and under the name of IoT, all kinds of devices are becoming connected via the internet so that they can be used and controlled at a distance. These concepts are also starting to penetrate the equipment made by FUJI TEKKO. I feel that the younger generation has a better understanding of these changes, and the very thought that the old ways are better is out of date.
Correct for meandering, based on pattern criteria!

**Uses pattern matching**
The system takes basic positions from within the entire image (such as the line, edge, pattern and text) and stores them in memory, detects web meandering and sends out correction signals.

**Uses ZNCC (Zero-mean Normalized Cross-Correlation)**
Stable detection is assured, even if there are variations in external light and print density.

**Easy Search function**
Simply specify the reference position from within the entire image and press the Search button to record the reference position in memory and start the detection.

**NI SERIES**
Nireco Intelligent Camera NIC100
Nireco Intelligent Panel NIP100
As a developer and manufacturer of vacuum forming equipment, Fu-se Vacuum Forming Ltd. (FVF) displayed some of the latest developments related to its proprietary TOM (Three-dimension Overlay Method) vacuum pressure forming process at 3Decotech Expo 2018. During the event, they also exhibited a compact car equipped with a variety of interior and exterior parts formed with films having superior functionality and design quality. In a slightly different vein, they also introduced a unique approach to improving vehicle running performance by applying dimpled sections to the surface of this car’s hood.

Automotive Interior and Exterior Film Forming

Given the demand to reduce VOC emissions generated during automobile manufacturing and production processes, FVF’s proprietary TOM film forming decoration technology has gained attention as a replacement for painting. TOM film forming decoration technology utilizes FVF’s NGF forming equipment and the larger Neo-TOM vacuum forming equipment to apply films (skins with an adhesive layer) with different functions and decorative qualities to automobile parts, for example. TOM is also used to precisely conform films to the surface of this car’s hood.
Ingenuity
For the satisfaction of our customers
Providing coating, labeling, and cutting technologies for increased value.

Coating
From thin to thick film coating

Laminating
Dry, non-solvent, wet, extrusion, thermal, print, hot-melt, transfer

Printing
Gravure (film, aluminum foil)

Slitting
Film, aluminum foil, copper foil, paper

Technological Innovation
For the growth of our customers
Contributing to the future by “creating value, productivity, and a clean environmental” and by “reducing loss and costs.”

Meeting the needs of our customers with order-made functions
Available products: coating machines, laminators, gravure printing presses, paper tube manufacturing machines, slitters, and all manner of industrial machines.

To support our customers, we have permanent test machines at our factory. Contact our sales department for availability.

Okazaki Machine Industry Co., Ltd.

Head office / Factory : 2-22-6 Befu Settsu-Shi, Osaka 566-0046 Japan Tel: +81-6-6349-5566 Fax: +81-6-6340-7570
Tokyo Sales Office: 3-10 Nihonbashi Kodenmacho, Kawaatsu Building, Chuo-ku, Tokyo 103-0001 Japan Tel: +81-3-5640-5566 Fax: +81-3-5640-1682
Traditional Japanese tatami mats are composed of a base, a cover, and a border, which are typically made of natural materials. In contrast, MIGUSA tatami mat covers, developed, produced, and sold by Sekisui Seikei, Ltd., are composed of plastic fibers that reproduce the feel of the natural soft rush of which traditional tatami mat covers are made. This past December, Sekisui Seikei captured the interest of visitors to the International Exhibition on Environment and Energy (EcoPro 2017) with its display showing their large variety of MIGUSA designs and styles. Sekisui Sheet Molding Industry Co., Ltd., Sekisui Blow Molding Industry Co., Ltd., and Sekisui Stretch Molding Industry Co., Ltd. merged in 1981 to form Sekisui Seikei as a subsidiary of SEKISUI CHEMICAL CO., LTD. The Sekisui Seikei Stretching Division, the successor to Sekisui Stretch Molding Industry, is responsible for MIGUSA.

The spun fibers used to weave MIGUSA tatami mat covers in a special loom are made of a PP that is blended with calcium carbonate. In fact, this fiber structure originated from the technology used by Sekisui Seikei to produce the plastic sake wrapping mats now used in place of rush sake wrapping mats. Each fiber is approximately 1.1 mm in diameter and is formed with depressions at several points along their surfaces in the length direction. The fiber core also contains air layers that provide the fiber with elasticity, which along with the depressions gives MIGUSA a feel that is similar to that of natural soft rush tatami mats. MIGUSA has better weather resistance than soft rush tatami mats, however, so is unlikely to discolor. Moreover, MIGUSA’s water-repellency enables it to be easily cleaned, while its low water absorbency makes it less likely to mold or serve as a home for mites. In this way, MIGUSA tatami mat covers have a superior durability that only requires replacement once every eight years or so.

First sold in 1991, MIGUSA was only originally promoted as a replacement for natural soft rush tatami mat covers, but in 1994 the Stretching Division began selling a version that could be directly placed on top of flooring, enabling a greater variety of interior decoration for both Japanese style and western...
Despite Japan’s declining population and coinciding expected long-term contraction in its building materials market, active development of advanced, high-value plastic films and sheets that functionalize building materials is creating new areas of demand. During Architecture + Construction Materials 2018, held this past February at Tokyo Big Sight in Tokyo, many companies focused their displays on these types of building materials using new concepts as well as reusing existing technologies. Some of the more impressive items included nonflammable advertising and display media, sound absorbing materials, tile-like plastic melamine sheets, and laminated glass center films that turn ordinary windows into displays.

**Nonflammable Glass Fiber Fabrics**

PHOTO CRAFT CO., LTD., an indoor advertisement and display media printing and production company, displayed its independently developed nonflammable media called GF Cloth. Made primarily of glass fiber, the material has been certified as nonflammable by the Ministry of Land, Infrastructure and Transport, and has been certified as flameproof by the Fire and Disaster Management Agency of the Ministry of Internal Affairs and Communications. Given its high strength and superior printability, the cloth has already been used as wallpaper in some train stations, as pillar wrappings in subway stations, and as wall decoration at luxury hotels and high-end shopping facilities in Japan.

PHOTO CRAFT produces GF Cloth by weaving the center layer glass fibers at a unique crossing angle, after which they impregnate the glass fiber weave with polyurethane resin to hold the fibers in place. Finally, they coat the textile with an acrylic resin that contains inorganic fillers, such as titanium oxide and silica. According to the representative, the acrylic resin coating provides the glass fiber weave with the ability to diffuse light and serves as a primer layer that enables the weave to be printed. The glass fibers, however, create an uneven surface, which is leveled by pressure bonding the impregnated weave to a heat softened PVC sheet. In this way, the PVC provides a smooth surface that can be printed at high-definition with a UV inkjet printer and grants the cloth a much greater strength.

At less than 1 mm thick, the cloth is transparent to light in the 5,000–6,000 Kelvin range often used for lighting in offices and schools. During the event, the company
**Product List**

**Latest Information**

Find the latest in converting related equipment:
- Detailed equipment description/specifications
- Contact information for manufacturers and dealers
- Search by product type
- Search by company
- Listings in English and Japanese

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**Order Form:**

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Fax to: +81-3-3861-3894
Exhibition Preview

ProPak Asia

The 26th edition of ProPak Asia will take place from June 13th to June 16th, 2018, at the Bangkok International Trade Exhibition Centre (BITEC), Thailand. ProPak Asia 2018 includes 9 Industry Zones, making it easier for buyers and sellers to meet and develop great business ties.

- The 26th International Processing Technology Exhibition
- The 26th International Packaging Technology Exhibition
- The 17th International Beverage & Brewing Processing & Packaging Technology Exhibition
- The 25th International Pharmaceutical & Cosmetics Processing & Packaging Technology Exhibition
- The 12th International Laboratory Equipment, Instrument, Test & Measurement and Quality Control Exhibition
- The 6th International Packaging Materials Exhibitions
- The 7th International Coding, Marking & Labelling Technology Exhibition
- The 2nd International Coldchain, Logistics & Warehousing Technology Exhibition
- The 2nd International Converting, Package Printing and Labelling Exhibition

Show Title: ProPak Asia 2018
The 26th International Processing and Packaging Technology Event for Asia

Date: Wednesday 13 – Saturday 16 June 2018, 10.00-18.00 Hrs.
Venue: Hall 98 - 106 BITEC, Bangkok, Thailand
Organisers: UBM Asia (Thailand) Co., Ltd.
HAGIHARA INDUSTRIES INC.

Stand No. AR11
Hall 99

One of the market leading manufacturers of slitter-rewinders in Japan, HAGIHARA INDUSTRIES INC. has been highly active in promoting sales on the Southeast Asia market. They have participated in overseas exhibition every year, including Propak, Plaspack, and Chinaplas, for example.

As usual, they will participate in Propak Asia 2018, and will exhibit slitter-rewinders and inspection rewinders. In particular, their "Duplex Center Drive Slitter Rewinder, Model HDF-406-1300/T" was developed specifically for the Southeast Asia market.

Their "One Side Inspection Rewinder, Model RSS-108VI-1300" has been one of their best selling standard rewinders for flexible packaging.

Hagihara’s technology improves production efficiency and will be on demonstration at their stand during the show.

**Duplex Center Drive Slitter Rewinder HDF-406-1300/T**

[Main features]
- Unwinder ø800mm (1000mm option)
- Rewinder ø600mm
- Hagihara’s original differential shaft "Air-Friction" for rewinding.
- Machine speed 400m/min.
- Duplex shaft type product receiver.
- User friendly touch screen

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**One Side Inspection Rewinder**

**DUPLEX CENTER DRIVE SLITTER REWINDER**

- Roller width : 1,300mm
- Web width : 400 ~ 1,200mm
- Unwind dia. : ø1000mm
- Rewind dia. : ø600mm
- Slit width : 90mm (Option 50mm)
- Speed : Max. 400m/min.
- Option : Inspection system
With consumers increasingly interested in healthy dining options, the world is seeing a boom in drinks that contain sliced fruit, jelly, vegetables, crushed nuts, and grains. In this light, Dai Nippon Printing Co., Ltd. (DNP) entered an alliance in May 2016 with SIG Combibloc (SIG), a Swiss company that provides aseptic filling lines and specialized paper cartons for the health beverage market, to coordinate their food and beverage aseptic paper carton businesses in Japan. Until recently, their collaboration focused on sales promotion activities in Japan, but given the positive outlook for the business, DNP and SIG launched a joint venture called DNP ∙ SIG Combibloc Co., Ltd. on April 1st, 2018. Financed equally by the two companies, the venture has begun selling paper cartons and aseptic filling lines designed specifically for new food and beverage options aimed at the Japanese market. The new company has already secured several orders for the aseptic filling lines, with the first line slated to begin operations during the spring of 2019 at Mori Milk Co., Ltd. of Saitama, Japan. In aiming to reach FY2022 aseptic paper carton and filling line revenues of ¥5 billion, a 10% share of the market, DNP and DNP ∙ SIG Combibloc have indicated their intention to challenge the dominance of Tetra Pak.

Adding Solids to Beverages

DNP ∙ SIG Combibloc will provide two new paper carton offerings on the Japanese market, namely drinksplus and Heat & Go. One unique aspect of drinksplus, which originated from SIG’s aseptic filling lines and paper cartons, is its ability to be filled with a mix of solids and juices, milk, and other beverages. According to Yoshifumi Kinoshita, general manager of the DNP Packaging Business Unit, all companies in the Japanese soft drink industry are faced with the challenge of setting themselves apart and increasing product value. The primary value of beverages lies in their flavor, aroma, smoothness, and nutritional value, but combining beverages with solids can create new value by adding texture and crunch to these basic values. Outside of Japan, SIG has seen steady growth in the number of beverages containing solids that have reached the market using drinksplus. For example, some unique products sold globally now include smoothies mixed with fruit chunks,
Despite being an easy to prepare part of many recipes in Japan, fresh block tofu packaged in water is not suited to stocking given its short shelf-life. In response, many types of carton packaged tofu that last longer than tofu packaged in water-filled containers have reached the market. One such example is the sterilized long life tofu that Morinaga Milk Industry Co., Ltd. (Morinaga Milk) first released in 1979. Using their long-life production technology, this tofu can be stored up to 10 months after production. In 1989, the company began selling a silken tofu developed specifically for home-delivery services. In order to meet the needs that this product had overlooked, in December of last year, Morinaga Milk began selling a new, firmer variety more suited to cooking. In this case, they increased the soy protein content by 10% over the standard variety to produce a tofu that will not break apart when boiled, but retains the flavor of the original.

Sterilized Tofu

The new cooking long life tofu developed specifically for home-delivery and released last December is a sterilized tofu that prioritizes texture and the ability to retain its shape when cooked. According to Go Tanaka, Market Milk Marketing Group Leader, Market Milk Business Unit, Sales Division, the new product maintains the high quality flavor of silken tofu, but maintains its shape when boiled, unlike standard silken tofu. Moreover, long life tofu does not need to be drained before cooking, which makes the product more convenient and results in better looking meals.

Morinaga Milk developed the new tofu based on their original home-delivery tofu first sold in 1989. As such, the tofu has the same soy bean sweetness and smooth texture, and is also primarily sold through their milk product distributors. According to Mr. Tanaka, since initiating their home-delivery business, sales of tofu products rose steadily to reach 1,000 units annually in 2008. Since 2008, however, sales have leveled off. Mr. Tanaka says that according to one of their surveys, most of their home-delivery tofu customers simply consumed the original tofu plain with some toppings. Therefore, they felt there was still plenty of potential for cooking tofu, such as in hot pots and soups, so set out to develop a new product that would meet the needs that the original product had failed to meet, and thus reinvigorate home-delivery tofu sales.

Mr. Tanaka explains that the company spent a year and a half developing the new tofu, during which time they worked to determine the best soy milk and coagulant ratio and the right production condition settings to realize the ideal tofu texture. Tofu hardens as a result of a reaction between soy protein and coagulants, so they were able to realize a firmer
texture by increasing the soy protein content 10% compared with the conventional product. Mr. Tanaka goes on to say that consumers were fond of the intensity of the soy bean flavor in the original product and the smooth texture, but consumers have also been satisfied with the new product in terms of both its flavor and its ability to retain its shape. In addition, the new tofu product uses the same package as the original, so also eliminates the need to drain the package of water before use, making cooking more convenient.

Long-life Production Method and Long-term Paper Carton Storage

Sterilized long life tofu is made by filling sterilized soy milk and coagulants into individual sterilized packages under sterile conditions, after which the packages are sealed and heated to solidify the tofu. Morinaga Milk handled all steps from tofu development to production, and successfully developed its first long-life tofu using this filling method in 1979. Moreover, the tofu can be stored for 10 months after production without using any preservatives. Although this long-life production technology was originally developed for filling long-life milk, after considering whether the technology could also be useful for other products they began to apply it to making tofu, a food that is commonly found in Japanese homes.

Mr. Tanaka explains that the film lid plastic containers often used to sell tofu in supermarkets and convenience stores necessarily let in some light and oxygen, which shorten the shelf-life. As such, Morinaga Milk packages its home-delivery tofu in high-barrier paper cartons like those often used for milk and juice to extend shelf-life. The paper carton used in this case contains an aluminum foil layer between the paper and the polyethylene, which blocks most air and light from entering the carton.

Popular Among Those in Their 40s

The majority of Morinaga Milk’s tofu home-delivery service customers are in their 40s or older, while their biggest customers are those who tend to cook their own meals at home. In fact, many customers have commented about the flavor of the tofu and the fact that they can eat it whenever without worrying about the expiration date. According to Mr. Tanaka, consumers also often order tofu together with milk and yogurt.

In promoting the convenience of long-life tofu, Morinaga Milk hopes to increase the value of tofu itself, thereby contributing to the tofu industry as a whole and expanding corporate revenues.
Despite the nearly unavoidable contraction of Japan’s food market as a result of the country’s shrinking population, the development of products targeted at elderly and single-member households, which tend to have higher food expenses, and at convenience stores remains active, indicating the continued existence of some growth sectors. In this light, the talks held during the Japan Food Packaging Association’s regular research meeting this past February focused on new preservation film, packaging, and printing technologies that are supporting development in these sectors.

Stand-up Pouch That Stands Out on the French Milk Market

Established in 1996 as a packaging manufacturer, Sweden-based Ecolean is known for its jug-shaped Ecolean stand-up pouches and its specialized filling equipment. According to Tomoaki Minoura, Ecolean’s Japan sales manager, the company’s business has expanded 40% annually over the past few years, and they now supply products to 30 countries in Europe and throughout the world, including the US, China, Malaysia, and Vietnam. During FY2018, Ecolean plans to add three more countries.

The inner film of Ecolean pouches is sterilized using electron beam technology and the outer film is sterilized using a combination of low-temperature hydrogen peroxide and UV light, thereby eliminating any chemicals from the sterilization process. The pouches are shipped in sealed containers and the seal is only broken immediately before content filling, so there is no need to sterilize the contents before filling.

Ecolean pouches come in a wide range of sizes (125–1,500 mL). In Europe, large family sizes are more popular, whereas pouches for smaller single-serving sizes are more popular in Asia. The specialized filling equipment is available in three chilled filling models and two aseptic filling models, but given the difference in regional needs, Ecolean is currently focused on developing small pouch filling equipment for Asia. The latest small pouch EL2+ filling machine has an enhanced filling capacity (12,000 pouches/hour) that is twice that of the conventional model.

In one example, a French milk company adopted Ecolean pouches in 2016, after which it saw a significant increase in revenue. This was an important development because companies on the French milk market have trouble setting themselves apart from competitors in terms of packaging and content, for example, so price competition has become prevalent. In this case, the milk company originally adopted Ecolean to enable room-temperature distribution and to deliver a new long-life high-priced milk product to the market, but as a surprise they saw revenue increase more than expected in part because of the originality of the package. The company is currently expanding the sales region for the milk products sold in Ecolean. In this way, Ecolean pouches are helping to increase the profitability of dairy farmers and contributing to a brake on the decline in the farming population, which has become a recent social problem in Europe. Mr. Minoura explains that there are also
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FB Coater
GC Coater
Die Coater
Doctor Coater

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SG Coater
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Doctor Coater

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Barrier packaging that helps preserve food, electronic tag equipped packaging that enables self-checkout, and packaging that can withstand the severe conditions of distribution are just a few of the increasingly important types of functional packaging. As part of a discussion on how functional packaging can help solve the problems of society and improve convenience, this past February the Society of Packaging Science & Technology, Japan (SPSTJ) held its 75th symposium in Tokyo. During the conference, presenters spoke on topics including new types of food packaging, the expanding use of electronic tags, and packages for improving the efficiency of distribution.

Expansion of Online Shopping

According to Mitsuhiro Sumimoto, director of the Sumimoto Technology Office, smartphones have further driven the growth of online shopping, making supermarkets and convenience stores increasingly unnecessary. Moreover, online shopping has increased the demand for a greater range of distribution packaging materials and greater packaging functionality to enable the shipping of a growing variety of products. In this light, Mr. Sumimoto spoke on the recent trends in food packaging made of functional films. More specifically, he mentions that some of the more topical issues include packaging material sustainability, pursuit of flavor, peace of mind, long-life, textured film surfaces, odor adsorption/absorption, anti-bacteria/anti-mold, track-and-trace, cold and freshness preservation, impact and counterfeit resistance, and labor shortage response.

In terms of pursuit of flavor, Mr. Sumimoto introduced the concept of MATS (microwave assisted thermal sterilization), which helps to reduce the damage to food caused by heat during retort treatment. In this case, 915 MHz microwaves are applied during the retort treatment process, so the packaging materials in this case must be permeable to microwaves and have a gas barrier.

Although retort foods are typically packaged in materials consisting of multilayer PET/CPET sheets, for example, the inside surface sealant odor can also be a problem. In response, packaging has been developed in Europe that utilizes the deodorization effect of cellulose nanofiber (CNF). In a similar vein, several companies, including Stora Enso, have jointly developed drink cartons made of paper and CNF. In one example,
Using Piezoelectric Film-based Micro-hydro Power Generators to Restore the World’s Coral

Hydrosphere Disaster Laboratory, Faculty of Societal Safety Sciences, Kansai University
www.hdl.muse.kansai-u.ac.jp

The coral found in oceans does more than just mesmerize us with its beauty, as a habitat for marine life it also serves as an essential part of marine ecosystems. Recently, however, rising ocean temperatures coinciding with global warming have led to coral bleaching and destruction. In response, researchers around the world have made efforts to restore coral. In this light, the research group led by Professor Tomoyuki Takahashi of the Faculty of Societal Safety Sciences, Kansai University, is taking an approach based on existing research showing that coral growth can be promoted using weak electrical currents, and has been applying their ocean current micro-hydro (low head hydro) power system for this purpose. Developed by Professor Takahashi, this micro-hydro power generation system consists of a vibration post that transmits vibration resulting from ocean currents to a piezoelectric element (piezoelectric film or ceramic) that generates electricity. In this way, the system will generate power as long as there is an ocean current and is easy to maintain. Along with developing a prototype of the power generation system, Professor Takahashi and his team are currently running demonstrations in coral reefs off of Ishigaki Island in Okinawa and the town of Kushimoto in Wakayama.

On the occasion of 2018 being the third International Year of the Reef, we spoke to Professor Takahashi about his project to regenerate coral as part of an approach to preserving marine ecosystems.

Environmental Problems Are Long-term Disasters

As as specialist in water-related disasters, you have simulated the impact of tsunamis and researched ways to connect these results to preventing and reducing the scope of disasters. Given this focus, what led you to your interest in regenerating coral?

Professor Takahashi: Diving is a hobby of mine and has been since 1991, but recently I have seen the progression of coral bleaching (a phenomenon in which the surface of coral...
FLAT EXPANDER

Wrinkle Removal Roller
This straight, non-bowed roller removes wrinkles without applying any deflection to the web. The roller does not cause any excessive stretching in the web center or sagging at the edges, as often seen with bowed rollers.

Wrinkle Removal Principle

Tighten the adjusting bolt at web Leading Edge A and loosen bolt at web Trailing Edge B. In this way, the rubber cord will contract at Point A and extend at Point B as the roller rotates. As such, the web wrapped over the roller at Point C will expand at Point D to remove the wrinkles from the web.

Flat Expander (FE)
This is a straight, non-bowed rubber band type wrinkle removal roller.

Miravo (MRV)
This wrinkle removal roller consists of a straight, non-bowed roller.

Applicable Machinery

<table>
<thead>
<tr>
<th>Industry</th>
<th>Applicable Machinery</th>
</tr>
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<tbody>
<tr>
<td>Nonwoven</td>
<td>Rewinding machines, slitters, coating machines</td>
</tr>
<tr>
<td>Film</td>
<td>Rewinding machines, slitters, printing machines, coating machines, vacuum deposition equipment</td>
</tr>
<tr>
<td>Glass Fiber</td>
<td>Weaving machines, rewinding machines</td>
</tr>
<tr>
<td>Paper Making</td>
<td>Rewinding machines, slitters, coating machines</td>
</tr>
<tr>
<td>Foil Making</td>
<td>Manufacturing plants for copper foil and aluminum foil</td>
</tr>
</tbody>
</table>

Due to product improvements, please note we may make changes without prior notification.
Working to Reverse the Increasing Danger of Marine Litter and Ocean-borne Microplastic

Interest in plastic, microplastic, and other types of marine litter has been increasing in Japan and around the world. Established as part of the Conference for Promotion of Measures against Articles that Drift Ashore under Japan’s Act on Promoting the Treatment of Marine Debris Affecting the Conservation of Good Coastal Landscapes and Environments to Protect Natural Beauty and Variety, the Marine Litter Countermeasure Experts Conference held its 12th meeting this past March, with Haruyuki Kanehiro, professor emeritus at the Tokyo University of Marine Science and Technology, serving as chair. During the conference, members from related ministries in Japan explained their initial budget proposals for 2018 related to policies covering marine litter countermeasures. Meanwhile, the Ministry of the Environment reported on the results of a status survey regarding the 2016 Coastal Marine Litter Disposal Promotion Act, the results of a 2016 survey related to marine litter, and some of the international trends in marine litter response. Of particular interest to the converting industry were the topics related to containers, packaging, plastic, and microplastic litter found in the ocean.

Reducing Microplastics From Fisheries and Aquaculture - Ministry of Agriculture, Forestry and Fisheries (MAFF)

At the outset of the conference, the organizing ministries provided an overview of their initial budget proposals for 2018. According to the report, the related ministries and agencies have proposed a total of 19 policies related to marine litter countermeasures (MAFF: 4, METI: 1, MLIT: 2, Meteorological Agency: 1 (no budget), Maritime Safety Agency: 2, Ministry of the Environment: 8, MAFF/METI: 1). The only new policy proposed by the MAFF, however, was the Fishery Ocean Plastic Litter Reduction Countermeasures included in the Fishing Ground Environment Improvement Promotion Program. This policy aims to investigate the amount of plastic used and discarded by fisheries and aquaculture, as well as to promote the switch to environmentally friendly materials and the reduced use of standard plastic. Moreover, the policy aims to stimulate conversation among regions that are involved in fishing about ways of reducing plastic use. Such conversations are expected to spread the use of new and existing technologies among fishermen as a way of reducing the generation of microplastic originating from fisheries and aquaculture. In this case, MAFF broadly stated that environmentally friendly materials are those that are biodegradable or natural.

In a slightly different vein, the Meteorological Agency has a long-standing policy by which it monitors plastic in the coastal regions around Japan and the North Pacific. In this case, monitoring is a secondary objective of marine weather observations conducted along fixed sea routes, meaning the policy does not have its own budget. Since 1977 this policy has set out to visually observe marine litter, including floating plastic. The observation results are published on the Agency’s website.

Given that marine litter includes driftwood washed out to sea by earthquakes, tsunamis, and heavy rains; oil leaked from ships; and other types of litter afloat or washed ashore, these 19 policies do not specifically focus on containers/packaging, plastic, and microplastic*. However, several of the policies do...
This past January, the Semiconductor Equipment Association of Japan (SEAJ) announced its FY2017–2019 demand forecasts for semiconductor and FPD fabrication equipment. These forecasts are the results of an SEAJ consensus based on a comprehensive discussion of the demand forecasts made by the SEAJ Semiconductor Marketing Research Committee and the SEAJ FPD Marketing Research Committee. The forecasts are also based on a marketing survey of 20 SEAJ Board Members and Auditing Companies. According to the forecasts, revenues for Japanese-built semiconductor fabrication equipment are expected to reach ¥1.97 trillion (+26.0% increase over the previous year) in FY2017, ¥2.167 trillion (+10.0%) in FY2018, and ¥2.211 trillion (+2.0%) in FY2019. Similarly, FPD fabrication equipment revenues are expected to reach ¥529.4 billion (+9.0% increase over the previous year) in FY2017, ¥540 billion (+2.0%) in FY2018, and ¥453.6 billion (-16.0%) in FY2019.

According to Kunio Morioka, chief executive director of SEAJ, total forecasted revenues for Japanese-built semiconductor and FPD fabrication equipment for FY2017 are ¥2.5 trillion, which is an increase of 21.9% over the previous year. In fact, revenues for FY2017 are expected to exceed the previous historical record set in FY2006. Specifically, semiconductor fabrication equipment revenues are expected to increase 26% to just under ¥2 trillion, whereas FPD revenues are expected to increase 9% to just over ¥500 billion. Semiconductor fabrication equipment will see their highest revenues in history, while FPD fabrication equipment will see their second highest revenues on record. The previous record high for FPD was set in FY2004. FY2018 semiconductor fabrication equipment revenues are expected to increase 10% over the previous year, with FPD revenues increasing by 2%. Similarly, FY2019 semiconductor fabrication equipment will likely see positive growth. FPD revenues, however, are forecast to see some braking, but

<table>
<thead>
<tr>
<th></th>
<th>2017</th>
<th>2018</th>
<th>2019</th>
</tr>
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<tbody>
<tr>
<td>Japanese-built</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Revenue</td>
<td>¥2.500 t</td>
<td>¥2.707 t</td>
<td>¥2.664 t</td>
</tr>
<tr>
<td>Growth Rate</td>
<td>+21.9%</td>
<td>+8.3%</td>
<td>-1.6%</td>
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</table>

Japanese-built equipment revenues refer to the domestic and international sales revenues posted by Japanese companies (including overseas operations)
Compiled based on the SEAJ January 2018 Presentation of the Semiconductor and FPD Fabrication Equipment Demand Forecasts (FY2017–FY2019)
FPD Production Area to Grow 5% Annually Through 2024

34th IHS Markit Display Japan Forum 2018

During the 34th IHS Markit Display Japan Forum held over two days this past January in Tokyo, IHS Markit revealed that flat panel displays (FPD) are expected to grow 5% annually in terms of area through 2024 and eventually reach a total annual production area of 267 million square meters the same year. One of the main drivers of this growth is the increasing size of today’s LCD-TV, but the emergence of new supporting players, including head mounted displays, public viewing displays, and automobile monitors, is also driving growth in production area. Meanwhile, special demand for LCD-TVs stemming from the 2018 Winter Olympics and the 2018 World Cup is also expected to drive up the number of units delivered by 5% this year. On the other hand, given the 8–10 year replacement cycle for TVs, HD (1280 × 720 pixels), analog-compliant, and CRT TVs purchased in 2009–10 are now being replaced with FHD (1920 × 1080 pixels), digital-compliant, and FPD TVs, respectively. In 2017 and 2018, specifically, older TVs are being replaced by 4K UHD (3840 × 2160 pixels), 8K (7680 × 4320 pixels), larger screen sizes of more than 50 and 65 inches, high-resolution OLED-TVs, and wide color gamut TVs. Meanwhile, IHS Markit’s outlook for TFT-LCD production capacity in 2022 ranks BOE (China) in first place with 66 million m², LG Display in second place with 47 million m², and CSOT (China) in third place with 37 million m², followed by Innolux and AUO (Taiwan) with 32 million m² each. On the other hand, LG Display holds the largest share of AMOLED area, including RGD and white OLED, at 18 million m². LG Display is followed by Samsung with 17 million m², BOE with 5 million m², CSOT with 3.4 million m², and Visionox (China) with 1.4 million m². Samsung dominated RGB AMOLED for mobile devices with 17 million m², followed by BOE with 4.8 million m², LG Display with 3.4 million m², CSOT with 1.5 million m², and Visionox with 1.4 million m². Overall, the prominent rankings held by Chinese companies in these sectors indicate the rapid progress of Chinese manufacturers.

Long-term FPD Panel and Component Delivery Volume Forecast

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<tbody>
<tr>
<td>TOTAL TFT-LCD</td>
<td>Volume 1 mil. Panels</td>
<td>2647</td>
<td>2716</td>
<td>2673</td>
<td>2611</td>
<td>2581</td>
<td>2556</td>
<td>2557</td>
<td>2571</td>
<td>2570</td>
</tr>
<tr>
<td></td>
<td>Area 1 mil. m²</td>
<td>183.2</td>
<td>192.7</td>
<td>202.8</td>
<td>211.3</td>
<td>221.2</td>
<td>225.2</td>
<td>232.8</td>
<td>238.5</td>
<td>243.8</td>
</tr>
<tr>
<td></td>
<td>Value US$100 mil</td>
<td>1009</td>
<td>950</td>
<td>916</td>
<td>906</td>
<td>892</td>
<td>878</td>
<td>868</td>
<td>858</td>
<td></td>
</tr>
<tr>
<td>TOTAL AMOLED</td>
<td>Volume 1 mil. Panels</td>
<td>416</td>
<td>446</td>
<td>606</td>
<td>738</td>
<td>826</td>
<td>884</td>
<td>925</td>
<td>949</td>
<td>967</td>
</tr>
<tr>
<td></td>
<td>Area 1 mil. m²</td>
<td>3.9</td>
<td>5.1</td>
<td>7.8</td>
<td>10.3</td>
<td>13.8</td>
<td>15.4</td>
<td>17.5</td>
<td>19.9</td>
<td>22.4</td>
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<tr>
<td></td>
<td>Value US$100 mil</td>
<td>155</td>
<td>229</td>
<td>349</td>
<td>428</td>
<td>506</td>
<td>539</td>
<td>567</td>
<td>579</td>
<td>587</td>
</tr>
</tbody>
</table>
The special transfer technology owned by FUSO that was used for this proposal enables transfer patterns to be easily applied to various materials, including cotton and synthetic textiles, without the need for an iron. In this case, the transfer sheet consists of a pattern with an adhesive surface that is sandwiched between two transparent sheets. Using this technology, Ms. Sakakibara’s proposal enables anyone to apply different combinations of transfer sheets and create new designs that can then be easily transferred to fabrics. “We wanted to make this patterned transfer sheet in such a way that it would be considered first before existing iron-on transfers. In making the proposal for this award, we felt that we needed to share ideas that went beyond the production phase, and thus included planning, development, design, and sales, for example, to create a concept that straddles these different areas. In this way, this proposal set out to serve as an opportunity to shift from a manufacturing focused organization to one that is more proposal-based as we went to work on the prototype.”
The world around us is full of industrial products made of relatively thin materials, including paper, textiles, plastic films, thin-film glass, nonwoven fabric, and metal foils. Although this variety shows that these materials are essential to our daily lives, they are also critical in furthering the development of high-tech industries that will eventually form the core of the global economy. Some examples from the IT, energy, and medical fields include optical films for flat panel displays, solid polymer membranes used in fuel cells, and artificial biological membranes for medical applications. During the manufacturing process, however, we call these materials webs.

Web manufacturing technology relies on the converting technologies of coating, laminating, and printing, as well as on web handling technology (here we include unwinding, slitting, cutting, drying, and rewinding, etc.). Among these, coating and printing have established themselves as cutting-edge technologies, for which academics have shown great interest. In contrast, web handling technology has conventionally been refined through production plant experience; although the technology itself has reached a fairly advanced level, its academic understanding is poor.

At the strong behest of the industry, the author has spent the past 20 years working to theoretically understand the physical phenomena related to web handling, and predicting and preventing the problems that occur during manufacturing. Our research has been studied widely in Japan by industries that utilize web handling technology, and has been praised for the help that it has provided in eliminating defects and developing new products.

On the other hand, we have also received strong interest from around the world in publishing our results in English given the desire to understand the strength of Japan's web handling technology. Given that the theoretical research into web handling began outside of Japan, we are elated to be able to publish an English version of our work as it will allow us to repay our debt to those who came before. At the same time, nothing would make us happier than to see this work contribute to the opening of new horizons for readers around the world involved in web handling technology.
11. Optimizing the Three Elements of Screen Printing

Until now, it has been considered important to optimize all three of the screen printing elements, namely the printing conditions, the screen mask conditions, and the ink/paste conditions. Moreover, each of these three elements consists of multiple sub-conditions, so many people still believe that it is extremely difficult to optimize screen printing. In fact, however, this is not true. Although it is true that the squeegee and other printing conditions and the screen mask conditions include many sub-conditions, most of these are *preconditions* that can be optimized and standardized to achieve high quality printing. The reason that screen printing has been considered to be complex until now is that operators would attempt to improve print quality by changing the printing parameters without optimizing many of these preconditions. As such, control relied on the experience and intuition of the operator. In other words, there was no "standard" in screen printing.

This is exemplified by the fact that there are so many types of squeegees sold today. In this way, we must ask ourselves why there are so many types of squeegees if these are not luxury goods but important industrial components? One potential answer is that many printing companies have used squeegees that match the experience and preferences of the operator without having a clear reason why the specific squeegee is used in many cases.

If the role of the squeegee is properly understood and appropriately evaluated throughout the screen printing field, the number of squeegee types used should converge on its own.

Under the concept of the "Paste Process Theory" proposed by the authors, the squeegee and other printing conditions, as well as the screen mask, are preconditions that can be optimized and standardized for high-quality screen printing so that the printing results depend entirely on the ink or paste printability. Put another way, if we have optimized and standardized the preconditions, anyone can then use an ink or paste with good printability to achieve good printing results. In fact, in this case, the printing conditions and the ink/paste conditions become the "variable factors."
1. Development Background

As shown in Figure 1, PSA labels consist of at least three laminated layers, namely a substrate, PSA, and release layer. PSA labels are used in a wide range of fields, including automobiles, electronics and electrical equipment, civil engineering and construction, health care and hygiene, packing and distribution, and lifestyle goods and stationery. Moreover, different functions can be provided to the substrate and PSA that correspond to the application, for example permanent adhesion or temporary adhesion, and functions that consider the usage environment and the application method.

The surfaces of metal products that are bent, welded, or undergo some other machining process are often coated in oil to prevent rusting, to cool the material, and as lubrication, for example. Moreover, labels printed with the necessary information for managing the storage and processing of these types of metal products are applied to their surfaces. When conventional labels are applied to an adherend that has been coated with oil, however, the labels do not have a sufficient level of adhesion strength to remain attached, and will peel off or shift. As such, label application requires complex preparation work that reduces the work efficiency, such as degreasing the area to which the label will be applied with an organic solvent. In this session, we will detail a PSA design concept and the PSA performance that is able to achieve a high adhesion strength even when the label is applied to an adherend coated with oil that has not been degreased.

2. PSA Label Design for Oily Surfaces

2.1 Design Concept

In this case, we first selected a stainless steel plate (#600) as the adherend, which we then coated with engine oil to a weight of 3 g/m². Next, we applied a general-purpose PSA label and measured the adhesion strength after 24 hours. Table 1 shows the results. Although the results indicate a high adhesion strength on clean surfaces, we observed a significant decline in the adhesion strength against oily surfaces. Moreover, we observed residual oil upon checking the surface of the adherend after removing the label. This residual oil indicates that oil exists at the interface between the PSA and the stainless steel. We assume that the reason this type of PSA label does not have a sufficient adhesion strength on oily surfaces is because the contact between the PSA and the adherend is insufficient.

![Table 1 General-purpose PSA Adhesion Strength Against Oily Surfaces](image-url)

*24 hours after application
4. Closing

This type of PSA label was first development for deployment to metal products, but we expect its use to spread to a wide range of fields beyond industrial oil use, including to use in the food industry where cooking oil is used and the cosmetics industry where cleansing oils and aromatic oils are used. Moreover, this PSA label also offers the potential to help improve work efficiency by reducing the degreasing process time.

Currently, the OT Series consists entirely of strong adhesion types, but there is also a demand for re-stickable types that can be removed after application to oily surfaces and reapplied when necessary. Therefore, we are currently working on the development of a PSA that meets the performance demands for peeling and reapplying labels on oily surfaces as we investigate ways to pioneer new markets.

References

2. Patent 2015-183053
5. LINTEC Corporation Website
   http://www.lintec.co.jp/products/label/printing_materials/brand/oil.html

4.3 Nano-bubble Properties and Control Technology

As seen with large-scale integration (LSI) and liquid-crystal plasma display devices, the development of the electronics industry of late has been remarkable. Although many process technologies must be brought together and optimized to produce these types of electronic devices, there is a significant need to further develop photolithography given its direct relationship to the device design standard.

As shown in Figure 4.43, the photolithography process consists of multiple steps, including mask making, resist coating, pre-baking, pattern exposure, alkali development, and pure-water rinsing. First, the underlying substrate is etched using the developed resist pattern as an etching mask to form the metal interconnects. Etching includes both dry and wet etching processes. Next, the patterned resist mask is stripped. Plating processes have also been developed to enable the lift-off process, which use plating to form the metal interconnects in the resist pattern openings in place of etching.

As shown above, there are various wet processes involved with photolithography, and development defects, etching defects, and plating defects can occur if bubbles adhere to the resist patterns openings in these processes. Figure 4.44 shows an actual example of a bubble that has adhered to a resist pattern. In this case, the bubble that has adhered to the pattern is stable.

As shown in Figure 4.45, smaller bubbles will adhere to the resist pattern at a greater rate. In this session, we will look at

![Figure 4.43 Lithography Process](image)

![Figure 4.44 Nano-bubble Adhered to a Resist Pattern](image)
Coating


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6. Status of Next-generation Secondary Battery Separator Technology Development

In describing the technical trends being seen in the development of separators for next-generation secondary batteries, we will cite and summarize the reports by Akira Yoshida in a new work titled "Cutting-edge High Performance Paper," edited by the High Performance Paper Society, Japan, for each technological issue.20

6.1 Separators Made of Materials Other Than Polyolefin
The lithium-ion battery (LIB) separators used today are made of porous polyolefin membranes. In contrast, there has been significant development of next-generation battery separators made using materials besides polyolefin.

One of the major aims in using materials other than polyolefin is to improve heat resistance. Some of the materials that have been proposed for this purpose include heat resistant rubbers (silicone rubber, fluorine rubber, etc.) and heat resistant resins containing aromatic polyamide, liquid-crystal polyester, and polyoxyalkylene resins. The common result of utilizing the heat resistance of these rubbers and resins is a separator with an improved high-temperature stability and high-temperature safety, a better ion permeability, and a higher current discharge property (rate property).20

6.2 Separator Surface Inorganic Layer Coating
More recently, many patents have been filed for technologies that coat an inorganic layer over the surface of the separator.

One of the issues with polyolefin separators is that the separator will rupture and lose its current breaking effect if the temperature continues to rise after shut-down. One method of solving this problem that has seen a significant amount of technological development is to coat a porous inorganic layer over the surface of the separator. In short, coating a porous heat-resistant layer consisting of inorganic materials over the surface of a polyolefin separator that has a shut-down capability prevents rupturing at high temperatures.

Inorganic materials that have been proposed for this purpose include glass materials, oxidation-resistant ceramic particles, clay minerals, metal salts, and platelet fillers. The most common inorganic materials include alumina, silica, titania, and magnesia. The binder resins used to form this inorganic layer include heat-resistant aromatic polyamide resin and polyimide resin, for example. The common results of forming an inorganic layer using these materials are known to be improved high-temperature safety because the separator does not rupture at high temperature and improved safety during overcharging. Moreover, the surface of the separator that comes in contact with the cathode also has an improved stability because the surface is formed of an oxidation-resistant inorganic material layer.20

6.3 Inorganic Material Doped Separators
In this case, the surface of the separator is not coated with a heat-resistant inorganic material. Instead, this new technology aims to improve the separator properties by mixing the separator material itself with inorganic material.

Mixing the separator material with inorganic material both improves the heat resistance and achieves a better ion permeability. The inorganic materials used here include those with oxidation resistance and electrolyte resistance, where
On Writing This Series

Putting All Our Hopes in Pressure-sensitive Tape

Some 15 years ago, I had the pleasure of writing an overview series on pressure-sensitive adhesive (PSA) tape for the Japanese language version of this magazine titled “Pressure-sensitive Adhesive Tape Science and Industry.” Although it is somewhat long, I would like to reprint the introduction to the original series here.

“Given the simplicity with which they can be handled and their practical ability to function as an adhesive, PSA tapes has been used widely in fields ranging from electrical and insulation use, the electronics industry, sealing, surface protection, bundling, display and decoration, nameplate securing, paint-masking, printing, packaging, office applications, and medical-use to standard household-use. In this way, the versatility of PSA tape is like the Thousand-armed Bodhisattva of Compassion in traditional buddhist teachings.

The Thousand-armed Bodhisattva of Compassion is a highly intelligent buddhist deity with the ability to listen to prayers for help, judge the situation of the prayer offerer, and provide help suited to each individual. Similarly, PSA tapes respond to an extremely wide range of demands, but a highly intelligent PSA tape with a performance that is optimized to respond to every situation, like that of the Thousand-armed Bodhisattva of Compassion, has yet to be developed. Although a single PSA tape that forms interfacial bonds with different adherends as a result of an inclined structure or the migration of functional groups to the interface will likely reach the market one day, as of now different types of PSA tapes are required depending on the adherend and usage conditions. PSA tape functionality, however, is excellent and is able to meet the demand for instantaneous adhesion (tack) while realizing an adhesion strength that rivals that of adhesives.

In this respect, PSA tape may one day meet all our needs for adhesion, and in some cases this era has already arrived. For example, PSA double coated tape is now used as a supporting material for joining parts, and today there are even some electronic devices that would not have been possible without PSA tape. In these cases, PSA tape provides value and functionality that cannot be realized with adhesives, indicating that PSA tape has become a critical compositional element.

In this series, we will cover the versatility (diversity?) of PSA tape science and industry to provide the reader with the ability to read the technological and market trends in PSA tape. Throughout this series, readers will also find answers to many of their questions about where this type of performance originates and why PSA tape is able to function as an adhesive. However, my own thoughts on how PSA perform when considering them in terms of adhesion, the interface, and bulk, is that the PSA bulk has a significant impact on adhesion despite the fact that PSA will not adhere to a surface that they cannot wet. In
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