

EDI Promotes Top Executives After 5 Years of Success

Following five years of strong growth initiated by a management buyout, EDI has appointed a new team to direct its worldwide operations, and promoted to chairmanship positions the four executives who led the buyout. The company also promises a strategy of expansion that will include geographic and technological diversification and possible acquisitions of new businesses.



John A. Ulcej

The new president of EDI is **John A. Ulcej**, who was one of the participants in the management buyout. He also assumes the position of vice chairman in charge of technology. Until now

Ulcej has been the company's executive vice president in charge of engineering and technology and in addition has been directly involved in the management of EDI's manufacturing operations. **Dennis S. Paradise**, who until now was EDI's North American sales manager, has been named vice president of sales and marketing.

EDI has also promoted **Sam G. Iuliano**, previously the company's product manager, to the position of technology manager; **Scott G. Smith** to global aftermarket manager, in charge of rework and spare part sales worldwide; and **Greg J.** *Continued on P. 2.*

Acquisition of QMI Helps EDI Provide Innovative Products and Services

A newly acquired manufacturing facility less than a mile from EDI's world headquarters plays a key role in a new strategic initiative by the company to offer a wider array of products and services to plastics processors and web converters. The initiative coincides with the establishment of a new top-management team following several years of strong growth for EDI (see article at left).

EDI has purchased the 19,600 sq.ft (1,820 sq.m) facility from Quality Machine of Chippewa Falls, Inc. (QMI) and transformed it into a Technology Center. It is the new home for much of the work of EDI's New Markets Group, which is charged with diversifying the company into new technologies. In addition, EDI has dedicated a 5,000-sq.ft. (465 sq.m) portion of the facility to three process laboratories that companies can rent for carrying out their own trial runs.

"A central concept of our strategic plan for EDI is the continuous development of new

products that help our customers compete in the global marketplace and are based on technologies that we are uniquely qualified to implement," says Timothy C. Callahan, EDI's CEO and newly appointed chairman. "While in some cases these technologies represent departures from our well-known flat die systems, they all represent a natural progression that builds on our engineering expertise and capabilities for precision machining."

EDI has promoted John A. Ulcej to be the new president of the company as well as vice chairman in charge of technology. Mark D. Miller has assumed the new position of manager of the company's New Development Group, responsible for directing a team charged with developing these products and services:

- **Advanced flat die systems**, such as EDI's "layer multiplier" system for producing micro-layer film of standard overall thickness but with dozens of layers; technology for producing *Continued on P. 2.*



PROCESS LABS FOR RENT: NEW EDI SERVICE. This slot die coating system is one of three laboratories that EDI has installed in its new Technology Center. The others are for cast film and extrusion coating/laminating, respectively. Instead of tying up their own full-scale production lines with trial runs, companies can rent these facilities and use them under protection of a confidentiality agreement with EDI.

Inside...

- ◆ EDI Joins New Era of Solar Electricity
- ◆ Liberty® Dies Offer New Capabilities in Slot Die Coating

Continued from P. 1. environmentally friendly foam board that incorporates new types of foaming agent; and tooling designed to process the new bioplastics now entering the marketplace.

● **Additional process capabilities.** Building on a longstanding specialty of QMI, EDI now offers full rework services for blown film dies. QMI's founder and president, Tom Przybylski, has joined EDI as a consultant serving blown film rework customers. EDI has also developed die heads for coextrusion blow molding.

● **Liberty® dies and WetWare™ modular coating systems** for slot-die coating, patch coating, and fluid-delivery. The Liberty fixed-lip slot die coating system enables converters to produce very thin and optically clear coatings while maintaining coat weights within precise tolerances (see article on p. 6).

● **EDI Process Lab Services.** The trial-run laboratories now installed in the new Technology Center are for cast film, extrusion coating and laminating, and slot die

coating, respectively. Each lab is a fully equipped production cell that companies (whether EDI customers or not) can rent.

Renting Process Laboratories Makes Good Economic Sense

"EDI is introducing its new processing labs at a time when outside trial-run facilities are increasingly scarce, and processors are forced to use their own full-scale production lines at the cost of lost output and high levels of material waste," says Christopher W. Curtin, vice chairman in charge of developing strategic market and commercial opportunities. "These companies don't have to be EDI customers to take advantage of our facilities, and they can carry out their lab work in the strictest confidence, affirmed in a nondisclosure agreement that we sign with every company that rents our labs."

The laboratories are for these processes:

● **Cast film extrusion.** This facility provides an opportunity to test options in resins, multilayer structures, feedblock

settings, and other variables.

EDI's coextrusion line produces film in the 2 to 32 mil range. Components include one 0.75-in. (19 mm) and two 1.0-in. (25 mm) extruders, an 8-in. (200-mm) die, 3- and 5-layer feedblocks, and a 10-in. (250-mm) wide roll face. Also available is innovative "layer-multiplier" tooling that yields dozens of layers in film of standard overall thickness.

● **Extrusion coating and laminating.** This small but complete converting line makes it possible to experiment with various polymers, substrates, and web structures and test out EDI's systems for fast width changes and edge bead control. The coating line accommodates web widths up to 380 mm and line speeds up to 122 m/min.

Besides a 2.0-in. (51 mm), 28:1 L/D extruder and EDI's Ultraflex® coating die, the lab includes: single-position brake unwind, corona pre-treater, coating nip (317.5 mm chill roll), two spare chill rolls, air knife, post-conditioning *Continued on P. 3*

EDI *continued from P. 1.* **Raleigh** to operations manager, with responsibility for manufacturing activities in Chippewa Falls.

In May of 2003, three executives besides Ulcej led the buyout of EDI, purchasing the company in its entirety from a Minneapolis-based bank: **Timothy C. Callahan**, who has been president and CEO of EDI, now becomes chairman and CEO and will be responsible for strategic growth initiatives. **Christopher W. Curtin**, until now executive vice president of sales and marketing, becomes vice chairman in charge of developing strategic market and commercial opportunities. **Ronald J. Kuhnen**, the company's CFO, retains this title while also assuming that of vice chairman.



Dennis S. Paradise



Gary D. Oliver



Sam G. Juliano

Shortly after EDI announced these promotions it was joined by **Gary D. Oliver**, a renowned authority in extrusion who previously spent 18 years with Cloeren Incorporated—like EDI a supplier of flat die systems. His last position at Cloeren was that of senior corporate scientist. At EDI, Oliver serves as vice president of technology, in charge of the R&D program. He draws on nearly four decades of experience in the polymer processing industry and is widely acknowledged for his innovations in extrusion, including contributions in flat-die coextrusion and barrier packaging.

'New Ways to Add Customer Value'

'New Ways to Add Customer Value'

Between the buyout in 2003 and the end of 2007, the company's average annual sales growth percentage was in the double digits, according to EDI president John Ulcej, and growth continued in 2008.

"The secret to EDI's growth has been a three-fold strategy of stringent quality assurance, technological innovation, and helping customers to expand productivity by finding new ways to increase extruder 'up-time,'" says Ulcej. "One of our most prominent innovations has been the Contour Die™, whose unique shape is the key to reducing the downtime for lip adjustment required with each new product run, enhancing gauge profiles, and yielding a uniform layer structure in coextrusion. It is now in great demand

worldwide and has become our standard design for all cast film dies."

Further evidence of EDI's dynamism is the undertaking of three major initiatives in the past year, according to Ulcej. Early in 2007, the company established EDI Precision Dies (Shanghai) Co., Ltd., a Chinese subsidiary to provide rework, technical support, and spare parts. Soon after, EDI purchased Liberty Coating Systems, a well-known builder of slot coating dies, and incorporated the Liberty® range of dies into its slate of offerings (see article, p. 6). Then in December 2007 EDI purchased a 19,600 sq.ft (1,820 sq.m) facility from Quality Machine of Chippewa Falls, Inc. (QMI) and transformed it into a Technology Center, including three process laboratories that companies can rent for cast film, slot die coating, and extrusion coating and laminating trials (see article at right on p. 1).

These moves are a sign of things to come, according to chairman and CEO Tim Callahan: "EDI will pursue a strategy of expansion with an emphasis on finding new ways to add customer value," Callahan said. "The future for EDI is likely to include more acquisitions, further geographic diversification, and entry into technological fields that represent natural progressions from our established expertise." ◆

Global Report



NEW MANAGEMENT FOR EDI GmbH. EDI has appointed

Ina Schmidt to be the general manager of its European subsidiary. She draws



Schmidt

on 18 years of experience working with EDI's European customers, first on the staff of the company's onetime representative in the region, the German firm Extrusion Dies



Genau

Service (EDS), and then as a manager with EDI GmbH when the subsidiary began operations early in 2004. "Ina has amassed a wealth of experience with EDI in customer service, management of rework and new-die projects, and business administration," says president John A. Ulcej. Also promoted is **Oliver Genau**, who becomes sales manager after serving as chief operator and shop supervisor since 2005. Based in Reichshof-Wehrath, EDI GmbH is equipped

with extensive machining capacity and provides rework service, technical support, and spare parts to EDI customers throughout Europe.

EDI APPOINTS TWO REGIONAL SALES MANAGERS.

The new manager for the the southern-tier states from Arizona to Virginia is **Rick Forbis**, who has 23 years of experience in plastics equipment sales. Now covering New York, New Jersey, Pennsylvania, Maryland, Delaware, the New



Forbis



Wise

England states, Ontario, Quebec, and the Maritime Provinces is **John Wise**, who brings nearly 20 years of experience in capital equipment sales and marketing. "Both Rick and John have spent nearly all of their careers focusing on extrusion," notes Dennis S. Paradise, vice president of sales and marketing. "In fact, they will be familiar faces for many of our customers."

Continued from P. 2 rolls, edge slitters, single-position winder, and two-loop water recirculation system.

● **Slot die coating.** Customers can use this facility to test alternative fluid formulations, coating/substrate combinations, and other parameters without tying up their own equipment or using large quantities of raw materials. Practitioners of roll coating can explore the advantages of slot die coating before investing in a commercial-scale system.

EDI offers two slot-die alternatives: Ultracoat® II or V adjustable-lip coating heads with support system and a range of lip inserts; or WetWare™, a complete trial-size coating module incorporating a Liberty® fixed-lip coating head. The coating line accommodates substrates with a maximum width of 12 in. (300 mm) and rolls with nominal 3-in. (75 mm) ID cores, maximum unwound diameters of 12 in. (300 mm), and maximum rewind diameters of 14 in. (350 mm). Other components include four different fluid pumps, a polished chrome-plated steel backing roll, and three hot air dryers.

For a new brochure on EDI Process Lab Services, contact sales@extrusiondies.com.

For more information, visit www.extrusiondies.com and click on "Process Labs." ♦

Technoscope continued from P. 5

could not be applied simultaneously with any of the others. One possible structure, from sun-facing side to back side, might look like this: PET film with UV-block coating; EVA protective layers; PET barrier film; a multi-component PV sandwich; a spacer film; a reflective film; an aluminum foil layer; and an EVE back layer. The PV sandwich would include amorphous silicon semiconductor,

electrode, and other layers, including special coatings.

Flat Dies Provide Many Solutions to Solar Industry

The solar-energy potential for film, sheet, and coatings that can be produced or applied with flat dies is remarkably diverse. To get a sense of the sheer breadth of possibilities, consider the range of materials offered



ALREADY IN USE FOR SOLAR ENERGY, patch-coating systems like this, centering on EDI's Liberty® slot dies, apply UV-blocking, anti-reflective, and other functional coatings on substrates in discrete solar panels. For thin-film solar systems, Liberty dies can be employed for continuous lane coating, and two dies can be configured for coating the same substrate on both sides simultaneously and in register.

by a company like DuPont, which has an entire program dedicated to photovoltaic applications. DuPont supplies multiple front sheet materials, encapsulants, metallization pastes, substrates, structural materials, and back sheet films for both thin film and crystalline-silicon types of solar system (see illustration, p.5). Other plastics raw material suppliers also have programs focused on the solar industry.

EDI builds dies systems for processing virtually all of these material types:

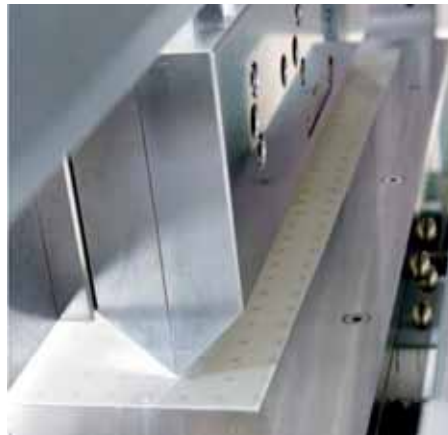
- **Liberty® slot dies.** These fixed-lip die systems are well suited for patch coating and lane coating, as well as continuous coating, because material is pre-metered and then applied by being drawn down in thickness as it passes from the die exit to the substrate. Optically clear coatings as thin as 1 micron are possible, and edges at the 'start' and 'stop' positions are clean and well defined.

Liberty dies are available for trial runs as part of a complete trial-size coating module called WetWare™ that enables converters using conventional roll coating processes to test-run slot die coating in their own plants.

- **Ultracoat® slot dies** have a flexible lip, whose adjustability is the key to controlling the lip gap profile and thus the coat weight. This is an important advantage in applying slurries such as those used for coating flexible battery or photovoltaic components, since slurry viscosity changes over the course of a production run and the die needs to be adjusted accordingly. The flexible lip of the die can be adjusted manually or by means of EDI's Autoflex® gauge profiler. The die lip is used to "wipe" the coating fluid onto the substrate. The minimum wet-coating thickness achieved is typically 10 to 12 microns.

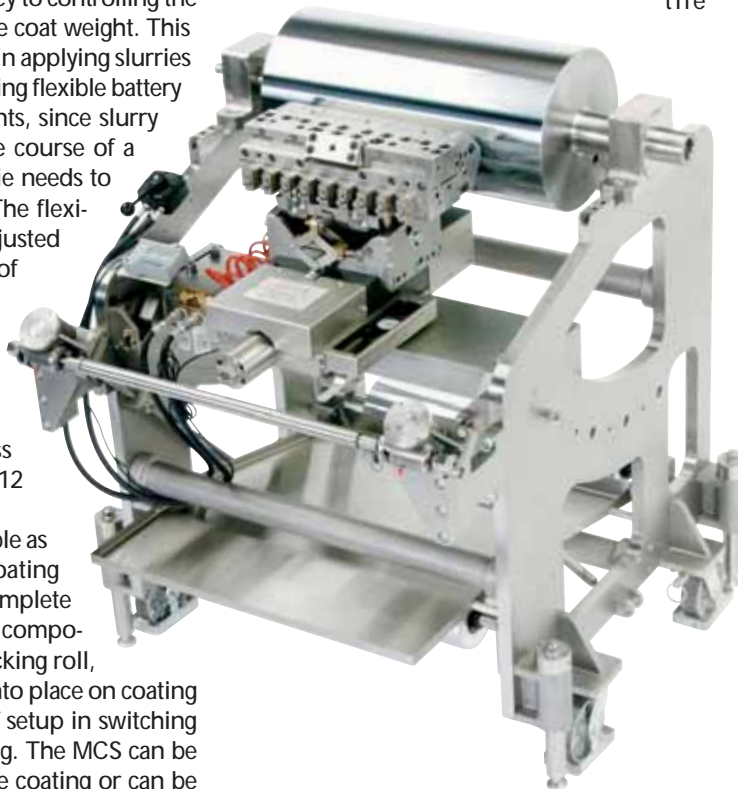
Ultracoat dies are available as part of EDI's Modular Coating System (MCS). This is a complete coating station, with all components from idler roll to backing roll, that can simply be rolled into place on coating lines, eliminating hours of setup in switching from roll to slot die coating. The MCS can be used to "test drive" slot die coating or can be implemented as part of a commercial scale operations where switching from conventional coating to slot die coating and back again is desired.

- **Contour™ Dies for cast film** are particularly valuable for critical optical and electrical applications because they eliminate the transverse cross-sectional distortion called "clamshelling," often encountered with con-



VERY THIN, OPTICALLY CLEAR COATINGS required in solar applications are possible with this Liberty® slot die because of the way it applies coating materials. Instead of being wiped onto the substrate, the material is drawn down in thickness as it passes from the die exit to the substrate.

ventional dies, and yield a uniform layer structure in coextrusion. The cause of both clamshelling and interlayer distortions is the deflection of the die bodies (the upper and lower halves of the die) caused by the



SLOT DIE TEST RUNS SIMPLIFIED. EDI's Modular Coating System, shown with an Ultracoat V slot die, can simply be rolled into place on coating lines, eliminating hours of setup in switching from roll to slot die coating. Since slot die coating is still new to many companies in the solar energy industry, this system makes it easier to 'test drive' a slot die. In addition, it can also be used commercial for fast changeovers between roll and slot die coating.

very high pressure from molten polymer in the flow channel between the bodies. By reducing or eliminating this deflection, the die makes it possible for precise fine-tuning of film gauge to be carried out quickly at the die lips through use of EDI's Ultraflex® or Autoflex® gauge profilers. Unlike previous "constant deflection" dies, the Contour die achieves this dimensional control without sacrificing flow streamlining and throughput. The system has been so successful that it is now standard for all EDI cast film systems.

Companies seeking to develop flat-die processes for solar energy applications, whether they involve discrete panels or continuous webs, can rent one of three process laboratories at EDI's Chippewa Falls, Wisconsin, U.S.A. world headquarters site. These are fully equipped pilot operations for cast film, slot die coating, and extrusion coating, respectively (see QMI article on p. 1).

In an era when sourcing of fossil fuels has become a security issue and finding alternate energy sources is seen as a key to combating climate change, solar-generated electricity is one of the most promising alternative energy sources. The innovations necessary to reap its full benefits will generate new companies and new jobs. EDI is prepared to work with innovators to help make their solar-energy visions a reality. ♦

EDI Will Be There...

Arabplast (Jan. 11-14, Dubai): EDI to exhibit at the stand of its agent ACIS Plastic Technologies.

Plastindia (Feb 4-9, New Delhi): EDI will exhibit in Hall 12, Stand E04.

SPE International Polyolefins Conference (Feb 22-25, Houston): EDI will have a tabletop exhibit.

International Battery Seminar & Exhibit (Mar. 16-18, Ft. Lauderdale, FL): EDI will have a tabletop exhibit.

Plast (Mar. 24-28, Milan): EDI will exhibit.

Extrusion Troubleshooting Conference (April 2, Charlotte, NC): EDI will be presenting and will have a tabletop exhibit.

TAPPI European PLACE Conference (May 18-20, Budapest): EDI will have a tabletop exhibit.

Chinaplas (May 18-21, Guangzhou): EDI to exhibit at, Stand 11.1G21.

CMM International (June 2-4, Chicago): EDI to exhibit at Booth 1502.

NPE2009 (June 22-26, Chicago): EDI to exhibit in North Hall, Booth 85007.

Technoscope continued from P. 8

Conventional solar modules are rigid flat-plate panels with several layers enclosed within a rectangular frame: 1) The top or sunward layer, often called a front or cover sheet, can be made of glass or plastic. 2) Inner layers consist of solar cells, typically protected by a plastic encapsulant, and a conductive grid or metal foil layer that closes the electrical circuit. And 3) a glass or plastic back sheet that provides support or protection from the elements. Since there is always some space between the PV cells in a module that allows light to fall directly onto the back sheet, a reflective coating on this sheet is useful for reflecting photons back to the cells.

EDI has supplied slot die coating systems that apply UV blockers, protective hard coats, antireflective substances, and other functional materials to the polycarbonate, EVA, or aluminum foil layers in these PV modules. For example, because the silicon layers inside are highly reflective, the underside of the cover sheet is typically coated with an antireflective material to reduce photon losses. EDI supplies several solar manufacturers with Liberty slot die systems that apply such coatings to glass or polycarbonate cover sheets.

This use of Liberty slot dies is called "patch coating." In this type of coating, materials are applied intermittently, at controlled intervals along a continuous web or onto discrete sheets or panels. In an automated process,

special valves start and stop coating application; this action is coordinated with movement of the die toward and away from the substrate to promote a clean break in the coating and prevent formation of edge beads. Like other slot die systems, patch coaters are closed systems that apply coating materials in amounts pre-determined by the action of a pump that meters material into the coating head.

Few solar manufacturers have been aware of slot die coating and its advantages over other coating methods, such as spray, roll, and spin coating. In comparison with these systems, slot dies provide greater control over coating weight and distribution because they are closed systems into which coating material is pumped at closely pre-determined rates; in turn this greater control makes possible thinner coatings. Since material in the conventional systems is exposed to the atmosphere prior to being applied, slot dies also present less risk of contamination and reduce emissions into the workplace.

**Tomorrow's Solar Systems:
Continuous Thin Film**

As an offshoot of the semiconductor industry, the solar electric industry until now has had little contact with the roll-to-roll, continuous-web production methods familiar to EDI and its customers. The ultimate reason for this is the batch process used to

fabricate the PV material that is used in most of today's solar applications: crystalline silicon semiconductor. It must literally be sliced into wafers, which are then paired to form cells. The discrete rigid panels that are today's most recognized solar electrical devices reflect the need to interconnect many discrete cells to form a module.

Increasingly the solar energy industry is looking to continuous thin-film technology as the key to bringing down the manufacturing costs of electric systems. What makes such roll-to-roll production possible is the replacement of rigid crystalline silicon with amorphous silicon supplied in a high-solids slurry that can be deposited onto a substrate by means of web-converting processes such as slot die coating. Though lower in PV efficiency than crystalline silicon, the amorphous semiconductor material is less costly, and this, combined with the automation made possible by roll-to-roll production, can bring down the cost of solar electricity generation. At the same time, the more extensive installations made possible by the thin film form helps offset the losses in PV efficiency.

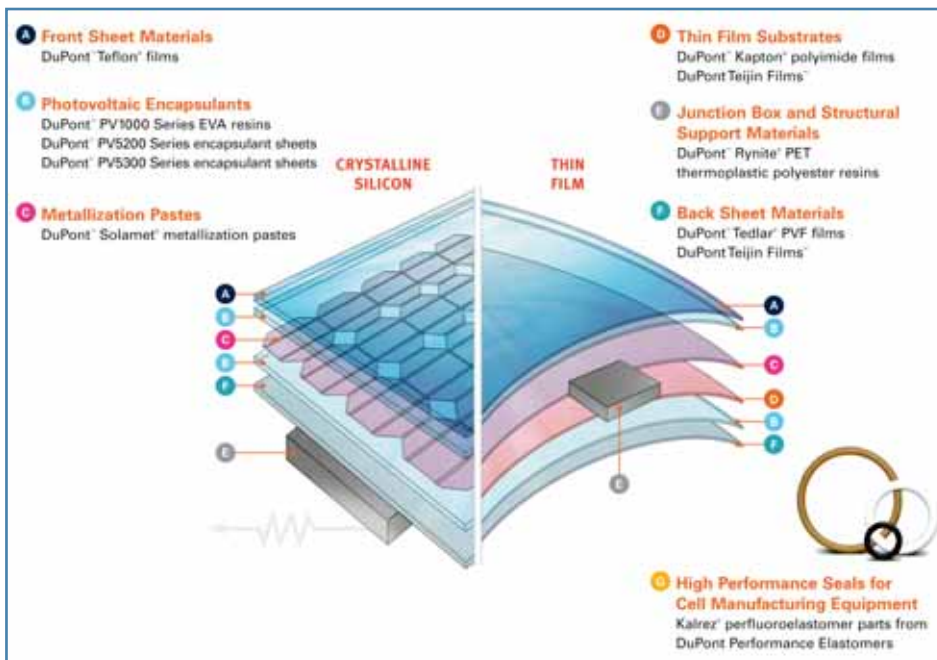
One of the ultimate goals of thin-film solar technology, for example, is to produce PV film in large quantities of rollstock that can be sold to general contractors for installation atop houses and commercial buildings.

PV systems like these are a logical next step for EDI, which has already refined techniques for applying conductive slurries onto a range of substrates in high-specification applications, including flexible batteries. We have, for example, developed patch-coating techniques for simultaneously applying anode and cathode slurries to both sides of films or metal foils for lithium ion batteries. And for continuous-web products like thin film solar systems, we have developed "lane coating" methods for applying conductive and semiconductive materials.

While patch coating involves uncoated intervals in the transverse direction, lane coating leaves continuous uncoated lanes in the machine direction, alternating with coated lanes. Using two dies, EDI has developed systems for simultaneously coating two sides of a substrate with up to 48 separate lanes, each 20 mm wide and separate from other lanes by 10 mm gaps. The coating fluid has been applied in register on both sides—a critical requirement for preventing short circuits.

A typical thin film solar system would include polymer films, foil substrates, and up to six active coatings, each of which would require curing and thus

Continued on P. 3



OPPORTUNITIES FOR FILMS AND COATINGS. This schematic highlighting DuPont products for photovoltaic systems shows that both conventional rigid-panel (crystalline silicon) and new flexible film solar systems are complex, multi-layer devices that require a wide range of films, coatings, and other materials. (Photo: DuPont)

Liberty® Dies Offer New Capabilities in Slot Die Coating

Versatility is the watchword for the Liberty® range of slot coating dies acquired by EDI with its purchase last year of Liberty Coating Systems.

Liberty die systems enable converters to produce very thin and optically clear coatings while maintaining coat weights within close tolerances, notes Mark D. Miller, manager of EDI's New Development Group. In addition, they can be adapted for a broad spectrum of single- and multilayer applications and specialty techniques like "stripe" and noncontinuous "patch" coating. And Liberty dies are available in complete trial-size coating modules called WetWare that enable converters using conventional roll coating processes to test-run slot die coating in their own plants.

"EDI acquired the Liberty line with the intention of offering converters the broadest possible range of slot die coating options," says Miller. "Both our Ultracoat® adjustable-lip slot dies and Liberty fixed-lip systems provide more precise, economical, and productive alternatives to roll coating."

Upon EDI's purchase of Liberty Coating Systems, Tom Johns, formerly design and application engineer with Liberty, joined EDI as a product manager.

Unique Mode of Coating Ensures Close Tolerances

Unlike systems that wipe coating fluids onto the substrate, EDI's Liberty system centers on coating heads with relatively large lip gaps (e.g., up to 3 mils) from which fluids can be drawn to coatings as thin as 1 micron, a reduction of as much as 98%. In commercial uses involving many fluids and substrates, Liberty slot dies maintained cross-web coat weight tolerances within 3 to 5% even at coating thicknesses of only 0.00008 in., or 2 microns.

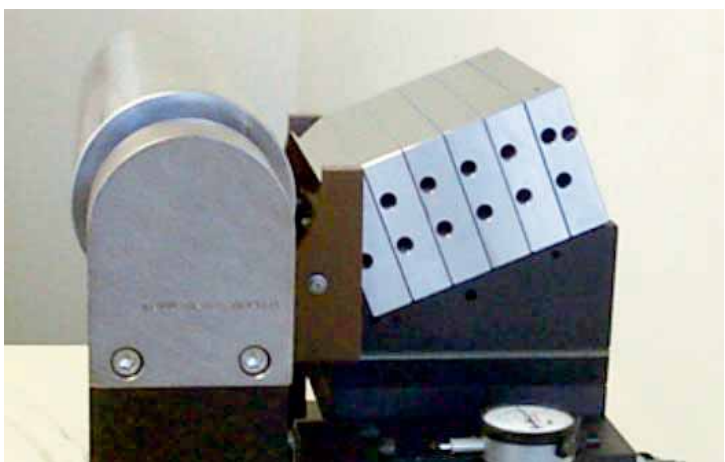
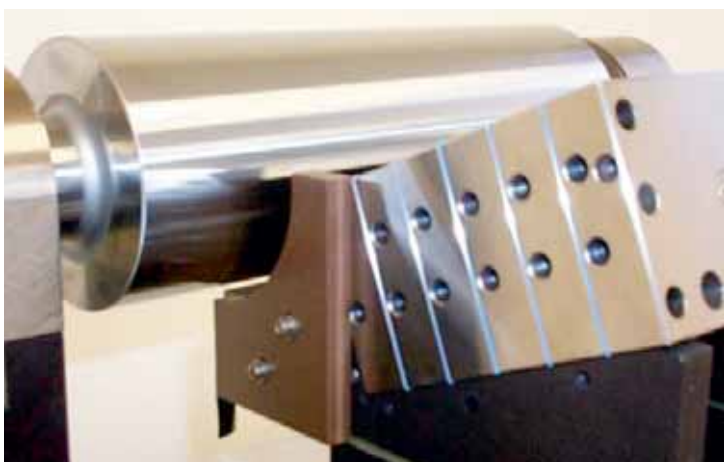
While the lip of the Liberty die is fixed,

coating thickness and width can be varied by means of interchangeable shims. For coatings of more than one layer, two options are available:

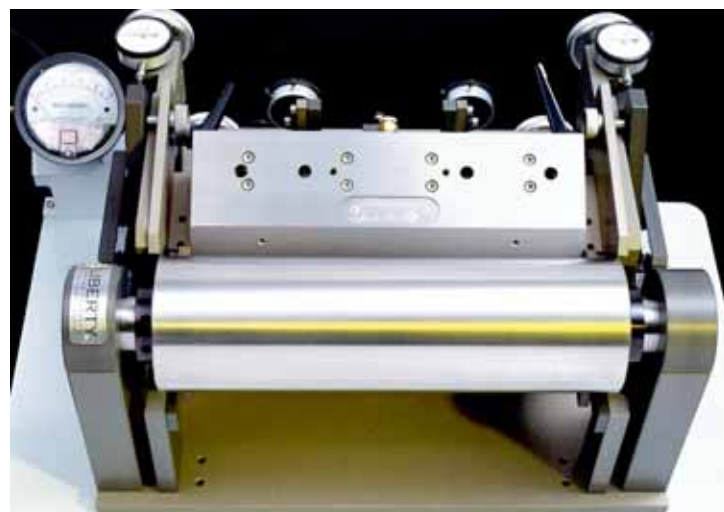
- **Dual- and Triple-Slot Dies.** These dies include options for conversion to single-slot (i.e., single coating layer) dies. An accompanying photo of a dual-slot die, for example, shows a wedge-shaped center body that adds a second slot but can be removed, leaving the two die bodies that are standard for mono-layer coating.

- **'Slide' or 'Cascade' Dies.** For applications of up to ten layers or even more, these dies are made up of an array of die bodies set at an angle to the web. The array provides multiple slots. The coating fluid from the slot farthest from the web becomes the topmost layer; as this fluid slides down the face of the die toward the web, additional coating layers flow in beneath the top layer; the fluid from the slot closest to the web becomes the bottom layer.

EDI can produce single-slot Liberty dies for coating widths of up to 120 in. (3 m) and wet coat weights from less than 1 to 254 microns (10 mils). Liberty dies typically are shipped as part of a system including positioner (to maintain a precise orientation to the backing roll), vacuum box (to remove air trapped between the coating as it exits the die and the approaching substrate surface), and fluid delivery equipment (filters, pump, drive, and controller). As an option, *Continued on P. 7*



MULTILAYER SLOT DIE COATING. *Top.* View from rear of Liberty® cascade die shows precision backing roll and array of die bodies set at an angle with respect to the web, providing multiple slots from which different coating fluids exit. *Bottom.* Side view of cascade die shows why it is also called a slide die. Fluid for topmost layer of coating exits from the slot farthest from the web (in photo, the slot farthest to the right); as it slides down the face of the die towards the web, additional coating layers flow in beneath the top layer; the fluid from the slot closest to the web becomes the bottom.



EASY WAY TO TEST-RUN LIBERTY DIES.

Wetware™ is a complete trial-size coating module that enables converters using conventional roll coating processes to test-run slot die coating in their own plants.

Redesign of EDI Website Reflects Expansion on Many Fronts

A wealth of new information about products and services from Extrusion Dies Industries, LLC (EDI) appears in a completely redesigned website now online at the company's www.extrusiondies.com address.

"In the past five years, EDI has introduced innovative die systems and services, expanded its manufacturing and product capabilities through acquisitions, opened service centers in Europe and China, and made new additions to its international network of agents," says Dennis S. Paradise, vice president of sales and marketing. "We have completely rebuilt our website to encompass these changes and provide new resources for current and prospective customers."

Some of the enhanced features of the website focus on:

- **Die systems.** Systematic and detailed information on every type of die, feedblock, slot die coating system, and auxiliary equipment built by EDI, arranged in an easy-to-navigate format.
- **Markets.** Each market has its own page, with links to relevant EDI die systems and services.
- **Aftermarket services,** including technical support, overnight on-site service by a Rapid Response Team, wholly-owned regional service centers, worldwide availability of die rework, access to spare parts (including online ordering), and availability of process laboratories at EDI headquarters that customers can rent for trial runs and product development.
- **Documents in up to ten languages,** including product literature, technical reports, news releases, and fact sheets for the press.



EASY TO NAVIGATE. New EDI website at www.extrusiondies.com has pictorial icons that serve as links to new pages with detailed information. Each of the nine icons on this "Extrusion/Coextrusion Dies" page, for example, leads to a product description with more photos, or to a categorized listing of product subcategories with links to each.

Continued from P. 6 EDI can incorporate in the positioner a die handling mechanism, called a "hinge," that enables operators to quickly split and clean the die, change shims if needed, and rebolt the die bodies. As with all other EDI dies, rework services are available to restore used dies to like-new condition.

Existing applications for Liberty dies include adhesives of many types (including optically clear), batteries, ceramic capacitors, decorative surfaces, electronic display media, filter membrane castings, flooring, fuel cells, health and beauty wipes, labels, laminate layers for printed circuit boards, magnetic slurries, medical products, photoresists, premium papers, pressure sensitive tape, solar cells, superconductors, tear tape, and window films.

For more information on Liberty dies, visit www.extrusiondies.com. ◆

In Memoriam: John Ryan



EDI mourns the loss of former sales and product manager John W. Ryan, who died in August at the age of 73.

John was widely respected as a leading technical and marketing expert in the field of extrusion and was a key member of our team for many years. He had a colorful personality, was well liked by customers and colleagues, and will be sorely missed by his friends at EDI and around the world.

John Ryan joined EDI in 1990 and worked from his office in Topsfield, MA as sales manager for the U.S. Northeast and Eastern Canada. He also served as a product manager for the company and played a key role in development of innovative die systems and components. Upon his retirement in 2003, he continued working for EDI on a consultant basis.

John came to EDI from Gloucester Engineering, and his extensive plastics industry experience also included work with Johnson Plastic Machinery and Monsanto Company. He leaves behind Carol, his wife of 53 years, six children, and eleven grandchildren.



EDI Joins a New Era of Innovation in Solar Systems for Electricity

by Mark D. Miller, Manager, EDI New Development Group

EDI now supplies extrusion and coat-

ing die systems to manufacturers of solar energy components and is working with them to develop next-generation products that will enable solar-generated electricity to be cost-competitive with energy from fossil fuel-burning power plants.

Much of the world has viewed solar and other alternatives to fossil fuels as desirable but costly and ultimately not widely applicable. This view is fast disappearing. The global surge in demand for crude oil, the intensifying debate about possible "peak oil," the national-security concerns of nations that rely heavily on oil imports—these forces have increased the urgency for developing solar power and improved its economics relative to fossil fuels. At the same time, technological innovation has driven down the real cost of solar power—a trend which continues.

EDI's systems are in commercial use for components in traditional rigid solar panels and promise to help make possible flexible photovoltaic structures that would reduce the cost and simplify the installation of solar modules on rooftops everywhere. These will be complex, multilayer products whose manufacture will call for high-precision systems like our Contour™ cast film dies and our Liberty™ and Ultracoat™ slot die coating systems.

Besides its expertise in these basic processing systems, EDI draws on experience in applications that, like solar energy, require thin-gauge, optically clear, close-tolerance films and coatings with critical functionalities. One example is optical films and coatings for use in applications like flat panels displays. Another is flexible batteries—particularly



NEW FRONTIER FOR FLAT-DIE TECHNOLOGIES. Manufacture of rigid multi-layer solar electric panels like those in this outdoor array can be carried out more efficiently by replacing conventional coating methods with EDI's Liberty® and Ultracoat® slot die systems. In the future, EDI expects that these coating systems and the Contour™ cast film dies will also play important roles in making continuous flexible film solar systems commercially viable. In addition, the company's microlayer technology promises to enhance the efficiency of these film systems by imparting outstanding barrier properties.

relevant, since solar cells are a kind of battery. In a project funded by the U.S. government, EDI has developed a process to produce lower-cost electrolyte and cathode films for batteries that power portable electronic devices used by soldiers. The technology has led to production of very thin films for high-energy rechargeable and primary disposable batteries. Nonmilitary applications include cell phones, notebook computers, and batteries for hybrid electric vehicles.

Roles for Plastics and Coatings in Solar Systems

The photovoltaic (PV) cell that is the functional heart of a solar electrical system consists of two thin layers of semiconductor

materials, typically silicon-based. One is boron-"doped" so that it functions as the positive layer, and the other is phosphorus-doped to make it the negative layer. When photons strike these materials, they dislodge electrons, and because the layers are connected to a circuit, an electrical current results.

In conventional solar electrical systems, a single cell is usually quite small and produces only a few watts of power, so multiple cells are connected in series to form modules. The solar panels seen on rooftops typically consist of one or more of these modules. In turn, a large number of modules can be connected in arrays that generate many kilowatts for multiple users. *Continued on P. 5.*

INSTANT ACCESS TO EDI www.extrusiondies.com

For more information, readers of EDI ADVANCES are invited to visit our web site at the address above. We also welcome your e-mail, which you can post from the web site or by keying in our sales@extrusiondies.com address. The web site is your resource for information on:

- EDI dies, feedblocks, decking systems, vacuum boxes, die carts, and related equipment.
- Sales, technical service, customer service, spare parts, and other departments.

- Agents in our worldwide sales & service network.
- Remanufacturing facilities in the U.S.A., Germany, and Japan.
- Visiting EDI headquarters.

Extrusion Dies Industries, LLC is a leading international supplier of flat dies for sheet and film, coating, and pelletizing. We draw on extensive engineering capabilities to design systems that are highly tailored to specific customer needs. Headquartered in Chippewa Falls, Wisconsin, U.S.A., we sell half of our dies to customers in other nations around the world.

© 2008 EXTRUSION DIES INDUSTRIES, LLC



EDI

Extrusion Dies Industries, LLC
911 Kurth Road
Chippewa Falls, Wisconsin, USA
54729-1443
Tel: 1-715-726-1201