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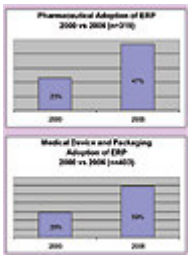
SUPPLY-CHAIN MANAGEMENT SUPPLEMENT

Looking into the Supply Chain

Pharmaceutical companies are driving for greater supply-chain efficiency, security, and safety.

by David Vaczek
Senior Editor

Drug firms confront a complex set of challenges in managing their supply chains. They are adopting solutions for streamlining business processes that also support the sharing of drug pedigree information for securing the supply chain. And firms are addressing the dual demands of improving transport efficiency and protecting temperature-sensitive drugs in cold-chain distribution. Many initiatives are tied to investments in technology to support demand-driven manufacture and supply processes. As RFID emerges asa promising tool for thwarting counterfeiters, some drug firms are exploring the technologies' promise for removing supply-chain costs.



These data were collected in the first quarter of 2006 by T.R. Cutler Inc. The sample sizes are noted accordingly, and the firm ensured that the respondents between the two segments were mutually exclusive. The margin of error is ± 3% based on the sample size and the cumulative universe. (Click Image to Enlarge)

While the ultimate goal is the efficient and safe manufacture and delivery of product, industry initiatives in supply-chain management (SCM) improvements are in various stages of completion. Costs have to be wrung from the drug distribution network, while ensuring that medications are always available to patients when they are needed.

Supply-chain security has moved to the front burner, as industry faces mandates for drug pedigree tracking and the loss of millions of dollars in sales to drug diversion and counterfeit products.

Firms are scrutinizing cold-chain management as cold-chain shipments increase with the growth of temperature-sensitive biologic-based drugs. The stable shipment of temperature-sensitive products must be ensured across increasingly far-flung networks.

New laws and guidance pertaining to lot tracking from material source to end-use, financial transaction documen-tation, as well as appropriate cold-chain transport, have raised the bar in the area of regulatory compliance.

Pressure to reduce costs in product manufacturing and distribution has mounted under marketplace pressure for lower prices, industry consolidation, and demand for more products and product styles, produced in smaller lot quantities. Through software investment and collaboration with trading partners, pharma firms are targeting business process improvements.

"In the life sciences industries, compliance has taken precedence over other aspects of operational excellence and manufacturing performance improvement. But we are seeing the focus on being able to do both at the same time," says Jamie Hintlian, partner, Accenture, Health and Life Sciences (Boston).

Tracking product, orders, and pricing through the intricate drug distribution network is no small feat. Most drugs are sold to wholesalers that then sell and distribute them to retail pharmacies, hospitals, long-term care facilities, and mail-order service providers. In some cases, retailers and mail-order companies buy some drugs directly from manufacturers.The major wholesalers all have repackaging businesses, where bulk drug shipments are repackaged and supplied to retailers or hospitals in patient-ready quantities such as unit of use. Drug makers may opt to use third-party logistics providers for product warehousing, inventory management, and distribution. Some drug companies outsource manufacturing to contract manufacturers. At the end of the chain, the use of medicines is contingent on physician prescribing and managed-care policies. Pharmaceutical benefit managers dictate which drugs are available to health plan members and drive market share through patient incentives.

ADVANCED ERP

Enterprise resource planning (ERP) solutions help users forecast inventory requirements more accurately, and

thus reduce inventories. Many support demand-based SCM that more closely aligns production with real-time information from supply chain partners on inventory position and customer demand. Inventory levels are minimized or improved as product is “made-to-order” under this model, rather than “made-to-stock.”

Forty seven percent of pharmaceutical companies owned ERP solutions in 2006 compared with 23% in 2000, reports T. R. Cutler Inc., a marketing information firm for manufacturers.

“Companies that began with ERP solutions starting in the mid-1980s have since upgraded to second-, third-, and fourth-generation software,” says Thomas Cutler, with the firm.

IT solutions support data sharing with suppliers and customers, such as through electronic data interchange (EDI) links or through Web portals. ERP information becomes “a leading indicator rather than a lagging indicator,” says Cutler. “Companies want real-time data. Is our production output accurate? Where in the supply chain are we backlogged? Are we running over cost or under cost? How much excess inventory are we holding? The process improvement is continuous, often driven by clients’ demand for more information,” says Cutler.

Firms are buying integrated ERP software that promotes more-efficient sharing of data internally. “ERP investment has taken a sharp turn in the pharmaceutical sector with the availability of more fully integrated solutions,” says Hintlian.

Yet he adds: Shop-floor-to-top-floor integration is much preached about, but still evolving. In some cases companies will elect to adopt best-of-breed applications, he says.

Departments can work off a single set of plans, drawing on shared data contained in a central repository. Warehouse managers or executives employing business intelligence (BI) applications can, for example, access SCM inventory management, warehouse allocation, or customer relationship management (CRM) data. “Supply-chain execution systems will be integrated with applications such as order, channel, and financial management,” Hintlian says.

AMR Research Inc. (Boston) reports that demand-driven process adoption is part of a changing emphasis by pharmaceutical and biosciences in their IT investments.

“There has been a shift toward a balance between compliance and productivity-related performance. The new emphasis is on integrating silos and translating downstream data demand into a profitable response from manufacturing and product supply,” AMR Research reports.

DEMAND-FOCUSED

Major drug firms are deploying demand-based supply solutions. AstraZeneca (London) implemented a “make-to-demand” SCM solution at its Wedel, Germany, packaging plant to improve customer service and the flow of information to its European bulk-product manufacturers.

Daily sales demand is linked to production and material replenishment in a solution that “augments conventional SCM practices based on “make-to-forecast” with dynamic supply-chain processes,” according to the firm.

The company employed software from SAP AG (Walldorf, Germany). The SAP R/3 real-time data-management platform is augmented with the SAP Advanced Planner and Optimizer (APO) that supports proactive production planning.

APO features LiveCache technology that dynamically plans material and production capacity requirements. Safety stock and daily supply inventory needs are calculated in real time with reference to daily demand, sales forecasts, and the stock levels. The application automatically generates and sequences orders based on varying customer demands and inventory levels.

The solution provides “dynamic end-to-end information flow from the sales forecasts through to the actual production plan scheduled on the lines to the daily-based replenishment planning,” SAP and AstraZeneca reported.

AstraZeneca reduced planning cycle times from 10–14 days down to one day, increased inventory turns by 14%, and improved customer service levels.

Purdue Pharma, King Pharmaceuticals, and Bristol MyersSquibb have adopted the Channel Commerce Management (CCM) solution offered by Edge Dynamics Inc. (Redwood City, CA), Edge Dynamics announced. The companies are using Edge Dynamics’ on-premise solution. The company also offers CCM in a hosted software-as-a-service (SaaS) model, according to a company spokesperson.

CCM captures demand data from wholesalers before it enters companies’ SCM/ERP systems. Data are analyzed in real-time, accounting for order and shipment status and business policies such as in-inventory channel agreements. CCM minimizes demand gyrations by determining optimal inventory requirements and adjusting and dispositioning orders accordingly.

“There are three cardinal axioms for getting rid of waste,” says Stephen Parker, chairman and CEO, DataCraft Solutions (Durham, NC). “First, improve product quality with a high degree of manufacturing predictability.

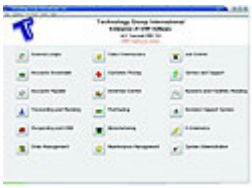
Then, cut costs out of manufacturing. Computer-controlled robotics accomplishes these two goals because you are eliminating human error. Then, you have to get the material there in a predictable way, without error-prone forecasting," says Parker.

"We have seen a keen interest by pharmaceutical companies in demand-driven supply processes that introduce predictability into supply-chain management. Companies are studying it, implementing it, and embracing it," Parker adds.

DataCraft Solutions offers a demand-based supply-chain solution in a SaaS model. By supporting supply replenishment based on consumption, its lean manufacturing digital Kanban solution automatically updates the inventory and order status of network tenants. Clients gain real-time visibility of supply status at each point of manufacturing and distribution through secure Internet portals.

Visibility Corp. (Andover, MA) offers Visibility.net, an on-premise ERP solution that remote users can access via the Web. The solution is based on Microsoft's Visual Studio.net business application tool set that yields programs accessible through Internet Explorer. Visibility.net is geared for complex manufacturing where users need to share in-process engineering data. Medical device makers EMS (Atlanta) and J. H. Emerson (Cambridge, MA) are among its clients, says Steve Carson, executive vice president, sales.

"In older-generation ERP solutions, a lot of the intelligence was built into the programs that resided at each work-station," in client-server configurations. "Web-based solutions go back to the old centralized model where the knowledge base is centrally contained," says Carson.
"You are eliminating the need to send as much data over a network, which slows down applications. And, with Web-based applications, you open up accessibility of business information outside your intranet environment to remote employees, partners, and suppliers," Carson says.



Technology Group International's Enterprise 21 ERP software suite is database independent. A decision support system features graphical dashboards. The software integrates with standard EDI applications, or users can perform e-commerce with the eCom21 package.

TRACKING FEE-FOR-SERVICE

Manufacturer and wholesaler inventory management agreements (IMAs) have produced pronounced supply- chain efficiencies.

IMAs support a fee-for-service model in which manufacturers pay for drug wholesalers' distribution services and distributors forego inventory investment tactics such as forward buying. Vendors discontinue the cash discounts that helped compensate wholesalers for their services. According to one estimate, wholesalers' inventory-to-sales ratios have declined by 50% in four years under this model.

In support of this approach, wholesalers have linked systems with vendors for sharing order, inventory, and sales information. Manufacturers can then act on that data to improve inventory levels and fill rates.

"This is a shift toward a more-traditional supply-chain environment, creating a more predictable demand pattern for many products," says Hintlian.

"The fee-for-service model is highly beneficial to manufacturers that are managing capital-intensive production environments, where a natural swing in demand can result in huge costs in overtime, product shortages, and expedited delivery of product," he adds.

In managing fee-for-service contracts, Edge Dynamics' CCM product provides a continuous channel scorecard that tracks inventory and service levels and manages wholesaler compensation based on performance.

Edge Dynamics' CCM is tailored to support pharma sector compliance and product integrity issues. Companies are looking for nuanced, sector-specific functions in ERP software and related channel management solutions that address regulatory concerns along with business efficiencies.

"Regulation is driving the technology selection process," says Cutler. In fact, only 10% of the ERP user base in pharma and medical devices have invested in SCM software, according to T. R. Cutler.

"In the past six months we have seen much higher SCM adoption. New adopters are more likely to look at every function available in ERP software," Cutler says.
Cutler notes that the emphasis on compliance has "drastically changed" the role of quality assurance and quality control managers that today are involved in ERP selection.

"Top management has viewed QA and QC as a middle-management quasi-accounting function. Today they are likely to be involved in ERP purchasing. ERP systems are a preventive solution, and the QA person has to answer when a crisis hits," he says.

COMPLIANCE FOCUSED

Michael Webster, director of life sciences, Ross Systems (Atlanta), estimates that 50% of pharmaceutical and medical device installations lack an SCM component.

"Companies want to rationalize one step at a time. ERP is a transactional tool. If you don't have it, you have to add more bodies and paperwork to keep up with your growing volume. SCM is an optimizational tool. You are using it to make better decisions, such as to improve inventory and customer service levels. Companies may

feel they do not have the resources or the volume to support it," he says.

Some companies start with the demand planning and forecasting component of SCM in phasing in SCM. "The business process cycle starts with demand planning and sales forecasting. Once the demand plan is created based on factors such as sales history, you then push it back to the ERP for SCM inventory and replenishment planning and material requirements planning and production scheduling," Webster says.

Yet Hintlian points out that ERP solutions address both compliance and business process tracking. "If you are providing visibility for material movement, and linking that to production and execution, you are complying with requirements around batch-record management, while at the same time providing visibility for shop-floor management. Compliance becomes less of a necessary evil. It becomes a way of enhancing productivity," he adds.

ERP software features embedded functionality for addressing compliance with regulations that include GMP quality assessment and control guidelines, 21 CFR 11, Sarbanes-Oxley financial reporting, and Bioterrorism Act of 2002 lot-traceability.

"Compliance puts you in business or out of business. [The rest of the ERP solution] pertains to efficiency. Many start-up companies have come to us looking for very strong lot and serial tracking controls, with systems that trigger a sequence of actions if an event occurs," says Scott McMaster, national sales manager, Syspro (Cosa Mesa, CA).

In 21 CFR Part 11, FDA has set requirements for maintaining electronic records and ensuring the validity of electronic signatures. Syspro's latest ERP iteration, 6.0 Issue 010, features electronic signatures for authenticating the operator performing a transaction. The feature can be configured at the operator, group, or company level. Authentication can be forced before an action occurs. Logs of each transaction including who authorized it and when are retained for auditing purposes.

"Electronic Signatures extends our program access control features. For example, you can configure it so that an authentication signature is required against an invoice payment transaction if the value exceeds $1000, and trigger a custom application or e-mail to the financial manager if the payment exceeds that limit. You can define a date range between which the signature is effective. This facilitates compliance with Sarbanes-Oxley and FDA and ISO certification rules," says Rene Inzana, Syspro product marketing manager.

Technology Group International (TGI; Toledo, OH) provides its Enterprise 21 ERP application suite as a Web-based solution geared to the medical device and food sectors. For 21 CFR 11, TGI features include unique identification and password-protected access to all system users, automatic creation of audit trails, and data archiving. "We can audit on any screen. If you are looking at a product master screen, you can see every time a change was made to that table, and who made the change. You use a reason code to get the reasons the change was made," says Rebecca Gill, vice president, Enterprise 21, TGI.

Systems must support lot traceability documentation to comply with GMP quality assurance guidelines and the specific requirements of the Bioterrorism Act of 2002. For managing a recall, firms have to access data on raw material sources and use within four hours.

"You need to provide a full genealogy of the product back to the source, showing all usage lots from vendor to manufacture to end-user. You are showing where the drugs in the lot are located, what components went into the drug, and tracking that back to other finished product where the raw material was used. With an ERP solution, you can produce that information in 20 seconds," says Gill.

Ross Systems' iRenaissance suite of Web-deployed ERP solutions features built in QA and QC functions. A complete history of lot records for tracing product can be retrieved from "any reference number—a receipt, a purchase order, a sales order," says Webster.

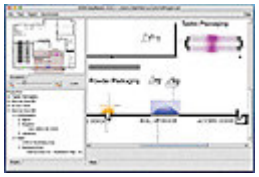
"Our first customer in the 1980s was Eli Lilly. Our whole business model is built around the complexities of quality compliance in pharmaceutical manufacturing," says Ross. The iRenaissance solution encompasses demand planning, inventory planning, field sales forecasting, and replenishment planning, supporting make-to-stock, make-to-order, and vendor-managed inventory processes. The solution addresses issues specific to pharma.

One application for collaboration records transactions with contract manufacturers and distributors. "Outsourcing companies build an internal data model of what is happening in the supply chain and own that data record. You are optimizing inventory levels adequate enough to support the planned product at each stage across the chain. [And] you need to own traceability across the chain. So if an API is rejected for quality reasons at a bulk manufacturer, you have the lot records across multiple manufacturers and distributors," says Webster.

An "available to promise" application helps generic companies, or makers of multisource drugs, determine their production capacity when potential customers come shopping. "The customer has not placed the order, but they are asking what your capacity is to deliver an amount of product at a certain time. You can run a schedule, accounting for all production constraints, to find out if you have the capacity and materials to meet that order," says Webster.

For managing Medicare/ Medicaid, an iRenaissance module handles adjudication of chargebacks and establishes pricing.

ERP AND BEYOND



Odin Technologies' Easy Reader software supports design and deployment of RFID networks. Users import the footprint of their facility and configure network topology, assigning portals at dock doors and Internet protocol addresses. The software creates a bill of materials for predeployment certification of preconfigured elements.

RFID presents major implications for cutting out supply-chain waste. Business sectors such as CPG have slashed costs where RFID has been employed. In one instance, the Department of Defense (DoD) reduced standing inventory from $120 million to $70 million by replacing a bar code–based system with RFID, says Patrick Sweeney, CEO, Odin Technologies. Odin has been named as DoD's sole supplier for RFID design and deployment.

"Our pharmaceutical clients fall into two different camps. Some are focused on learning RFID for pedigree compliance and Class 2 narcotics tracking. They don't want to invest in 2-D bar codes that they think will be obsolete in two years," Sweeney says.

"The other camp is more attuned to the strategic advantages along the lines that CPG firms have identified. How can we use this highly accurate, real-time information to track product sales and shelf lives though the supply chain and on to end-users," he asks.

Drug company pilots testing RFID for product authentication and e-pedigree tracking are in full swing. FDA provided further incentive by reaffirming its support for RFID as a counterfeiting deterrent, stating that it will implement Prescription Drug Marketing Act drug pedigree requirements effective January 1, 2007.

Printer and labeler suppliers have devised systems to ensure the quality of inlays, confirm that information contained in readable tags corresponds with other label identifiers, and for tag encoding, to support client e-pedigree initiatives.

"Using the unique capabilities we have developed for RFID-enabled labels, we are providing our customers with product and documentation that gives them the ability to easily validate RFID labels anywhere in the supply chain, or anywhere that a labeled product turns up. So we are providing a powerful tool supporting product traceability," says William Gunther, president and COO, George Schmitt & Co. (Guilford, CT).

George Schmitt developed proprietary technology for supplying RFID-enabled labels to Purdue Pharma for pilot programs tagging individual bottles of OxyContin and Palladone.

The labeler's solution ensures 100% readability of inlays. Propriety hardware and software automatically in real-time verifies that the correct inlay is placed with the correct label so that EPC tag and bar coded unique identification numbers match. Clients are provided with a roll map through a CD or secure Web site of sequentially listed unit IDs contained in each roll of labels.

"The roll map validates the fact that we have correctly read every one of the codes on the roll and improves the security of the supply chain. At the outset, we are providing a secure list of all the validated, unique codes that we are shipping to our customers, and that should show up later in the supply chain," says Gunther.
The labeler maintains files associated with every label roll shipped so a customer could verify with it the EPC code on any individual label.

The solution incorporates patent-pending elements that verify tag readability at production speeds of 200 to 300 feet per minute and at the distance specified by the customer. Purdue required UHF tags for reading at a distance of 24 in. or greater.

The company uses unique technology for isolating the individual inlays, in which inlays are tested several times. Readers identify each inlay, and tags that are dead, weak, or exhibit intermittent performance are eliminated.

"In order to know that I have read every inlay in the role, I have to know that I have read the specific identity of each inlay in the role. We can demonstrate that we have validated every single inlay in the roll, and that there are exactly the same number of unique EPC codes in our roll map as are contained in the [label] roll," Gunther says.

Tagsys (Cambridge, MA) offers various tag form factors designed specifically to address the unique needs of individual pharmaceutical clients. For applying RFID labels to Viagra bottles, Pfizer adopted Tagsys's HF Flexible Module Folio tag that employs a microthin material for flexible configuration to curved and square packaging. Tagsys also produced ARIO SDM, an 8.9-mm rigid disk for covert embedding in vial seals offered by West Pharmaceutical Services (Lionville, PA) in its West Spectra tamper-evident solution for parenteral drugs.

Tagsys's new Adaptive Kernal (AK) tag and inlay design, which the firm refers to as "The-Package-Is-the-Tag," employs a 12 ¥ 8 mm UHF Gen 2 module, including chip and antenna. Solutions can be customized with the addition of a second antenna that can be incorporated into packaging using conductive ink or copper and aluminum material.

“With the innovative AK design, we are able to provide economies of scale and the most cost-effective EPC Gen2 module,” claims Ken Reich, director of global marketing and public relations for Tagsys. “The secondary custom-designed antenna can be attached to a product that is already tagged with the kernel, thereby expanding its functionality depending on the specific item-level application and actual package requirements. The very unique aspect to this design is the fact that the adaptive antenna need not actually touch the kernel, but rather be in close proximity to achieve an electromagnetic coupling between the two antennas. Taken together, the kernel and secondary antenna provide an enhanced item-level offering, and, by not having to attach them, a costly manufacturing step is side-stepped,” he says.

Tagsys offers the AK Gen2 solution for pharmaceuticals and other markets because “certain application-specific needs could be addressed where Six Sigma performance is not a mission- critical objective,” Reich continues. “However, in terms of supply-chain track, trace, and authentication, we continue to recommend HF 13.56 MHz at the item level. We have found that HF tags provide consistent proven and time-tested Six Sigma 99.9997% read rate performance. We do not currently see UHF being at that point, even with Gen2 near-field tags. At 99.65% read performance, it’s hard to see UHF delivering RAS (Reliable, Accurate and Secure) Six Sigma level reading efficacy,” he says.

In supporting RFID data management, IBM’s EPCIS repository processes and serves data in real time to internal applications and trading partners.

EXTENDING RFID

Some firms are testing RFID in nonpackaging applications, such as in plant asset tracking and in creating more-compliant manufacturing processes. Tags and readers, for example, could monitor forklifts to ensure that they are carrying the right material to the right location.

“You can draw a box around certain [RFID deployments for ROI purposes]. With RFID, you no longer require line-of-sight and manual scanning. The productivity implications are profound. Implementing RFID across the supply chain is where it gets a lot trickier, because [in that use] ROI depends on the scale of deployment,” Hintlian says.

RFID deployment in the cold chain is another example of firms testing RFID solutions and expanding “outside the mandate” for RFID tagging in support of anticounterfeiting, says Joseph White, vice president, product management and tag engineering, RFID division, Symbol Technologies Inc. (Holtsville, NY).

“Some firms are anticipating great value in RFID; others are saying, ‘I don’t see it.’ But what we are seeing is that all companies are becoming more RFID aware and putting it to new uses,” White says.

Yet regulatory guidance, standards development, and infrastructure issues will have to be resolved for RFID to advance.

“Many companies are waiting to see what FDA will do next as well as for what EPCglobal will produce in terms of item-level Gen2 standards. I have a sense that there is a lot of fence sitting ocurring today and that RFID investment has paused briefly, plateauing for the time being,” says Tagsys’s Reich.

Chris Holt, vice president, UPS, Healthcare Center of Excellence notes that “the risk is making sure RFID supports the operational efficiency of the supply chain.
“At this point we are looking at RFID closely. [But] we have proprietary track-and-trace systems that we believe are more applicable to today’s business problems than RFID. These include bar code and scanning systems in all of our facilities. You can go to our Web site, enter the package number, see where it has been, where it is now, and when it will get to you,” Holt says.

“We have hundreds of thousands of people shipping. We can’t have multiple [RFID] standards. With RFID tags and readers, quality is still an issue. And there are business process questions such as data sharing and who owns the data [that have to be resolved],” he adds.

STANDARDS-BASED

In the EPCglobal Network, parties will have Internet access to automatically disseminated real-time data on serialized items as they move through the supply chain.

IBM offers RFID solutions based on EPCglobal standards that GlaxoSmithKline is using in its pilot tagging 100% of bottles of its HIV medicine Trizivir. GSK says the pilot could lead to the sharing of EPC batch and lot data for the purpose of e-pedigree tracking.

GSK uses IBM solutions for RFID-enabling the packaging plant and distribution center. Readers incorporate the Websphere RFID Device Infrastructure (WRDI). WRDI middleware creates an intelligent reader that filters and moves data to appropriate software applications and to IBM Websphere Premises Servers. The Premises Servers further aggregate data for delivery to companies’ IT systems.

The granular data are collected in an EPCglobal Information Systems (EPCIS) data repository. EPCIS is EPCglobal’s specification for a standard interface for accessing EPC-related information and enabling users to exchange EPC data through the EPCglobal network.

IBM’s EPCIS repository solution may be integrated with a company’s ERP solutions and other legacy systems.

Data are served to applications such as e-pedigree, reverse logistics, and warehouse and inventory. EPCIS serves data to EPC Object Naming Services, and EPC Discovery Services, that trading partners will use to identify EPCs and source EPC-related data and chain-of-custody information.

“Our EPCIS product is not generally available yet. We have no official name for it,” says Paul Chang, worldwide development, EPCIS Solutions, IBM Software Group.

“There are volumes of data associated with EPC numbers. EPCIS provides a repository capable of processing and sharing all that data in real time, with internal applications or with trading partners. The query mechanism has built-in security layers, so you get only the information that you and your partners agree to share,” Chang says.

The repository resides at multiple sites within an enterprise. It is capture-device independent. “The data-collection mechanism is irrelevant. We manage RFID, bar code, and human data entry,” he says.

“We believe this is transformational technology” supporting demand-driven supply, Chang continues. “It is no longer about what the system thinks the inventory position is out in the field. It is physical movement data capture. You are working with real physical inventory data [instead of] perpetual inventory data, so you know what your inventory position is at each location that is RFID-enabled. If you enable point of sale, you know exactly when each product has been sold. You can then send a signal to an application that figures out velocity of production and plan product for inventory replenishment.”

COLD-CHAIN ISSUES

The United States Pharmacopeia’s (USP) General Guidance 1079, Good Storage and Shipping Practices published in November 2005, outlines guidance for manufacturers, wholesalers, and transport logistics providers in the packaging and transport of temperature-sensitive product. As a result of this influential guidance, manufacturers are no longer washing their hands of responsibility for product at the loading dock. Product identity, strength, quality, and purity must be safeguarded throughout distribution.

“Manufacturers and distributors should work together to establish proper distribution and product handling requirements for the purpose of ensuring appropriate product maintenance in transit,” the guidance reads.

USP’s 1079 guidance document includes the requirements that shippers and distributors must follow proper storage and shipping requirements as indicated by the manufacturer. Wholesalers, manufacturers, and delivery contractors should provide documented evidence showing that temperature ranges were maintained during transport.

“Manufacturers have to ensure the quality of the product all the way through to the patient and work with supply-chain partners to ensure that takes place,” says Henry Ames, director of strategic marketing, Sensitech Inc. (Beverly, MA), a business unit division of Carrier Corp. (Farmington, CT).

“In auditing to the USP guidance, FDA is asking for documentation that product has been maintained at the appropriate temperatures, regardless of who owns it. The agency is issuing 483 citations for noncompliant practices,” says Ames.

Supply-chain partners need to collaborate to assess cold-chain risks and infrastructure. Ames notes that the fee-for-service model trend has created collaborative incentives for wholesalers. “The cold-chain provides these distributors with the chance to up-sell specialty services in packaging, handling, control, and distribution,” he says.

Transportation companies and third-party logistics providers are offering solutions that ensure cargo stability, security, and reduce product damage and shipment delays.

FedEx Custom Critical Inc. (Akron OH) offers its Temp-Assure Validated ground services employing thermal-mapped vehicles equipped with NIST-traceable recording devices. The CustomCritical Shipping Tool Kit provides online shipment monitoring with temperature updates every 30 minutes. With the Temp-Assure Validated Air service, U.S. and overseas freight is transported in temperature-controlled vehicles and by FedEx airlift.

At UPS, tracking of temperature-sensitive products is part of a “strategy to provide a global footprint for pharmaceutical distribution regardless of the regulations or product temperature requirements,” says UPS’s Holt.

UPS operates 20 licensed shared-use distribution centers (DCs) in North America where orders are received and product is picked, packed, and then shipped for ambient or cold-chain distribution. DCs must comply with PDMA requirements for validated IT and business practices covering product storage and handling.
“We feel we have a head start on the transportation requirements because the regulatory requirements on the distribution piece are much more severe than on the transportation piece today,” says Holt.

END-TO-END LOGISTICS

A dedicated quality assurance and regulatory affairs team addresses safe and secure transport. “You have to track the shipment and temperature history all the way through

the supply chain. This is not a regulatory requirement, but it is a customer requirement for many of our customers that are holding us to a higher standard. They want us to show where it went and how it was handled, if the shipment became stressed, and that we have processes in place to intervene if something goes wrong. We have pharmaceutical customers that want to be overly careful and ship everything in gel packs or dry ice, even if product doesn't have a temperature requirement," he says.

Sensitech's ColdStream PTS (Plant-to-Shelf) solution collects time, temperature, and location data continuously through the supply chain, reporting product status at the item level.

UPS retrieves data from carton and pallet monitors that are downloaded as a direct feed or through e-mail to the customer. "We are in the process of developing a relationship with a leading vendor through a client pilot project to actively track temperature and humidity throughout the supply chain," says Fred Lamb, vice president, quality assurance, regulatory affairs, UPS Supply Chain Solutions, Americas Region.

LifeConEx (Plantation FL) offers an end-to-end cold-chain logistics service for heavy-weight airfreight that mitigates supply-chain delays and ensures that temperature-sensitive product is shipped within parameters. Customers have also removed significant ground and air transport costs, says Angelos Orfanos, senior vice president, sales and marketing.

Launched in April 2005, LifeConEx is a joint venture of DHL Danzas Air & Ocean and Lufthansa Cargo. Customers include Sanofi-Pasteur, Wyeth Pharmaceuticals, Schering-Plough, Abbott Labs, and Dentsply, says Orfanos.

Angelos says that in developing the solution, LifeConEx discovered that cold-chain problems often arose at airports. LifeConEx identified supply chain "gaps" where product was affected by events such as temperature excursions, physical damage, delays, lapses in preconditioning, and documentation errors. "We found that most of these were occurring in the airport environment and with the ground handlers subcontracted by the airlines," he says.

Of 12,662 claims by shippers against airlines in 2005, 36% were temperature related, and 30% stemmed from shipment delays, according to a report by Germanischer Lloyd.

The steps executed in point-to-point transport were virtually mapped to a LifeTrack IT platform. "We identified 61 airports that handle about 94% of the pharmaceutical cold-chain business and surveyed the ground handlers' cold-chain capabilities. We process-mapped the steps executed by the forwarders, ground handlers, and airlines. LifeTrack identifies each milestone, the areas of potential risk, and features a response system for addressing problems," he says.

Orfanos says that LifeConEx is airline-neutral with 12 certified commercial and cargo airline partners. DHL Global Forwarding handles forwarding requirements. Orders are initiated with DHL's Logis order management system that links to LifeTrack. Customers track shipments through Web portal links to the LifeTrack platform.

The single-source provider solution speeds delivery times and reduces costs arising from delayed and damaged product. "We have reduced cycle times by more than 30%. By managing leased containers, we are reducing leasing costs," Orfanos says.

Environtainer has been named as a preferred provider for active temperature control containers. "Most of the time the customer selects the packaging solution. Our position is that containers are effective if they are managed properly in the door-to-door process."

COLD-CHAIN RFID

Deployment of RFID infrastructure in the cold-chain promises to provide shipment data closer to real time and thus allow real-time decision making.

Sensitech's Cold Chain Manager application and RF-enabled TempTale monitors are designed to collect time, temperature, and location data continuously as product moves through the supply chain.

"Information-driven process improvement is a well-accepted practice in other areas of business. However, it is relatively new to cold-chain management. RF solutions enable the delivery of reliable, accurate, and timely cold-chain and logistics data. With our application, we are adding significant value to traditional cold-chain data by incorporating location and improving timeliness of data collection," says Sensitech's Ames.

"The issues of supply-chain security and cold-chain management are converging. A safe and secure supply chain means not only providing an authenticated chain of custody, but also ensuring that product quality has not been negatively impacted during storage, handling, and distribution," he adds.

TempTale RFID-enabled data monitors affixed to pallets and cartons collect data that are automatically uploaded via the Internet to a database for management and analysis.

"Historically, data monitors are individually downloaded upon arrival at their destinations. The user receives a view of the temperature history over time, but after the fact. Using our RF application, the need to open a carton, retrieve a monitor, and download the data is eliminated. Data are automatically read and downloaded at each location where readers are deployed," says Ames.

Time and location data pinpoints the chain of custody, and the system sends alarm and alert messages when anomalies occur, such as temperatures trending out of range. Managers can take corrective action before product is damaged.

The Cold Chain Manager application maintains containment hierarchies relating tags on pallets to tags in containers to items within containers, allowing companies to track product quality status at the item level.

Ames says that Sensitech has successfully piloted the solution on both domestic and international shipments. One roadblock is that FDA has not yet approved the use of RFID around sensitive biologics and liquids that comprise the bulk of cold-chain product. FDA is studying both thermal and nonthermal effects of RFID. Sensitech does not perceive significant hurdles for its solution as it employs active technology that uses much less power than passive RF solutions, says Ames. Thus far, Sensitech's pilots have used expired or simulated product.

GUARANTEED SERVICE

Demand-based SCM processes supplement traditional sales forecasting methods by leveraging real time information about supply chain inventory positions and customer sales.

Accenture's Hintlian foresees that drug makers will often require and adopt "hybrid" solutions that encompass forecasting along with build-to-demand elements. "Many CPGs work in short cycle times, and they don't face the challenges of a regulated industry, [where, for example,] product could be quarantined or put on hold."

"Pharmaceutical manufacturing is an asset-intensive business, producing bulk materials that may then go to other sites for additional processing and packaging. Cycle times might not be hours or days but weeks or months. This implies you will build to forecast and carry more inventory than in a "just-in-time" environment to guard against product service failures," he says.

Webster, at Ross Systems, agrees. "In the pharmaceutical industry, to not have available inventory is unacceptable," he says. "Demand planning solutions reduce or optimize the amount of inventory you have to carry, while still maintaining a high-level of customer service."

Through new IT investments and collaborative agreements with suppliers and distributors, pharma has made manufacturing efficiency a priority. Many foresee benefits from streamlined internal processes. In gaining visibility into the supply chain, they are in a position to reduce costs and support secure and safe product distribution, without taking anything away from supply continuity.