CONTROLLING PURCHASING AND INVENTORY TO REDUCE WASTE

Simple and inexpensive ways to reduce waste and cut costs

Inventory control and purchasing improvements are simple and cost-effective pollution prevention measures that can be applied by virtually any company, of any size, in any type of manufacturing or service business. Implementing these techniques costs little and can be accomplished easily using in-house staff. In addition, taking steps to control inventory and purchasing also often improves production performance.

This article discusses several easily implemented techniques. The discussion first reviews ideas for improving purchasing practices. It then explores techniques for controlling inventory, including just-in-time (JIT) manufacturing, which has been shown to reduce waste while also improving quality and performance.

Improving Purchasing Practices

Purchasing decisions largely control the type and amount of raw materials that enter a company's manufacturing stream. Thus, efficient and waste-sensitive purchasing practices are critical to controlling inventory and ensuring that too many materials do not end up as waste.

Efficient purchasing practices can reduce both the toxicity of waste and the amount of a product or package that is destined to become waste. Clearly, such practices can minimize the waste that results from overpurchasing materials which are then allowed to expire on the shelf. In addition, when creating purchasing standards, a company can go further by specifying the purchase of less toxic or more easily reusable products. Moreover, as part of its purchasing program, the firm can negotiate with suppliers to reduce the amount of packaging used in connection with the goods they provide.

Educate and involve employees

The first significant step to improving purchasing practices is to educate purchasing staff about the high cost of disposing of excess or expired raw materials. Purchasing employees should also be represented on any internal teams that address product quality or environmental issues. The more that purchasing staff know about production, en-

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vironmental, and maintenance procedures, the better equipped they will be to work with vendors and others to make good purchasing decisions.

**Establish purchasing review criteria**

Crucial to making good purchasing decisions is establishing review criteria for all material purchased, including minimum standards for purchasing approval. Purchasing personnel should consider a number of elements with regard to products being acquired, including:

- environmental hazards,
- the potential for creating liability,
- worker exposure concerns,
- storage requirements, and
- handling and use requirements.

Sources of information on product characteristics may include material safety data sheets (MSDS), data provided by chemical suppliers, and chemical reference books.

**Avoid ordering more product than is needed**

It is important to purchase only the amount of raw materials needed for a production run or a set period of time. Excess inventory often must be disposed of because it expires before it can be used, or because there is no place to store it.

An example of the kind of problems that can be caused by overpurchasing arose in one of 3M’s plants. The plant was having difficulty meeting a chloride limitation contained in its wastewater permit. Sources of the chloride were investigated, but nothing was found to explain why the permit limit was being exceeded. After discussing the problem with operating personnel at the plant, the company discovered that the problem was related to purchasing quantity. Apparently, whenever the storage tank for the hydrochloric acid used in regenerating the water treatment deionizers began to run low, maintenance personnel would notify plant purchasing that more acid was needed. The acid would be ordered and delivered in a bulk tanker truck. At times, there was more acid in the truck than could be accommodated by the plant’s storage tank. When this happened, maintenance personnel would regenerate deionizers until enough storage space was available for the acid being delivered. This added unexpected amounts of chloride to the plant’s wastewater since the deionizers were being regenerated sooner and more frequently than needed or expected.

In this case, the problem ultimately stemmed from the fact that the purchasing department always ordered the same quantity of acid—a quantity which amounted to virtually the entire storage capacity of the acid tank. Because the supplier assessed a penalty for any acid not accepted for delivery that had to be returned in the tank truck, the employees simply wasted the excess in order to avoid the penalty. Purchasing procedures have now been corrected to address this situation.

In addition to avoiding buying a larger quantity of a given product than is needed, a company can eliminate waste by reducing the number of different products that are used for the same purpose. This practice can decrease the number of partially used containers or raw materials and can make some wastes more reusable or recyclable.

**When is bulk buying preferable?**

The value of streamlined purchasing practices for minimizing excess inventory must be balanced against the advantages of purchasing in bulk or large volume. Bulk purchasing is often more cost-effective. In addition, purchasing products in bulk or in large containers can minimize the number of small, empty containers that must be stored, returned, or disposed. If large quantities of a material are used, then purchasing in bulk will produce...
less waste, both in product loss and empty containers. On the other hand, small containers may be better if the material has a short shelf-life or is not used in large amounts.

**Buy reusable, repairable, and remanufactured products**

Buying products that are reusable and repairable can substantially reduce waste. When negotiating vendor contracts, companies can build in specifications for equipment that meet criteria relating to reusability, repairability, durability, and quality. Such products conserve resources, avoid environmental damage, and reduce solid waste. Buying reusable products also frequently makes economic sense, since it often is less expensive in the long run to buy durable, reusable products than to repeatedly buy disposable items. Even a product that may be reused only four or five times can reduce waste and save money when compared to a product that must be disposed after a single use. Commonly purchased disposable items that can be replaced by reusable versions include HVAC filters, lunchroom supplies, batteries, and disposable wipes.

Companies should also investigate the possibility of purchasing products that have been remanufactured. In addition to saving waste, such products often can be obtained more cheaply than newly manufactured counterparts.

**Buy products with reduced packaging**

There are many options for reducing packaging waste connected with purchases. These options include buying products with minimal (or even no) packaging, products delivered in reusable or returnable containers or pallets, and products that use easily recyclable packaging or that incorporate recycled content into their packaging.

Companies may be able to specify in their purchasing contracts that the vendor will provide products and packaging that contain the highest feasible amount of postconsumer recycled content for plastics, paper products, construction materials and other items. Such practices help improve the market for recycled material, eventually making products that use such material more readily available to businesses that want to purchase them.

**Work with vendors**

Vendors play a key role in purchasing and inventory control efforts. Companies should seek to work with vendors who are flexible and who will help, rather than hinder, the establishment and maintenance of an inventory control program. Companies can set a number of simple guidelines in dealing with vendors:

- Vendor samples should not be accepted unless they will be used completely or the vendor agrees to take back excess samples.
- Contracts for housekeeping and repairs should require that vendors of these services use only nonhazardous products, such as aqueous cleaners.
- Contracts with chemical suppliers should provide that the vendors will take back raw materials if specifications for the job change and should include discounts for bulk purchases when such purchases are appropriate.

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**Environmentally Responsible Purchasing Checklist**

Ten points to consider when making or requesting purchases

- Do I need to buy it, or can the product be borrowed or rented?
- Can a used or remanufactured product be substituted for a new product?
- Can the product be reused, refilled, or reconditioned to extend its life?
- Can the item be easily updated or upgraded by replacing or adding a part?
- Does the product contain postconsumer recycled materials?
- Can the product be recycled in my facility and/or community?
- Is the product toxic? If the product is hazardous, what are the disposal requirements? Is there a nontoxic or less toxic alternative?
- Can the product packaging be reduced or eliminated?
- Can the product packaging be reused, returned, or recycled?
- When considering the purchase of electrical equipment, appliances, or machinery, consider quality, durability, energy efficiency, and salvage value.

• Contracts with other material suppliers similarly should provide for them to take back and rework obsolete materials.

**Steps to Establishing a Successful “Buy Recycled” Program**

**Generate commitment**
- Adopt a “buy recycled” policy. Look for and buy recycled-content products with the highest available percentage of postconsumer materials.
- Top management commitment is essential. “Buy recycled” programs work better when buying recycled is a matter of policy.

**Learn about recycled products**
- Many different kinds of recycled-content products are available for office, manufacturing, packaging, construction, landscaping, food service, transportation, recreational, and agricultural uses.

**Revise specifications**
- Remove restrictions against recycled materials unless there is a performance reason for specifying virgin materials.
- Eliminate overspecification where you can do so without compromising performance and function. Allow substitutions that satisfy the end use.
- Test samples of recycled products. Blind tests ensure that recycled content products are not required to perform better than virgin-material products.
- Define the types and percentages of materials that qualify as “recycled.”

**Set goals and evaluate progress**
- Determine what recycled-content products you already purchase, then find other opportunities to buy recycled.

**Handle product price**
- Recycled-content products may cost more. Until “buy recycled” programs increase demand, these products cannot achieve the same economies of scale as comparable virgin-material products.
- By starting source reduction and recycling programs, you can avoid labor, storage, and disposal costs, which may help compensate for short-term costs of your “buy-recycled” program.
- Increasing the quantities purchased can reduce costs. This can be done by: ordering less often; combining purchases with other business units, sub-units, or facilities; or buying cooperatively with other organizations.
- Changing the dimensions of your product can compensate for the higher cost of recycled content.
- Reciprocal purchasing agreements (that is, buying recycled-content products from manufacturers that buy materials from your recycling collection program) also can reduce prices.

**Work with vendors**
- Inform your product vendors in writing that your organization gives preference to recycled products with the highest available percentage of postconsumer materials.
- Ask your service contractors—such as printers, janitorial services, maintenance contractors, and builders or remodelers—to use postconsumer recycled-content products.
- Provide reasonable time frames for responding to solicitations and delivering products.
- Require certification of recycled content as defined by your specifications.

Adapted from the Minnesota Office of Environmental Assistance Fact Sheet: Tips for a Successful “Buy Recycled” Program.

**Examples of Improved Purchasing Practices**

The examples discussed below illustrate some ideas for improving and streamlining purchasing practices.

*A furniture manufacturer:* A furniture manufacturer reduced excess inventories by having one employee assigned to the job of purchasing the solvents and finishes for all divisions. Purchases are based on long-term production schedules, which in turn have been developed to fully utilize finishing materials.

*Eagan, Minnesota, Maintenance Shop:* The City of Eagan, Minnesota, Maintenance Shop was able to replace paper towels with cloth ones at its shop, eliminating the purchase of five cases of paper towels every two months. The source reduction team (mechanics, a parks supervisor, clerical staff, the recycling coordinator, and the water supervisor) at first met resistance from product vendors on decreasing packaging waste. The team then suggested coordinating purchases among public agencies in order to gain leverage with vendors, reduce costs, and achieve greater efficiency. Coordinated or cooperative purchasing offers an opportunity to obtain lower prices through consolidating the buying power of several facilities. In addition, in the case of government agencies, it reduces the number of solicitations that must be prepared, printed, and mailed.

*Minnesota Department of Administration:* The Minnesota Department of Administration, which implements and oversees a number of P2 programs throughout the state government, has instituted several practices aimed at improving purchasing:

• The department purchases remanufactured gasoline engines for many of the state transportation department’s trucks, as well as remanufactured...
diesel engines and transmissions for heavy duty trucks, and remanufactured starters and alternators for both cars and trucks. All of these items conform to the original equipment manufacturer specifications and come with one-year warranties for parts and labor. The state saves about $3000 per transmission, and about 30 percent per alternator and starter, by using remanufactured products.

- The department’s Materials Management Division has also worked with the state transportation department to specify use of no-lead paint for traffic marking and in heavy equipment manufacture.

- The Division of Print Communications has specified the use of soybean ink in place of petroleum-based inks that evaporate and release volatile organic chemicals.

- The Materials Management Division uses contract language that specifies that “base or special chemicals which are excess unused quantities left over at the end of the contract period shall be picked up by the contract vendor and a credit issued to the state. The contract vendor will assume all transportation costs involved in the return.”

- The department’s Plant Management Division purchases housecleaning chemicals in bulk concentrate form to reduce packaging waste by 85 percent. Janitorial staff fill their dispensers from the bulk concentrate and add water to bring it to the proper strength. Purchase of these cleaning chemicals undergoes careful review to ensure that they meet cleaning needs, minimize packaging, and reduce toxics.

- The Plant Management Division’s Resource Recovery Office also promotes the purchase of products that are locally recyclable and have recycled content, products with a reduced quantity or toxicity of materials and degradable packaging, and environmentally responsible products.

### Improving Inventory Control

Poor inventory control practices can create three major sources of waste:

- excess materials;
- out-of-date, expired, or out-of-specification materials; and
- materials that are no longer needed or used.

This costs companies money directly because they lose the benefit of these once-valuable raw materials. In addition, holding surplus materials creates additional, indirect costs because it increases the need for storage or floor space, which in turn can reduce production area; increases disposal costs; and worsens the risk of spills because holding materials longer leads to more handling, and because the integrity of the packaging declines with age.

By contrast, an effective inventory control system allows a company to track and control the types and quantities of raw materials it purchases, stores, distributes, and consumes. A good inventory control system reduces costs associated with handling raw materials and disposing of unusable materials. It can also reduce waste by decreasing the quantity of hazardous materials used to make products, and the amount of excess raw materials kept in stock. Finally, effective inventory control ensures that material is available when needed—a basic premise of a “just-in-time” system.

Some simple and effective techniques can eliminate surplus inventory and prevent waste. Below are some important steps that can be taken toward creating an inventory control system.

### Keep track of materials

In order to track materials brought on-site, it is useful to have a centralized purchasing system...
that can log and identify all materials and prepare a summary report for the year. Facilities that lack such a centralized system should try to at least keep individual purchasing or delivery records unless the amount of material present on-site is so limited that it can be determined from a visual inspection of storage and stockpile areas.

**First-in, first-out**

Materials generally should be used in the order in which they are received. Organize and rotate inventory to ensure that older stock is used first. Arrange older materials in front and newer materials in back in both the storage and production areas to ensure that perishable inventory is used before its shelf-life expires.

**Store materials properly**

Avoiding moisture and temperature extremes, and otherwise storing material under the proper conditions, will help protect material shelf-life.

**Encourage materials exchange within the company**

When excess materials accumulate, a company often can organize an internal materials exchange or surplus inventory program that makes it easier for other departments within the organization to use the excess material. For instance, a large paint formulator has developed a computerized procedure to search for available stock at two plants and 27 warehouses before formulating another batch of the particular stock. This procedure has significantly reduced the quantity of discontinued finished product which the company needs to dispose. In this case, the company has found that transportation costs for moving the finished product among plants and warehouses are small compared to the high cost of disposing of the discontinued product as hazardous waste.

3M's resource recovery department is active in finding productive uses within the company for surplus materials, equipment, and reusable or recyclable waste products. For example, using the company's electronic purchase order system, it has worked with the purchasing department to set up a computerized process that automatically matches any surplus materials within 3M to purchase requisitions being generated by anyone in the company. As an employee enters the name of an item to be purchased, the computer displays where the item can be obtained within 3M, the quantity available, and the price. The employee then has the opportunity to decide how much of the material to obtain through internal transfer.

**Minimize individual area stockpiling**

Many work areas maintain independent stockpiles for the chemicals and other materials involved in their operational tasks. The need for such stockpiles is rarely questioned because stockpiling is an accepted practice. In addition, the time and effort required to obtain materials often are considered wasted, so trips to the central supply area are used as a chance to "stock up on a few essentials." Moreover, some stockpiling occurs simply because there is no way to return partial containers of materials to the storeroom for others in the company to use.

Local area stockpiles should be avoided to the extent possible. Such stockpiles can collectively contain large volumes of materials and represent a potentially significant source of waste. As a result, they often generate unrecognized costs, in addition to creating areas where accidents can occur.

**Just-in-Time Manufacturing**

Improving purchasing and inventory management practices may naturally lead to using a just-in-time (JIT) manufacturing system. Under such a system, raw materials move directly from the receiving dock to the manufacturing area for immediate
use. The final product is then shipped without any intermediate storage. The JIT system views the next worker in the production line as a “customer.” Essentially, one employee works off the previous worker’s inventory—which means that quality must be high and there must be few or no defective parts. The advantages of JIT include reduction in lot sizes, setup times, purchase order costs, and scrap, as well as elimination of buffer inventory. In addition, because JIT manufacturing makes results visible and exposes problems otherwise hidden by excess inventories and staff, it can lead to significantly higher quality and productivity, and can also improve worker responsibility and commitment.

JIT production is simple and requires little use of computers. In some industries, it can control inventory even more tightly than can computer-based approaches. In fact, JIT is primarily viewed as an inventory control system, even though it provides many other advantages as well.

Many companies are using JIT successfully. Again, 3M provides a good example. 3M utilizes a number of basic principles in its JIT program, four of which directly affect waste reduction:

- **Stockless production**—This term refers to producing only the minimum amount of material required for the next step in the process. It eliminates the creation of “just-in-case” inventories that can eventually become waste.

- **Customer/supplier networking**—Enhancing the customer/supplier relationship (internal and external) is an integral part of the JIT production system. Effective communication and accurate requirements are necessary so that exactly the required amount of material reaches the right point at the right time. In this way, the risk of production mishap is significantly reduced and the production process moves efficiently with no unnecessary waste.

- **Pull system**—This term refers to a flexible, “reactive” mode of operation under which a production step is carried out only when required to satisfy a “downstream” need. That is, the work center “pulls” inventory from the supply points as needed, in contrast to conventional manufacturing methods, which “push” inventory forward. This principle, which can be applied whether the next step is internal or external, eliminates the need to create any type of inventory.

- **JIT transportation**—Under the JIT system, raw material, component parts, and supplies must be delivered to production facilities exactly when and where they are required in the manufacturing process. Delivering too early builds unneeded inventory, while delivering too late shuts down production. Moreover, finished goods must be moved out as soon as they are produced to keep the plant from getting overcrowded.

### Coordinating and Monitoring Efforts

Purchasing and inventory management practices can only be effectively controlled where there is coordination between the people in charge of purchasing and those in charge of production and shipping. Coordination is especially important where a company uses a wide variety of raw materials in different production operations for different products.

In addition, efficient inventory control requires monitoring. Start by taking an inventory of stored materials (and be sure to properly dispose of unusable and obsolete items). Then closely monitor raw materials inventory, including the type and amount of materials needed and when and where they are needed.

### Benefits of Improved Inventory Control and Purchasing

The benefits of improved inventory control and purchasing practices include reduced costs for
raw materials, decreased disposal costs for wasted materials, a lower risk of spills resulting from reduced handling and storage requirements, and a decreased need for storage space (which frees up space for production).

Purchasing and inventory are areas where modest and inexpensive changes can yield significant cost savings. For instance, one manufacturer of polyvinyl chloride products used improved purchasing and inventory control to reduce out-of-date and off-spec raw materials by over 50 percent. Techniques used included purchasing containerized rather than bulk materials, reducing purchase quantities, and separating and reusing excess materials where possible. The program took six months to implement, incurred only a negligible cost, and is saving the company $50,000 per year in raw material and waste management costs.

Notes
4. Minnesota Department of Administration, FY 94 Pollution Prevention Summary Report.
6. Id.
8. Id.

For additional information on improving purchasing and inventory control:

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