source

Minnesota Technical Assistance Program

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preventing pollution

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Supply lock down

Endocardial Solutions, Inc. knew the answer to high supply costs wasn't putting a lock on the supply closet.

MnTAP intern Kevin McGuire test-cleans a catheter in his redesigned solvent bath.

"We'd been looking at scrap cost, component shrinkage and finished product scrap," said Mike Costello, director of manufacturing at Endocardial Solutions, Inc. (ESI). "Those costs were about $20 per (catheter) unit. We looked at consumables. They were costing around $35 per unit—almost twice as much."

Costello tracked the supply costs for producing its catheters, used for diagnosing a heart abnormality. "We were looking to save money and that's where there was the most to save," he said. "We made the big pie chart and a few of the items made up over half of the supply cost."

Costello requested a MnTAP intern to investigate ways to reduce the four most-costly supply items.

Clean room wipes

The intern evaluated the use of wipes in the clean room, where catheters are assembled. ESI used two grades of wipes in 12 different operations.

Only minimal particle shedding is acceptable for wipes used in more critical steps—like those near the end of production. The less particles shed, the more expensive the wipe.

The intern observed that most employees did not use the full surface area of the wipes. He instituted smaller wipes at several of the work stations, reducing solid waste by 950 pounds per year, saving $8,800 annually.

The intern learned that wipes could be laundered, like lab coats, at less than half the cost of purchasing new. The intern wrote procedure changes to designate which work stations could reuse wipes. Laundering wipes reduced solid waste by an additional 500 pounds per year, saving $5,200 annually.

Fluorinated solvent losses

ESI uses a fluorinated solvent to dry and clean catheter parts and assemblies at various points in production.

Catheter surfaces were hand cleaned in three production steps using a solvent-soaked wipe. Technicians folded oversized wipes and used a squirt bottle to soak them with solvent. Switching to smaller wipes, that did not need folding, helped reduce the volume of solvent absorbed. Also, plunger cans that pump a small, uniform volume of solvent to the wipe replaced the squirt bottles, cutting solvent use from 16 to four grams per use. This reduced solvent use by about 32 gallons per year, saving $7,000 annually.

To remove water residue left from cleaning, catheters were immersed in a solvent-filled tray. A significant

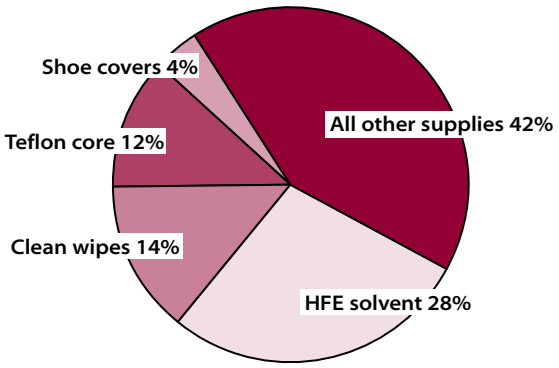
(continued)

(ESI, continued from cover)

amount of solvent was lost through splashes, spills and absorption during solvent transfer and filtering. The intern redesigned the bath to reduce exposed surface area and make solvent transfers easier.

Because the bath's main parameters are staying the same—like the size of the bath and the time the catheters reside in the bath—ESI doesn't need to revise the basic validation for the procedure.

Catheter Supply Costs (the big pie chart)



The bath will be continuously filtered instead of filtered once a day. The cleaner fluid will reduce the potential for contaminating catheters with water or particulate. By reducing the number of transfers needed each week, ESI will save $7,000 annually from reduced solvent losses.

Reusable shoe covers and Teflon rod

Disposable booties were replaced by launderable, over-the-calf shoe covers. Over the expected three-year life, ESI will cut solid waste by 1,300 pounds per year and save $5,100.

ESI uses Teflon rod as a form to braid wires around when building the catheter's inner structure. Although the intern was not able to reduce this waste, he discovered that the company could reduce its cost by $4,200 by purchasing with an annual contract. He also set up a recycling service for the used rods.

"Kevin is a really hard worker. It was incredible to see his energy level," commented Costello. He was so pleased with Kevin's work that he helped the intern obtain a full-time engineering position with St. Jude Medical, which purchased ESI in 2004.

See the complete intern project summary online at <mntap.umn.edu/intern/projects/endocardial.htm>. ■

Air alert season

While some might curse cold Minnesota winters, those winters give us a reprieve from pollen allergies and ozone alerts. But, air quality alerts from particulate matter are an issue year round.

Air quality alerts are triggered by four pollutants: carbon monoxide, fine particulate matter (PM), ground-level ozone and sulfur dioxide. Ground-level ozone is formed in Minnesota summers when volatile organic compounds (VOCs) interact with nitrogen oxides (NOx) by a chemical reaction involving heat and sunshine.

As well as causing health problems; air pollution can have a significant impact on the economy, according to the Minnesota Environmental Initiative's Clean Air Minnesota program. If the Twin Cities metro area exceeds federal air pollution standards, it may be designated as a "non-attainment" area. This would mean imposing costly mandatory controls to reduce air pollution. A Minnesota Chamber of Commerce study concluded that complying with such a regulatory program could cost Minnesota citizens and businesses between $189 million and $266 million each year.

Minnesota Pollution Control Agency (MPCA) reports that Minnesota's ambient air is at about 80 percent of the new federal ozone and fine particle standards. The Twin Cities area had seven alert days last summer (Duluth three, Rochester and St. Cloud each had five)—the cool summer helped minimize the number of alert days. This year, the Twin Cities has already had three alert days.

Clean Air Minnesota offers the following suggestions to employers to reduce air emissions:

Air pollution alert day recommendations

Activity	Pollutants reduced		
	VOC	NOx	PM
Employee commuter incentives (transit, telecommute, carpool)	X	X	X
Refuel employee vehicles after 6 p.m.	X		
Postpone lawn/landscape maintenance	X	X	X

More information on air quality alerts, including links to MPCA's daily air quality index, see this article online. ■

site visit

Port placement

Kyle Bartholomew, MnTAP FRP specialist, reviewed Precision's part dimensions to analyze resin flow through the mold.

Because regulations are pushing fiberglass reinforced plastic (FRP) shops to control hazardous air pollutant (HAP) emissions, Precision Fiberglass Products, in Grove City, was testing Light RTM—a reduced air emission technology. But, defects were at 50 to 60 percent.

The company builds lots of big FRP parts for agricultural vehicles, boats and other applications. It typically uses open molding, with operators spraying glass and resin onto a mold. The spraying releases styrene emissions which can negatively impact health and the environment.

Closed molding uses a two-part mold, with an injection port that pumps resin in and a vacuum port, near the opposite end, that draws the resin through a glass mat to coat the entire mold. Because the mold is closed, air emissions are essentially eliminated.

Problem

"We were testing RTM-lite and having a high reject rate," said Bob Meyer, pattern and mold maker at Precision. "Some parts worked fine. Other times, the resin wouldn't completely fill the mold."

The resin was not able to completely circle the mold before being pulled into the vacuum port, leaving a bubble of air at the end of the mold—resulting in a defective part.

Kyle Bartholomew, MnTAP's FRP specialist, helped the company work through some of its start-up issues with Light RTM. "I spent a day at Precision thinking real hard about that bubble," said Bartholomew.

Solution

Bartholomew worked with Precision to determine how the resin flowed through the mold; he also discussed the problem with a few FRP experts. He determined where to move the vacuum port so resin would flow properly. "When they changed the port, the effect was immediate—they got good parts right away," noted Bartholomew.

An industry rule of thumb is to set the vacuum port away from the injection port by 65 percent of the length of the mold. "It's common practice to move the ports, but I don't think port placement needs to be so much trial and error. Why not get it right the first time?" Bartholomew questioned.

"Kyle asked lots of questions and tried to find out what we could do to improve our situation," said Meyer. "He asked the technical questions that I didn't have the know-how to ask."

By improving resin flow, defects were reduced, cutting polyester resin and fiberglass waste by 300 pounds and saving $1,000.

After testing this technology, Precision has a better understanding of Light RTM. "We'll use RTM-lite again in the future if the opportunity arises, when we have the right customers," said Meyer.

Contact Kyle Bartholomew, MnTAP, at 612/624-4633, for help with closed mold, low HAP gel coating, nonatomized spraying and robotics to reduce FRP emissions. ■

FRP Demo Day: closed-mold technology

MnTAP is sponsoring Seeing is Believing, a Fiberglass Reinforced Plastics Closed Mold Demo Day, to showcase closed-mold technology on Wednesday, June 22, 2005, at Century College in White Bear Lake.

The event will feature demonstrations of Light RTM, vacuum infusion and low VOC gel coats. Larry Craige, American Composites Manufacturing Associations (ACMA) is the keynote speaker, addressing what continued regulatory emphasis on worker safety and improving the environment means for fabricators.

More information at <www.mntap.umn.edu/fiber>. ■

Peddling electronics in the EU

Get the lead, and other toxics, out

Manufacturers whose electronic or electrical products are sold in Europe or whose components are in products sold in Europe need to comply with RoHS and WEEE.

Photo: Scott Andre, MOEA

RoHS

Restriction of certain Hazardous Substances (RoHS) is a European Union (EU) directive intended to phase out the use of several particularly toxic substances, namely cadmium, hexavalent chromium, lead, mercury, polybrominated biphenyls and polybrominated diphenyl ethers in electrical and electronic equipment products.

Companies face financial risks if their products are non-compliant after the July 1, 2006, effective date and, worst case, are banned from multiple countries.

According to Jeff Phillips, international trade representative with the Minnesota Trade Office, manufacturers must verify that the components used in their end products are RoHS compliant. Documented compliance must be available for each component. Suppliers may design their own materials declarations or certificates; no standard format is available. No special marking or testing by independent third parties is required.

WEEE

Waste Electrical and Electronic Equipment (WEEE) is an EU directive that requires manufacturers to finance the collection, recycling and recovery of waste electronics and electrical equipment. Package labeling requirements are also included in the directive. It is scheduled to take effect August 13, 2005, with additional requirements taking effect December 31, 2005.

For WEEE compliance, manufacturers will need to register to the National Clearing House which is being developed.

Benchmark Electronics

Benchmark Electronics, in Winona, received a grant from the Minnesota Office of Environmental Assistance to pilot the use of lead-free soldering in its circuit board assembly process. Benchmark expects to eliminate up to 8,300 pounds of lead at its facility and expand into new markets with a lead-free product. This emerging pollution prevention technology is one way that companies are getting the lead out to meet the RoHS directive.

Assistance

On June 21, 2005, the Surface Mount Technology Association is sponsoring the one-day workshop "Complying with RoHS" in St. Paul. It will focus on experiences that companies are having to solve the many difficult compliance challenges.

See this article in the online Source for links to the RoHS and WEEE directives. For additional information on these directives, contact Jeff Phillips, Minnesota Trade Office, at 651/297-8841. ■

Ingredients: raw material, wastewater...

No product label is likely to list "wastewater" as an ingredient. But, wastewater might be dilute product that can be formulated into the next batch.

A formula for reuse

Although Abby Science Labs, a formulator of skin care products, cleaners and other supplies, stays away from petroleum-based products—focusing on organic solutions—its landlord wanted a letter from the U.S. Environmental Protection Agency (EPA) saying that it is okay to drain its wastewater into the septic system.

"No one appears willing to write that letter so we started testing and putting rinses in a holding tank while we evaluated disposal options," said Greg Boster, Abby's president.

Boster called Karl DeWahl, MnTAP chemical engineer, to ask about what is allowed in a septic system.

"When we called Karl, he started a discussion about reusing the solutions," Boster said. "I thought 'How simple! Why didn't we think of that?' Now, instead of storing all of the rinse solutions together, we store them on a per project basis so we can reuse them."

Abby tests the stored rinses to ensure that contamination is not a risk.

The Ham Lake company will save $2,000 a year in water and disposal costs. "This gives us peace of mind more than anything. We know for sure that we are not creating an issue in the drain field," noted Boster.

Reuse in dairy

Cheese production creates salt whey, a byproduct containing primarily water and salt.

Unable to discharge salt whey into its wastewater treatment ponds because of the high chemical oxygen demand (COD), Bongards Creameries, in Norwood, separated and hauled the waste to St. Paul for treatment. At $2,800 a week, freight and wastewater strength costs were expensive.

Brent Jewett, Bongards' plant manager, wanted to reuse this byproduct as an ingredient. "Everything in the salt whey already exists in process cheese," he said. "Fat and salt are dairy ingredients."

Bongards worked with Lloyd Metzger, assistant professor in the Department of Food Science and Nutrition, at the University of Minnesota. Metzger researched the use of salt whey as an ingredient in process cheese.

Over two years, he gathered samples and ran tests that showed the "waste" whey could effectively and safely be used as an ingredient. The company used those findings to receive approval from the Food and Drug Administration (FDA) to allow reuse.

"Right now, we're using about half of the salt whey in product," said Jewett. "Eventually, we hope to be using it all. Then we expect the savings to increase."

Because the company produces processed cheese in the same facility as its natural cheese, it's economical to reuse the salt whey. This saves Bongards $144,000 in raw materials and in waste management fees.

More information

Regardless of the product you formulate, evaluating your wastewater discharges for potential reuse opportunities may be a recipe for savings. For assistance with reusing waste streams call MnTAP.

Septic systems are regulated in order to protect underground sources of drinking water from contamination. More information is available in the U.S. EPA fact sheet *Underground Injection Control (UIC) Class V Wells;* see link in the online Source.

For regulatory information, call the MPCA Customer Assistance Center at 651/297-2274 or 800/646-6247. ■

TrueRide tweaks,* reduces scrap

TrueRide, a Duluth company that designs and constructs skateboarding parks, would like to have its raw materials going into a funbox* rather than the Dumpster.

"My desk looks over the Dumpster. I can see it right now—it's full," commented Greg Benson, owner of TrueRide. "I ask myself 'How do we reduce that? How do we put less stuff in there?'"

The company should feel stoked.* It has made several improvements to reduce waste, including starting two new businesses.

Wanting more than an exchange

Benson was signed up as a Materials Exchange user, listing several scrap materials. He had calls from people who needed small quantities, one time, from what he'd listed. What he wanted was someone who could use his scrap materials on a consistent basis. Unable to find that arrangement, Benson did a 180* and found ways to reduce waste and developed new uses for some of the scrap.

Benson knew the company would be more efficient by generating less scrap to begin with. The company looked at its operation and found ways to cut waste by:

- Purchasing materials at more optimal sizes,
- Re-engineering products to decrease waste and
- Nesting little parts in with big parts when cutting out patterns with a CNC router.

These steps cut TrueRide's waste, eliminating one 30-cubic yard Dumpster per month. But, Benson still saw one full Dumpster.

New businesses out of scrap

To further cut scrap waste, TrueRide started two new companies. The more successful spin-off business, Epicurean Cutting Surfaces, makes cutting boards from scrap wood fiber composite laminate.

Benson knew that the laminate material had been used for years to make professional grade cutting surfaces, but these weren't available at the retail level. Now, TrueRide's scrap turns into high-end, consumer cutting boards, sold in over 1,000 retail stores. The product is so successful that Epicurean has to use new material as well as TrueRide's scrap to make the cutting boards.

"This product developed because we had this waste," Benson said.

Benson's fledging business, Loll Designs, uses TrueRide's high-density polyethylene (HDPE) scrap to make lawn furniture. The product can only be priced competitively if scrap, not new, material is used. Benson plans to reuse 8.5 tons of scrap HDPE this year. The lawn furniture will start selling this season at stores in the Duluth area.

Materials exchange

"We have scrap plywood. If anyone needs it on a regular basis, we'd like to give it to them." Benson added, "We could even cut shapes out for them." ■

*See link in the online Source for a list of skateboard lingo.

materials exchange

A materials exchange program lists one company's unwanted material and makes it available for use by another company. The lists below are examples from the Minnesota Materials Exchange.

For more information, call MnTAP at 612/624-1300 or 800/247-0015. Or, visit **<www.mnexchange.org>.**

Materials available

Drums, plastic: 400. 55-gallon. Closed top with two bungs. Free. Park Rapids. [17005]

Granite scrap: Amount varies. Smaller than two square feet, 0.75 to 1.25 inches thick. Various shapes and colors. Polished on one side. Some broken edges. From a countertop manufacturer. Free. Rochester. [16892]

Gravel: 35.5 tons. 1/4 to 3/4 inches. From a flat asphalt roof. Will remove if transportation provided. Must pay shipping. St. Paul. [17063]

Mold release compound: 55-gallon drum. For use in mold applications, used above 140 degrees Fahrenheit. Must pay shipping. Chanhassen. [17058]

Photocopier staples: Seven cartridges. Ricoh Type D. New. Free to nonprofits. St. Paul. [17093]

Polyolefin: Amount varies. Teslin Synthetic. Seven millimeters thick. Microporous surface. Free. Worthington. [3883]

Spray cans: 96. 12 ounce. New. Level 3 aerosol cans. Can be filled for one time use. Free. Anoka. [17098]

Materials wanted

Baling twine, sisal: 100,000 pounds per year. No knots. Will pay fee. Winona. [17107]

Boxes, Gaylord: Several hundred per month. In good condition. Will pay fee. Fergus Falls. [17055]

Chairs: 10. Wood or metal. In good condition. Must match. For a nonprofit. Prefer free. Minnetonka. [17085]

Food waste: Any amount. No meat. Will provide collection containers and transportation for a fee. Rosemount. [17075]

Lumber: Any amount. 2 x 4 inches and 4 x 4 inches. For nonprofit. Prefer free. Silver Lake. [17020]

Packing peanuts or bubble wrap: Any amount. Prefer free. Two Harbors. [17094]

Packing peanuts or Styrofoam: Any amount. Will pick up in Itasca or St. Louis Counties. Prefer free. Grand Rapids. [17090]

Pallets, wood: 25 to 35 per week. 40 x 48 inches. Prefer free. Savage. [17078]

Successful exchanges

- A cabinet manufacturer in Fergus Falls gives 75 tons of sawdust a week to local farmers to use as animal bedding.
- A medical device company donated 1,000 tin snips to a trade school and several high schools.
- A fluid-management equipment company donated $1,000 worth of sodium hydroxide to a paving company. ■

Beneficial Reuse: chips and eggs

What do wood chips, chicken eggs and incinerator ash have in common? They are all candidates for beneficial reuse, according to Matt Herman, MPCA.

In an effort to keep waste out of the landfill, MPCA is assisting people who generate solid waste with identifying beneficial use options. The solid waste utilization rules identify three conditions under which wastes can be used rather than disposed of.

1. Wood chips, and 16 other specified wastes, have a **standing beneficial use** determination. When reused in accordance with applicable rules, MPCA does not need to be contacted.
2. For chicken egg shell waste, the agency is making a **case-specific beneficial use** determination to see if the material can be used as an alternative liming material to adjust the pH of soils to facilitate plant growth.
3. Incinerator ash from a municipal burner is being tested as a component in parking lot asphalt. This **demonstration/research project** is undergoing extensive monitoring and testing and is considered exploratory. The results of this type of research may be used as future justification for a case-specific beneficial use determination.

For more information, contact Matt Herman at 651/296-6603 or see <www.pca.state.mn.us/waste/sw-utilization.html>. ■

helping businesses implement industry-tailored solutions that maximize resource efficiency

mntap

The **Minnesota Technical Assistance Program** helps businesses and industries maximize resource efficiency, prevent pollution and reduce waste—which saves time and money. Located at the University of Minnesota, MnTAP provides free technical assistance tailored to individual businesses. By reducing waste and increasing efficiency, companies save on disposal and raw-material costs and make working conditions healthier and safer for employees.

MnTAP is funded by a grant from the Minnesota Office of Environmental Assistance to the University of Minnesota, School of Public Health, Division of Environmental Health Sciences.

calendar

Lean Administration—How do you take lean practices beyond manufacturing? June 9, Bloomington, MN. Sponsored by Manufacturers Alliance, 763/533-8239.

Hennepin County Hazardous Waste Management Training June 17, Brooklyn Park, MN. Sponsored by Hennepin County Department of Environmental Services, 612/348-8100.

Air & Waste Management Association Annual Conference June 21-24, Minneapolis, MN. Sponsored by 3M, 412/232-3444.

Complying with RoHS (the European Union's Restrictions on Hazardous Substances (RoHS) Directive) June 21, St. Paul, MN. Sponsored by the Surface Mount Technology Association, 952/920-7682.

Healthcare Environmental Awareness and Resource Reduction Team (HEARRT) Meeting July 14, St. Paul, MN. Sponsored by the Minnesota Office of Environmental Assistance (OEA) and MnTAP, 612/624-4635.

Managing Daily Improvements July 14, Minneapolis, MN. Sponsored by Manufacturers Alliance, 763/533-8239.

24th Annual National Recycling Congress & Expo August 28 - 31, Minneapolis, MN. 202/347-0450.

For more information and links to Web pages for these events, visit MnTAP's online calendar at <mntap.umn.edu/resources/cal.htm>.

Editor/writer: Deb McKinley. This newsletter is sent free to Minnesota businesses and is available online at <mntap.umn.edu/source> and in alternative formats upon request.

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