Plastics Facilities

WISHES CAN COME TRUE

When a senior vice president of a packaging company received a **$2,000,000 plus proposal for automated material handling equipment**, he went for a walk in the plant to think it over. He wondered if he was getting an **off-the-shelf solution to a poorly defined problem**.

He noticed that some employees in the plant appeared to be less than productive and he wanted to know why. He wanted hard information to cost-justify a project of this magnitude.

He found the hard information he needed through the **technical decision support capabilities** of the Sievert Group. With the benefit of the information from a man-machine-interface study, the real, process bottlenecks became apparent.

The packaging company found that it could automate certain production functions on the packaging machinery, redirect some members of its workforce, and avoid making a significant financial commitment to **non-value-adding activities** or equipment when it had the right information.

MANAGEMENT CONCEPTS

- Through-the-Wall manufacturing-the Least Sum of All Costs
- Housing an Acquired Business
- New Controlled Environmental Tool Room-More for Less
- Technical Decision Support-Non-Value Adding Activities

One international manufacturing company with a large injection molding operation needed space to **house an acquired business** that produces a complementary product. However, investing in new space was undesirable and inconsistent with budgetary constraints. The company also wanted to minimize its inventory and improve its manufacturing processes.

The Sievert Group helped the management explore and evaluate alternatives for arranging manufacturing machinery into flexible work cells that would reduce process complexity, waste, and costs. With The Sievert Group's recommended process arrangement, the company freed up 20,000-square feet of space for its newly acquired subsidiary.

When one extruder upgraded its facility with a **new automated tool room** it reduced process cycle time and manpower requirements. Management showcased the new capacity to customers. Beginning with a $1,200,000 price tag for the project, The Sievert Group guided this company to its goals with an approximate cost of $250,000-21% of the original budgetary estimate. With value engineering and project programming, this extruding company optimized its existing facility space over building new space for its automated tool room. The company wanted to capitalize on its core-competency-its in-house design and manufacture of extrusion dies for quick changeovers for its customers' marketing display requirements.

They needed space with a **steady-state environment-temperature and humidity**-since variation affects the tooling's ability to maintain tolerances. Now, the company runs its EDM machines around the clock in an unmanned setting and maintains quality levels. The point-**getting more for less**!

The Sievert Group presented **"Ten Strategies for Using Facility Assets to Gain and Sustain a Competitive Advantage"** at the Society of the Plastics Industry (SPI) Southern Conference, Hilton Head, South Carolina.

The Sievert Group enables businesses to optimize assets and generate profits by providing comprehensive facility and process support services including plant layout and design, facilities engineering and construction, mechanical system and machinery installation, customized training, maintenance and repair, value management and productivity improvement.

JUST-IN-TIME DELIVERY OF A NEW FOOD PACKAGING PLANT

Sound Project Management and Good Design are the Basis of a Successful Project

A large plastics processing company received a contract from an important food processing customer to manufacture a new type of plastic container. The plastics company had the technology but lacked the facilities for producing the new product. There was an immediate need to build a new facility capable of full production in six months. Renovation of an existing building located in the southern United States was determined to be the fastest and most cost effective way to satisfy the customer's requirements.

The plastics company believes in lean manufacturing and maintains a small engineering and program management staff to

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BLOWING OUT THE STOPS ON PRODUCTION

The proper equipment to support the process, installed properly, ensures the molding process reaches full capacity and maximum productivity.

It seems easy to add a molding machine and assume you have increased capacity by a specific percent or number of pieces produced. However, that assumption must be based on the capacity and availability of certain plant utilities. Take for instance the situation in which a molding company decides to increase production-let's say, double the output. At first blush, the additional blow molding machines to increase capacity mean greater profits and an incremental increase in demand for compressed air.

However, the plant already has a large, high-pressure compressed air system. It appeared that adding another air compressor to the existing compressor bank would do the job. Yet, there's more to a compressed air system than compressors.

Utilities like compressed air systems can be process elements and a part of the process support system. It's worthy to note that compressed air often makes direct contact with the molded parts and drives machine components. In that instance, product contact means that quantity and quality of compressed air is critical to the company's profit profile.

As the company realized, the quality of the molded products and the number of rejects directly affects profits. They were ready to blow out the stops on production and double their capacity. But, they chose to have The Sievert Group review their utility systems first.

Sievert engineers and technicians found a large, high-pressure compressed air system that needed refurbishing. Problems such as weld cracks, scale, rust, and ineffective air dryers were present. These problems meant moisture and contaminants in molded products and a source of machine fouling and degradation.

Further, in high-pressure piping systems, even small pits and cracks in welds and insufficient expansion joints and shock isolators are a setup for process downtime and serious accidents if the system fails. By understanding the needs and the business implications of the processes, The Sievert Group analyzed, evaluated, and upgraded the systems that were necessary for the additional production.

Just as every part you produce consumes a unit of machine time, it also consumes a portion of your utilities' capacity-btus, kilowatts, gpm, and cfm or maybe all four. The cost of misunderstanding critical plant systems is measured in elevated reject rates, downtime, as well as increasing your exposure to accidents.

The fact is that plant infrastructure-the utilities- only has so much capacity. If you add production equipment you also increase the demand on your own utilities. There is no way to avoid it. You need to know what makes your capacity possible and The Sievert Group can make increased capacity a reality for you.

THE VALUE OF SIEVERT'S APPROACH TO ENGINEERING AND CONSTRUCTION MANAGEMENT

If you want to stay in the plastic blow molding business, you know you must look at the cost of every element of your product and come up with a combination of costs that provides your customers with what they want at an acceptable profit for your company. As well, you've no doubt also seen that the pressure is on plastics manufacturers to deliver their products to their customers at the lowest possible price and in the shortest possible time. These are imperatives that have led manufacturers to re-profile their business and business practices.

Generally, greater profits for your company depend on you being able to provide your customers with products for the **least-sum-of-all costs** for all resources. Typically this includes such items as resins, type and number of personnel, processing, material handling, packaging, and shipping the product to the customer.

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Also, the focus of late in plastics manufacturing is on achieving a **time-based advantage** to gain or maintain a competitive position in the market. Gaining a time-based advantage depends on additional business constraints. These constraints- time and distance- can be addressed by reducing the distance between supplier and and customer. That means the distance from supplier to customer is a determining factor in reducing transportation costs and being able to reduce those costs enough to get business.

In the presence of these constraints, suppliers are finding that by locating their production facilities as physically close to their customers as possible they can accommodate their customers just-in-time manufacturing strategy.

This practice also eliminates shipping, material handling, and warehousing expenses from the supplier's cost equation. The concept is referred to as **through-the-wall manufacturing or co-location**. The usual options in through-the-wall manufacturing are leasing space inside the costumers' plants or relocating operations as close as possible to the customer's facility.

When contracts are rewarded based strictly on first cost and the ability to meet the customers delivery schedules, the difference in profitability can lie in the cost of facilities and location. That means through-the-wall manufacturing may be the deciding factor in winning, keeping, or loosing a customer contract.

Further, some contracts are time-based and are awarded based on the ability and capacity of the supplier to begin deliveries that match with the primary customer's production schedule.

A case in point

One national plastics company manufactures plastic bottles with a blow molding process. The company received a large, multi-year contract to produce bottles for a primary customer. The obvious consideration in winning that contract was pricing the bottles that included being the lowest cost supplier and being able to meet production requirements.

Here, a significant factor in the cost structure was transportation. Also, for this manufacturer, empty bottles meant shipping air. So reducing or eliminating the shipping requirement became an attractive option. The company knew that manufacturing in a warehouse with approximately, 1/4-million square-feet of space next to their customer would eliminate their transportation requirements and its cost.

Another aspect of the contract called for an annual unit output in the hundreds of millions and in unit volumes from twelve ounces to 1 gallon. That meant new process equipment and production support utilities. However, a significant challenge came in the form of converting the warehouse space into manufacturing space and installing the process equipment within a 6-month time frame to meet the costumers production requirements. That meant a complete design-permit-construction and commissioning project.

This manufacturer knew the increase in capacity meant additional production staff. Although they had a staff of competent process engineers, this project was larger and more complex than they had done before. They also needed additional support to engineer and oversee implementation of the project. However, they new that engineering would be necessary early in the project to prepare realistic budgets and ensure the projected return on investment (ROI).

To complement the in-house engineering staff, they needed technical support to make the project and profits a reality. The answer was outsourcing the project to a multi-disciplined, engineering firm- The Sievert Group-with construction management experience in the plastics industry and a recognized history of getting things done on time and within budgetary constraints. The tight budget for the facility and process support requirements necessitated a **value engineering** analysis. Value engineering incorporates an economic evaluation of practical alternatives that meet an acceptable ROI.

The Sievert Group performed a valued engineering study that **identified realistic alternatives** to convert the warehouse to manufacturing space to meet an unrealistic, 6-month schedule from engineering through construction and commissioning. This enhanced the company's ability to manufacture, warehouse, and deliver product to its customer. The savings realized from using the Sievert project delivery system more than offset the fee for engineering and construction management. After the programming and value engineering study, final design, permitting, equipment installation, and commissioning became a straightforward process. The modernization process proceeded while avoiding the expense of a new plant.

The manufacturer could predict the cost of operating the production support equipment accurately. Also, the value engineering study provided the information that was necessary to calculate the cost of bringing the production system on-line.

Briefly, the project included the following technical improvements and their cost related implications:

- A **systems design recognizing the critical nature of the process** to maintain full production at all times,
- A **design responsive to achieve the lowest energy usage** and the application of variable frequency drive technology,
- Incorporating **control, balancing, and monitoring devices in the design to system performance** under all conditions.
- Incorporating **instrumentation to benchmark system performance** to obtain data that will be used to determine if additional production lines can be added to the piping and pumping systems,
- Incorporating **energy management systems**, and
- Achieving maximum control during construction through a **project delivery system resulting in major savings to the owner**.

Ultimately, this manufacturer planned to hire more than seventy-five people for its new facility - a modernized and converted warehouse. The company realized that their engineering and construction management firm (The Sievert Group) was, in fact, an extension of its own management team. Through building a strong relationship with The Sievert Group, the company avoided poor decisions and obtained realistic budgetary information about the facilitation costs of accepting a manufacturing contract early in the project life cycle.

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meet normal workloads. The Sievert Group was retained to provide facility programming assistance, engineering-design and project management support services for installation of extrusion lines and related plant operations.

The project scope involved installation of extruding lines, design of plant water cooling systems, compressed air, heating and ventilating systems, power distribution and lighting systems, material handling systems, fire protection, architectural and structural support systems. Additionally, space was needed for administration offices, lunchroom, restrooms/locker rooms, quality control lab, tool room, maintainence shop, grinding/blending room, mechanical and electrical rooms.

After evaluating the limited stock of existing facilities available the plastics processor decided to **lease 40,000 square feet** of warehouse space and convert it into a facility for optimizing food packaging. Sievert completed the **programming and preliminary design documents for owner review and approval in six weeks**.

The preliminary design documents were used to prepare a definitive construction cost estimate and substantiate the processor's initial budget expectations. Design must generally be about 25% complete to permit definitive estimates to be formed. **It turned out that the processor's budget estimate was grossly underestimated**. Moreover, during the preliminary design phase long-lead equipment (i.e., switchgear, chiller, cooling tower, pumps and material handling equipment) was specified, bid and ordered direct from suppliers to avoid project delays and contractor price mark-ups on equipment.

Sievert conducted a visual field survey and evaluated existing building systems serving the warehouse. It was determined that the existing roof structure was not capable of supporting the new process support utilities to be installed. Therefore, an independent structure was designed to support the new piping and conduit runs. During a review of the resin silo pad design criteria it was noted that existing silos to be relocated from another plant did not confirm with the local structural code requirements for seismic loads. Subsequently, the silos were structurally reinforced to meet the new requirements. The owner's plan for layout of the extruders and palletizers had to be shifted in order to miss existing column footings covered by the floor slab.

Sievert also advised the project owner of a shortfall in the existing sanitary sewer's capacity to accommodate potential overflows in the process cooling water tanks. Potential remedies to this problem included installation of a new larger sewer or installation of high water level alarms that shut down the system and interrupt production processes during an overflow condition.

The final design documents were completed for permitting, bidding and negotiating construction contracts with local specialty contractors three weeks after owner approval of the preliminary design and cost estimates. This case study demonstrates the importance of sound facility planning and getting Sievert involved with the project as early as possible.

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National Cup and Container Company, Jeddah, Saudi Arabia, Continental Diversified Industries and Banawi Factories.

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