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## **What's in the Secret Sauce for U.S. Manufacturing?**

### **Century Old Company Stays Competitive by Designing for Manufacturability**

For more than a century, the ATW Companies have been world-class suppliers of precision tubing and fabricated metal components. The Rhode Island based ATW Companies is the parent company of A. T. Wall Company, located in Warwick, RI, Judson A. Smith Company, located in Boyertown, PA, and Parmatech Corporation, based in Petaluma, CA.

As a U.S.-based manufacturer, ATW differentiates itself by its skill in designing for manufacturability, using its top notch engineering support and superior prototyping capabilities. In addition, its proprietary metal injection molding (MIM) technology has also earned it a place at the table of competitive U.S manufacturing companies.

Founded in 1886 as a supplier of metal findings to the jewelry trade, the ATW Companies now specialize in the development, prototyping and manufacturing of rigid and flexible microwave tubing and components, custom seamless tubing in a wide array of alloys, coined and drawn stamped metal components, laser fabrication and welding of small diameter tubes, computer numerical controlled (CNC) machining of metallic and non metallic materials, and manufacturing of metal injection molded (MIM) parts. About 60 percent of the firm's products are used in medical, defense and military applications.

Company president and 5<sup>th</sup> generation owner Peter Frost cites his family's long history of U.S. manufacturing, his belief that "actually manufacturing products" must be the underpinning of an economy, and his personal commitment to maintaining a proud tradition, as the underlying foundation of the firm. "The industries we serve require a variety of different capabilities, and what gives us leverage is that we can supply all the services required under one family of companies that share the same level of ethics, and commitment to quality, service and performance."

What this means is that the ATW Companies has found a niche as a valuable resource and strategic partner with its customers, rather than simply a supplier. By focusing on the factors driving its customers' business and communicating with them to solve their problems, the firm has earned a reputation for making its customers successful.

#### **Design for manufacturability**

Design for manufacturability (DFM) is perhaps the most important way the ATW Companies differentiate themselves and remain competitive in the face of global competition.

Manufacturability is the factor that can make or break the economic viability of a particular product. Nowhere is this more evident than the medical device industry, and in particular minimally invasive surgery, one of the key industries that ATW serves.



*Judson's laser technology offers extremely precise tube cutting capabilities*

Device designers may already have specifications on drawings, but frequently there are ways to make modifications to get to an end product that is easier to build, economically producible in volume, repeatable, and highly reliable. Obtaining good surface finishes, tight dimensional tolerances, and going from a prototype to an economically producible volume that may number into the tens of thousands is challenging.

Judson Smith, which manufactures custom and precision tubing products and is one of the most highly

specialized tube fabricators and machined component manufacturers, originally entered the medical device market by providing heat exchange tubing for blood oxygenators in the early 1980s. It has since been involved in a number of projects where the metal tubing it supplies is an important component of new devices used in tools for minimally invasive surgery.

The success of the tubing portion of these complicated medical devices is improved if the tubing company is involved in the project from the initial concept to full production, and Judson Smith relishes the design challenges of both small and large projects. “At Judson Smith, problem solving is a big part of our service, and we specialize in diving in to offer design solutions to assist our customers moving from design concept to market,” said Robert Kelly, Judson Smith’s engineering manager.

“When developing new products, designers often have a long wish list of features for a particular component,” says Kelly. “Judson Smith emphasizes front end communications between our engineering group and the customer to develop a realistic design that obtains the highest cost benefit from a component. Cost reduction is at the tops of everyone’s list, and we focus on providing a component or assembly that is cost-effective.”

For example, the company used a DFM process as part of the development of a unique forming machine to construct a trocar, which is used to pierce the skin and serve as a porthole into the body cavity for a variety of laparoscopic procedures. Along with being a design improvement, the solution provided a cost structure to support the new design, keeping the cost of goods sold to a minimum. Without the improvement, the part would have been too costly to manufacture.

Another successful example of designing for manufacturability in the medical device industry is Parmatech’s work on metal injection molding (MIM) parts used in manufacturing bariatric and laparoscopic instruments, as well as orthodontic brackets.

MIM is capable of producing complex, three dimensional shapes that are difficult or near impossible to manufacture using conventional fabrication technologies. MIM provides for complex shapes in a high volume manufacturing process, and supports the drive towards miniaturization of surgical devices and lowered costs for healthcare equipment. As a result of the trend towards miniaturization, most of the parts made with MIM technology weigh less than 50 grams, and can be additionally lightened by adding holes or pockets without sacrificing strength.



*Parmatech's MIM components are used in articulation gear for varying the direction of the working end of the device.*

“Manufacturing of metal components using MIM technology has enabled U.S. companies to stay within the U.S. for sourcing components, due to MIM’s high manufacturing capability and competitive pricing,” says Parmatech sales manager Dan Lauck. “MIM offers onshore capability that is a substantial savings over more costly machining options, fighting effectively against machining

offshore by offering MIM capability onshore.”

MIM parts can cost about 30 percent of a machined part, with high production rates and no individual part handling once stacked from molding. By using

DFM early in the design process, Parmatech works with designers to incorporate features that lend themselves to the benefits enjoyed by MIM.

One recent example is where medical engineers were seeking to build a next generation bariatric surgery device with a more robust platform. Parmatech responded to the customer request by conducting joint design reviews and discussions centered around design intent of the components, and the detailed manufacturing process needed to fabricate these components. Detailed discussions focused not only on the MIM parts themselves, but also on ways to control elements of the manufacturing process pertinent to subsequent steps in the process. “Our DFM takes into account elements that are critical to the manufacturing process as well as those critical to the overall product design,” says Lauck.

Similarly, A.T. Wall Company helps customers achieve significant cost savings by



*A.T. Wall's stamped parts*

finding ways to convert machined parts to stamped parts. In large volumes, stamping becomes a much faster method of manufacturing than machining, driving down production costs compared to traditional machining. The company has enhanced its stamping capabilities and is expert at piercing very small holes through very thick material. One recent example is for a fuel cell battery top, where A.T. Wall was able to pierce a .078 inch hole through .125 inch material, which far exceeds the industry standard.

According to John O'Brien, corporate sales for A.T. Wall Company, “We applied our design expertise, material knowledge, and careful monitoring of tool wear to develop a stamping solution that allows us to form material of higher than normal thickness with high precision, well beyond what is usually considered possible.”

Working directly with engineers in the initial phase of a development project allows A. T. Wall to meet numerous design challenges and come up with a cost effective solution.

“There are areas that will remain machined parts, but knowing where stamping fits could supply my customer a competitive advantage. In this way, we become a resource for our customers.”

## **Cost competitiveness - onshore versus offshore costs**

As a U.S.-based manufacturing company, the ATW Companies have long focused on driving out inefficiencies in their processes to drive down their per piece costs. “The days of passing on cost increases for inflation or operations are long gone,” says ATW’s Peter Frost. “We have to constantly find ways to be more efficient, and improve productivity to maintain our profitability.” The continuous improvements ATW makes enables the firms to share cost savings with its customers.

ATW notes that its U.S. customers are starting to see that calculating the total cost is trickier than just looking at the piece cost of an item. “Although U.S. labor rates are far higher, if you factor in quality, logistics, language, time, and potential communications problems, many of our customers are finding that overall offshoring costs may not be much different than sourcing in the U.S.,” says Frost.

Delays in communication, ability to get a product quickly, the unrecognized value of face to face time with a design team, and the ability to get on a plane and be in front of your customer quickly, are just a few of the less quantifiable aspects that should be part of the cost equation.

Frost notes that ATW focuses on providing the minimum piece price cost for a part, supplied defect free and on time, and delivered quickly. This saves money by reducing expenses associated with maintaining inventory sitting on shelves, managing vendors, and transportation. “We are frequently cost competitive if a true overall comparison is made.”

Adopting lean manufacturing techniques and continuously improving operational efficiencies is one way ATW is remaining competitive. As the quality of offshore sourced products has improved and comes closer to what is available in the United States, ATW has dug even deeper into lean practices, diving into individual processes to drive out any fat.

Another technique being used to reduce costs is vertical integration. ATW has brought in-house processes that may have been outsourced only a few years ago, where it makes sense and manufacturing space is available. For example, laser marking, pad printing, and heat treating processes have recently been brought in-house to reduce costs.

Carefully examining customer needs and developing stocking programs to meet them is another way ATW reduces costs or minimizes customer risks. The A.T. Wall Company has significantly reduced the lead time required for a vast majority of its products. Whereas other mills require financial commitment many months in advance, A.T. Wall carries raw material and finished goods stock so customers can wait to order their material until they know their project is actually proceeding, reducing their risks considerably. For example, A.T. Wall has developed a program to stock popular sizes of its waveguide in aluminum, copper, and brass on the shelf at all times, offering a 5-day turnaround, which is just not feasible from offshore suppliers.

The nimble company is also looking for ways to reduce its shipping costs to enhance its growing export trade. For example, A.T. Wall is exploring options for leasing warehouse space in Europe to service its customers in Europe, Israel, and Turkey. By shipping a container by sea and renewing stock monthly, it will greatly reduce the price it must charge customers, setting the stage for increased exports.

Another factor in the cost equation is that many of ATW's customers in the medical device and aerospace engine fields recognize that there is risk to offshoring raw materials for their products. Not wanting to jeopardize the overall quality of an instrument or engine, they are willing to pay a higher price for a component or assembly, in exchange for a greater degree of confidence in the product delivery and quality. For these customers, the tight tolerance, high quality components that go into products that affect life and death are worth paying for.

Of course in the quest to remain competitive, ATW has looked at ways to support the raw material portion of component costs by developing sources outside the U.S. in lower labor-cost countries. "Companies need to develop access to raw materials from low cost regions in order to survive," said John O'Brien, corporate sales for A.T. Wall Company. "ATW has had success in getting individual natives of particular lower cost countries to come to the United States as manufacturers representatives, learn what we need and then manage the supply chain for us in their own countries."

### **Quality systems increase value**

Quality systems have always been important to ATW, and the firms have been ISO 9001:2000 certified for several years. "Having the certification gives customers a sense of confidence that we will supply what we say we will on time every time," says A.T. Wall's Donna Parker. "However, there is no magic in the certificate. It's a lot of hard work by everyone involved, from the receptionist to the general manager because we consider servicing a customer or prospect the job of everyone in the company."

In order to be a player in the medical device industry, Judson Smith extended the quality systems for its tubing to meet the stringent medical quality level for orthopedic and medical device requirements contained in ISO 13485. Most OEMs require vendors to be ISO 13485-certified because this enables them to meet FDA requirements that flow down to vendors. Judson Smith adapted its quality systems to meet the ISO 13485 requirements for recordkeeping, material and traceability, so they mesh with those of major producers of medical devices.

"It is difficult for a firm of our size to meet these requirements, but we've been disciplined, and have a commitment, and achieved our certification a few years ago," said Judson Smith's sales and marketing manager John Shields. "This definitely opens up new opportunities for us in the medical device arena."

### **Look to the future – increased exports and expanded markets**

ATW is looking to increase its export trade as part of its strategy to remain competitive in the future. For example, more than 30 percent of A.T. Wall's business is in exports and the company sells its products in more than 30 countries, including China and India. To support and expand the export trade, A.T. Wall has added in-country commission-based sales representative who speak the native language and visit customers on a regular basis. The network of native sales representatives is key, since business customs vary so widely and miscommunications can stymie sales. A.T. Wall supports the rep network with trade shows, customer visits to key accounts and training.

"The bottom line is that people buy from people, not machines," says Donna Parker, A.T. Wall's director of sales. "To obtain and retain export-based business, you have to invest

in long hours beyond the normal work day and respond to emergency calls in a timely fashion. The question is, how badly do you want to grow?”

A final strategy practiced by ATW Companies is a concerted effort to promote its core capabilities with tubing, stamping, machining and laser cutting with an expanded customer base. The quest has led it to pursue a variety of green energy-based alternatives. “ATW Companies capabilities have expanded to meet our customers’ needs,” says Peter Frost. “We will continue to leverage our strengths as we expand into new markets and export our products around the world.”