

Micro Solutions Enterprises (MSE): Turning Technology Into Superior Quality

Yoel Wazana always seems to be smiling. The proud president of Micro Solutions Enterprises is beaming as he walks the freshly finished floors of the company's new Research and Technology Center. In the final stages of remodeling, this 14,000-square-foot facility epitomizes the commitment to quality that the company has embraced since its inception. According to Yoel, engineering and technology will be MSE's future, and hopefully, the future of the cartridge remanufacturing industry.

"This building is dedicated to developing technologies that will take us to that next level," Yoel said. "There are a lot of new things that we are working on in the next 12 to 18 months that are going to be incredible. We have the technology today and some top-secret things coming into place that nobody could have imagined. Our teams tackle challenges head-on and are always thinking outside the box. We are revolutionizing the way the cartridges are being manufactured."

The new Research and Technology Center is the fourth building at the company's headquarters in Chatsworth, Calif. (MSE is currently eyeing prospective locations for a new manufacturing facility in the neighborhood of 150,000 to 200,000 square feet to bring the entire manufacturing operation under one very large roof within the next 18 months.)

It has been almost five years since MSE was featured in the October 1999 issue of *Recharger Magazine*. Since then, the guiding principles have not changed. The company remains very family oriented, customer focused and quality continues to be priority No. 1. With the advent of the



To engineer its high-quality products, MSE designs and manufactures tools, fixtures and equipment in its in-house MSE Machine Shop.

changing marketplace, MSE has acted proactively. Undeniably, MSE is one of the most technologically advanced companies in the industry.

Patented Technologies Equal Quality and Efficiency

According to CEO Avi Wazana, "MSE never wanted to be just another cartridge assembler who was solely dependent on vendor-based solutions and also at the mercy of the latest OEM designs."

Instead, MSE has positioned itself as an engineering company that solves challenges in-house. "We wanted to be an engineering company and be different," Yoel said. "Our goal is to rival the originals. We help convert people from OEM to MSE products because it just makes sense for everyone."

The most prominent examples of MSE engineering are its Patented Laser Cutting and Ultrasonic Welding Technologies. In 2001, the MSE research and development team invented a proprietary and patented solution to use ultrasonic welding to seal cartridges. This unique process was designed and implemented to enhance product performance and increase manufacturing efficiencies.

"We began ultrasonically welding the HP 4000 series cartridges to eliminate inherent flaws in the standard manufacturing protocol," Yoel said. "Our patented system improves quality and ensures proper mag sealing blade alignment. It also prevents bowing that can lead to sporadic print defects and uneven grayscales. The structural integrity of the new weld is stronger than the original

and this process also eliminates the need for clips.”

MSE’s welding process is used in both laser and inkjet manufacturing and the company currently welds more than 20 models with 11 cartridge-specific welders. The most recent development is MSE’s EX welder, which eliminates cartridge complications that result from splitting this cartridge. “Although it is an older model, it is still one of most popular,” Yoel said. “Our research indicates that we can actually make our existing EX cartridges even better.”

In 2003, MSE developed and patented a new computer-guided laser-cutting process for manufacturing. It was developed to increase production efficiencies and enhance product performance through precise splitting of the HP 9000. “This cartridge is a real challenge,” Avi said. “Because it is chemically bonded together, they (the OEMs) said that you cannot open this cartridge. When our engineers saw this challenge, they quickly went to work, and after 18 months of R&D, they perfected it.”

The first use of the MSE laser was to split the HP 9000 cartridge. To split this cartridge, most companies utilize a rotary cutting mechanism and are cut open by hand. This process took MSE technicians approximately 45 minutes to complete. The MSE laser reduced this time to less than four minutes, and has enabled MSE to turn out more than 200 HP 9000 cartridges a day. “The real implication of this technology is more far-reaching than just the 9000.” Avi said. “We are already developing other applications.”

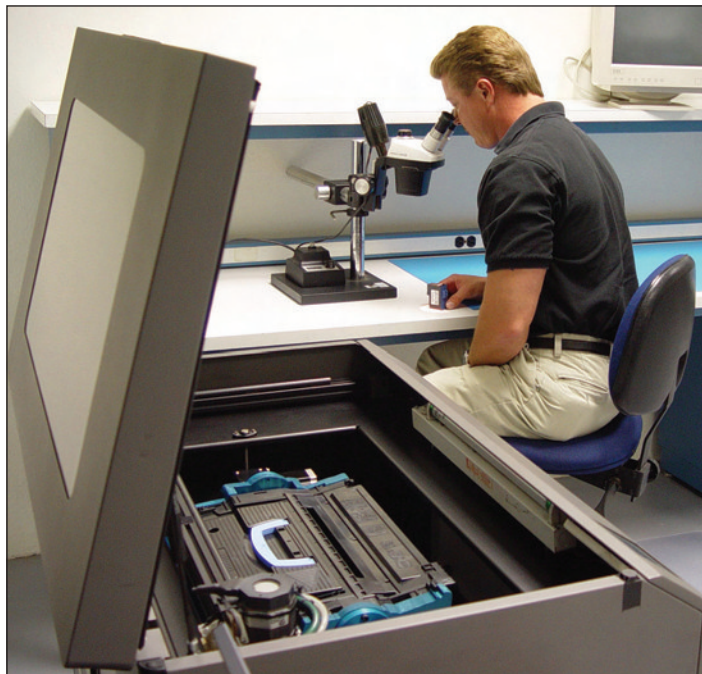
The company feels the real potential and impact of this technology will be apparent when manufacturers like HP decide to release the same tech-



MSE has the ability to ship from its four North American facilities located in California, Pennsylvania, Canada and Mexico.

nically challenging designs on lower-priced cartridges. For example, the time and effort spent to remanufacture by cutting an HP 9000 model that has a \$250 price tag may be justifiable. However, if Hewlett-Packard fully encapsulates its sub-\$100

cartridges and it takes the same 45 minutes to split those cartridges using conventional methods, profitability will become more difficult to achieve. Avi added, “In the future, our Patented Laser Cutting Technologies may be the only solution in some cases.”



At the Research and Technology Center, MSE engineers are expanding uses for the company’s Patented Laser Cutting Technologies.

Team Efforts

Walking the production floor with Yoel, the area is a buzz of activity and full of smiles. Yoel greets his employees by their first names, shakes hands and stops to chat briefly about families and work. It is obvious that Yoel’s presence on the production floor is not an uncommon occurrence and the staff seems to be at ease with him watching them work. He knows in detail what everyone is doing and how long they have been with the company. There was a time, not so long ago, when the focus of Yoel’s job was drums and wiper

blades. Now, MSE's teams — Engineering, Research and Development, Quality Control and Production — are entrusted with maintaining the integrity of the MSE brand.

“If Yoel or I get on the phone and make a promise, we no longer get off our chair and physically go make sure that every screw is done right. We have teams behind us that take pride in MSE quality,” Avi said. “We are nothing without our team and that is why our employees’ well-being is a top priority.

“In the past few years, we have also expanded our Customer Care, Graphics and Marketing departments. We have some fantastically talented people who are committed to the customer. I could not be more proud of every employee and their efforts. Our Customer Care team works hand in hand with sales. We have paired them up to provide solutions for our customers and empowered them to make important decisions,” Avi said.



MSE has also expanded its Patented Ultrasonic Welding Technologies to include the HP 4600 compatibles, resulting in precision alignment and matched colors.



MSE's foam-in-place packaging system is unique, allowing cartridges to remain more stable during shipping. The foam, as well as the boxes, can also be used by customers who are interested in recycling.

MSE's Customer Care team provides technical support and logistical solutions and immediately responds to the needs of their customers via e-mail, phone and/or fax. “We feel it is important for our customers to have more than one point of contact,” Avi said. “When a customer needs help, there is always someone willing to step up to the plate. In essence, we understand that post-sales support is as important as the sale itself.”

As the market has evolved, so has MSE's image and customer-solution focus. The MSE Graphics and Marketing teams work together to educate MSE dealers about the strategic advantages of MSE.

“We do a lot of creative things to help our customers increase sales,” Avi said. “We almost act like

consultants who come in and help them grow their businesses. We offer a suite of sales and marketing materials to help our customers grow their businesses and educate their customers about the value of MSE products.”

Continuous Improvement From Start to Finish

To engineer a new product, MSE's R&D department will start by benchmarking the OEM product. The company will buy the OEM printer, including variations of the printer to account for different speeds or duplex options. OEM cartridges are also purchased and their performance benchmarked to “make sure we know everything about the originals,” Yoel said. “By investigating them (the OEMs) in detail and logging all of the pertinent information needed, we can have a complete understanding of the original design and start to create solutions before we even start building our own products. Sometimes, we find obvious OEM engineering flaws and that is where we excel.”

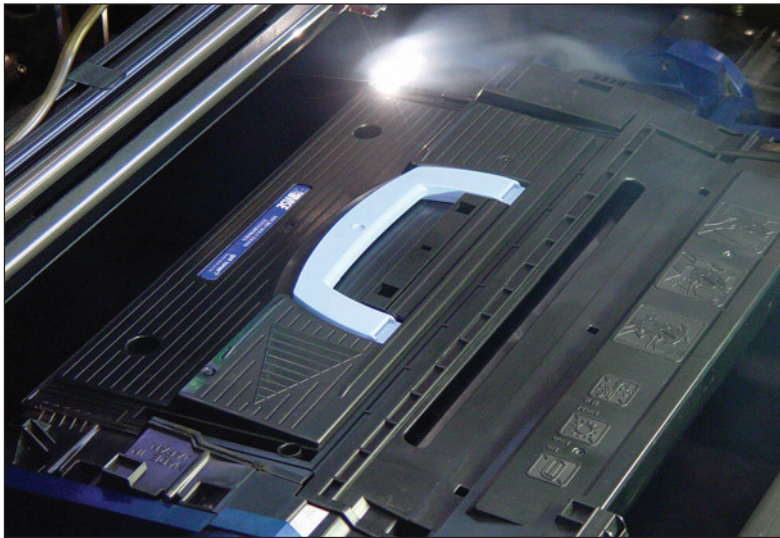
MSE will also evaluate the standard cartridge manufacturing processes and see

how MSE can improve upon it. Inside the MSE Machine Shop, custom cartridge fixtures and precision tools are designed and manufactured. This increases MSE's manufacturing efficiencies and ensures the highest percentage of component throughput for each model.

"Our engineers manufacture as many as 25 pieces of custom equipment for each new model," said Yoel. "We spare no expense to manufacture the highest quality products possible and in certain instances, MSE has proprietary components manufactured for us under exclusive arrangements."

Manufacturing instructions are then written on how to build cartridges the MSE way. Once these instructions are approved, every production line worker attends classes on how to build the cartridges — another example of the investment in both equipment and human resources. More impressive is the fact that MSE has more than twice as many Quality Control and Research and Development employees than salespeople. Yoel claims that, "Quality products will sell themselves."

Once the initial production runs are completed, the quality control team goes to work. Their goal is to evaluate what R&D has come up with and make suggestions on how to improve. "Our QC Team is our own in-house, independent testing laboratory," Yoel said. "Our philosophy is that they should be separate and independent of R&D in order to be unbiased. Sometimes they have different ideas or viewpoints on how to make the product better. In the end, our customers win because everything revolves around making our products better."



With MSE's Patented Laser Cutting Technology, technicians are able to split an HP 9000 cartridge in 3 minutes and 33 seconds. The cut made by the computer-guided laser is less than one one-hundredth of an inch.

The responsibility of testing each and every aspect of the MSE product has been delegated to the employees. It is obvious that they take personal pride in their jobs. Yoel remembers a recent call he got at home late at night. "Our alarm and security company called me because it was 10 o'clock on a Saturday night and the alarm had not been turned on yet. I was a bit worried, so I drove over to find the lights on and members of our QC Team hard at work. They said they didn't want to go home until the problem was solved. I told them that I was impressed and also wanted a solution but not to stay too late and to go home to their families."

Once cartridge production gets rolling, the QC team continues to randomly pull cartridges from their finished goods for a battery of intense testing. MSE cartridges are subjected to everything from vibration and extreme temperature changes to humidity variations and pressure testing. For inkjets, MSE tests for bleeding, color matching, page yield and photo quality. "We never know where our products will end up," Yoel said. "Customers might keep the products in their cars somewhere in Florida in the middle of summer where the temperature and humidity is high. On the other hand, we ship product to Alaska

where it is cold and dry. We try to think of every imaginable environment. It's almost like cartridge torture but in the end, I can sleep at night knowing that the product is working in the field."

The company's use of foam end caps, which are customizable to fit any cartridge style, has reduced product damage during shipping and is unique to MSE. The wooden molds for the foam were designed and engineered in-house, and allow MSE's packaging department to ensure

that each cartridge is perfectly positioned and can withstand the rigors of shipping. Yoel does not hesitate to demonstrate his faith in MSE packaging by throwing cartridges high in the air, kicking them and even walking over them before sending them off to the QC Lab. "I like to see a reliable product that can make it safely to our customers," Yoel said. "I have to admit too, it brings out the kid in me."

The company's packaging is not only designed to protect the product. There is also extensive thought given to how to make the end users' handling of the MSE product more user friendly. MSE boxes are opened by a pull-tab. The cartridge is protected by static-resistant bags that also tear open easily. The box is re-sealable, and cartridges can be re-packaged for return by folding the flaps of the box without using tape. "I'd like to think that a ten-year-old can open our product without difficulty," Avi said. "We engineer quality and ease-of-use into every product we make."

While walking the toner production floor, Yoel stops to point out the labels on the cartridge packaging and how they are applied by hand. He points out that each label is placed exactly in the same spot and is perfectly level. "What if our customer looks at our package and the label is not

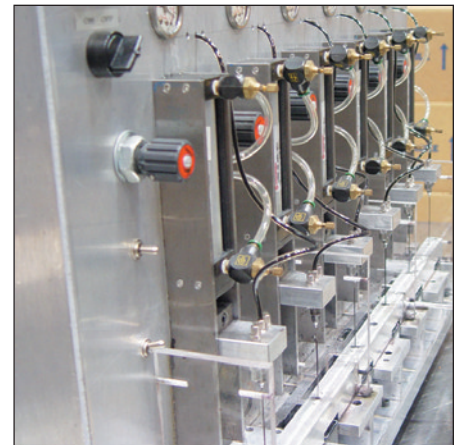
even? What does that say about the product that is inside?" he said.

Strategic Expansion

Assuredly, success has not made the staff at MSE a complacent group. The company has experienced considerable, one might say hyper, growth during the last five years, and with so many new projects in the works, and so much vision for the future, now is no time to rest.

Last year alone MSE released cartridges for 44 different engine types and has already released 25 new models in the first four months of 2004. As many in the compatible imaging industry can attest, the influx of different printers and cartridge models can make the decision of investing the time and resources to a new model risky business. Through research, marketing and customer feedback, the MSE teams closely watch the market for new models.

"It takes a lot to make a decision on which cartridges to pursue," Avi said, who said new products from HP and Lexmark automatically demand attention from the company's R&D department. "Other factors that come into play are component and empty availabilities. If we cross all of those bridges and there is margin for MSE, margin for the dealer and savings for consumers, we will continue with its development."



Left: MSE has expanded its inkjet offerings and now manufactures more than 12 print-head-based models. Inkjet capacity exceeds 150,000 inkjets per month. Right: MSE engineers also design and manufacture equipment such as the HP 56 inkjet filling station in-house.

In 2003, MSE was recognized by *Inc. Magazine* as one of America's Fastest Growing Privately Held Companies for the third consecutive year. MSE has approximately 400 employees, about four times as many as it had five years ago. During the past few years, MSE has also opened sales and distribution facilities across North America including in Pennsylvania, Canada and Mexico. MSE now owns and operates more than 115,000 square feet in North America and are planning additional expansion in Pennsylvania late 2004. "We plan on doubling our facility in Pennsylvania to pro-

vide better service to our East Coast customers," Avi said.

After years of analyzing the inkjet market, MSE made the strategic decision to start manufacturing MSE-branded, print-head-based inkjets. The company currently produces up to 50,000 inkjets a month, with the capacity to produce more than 150,000 a month. The fact that MSE only produces a fraction of the inkjet cartridges of which it is capable illustrates the company's commitment to quality over quantity. MSE manufactures 12 print-head-based inkjet models with several more in development.

"Even though we recognize the growth potential in the inkjet market, we are committed to increasing consumer confidence in remanufactured inkjets," Avi said. "We want to be the best and it takes time to do it correctly. The approach was that we are not going to go into the inkjet business unless we were going to do it right, not necessarily to do it fast or big. We are purposely releasing our models slowly. We have spent the money to do it right from the beginning. The potential of compromised quality can become corporate suicide. If you revert back to what MSE is all about, it's our commitment to quality in all areas and aspects of the organization."



MSE's Patented Welding Technologies are also used in the company's inkjet facility.

A Big Family Company

Even with so much change and growth in such a short period of time, the company still sees itself as a family-owned business run by two brothers. MSE's priorities have always been with their employees, customers and vendors in that order. "Employees are No. 1 on the list because if you have happy employees, you are going to have happy customers," Avi said. "Over the years, our company has grown so much but dealers can still contact both of us. We are in the office every day and remain hands-on operators. We encourage visits to our facilities for tours and we love to educate our customers on what we're doing. It is important that our customers understand why we are different."

Yoel added, "The family feeling is still here and nothing has changed except that we now have 3,200 customers in our extended family."

Strategic Decisions Pay Off

In 1999, MSE was a different company than it is today. The company model was more what Avi calls a "mainstream pro-

ducer." The company manufactured a high volume of approximately 35 different cartridges, most of which were HP models. When the requests came pouring in for quality-driven niche products, Avi and Yoel came to a crossroads.

"I remember the day that we decided to expand our product mix and we were committed to filling in the gaps but only when quality was not compromised," Avi said. "The decision would have company-wide ramifications as it would totally change the structure of our company. I think the industry is evolving and it's a blessing in disguise for us. We have been preparing for the market proliferation all along. Now that it is here, we are fortunate to be ahead of the curve in technology, quality and new-product development."

Today, the MSE catalog has more than 300 SKUs. MSE provides cartridge solutions for more than 150 different engines, including thermal transfer ribbons, inkjets and more than 55 models of MICR toner cartridges.


Many of the company's clients are manufacturers who partner with MSE in an outsourcing relationship. Outsourcers usually come to MSE in one of two forms. They are manufacturers that either completely close their production and outsource their entire production, or continue to manufacture certain models and complement their product line with MSE products. MSE's outsourcing clients place orders that



MSE's documented failure rate of less than 0.8 percent is monitored daily in the Quality Control Lab.

range in size from 5 to 5,000 cartridges a month.

"MSE is able to provide true value in outsourcing," Avi said. "Our customers rely on us for more than a quality product. They put their livelihoods in our hands. We take that responsibility very seriously and some people do not realize that it is not always about the monetary rewards. We always aim at making outsourcing a viable and profitable option for our customers. At the same time we never forget the human factor and the fact that ultimately it is all about long-term positive relationships. We now do everything from sales and marketing training to giving our customers leads. Since we do not sell direct to end users, it works out well. We all benefit and are true to the channel."

Yoel added, "Into the future I feel confident that MSE will continue to grow because of our commitment to quality and to the customer. Without everyone working together, we could not have achieved what we have and we cannot lead where we want to go. One could say that technology is king, but remember, it is the people who develop it. We are very fortunate to have a great team — especially one that smiles too." 



Building No. 1 of MSE's four facilities in Chatsworth, Calif.

Contact MSE at (818) 407-7500 or visit www.mse-usa.com.