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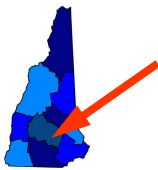
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MuShield® Company, Inc.

MuShield®, up until 1989, existed as the magnetic shielding division of Bomco Inc., located in Malden, MA. Dave Grilli and Bob Joy were running the MuShield division and decided to purchase and transition the division into a stand alone company. The new entity was incorporated in the state of New Hampshire as The MuShield Company, Inc.

Dave has strong engineering skills with problem solving design ability, while Bob's strengths are centered on manufacturing engineering. With their individual strengths, Dave and Bob truly complement each other to make MuShield shine. No one gave them the business, they invested their life savings, and they worked hard building the company by hiring and investing in the very best people and equipment they could find.

Almost 30 years later the company has grown from 5 employees to 30+ employees, and has turned into a dual family run business. Brett Joy, Bob's son, joined the company after earning his BS degree in business and is the VP of Production. He closely follows his father's career path with manufacturing savvy and the business continues to expand in the manufacturing arena.

(Right) Bob Joy, Owner-Partner runs the hydroforming machine. Talk to the man if you have problems with hydroforming, and you can sense he knows what he's doing, and totally enjoys it!



Continued on page 7



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MuShield recently added this IPG LaserCube which reduces scrap material while improving on laser cutting accuracy, adding efficient material yield and faster cutting rates.

Luke Grilli, Dave's son, is the VP of Sales and Marketing. Luke is gifted with a different savvy, in that he can sell. Luke has an educational background in communications and marketing, giving him the capability to paint a picture of MuShield's scope of work for all current and potential customers. Both Brett and Luke began their employment at MuShield in the shop. There, they learned skills and earned operating experience which has helped them succeed in their day to day operations as VPs of the company.

For over 60 years MuShield has specialized in producing custom magnetic shielding products for the medical, aerospace and defense industries. MuShield's customers require precision magnetic shielding solutions for electronic components.

Magnetic interference can come from many sources. Nearby electronic devices, the Earth's magnetic field or power distribution circuits can cause problems for many high tech devices including electron beam applications such as electron microscopes or GPS systems for

munitions. The slightest magnetic interference in a fiber optic guidance system could mean landing in Spain when you want to be in Paris.

MuShield solves these problems by working with engineers and designing a shield solution fabricated out of a high permeability, 80% Ni 17% Fe alloy. The shielding material, generically



This Amada Turret Press is excellent for larger volume applications and even allows them to produce blanks for hydroforming with minimal waste.

Continued on page 9



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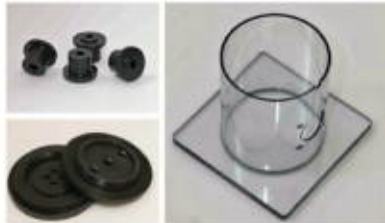
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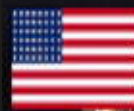
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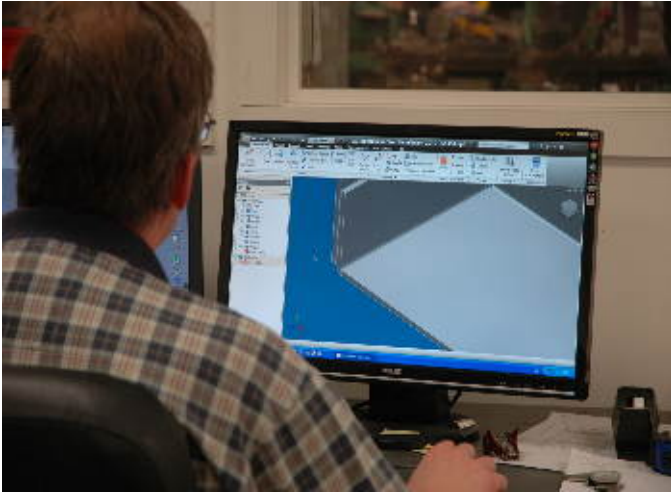
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“MuShield has 30+ years of experience working with customers on their magnetic shielding and sheet metal designs. If you need design consultation, we are happy to help.” *Luke Grilli*

referred to as mumetal, absorbs the electromagnetic interference being emitted, or serves as a shield for sensitive devices from ambient magnetic interference. MuShield’s products are not a luxury, but a necessity in most electronic components.

With MuShield’s equipment, employees and know-how, the company has begun diversifying. A few years ago, MuShield made a capital investment in a Cincinnati hydroform press, which has expanded the company’s in house capabilities and allows MuShield to offer deep drawn sheet metal forming services, working with alloys other than the high permeability magnetic shielding.

Hydroforming expands sheet metal forming capabilities, offering greater dimensional stability, longer tool life and small lot production cost



Examples of parts made using the hydroforming process followed by 5 Axis Laser trimming and cutting.

savings. Unlike spinning, hydroforming is not limited to producing just round shapes. Hydroformed parts can be square, rectangular, oblong or complex shapes. Hydroformed parts are often more cost effective, eliminating subsequent fabricating operations such as welding.

Another benefit of hydroforming is creating a formed sheet metal enclosure with little to no change in material thickness. Material thickness consistency is very important when strength or magnetic shielding comes into play, so consistent material thickness is key. The end result of the hydroforming process is a smooth and consistent part. Enhanced surface smoothness is another cost saver as little to no finishing operation is required.

MuShield’s “bread and butter” hydroform and sheet metal work is still with mumetal, but the company additionally works with other materials such as tantalum, stainless steel, aluminum, and other non-ferrous alloys.

Along with the hydroform, MuShield has built a strong and up-to-date fabrication and



Continued on page 11



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HYDROFORMING PROGRESSION



This example shows the step by step progression of hydroforming. Starting with a flat blank, the part goes through multiple forming operations with stress relief annealing between each form. After a final form, MuShield laser trims the part to yield their final part.

welding shop, with CNC milling and CNC turning. MuShield can handle any type of job, big or small, from prototype to production. Most orders are completed 100% in-house and orders range anywhere from a one to two piece prototype run, to a 10,000+ production run.

MuShield also has a fine in-house hydrogen atmosphere heat treating department, complete with two hydrogen atmosphere furnaces. Hydrogen atmosphere heat treatment is needed to maximize mumetal's shielding capabilities. Additionally, stress relief cycles can be run in the furnaces to aid in the manufacturing process.

The welding department is equipped with talented TIG welders, a CNC rotary welding machine and a CNC seam welder. CNC welding

yields precision, consistent welds for production applications. MuShield's specialized team has the equipment and know-how to weld materials ranging in thicknesses from .006 - .250".

MuShield uses both their IPG Laser Cube and 5 Axis Trumpf laser to meet the high precision requirements their customers demand. Holding tolerances of +/- .002" on dimensions has become the norm at MuShield.

Ed Nordengren, the plant's Operations Manager, has been with the company since 2006. His 30+ years of experience include a diverse management background in manufacturing and industrial finishing. He has held positions such as the Vice President/General Manager of a coating company, the Plant/Production Manager of a



This stainless steel vacuum chamber fabrication is a great example of MuShield's capability and finishes are critical for vacuum creation.



One of MuShield's® welders, in this well equipped welding area is putting the finishing touches of closing a large shielded container.

Continued on page 15



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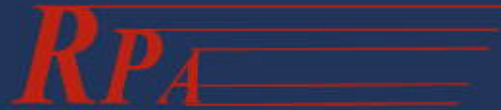
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This Trumpf TruLaser, 5 axis laser is the perfect machine to trim parts to perfection following the hydroforming.

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Ed's philosophy for success starts with placing the right people in the right positions. "Our work is very demanding. We apply machining tolerances to sheet metal parts, sometimes within thousandths of an inch. Our mechanics have years of experience blending older manufacturing technologies like metal spinning on spin lathes with that of the latest five axis lasers to achieve these tolerances."

Quality is a very important subject at MuShield. Consistency is their number one goal. The company's quality system is ISO 9001:2015 and AS9100D certified and the shop has an active check point system on the shop floor, under the guidance of Fred Wachter, Quality Manager / ISO Representative. Seeing the trend of the Aerospace and Defense industries they service, MuShield knew it was imperative to make the investment to undergo the rigorous AS9100D audit and certification. Considering that their ISO 9001 quality program was already way above par, the AS9100D audit was relatively pain free, and MuShield's quality system was quickly dubbed AS9100 D certified.

"Magnetic shielding is a very competitive market. Quality has to be our first priority. 100% acceptable parts 100% of the time. Our greatest strength as a team is to achieve performance, price and delivery; this is what separates MuShield from



This hydrogen atmospheric controlled heat treating furnace is used to anneal finished or semi formed parts, removing the work hardening that occurs when metal is transformed. MuShield has two of these hydrogen heat treating furnaces to heat treat components up to 2100F.

our competition," Ed said.

Luke, told us, "We are a close knit family owned company and our goal is to provide our customers consistently great parts, great quality and great solutions. We are often called upon for our expertise to solve design problems. Many customers have sent us drawings of their equipment and we have developed shielding designs that work. That is our expertise and now we're going to offer that same solution to customers who need help with a proposed or current design. We offer buyers a one-stop, one PO, on-time delivery, shopping plan fabricated sheet metal and machined components, finished and ready to go."

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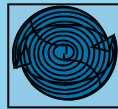
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The judge then said, "I will give you 6 days in jail."

Before the judge could actually pronounce the punishment the woman's husband spoke up and asked the judge if he could say something.

He said, "What is it?"

The husband replied, "She also stole a can of peas."



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PRESS RELEASE

Plastic Supply, Inc. is excited to announce its recent acquisition of a 50 year old machine shop specializing in high tolerance parts used in both the medical and aerospace industries. The machine shop has been relocated and merged internally.

Staff is being trained on an array of new machines and assets as you read this press release. While capacity has already been increased, the goal is to have all new assets fully functional for the start of 2019.

The additional machining services will further strengthen Plastic Supply's current offerings of Plastic Fabrication, Distribution, CNC Routing, Laser Cutting, Assembly and Design.

This acquisition greatly expands our machining related equipment list to the following:

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