

CTM Magnetics Certifies To ISO 9001: 2015



CTM Magnetics is an extraordinary company, selling to the largest OEMs. The company, purchased by Ken MacLennan in 1980, became a partnership in 1990 when Ken's son Grant joined the business.

Today, Ken, at 77 years of age, allows Grant to run the family business. Grant says, "Throughout the 1980s and 1990s, we engineered and manufactured custom transformers and inductors for medical electronics, professional audio and some military. The business model was impossible to scale as competitors would copy our designs and manufacture in Asia or Mexico at significant discounts with no engineering investment. We managed to grow by 50% in the '90's but China and Mexico were killing us. CTM partnered with a manufacturing company in Agua Prieta, MX in 2000 to compete and we were able to grow another 50% by 2003."

In 2004, things changed. Grant says, "One of our large customers in Oil and Gas Harvesting had new technology using electro-submersible pumps to lift oil from thousands of feet below the earth. The pump speeds were controlled by a variable speed drive (VSD) at the surface of the well. VSD's create harmonic voltage noise; the harmonic noise gets amplified by the long power cables down the hole. The amplified harmonic voltage spikes shorted out the pump motor quickly. Millions of dollars of oil production were being lost; our customer needed an inductor to filter this high frequency, harmonic noise before it could get to the pump motor."

Grant is not an engineer by education, he studied finance in undergrad, but he does have a mechanical aptitude. Grant says "I had never designed a 3 phase inductor, never been exposed to 480v, 1200A (1 megawatt) power levels, the inductor had to accept line and high frequencies which were rare, and to top it off, we had no means to test a prototype." Grant adds "I had no appreciation for the risk, but lots of interest in the opportunity so I engineered 3 interesting and creative designs; all of which failed and burst into flames within 2 hours of run time." Grant told the customer "It is clear that I don't know what I am doing; please use the conventional solution which is large, expensive, and inefficient; but it will work. I am going back to the drawing board; when I have something worth testing I will ship it to your test lab."

Grant continued to think about a solution to this unique inductor problem for the next 6 months. Grant said, "The key was developing a material which would not overheat from the high frequency harmonics, but could also

accept the dominant line frequency current. He says, "Once I had the right material; the next questions were geometry, manufacturing, and mounting for shock and vibration." Grants creation was a toroid, or donut shape, inductor which looked like a golf cart tire but was 60% smaller and lighter than conventional technology. He comments "When my engineering friend in Tulsa opened the crate in the lab and saw what I wanted him to test; he laughed." Grant says, "The toroid inductor was very quiet but the temperatures were not stabilizing and it was going to overheat; we blew some air across the toroid surface area and the temps stabilized very fast and the technology worked perfectly"



Grant commented, "I knew I had something unique so I decided to invest more money to protect the idea with a patent." To date, CTM has been awarded 23 patents with over 450 individual claims and Grant says there are more patent requests pending.

In 2006, CTM took another risky gamble to develop direct liquid cooled inductors for a new US Navy project called DDG 1000; the next generation of US Navy ship technology. Grant says, "Mixing water and electricity together scared most companies away, but we came up with an exceptional concept to safely and reliably combine them to shrink size and weight beyond what existed in the market." Every magnetics supplier with any experience in high power in the US was contacted for this project; CTM was the only technology which met the specs the US Navy needed for this new ship, the USS Zumwalt.

Grant says, "CTM's liquid cooled technology was critical to the USS Zumwalt's success; the ship finished sea trials this fall and is on its way to its commission in San Diego today." The ship is the largest and most lethal vessel ever made by man; it has a stealth shape and it is so automated that it can operate with only 135 crew members.

After their Military success with the DDG 1000 program, CTM commercialized their liquid cooled technology to drive out cost and improve packaging and today, CTM leads the world in high power liquid cooled inductor and filter products. Grant says, "Our commercial liquid cooled products are used in markets like Chillers, Solar, Wind, Energy Storage, and Microgrids. Our customers now are GE, ABB, Caterpillar, Parker, Trane, Johnson Controls, Halliburton, Baker Hughes, DRS; we have completely re-invented our company, our customers, and our markets." These companies have adopted CTM technology because it brings: • 40% Reduction in Size, Weight, and Power Loss • 75% Reduction in Audible Noise • Innovative Packaging Solutions • Advanced Cooling Technologies • Reduced System Cost

Grant says, "These companies are all certified to ISO 9001, and while we were audited by all of them, we weren't ISO certified." He continued, "We viewed ISO certification as expensive and time consuming." Grant and his team knew that while their products were integral to their customers' designs and products, it was now time to invest in the company's certification.

Grant says that the company approached Bretta Kelly, owner of BMSC, to assist them in achieving certification. Steve Foley, CTM Magnetics Quality Assurance Manager, says, "I had heard of Bretta from others in our industry, and I always read about her in the A2Z Manufacturing magazine." The company met with Bretta, and immediately made the decision to achieve certification with her consultation.

Grant says, "BMSC is extremely professional, they worked within our existing processes, and it was actually a very beneficial process. ISO is, in essence, a business management system, and it feeds back information in a structured way so that we can improve literally every process." Grant says that had they elected to pursue ISO certification on their own, without BMSC's expertise, he estimates it would have taken twice as long and cost twice as much.

To learn more about CTM Magnetics, contact 480-967-9447 or visit ctmmagnetics.com

To learn how BMSC can help you to achieve ISO and/or AS9100 certification, contact them at 602-445-9400 or visit businessmsc.com