2014

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Finalist

Zel-Tech Training Solutions

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Florida

Zel Tech Training Solutions LLC[i] has been in business for three years. Operations began early in 2011 with a small core group of individuals leaving Lockheed Martin to form the company. Our strategy is to respond to our customer's needs in a quick, and streamlined fashion; to take a project from inception, through design & testing, and into production by the most efficient means. Within the field of business that we operate, no other companies have adopted this approach. We run lean; our employees are flexible, and our operations are unburdened by redundant overhead and unneeded procedures. We keep product design moving toward completion, and we strive to put in place equipment and processes that help facilitate that goal.

Zel Tech Training maintains a nucleus of technical capabilities in mechanical & electrical design, software, and manufacturing. We have our own in-house assembly area, stockroom, test lab, inspection, and electronics lab. One of the most essential parts of our operation is our model shop. It is in this area where we are best able to bring to fruition our goal of rapid product development.

Our operation has twenty-three employees. They range from assembly labor through to project management staff. Our principal staff of engineers and managers have decades of experience in our field of business, and are regarded as experts by peers in their respective fields. We maintain good relationship with others in our industry, and are active members of industry related associations.

We currently have a three-year production contract, and have completed a number of short-term projects; no doubt we will continue doing more short term jobs in the future, as well as, bring in more long term work.

We design and produce training equipment and simulation devices. Our focus is primarily in two specialized areas; MILES (otherwise known as Laser Tag), and Range-Training/Live-Fire (pop-up targets, pyrotechnic simulation, and related devices).

MILES devices tend to be small, man-worn, handheld, or vehicle mounted products. All are ruggedized and fit into the category of being a radio and/or infrared communication device. These devices are either mounted on vehicles and weapons, or worn on the soldier. The weapons, of course, emit infrared light in the direction the barrel is pointed. The receivers, mounted, or worn, detect hits, sound alerts, and relay the disposition of the effected vehicles or soldiers to a command center.

The Range-Training devices are used predominantly during live fire training, where soldiers practice target shooting. We design and build the pop-up targets, but we also build pyrotechnic devices, which are used during these training sessions to simulate battlefield situations.

Beyond the internal electronics, the fabrication of the component parts that make up MILES training devices are produced by a variety of processes; die casting, injection molding, sheet metal stamping, sewing, and machining. Most of these MILES products are about the same size as a smart phone. Range-Training equipment tends to be larger than the MILES equipment, but the component parts are typically produced using many of the same processes as the MILES parts. For some of the larger housings, though, we use compression molding thermosets, RIM, and weldments.

Our product development always goes through a prototyping stage. It does not matter whether a proposed housing design will ultimately be injection molded or die cast, during prototyping stage, we machine. While we could produce these parts by using an additive process (3d printing), they would not

have the same precision, or physical characteristics, and would not give realistic results during operation testing. Product testing costs tens of thousands of dollars, and tooling for castings, or molded housings, costs more. It is important that our prototype designs be made up of parts that are as close in physical attributes to the final production part as possible. The only method we have found to achieve this is to machine the parts from the same material that they will be made from during production; or, to machine low-cost tooling from which prototype parts are made. In either instance, our machining capabilities are critical.

Pictured above is an example of an assembly of parts that were machined for prototype testing, but in production will be injection molded and die cast. Estimated tooling costs for this product is over $50,000.00. Each part in the above assembly was machined from the same material that it will be made from in production, and each part was machined to the same identical geometry that they would be made to in production.

Same main housing as shown in previous image, but made from a black colored material.

We have two CNC mills in our model shop; one Hurco VM-10, and one non-Hurco. We run the majority of our prototype parts on the Hurco. The control's flexibility and ease of use is a real time saver. It allows us to set up and run simple prismatic parts at the machine, without involving programming from a CAM system; yet, we easily go from the most basic of geometry to complex with little effort and confusion.

In instances, such as this yellow silicone cast prototype boot, we were able to square up the stock for the casting mold at the machine, while the actual boot geometry was being programmed offline on our CAM system. The tool was completed in one day, and the first silicone part was cast that afternoon.

Above image is a prototype aluminum housing machined on our Hurco, with a black anodize finish. In production, this part would be die cast. The geometry is highly contoured, non-prismatic. Our Hurco control is capable of handling 3-axis tool-paths with ease; the control has a good, fast, block processing rate, which allows for high speed tool paths, and the precision of the tool-path geometry is very good. Even with all the tight contours and 3-d geometry on the parts we run, I have not experienced an issue with data-starving; yet, I'm able to run these contours with relatively high feed-rates and hold close tolerances.

The types of prototype parts we machine require programs that are very large. It is not unusual to have up to a million lines in a program. The Hurco has ample memory within the control; I have not come across a part program yet that I could not run for lack of memory.

The re-start feature on the Hurco is one that I appreciate a lot. Given that we run long programs, we often have to stop the machine before a cycle is complete. I find that I can re-start at any point in a program and the control assures that its modal variables are set properly before the machine begins running. The cycle interrupt is another feature I have found very useful. Lots of fore thought went into the development of the Hurco control.

It is especially beneficial to us that our Hurco control processes RS-274; G-code. Apparently, the control processes this type of "Fanuc Om" code, as output from our post, verbatim. This has proven a huge plus. I have been able to pass on program code, used to run prototype parts in house, to our vendors so they could run production parts; saving, both time and money.

The pyrotechnic assembly shown above is one in a family of three products. It is made up of component parts of varying processes; machined aluminum castings, RIM, compression molded housing & baseplate, sheet metal, machined parts, injection molded parts, and investment castings. Total tooling on this project was over a half a million dollars. Excepting the sheet metal and electronics, all the component parts were machined before the tooling was built to assure proper fit and functioning. After tooling was complete, all parts fit together and functioned as expected. Without machining capabilities at hand, the risk of doing this type of job, for a small company such as ours, would be prohibitive. Without having a quick-response shop to make these parts, time delays would run up job costs.

The Hurco control has proven itself to be ideal for the type of work we do. I have over thirty years in machining, and have seen or used most of the major machine tool brands on the market, plus their controls. The versatility of the Hurco control is unmatched. The quality of the machine exceeds expectations, and the ease of use is refreshing. The ability to move from an interactive programming screen at the machine to running a G-code, CAM created, program is intuitive and virtually effortless.

We are constantly in the product design cycle. Our prototype machining capacity is key to this. The most significant inhibitors to the rapid design pace we strive for, is not having enough Hurco

capability! This is true for the available machine time on our VM-10, and size of machining envelope. Our VM-10 has been a boon, but is too small for many of the jobs we need to run. A 42”x 24”machine would aid matters greatly.

Heretofore, I have covered only the engineering and prototype aspects of the machining we do in house. We send out our production work, as this has been the best way to control pricing. Machined parts make up about thirty percent of the total. Unfortunately, timely deliveries of these parts tend to suffer. Going forward, it is likely that we will need to curtail product development in an effort to reserve bandwidth in the model shop to cover these shortfalls, or well need to add more equipment.

We are in the defense contracting business. Clearly, the near future is going to be lean. Nevertheless, new weapons will be deployed, and new recruits will have to be trained. There will be fewer dollars to spend, but the need to development new training systems will not subside. Companies competing in this field will be under intense pressure to development these systems and field them more efficiently. This will be a challenge, but we intend to be in the vanguard of this movement.

Zel Tech Training is a member of the Central Florida Chapter of the National Defense Industrial Association and the Association of the United States Army Central Florida Chapter. We attend industry trade shows as an exhibitor, and we frequent related industry trade shows as attendees. We also have an excellent relationship with the Army Contracts office; they know us well. Some of our principal employees have, in the past, worked on a number of programs, including training devices for teaching soldiers how to defeat Improvised Explosive Devices. These efforts were rewarded with recognition by the Army.

Every key position within our company is filled by individuals that have been in this industry over twenty years. Our customers know us, our vendors know us, and our competitors know us. This type of familiarity allows for smooth and efficient interfacing with outside contacts.

We maintain at least one representative at the Contract Office’s product working groups. They encourage feedback and participation in the development of future product requirements; and, we do. We often go as far as developing mock-ups and technology demonstrators. We are located within five miles of the Army Contracts Office, which helps facilitate face to face communications. It is not uncommon for a program manager, or engineer, from the Army to come by for an update and review of ongoing work.

We firmly believe in our business model. Despite the current environment, we anticipate steady growth over the next five years, and a significant portion of which will be due to expanding our CNC machining capabilities.

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[i] ZelTech Training Solutions, LLC is an Orlando-based training simulation company that rapidly produces innovative, cost-effective training solutions for constantly evolving military training requirements. ZelTech's mission is to deliver robust solutions through the modernization of fielded products, extending the life and increasing the capabilities of those devices. A spin-off of Virginia-based Zel Technologies, ZelTech Training Solutions is a paper-to-prototype to full production company, focused on customized solutions based on each client's unique needs and requirements.