

How Electronic Manufacturers Can Meet the Need for Low-Cost Custom Prototyping in Today's Automated Production Environment

The Solution Lies in Learning to Evaluate Your Supplier
by Steve Hyde, Technical Writer, Power PR

Present day manufacturers rely on increasingly complex technology to produce massive volumes of quality parts at a reasonable cost. Technical advancements in automated assembly lines, computer guided milling machines, robotic welders, and "just-in-time" inventory systems have evolved to serve a bottom-line consciousness that demands high production rates and reduced unit costs. Ironically, the same automated equipment that is so well suited for making thousands of cookie cutter reproductions of established products can, by virtue of its complexity, inhibit new product testing and development because extensive assembly line alterations and tool and die changes make short, experimental, production runs prohibitively expensive.

As a result, many high tech industries and start-up companies are returning to pre-industrial revolution craftsmanship, in the form of hand fabrication, to prototype, test, develop and even produce the metal enclosures for many of their new electronic products. The problem lies in finding a fabricator that has the expertise to help in product development, the ability to produce a quality product, a willingness to make design changes as the product evolves, and the capacity to perform all of the above within a short time frame. The solution to the challenge of selecting a suitable fabricator lies in learning a little about what can be expected from the hand fabrication process and putting this knowledge to good use.

Tricia Brehm, General Manager of CFW/Precision Metal Components, a Grover Beach, California based metal fabricator agrees. "Since companies contemplating hand fabrication are generally treading on new ground, they should take time to perform a little research before entrusting a vital new product line to an outside vendor. "By researching the

following areas manufacturers should be able to find a metal fabricator that meets their needs.

Technical Support

Confirm that the shop has engineers or technical support available to readily provide design assistance. This is especially important early in the development process where many potential pitfalls and unnecessary costs can be avoided by relying on the fabricator's expertise. "A good fabricator will be able to aid their clients in speeding up the R&D process and make suggestions that expedite development of new products," Brehm states. "We have engineers call us all the time looking for suggestions or ideas on material use, product design, dimensional concerns and special processes."

Small Production Runs

Determine that the shop can fill small quantity orders to facilitate product prototyping and if necessary, make changes. This is vital since hand fabrication permits the rapid production of product prototypes and is ideal for completing production runs that are too small to warrant extensive tooling changes. "Hand fabrication permits producing parts that are unique or out of the ordinary," explains Brehm. "If a client needs to make a few copies of a part and can't justify paying huge fees for engineering and re-tooling, hand fabrication is ideal since parts can be made with little or no tooling. After the initial run, design changes can be made easily without involving additional charges for tool and die alterations."

Secondary Operations

Make sure that the fabricator can provide all secondary operations including installation of terminals and inserts, drilling, notching, abrasion tumbling, soldering, brazing, laser cutting, and silk screening, etc. Finishing the work at one location simplifies scheduling, assures responsibility for quality, improves security and facilitates design changes. "A client may start with a container or enclosure that requires a stepped bend, or corners that are notched to fit into a particular spot," Brehm noted. "If, after trying it out he wants to change the size, add vent holes, or change the brazing or soldering process, a well-equipped fabricator should be able to make these changes at minimal additional cost."

Close Tolerances

Check that the fabricator uses inspection equipment calibrated and traceable to the National Institute of Standards and Technology requirements. Fabricators should also perform quality control checks at every stage of production. "If one part has to fit inside another part and there is only a few thousandths of an inch of play, tolerances become very important and have to be maintained for the entire product run or the product is useless," Brehm explains. "For instance, since some manufacturers expect the same precision from hand fabrication that would be attained by a drawing or stamping, we tell them we can build products to similar tolerances of $\pm .002$ ".5.

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Quick Turnaround

Confirm that the fabricator meets deadlines and responds quickly to large or unplanned orders. Some metal forming shops maintain an inventory of standard dies and molds in order to hasten the production of stock shapes. The resulting savings in engineering and design costs also help reduce the total unit costs. "The faster that the client gets their prototype then the sooner it gets tested, ready for the market, and making money," Brehm states. "For example, by maintaining tooling for over 500 rectangular, round, and square enclosures, CFW/Precision Metal Components can reduce turnaround time on standard products down to one week."

Inspection

Make sure that the fabricator inspects 100 per cent of the finished parts rather than making random spot checks. "A fabricator should be able to custom make products to very stringent military quality specifications," says Brehm. "Not one part should go out that doesn't meet the customer's design requirements. To assure low rejection rates, parts should be tracked on computerized statistical process control charts which reference all quality assurance information within the manufacturing process."

Quality Control Check List

Prepare a Quality Control checklist and submit it to potential hand fabricators. Information on this list establishes that the fabricator has mechanisms in place to: track the purchasing, handling, and storage of materials; ascertain that tools are calibrated; guarantee that finished products are inspected; and trace what happens to rejected parts. "The checklist is vital in making sure that the fabricator's procedures are traceable and that they maintain Quality Control documents on file," says Brehm. "We get questionnaires from vendors all the time which verify that we keep drawings on file, maintain records of measurements, and document our QC standards and certifications." Last year CFW/Precision Metal Components manufactured over 1.5 million precision metal components from cold rolled steel, stainless

steel, brass, aluminum, copper, and nickel. Applications included enclosures for the Navy's D-5 Trident and Stinger missile systems along with housings and parts for satellites, microwave oscillators, load cells, quartz filters, and much more.

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