

Hand Fabrication Makes Economical Prototypes and Short Runs

Besides stifling the development of new products, the high costs of tool and die setup and prototyping prevent many small manufacturers from offering cost-effective, short production runs. However, the old-fashioned method of hand fabrication can help small manufacturers produce short runs—ranging from a handful of parts to a few thousand—on a cost-competitive basis.

Precision Metal Components (PMC), Grover Beach, California, provides services that encourage new product development and small-volume production. The company specializes in close-tolerance hand fabrication for a variety of commercial and military firms.

Precision Metal Components was born in 1973 when its parent company—California Fine Wire (CFW)—purchased a machine shop to repair and maintain its wire drawing equipment. Research and development for the CFW product line would become a service that the shop, PMC, was able to provide. By the year 1987, PMC had become nationally known as a leader in the field of deep-drawn, precision metal enclosures for industry.

Known as a precision manufacturer, PMC has produced diverse parts for many industries, including telecommunications, electronics circuitry, and automotive. The handcrafted metal components that

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the firm has produced for the U.S. military—especially for the Trident and Stinger missiles—are among its proudest achievements. However, the company has also fabricated parts for satellites and microwave communications equipment.

One manufacturer that has been making use of PMC's hand fabrication services for the past ten years is L.R. Baggs Co., Nipomo, California. During this time, the company has been manufacturing electronic pickups and pre-amp equalizers for guitars and, occasionally, violins. Because most of its parts are small, very precise, and only needed in small quantities, L.R. Baggs discovered that hand fabrication work was appropriate for its enclosures.

"PMC has helped us with the design and manufacture of enclosures for pre-amp equalizers, a variety of pickups, and recently with a double-barrel microphone and mixing devices," said Debbie Fletcher, production manager at L.R. Baggs. "The

double-barrel tube that they make for us contains amplification electronics in it and attaches to a plug-in jack. We just started with a rough concept and they helped us put together a design for it. After we got the right design, they created several prototypes for us so that we could see if it was a workable idea.

"Their quality has always been very consistent, their work is priced very competitively, and their lead times are very workable," Ms. Fletcher said. "In terms of quality, they give us a Quality Control Report with each shipment of parts, so we know that they've QC'd the parts and that they're within the correct tolerance level."

An Alternative to Pre-Production Tooling

PMC recently produced, for L.R. Baggs, parts that required a very high level of precision: enclosures for electronic components. The parts required many intricate machining procedures so that circuit board controls could be fed through slots in the enclosure. When completed, the top and the bottom pieces fit together perfectly, allowing the controls to feed through precisely.

"The pre-amp equalizer boxes that they made for us had very tight tolerances, and it seemed to be no problem for them to produce the parts cheaply and quickly. These enclosures

HAND FABRICATING

are just one example of why we've stayed with PMC for so many years," Ms. Fletcher concluded.

Not only is hand fabrication a cost-effective alternative to expensive pre-production tooling. It also gives companies that require specialized shapes, bends, or notches, the ability to manufacture cases or other enclosures economically and quickly. In addition, hand fabrication provides the means to produce prototypes and pre-qualifying components for first article approval. PMC's work is produced to very tight specifications, because its military work meets and exceeds MIL-I-45208-A specifications.

"If a client calls me and says that they only need to produce 500 copies of a particular part, and they don't want to pay out \$4,000 in engineering fees for tooling, I tell them not to

worry because our hand fab department can build the parts without creating tooling and do it very economically," said Tricia Brehm, PMC's General Manager. "We can also do it in less time than it takes to tool it and then produce it on a punch press."

Difficult Shapes and Angles

An added bonus with hand fabrication is the possibility to produce prototypes that a client can use to test a design or to show its clients. The fabrication company can work with a customer's supplied stock and blueprints to produce odd shapes, step bends, or angles that would be hard to duplicate in assembly-line production.

The fabricator first shears the blanks to size, then folds up the sides on a hand press brake. He then sends them to their assembly department

where they are either hand brazed, or sent through an atmospheric brazing furnace. They can also be hand-soldered with silver solder. Finishing processes, such as powder coating, painting, and plating, are then contracted out for the client.

"Hand fabrication permits handling jobs that are unique or out of the ordinary," Tricia Brehm stated. "A client may want a container or enclosure that has to fit into an odd-shaped area, or they may need a stepped bend or some corners that are notched to fit a particular area. We can do all of these things, and to very high military specs," she said.

Precision Metal Components uses equipment calibrated to National Bureau of Standards requirements. The firm's products must pass stringent quality control checks at every stage of production. In-line checks

HAND FABRICATING

ensure that product specifications are constructed to within tolerances of ± 0.002 inches.

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All product test results are tracked on computerized statistical process control (SPC) charts, which permit quick reference to any quality assurance function within the manufacturing process. This process produces low parts rejection rates and, ultimately, gives a company a reputation for producing high-tech, close-tolerance components for military and commercial applications.

For more information on the hand fabrication services of Precision Metal Components, **circle RF62.**