

Plasma Cutting

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The Challenge: Computerize a Duct-Making Operation

At the heart of R. W. Mead's heat and air duct manufacturing operation is a computer-controlled plasma cutter that lays out and cuts sheet metal into duct work fittings faster than Mead's field crews can install them. Vice President of Construction Mark Mead was able to computerize his entire operation when this plasma cutter went into production in 1986. And by computerizing the entire operation, Mead has improved efficiency and productivity manyfold.

Mead's shop was having trouble keeping the field crews supplied with cut materials. Therefore, Mark Mead sought a solution that would

- Increase output from the shop floor
- Reduce part handling
- Be more responsive to workload demand
- Streamline Mead's entire operation.

The Old Way

Mead manufactures and installs heat and air conditioning ducts for commercial, industrial and residential buildings. When Mead receives a request from a general contractor, one of its field engineers goes to the building to confirm the measurements and sketch out the duct work.

Before its new system was installed, an engineer would take the field sketches, design the system and create part drawings. After the dimensions were confirmed in the field, the part drawings would be sketched onto the sheet metal and the parts cut with hand tools such as electrically powered shears, slitters and snips. This was slow, difficult work with danger from burrs and sharp edges. In an effort to maximize material usage, usable pieces of scrap would be sorted into piles and scavenged when smaller pieces needed to be cut.

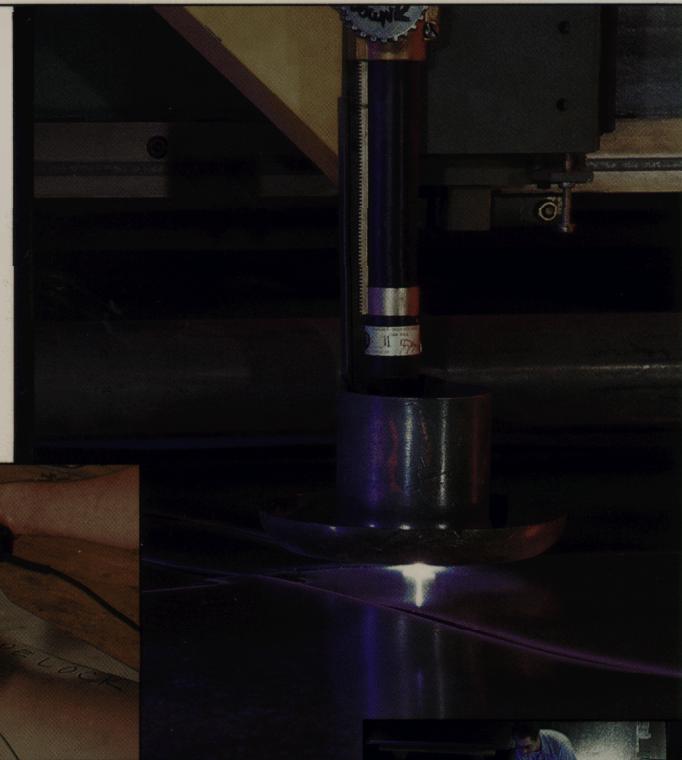
The cut parts would then be assembled and shipped to the job site where field crews would install the duct work. Sometimes, because of errors in part layout and design, a fitting did not come together properly and a new part was needed. This slowed down installation.

The New Way

Today, field data is entered into Mead's CAD/CAM system. The part drawing is created electronically by adding dimensions to a part shape stored in the computer's memory, thus freeing the designer from tedious calculations and eliminat-



Fittings used to be cut by hand, a slow and wasteful process.



The plasma cutter works on 1 of 2 tables to cut parts to exact specification. The parts layout is very efficient, significantly reducing the scrap rate.



ing human errors. All the parts for the day's cuttings are entered before cutting begins, and the system specifies what size sheets are needed.

The computer-controlled plasma cutter then cleanly cuts the parts to within a pencil line of exact specifications, much more rapidly and accurately than is possible with hand tools. And the plasma cutter can make longitudinal and transverse cuts with equal ease. The computer-generated layout is so efficient that the scrap material now resembles ribbons and wires and is discarded. In addition, labels are generated that are affixed to the parts for identification by part number, size and application, as well as for sorting and tracking of cost estimates.

Without a way for the computer to control the cutting, most of the benefits of the CAD system would be lost. The plasma cutter is rugged and simple to operate, making it well-suited for the shop-floor environment. Lasers could be used to cut

the metal, but they do not have the necessary durability. Lasers were not considered for this job because of their expense and their cutting precision far exceeds that needed for duct work.

The Results: More Versatility and Increased Productivity

The benefits from the plasma cutter and computerized operation are many:

Labor efficiency. Previously, 3 or 4 workers generated work for 30 installers. Now 2 workers in the shop generate work for up to 50 in the field. And no worker spends time sorting through piles for usable scrap.

Material savings. The capability of the computer-controlled cutter to nest parts has resulted in a decrease in scrap rate from about 20% to 10%.

Increased production. The plasma cutter can work off 2 parallel tables. While it is cutting a sheet of metal on one table, the other table can be set up and the cutter can be in use continuously.

Production rates have been increased from 15 to 20 fittings per hour per worker to as high as 250 fittings per day for 1 worker using the plasma cutter.

Fewer rejects. The plasma cutter has abolished human cutting errors so rejects have almost totally been eliminated.

Energy costs. Although more energy is used with the plasma cutter, productivity has greatly increased. This added industrial competitiveness strengthens Mead's position in the marketplace.

Product improvement—New product line. The plasma cutter has increased the gauge of metal that can be cut from less than $\frac{1}{8}$ inch to $\frac{1}{4}$ inch.

Production flexibility. Now Mead handles at least 4 or 5 jobs at one time.

Process control. Since a job's price depends on the weight of the metal installed, Mead used to weigh the parts by hand. Now the computer calculates the weight of the job automatically.

What Did It All Cost?

Mead's 2-table system cost about \$100,000 installed. An exhaust system and installation added another \$30,000. Mead incurred some additional expenses to make its floor level, a requirement it was unaware of when it purchased the system.

The payback period was about a year. It took 3 workers a week to assemble and install the system. Training took 2 days.

The Bottom Line: An Efficient, Versatile Operation

Mead workers are versatile and can work in the shop cutting out and fabricating parts or in the field. Now because of

the plasma cutter more workers are out in the field and Mead can more quickly respond to customer needs.

Other Applications of Plasma Cutting

Plasma cutters are used in place of traditional sawing, drilling, machining, punching, and cutting. A computer-controlled plasma cutter is capable of consistently cutting to close tolerances a variety of metals into many geometric shapes.

Company Profile



Vice President of Construction Mark W. Mead, President Robert W. Mead, and Vice President of Service Richard M. Mead computerized their operation to improve productivity.

R. W. Mead & Co., Fraser, Michigan

President—Robert W. Mead

Approximately 70 employees

R. W. Mead is a complete heating, ventilating, and air conditioning contracting company

Company philosophy: To be the best in the industry.

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