

Calling All Machines

***How Wireless DNC Helps
Integrate a Successful
Production Facility.***

story and photos by C.H. Bush, editor

Shown here is a Predator Wireless DNC antenna sitting atop a Haas machining center. The antenna receives input from the Predator DNC Access point mounted on a wall at one end of the 12000 sq ft facility. (upper right corner of photo) The Access point gets information from Predator software running on a computer in the office. The Access point broadcasts to all machines. Each machine is programmed to receive only messages intended for it. The system is wireless and highly flexible.



Visit the Alumco, Inc. 12,000 sq ft machine-shop in Phoenix, Arizona and one of the first things that strikes you is that it is beautiful, spacious, well laid out, brightly lit, and it is as neatly maintained as you might want your own home away from home to be. But, if you ask company founder and president Charles Eckman about why the place is so cheerful and immaculate, he'll tell you plainly that he planned it that way.

"The key factors in my personal business philosophy are a commitment to on-time delivery, a commitment to producing quality parts, and a commitment to giving our employees a comfortable and safe place to work," he says.

However, Eckman believes that if you want your employees to produce quality parts, you have to give them a quality environment in which to work.

"When we bought our new facility in 2002, we went an extra mile to make it a good place to work, to make it a place our people would be happy to show off to their families and to our customers," he says. "We also wanted it to be as efficient as possible from a work flow standpoint."

The "extra mile" Eckman referred to included doing such things as creating a large, open manufacturing space with no permanent partitions in order to enhance future flexibility, tiling the entire machine shop with white tile flooring, and doubling the amount of lighting that was in

the building originally.

"The philosophy behind white flooring, extra lighting, order, organization, cleanliness all ties back to quality," he explains. "Our people know they work in one of the cleanest, most organized facilities in Phoenix. They know that the facility is representative of our company's capabilities. When a customer or potential customer comes in and views our facility, what they see is a snapshot of what they can expect when we deliver their products. It's a statement of quality, and it also influences the everyday work habits and attitudes of the people who make our products."

Slow, Steady Growth

Founded in 1992, Alumco started out as a one-man operation with a few manual machines specializing in aluminum machining for commercial manufacturers in the Phoenix area. Since then his staff has grown to a number fluctuating between 16 and 20 people. In the beginning he found one good customer a few doors down from his small shop. Today his customer base includes manufacturers in industries ranging from bicycles and racing to consumer electronics. At the same time, they're in locales across the United States and as far north as Canada.

"If I was going to pick one item that explains the success of this company," he says, "I would say it's our ability to



Charles Eckman (right), discusses part finishes with Michael Pellegrim, process engineer.

clearly define the manufacturing process that's needed for each of our parts. I'm talking about the selection of the correct materials, sawing the blanks, machining the parts, deburring or finishing, anodizing, laser marking, hardware insertion, assembly, packaging, you name it. By really focusing on the design of a process before we get caught up in the actual steps of producing a product, we always start out with a clear-cut plan, and that plan is laid out in detail on a job traveler for use by our people. The result is consistent quality, efficiency and in most cases, profit."

Quality Parts, Quality Customers

Eckman's focus on process and quality extends beyond his shop and reaches out to his attitudes about the kinds of customers he wants to serve and how he goes about choosing them.

"We actually choose the kinds of customers we want," he says. "In general we prefer to work for numerous small to mid-size customers, instead of for giants, who tend to want to dominate a small shop like ours. Customers frequently research potential subcontractors before they give them work. They send source inspectors or engineering staff out to view the facilities and view process control. I think it's the right thing to do for them, but I also believe it's the right thing for us to do, too. In fact, selection of the right kinds of customers is probably the most critical job I personally do for the success of our company. I spend more time and energy researching and interviewing potential customers than I do interviewing potential employees and on other issues."

How does Eckman define a good customer?

"Over the years I've learned that there are some basic ingredients that make a good customer," he explains. "First, that customer needs to have good documentation and specification of what they want to buy. The customer needs to have reasonable expectations on lead time. If they

View of the Alumco shop, which operates 11 Haas CNC machines using the Predator DNC system. Operators are Steve Graham, set up (fore ground), shop supervisor Joe Willard (middle) and process engineer Mike Pellegrim (back).

want to wait till the last possible moment time after time and every order is a panic, it's very disruptive to our manufacturing process. In my view, a good customer is one where at least eighty percent of their work comes in in an orderly way with reasonable lead times. And, of course, a good customer should have a reputation for fairness, ethical behavior and financial stability. They shouldn't be firestarters, because we're not firefighters, at least not by choice. We prefer an orderly process."

Communication Process

When it comes to being methodical, Eckman leaves nothing to chance. He believes in maintaining good communications with his employees and with his customers. He uses verbal communication and travelers to make sure his employees know exactly what is expected of them at all times, plus he makes certain his customers know at all times what to expect from his company.

"By keeping close communication and a good working relationship with our customers, we frequently avert problems," he says. "By maintaining close communication with our employees we also avert problems."

But Eckman's desire for clean, clear communication also extends to his machines, as well.

"My first CNC machine was an old Bridgeport knee mill," he says. "That was in our early days, '92, I believe. The machine had no floppy drive, which meant you had to stand there and manually program everything directly into the controller, which I hated. So, I decided to find a way to link that old machine to my computer, which was an early PC running Windows 3.1. The problem was I had no manuals, no schematics. I had to figure everything out from scratch, but I finally got it to work. After that, I used a word processor in the office to write my G-code, and then downloaded it via RS 232 to the Bridgeport. It worked great and I was proud of that."

Lost Data and Confidence

Before moving to his new building, Eckman added 8 Haas machining centers to his production arsenal, all of which he wired to his computer system via RS232.





Portable wireless receiver rigged up by Eckman's team is rolled from machine to machine to allow the Predator DNC system to communicate with them. Eckman will use this system until he has enough additional machines to justify purchasing another 8 seats of the Predator DNC system.

"It all worked fine at first," he says, "but eventually we began to lose data between the computer and the machines. Back then when we added a machine, we just looked for space in the shop that was big enough and then pulled another cable across the ceiling to the machine. We had switch boxes for our switch boxes stacked up to allow us to select the one machine we wanted to send our communication to. Eventually we started having data errors, which caused us to lose confidence in our downloaded programs.

Alumco has a lot of standing jobs, so the company saves all its tools, its fixturing and its programming.

"When a part is reordered we can quickly and efficiently get back into production on that item," says Eckman, "but when you have pieces of your CNC program mysteriously missing, that really ruins the process. You have to go back and reprove your programs and your tools, which is really a waste of time. At one point we thought it was the fluorescent lights interfering or dirty switch contacts, but we never did figure out what was wrong. We moved to our new facility before we got an answer."

Calling All Machines

In addition to the cosmetic and organizational improvements he made to his new facility, Eckman was determined to find a neat, clean and reliable way to connect his machines to his computers.

"I did a lot of research," he recalls, "and since too many wires apparently had been the cause of our previous data loss problems, I decided I wanted a cutting-edge system that worked without wires. I eventually decided on the Predator Wireless DNC system offered by San Diego's Shop Floor Automation. The system seemed pretty straight forward and I had a recommendation from someone whose opinion I trusted."

Eckman bought 8 "seats" of the Predator system, which means he got a software package capable of communicating with 8 machines. He got a central transmitter, called a Wireless Access Point, plus one receiver device (called a Wireless Client) for each of his machines.

"The way it is sold, the system isn't quite wireless," Eckman says. "It needs a 110 AC outlet at each machine to

power the adapter, which is understandable. Electronics need power. But I wanted a completely wireless system, so I found a way to connect the adapters into a spare 5-volt power source on the machines. I took complete responsibility for doing this and it has worked fine."

Eckman went a step further and hid the small receiver units inside the machines, so that only the receiver antennas are visible on the outside. (See the photo on the first page of this article.) Predator Wireless DNC™ is run over an IEEE 802.11b wireless ethernet network and is capable of supporting up to 256 CNC machines simultaneously. Each 8 machines requires an additional wireless access point to be installed.

"The way it works is pretty interesting," Eckman says. "The system just broadcasts data to all the machines. The receivers on the machines listen and when they hear a message intended for them, they take it and transmit it to the machine controller. At the same time, if a program is changed at the machine, it gets sent back to the access point and to our computer. The Predator software automatically compares the original program to the changed one and gives us an easy option to keep or discard the changes. That alone saves a lot of time and effort."

Portable Wireless Client

Since moving to his new building, Eckman has added three more Haas machines, bringing his total to eleven.

"That posed a bit of a problem," he says. "We considered purchasing another eight seats of the Predator, but that would have been overkill for three machines. So, we took one of the wireless clients and made it portable. We have a four-machine manufacturing cell that very seldom gets program changes, so when we need new programs, we just roll the portable unit over to one of those machines, plug it into the RS232 port and we're in business. It's a little more trouble to do it that way, but it's not something we do every day. Those machines are dedicated to long-run production for one of our best customers. We think our portable client unit is a good solution until we add a few more machines."

Reliable Operation

How has the Predator Wireless DNC system performed so far?

"We've had the system for about two years now," Eckman reports. "So far it has been totally reliable. No maintenance problems, no more wires and switch boxes to worry about, and best of all, no more lost data." ■