# Achieving Automation With "Made in America"

**Shalabh Kumar**
Founder and Chairman of AVG Automation.

**N**ext year, AVG Automation, the parent company of EZAutomation, a midwestern U.S. manufacturer and factory-direct purveyor of industrial automation systems and components, will celebrate 50 years since its founding in 1975. The automation technology landscape has changed dramatically since that time, but many of the underlying industry needs remain unchanged. To learn more about what has changed (and what hasn't), New Equipment Digest spoke with Shalabh "Shalli" Kumar, AVG founder and chairman, about the current automation landscape and how his company is creating a path for businesses to easily automate operations.

**Shalli, can you take us through how AVG Automation started and how it's grown over the years?**

**A:** Right off the bat, I want to thank NED and your subscribers for giving me a great start in business in 1975, when I founded AVG. I had invented the programmable limit switch, named it the PLS at that time, and I had carried it to a trade show in McCormick Place in Chicago. I didn't have the funds to have a booth at the show, so I was just carrying it in my hands to see if I could get the attention of any visitors. Luckily for me, it caught the attention of the then-chief editor of NED. He was fascinated with the concept and put it on NED's front cover. We still carry that front cover in our lobbies. I got my first 100 orders from this front cover. At that time, these orders were good enough to sustain AVG for six months. Since then we have acquired many companies, invented a lot of new products, and by now we have an installed base of over $2 billion worldwide.

**AVG has a long history of securing many patents for new and innovative equipment, demonstrating a consistent drive to create and develop new products and solutions that enhance productivity and convenience for its customers. Can you share some examples of these patented technologies and discuss how this culture of innovation influences the development of the products?**

**A:** I'm driven by finding solutions to problems. Back in 1974, in a Fisher body,

General Motors stamping plant, I saw how the press set-up guys set up timing of a press after a die changeover, and I said to myself that there has to be a better way to do it.

One guy is on the top of the press where the rotary cam limit switch is mounted, and the other one is down at the press bed. The guy at the press bed says: turn the cam clockwise on the feed and the guy at the top rotates the cam. And the press bed guy says it's a little too much, back it off of it. They go back and forth and back and forth for each cam. There are eight cams. One cam affects the timing of the other cam. It took these two guys two shifts to finally set up all the cams. This is when and where the PLS was born.

Today this whole setup is done in less than five minutes. From EZAutomation's standpoint, it's the same drive to improve plant productivity, reduce downtime, and decrease cost. In 1991, we were the first one to introduce the concept of a graphical human-machine interface (HMI). Learning from my PLS experience, their fine-tuning in motion was critical. We came up with the concept of dual memory in the HMI to be able to make a screen change in a fraction of a second without shutting down the machine at all. This isn't just the changing of the screen itself, but the screen design itself.

This is a patented feature in all of our HMIs. I myself head the design team, even today, and I have over 20 patents. In 2005, we introduced the concept of an HMI integrated with a PLC programmed by the same single software. We made

our programming software so simple that even a CEO can design of a fairly complex screen in less than 10 minutes. Unlike our competition, nobody needs to attend any school to learn how to program our products. Programming software itself has many patented features like a visibility tag for objects to save space on the screen, allowing a smaller, less expensive HMI to do the same job.

We recognize that many OEMs or system integrators do not want to share their intellectual property—that's the HMI screen design itself—with their customers, the end users. So we came up with OEM utility that allows the HMI to be reprogrammed in the field with an exec. file sent over e-mail without the need for programming software.

**In an age where a lot of products are manufactured in China, it's impressive that you've been so successful in producing all of these automation products entirely here in the U.S. and even some that provide more features for less cost. Can you elaborate on the strategies or factors that enabled you to achieve these cost efficiencies while still maintaining high-quality standards?**

**A:** It's true and amazing that more than 80% of all automation products in the world are made in China. Think about it—80%. First, we have to have a commitment to design and manufacture products in America.

I was once invited to speak to the faculty of my alma mater, where I got my Masters in electrical engineering. I told the President and the faculty that this Made-in-China problem gets accentuated by our colleges themselves. We teach our students system design and not circuit design. That forces the makers of automation products to design with blocks like CPU blocks, memory blocks, I/O blocks,

and communication blocks. And China makes these blocks in mass volumes with cheap labor. Eventually, the whole product is built in China.

At EZAutomation and AVG, our design team is mandated to do a complete circuit design that can be manufactured cost-effectively in America. Where there's a will, there's a way. We need to challenge the whole automation industry to move away from Made-in-China. Make no mistake, China is an existential threat to American prosperity. It is our number one geopolitical enemy. Sooner or later, Americans are going to recognize this phenomenon and this situation, and it's a serious possibility that there might be a total ban on imports from China.

In a direct conversation with President Trump not too long ago, he did ask me if I would like him to stop Chinese imports cold turkey. That's his term. It's a distinct possibility, regardless of who the president is, that might happen.

New equipment designers need to take this into consideration when they design a new machine. You don't want to have automation control for which there might not be any product supply or support five years from now. And yes, most of our products cost less than those made in China.

**One of your newer products is the EZminiTouchPLC which is a compact device that combines an HMI and PLC together. What inspired the development of this specific device and what are the advantages of integration for machine builders and users on the shop floor?**

A: The EZminiTouchPLC is a prime example of Made-in-America innovation costing less than Made-in-China. No competitor of ours, none, can come close to this engineering marvel Made-in-America.

One of the five traits of AVG automation is maximum horsepower per cubic inch. Inspiration for this product, as usual, came from talking to our customers. They needed a very compact and thin HMI with a PLC integrated into it.

The EZminiTouchPLC has 27 I/O which is 12 DC inputs and 8 DC outputs with four, 5 amp 1 form C relays, 2 analog in, 1 analog out, and 250 kilohertz encoder input. All I/O is wired through plug-in terminal blocks with LED light indicators. The DC outputs are short-circuit proof. We even put in RC snubbers on all relay

contact outputs so that customers don't have to put external snubbers that cost at least $20 each in just material, plus labor costs. As a result, our customers save at least $200 for each PLC.

Besides the fact that the EZminiTouchPLC itself is a very low cost—it's just $399 for a four-inch 27 I/O model. Even the lowest cost Made-in-China integrated HMI PLC with no relays—forget about snubbers—costs double this price.
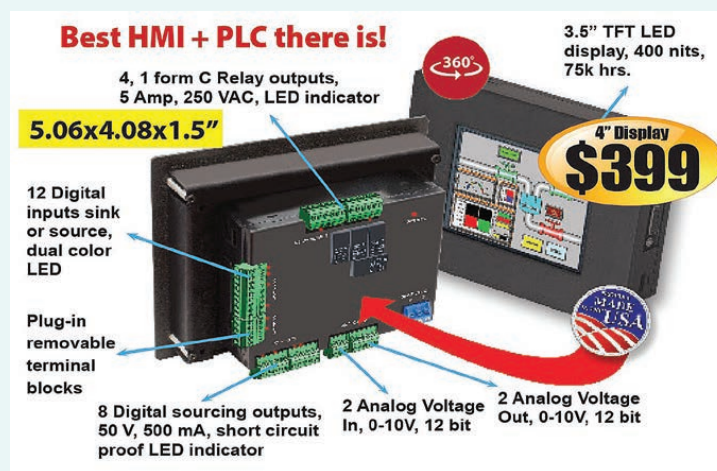


The EZminiTouchPLC features advanced capabilities and a robust design seldom seen in such a small form factor.

Coming back to the PLC, it's a high-end PLC with lots of function blocks with a unique drag-and-drop feature in its PLC programming. You can watch a video of this feature on our website at pdt.ezautomation.net. Go to the intro page for this product and click on product videos and it's the third video.

The product, in its four-inch version and all this I/O, is only 5 x 4 inches and just 1.5 inches thick or deep. The website also has a 360-degree rotational view of the product. The HMI in the EZminiTouchPLC is a top-of-the-line HMI with the easiest-to-program screens. It has at least a dozen features not found anywhere else. Besides real-time data logging, it has remote monitoring and control and can also send text and e-mail alerts.

A big benefit of integration is the panel space and cost. There are a lot of small machines where there's a fight for every micro inch of space, like small packaging machines, air purifiers, air compressors, generators, etc.

**In the past, you've stated that owners of new machines typically go through 10 screen changes on their HMIs in the first three months of ownership. How do the new HMIs like the EZminiTouchPLC or EZTouch Series 3 and Series 7 HMIs handle this challenge?**

A: This comes from our constant attention to work in the field. I was once in one of

Kraft's food plants and I was talking to an operator of a newly installed machine with one of our HMIs. I wanted to get the operator's feedback. The OEM had put in a digital indicator for pressure but the operator was more comfortable with a gauge. Everybody, including the plant manager, control engineers, and operator were amazed. They were there when I was in the plant talking to the operator about how we could change the digital indicator to an analog gauge in the blink of an eye without shutting down the machine. The plant manager termed it a miracle as he had seen nothing like it before.

Several trade magazines have conducted surveys on how many times the screen design needs to be edited in the first three months of a new machine install. That's where the number of 10 comes from. This is a standard feature on all of our HMIs, including the EZ 3 enhanced and EZ 7 detachable HMI. With our HMI online edit feature, users can change the screen design with no downtime at all. Zero

downtime. This feature alone saves thousands of dollars for the user.

The HMI online edit can be done through a mini Wi-Fi in the miniTouch PLC from 50 feet away so that the programmer can make the change without jumping over conveyor lines and opening the control cabinet. It can also be changed remotely with a smartphone.

To clarify, the online edit is an advanced feature to change the HMI program itself. Not just the layout and data sets, which can be programmed inside the HMI. So let's be clear, the HMI online edit allows complete modification of the HMI program.

There are more than 50 manufacturers of HMIs in the world, all of them in China. But no other HMI in the world has this feature of program modification online with zero downtime. In fact, it's done through our dual memory system. Even though it costs more where the change design resides in the second memory and the transfer from the second memory to the operating memory is done in microseconds. That's why there's zero downtime.

**Downtime has become very important in modern manufacturing. With the EZTouch series 7 HMI, you've taken the challenge of the all-in-one HMI assembly and split it into two separate components, effectively reducing downtime when the HMI needs to be replaced. What's the thought behind this design and how can it change operations on the plant floor for the better?**

A: When a component like the touch screen or the display goes out in an HMI, which are the most vulnerable components of the HMI, we want minimum downtime to get the system back up and running.

In our EZ 7 series of HMIs, we went a step further in our quest to reduce downtime for our customers. We split the HMI into two parts: the front panel which has the touchscreen and the display, and the back panel which has the logic and communications. The two are connected by an HDMI cable. This allows for a change over to a new touchscreen and display in less than two minutes. And if it's smaller, like a 7-inch model, it takes less than a minute.

There's no need to rewire or reprogram the HMI. An added benefit is that the control panel doesn't need a large cut-out. All you need is a small, 3/4-inch hole for the HDMI cable. NED