

Part Sensing for Automation

The Positrol LED system is offered as an alternative to air sensing to determine work piece location in the machine. Using proximity switches and an LED, this system was designed to provide Robert Bosch LLC a way for their machine operators to have instant visual results. Air sensing was not an option for this application; however this alternative system has proven to be quite effective. Utilizing part sensing during machining ensures that the work piece is properly seated against the workstop. This controls length and parallelism and can improve quality and reduce scrap.

It is standard practice to use air sensing from the machine to determine part presence. Robert Bosch LLC wanted to load 10 parts into the Positrol Cartridge Arbors all mounted

onto one plate. The entire fixture would then be shuttled into the machine. If a part was not loaded correctly, the machine operator needed to know which part so he could reload just that part and continue production.

In order to do this, each Cartridge Arbor (10 total) needed its own dedicated air line. Not only was this going to create an issue with the controls on the machine, there also was not enough space for ten separate hoses. The challenge was to provide a part sensing mechanism that would repeat, be accurate, be individual for each part and not take up much space. All sensing options were considered, including wiring all of the arbors together, thus requiring only one air line. Also considered, was using proximity switches for location and accuracy and then using a bank of LED lights to indicate visually to the operator if each individual part was located and seated correctly. A third option was to place a vision system above the top of the parts to check heights at the fixture before it was shuttled into the machine.

There was also a version of the LED system discussed that would run on

batteries inside of the fixtures to eliminate external wiring.

Robert Bosch LLC selected the LED system utilizing proximity switches to locate each part. This system had the desired level of accuracy and control while monitoring each part separately. There is a clear check to make sure parts are seated correctly. The system will identify any specific part that needs attention.

The idea of using batteries for this option was eliminated due to corrosion concerns and the need to change out batteries too frequently.

The LED system turned out to be a very economical solution.

"The new Mori Seiki DV5100VMC replaced a process that utilized a mechanical method to ensure the part was seated properly. We wanted to maintain this integrity in the replacement process. The LED with part presence switches allowed us to accomplish that requirement," said Larry Stroud, Manufacturing Engineer, Robert Bosch LLC.

The part manufactured is a component for the Bosch Hydro-Boost®. The material used is grey cast iron. Automation was accomplished employing the Midaco automatic pallet changer.

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Fixture queued up ready to be transferred into the Mori Seiki DV5100 VMC machine by the Midaco automatic pallet changer.



All ten parts loaded into the chucks on the fixture prior to being clamped. The external pressure system is coupled to the fixture to actuate the collets.



The LED system shows that eight of the 10 parts are seated correctly. The parts sit on three proximity switches in the workstop.



Cell with four identical machine setups.



The fixtures shuttle in and out of the machine. The fixture going in is loaded with parts ready to be machined. The fixture coming out is full of finished parts.