



SYNERGY AND THE PURSUIT OF CONTINUOUS QUALITY IMPROVEMENT

# AUTOCAM GETS PERFORMANCE BOOST FROM TORNOS MULTISWISS

With 15 sophisticated lean manufacturing locations in North and South America, Europe and Asia, employing 2000 people worldwide making precision-machine components for all major OEMs and Tier 1 automotive suppliers, Autocam is an amazing success story. Celebrating its 26th anniversary this year with \$300M in sales for 2013, Autocam started out with 1 customer, \$9 million in annual sales, and 50 associates, says a recent press release issued by the company. They also began with a handful of Tornos machines.



Autocam machinist, Kirt Plude, at work on the Tornos MultiSwiss.

## Today: 200+ Tornos machines globally

Mike Clay, Technical and Quality Director for Autocam, and Frank Zacsek, Manufacturing Quality Engineer, spoke to decomagazine about their experience with Tornos. Mike begins, "We have around 200 Tornos machines today. We use them globally. And Tornos is an important partner for us." In the Kentwood, Michigan headquarters Autocam manufactures ultra-precision stainless, alloy, and tool steel components for fuel systems, braking, transmission and other automotive parts on their Tornos machines.

## How does Tornos fit into the Autocam equation? Like a fine leather driving glove.

"The market we're in is high precision or ultra-high precision transportation parts," Mike explains. "We're turning tolerances of  $\pm 10$  microns and below. We provide the majority of our products into advanced fuel systems such as GDI and high pressure diesel. Many of these parts have complex geometries and materials that are very challenging to machine. To maintain our leadership position in these markets, we need a machine tool supplier who can provide us

with a machine that is ultra-precise, rigid and partner with us to ensure the process runs optimally. This allows us to provide the highest quality products to our customers at a competitive cost. The relationship that we have with our machine tool suppliers is very critical to us. We know processing... we know the tooling, the materials, the part function and what's critical. We think we're pretty good at understanding the machines; but the machine builders know the machines better than we do. So we rely on our machine tool partners to play a key role in successful process development and optimizations."

### Enter the Tornos MultiSwiss Team

When Autocam was looking to add 2 more CNC twin spindle machines to increase production on a direct injection gasoline engine pump component at the Kentwood facility, Frank Zacsek, and Matt Tufer, Senior Technician, convinced their Autocam colleagues to consider the new Tornos MultiSwiss machine. Frank had seen a presentation on the machine's capabilities and thought it looked like a good machine. Mike tells the story, *"The interesting thing on this (direct injection gas engine pump component) program is that the volumes did not require a fully equipped Multispindle CNC. So we wanted a machine that was more suited for this type of program volume that still required high precision. Therefore, it made sense to compare the MultiSwiss to a bank of competitive model CNC twin spindle machines"*.

Frank and his team thought the MultiSwiss might be a more economical way to manufacture this part. The thinking was: *"if we can do it on one machine for roughly the same manufacturing cost as several single spindle machines, it's a better process for us and for our customer."* With high precision direct fuel injection components, surface finish damage to the part must be avoided – the less material handling and moving between machines for these parts, the better. Mike explains, *"The more that we have to handle the part and go through subsequent operations, the more possible opportunities for damage there are. Our CEO's philosophy is to stay on top of technology; and if there's a better technical solution out there that improves the quality or reduces the variation to our customer, we better pursue that even if we're going to spend more money."*

The purchase price of one MultiSwiss was higher than two additional twin spindle machines; but Autocam thought the ROI on the MultiSwiss looked promising. *"So John Kennedy (Autocam CEO) said, 'Pursue it. Get the cycle time. Work on the processing. Let's prove it out to see if we can actually manufacture this part on the MultiSwiss. And if we can, we'll make sure we place an order.'"*



Frank Zacsek, Autocam Manufacturing Quality Engineer; and Matt Tufer, Senior Technician in front of the Autocam MultiSwiss.

### And that's exactly what happened.

*"With the MultiSwiss, we're able to develop processes that finish critical dimensions, especially surface finish or flatness,"* explains Mike. *"And we're able to do that complete in the machine where a lot of other companies would have to do a face grinding operation."* The fact that the parts don't have to travel from machine to machine to complete all the necessary operations and instead stay in the MultiSwiss where turning, drilling and milling are done in six sequential spindle stations with up to 3 tools per position means they have a leaner process with reduced chance for part damage. *"The Tornos equipment allowed us to improve the process,"* Mike continues. *"Autocam's mission is the relentless pursuit to improve quality and reduce variation... Tornos equipment allows us to be able to do that. We understand that many manufacturing companies inspect quality into the part, so they'll have high variation throughout the product features; however we have very tight distributions. We operate on the Taguchi Loss function."*

### Working together – Creating synergy

A key characteristic of a good relationship, according to Mike, is the ability to react quickly. *"We understand we're a difficult customer... we ask a lot."*

Tom gets a lot of calls at 5:30 on Friday telling him we have to have something on Monday." Tom Broe, the direct sales agent for Tornos in Michigan, (who began working with Autocam as a Tornos technician back in 1987 when Autocam had just 7 Tornos machines), chuckles and then explains how the MultiSwiss program began. "We were pushing the envelope with this part on the MultiSwiss. It's not an easy part. There are some tight tolerances and difficult material. I felt confident that the part could be done and so I had to convince Rocco (Martoccia, Tornos Product Manager), and Rocco, in turn, had to convince a few people."

### **Pushing the limits of the MultiSwiss required a little fine tuning**

The part required turning, drilling and milling operations on 440C material with a 7.3 mm diameter and a length of 24 mm. Tolerances on the part are  $\pm 30$  microns on length;  $\pm 20$  on ODs. The part was going to push the length-to-diameter limits of machining. Mike adds, "I think if you talk to Rocco, I'm sure he was a little uncomfortable. He knew... from the tolerances and cycle time target that we had to hit... and with the material and part geometry, that it was going to be challenging. And he was very up front about that. This is where we work well together. We pushed him a little bit. And we all decided to take the risk." Tom continues the story, "One by one people bought into the idea of pursuing the MultiSwiss for

this fuel injection production part. Donato Notaro (Product Engineer for Tornos SA) did a lot to work with Autocam to develop the part. He was involved in writing the program and developing the sequencing of the operations... working with feeds and speeds to optimize the cutting operations. On the multispindle machines, each position is optimized because each position works independently."

Frank adds, "Donato's involvement was pretty critical to the success. We had 2 people in Switzerland for about 3 weeks or more. I think in developing this particular process, both organizations really worked together to make it a success." Mike elaborates, "When we saw some issues, neither one of us walked away. Together we solved it and developed a robust process. We got it to a point where it looked like it was going to be viable, and then transferred it over to the US. And it's been a great process for us." Though a lot of time and effort went into proving the MultiSwiss for the direct injection pump production component, Autocam doesn't buy machines to manufacture specific parts. As Mike explains, "We look at how we're going to use the machine in the future as well."

### **What Autocam likes best about the MultiSwiss**

In addition to the excellent service Tornos has provided to Autocam over the years, and the ability of the MultiSwiss to get the job done and help Autocam



make money, the group has other great things to say about the machine. *"One of the nice things about the MultiSwiss,"* begins Frank, *"is you can optimize the spindles. This will allow us to hold even closer tolerances on future products. We can bring each spindle into its most capable state."* Each spindle runs independently so if you need to increase or decrease the speed in each position you can do it. Frank also likes the ergonomics of the machine. *"Most of the tools are a little bit higher than a standard multispindle, so you're not bending over quite as much. And when you open the door, everything is right in front of you. It's definitely an improvement over other machines where everything is over your head and you are taking a shower. It's much better for the machinists."*

## AUTOCAM STATS

**Founded:** 1988

**Number of employees:** 2000

**Global manufacturing facilities:** 15 on 4 continents. 750,000 square feet of manufacturing space.

**Approximate number of parts made per year:** 500 million

### Tornos equipment:

~160+ > SAS 16, SAS 16DC, SAS 16.6

~25+ > BS 20, BS 20.8

5 > MultiDeco 26/6

3 > MultiDeco 20/8

1 > MultiSwiss 6x14

3 > MS 7

5 > Deco 20

### Mission statement:

Our mission is to be the worldwide leader in the manufacture of precision components for customers with whom we develop long-term business relationships. Our mission will only be met by focusing on continually improving our process, thereby improving our products and services to meet and exceed our customers' expectations.

With 130 Tornos operators on staff in Kentwood alone, ease of use is also very important to Autocam. Explains Mike, *"The development time – the learning curve – is generally much steeper for machinists on multispindle machines. But I like that when a machinist or engineer looks at the MultiSwiss, it's not threatening. Because of the way it's laid out, you can break it down pretty quickly in your mind and get your head around the processing and the management of it. The MultiSwiss is comparatively easier to understand and operate."* Mike continues, *"At Autocam, we do not have operators who merely check parts. They are true machinists. They understand machines. It's a continuous challenge to find qualified machinists. The MultiSwiss aids in developing machinists fairly quickly."* *"I really like the integrated coolant lines,"* says Mike. *"With our parts, the material is very difficult to break into small chips. The MultiSwiss design means we don't have all those oil lines in there catching chips. When we look at processing a part, chip flow is a very real thing that needs to be considered. A lot of machines will have a significant amount of downtime because we have to open it up and pull chips off of oil lines and other miscellaneous components. With this machine, Tornos basically eliminated the problem. We have better uptime because of that. Also, since the majority of our equipment is temperature controlled, the ability to integrate the MultiSwiss with our temperature control system is nice too."* Frank adds, *"Workplace organization and cleanliness is important to us. And this machine with its enclosed design and maintenance prompts on the control helps with that."*

### The Future: Staying ahead of the curve

In recent years, the most significant thing that has impacted business for Autocam was the development of gasoline direct injection. Mike explains, *"That was a technology shift. There was a huge learning curve for the industry on manufacturing direct injection components because the material is more difficult to machine at high volume with the extremely close tolerances. The surface condition is much more critical because injectors are going right into the cylinder. On the pump side, the clearances are smaller and the fit of the parts is substantially tighter. So any damage or nick or ding is very detrimental to the pump. That whole technology shift over the past few years has really driven the process development on all the machines at Autocam. We expect the same results from the MultiSwiss in the future – for the next generation of components. We know that the technological development is going to continue. The drive for better emissions, better fuel economy, and reduced manufacturing cost is always going to be*



*there. We need to be ahead of the curve. That's a big part of my responsibility and John Kennedy pushes for it... we're always looking at the next generation of product. When we evaluate machines we need to think about how it is going to help facilitate the next technology leap. With the MultiSwiss, we're well positioned for the products of the future."*

In fact, it looks like the MultiSwiss may be a key Autocam "program" for the future. Autocam sees real advantages to progressive type machining operations with CNC flexibility for process development. Mike says it gets them through continuous improvement faster. *"Tom, plug your ears because we've got to negotiate price first. But the MultiSwiss is one of our machines that we'll be utilizing in the future for production."* According to Tom, that means there will be lots of brother and sister MultiSwiss machines filling the Autocam facilities in the years to come.

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