



# Magic Bullets in Precision Machining

By Miles Free, Director, Industry Research and Technology / mfree@mpa.org

As a supplier of steel bars to machinists for more than 30 years of my professional career, I was often invited to help shops trouble-shoot or problem-solve. These invitations were almost always “command performances.” Because if I was not there, it was a foregone conclusion that the steel would be blamed, a new batch from another supplier would be brought in and,

**Magic Bullet Number 1 — Coatings.** Tool coatings are important technologies that help provide longer tool life and thus, longer operating uptime. That, in turn, means more billable production (dollars) per day in our shops.

But just as cold medicine is not the cure for heart attacks, tool coatings are not always the solution for an underperforming job. On a

of the power required, as well as strength of the tool edge and the setup.

Geometry has an important role in surface finish. In confined spaces (deep holes, parting off, grooving), the ability to control the chip with geometry alone is an important means of assuring success.

While rake angles tend to be fairly typical for certain workpiece materials, there are situations where a change in geometry can solve the problem of chip clogging, rough finish or poor tool life.

Once a shop has learned that changing geometry can make a material problem go away, it tends to over-generalize that lesson. While it is likely that the geometry change was effective (because of the particulars of the operation, not just because of the workpiece material), changing angles jumps to the head of the line the next time the shop runs into difficulties, especially if it is the same material.

Geometry and chip control are crucial aspects of machining success, particularly in deep holes, grooves, bores and cutoffs. However, it is not the only aspect.

**Magic Bullet Number 3 — Substrate and Material Issues.**

What the tool or workpiece is made of is another area that can mean success or failure on a difficult job. The advent of micrograin carbides was an event celebrated by machine shop owners everywhere. Developments in this area continue to improve our bottom lines.

(Continued on page 4)



generally, the cycle would repeat as the problem reappeared in the new supplier’s material.

One of the traits I observed at many shops was the fact that once a root cause was identified, the folks at the shops would immediately burn that lesson into their brains. The next time any anomaly would arise, the first thing to check was the latest solution these folks in the shops had learned. I called these talismanic learnings “magic bullets.”

job with interrupted cuts, the tool’s material, strength and grain structure are often far more important than the tool coating.

If the last problem experienced by the shop was cured with a new “super coating,” you can bet that the new coating will be the first solution to be suggested for the latest problem at hand.

**Magic Bullet Number 2 — Geometry.** Geometry is a critical component of every machining operation. It is the determinant



(Continued from page 3)

The same is true for workpiece materials. Once a shop finds out that Supplier A's material machines fine on a job, the shop immediately prefers that material (oftentimes without identifying which aspects of the material are aiding production).

Some suppliers have multiple process paths to make some items. Service centers often shop the world for price or delivery, bringing the full range of global variability to bear on your job.

Consistency in supply is important. But it goes well beyond the name on the tag...to parameters of the processing and sourcing of the material itself.

**Where is the Magic?** The magic is in our shops. It is in understand-

ing the particular role each of these three Magic Bullets plays in our machining production system.

The goal of our shops is to maximize the dollar income of our available machining resources. This means maximizing productivity while the machines are running, minimizing the amount of time they are down and not overpaying for tooling (and thus, reducing margin).

The magic is in understanding that there is an optimum solution for a particular workpiece material and situation. A solution that uses the right combination of coating, workpiece substrate and geometry to produce the longest-running, least-variable finish at the lowest cost to the shop.

It is almost never an optimum solution to rely on just the coating, just the tool substrate, or just the perfect geometry. However, when the constraints of what is trying to be done are carefully considered and understood, a combination of these can be the difference between on-time and profitable versus the time-wasting, all-day vampire jobs that consume almost all available management attention.

Machining profitability is not about magic bullets. It is about selecting the combination of tooling characteristics for a given situation that will keep your tools in the cut longer, keep the chips moving and keep maximizing the number of billable parts out the door at the end of the day.

## What Do Customers Want?

We all know that customers want ever-decreasing prices. The bankruptcies and bailouts of GM and Chrysler showed us how that thinking turns out.

Ever-decreasing prices! I want ever-decreasing prices! So what do customers really want? Here are my top three ideas:

**1) Solutions.** Customers want solutions. They don't want to buy your product. They want you to solve their problems. They want to see their problems go away. Are you selling them products when they are looking for solutions? How is that working out?

**2) Service.** Customers want service. They want it now. Lead time is so...20th Century. It is a global, inter-networked, 24-7 world today. Somebody has what customers need. The first one to say "yes" gets the order.

**3) Value.** Customers want value. Not cost. Value. Customers will pay for what they value. Not just pay for what it cost you, but for what they value. Is it really a deal if you have to take the "gi-normous" soda when all you really want is the sandwich? How much "soda" are you pushing to your customers when all they want is the sandwich?

Solutions. Help them solve their problems with <gasp!> the products you can deliver this week.

Service. It is no surprise that all mature economies become more and more service-oriented. People want to be served. Customers are people.

Value. The customer tries to get you to lower your price. You think that it is about lowering cost. What the customer really wants is higher value.

► solutions.  
service ◀  
► value