

BAT MACHINE CO. INC.

Precision Toolholding Delivers Shooting Accuracy



Bruce Thom, founder of BAT Machine Co., with one of his machine tools running a Rego-Fix powRgrip toolholder. (All images provided by BAT Machine Co. and Rego-Fix Tool Corp.)

For the highest levels of competitive benchrest and extreme long-range (ELR) shooting, feats of precision manufacturing and machining are required for success. Like Formula 1 racing cars or PGA golfers' clubs, world-class competition rifles are made with highly engineered precision parts. Many top shooters rely on rifle actions from BAT Machine Co. Inc., Post Falls, Idaho. Precision components like BAT actions deliver outstanding accuracy that can be attributed, in part, to equally precise toolholding from Rego-Fix Tool Corp., Whitestown, Ind.

BAT Machine was founded in 1996 by former moldmaking specialist Bruce Thom with his initials as its name and his long history in machine shops as its expertise. As Thom puts it, "I've been machining since I was 14, and now I'm 54. I never intended on starting a business, but by 1996, the receivers I was cutting in my spare time outgrew being just my night-and-week-end hobby. I couldn't do that and keep my 50-hour-a-week mold shop job. I hired my first employee and we got our first CNC

machine a year later. And we just slowly grew from there strictly by word of mouth."

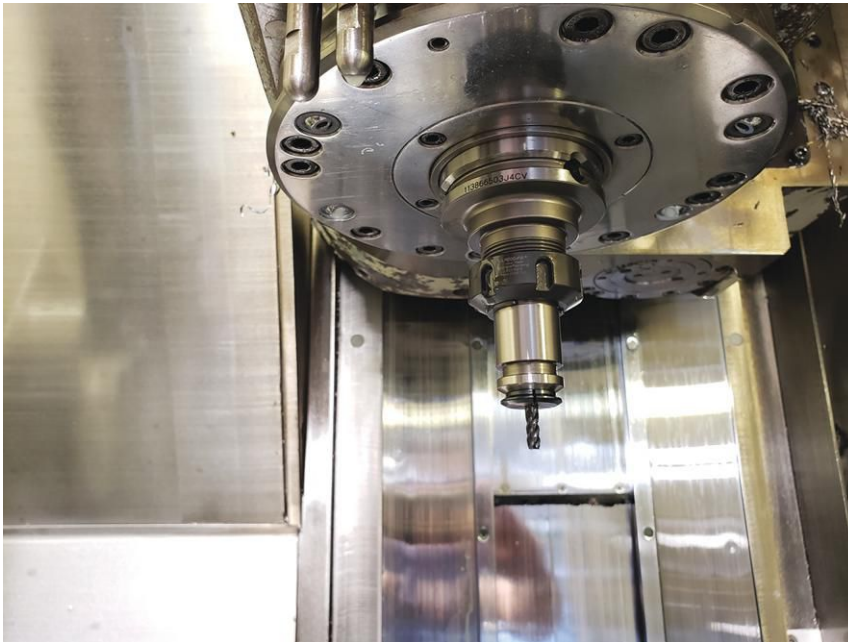
Over the years, BAT Machine has dabbled in machining other parts, such as medical equipment, but the company made its name on its rifle actions. The leaderboards of competition shooting organizations like the National Benchrest Shooters Association or International Benchrest Shooters are filled with the names of BAT Machine's customers. In fact, demand for its rifle actions is so high that the company's average lead time is six to eight months.

"Our customers are picky," explained Thom. "When they build a new rifle, they start with the receiver. These individuals will have a gunsmith chamber and machine five or six custom-made barrels to fit that receiver. Then, they'll test the receiver barrel by barrel, keeping the best for the most important competitions. Typically, these shooters go through two or three barrels a season."

With the rise of extreme long-range events that require making accurate two-mile shots at minuscule steel plates, shooting

sports have become more and more engineering-intensive. As a result, performance shooting industry shops have had to step up their manufacturing game as well. Naturally, tolerances must be held extremely tight for accurate rifles. And as a former toolmaker, Thom understands how machining accuracy is achieved.

“When it comes to toolholding collets, we always search for the best we can afford, but unfortunately we’ve been disappointed in every type of collet holder we’ve ever used. We would purchase double-A grade, top-of-the-line products and would still have more tool runout than was acceptable,” said Thom.



BAT Machine incorporated Rego-Fix's SwissQuick ER adapter on a powRgrip holder to get added length and reduced tool diameter for work right against the chuck on its Mazak Integrex multitasking machine.

Because of this continued disappointment, the BAT Machine team closely examined its toolholding requirements and found that it needed extended tools that could also reach alongside part tombstones, in particular on the shop's new horizontal machining center (HMC). Typical hydraulic holders were too bulky to comfortably reach parts on the tombstones, while normal ER collets and their nuts rarely provide the runout precision necessary for good tool life and fine surface finishes, the team felt.

Instead, the company explored another option. Rego-Fix powRgrip toolholders were recommended by its supplier, Aronson-Campbell Industrial Supply Inc. “Anyone who has spent any time in a shop knows that the way we hold end mills in machine spindles needs improvement,” said Thom. “I’ve spent much of my career saying someone should make something like

powRgrip toolholders. They make so much sense. Once we got them in our machine, they did everything we hoped they would. The concentricity and rigidity are outstanding, even with our small end mills. And we’ve yet to replace a single powRgrip collet.”

A few years after the acquisition of its HMC, BAT Machine replaced an older machine with a new high-production turning center, and the company looked to upgrade its toolholding to take advantage of the new machine's live tooling turrets to expand its ability to perform multi-tasking. The company considered heat-shrink solutions, but the cost of an efficient heating/cooling unit made it a poor fit for its eight-man team. “We don’t have a separate toolroom. The operator, the programmer, the setup specialist—that’s usually just one person,” Thom explained.

Once again, BAT Machine turned to Rego-Fix and added its SwissQuick ER unit to powRgrip holders. The combination has been particularly beneficial in terms of tool life, with the biggest gains in the shop's smallest end mills. For tools below 3 mm in diameter and in the hardest materials—including 4140 chromoly steel that is machined hard at HRC 42 to 45 as well as 17-4 stainless steel—the rigidity and low runout of the SwissQuick system powRgrip holders extends tool life and improves cutting performance.

In fact, with the new holders, high-quality surface finishes are possible even at high feed rates. As Thom puts it, “When customers are paying for a high-per-

formance rifle, they expect all machining work to look as precise as the way the rifle shoots.”

Through its solid ER case-hardened steel body, the SwissQuick adapter improves machining accuracy with a taper-to-collet cavity TIR of less than 0.0001" (0.0025 mm). The body also allows the adapter to be repeatable within 0.0004" (0.010 mm) on tool length, all while allowing BAT Machine to use it as a virtual quick-change tool setup. “Maybe they weren’t intended for the job,” said Thom, “but we treat them as quick-change live tool adapters. With the SwissQuick’s design, we can keep a full set of redundant milling tools ready to be switched into the machine to keep production up and going.”

The BAT Machine team had to do some slight modification to the base SwissQuick system, adding a custom nut for the

Swiss Quick system. Originally designed for Swiss-style machining, the space-saving SwissQuick adapters are short “miniature” toolholders. They feature a larger, solid ER body on the back end that interfaces to the live toolholder ER taper and a Rego-Fix powRgrip series cavity in front. Such a design allows for the shortest, most rigid ER-to-powRgrip reduction available, according to Rego-Fix.

BAT Machine now has Rego-Fix solutions on about 10 percent of its tooling. According to Thom, incorporating the technology into the shop’s processes has been easy. “The team was a bit hesitant with the new toolholding,” said Thom.

“But this time, there were no complaints as there often were with holders we tried in the past. Everyone was happy when they realized the tool life they were achieving with the technology and the time they were saving on tool changes.”



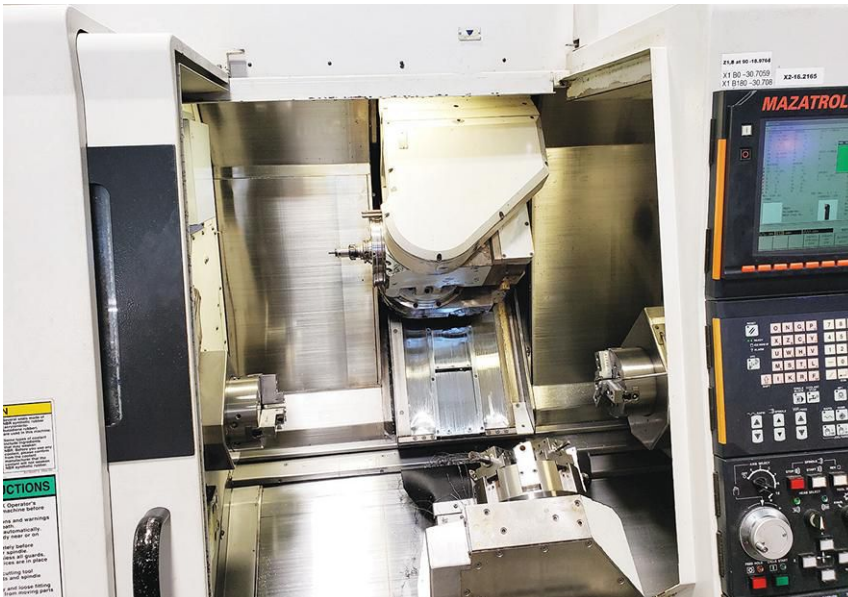
A Rego-Fix manual PowRgrip clamping unit at BAT Machine Co.

Now producing about 1,000 receivers a year, BAT Machine has looked toward further expanding its capabilities, including additional machining centers. It’s hard, detailed work—the kind of task that Thom and his team specialize

in. “In benchrest, you have to consider everything,” said Thom. “The wind, the mirage effect, even the humidity. They’ll tweak their equipment throughout the day to get the most out of their rifles and hit the smallest targets. Those are the kind of meticulous experts who make up my customer base.”

Editor’s Note: BAT Machine Co. is also a manufacturer of medical components. During the COVID-19 pandemic, the company is continuing production of all of its products with medical parts getting machine and staff priority.

For more information from BAT Machine Co. Inc., visit www.batmachine.com or call 208-981-0300. For more information from Rego-Fix Tool Corp., visit www.rego-fix.com or phone 317-870-5959.



Shown here in a Mazak Integrex spindle, the SwissQuick powRgrip combination is particularly beneficial in terms of tool life with the biggest gains in the shop’s smallest end mills.