The Latest in Broaching

From standardization to automated, Industry 4.0 capable broachers, here's the latest in what's being developed in the field of broaching.

Alex Cannella, Associate Editor

BROACHING MACHINE SPECIALTIES MOVES TO STANDARDIZATION, ADOPTS NEW FRAME

Broaching machines have always been treated a little differently by buyers than other types of machine tools. Rather than purchasing a standard machine, buyers would often force a broaching manufacturer to customize their machines to meet rigorous specifications. Matt Egrin, president of Broaching Machine Specialties, has been observing this dichotomy for quite some time.

"[Gear manufacturing machines customers] are walking into a company like Mazak or Hardinge or any number of those big name guys…" Egrin said. "They're going in there and they are buying a standard machine off the floor. It's comes in this color, it's got these controls, and this is how it works. A lot of broaching machine customers don't look at broaching the same way. They don't walk into a broach company and say 'I want that machine standard off the floor.' Rather they send us a thick spec book or something many dozens of pages long and say you have to build your machine to our specs."

In his years of time at Broaching Machine Specialties, Egrin has seen plenty of tradeoffs that come with insisting on custom-made broaching machines: longer delivery times, more expensive machines, more complicated in-field service — which again means more expensive and slower repairs, and a lower resale value when the machine is no longer needed.

So in 2017, when Broaching Machine Specialties developed its latest product, the Dual Drive electro-mechanical table-up broaching machine, they drove to standardize the design wherever possible and have urged its customers to look at the machine like they look at other types of machine tools and purchase it standard. And according to Egrin, it's been working, with their most high-profile sale being a large multi-national auto supplier, which approved the new BMS machine to be used in its plants throughout North America without having to customize it to meet their company specifications.

Standardizing the machine's design has kept it price competitive, along with a host of other benefits that normally come with standardization: easier maintenance, faster part replacements, and faster machine delivery time — 16 weeks compared to BMS's previous 22–24.

None of these talking points are particularly controversial. On the contrary, they're manufacturing 101 maxims that have held true since the Model T and are already readily accepted elsewhere in the gear manufacturing industry, which is a core part of the Egrin's argument.

"If you're ok with buying a Mazak just the way it is...right off the floor, why can't you do the same for a broach?" Egrin said. "I'll save you money. I'll deliver it faster."

But to dispel what might be the most likely cause for potential trepidation about the Dual Drive, just because the machine itself is standardized doesn't mean its tooling has to be, as well. Broach tools, fixtures, automation, you name it — the Dual Drive can still mount custom tooling for different jobs, as well as tooling from other manufacturers.

The Dual Drive broaching machine from Broaching Machine Specialties.

But standardization isn't the Dual Drive's only selling point. While perhaps not as headline-grabbing, just as important is the machine's H-frame design. In older, traditional table-up machine designs, the workpiece is supported on an L-shaped bracket mounted on the slide, which results in a downward moment that can cause the bracket to deflect, resulting in a degradation of part quality. With the new H-frame design, the broaching force is centered between the two roller screws and in line with the part travel leading to improved part quality, with a bonus reduction to how much floor space is required for the new design.

Going forward, Egrin would like to continue pursuing further standardization, envisioning a future where each of BMS's broaching lines and varying size machines have been converted to standard models. But in the meantime, he says that the Dual Drive has seen a positive reception, and he'll keep trying to convince his customers that standardization can work in broaching.

For more information:
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EVER SHARP TOOLS BRINGING EXPERTISE TO NORTH AMERICAN MARKET

Hard broaching comfortably established itself in the overall manufacturing hierarchy years ago, but according to Catherine Chen, CEO of Ever Sharp Tools, her company has been doing hard broaching since even before it was in vogue. EST touts over 20 years of custom hard broaching tool manufacturing knowledge, and they're looking to bring that expertise to the North American market.

EST develops hard broaching tools for automotive, machine and aviation industries and beyond. They primarily make solid carbide hard broaches for the finishing process of internal involute spline parts.

The latest addition to EST's catalogue is the ability to sharpen hard broaching shells. Alongside this offering, EST can design both carbide shells and their associated gauges to ensure components fit together properly.

"With our expert knowledge of involute splines, the capability to do test pulling and providing gear analyzer reports for all of our products, EST is able to offer a full range of green broaches and hard broaches as well as spline gauges to check green process parts and gauges to check final hardened parts," Chen said.

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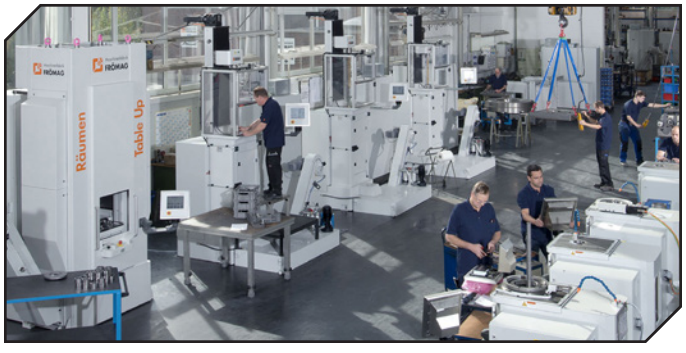
MITTS & MERRILL KEYSEATING AND BROACHING MEETS TECHNOLOGY

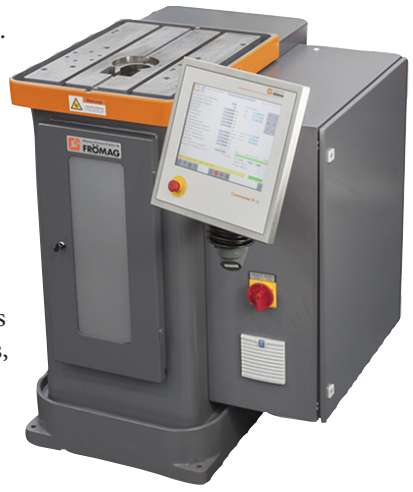


Keyseating and internal broaching/splining of bores has always created a unique machining problem for manufacturers. For over a century, Mitts and Merrill, a member of the Fromag group, and Fromag have been producing machinery and solutions for the machining of these type parts. As the industry leader in this area of manufacturing, they have also met the demands of our customers with increased technology in our products. In 2020, they're offering the following product lines:

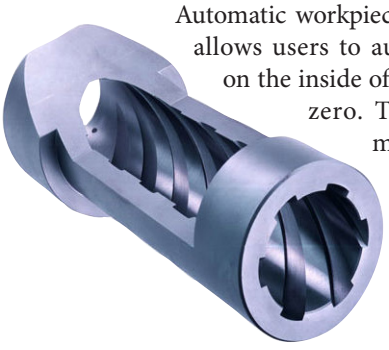
CNC Keyseating machines E and CNCE lines:

Mitts & Merrill's core line of keyseating machines can cut internal key widths ranging from .080" to 7.875" with a stroke "keyway length" of 16" to 78". Their 16" models do not require any foundational pit in the floor.

One key feature of these machines is a 15" touchscreen panel with on the fly speed and feed change, user friendly design and multiple language options. Users input work offsets, key requirements and workpieces dimensions into the panel and the program for machining is automatically calculated. Up to 600 of these "programs" can be saved for later retrieval.



The E and CNCE lines also feature indexing tables, including manual and automatic models. Mitts & Merrill's automatic indexing tables are fully integrated and provide the ability for users to machine splines and multiple keyed parts. During this process the machine will cut one full key to depth, and rotate to the next position(s) to begin the key process again. The indexing table also can be programmed to cut helical keyways in combination with special tooling.



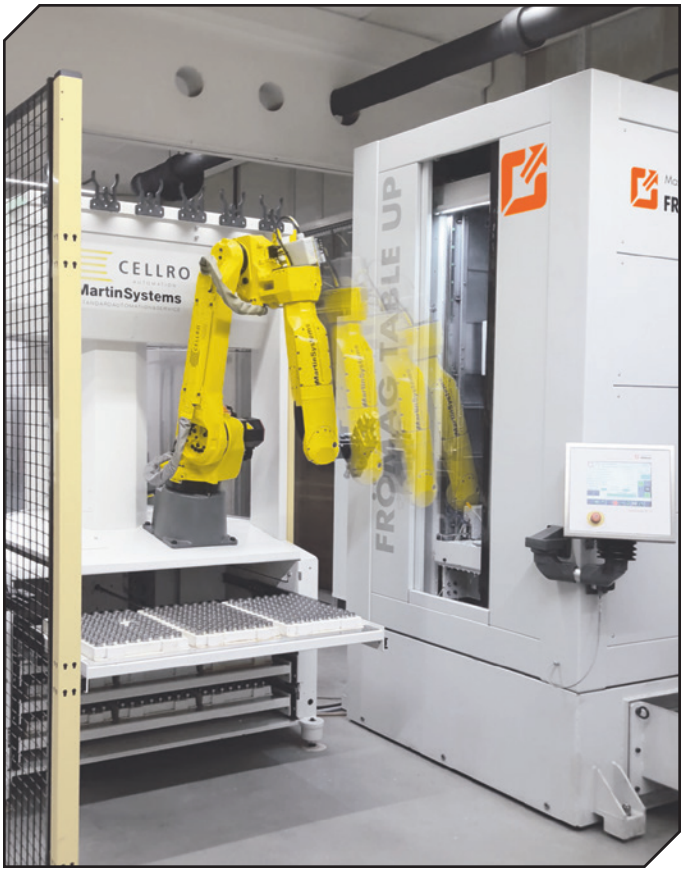
Automatic workpiece recognition. This feature allows users to automatically set the cutter on the inside of the bore to establish a tool zero. The tooling automatically moves forward until making contact on the workpiece. This contact is established via electrical conductivity and a zero point is set.

All keyseating machines are also electromechanically driven allowing for precise tolerances, smooth and quiet operation, and no worry of hydraulic oils leaking. Additionally, the electro-mechanical design reduces power consumption greatly from that of a hydraulically driven machine.

In addition, these machines also have programmable tapered key cuts up to 3°, for which the user inputs the taper requirements and the machine calculates the program automatically; tooling retraction, allowing users to easily remove parts or check parts while still on the machine table; remote maintenance router allowing technical troubleshooting and repair of the machine from a remote location; upcutting in blind bores; automatic clamping and unclamping of workpieces; and Industry 4.0 compatibility. Machines up to 2" cutting width capacity are compatible with Mitts and Merrill style tooling, or with Fromag style tooling. In most cases, old tooling is interchangeable. Machines are also linkable and can be interfaced with robotics for loading/unloading operations and closed cell machining.

CNC Table up broaching machines – FTR line :

In addition to Mitts & Merrill's standard and short broaching machines, they now offer electro-mechanical table up broaching machines for users that have a need for a high production, space saving broaching machine. Contrary to conventional broaching machines, the broaching tool stays stationary



while the table, workpieces and workpiece clamping is moved upwards relative to the broaching tool. Parts are completed in one pass and broaches can be made to any technical specifications. Because of this design feature, these machines can be placed at ground level and do not need a foundational pit in the ground. These machines can be set up as stand-alone machines with either manual or automated feed, additionally they can be fully integrated into machining cells, applying robotics and handling devices.

Like the E and CNCE lines, the FTR broachers include a 15" touchscreen panel with on the fly speed and feed change, user friendly design and multiple language options. Users input work offsets, broach requirements and workpieces dimensions into the panel and the program for machining is automatically calculated. Also much like the E and CNCE lines, FTR machines are electromechanically driven, with no leaking hydraulic units, easier maintenance and significant cost savings over hydraulic units in the amount of power consumption used. The FTR is also designed for smooth, quiet operation, allows fast unloading of parts, can be integrated with Industry 4.0, closed cell units, and robotics and allows for remote maintenance available via router.

For more information:
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