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➤ BY MIKE PRINCIPATO

Straight SHOOTER

Colt Defense manufactures the M4 automatic rifle at its 300,000-sq.-ft. plant in West Hartford, Conn. The rifle can fire up to 950 5.56mm-caliber rounds per minute.

All images: M. Principato and Colt Defense

Colt Defense helps make sure the good guys win.

In the third installment of our Made In America series, CTE columnist Mike Principato learns the true meaning of 'gundrilling' and gets a return on investment for all those quarters he spent at amusement park shooting galleries.

I wish I could say that my motivation for visiting Colt Defense LLC was based solely on the company's reputation for manufacturing top-quality firearms or on the venerable gun maker's crucial role in American history. Or even on the firm's unique and effective blend of old-school handcraftsmanship and modern machining technology.

Sadly, I'm not that deep. The truth is I wanted to see—and fire—Colt's signature weapon, the iconic M4 carbine. After watching hundreds of war movies and History Channel documentaries in which—for me, at least—the weapons are the stars, if there was even a slight chance that the nice folks at Colt would let me get an insider's view of how the M4 is made and give me an opportunity to fire one, I was more than ready to head for the company's West Hartford, Conn., headquarters.

Weapon of Choice

The M4 is no ordinary firearm. It's the automatic rifle of the 21st century American soldier and the nation's law enforcement agencies. Firing up to 950 5.56mm-caliber rounds per minute with an effective range of up to 500m, the M4 is as lethal to enemy troops and criminals

as its malevolent looks imply.

Unless you serve in the military or are part of a SWAT team, you likely know this weapon the way I know it: strictly vicariously, since the M4 isn't sold to the general public. If you have served recently, however, you're intimately familiar with this gun. All branches of the U.S. military use the M4, along with 15 NATO countries.

You may be more familiar with the gun's predecessor, the ubiquitous M16, which was introduced to the American consciousness during the Vietnam War. Viewed side by side, the heritage is unmistakable, but the M4 is a different weapon than its ancestor. For starters, it's shorter and, thus, easier to carry and maneuver.

The M4 also boasts a four-position sliding buttstock, which allows the user to adjust the overall length of the weapon to suit his or her stature. (Remember, it hasn't been exclusively "this man's Army" for quite a few years, and the M4's designers changed their signature product to reflect the times.)

Through a series of management missteps during the 1980s, Colt lost its status as exclusive supplier of the M16 to the U.S. military. Although the company produced over 7 million of those rifles in its heyday, the lion's share of the fading M16 market is now controlled by several lesser-known companies.

Colt is clearly not about to make the same mistake twice, which explains why getting approval to research and write this article required a vetting process the likes of which I haven't experienced since my first meeting with my future mother-in-law. Fortunately for me, Colt CEO and retired Marine Lt. Gen. William M. Keys wasn't quite as tough to win over and permission was ultimately granted.

High Quality, High Stakes

I was greeted at the entrance of Colt's 300,000-sq.-ft. plant by my hosts

Not-so-straight shooter

Regular readers might recall that my first Made In America installment ended with an ill-fated "flight" in a Lockheed Martin F-22 Raptor cockpit demonstrator. During that experience, I ably demonstrated that I did not miss my calling to the U.S. Air Force, essentially collapsing into an ineffective bowl of journalistic gelatin when confronted with the world's most advanced life-or-death video game.

Still smarting from that fiasco and, therefore, anxious to redeem my dignity, I'd been looking forward to firing an M4 for months. And I was about to get my chance.

The author, Mike 'Rambo' Principato, shoots "the hell out of the target" with an M4.

Phil Hinckley introduces me to Colt Rangemaster Dick Welch, a Vietnam vet who tells me I'm about to join good company: Colt aficionados from The Lone Ranger to members of Lynyrd Skynyrd have test-fired weapons at the same range on which I was about to take aim with a brand-spanking new M4. Talk about pressure!

Welch briskly reviews the basics of shooting the M4 while Young suggests I don a "shooting coat" to protect my blue blazer from gunpowder residue. At a cyclic rate of up to 950 rounds per minute, the M4's gas-powered magazine spews not just spent cartridges at a furious rate but a fine spray of the gray powder, too. Cool.

"Let's try single shot auto, first," instructs Welch. What, no Scarface-like spraying of 5.56mm bullets? But once I point the M4 downrange at a chest-sized target 35 yards away, it's all business for everybody in the room: Welch, Young, Hinckley, myself and the looming ghost of The Lone Ranger, waiting for me (no doubt) to figuratively miss the broad side of a barn.

Eureka! I do not. In fact, Young pronounces that I have "shot the hell out of the target." Welch decides to up the ante, switching the weapon to "burst" mode: one trigger pull equals three rapid rounds. He also replaces my spent magazine and it dawns on me that the M4's 30-round magazine empties pretty quickly. Welch explains that in most combat situations, accuracy matters more than quantity. Makes sense, but it doesn't in any way dampen my eagerness to start wailing away at the hapless target with the burst-enabled M4.

Thwack-Thwack-Thwack. Even through the hearing protection, the M4 sounds like a rapid-fire cannon as multiple rounds echo down the range. The weapon has some recoil in burst mode, but not unmanageably so.

And now it's time for the moment of truth: Firing the M4 in all of its searing, full-automatic power. "You might want to lean into the gun a bit more this time," Welch gently suggests.

Good advice. The gun rips through 30 rounds in 2 seconds flat while I earnestly try to keep it pointed at the target. I succeed only partly, and realize in that moment that most of my favorite war movies have exchanged reality for drama: "Machine gunning" looks better than it actually works.

But I also don't care. I'm so stoked with adrenaline that I'm ready to chuck this writing gig and ask Welch for a job. He laughs. Apparently, I'm not the first one to ask.

—M. Principato

for the day, Phil Hinckley, director of quality, and John Young, director of manufacturing. As my tour proceeded, it became clear that the two men know every inch of the factory as well as every cool tidbit of Colt history, including that founder Sam Colt was making handguns on the nation's first moving assembly line in 1855—58 years before Henry Ford was credited with inventing that production method.

Just 1 year later, Colt's company was producing 150 handguns a day using the most modern metalworking machinery and processes of the era—processes that have been updated but are, in essence, still used to manufacture the M4.

Compared to, say, a wristwatch, an automatic rifle isn't terribly complex. Fundamentally, it's a stock, a receiver, a barrel and a firing mechanism. But the consequences of a soldier's primary weapon malfunctioning are considerably higher than those that might result from your Timex running 10 minutes slow. Accordingly, the Colt M4 production process is highly refined and focused, if not necessarily pretty.

The emphasis in this factory is on zero defects first, throughput speed second. That's not to say Colt hasn't manufactured a ton of M4s. It has. And as military and law enforcement contracts continue to roll in, Young and Hinckley have been tasked with spooling up their respective systems to meet demand.

Phil Hinckley (left), director of quality, and John Young, director of manufacturing, inspect a finish-turned M4 barrel.

Despite ramping up, though, there's no mistaking the positive vibe that permeates the 1960s-vintage building; it's as pervasive as the plant's rich aroma of metalcutting. Colt Defense's 370 or so employees make deadly weapons for the good guys. Those weapons need to work in every conceivable situation and environment—every time. In its own visceral way, that's a far more powerful motivator for continuous quality than any of the ISO or TQM standards and metrics that the Colt plant also meets.

A Colt machinist loads a tombstone with M4 lower receivers.

As a result of this single-minded focus on quality, the M4 production line consists of what, at first glance, seems like an odd hodgepodge of machinery and methods. New Toyoda horizontal machining centers coexist alongside 30-year-old cylindrical grinders. Quality checks involve the use of a mix of modern electronics and toolroom-built gages. And it all works with—pardon the expression—bulletproof reliability.

Hinckley shows me the M4 line's quality reports, posted prominently in the plant for all to see. Monitored daily by two full-time federal inspectors, they indicate that the plant's daily production output ranges from 400 to 450 rifles. During the last 3 months, 99.8 percent of the output passed "function fire" inspection with zero defects.

"And the two-tenths of a percent that didn't pass were for magazine-related failures," Hinckley noted, adding that the magazines are provided by a subcontractor. He cited a statistic that even the reportedly demanding Sam Colt would have to acknowledge is pretty impressive: Out of 60,000 M4s shipped for a recent military contract, two were returned for nonconformance.

Young, who's been at Colt for 30 years, recalled the Vietnam era, when M16 production peaked. "Over the years, we've shipped about 7 million

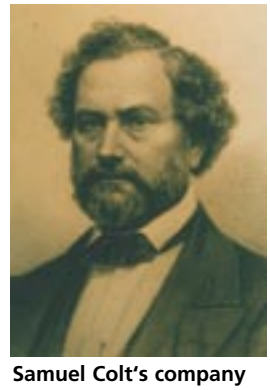
M16s. It's a very good rifle. But from a quality standpoint, the M4 is the best gun we've ever built."

Putting the Gun in Gundrilling

Gun production techniques haven't changed much over the years, despite the addition of increasingly automated machinery. Aircraft-grade aluminum, carbon steel, stainless steel and plastic components are forged, machined, heat-treated or molded, and, ultimately, manually assembled into a rifle or handgun.

While we strolled through the cavernous Colt plant, it was easy to imagine an early 20th century Colt factory with leather-belt-driven machinery. A small number of specialized machines from that era are actually still in use. They are used for minor, but important, tasks, such as polishing the barrel of collector's edition Peacemaker revolvers or deburring firing-mechanism components.

Young has configured the M4 line into cells, each of which produces a major component or subassembly. Vertical and horizontal machining centers rip away at forgings and bar stock that will become the upper and lower receivers, barrels, carrying handles and front sights of the M4. Finishing work on those components is performed concurrently.



Samuel Colt's company employed a moving assembly line to manufacture handguns in 1855—nearly 60 years before the world had heard of Henry Ford.

One of the cells is in the gundrilling department and is a source of special pride for Hinckley and Young. With good reason, as Colt's gundrilling process is apparently the gold standard, refined over years of trial, error and millions of gun barrels.

Hinckley explained each step in the process, which starts with multiple 4,000-rpm drills cutting into raw gun-barrel stock rotating at a predetermined rate in the opposite direction. Each drill is guided by a precision carbide bearing. "We're accurate to 0.0007" in this part of the operation," he noted. High-pressure button broaching, stress relieving and CNC turning operations follow before the barrels are outsourced to a local vendor for hard-anodizing.

Each step in the gundrilling process begins with multiple 4,000-rpm drills cutting into raw gun-barrel stock rotating at a predetermined rate in the opposite direction. The operation is accurate to 0.0007".

According to Young, a job here is one that a lot of skilled machinists and operators want, many of whom, as he put it, "stepped up" from local machine shops.

Ready, Disassemble, CLEAN!

One of the M4's claims to fame is how easy it is to disassemble, clean and reassemble in the field. Young gives me a quick lesson—and I do mean quick, because in his expert hands, the gun comes apart and back together again in less than 60 seconds. It takes me twice that long to try writing the procedure down before I abandon the effort. I console myself by thinking Young didn't actually clean the weapon, which would have consumed another, what, 30 seconds?

Final assembly of the M4 is similarly rapid, in a well-organized department containing a buffet of gleaming rifle parts. I imagine the Colt assemblers saying, "I'll take one of those barrels, two of those receiver assemblies and, oh, yeah, don't forget to throw in a couple of sights with that gun, please." In reality, though, it's an understandably serious process with quality checks out the gazoo.

It's also here that I'm about to have my shooting dreams fulfilled, because the assembly department is the threshold of the test-firing range. Young asks me if I'm ready.

"Hell, yes!" I reply, with all the bravado of an innocent who has never fired an automatic rifle. As the sidebar indicates (page 59), the folks at Colt aren't just helpful. They're also very patient. △

About the Author

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