



Machining

What Does It Take to Be a 'Top Shop' in Manufacturing?

Holly B. Martin | Apr 24, 2018

What You Need to Know

Top Shops use ERP software at a higher rate than other manufacturing companies—and believe strongly in its ability to help discover the jobs that are the most profitable.

Aerospace was the leading industry served by Top Shops, followed by machinery/equipment manufacturing and automotive.

World-class shop floor practices contribute to top performance KPIs, including a median order lead time of 20 days compared with 25 days for other shops, and a mean on-time delivery rate of 95 percent versus 90 percent.

The median pay rate for operators and setup workers rose an entire dollar to \$19 an hour. Programmers saw a bump of \$2 an hour to a rate of \$28.

We dive into the 2017 "Top Shop" survey data to discover key elements and differences of distinction. What do they spend on tooling and machines—and which ones do they use? How do they train and share the wealth with employees? Find out.

Each year, hundreds of manufacturers fill out *Modern Machine Shop* magazine's comprehensive Top Shop survey, covering the technologies, processes and strategies they put to work on the shop floor and in the office. According to the *2017 Top Shops Executive Summary*, answers from 356 machine shops of all sizes were included in that year's database.

Based on survey responses, the magazine's editors then select a group of the top 20 percent of shops in order to identify their world-class shop floor practices, operational metrics and business strategies. Machine shop owners and executives can use the survey data to benchmark their own companies, comparing them with the top businesses in their sector to plan for improvements.

So, What Really Makes Up a Top Shop?

What are the best practices manufacturers can use to become a Top Shop in their industry? From Enterprise Resource Planning software adoption to KPIs such as 20-day lead times, elite Top Shop manufacturers not only adopt technology and lean manufacturing principles, they put them into daily

practice to improve their business outcomes. For example, Top Shops reported using ERP or Material Requirements Planning software 11 percent more than other shops (83 percent vs. 72 percent). Many survey respondents claimed that implementing ERP was the most influential strategy to their business success.

Top Shop Honors for Machining: XL Machine

XL Machine, of Three Rivers, Michigan, won the 2017 Top Shops Honors Program award in machining technology for its recent adoption of top-of-the-line machining technology. The company specializes in supplying prototype-to-production parts and assemblies primarily for the automotive industry, including the supercharger cover for Camaro, Corvette and Cadillac models.

In conferring this honor, Modern Machine Shop cited XL Machine's cutting-edge equipment, including HMCs, 5-axis machines and a universal grinding machine. Many of these are fitted with advanced features including probes, quick-change fixturing, collision avoidance systems, magnetic chucks, and through-tool coolant delivery, which improve the speed, accuracy and efficiency of the machines.

According to the editors, XL Machine "believes its ability to invest in new technology continues to provide the leading-edge capabilities necessary to distinguish itself from its competitors."

Once set up, this software provides clarity about which jobs are most profitable—and what changes could be most beneficial. The software's fully interactive nature helps supervisors access business information while walking the shop floor, and make needed changes directly from hand-held tablets. Chris Orłowski, general manager at **XL Machine Company**, a Top Shop Honors Program winner, said JobBOSS ERP software helps the company make sure the right people were working on the right parts at the right machine at the right time.

"JobBOSS software has helped us estimate our production costs, and will enable us to implement shop floor automation very soon," Orłowski said.

The Major Trends of Top Shops

The Top Shop survey results provide insights into major trends in the manufacturing sector. For example, the **aerospace** industry was the leading industry served by this year's Top Shops at 56 percent, followed by machinery/equipment manufacturing (53 percent) and automotive (45 percent).

The use of **3D printers and additive manufacturing** increased markedly for the Top Shops—moving from 19 percent up to 37 percent in a single year. In addition to printing plastic parts on a desktop printer, 17 percent of the Top Shops used this equipment to print tooling and fixturing for customers, while 74 percent printed tooling and fixturing internally.

Another trend revealed by the survey is toward low-volume, high-complexity machining, as seen in the relatively small median batch sizes of both Top Shops and other shops (95 and 50, respectively).

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Chris Orlowski

General Manager, XL Machine Company

What Are the Best Practices in Machining Technology?

A top machine shop requires top-notch machining equipment. This includes multifunction **CNC Swiss-type lathes** that offer both turning and **milling**, allowing them to machine a complex part in a single setup—reducing setup errors and time to completion. In 2016, only 19 percent of Top Shops used these lathes, but that number doubled to 32 percent in 2017.

More than half of the Top Shops (55 percent) employ horizontal machining centers, or HMCs, with a dual pallet that allows one job to be set up while another is being machined. Top Shops are more likely than other shops to use both 4-axis and **5-axis machining**, either for contouring or positioning. Wire or sinker EDM machines—used for unique parts that can't be made any other way—are employed by 38 percent of Top Shops versus only 27 percent of other shops.

Still working with only three axes? Maybe it's time to make the move to 5-axis machining.

Other **advanced manufacturing technologies** preferred by Top Shops include lights-out machining, multiple workpiece fixturing, and high-speed machining.

What Are the Best Practices on the Shop Floor of Top Shops?

All the best equipment can't make up for poor shop floor practices, with wasted time and materials, reworking of products and impeded workflows.

Top Shops consistently scored higher on their use of shop floor improvement processes, using methodologies such as six sigma, kaizen and kanban. Twice as many Top Shops as other shops employed SMED, or single minute exchange of dies, which significantly reduces equipment changeover times.

Top Shops were also more likely to use robotics and automation to speed up workflows. Automation can be as simple as a tool pre-setter, bar puller or bar feeder or as complex as a flexible manufacturing system. A significant number of Top Shops use robots to load and unload parts for machines—26 percent, compared with only 18 percent of other shops.

These world-class shop floor practices contribute to top performance KPIs, including a median order lead time of 20 days, compared with 25 days for other shops. Their mean on-time delivery rate is 95 percent versus 90 percent.

Need help improving your lead times and on-time delivery rate? See how in "Get Lean: Choose Better Tools, Compress Time, Deliver On Time."

What Are the Top Business Strategies of Top Shops?

Top Shops spent two to three times more on employee costs and material and components. Top Shops spent more than twice as much as other shops on capital spending \$388,500 compared with \$150,000, and spent similarly in tooling (\$95,000 to \$40,000).

Their median gross sales per machine were \$300,000 versus \$160,000 for other shops. In spite of higher capital expenditures (5.0 percent vs. 1.6 percent) Top Shops showed a growth rate of 9.0 percent, as compared to other shops with only a 1.5 percent growth rate.

For the most significant indicator of overall business health, Top Shops achieved a median higher profit margin of 15 percent compared with 8 percent for all other shops.

The Top Shops Honors Program award in business strategies for 2017 went to Land Sea Air Manufacturing Co. of Westminster, Maryland. Land Sea Air is a contract manufacturer for the aerospace, defense and intelligence communities, and a member of the innovative **Maryland Manufacturers COOP**. Like 45 percent of Top Shops (compared with only 34 percent of other shops), Land Sea Air offers design for manufacturability services to customers, including creation of a digital thread to standardize part manufacturing and protect the original design intention of the product. Suggested design changes can simplify the manufacturing process and reduce costs.

Human Resources Trends for Top Manufacturers

There was good news in 2017 for manufacturing employees. The usually unchanged median pay rate for operators and setup workers rose an entire dollar to \$19 an hour. There was also good news for programmers, who saw a bump of \$2 an hour to a rate of \$28.

In addition to pay bumps, Top Shops also do more to retain and train workers—and to offer a career path into management. The big number in 2017: 78 percent of elite shops offer education reimbursement to workers—up from 61 percent the prior year. Forty-five percent of these manufacturing companies offer profit sharing to help employees own in the success they help bring in productivity. Over half of Top Shops (56 percent) offer in-house training compared to only 36 percent for the rest of the pack. Similarly, over half (52 percent) of these model manufacturing firms have a supervisor development program—while only 40 percent of other shops offer this kind of formal advancement arrangement.

For more information about the Top Shop survey, visit: <https://www.mmsonline.com/zones/topshops>.

Does your shop strive to be a “Top Shop” or is it one already? If not one now, what do you think it would take to get there? Share your ideas.