

General Stamping

General Stamping & Metalworks



Raw stock, labeled and ready for picking.

The company operates less like a job shop and more like a contract manufacturer, operating almost as an extension of some of its largest OEM customers. This allows for some long-term capacity planning. Jobs from major customers continue coming in the door at all hours, filling up machine capacity, while all the other work fits in between the major contract work.

New jobs take up to 20 minutes to process, particularly if parts need to be redesigned for manufacturability—adding reliefs, adjusting the blank size to account for elongation during forming, and the like.

Despite General Stamping's contract manufacturing nature, the company operates a very high-product-mix part flow. In its South Bend plant alone, the company has laser cut 23,655 different jobs involving 5,697 different part numbers over the past year.

All part files reside in the ERP system and are downloaded to engineering and programming. Engineers check drawings as needed, then make a call as to whether the orders will be statically or dynamically nested. Static nesting dedicates one job to a nest and is usually reserved for repeat and blanket orders, while smaller orders get nested dynamically.

Nests are created automatically in CAM software based on orders in the ERP system, and one person is responsible for checking the nests and adjusting material utilization, slipping in hot or extra jobs as needed. This allows just one person to oversee the nesting and programming for nine lasers running over three shifts.

What makes this high degree of software automation possible? General Stamping has found a nesting engine that “handshakes” well with its ERP. This type of communication between platforms is becoming more important as cutting capacity increases. Welcome to Industry 4.0. Of course, depending on a fabricator's work-in-process buffers, if the flow from laser cutting stops, sooner or later the entire shop will be starved of work. Any wasted time at the laser can have serious ripple effects downstream.

General Stamping employs fork truck drivers and material handlers who work with a pair of powered over-under tables at each machine. If anything in the schedule changes, the

23,655 jobs;
5,697 unique part
numbers cut over
the past year.

Orders generally
take a few minutes
to enter; new orders
take up to 20 minutes
to ensure prints are
right and tooling is
available.



Fork truck drivers retrieve raw material from high-density racks.

Enterprise resource planning system and nesting engine have seamless connection. Nesting engine automatically pulls jobs from ERP.

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drivers see it immediately on their tablet computers so they know what material to retrieve and where to deliver it.

High-density storage racks sit directly behind the lasers, and drivers carry pallets to the over-under tables; an empty pallet in the load position signals the fork truck driver that a laser will be needing more material. The fork truck driver returns the empty pallet to the receiving area and then brings the next pallet to the empty table. Sheets are loaded with a vacuum hoist onto the shuttle table. While one sheet is cutting, parts from the previous sheet are de-nested and sorted, and another sheet is loaded.

Although the material handling is manual, General Stamping has well-defined processes and procedures, and a very thorough in-house training program. Moreover, new laser machine operators (and other operators, for that matter) wear orange shirts to let others know they were new and being trained. The initial phase of the training program typically lasts about 45 days, and ends with the successful completion of a qualifying assessment. Until then, the operator works under the watchful eyes of the trainer and senior operators.

Another part of General Stamping's system is a first-and-last-article coupon inspection process. Instead of measuring the features of each part in a nest, operators inspect a standard coupon using go/no-go gauges. Actual part features are measured only if the tolerance is tighter than that of the coupon.

As pieces are offloaded and stacked, they're handed off again to a fork truck driver. The fabricator employs what it calls "circuit drivers" who drive in a defined path around the plant—like a bus driver, but for WIP instead of people. These drivers deliver raw material to the lasers, deliver laser cut parts to the press brake, and so on downstream. If a machine operator misses a fork truck driver as he passes a designated load/unload station (like a bus stop) on the circuit, not to worry—another one will be along shortly. Armed with tablets



An empty staging table signals a fork truck driver to deliver material.

Engineers create static nests and send them to a programmer on shop floor. That same programmer monitors the static nests and manages the incoming dynamic nests. With jobs being pushed from ERP to nesting automatically, one person can manage programming for nine lasers running three shifts.

Programming runs between 26 and 32 nesting jobs a day, with each nest consisting of a number of individual sheets. It takes between 3 and 15 minutes for the software to generate the nest, depending on the number of parts.

If a 120-in. sheet has 24 in. left, operators scrap the remnant; more than that, remnants are kept and tracked. Remnants are generated less than 5 percent of the time.



Bins await the offloading of cut parts.

showing the order tracking page from the ERP system, the drivers see jobs that are ready to be moved, make a stop, and carry that work to another stop on the circuit. They never backtrack or otherwise veer from the circuit, but instead make sure parts are moving on to the next operation. It's a practice the company started to facilitate flow in its old facility, which was full of walls separating one department from the next—common in older plants. The idea of the circuit driver worked so well that the company continues the practice in its new, open facility in South Bend. Yes, the plant may have some redundancy in fork truck drivers, but from the company's perspective, that's a good thing, because it keeps WIP moving all the time.

About 66 percent of parts are less than 12 in. wide or high; 32 percent are between 12 and 48 in.; 1 percent are larger than 48 in.

Less than 5 percent of parts use common-line cutting.

Laser programs have scrap cuts for material $\frac{3}{16}$ in. and thinner. A crane lifts the skeletons of thicker sheets.

The lasers use bulk nitrogen (30 bar), oxygen (10 bar), and compressed and filtered shop air (90 PSI).

The South Bend plant receives about six truckloads of raw material a day.

24 laser cutting operators work across three shifts on nine laser cutting machines, three of which are solid-state machines. Eight lasers run in eight-hour shifts to cut the bulk of the parts; one laser runs hot jobs or orders that require unusual materials.

Sheet thicknesses run the gamut from 22 gauge to 1 in., with the heaviest concentration between 10 gauge to $\frac{3}{8}$ in.

Operators de-nest using hand magnets and an air impact tool for separating slugs and tabbed-in parts.

Fork truck drivers, who run a designated circuit around the plant, deliver raw stock to the lasers and cut parts downstream.

The company devotes six hours a week over three shifts for basic maintenance and cleaning the machines.

Slats are cleaned on third shift Sunday, second shift Wednesday, and first shift Friday. Slat maintenance takes between 30 and 45 minutes.



Laser consumables are stocked in a vending machine.