

# automated j i g g i n g

by Jerry Koskovich, PE.

The solution to the most common shop bottleneck is revealed.

Over the decades since nail plate connected wood truss manufacturing first became an industry, we've seen steady and persistent improvement in virtually every facet of the truss manufacturing process. In my own experience, I saw my first connector plate truss while working as a plan check engineer in Los Angeles County in 1964.

Designs had been submitted to our office for trusses to be installed on a single family residence in the region. The design submitted included a multitude of pages of handwritten calculations. I checked each and every member using my Post Versalog slide rule, which I might add, I still have. Forgive me for dating myself (I'll be 70 this fall).

Since we hadn't seen such trusses before, myself and another engineer from our office made a trip out to the fabricator, which was a large lumber yard. I confess not remembering how the plates were pressed (most likely by roller), but I do recall that the components were cut on a radial arm saw.

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Leap forward about five or six years and I was again working in a government building and safety department and I began seeing printed designs giving all of the specifications of the truss. If you were to cruise through the office of a truss company at that time, you'd see loose leaf binders that included virtually all the truss designs prevalent during that period. Those designs or "catalog designs" were what we refer to today as "common" trusses. As we all know today, common trusses are uncommon!

Before the advent of the computer, the means to produce such trusses were, for the most part, adequate for the task at hand. Manually operated component saws did perhaps 25 setups per shift, sometimes cutting hundreds of pieces per setup.

Building the trusses was truly more of the same. You laid out the truss with tape and a chalk line, then bolted, locked, or nailed the fixtures in place, and proceeded to build a few dozen, sometimes hundreds, of identical trusses. I remember at least one of the major equipment manufacturers built an automated pedestal press to accommodate the tremendous demand for common trusses. The pedestals had hydraulic presses built in. After the truss was pressed, the heads retracted to eject the truss automatically.

I also remember a truss plant here in Minnesota that made the claim of building a thousand trusses during a single shift. Some major fabricators attached to retail outlets still use these systems for their "common" trusses.

Sometime during the mid to late '70s (if memory serves me correctly), the computer began having an effect on the industry. By the early to mid '80s, it was having

a major effect, namely the designs were becoming ever more varied and complicated and the manual saws spent more time in setup than they did actually cutting components.

It was during this period of time that the machine tool industry was going through its conversion to automation. And there's a big lesson in that conversion for all of us. A number of machine tool companies resisted automation, some hesitated. Those companies that paid the price to automate—and it does come with some measure of upset, not just direct equipment costs—prospered at the expense of the others who didn't automate. Even those that hesitated, figuring they'd catch up later, I suppose, often found their business being taken away by those with the automated upper hand. The automated machine tool companies have since found that they can accommodate business spikes—both up and down—with a lot less impact on their work force and their margins. Non-automated machine tool companies of any size really don't exist anymore.

By the mid '80s our industry's first automated component saw was cutting its teeth, so to speak. While its acceptance was moving forward at a snail's pace, it likewise was beginning to have an impact on some plants. The first of those was Villaume Industries in the Twin Cities in 1985. They were the first company in the industry to successfully incorporate an automated saw into their production system. What they found during that first year of operation was the ability to more than keep up with the demand for cut components. It was a first...prior to that cutting was the major bottleneck. In late '87 they asked me when I was going to do something about automated jiggling.

In 1988 at the BCMC Show in Nashville, the industry got its first look at a functioning automated saw and an automated jiggling system. The industry would never be the same!

During the '90s, acceptance of automated component saws grew exponentially. The introduction of competitive saws by the major nail plate companies promoted the use of these evermore sophisticated saws. In the early years of such saws, 20- to 30-second setups, while doing perhaps 300 to 400 setups per shift, was considered quite good. Today some saws have the ability to average 800 and 900 setups per shift with

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setup times ranging from three to eight seconds on average.

Since the early years of this decade, the industry has become familiar with linear feed saws. They've provided a different approach to cutting that better lends itself to "just in time" truss manufacturing. All said, cutting will not likely be a bottleneck in plants that have automated saws. Amazingly, these plants have significantly increased their production of cut components with no increase in manpower—exactly what automation is all about. While these automated saws are costly, their payback is dramatic!

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## at a glance

- When automated component saws became widely used in the '90s, truss tables became the new shop bottleneck.
- Laser projection systems and automated jiggling systems offer two solutions to this bottleneck.





## Automated Jigging

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They have, however, amplified a formerly lingering problem... truss tables can't keep up with the production of components being generated by the saws. Automated cutting has shifted the bottleneck! In the past fifteen years, while a small percentage of plants have taken advantage of automated jigging from the start, the vast majority have not.

As with automated saws, automated jigging systems were slow to catch on. During the mid '90s, another approach was brought forth...the laser projection system. While it moved no automated pucks into position to define the perimeter of the truss, it did provide an outline for positioning manual jigging and offered the ability to precisely locate the nail plates on one side of the truss. For several years the laser was perhaps more popular than automated jigging systems then available. However, it would appear, from my view at least, that the industry is beginning to recognize the value of these puck positioning systems.

During the past two years, the industry has suddenly begun

to catch up with the technology that has for some time been available. New entrants in the automated puck positioning game have also helped bring attention to this valuable tool. Variations on the original jigging systems have caught the eye of savvy plant owners and managers, and the number of users is increasing at astounding rates.

The new systems claim little or no extraneous jigging is necessary for most any truss configuration. What does this mean to the production manager? Let's spend a few paragraphs thinking about it.

Many truss plant owners and managers don't really have a good idea of how long it takes to do the average truss table setup by hand. They know it's time-consuming, but to be honest, would likely be shocked if they stood there watching some of the setups from start to finish.

On two different occasions back in the late '80s and early '90s, I had opportunity to videotape the setup process at several plants for viewing later by the plant owners. In one instance, the owner, after watching the snail's pace of the process, jokingly threatened to

fire the crew that was doing the setup.

In the other case, the owner came in on a Saturday to view the tape of several setups that had taken place at his plant the day before. After ten minutes of watching paint dry, we shut off the video and he ordered the first automated jigging system we sold in this country. The year was 1992.

In studies that I did in earlier times, one could assume that the more simplistic truss (i.e., the common truss of moderate span), could typically be set up in around twenty minutes. With the more complicated trusses, the sky was the limit. It wasn't uncommon to spend an hour or more. Worst of all, you may only build one truss with that setup! It hasn't gotten any better.

With the automated setup systems, the pucks will typically move into position within about 30 seconds on average, sometimes less, and seldom more. With the newer systems, pucks are more typically spaced along the length of the table at about two feet on center, thereby minimizing the need for most manual jigging. That being the case, it's likely that your builders can be placing components on the table within

a matter of no more than a minute or two. On most systems and truss types, you'll likely be ejecting the first truss within five minutes or less.

I'm aware of a plant with an automated jigging system that only used the system to build runs of three or less. They averaged 1.8 trusses per setup. The best of their three workstations on that automated table system averaged a little over eight minutes from start to finish to build the average 1.8 trusses (less than two). The worst did it in about 13 minutes...still not bad when you consider that the simplest of manual setups takes around 20 minutes or more just to do the setup.

The result is that each of the different runs you do will probably save at least 15 minutes (more likely, much more). If you currently do six to eight setups and runs per table or workstation per shift, it's likely you'll find yourself with perhaps two or more hours of unused time before you get to the end of the shift. While you've saved time and money on each of the aforementioned setups, the big pay-off really comes in that last two hours of free production time.

Stop and think about it. It's like getting a free day of production every four days! Assuming you're making money on your product, the profit from that extra production is truly "money in the bank"! The more shifts, the more money... especially if you eliminate entire shifts.

**...an automated jigging system has the potential to pay for itself faster than an automated saw. The catch is... you need them both...otherwise you're just shifting your bottleneck!**

A single automated jigging system can impact your whole operation even if you have tables that aren't automated. Since a single truss can be produced in such a short time, use the automated system as a pattern maker for the manual tables. You'll save money on every setup and run you build throughout the plant, plus you'll have the bonus time mentioned above on every table.

Finally, the accuracy of the setup is almost certainly going to be better than doing it with a tape measure and chalk line, so problems in the field due to screwed up trusses should become a thing of the past.

I've said it for years in the past...and I may as well say it again...an automated jigging system has the potential to pay for itself faster than an automated saw. The catch is...you need them both...otherwise you're just shifting your bottleneck! **SBC**

*Jerry Koskovich is President of The Koskovich Company in Rochester, MN.*




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