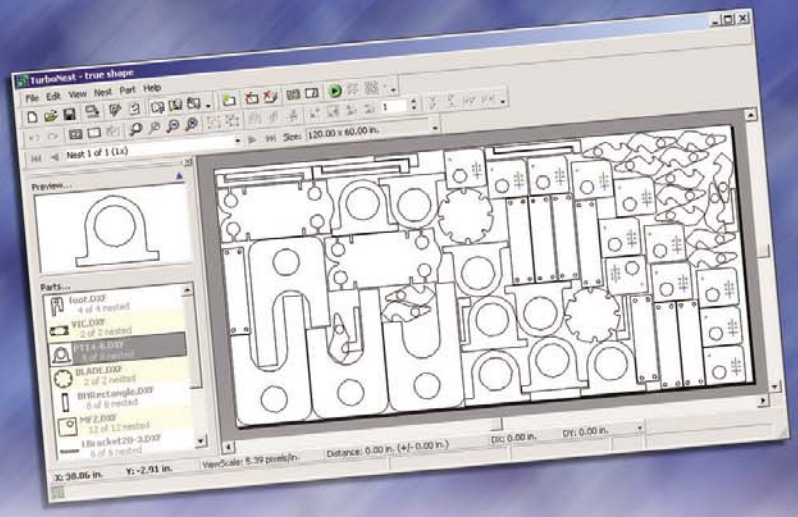
Nesting Software:

No Longer Only a Stand-Alone Tool



Nesting software is finding a new nest in MRP systems. But it may take some slick interfacing to make it play well with the other modules—at least for now.

Art Klein
Editor

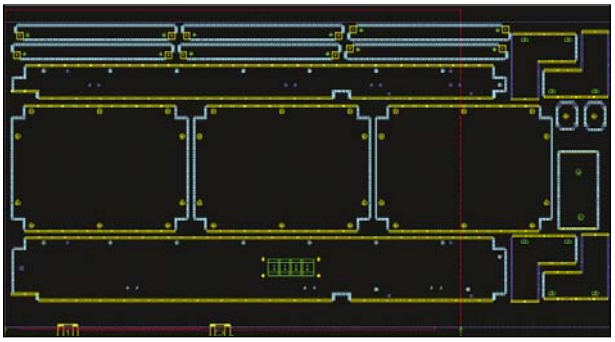
Nesting software helps fabricators get the most parts from every sheet of metal. Less waste means fewer sheets and, thus, lower material costs. Whether the software is supplied with the machine or added on by a third-party software supplier, better sheet utilization is the main goal. At least until recently.

Now, nesting software is no longer viewed as merely adding capability to a machine, but rather as a means of integrating laser, plasma, and turret punch presses into a company's MRP capabilities. "One of the most interesting things with automatic nesting," says Bob Rouillard, CAD/CAM program manager at Trumpf (Farmington, CT), is that it is no longer only one machine you're dealing with. It is becoming part of the full manufacturing flow, especially in integrating part requirements from an external computer system that is driving the part requirements from an MRP system."

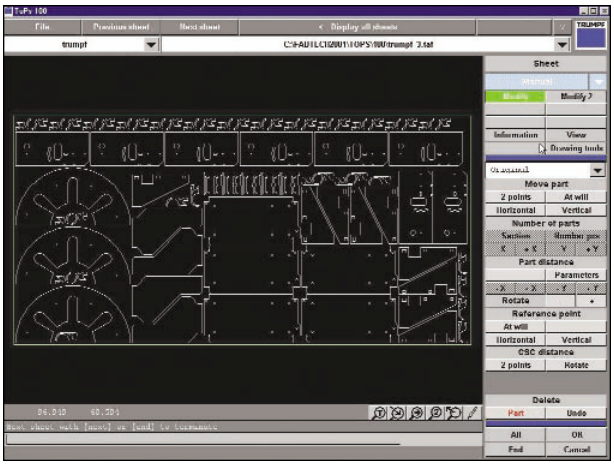
Rouillard believes integration benefits small as well as large manufacturers. "The key is flexibility," he says. "It gives users a choice of a hands-on involvement with nesting or an automated approach for part requirement entry."

Strippit/LVD's (Akron, NY) Shawn Thompson, CAD/CAM product manager, is also seeing the same thrust toward integrating nesting software into factory-wide systems. Says Thompson, "One of the interesting things that's happening in nesting software is the link to MRP systems, and shop floor and inventory control management. Good nesting software, in addition to doing all the things it does with part nesting geometry, can process additional information that has to do with material flow. It can also interface with an MRP or a database system to keep track of how many parts to make and put on a nest."

This trend toward integrating nest software into MRP systems is obvious not only to machine-tool OEMs like Strippit/LVD and Trumpf, third-party software suppliers are seeing it, too. Mike Boggs, vice president of sales and marketing, Striker Systems (White House, TN), has also noticed



Striker Systems



Trump

that, "Industry is moving more and more toward automation; what it classifies as hands-off or lights-out programming. We're doing quite a bit of that.

"What we're seeing, especially from larger firms, is more companies wanting to read from a schedule file. Regardless of the software they use to schedule jobs and to determine which parts are going to be made by which machines and when, we pick up from that schedule file and do the process, essentially hands-off.

"But it's not going to work in all situations or in all applications," he adds. Most MRP systems are modular. Users can add separate functions as their needs change, but all modules in a particular system are designed to be quickly added to that system. Not all nesting software is currently furnished with the ability to quickly integrate into existing MRP systems.

Strippit/LVD's Thompson expands on the difficulties: "The big thing, I think, depending on the kind of MRP system or type of information technology department a company has, is interfacing with the nesting software. MRP systems are often very different from each other. The question is where do you make the interface between the nesting software and the information management system.

"If it's a more sophisticated company, like a manufacturer that has its own MRP system," he continues, "it may have an MIS department whose job is to run the MRP system. They would have to interface the database with the nesting software. For example, when the MRP system generates a work order, they would have to output that information to the nesting software's database so the nesting software can then generate the nest."

Striker System's Boggs describes how nesting software/MRP integration might work: "A company receives an order for 100 metal desks. The software will get their preprogrammed parts, pull their schedule file, and nest the parts. There may be a variety of materials required. The software will have to look at those requirements, and sort them by material type and gage so they will be nested on the proper material. It will compare the requirements against the company's sheetmetal inventory and make sure there is sufficient material for processing the order. It will do all that and process the job through to the NC code. We are starting to see more and more of that level of automation being required."

Better Sheet Utilization

Nesting software/MRP integration is, of course, not the only issue. Sheet utilization, pre-tooling, and whether a job shop or large manufacturer will profit from nesting software are also important considerations.

According to Trumpf's Rouillard, "Most users are looking for the best sheet utilization. Others are more concerned about part organization. You have to give in one area to get in another. If you want to structure your nest so you can bundle similar parts together on the same sheet, you are going to sacrifice some sheet utilization in the effort to maintain part flow. If you are prioritizing parts, you will tend to restrict your utilization of the material."

Trumpf's nesting software provides the option of prioritizing parts or setting priorities so that all parts are equal. To comply with the latter requirement, the software will nest for best material utilization.

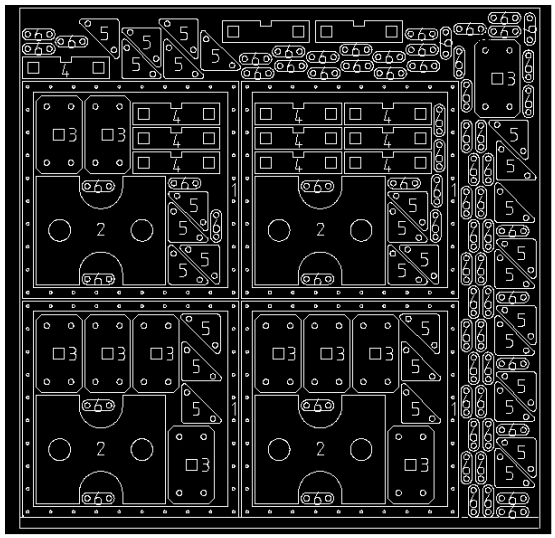
Going a step further, Rouillard suggests, "Utilization can be increased by differentiating actual parts from scrap in the program. Without good software, every hole you cut is scrap. If part of that sheet has large cutouts, will the software track that? Better software can put another part on the sheet to use some of the material that would otherwise become scrap, and then your sheet utilization improves."

To improve material utilization, good nesting software will use common-line punching or cutting, Thompson says. "On the laser side, common-line cutting will speed processing because, with parts next to each other, you can cut common edges of both parts in one pass. It also improves material utilization because you do not waste web space between parts."

Although web space between laser paths is very thin, plasma webs are wider, resulting in more wasted material. Both laser and plasma, however, require thinner webs than turret punch presses.

Parts can be programmed for immediate use or recalled later for additional production runs. It is also possible to "pre-tool" parts, a process in which turret punch press tools are specified to produce that part. The advantage of pre-tooling, explains Boggs, is that "Whenever anybody needs to run that part, they just call it up. Tool hits are already in the program. It's ready to run."

There is sometimes a problem with this approach. Boggs goes on to say,



Radan

"Pre-tooling parts may introduce some other issues the user has to contend with. For example, let's say Programmer A and Programmer B are programming parts on two different computers that are tied into the same network. They both access the same parts database. They both program for cutting the parts on the same machines.

"Say one of them programs a part and enters it into the tool library. Six months later, the other programmer tools a different part and enters it into the tool library. Later on, if one of them has to generate a nest, and that nest includes those two parts, what may have happened is that when those programs were generated, the tooling setup in the turret was not the same as it is now. You have one part that was programmed assuming a quarter-inch round tool in one station, and the other was programmed with the same tool, but assumed it was loaded into a different turret station. Now, they generate a nest that includes these two parts, but the same tool is pointed at two different stations. In reality, it may not even be currently loaded in either of those two stations. As you can see, you can get into situations in which the preprogrammed tooling does not match actual tool loading.

"Most software companies have provisions for handling that. We do it with an automated process that runs in the background, called Tool Map and Merge. Once you nest a sheet, it looks at the tooling layout and goes back and looks at the turret and tool libraries. It rebuilds the turret to match the current layout. This information gets to the operator on the floor so he knows what the tool setup should be."

Who Benefits the Most?

"There are two distinct markets for nesting software," says Thompson. "One is the job shop market; the other, the OEM market. The needs in each can be quite a bit different.

"Job shops often need quick turnaround for low-volume parts. OEMs typically need greater capability to maximize sheet utilization for higher volume parts in regular production runs.

"With the right capabilities, nesting software can satisfy both these fabricating customers. There are a lot of things that nesting software can do. It can take a variety of parts and place them on a sheet to get the most parts per sheet to maximize material use. In addition to just repeating the part on the sheet multiple times, it may rotate the part. It will be able to fit additional parts by turning them some number of degrees. That is particularly interesting if you have parts that are not particularly 'easy' in shape.

"The ability for nesting software to be integrated into MRP systems is important for a job shop," says Thompson. "It gives the shop some flexibility because their jobs may change every day or on a regular basis. If a job comes in from one of its customers and they need quick turnaround, the shop adds it to the list of parts to be made. The nesting software will put it on the next available nest. It can combine a couple of jobs on one sheet. It maximizes material utilization and productivity. It manages the shop's information very efficiently. They just tell it what parts they need to make and the software will make the decision that these parts can be made together.

"The interesting thing," he continues, "is that this capability also serves the exact opposite need. OEMs are more interested in quantities, inventory control, and sheet utilization because of their high-volume requirements. With their software, they can do more production planning. They can also a run all the job's parts that go into a common product.

"A work order may hit their floor for a computer chassis, for example, and it may include six different panels. Three panels are made from one thickness and the others are made from a different thickness material. Nesting software can take that single work order and break it into individual nests as necessary, and maintain those parts together on one work order even though they are on different sheets.

"That's the direction that nesting software is going. It's gone above and beyond just nesting geometry and into nesting information management. For job shops, it offers the flexibility they need. And it has the shop floor and work order management capabilities OEMs need."

Whether you are using nesting software on a stand-alone basis or integrated in your company's MRP system, "....one of an automatic nester's main benefits is you can look at different part layouts based on your criteria," says Trumpf's Rouillard. "Before there were automatic nesters, people would create layouts manually by picking and placing parts. It was very time consuming. They could not quickly evaluate different scenarios, such as the effects of a larger frame, larger web width between parts, or part orientation, as today's users can. They were also unable to evaluate changes, such as a different sheet size, that would give them the best results. With automatic nesters, users can now calculate how a different sheet size, web spacing, or part orientation affects material utilization and costs," he concludes.

Available Nesting Software

A sampling of available nesting software follows. (Trademark and registration marks omitted for clarity.) To make sure you are getting complete information about each package, circle these numbers on the reader service card or, for faster results, visit the manufacturer's web site via www.sme.org. Scroll down

to and click on the *Forming & Fabricating* logo. Under "Issues On-Line", select May 2002, then "Nesting Software: No Longer Only a Stand-Alone Tool."

FastNest from FastCAM accepts native NC code, DXF, IGES, and the company's own CAM format. Entries and exits can be moved before or after nesting. Entire nests can be sequenced for optimum cutting operations. Other features include hole avoidance, part marking, bridging, and beveling. **Circle 365**

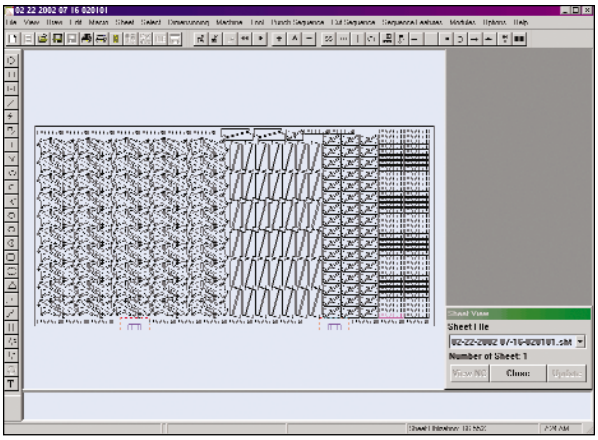
Finn-Power's NC Express software contains a rectangular nesting algorithm for use on the company's Shear Genius Punch/Shear FMC. It provides automatic notch recognition for dynamic common line, and interactive nest tooling and grid nesting. Small parts are automatically nested within larger parts' holes. **Circle 366**

FlowNEST is part of Flow International's FlowMaster Intelligent Control family. FlowNEST's 32-bit Windows application is specifically designed for use with waterjet. Cut orders can be changed via the drag-and-drop feature. The automatic gap-jump feature bypasses drawing imperfections. **Circle 367**

Koike Aronson's C-Cut is used with flame, plasma, laser, and waterjet cutting machines. In addition to its automatic nesting capabilities, nesting can also be performed manually. Plate remnant control uses a remnant as many times as necessary to fully utilize the sheet. **Circle 368**

TurboNest is a nesting package from MTC that handles plasma, laser, oxy-fuel, waterjet, and routers. PRONEST handles the same, plus profile/punch machines. PRONEST can also be integrated into MRP, ERP, and JIT systems. **Circle 369**

NestMaster Punch and NestMaster Laser from Merry Mechanization both accept comma-delimited ASCII files to generate lists of parts to nest. The former is for use on punch, laser/plasma, or combination machines. The latter is for these, plus flame and waterjets. **Circle 370**


Metalsoft

Optimation's nesting software offerings include OPTINEST (for CNC flame cutters, plasma, lasers, and waterjets), OPTILASER (CNC gantry and C-frame lasers), OPTIPUNCH (CNC punches, lasers, and punch/laser, /plasma, and /shear combination machines), OPTICOMP (CNC ultrasonic and reciprocating knives), and OPTIROUT (CNC routers). **Circle 371**

radan2000 automatically creates profiling paths for individual parts or the entire nest. RADAN CIM's package also supports common-line slitting and can automatically cut up the sheet's skeleton. It can be used on CNC punching, profiling, and combo machines. Data can be accepted from the customer's MRP system. **Circle 372**

Salvagnini's NEST punching and shearing package consists of a set of software modules for automatically planning and producing a collection of punched blanks from a variety of large starting sheets. Nesting programs can be created manually or via parametric programming. **Circle 373**

SigmaNEST is SigmaTEK's automatic nesting software. Structural Material Manager's plate-nesting module determines the optimal flame-cutting pattern. Up to 20 different stock plate sizes for each plate thickness and grade can be specified. Rectangular items can be rotated 90° so more configurations can be analyzed. **Circle 374**

SS-Nest is Striker System's nesting software. It attempts to minimize cutting head up and down movement by keeping the cutting head working as much as possible. Common edge cutting can reduce burn length and eliminate piercing operations. Multiple torch cutting is an option. **Circle 375**

Among Strippit/LVD's CADMAN-L 3D module's functions is nesting for laser cutting. This module is one of three that integrate into the CADMAN base module. The CADMAN-P 3D module provides nesting for punched parts. The third, CADMAN-B 3D, is for bending. **Circle 376**

ToPs 100 is Trumpf's software for flat-sheet laser processing and ToPs 300 is for punching. Free Geometry and Extended Rectangle are the two nesting processors. The user selects which one to apply. Nesting can also be accomplished within other parts on the sheet. **Circle 377** ❐