

MANAGEMENT » CHIEF CONCERNS

RFQ

Request
For
Quotation



FREE THE QUOTING CONSTRAINT

How much money are fabricators leaving on the table?

By Lars Hedman

You've updated your shop floor with automation. You have state-of-the-art machine tools. You can respond to customer manufacturing requirements quickly. Your enterprise resource planning or manufacturing execution system (ERP/MES) schedules and tracks production and analyzes costs. You have a modern manufacturing facility, but so do many of your competitors.

The "great lockdown" of 2020 has slowed quoting activity for many, of course. The question is, will you be ready for the rebound? Customers have easier ways to generate request for quotes (RFQs), and during normal times they can send RFQs to more vendors than ever. They want quality products at the lowest cost. They require fast turnaround, both for quotes and delivery. Your production facility can handle the requirements, but do you miss out on orders because your quoting department can't handle the volume of RFQs quickly and accurately? You've invested heavily in expensive production equipment, but are you keeping your shop floor as busy as it could be?

Custom metal fabrication is a complicated business. Jobs share resources and are grouped together in myriad ways. Material prices vary too. It's so complicated that many shops operate without true knowledge of what a specific job actually costs. Companywide, fabricators know when they're making or losing money—but where exactly is that money being made and lost? If they can unlock this information, metal fabricators can discover their true potential.

Common Quoting Challenges

Manufacturers of all types have varied quoting challenges, but they often follow a common theme. It takes time to organize and analyze incoming data

from RFQs. The more complicated and varied the products they're quoting, the longer it takes for them to produce an accurate quote.

A lack of process knowledge can slow quoting even more. If only certain quoting personnel have unique process knowledge—that is, they rely on tribal knowledge—the operation is more likely to experience quoting delays and, in turn, lost opportunities.

Even worse, as the RFQ volume increases, all with tight due dates, manufacturers face a double-edged sword of meeting quote requests at the expense of producing inaccurate sales quotes that either cost the fabricator money or cause it to lose out on winning profitable business.

One of the main constraints of generating a fast and accurate sales quote is the manual analysis of incoming customer drawings and related specifications. These can be from 3D CAD models, DXF flat patterns, drawings in PDF format, or numerous other sources. Estimators analyze these documents, then plug information into homegrown spreadsheets.

These spreadsheets are essentially a set of unconnected databases that require estimators to key

in changes manually. The spreadsheets grow more complex over time and become harder to maintain as product requirements change. When the quoting process is a combination of spreadsheets, home-grown software applications, and tribal knowledge, fabricators find it more difficult to gather accurate time and material cost data.

When specific data in quoting spreadsheets relies on tribal knowledge, quoting efficiency can suffer tremendously. Depending on key personnel typically becomes more taxing as the quoting work load increases.

The Current State of Quoting

As with anything else, to improve the quoting process, it helps to understand the current state. Quoting fabricated sheet metal parts incorporates some common steps.

1. Organize/store RFQ information. Estimators receive RFQs that can include drawings in many formats, including CAD files, PDF files, even hard copies. The more quotes estimators receive at one time, the more time it takes for them to organize, sort, store, and prepare the information for quoting.

2. Perform the part analysis. This can be challenging for sheet metal fabricators because it involves determining the optimal routing for fabricating and costing each part. This normally entails manually determining part parameters, including part size, perimeter length, cutout perimeter lengths, hole counts, cutout types, bend counts, and material types and thicknesses.

Consolidated Data Warehouse		
Engineering / Quoting	Work Flow	Manufacturing
Part Master Database	Work Flow Configuration Rules	Routing Rules
Part / Cost Parameters	Design Processes	Machine Size Limits
Product Configuration Rules	Manufacturing Processes	Machine Tool Parameters
Part Numbering Rules	Quoting Rules	Machine Tool Learning
Material Options / Selection	Revision Processes	Manufacturing Exceptions
Document Attachments	Review / Approval Processes	Scheduling / Capacity Rules
Engineering Tribal Knowledge	Work Flow Tribal Knowledge	Manufacturing Tribal Knowledge

Quite often information for quoting is spread throughout the enterprise. Consolidating it all helps streamline quoting significantly.

3. Determine the routing steps, time, and costs.

Once estimators determine the part parameters, they determine the routing steps based on those parameters—and again, they often base these off of tribal knowledge from key personnel. Estimators then establish machine tool times for each routing step and apply costs to those times based on part quantities.

4. Calculate material and vendor costs. The estimator then calculates material costs and vendor costs for outside services that need to be rolled up into the quoted part cost. For instance, if a routing step involves some outside plating, the estimator applies the cost of it here. Waiting for vendors and suppliers to respond to pricing requests, of course, does take time. At some point that time can cost a fabricator dearly.

5. Generate a part bill of materials. Many sheet metal fabricated parts require a list of components like hardware and packaging that needs to be factored into the quoted part cost.

6. Configure and generate sales quote drawings. With products like configurable sheet metal cabinets and enclosures, a fabricator's customers might require a drawing of the quoted part or product. This, of course, adds time to the quoting process.

7. Sales quote approval. Quite often appropriate personnel need to approve certain quotes. Of course, if these people aren't available, more delays ensue.

8. Integrate quote data with ERP or customer relationship management (CRM). Estimators or other personnel then manually key quoting data into the fabricator's business software—again, another time-consuming step.

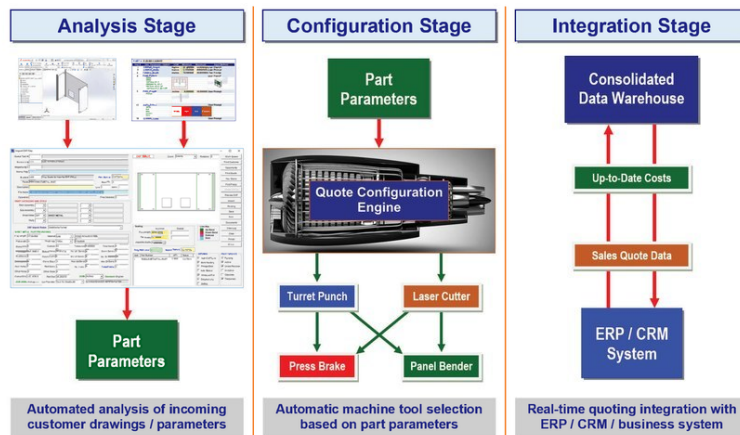
The Potential of Quoting Automation

Gathering all the needed information for a good quote is a common challenge with many nonstandard, engineered-to-order products. Someone must analyze various forms of information included with the RFQ that come in a variety of formats—and that someone needs to be familiar with the parts and products being quoted.

In recent years the industry has seen the rise of software that automates quoting at least to some degree, and that trend is likely to continue. That said, truly effective software must not only take into account the details of a specific part, but how those details relate to a shop's technology, routing, and, not least, available capacity.

Step 1: Process Incoming Information

Before anything else, though, a fabricator needs a single version of the truth. Again, many fabricators struggle with managing multiple databases, juggling BOMs on spreadsheets, ERP systems, and elsewhere. But if an operation can consolidate all that information into a "single version of the truth" data



Automated quoting occurs in three stages: analysis, configuration, and integration.

warehouse, it can create manufacturing BOM with complete information for job costing.

Step 2: Analyze the Parts

The analysis starts on the part or subcomponent level, and at most fabricators this entails bending and forming. To perform this, the quoting software engine needs to consider a plethora of variables, including:

- Flat length and width.
- Part perimeter and cutout perimeter.
- Material type and thickness.
- Total number of cutouts.
- Hole counts and sizes (obround, rectangular, round, and other shapes).
- Bend counts (up-bends and down-bends).
- Internal bend counts (up-bends and down-bends).
- Total bends.
- Cutout and part distance.

This is just a partial list, of course, and this kind of analysis is required for every component and BOM level in a job, from hardware insertion to welding and assembly.

The analysis also can incorporate product configurators that can streamline the quoting of product families: for instance, a family of enclosures with infinitely variable dimensions within specific ranges. If a customer requests a quote for a specific size within that product family, a product configurator can produce a drawing instantly for quoting.

Step 3: Quote Configuration

This involves processing part parameter information to generate routings, BOMs, required tooling, as well as up-to-date machine process times and material costs. Many shops have incorporated these parameters into their own quoting methods, whether they use spreadsheets or some type of

Quoting capacity is just half the problem; quoting accuracy is the other half. Many today might operate by a you-win-some-you-lose-some strategy. If a shop doesn't know exactly which jobs are money-makers and which are money-losers, and why, good planning becomes extremely difficult.

homegrown software. But these days software is advancing to the point where it can also incorporate a shop's tribal knowledge.

For instance, say you have a large component with a specific flange height that allows it to be formed either on a press brake or a panel bender. Which would be most cost-effective? That depends on the part geometry. A large part might be difficult to maneuver on a brake but be quick and easy to form on a panel bender, if the flange height is right and the piece has a flat surface for the panel bender's clamping tools and manipulators. That's a no-brainer: The quote should incorporate a routing through the panel bender.

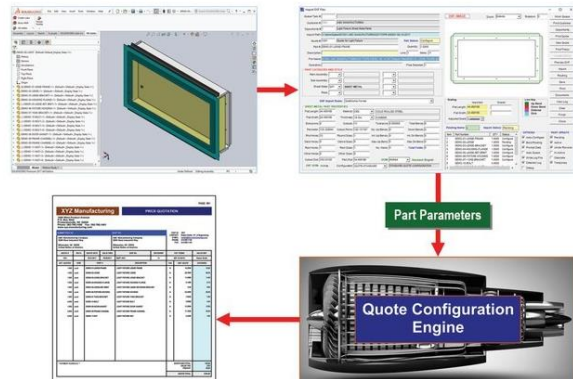
But let's say another large part has a short flange height—too short, in fact, for the panel bender to form effectively. What's the price differential between bending on the panel bender versus the press brake? If the differential is large, because of labor requirements (multiple people having to lift a piece during the bend cycle) and the high rework risk, would it make sense to stitch-cut or punch a

sacrificial tab on each piece to extend the flange height during forming? After forming, the tab could simply be snapped off. This might make the part suitable for the panel bender.

Still, the tab might require the final edge to be deburred. So is the sacrificial tab worth it? If the sacrificial tab makes press brake bending easier and more repeatable, should the job go through to the press brake because the panel bender is swamped with work—if, of course, the cost to do so remains reasonable? It should, as long as the alternative routing doesn't lead people to "muscle through" work that's difficult to perform on specific machines. A part might be easy to form on the panel bender but require extensive setup or rework on the press brake. In that case, an alternative routing might not make sense. Again, this kind of information comes from tribal knowledge, and such knowledge now can be incorporated within software.

Note that the previous example requires advanced logic, depending on the parts involved and the product mix. In fact, if a fabricator is just starting to streamline quoting with software, this example is by no means a starting point.

When specific data in quoting spreadsheets relies on tribal knowledge, quoting efficiency can suffer tremendously. Depending on key personnel typically becomes more taxing as the quoting work load increases.



Automated quoting starts with the job information (in this case a solid model). After analysis and configuration, the quote is ready.

Step 4: Integrate Quoting Into Business Systems

Most manufacturing companies use some sort of ERP, CRM, or other business system to run the financial portion of their business. Some fabricators might use quoting systems integrated into these systems, but more often than not, they rely on homegrown systems and spreadsheets into which job parameters need to be manually retyped.

For software-based quoting to truly make sense, it needs two-way communication with multiple sources, including direct links to email to capture incoming RFQ information as well as links to multiple data sources. Someone manually typing information into any system related to quoting puts accuracy at risk and adds yet another constraint to the process.

The Future of Quoting

Consider a precision sheet metal fabricator with the latest equipment: an extraordinarily productive fiber laser, several punch/laser combos, all fully automated; press brakes with automatic tool change and varying degrees of automation; perhaps even an automated powder coating line.

Then a young estimator walks to the floor to talk to the press brake supervisor—not about advanced manufacturability strategy, but simply about whether a specific flange can be formed. The chief estimator would know the answer immediately, but he isn't in the office, and the new estimator looking at the customer drawing wants to be sure. Of course, such communication is great—much better than misquoting a job, winning it, and releasing an unformable order to the floor—but it's still not efficient.

It goes back to quoting volume: How much work can the estimating team realistically produce? Even if everyone were a quoting wizard, the quoting team still couldn't keep up with demand. Sure, some fabricators will still no-quote some work that falls outside their core competencies. But some shops might miss out on quoting certain work just because of low win rates from "window shoppers" (those who request quotes but rarely buy) even though the work itself perfectly fits the operation's core capabilities. How much are these operations leaving on the table?

Again, quoting capacity is just half the problem; quoting accuracy is the other half. Many today might operate by a you-win-some-you-lose-some strategy. If a shop doesn't know exactly which jobs are money-makers and which are money-losers, and why, good planning becomes extremely difficult.

Estimators aren't quoting blindly, exactly, but they aren't working with 20/20 vision either. In the future, those with better vision most likely will make best use of machine technology, software, and talent—and ultimately find success where their competitors can't. **FAB**

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