



## DIGITAL INDUSTRIES SOFTWARE

# How can independent electronics manufacturers compete better for jobs?

Smaller companies need a competitive advantage to manage the quotation process

### Executive summary

Small and mid-sized electronics assembly and manufacturing service companies need a quoting and costing solution that will give them the edge during the process of bidding on jobs. They cannot afford to spend their engineers' time on cost calculations; they need tools that will help them be leaner, faster, and even more accurate than their larger competition. This paper illustrates how automation, working smarter, can speed up the request for proposal process, enabling instant processing of supplier quotations. BOM Connector is one of the solutions in the Siemens Xcelerator portfolio that can accelerate smaller manufacturers' capabilities. With these solutions, a company's manufacturing experts can focus on the work of building things, while the cost-calculation experts can be assured of accuracy.

## Must be faster and leaner

As electronics printed circuit board (PCB) assembly and electronic manufacturing service (EMS) companies move to higher mix production, the number of quotes required in this new environment increases significantly. They face challenges every day to provide quotes accurately and quickly to their customers. Keeping up with the demand but also improving accuracy increasingly will become a critical part of the day-to-day quoting requirements. Smaller companies must generate quotes they may not necessarily win; but the risk is, if they do not participate in the bidding process, they might not be included the next time around. This dynamic within the industry makes it challenging to compete and keep a viable business going.

A large company has an entire department dedicated to cost calculation, which includes several process experts, a dedicated purchasing group, hardware engineers, and an up-to-date ERP system. Even at this level, quoting is not easy if information is missing in the ERP about new components and availability.

***"It may feel like everyone is too busy with quoting to build anything and make money."***

# How can a smaller company compete?

The biggest part of the job cost is generated by materials, but a quote also must consider the process costs, packaging, shipping, taxes and profit margin. In a small company, it may feel like everyone is too busy with quoting to build anything and make money.

Even a small electronic assembly site is a complex organization comprised of a process and maintenance team with advanced knowledge, whether the factory has one SMT line or 10. Inputs into a job quote will need to come from the SMT experts who understand the manufacturing process, THT assembly and selective soldering experts, and people who understand ICT and functional test, as well as press-fit and PCB separation processes.

If everyone has to calculate production costs for the quoting requirements several times per week, the production flow will be disrupted. Most of the team in production are passionate about mechanics, electronics or automation, and asking them to calculate costs of production can be demotivating if they have minimal finance knowledge.

So, even a small company needs some sort of quoting and costing department to support the incoming quotes from sales. Quoting based on

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materials is possible, but input from the manufacturing experts who have advanced process knowledge is still needed for accuracy. If a manufacturing expert is assigned to quoting, it means they are not doing their production tasks.

They could just use the material costs and add a particular percentage, but this results in mistakes. Offering a quote that does not cover production costs is not good, but overestimated costs is bad for a small business running on tight margins. They need to be able to see the real production cost so

they can adjust the profit margin.

The cost calculation department typically works with Excel files, and process costs are generated based on part quantity, PCB size, number of PCBs in a panel, assembly technology and production volumes. The spreadsheet includes the theoretical pick-and-place

Cost Calculation Electronic Assembly										
Customer	Demo	SOP	Q3 2023							
Region	Europe									
Country	Germany									
Part-Number	Layout Variant	Quantity	PCB / Panel	SMD		Press-Fit	THT	Lot		
				Top	Bottom					
PN_0000111	PCB_1	750	6	125	210	0	3	500		
PN_0000112	PCB_1	500	6	125	210	0	3	500		
PN_0000113	PCB_2	1500	8	250	375	0	0	500		
PN_0000114	PCB_3	75000	170	4	0	4	0	500		
PN_0000115	PCB_4	2800	12	158	75	0	2	500		
PN_0000116	PCB_4	3000	12	158	75	0	2	500		

speed provided by the machine supplier, so a formula can be set up to consider just the real speed of 60 percent. The SMT cycle time is calculated as a sum of placement time and the conveyor transfer time, considering the line bottleneck. This seems like a simple and fast solution, but it is wrong.

This solution is problematic because it does not include a panel design and exactly what type of components should be placed, so the cycle time is incorrect. In real life, there is a substantial difference in cycle time when placing small or large components. It cannot be calculated accurately without importing the CAD file and analyzing it with the pick-and-place machine software.

# I Competitive edge

An easy-to-use, accurate and quick, turn-around solution is to integrate the existing BOM-driven process (spreadsheet) with intelligent CAD data (such as ODB++ Design). The latter provides all the base data that can then be used to drive the calculations more accurately and is fast enough to keep up with the high-quote/high-mix production jobs coming in.

Using CAD data allows the extraction of top and bottom parts, surface mount versus through-hole versus press-fit versus mechanical, number of layers, number of nets and board or panel size, etc. This is the necessary data to drive process calculations in a few seconds without help from the production engineers.

Now information about the product is in CAD and BOM, but there is no way to extract it and calculate costs automatically. After each booked project, the real cycle time has to be calculated manually and the formulas in the spreadsheet corrected.

But, at least the conversion of intelligent CAD data provides everything needed from the design to create a quote. This allows adding information that is missing when a quote is based on just a BOM file.

The best solution for a smaller company is to use fully automated, intelligent software that knows the structure of a BOM and how to extract the pertinent data. Siemens provides a solution, BOM Connector, that understands the unique characteristics of

Production Steps		ACC Demo (100)					
		USA		China		Germany	
Step	ERP-ID	Cost	Cost	Cost	Cost	Cost	Cost
<b>A Pre Production Preparations</b>		Office		Office		Office	
BOM Scrubbing		1.58 USD	1.18 USD			1.58 USD	
BOM Material Calcul.		2.27 USD	1.70 USD			2.27 USD	
Production Calculatic		0.66 USD	0.05 USD			0.66 USD	
		<b>Total 4.52 USD</b>	<b>Total 2.94 USD</b>			<b>Total 4.52 USD</b>	
<b>B SMD</b>		Line A		Line B		Line A	
Assembly Line		0.00 USD	0.00 USD	0.00 USD		0.00 USD	
Programming NRE		40.70 USD	40.70 USD	40.70 USD		40.70 USD	
		<b>Total 40.70 USD</b>	<b>Total 40.70 USD</b>	<b>Total 40.70 USD</b>		<b>Total 40.70 USD</b>	
<b>C THT</b>		Machine		Manual		Machine	
THT Assembly		1.50 USD	1.50 USD	0.73 USD		1.50 USD	
		<b>Total 1.50 USD</b>	<b>Total 1.50 USD</b>	<b>Total 0.73 USD</b>		<b>Total 1.50 USD</b>	
<b>D Electrical Test</b>		ICT		Flying Probe		ICT	
Test		0.08 USD	0.08 USD	9.04 USD		0.08 USD	
Test Fixture NRE		29.13 USD	29.13 USD	2.91 USD		29.13 USD	
		<b>Total 29.22 USD</b>	<b>Total 29.22 USD</b>	<b>Total 11.96 USD</b>		<b>Total 29.22 USD</b>	
<b>E Optical Test</b>		AOI		Manual Optical Inspection		AOI	
Test		1.60 USD	1.60 USD	9.04 USD		1.60 USD	
		<b>Total 1.60 USD</b>	<b>Total 1.60 USD</b>	<b>Total 9.04 USD</b>		<b>Total 1.60 USD</b>	
		<b>ACC Demo (USA)</b>		<b>ACC Demo (China)</b>		<b>ACC Demo (Germany)</b>	
		<b>Total: 123.36 USD</b>		<b>Total: 121.67 USD</b>		<b>Total: 123.36 USD</b>	

Complete production calculation for three different locations.

reference designators, customer part numbers, manufacturer names and part numbers, and the relationships between them. This automated system allows the costing department to use templates that can be reused across projects. With the software, importing future BOM files is faster, accuracy is improved, and valuable manufacturing experts are left to do their work making things.

The software connects to the ERP system and provides various ways to determine if the parts are on hand in the factory in sufficient quantities for the project. Exact matching of manufacturer part numbers is easy. It supports fault-tolerant searches, smart searches, and alternate parts, looking to find as many parts as possible that are already sitting in inventory. Being able to save those connections so that they can be used again for the same customer improves future accuracy and reduces overall quoting time.

Of course, the software should be able to find prices for parts that are not in inventory. Connection to the component supplier's web portal allows automated extraction of prices, lead times, and stock levels, as well as alternative parts. A fully automated solution can perform these queries much faster than manual methods.

Finally, a small number of parts will need to go through some form of RFQ process; being able to quickly create an email with an attached spreadsheet file that can be easily updated by the supplier, saved and returned, and then imported directly saves significant amounts of time. It also makes quoting easier for the supplier, which means that they may potentially lift the priority of that request over ones that require much more effort.

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## I Real results

Omnigo (Pretoria, South Africa) is an EMS company that took advantage of such an automated solution to improve both the timing and accuracy of their quoting process. Omnigo is an electronics contract manufacturer (ECM), providing printed circuit board assemblies (PCBA) and turnkey project services to telecom, mining, and defense companies. They were looking for ways to improve the RFQ response times.

“We have always used a manual, spreadsheet-based process for providing quotes,” explained Marius Nel, director of operations. “It worked well, but with the advent of Covid and the turmoil it created in the electronic component market, we realized that we needed to look at alternative methods to become

nimbler and adapt to an ever-changing environment.

“We imported our clients’ bill-of-materials into spreadsheets and sent email requests to our suppliers. Once all the responses were received from our suppliers, we consolidated them into a master spreadsheet. Components would then be manually selected according to cost and/or lead time considerations, and a quote would then be sent to the client. Once an order was received from a client, it went through a ‘scrubbing’ process to validate the information and import the BOM into our ERP system.”



Image courtesy of Omnigo.

Turnaround times were long because of their manual quotation process. They also had technical and cost calculation gaps due because validation of the BOM would only take place once an order was received.

“We began to search for a solution that would improve both quotation turnaround times and accuracy. Siemens Valor BOM Connector was the best fit,” said Nel. “With this solution, materials data can be imported directly into the platform and information is validated immediately, improving performance and accuracy.”

**“We’ve reduced our average RFQ turnaround time. Much of the improvement is due to our ability to instantly process supplier quotations.”**

Marius Nel, Omnigo director of operations

Quotes can be imported directly through supplier APIs. Once an order is received from a client, they simply export the relevant information and import it directly into their ERP system.

“We’ve reduced our average RFQ turnaround time,” Nel said. “Much of the improvement is due to our ability to instantly process supplier quotations.”



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