

Data-Driven Manufacturing — Profitability GPS

What data drives your shop? An unexpected look at the kinds of data that you *ought* to be using to make your shop the most competitive and sustainable that it can. Spoiler alert — no new sensors or IT technologies required to get the payback from these data tools.



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The jobs you quote drive the work that you do. The following indicators will give you a “Profitability GPS” to keep your quoting process on track and help you maximize revenues, profits and machine utilization.

Three Shop Data Tools/Indicators For Understanding Your Shop Success

Run time/ setup time ratio.

Data needed; cycle time for the item being quoted; Setup time for the complexity and tolerances of the job being quoted. This can be done in dollars but, frankly, comparing units of time is sufficient. If the time for setup equals the time needed to make the production run, the manufacturing cost component of each piece will double.

Manufacturing cost = (cycle time divided by one part plus setup time divided by total number of pieces) multiplied by \$hourly machine rate/ seconds.

If setup time is greater than run time, it will be an additional expense that will make you economically uncompetitive. You need to determine a minimum quantity for cycle time to give your team a clear indication which jobs are not worth working up. Have the discipline to get the quantity increased or an agreed upon setup charge for small quantities so your shop remains a profit generator and not a public service.

Bonus indicator: Tolerance or finish classes that describe difficulty of job or the setup.

If moving from one level of surface finish to another adds half an hour or some measurable percent to the setup time required, or measurably lowers the uptime while operating, why wouldn't you use that factor to adjust your price? Who in your organization knows these “profitability tipping points?” Why haven't they published for your sales team a reference document to make this evaluation a simple and routine part of your quoting — and profitability maximizing — process?

Material-to-machine time cost ratio. I developed this indicator back in the 1980's for my COMPUT-A GRADE cycle time calculator for multi-spindle machines. It broke each job layout into a material cost component and a machining cost component. The machining cost

component was calculated by the cycle time determined for the limiting tool operation, plus the index time. The material cost component was the weight of the steel blank required to make each part — not the finished weight of the part. You are paying for the kerf loss. The weight of that blank was then multiplied by the cost per pound for the raw material, and the cost for the material could now be compared to the cost of the machining time in process. Then my calculator could adjust for changed materials by adjusting the machining parameters associated with the alternate grade. I wanted to prove the economics of a higher cost but improved machining, reduced cycle time steel.

Your use of this ratio is to evaluate the parts that you are most profitable on to determine your shop's sweet



spot. Does your shop typically make the most profit on jobs where the material cost is equal to the machining cost? Less than half of the machining cost? Less than one-third? Less than 10%? Use this simple ratio to help you fine-tune the quoting opportunities that you accept, to maximize your profitability. No, we are not saying to pass up the less profitable jobs — if you have open time you probably should accept every job where you can be profitable. But when your lead times start extending, it is really important for you to prioritize the most profitable jobs for your open capacity. This information can also be used to help you gain insights into why some of your capacity is full and long lead time, while other capacity is lightly bought by your customers.

Pro tip: Instead of comparing the material cost fraction to the machining cost component fraction, you could just look at material cost as a ratio to selling price. Find the range where you are making the most revenue/ profits and then adjust your quoting accordingly. Prepare for pushback from the shop when they notice that their mix has changed.

Future value/present value of an hour of machine time.

In MBA school we spent WAY too much time looking at present value/ future value and discounting of cash flows. In MBA school, cash was the “asset” being considered. I still have bad dreams occasionally about needing to solve some of these problems and not being able

Your quoting process is what is really driving your manufacturing. What data are you using to drive your quoting process?

to find my calculator. But have we, as shop owners and controllers, ever stopped to think about this same value calculus being applied to the asset over which we have the most control — the time available for production on our machines? Why wouldn't we expect — in today's ever-connected, instant gratification, get it in 24 hours with Amazon Prime, I need it NOW world — to be paid more for parts that we can deliver by next Friday, as compared to parts to be delivered in June?

Am I saying that you can turn your shop into Wendy's and turn over custom parts on demand for 100% of your business? Not a chance. However, if you have the

institutional skills to do setups quickly, make special tools as needed, and have access to the material to start production within 48 hours, I am suggesting that parts by next Friday should sell for a higher premium than parts for two months from now.

As consumers, we face this all the time — or used to when we were travelling — at hotels and airfares. It is called “revenue management.” Sell a portion of your capacity — whether airline seats, hotel rooms, or your shop's available machine time — at normal price for long lead times; then maximize revenue by selling some of the open capacity available now for those orders that are required immediately at a price premium over the normal cost for that capacity. Nothing about discounts here — just capturing more time value.

Bottom Line

Revenue is essential to make our shops profitable. No revenue, no profits. Profits are what makes our shops sustainable. Sustainability is achieved by investing in new technologies, capabilities, and training for our performers. These all make us more competitive. It is a virtuous circle. No expensive sensors or software to purchase. Not a lot of manhours involved to capture these three indicators.

But once you harness the insights and deploy the lessons learned of the run time/setup time ratio, material-to-machine time cost ratio, future value/ present value of an hour of machine time, you will be quoting with knowledge from your process. Knowledge that will help you maximize your revenue, machine utilization and profitability. Your quoting process is what is really driving your manufacturing. What data are you using to drive your quoting process?

The real need for data-driven manufacturing is at the quoting stage. It is a virtuous cycle to better understand how the factors for each job will impact costs in your process, and potential recoverable revenue for the capacity that you have available. You will be quite pleased for the return on your efforts of a bit of simple math. Why not give these three “Profitability GPS” tools a test drive? **PMPA**

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