Munro & Associates, Inc.®

Cost Estimating Methods
By Dr. Susan Okray

There is plenty of discussion around cost estimating these days and rightfully so. Today's economy and discerning global consumers demand value. Global competition continues to increase and the pressure is on firms to be more innovative and responsive with accurate cost estimates. Producers of product must be on the "cost" mark, right the first time to stay in the race.

With all that is riding on accurate costing systems many companies still rely on quick rough order of magnitude (ROM) cost approximations where estimators look at past part costs and attempt to reason forward. This type of estimating is called Proportioning Historical Costing. The costs of a future product or process are determined from those of a similar existing products and processes to which proportional coefficients are applied. This method is typically used when there are no perceived important technological differences between the two products or processes or when a rough order magnitude estimate is required. The assumption is that the historical cost is accurate. This is a dangerous assumption that can inadvertently but quickly erode any profit picture. Proportioning Historical Cost estimating is perilous because it is not just minor part changes that drive costs. Underlying cost assumptions change with the economy and these too must be taken into consideration.

For this reason cost estimating is a continuous, cyclic process and depending on the accuracy desired two major costing methods are used. The most comprehensive and preferred costing method involves understanding all the steps and operations required to deliver a product "Total Accounted Should Cost" estimate. This process requires definition of the conventional inputs such as labor rates, material costs, machine rates, scrap and also the less easy to attain; tariffs, exit tax, monetary shifts, logistics etc. This process is called Engineered or "Bottoms-up" estimating.

"Bottoms-up" cost analysis is the most detailed of all the techniques and it is the only method that delivers a complete "Total Accounted Should Cost" analysis. Since each component is broken down into discrete process steps and all the assumptions are outlined, the product stakeholders can review and modify the inputs as necessary. Due to the rigor involved it is also the most time consuming and costly to develop and implement; however once in place it becomes the most accurate, reliable and easiest method to use.

Whether a rough order of magnitude (ROM) or Total Accounted Cost (TAC) bottoms-up estimate, knowing your costs is an important part of your on-going business routine. Getting the right information is critical to performing timely and accurate estimates. The two aspects of costing are "element databases" and "costing formula."

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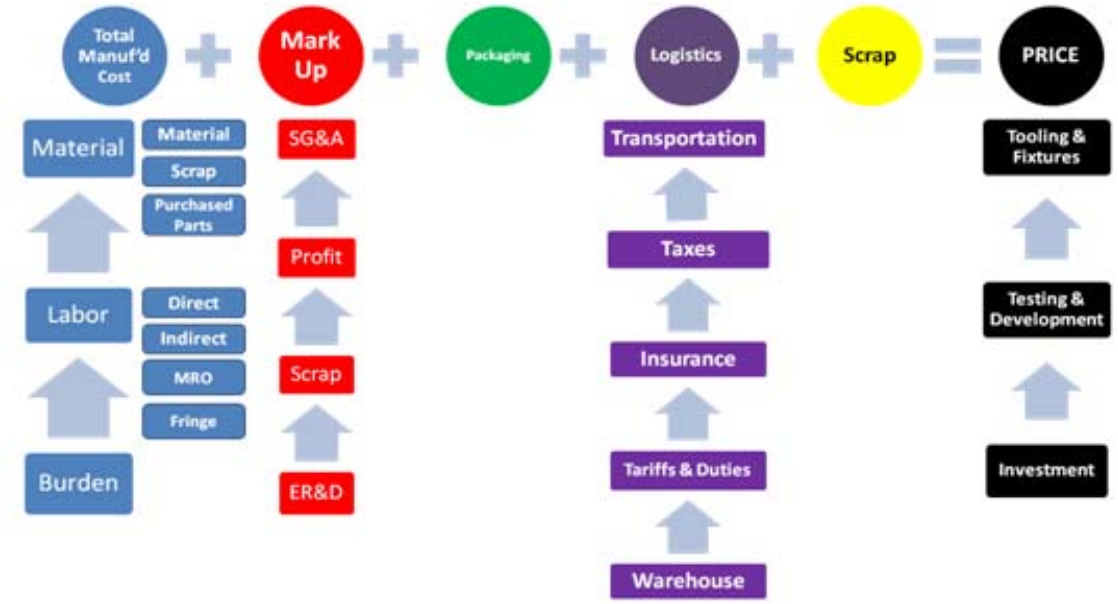
Building strong element databases is the foundation from which good cost estimates will be generated. Below are the elements in a standard TAC input database required to produce a final product price starting from raw materials to end item product ship. It is important that theses databases are kept current, especially in a volatile economy, as the information is the fundamental cost analyses assumptions. These databases provide a means of ensuring transparency, accuracy and consistency throughout the costing process. Having the element databases however is only half the equation.




Cost formulas are the models that generate the Total Accounted Should Cost. It takes several models to construct a total product Should Cost from primary processing to final product ship and all the steps in between. Most models include obvious cost elements, however Munro has learned that models based on traditional part features often overlook the hidden costs of quality and logistics. This is especially important when deciding to outsource or offshore operations to lower wage countries. Hidden costs associated with shipping and logistics, tariffs, duties, insurance and IP protection become important cost elements as they can easily increase product costs 15 to 50 percent. Cost models, like those developed at Munro & Associates, are comprehensive and include "hidden cost" factors as they contribute important data for make / buy decisions.

Additionally, accurate models must be constructed and employed with some foundational intelligence. As is the case in all computations, the quality of the output is only as good as the quality of the inputs. In this case the inputs are the costing models and their supporting databases. Therefore, the information in the databases must be researched thoroughly and the embedded formulas in the cost models must represent current production capabilities. Both require regular updates and validation as economic conditions and technologies evolve.

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Processing knowledge is also required to properly use comprehensive cost models. Parametric based models, like those used at Munro & Associates, have some built-in decision making capabilities. However every model will have input cells that demand intelligent inputs to generate reasonable cost outputs. These cells may include material choice, thickness, depth of cut, number of slides, etc. The cost model will assume these inputs are intelligent. The models will not pass judgment on the inputs; processing method selected, or predict final product performance. That is left to the user.

Case in point: A user of the injection molding cost model selects polypropylene for an under-hood application such as a battery tray. The user is unaware that this material is unable to meet the performance specification of temperature and load. Exposure to high heat from the engine compartment and the weight of the battery will cause the tray to eventually warp and deform. Using these inputs though, the injection molding model will deliver an accurate cost estimate. The cost model accurately predicts the cost but it cannot flag the material choice as an error. Therefore the cost is essentially meaningless because the part will not function.

However, all is not lost when using a Bottoms-up costing methodology. In this instance, it only takes a quick material change to make things right. A much stronger material, such as 30 percent glass filled nylon can be entered into the model. The model will comprehend the increase in the raw material cost and the injection molding process time and generate a new battery tray cost.

This process works well to establish an accurate "Should" Total Costs for minor changes. But what if there is a potential opportunity to integrate two body brackets and electrical wire harness clips into the battery tray. Despite the fact that Bottoms-up analyses may very accurate, a substantial amount of time and effort will be required to produce and document estimates for a brand new design particularly when little is known about the details of the component design and the production processes. Insufficient information may preclude the effective use of this method. In this instance, Munro suggests a first pass Design Profit® analysis to develop and optimize the new product design.

Munro's Design Profit® method identifies and generates standardized metrics for early trade-off analyses so that we can minimize total costs and the costing effort in the planning stage. The Design Profit® tool is used to map and optimize design elements of a product or system. It highlights waste in the design and identifies product cost issues and high cost drivers. Using Design Profit®, product designs are optimized by eliminating non-value added parts and processes. Reducing the number of parts decreases the part cost and the costing effort. Design Profit® also provides a method to make quick concept design changes. Compared to the current design, these changes are evaluated and state using metrics that build preliminary business cases. Only the redesign concepts that make the preliminary business case cut are targeted for Bottoms-up cost analysis. In this way, costing efforts are focused on the components or redesign concepts that will deliver the biggest return early in the program.

Unfortunately there are no shortcuts for accurate cost estimates. Accuracy requires time, and there always seems to be a shortage of time. Therefore it is important to focus cost efforts on the right things. The objective is to bring the right tools and data early in the design process. Design Profit® is one such tool to help focus the costing spotlight. Delivering detailed "Should Costs" on the few critical and optimized components will greatly enhance the costing effort and confidence in the design direction. Ultimately, having efficient and optimized designs with accurate costs is the key to delivering products at the "*Right Cost*", a cost that will be on the mark, right the first time.

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