

**Composite Engineer's Viewpoint**  
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Designing with Composite Materials  
Part 6A – Initial Cost Estimation

Now from what we have so far in our design is a composite structure with initial estimates of the materials to be used, the laminate configuration and subsequent engineering and physical material properties, and the planned manufacturing method. With such information we can do the first estimate of the product costs. Cost estimation is a mix of science and art. The science comes from statistical relationship of pricing and your historical data. The art is how we use this to get the best, or more precisely, the most accurate estimate. More often we can use cost estimation to see if one material selection and/or manufacturing method is more cost effective than another.

Cost estimation should basically cover the material (fibre/filler/resin) costs, expendable supplies, labour rates and associated costs, tooling fabrication and usage, production rates, and capital equipment costs. A brief review of each of these follows:

**Material Cost Estimates** – Typically fibres, fillers and resins have a set cost based on large quantities, however using a very simple relationship that shows material costs exponentially increasing with low volume orders you can estimate (with reasonable results) your materials costs. Don't forget to add in scrap and wastage rates. Typically you can determine the materials costs through the following relationship:

$$A = B \left( \frac{C}{D} \right)^{-0.1}$$

Where  $A$  is the required cost a desired quantity  $C$ , and the known cost  $B$  for a quantity  $D$ . The exponent (typically given as -0.1) can vary based on known experience.

- **Expendable Supplies** – This is very much dependent on your own experience and workshop practices, but with good purchase history data you can quickly know your usage pattern for previous tasks.
- **Labour Costs** – Labour rates and associate cost are also variable throughout the composites industry and again your experience and current knowledge is invaluable. Bearing this in mind labour rates are also dependent on the fabrication technique to be employed and the skill level needed to complete the task. Chopped mat sprayers will be on a lower pay rate than technicians involved laminating and autoclave curing.
- **Tooling Costs** – Fabrication tools are either composite tools, single-sided metal tools, match metal tools or harden surfaces metal tools. Costs associate with each increases with the tooling material costs and preparation requirements. However, multiple usage capability increases with the added expense, so there are break-even points for different types of fabrication tools based on production runs.
- **Production Rates** – The quantity to be produced can impact all facets of the product costs. This will be highlighted in the next article when an example of cost estimation will be demonstrated.
- **Capital Equipment Costs** – The different materials used (particularly the resin system) and the manufacturing methods employed will require a range of capital equipment to complete the product. The capital equipment used also impacts the production rates, but the costs of such equipment can be amortized over known usage rates and wear out expectations.

In the next article, we look at an example of the initial costing analysis that demonstrates the importance of early costing estimations. I also welcome questions, comments and your point of view. Feel free to contact me via [r.heslehurst@adfa.edu.au](mailto:r.heslehurst@adfa.edu.au). I may publish your questions and comments, and my response in future newsletter.

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