



Prifysgol Cymru

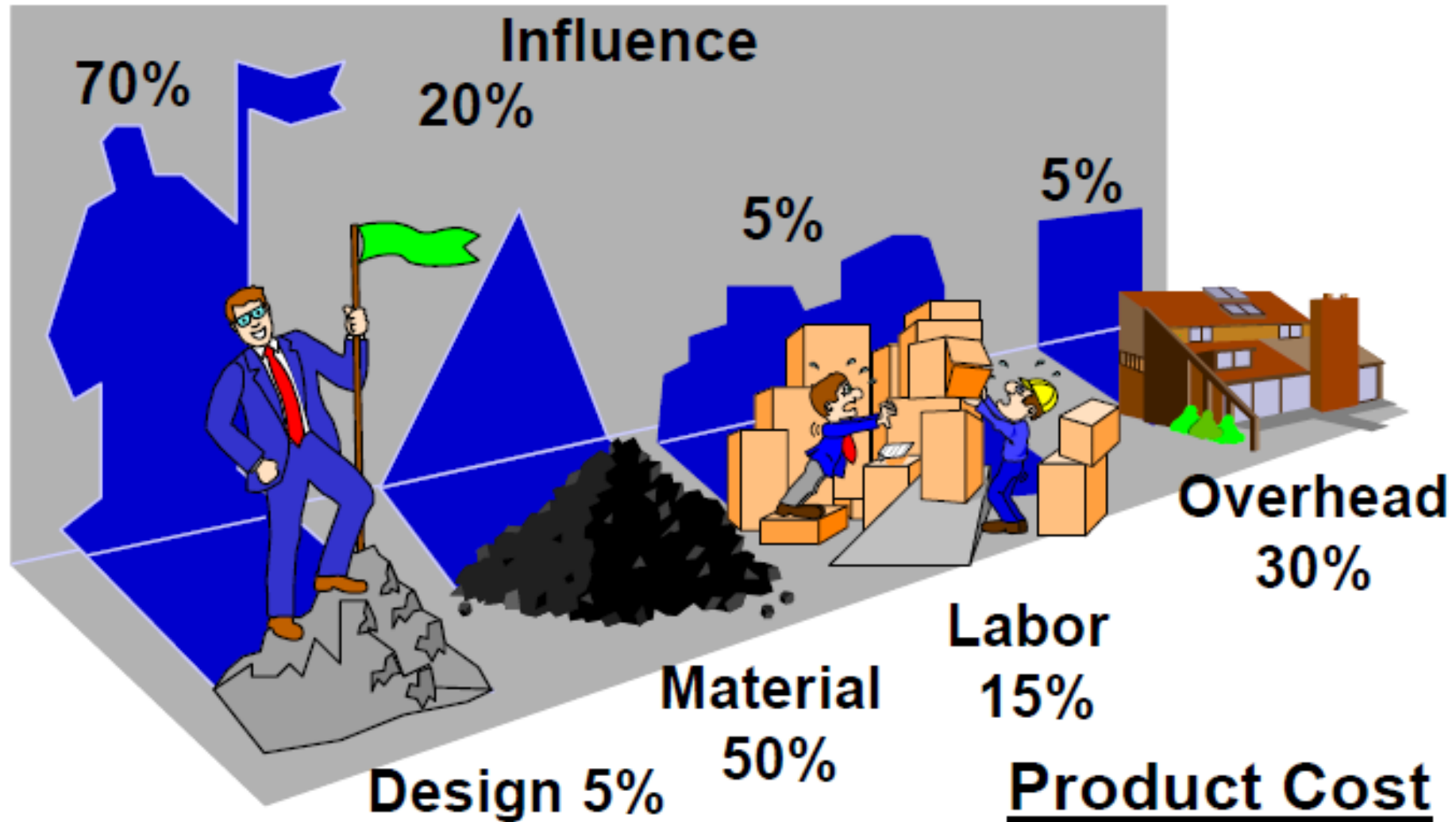
Y Drindod Dewi Sant

University of Wales

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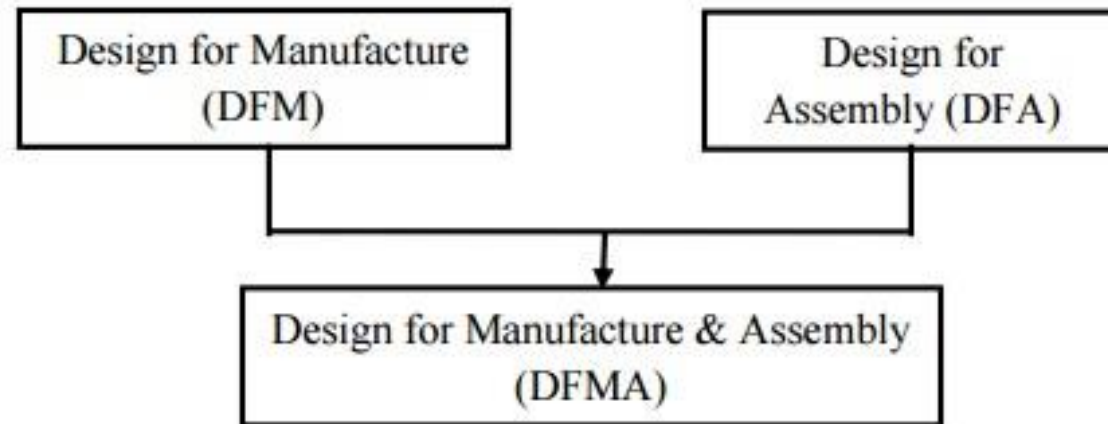
Design for Manufacture (DFM)

Who casts the biggest shadow?



Design for Manufacture

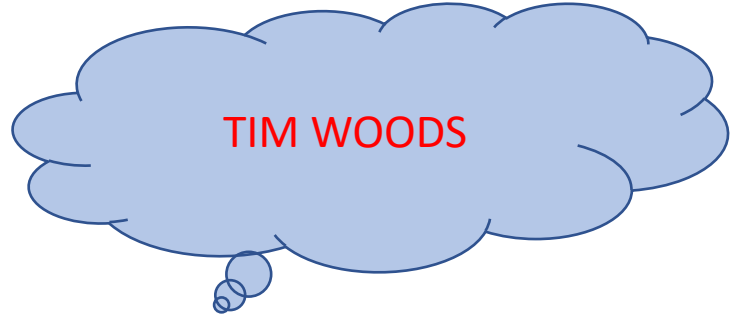
Design for manufacturability (DFM) is the general engineering art of designing products or systems in such a way that they are easy, cost effective to manufacture to within specifications.



Design for Manufacturing (DFM)

- Designing or engineering a product in order to facilitate the manufacturing process
- Reduce manufacturing cost
- Designer should consider the type of raw material and the form of the raw material
- Optimize all the manufacturing functions: fabrication, assembly, test, shipping, delivery, service, and repair
- Assure the best **cost, quality, reliability, regulatory compliance, safety, time-to-market, and customer satisfaction.**

5 fundamental DFM guidelines...



TIM WOODS

1. **Simplify** the design and **reduce** the number of parts

The reduction of the number of parts in a product is probably the best opportunity for reducing manufacturing costs. Fewer parts implies:

Fewer purchases

Less development time

Less handling

Less equipment

A reduction in assembly difficulty*

Less processing time

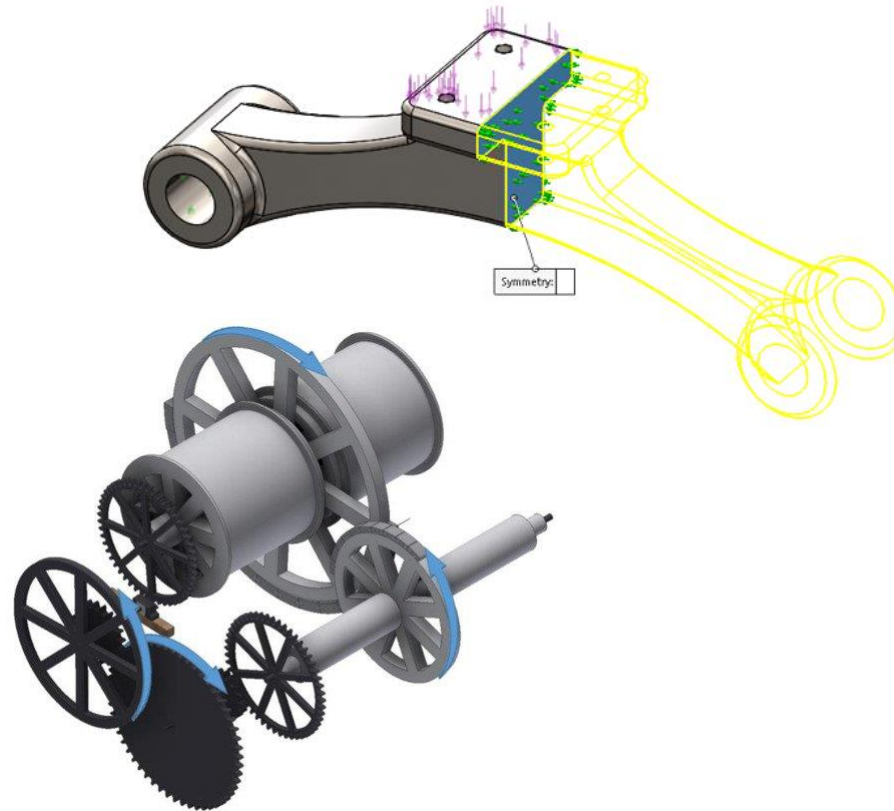
Less testing

Less inventory

Less service inspection

2. Look for opportunities to utilize **modular design** principles

The use of modules in design simplifies the manufacturing activities such as inspection, testing, assembly, purchasing, redesign, maintenance, service etc.



3. Use of standardised components in design

Standard components are less expensive than bespoke, custom-designed and made items. Does the bespoke route really add value (VOC)?

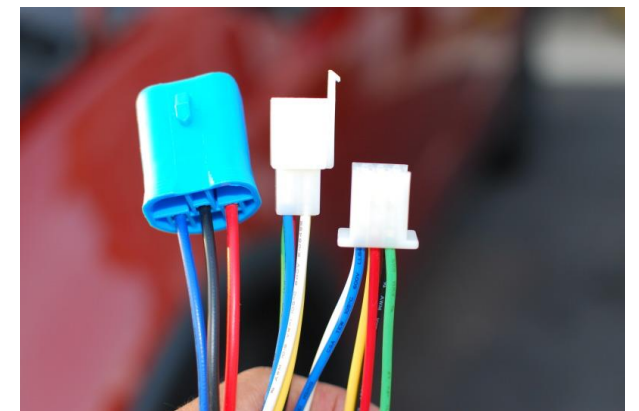
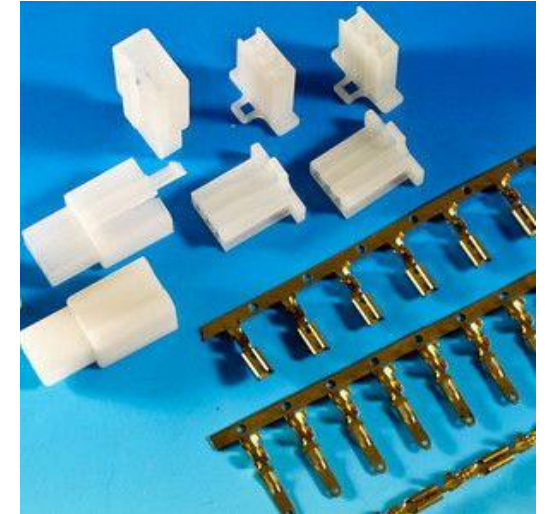
- The high availability of standardised components reduces development lead-times.
- Reliability factors are well ascertained.
- Use of standardised components refers some production pressure to the supplier, relieving, in part, the manufacturer's concern of meeting production schedules.



Standard Components

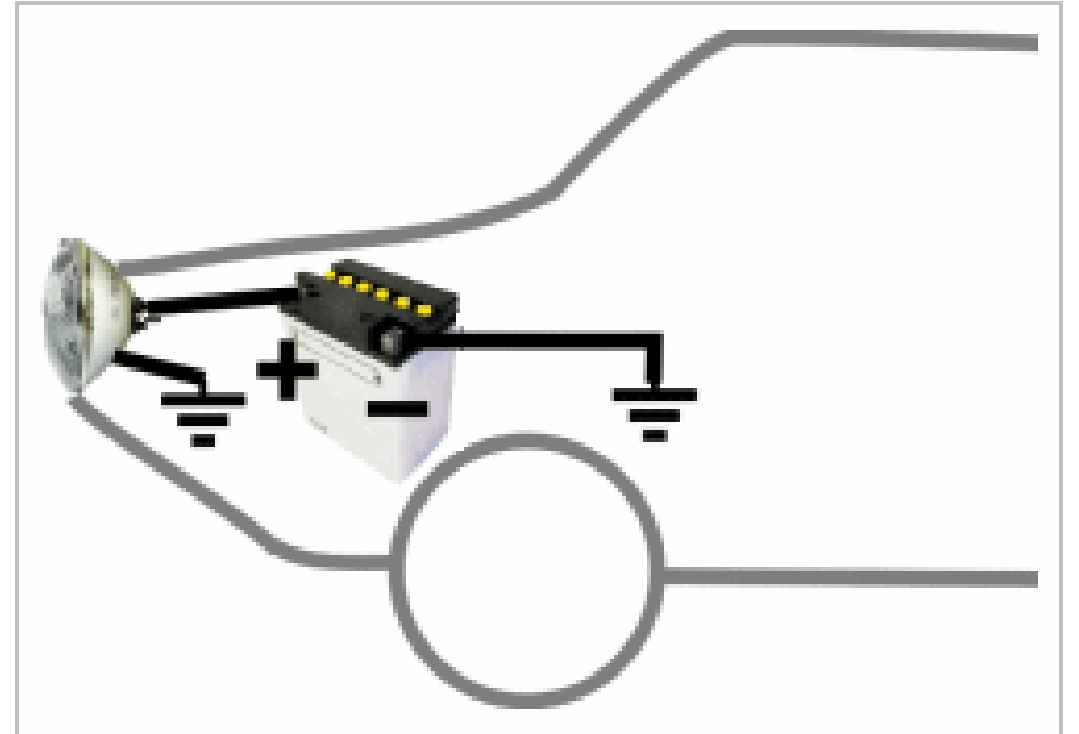


Non-standard components



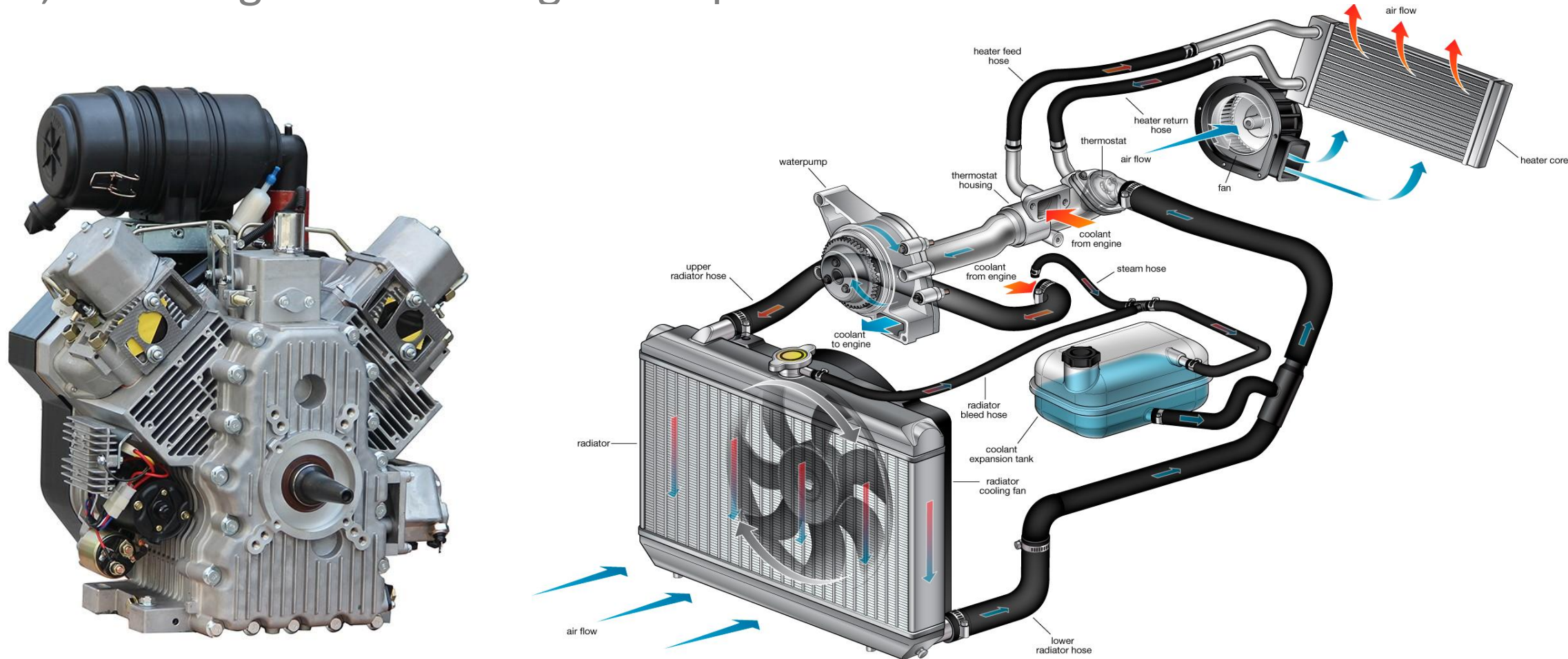
3. Design parts to have **multi-functionality**

Multi-functional parts reduce the total number of parts in a design, thus, obtaining the benefits given in point number 1.



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4. Design for **ease of fabrication**

Select the optimum combination between the material and fabrication process to minimise the overall manufacturing cost.

In general, final finishing operations such as painting, polishing, finish machining etc. should be avoided if possible.

Excessively restrictive tolerances, surface-finish requirements are over-represented in terms of defect and non-compliance issues. They can result in elevated production costs. Ask if you really add value (VOC).



5. Keep **tolerance size** in mind when designing

- Each production process will have an inherent capability to maintain a certain range of tolerances and to produce a certain surface finish/roughness.
- To achieve tolerances outside of the “normal” range requires special (sometimes additional) processing that can result in an exponential increase in the manufacturing cost.
- Seek to design in such a way as to reduce the requirement for tight or excessive tolerances.

