"Design to Customer Value"

How to develop products that fulfil customers needs at the lowest possible cost June '08

In recent years, manufacturing companies have applied lean manufacturing techniques to streamline production processes and introduce automated solutions with the aim of reducing production costs. However, product costs have been largely ignored in the drive to optimize costs overall. Now Arthur D. Little has developed a comprehensive methodology to reduce product costs without jeopardizing the ability of products to compete on functionality, performance and quality. When applied for automotive and manufacturing clients, our "Design to Customer Value" methodology has reduced product costs by an average of almost 18%.

Many manufacturers have already made considerable efforts to reduce production costs and improve quality, and a wide range of production systems has been developed in support of this goal. To a large extent, the opportunities for optimizing production processes have been exploited. However, Arthur D. Little's experience shows that in many companies there is still scope to reduce product costs significantly – in fact, by as much as an average 18%. Reductions on this scale can be achieved by undertaking a systematic review of customer, design, production and supplier issues. In addition, this approach can result in an improvement in product performance of, on average, 16% and a reduction in product complexity (number/variety of parts) of 10%.

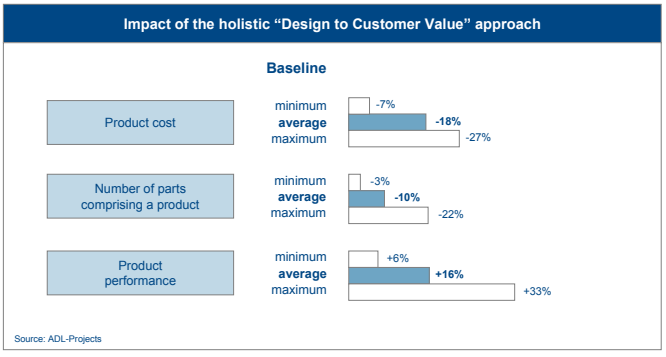

Fig. 1: The holistic "Design to Customer Value" approach emphasizes the integration of customer needs and competitor know-how.

Avoiding cost pitfalls

Excessive product costs typically result from a failure to consider the implications of product design for manufacturing, assembly and after-sales service. Typical cost pitfalls include:

- excessive product functionality and variants for which customers are not willing to pay (over-engineered products)
- invalid specifications taken over from previous or non-relevant products
- product engineering that fails to take sufficient account of manufacturing/ assembly issues
- failure to standardize purchased parts, leading to high procurement costs

By changing the design of the product itself, rather than focusing on production processes, manufacturers can achieve significant cost reductions.

Making a quantum leap in product-cost reduction

Making a systematic comparison between the functions and performance of an existing product and those of its competitors is one of the keys to optimizing product design. While comparing complete products often reveals only small differences in performance, design and price, a more detailed analysis of the product's functions and its sub-assemblies often

reveals clear differences in technical concepts and thus in cost structure.

In many cases, the cost advantages delivered by some sub-assemblies are cancelled out by the over-engineering of others. As a result, a quantum leap in product-cost reduction can usually only be achieved by using a combination of best practice solutions in design, manufacturing and assembly techniques selected from different products.

Advantages of the methodology	Tools
1. Comprehensive consideration of customer expectations	▪ Conjoint analysis ▪ Customer surveys
2. Analysis of functions ▪ Analysis of value placed on functions ▪ Product comparison by functions	▪ Function cost matrix ▪ Quality function deployment
3. Systematic, in-depth analysis of competitor products	▪ Technical benchmarking analysis ▪ Disassembly workshops
4. Cherry-picking based on lowest cost and best functional compliance	▪ Target costing
5. Supplier integration	▪ Crossfunctional supplier workshops

Fig. 2: The application of this methodology offers numerous advantages compared to other approaches for product-cost optimization.

"Design to Customer Value"

Arthur D. Little's "Design to Customer Value" methodology incorporates all of the strategies outlined above. It covers a number of key steps: an analysis of market and customer requirements, a cost analysis, a technical product analysis and the development of new product concepts. Importantly, the methodology draws on the expertise of the manufacturers' own marketing and sales, R&D, production, purchasing, service and product-cost-control teams. In most cases, suppliers should also be involved.

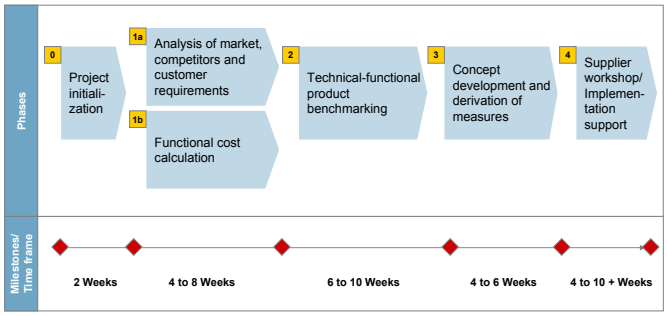

Fig. 3: The main activities are split into work packages, structured by milestones.

- ***Analyze customer requirements:*** The methodology incorporates an analysis of market and customer requirements focused on:
  - key buying factors and how much value customers place on each
  - the value of single functions and modules
  - customers' expectations of the product and its functionality
  - the performance of the existing product
  - competitors' product portfolios

  This analysis results in the development of specific functionality and performance parameters for the improved product.
- ***Calculate the cost of functionality:*** The methodology compares the cost structure of the existing product and competitor products. By measuring key indicators for different concepts and performance features, best practice solutions are identified.

  Using a standardized calculation scheme, the team calculates how much it costs competitors to produce the different functions incorporated in the analyzed products. This allows the team to cherry-pick the most cost-efficient solutions for each function and, by combining this information with the results of performance tests (see below), to identify the best solution from a cost-performance perspective.
- ***Benchmark function and performance:*** The systematic analysis of function and performance variables can help to identity best-practice solutions in competitor products.
  This takes place in disassembly workshops, where differences in the function, performance and design of the products undergo systematic analysis. It can also highlight areas where the existing product fails to match best practice in terms of function and performance and to track these weaknesses back to specific sub-assemblies.
- ***Define new solutions:*** The best individual concepts, as identified by the analysis, are modified if necessary and integrated into an overall concept for an improved product. The team draws together the results of its analysis to define a new overall solution, including product variants, and to establish concrete measures for further development work. This step also covers the development of target-costing diagrams and the definition of target costs. In-house expertise from marketing & sales, R&D, procurement, production and service departments has a key role to play in the development, manufacture and sale of the new product.
- ***Support implementation and leverage supplier know-how:*** The holistic approach outlined above often results in new processes and structures. For this reason, all stakeholders take part in workshops to support the implementation of new processes and structures.
  As changes are implemented, continuous cost monitoring also begins. During this phase, supplier workshops are conducted to help identify purchased parts with the potential to deliver the

greatest cost reductions. The objective is to reduce the purchase price jointly with suppliers for a win-win outcome.

A methodology for widespread use

While the application of the methodology may vary according to context, the fundamental concept remains constant: structured analysis of existing products can provide the information required to develop improved products and achieve reductions in product cost. The "Design to Customer Value" methodology is suitable for any product that can be disassembled to enable an in-depth technical comparison. This includes products from selected sub-assemblies to complete machines incorporating a large number of variants. Depending on the product structure and time restrictions the degree of analysis can be customized.

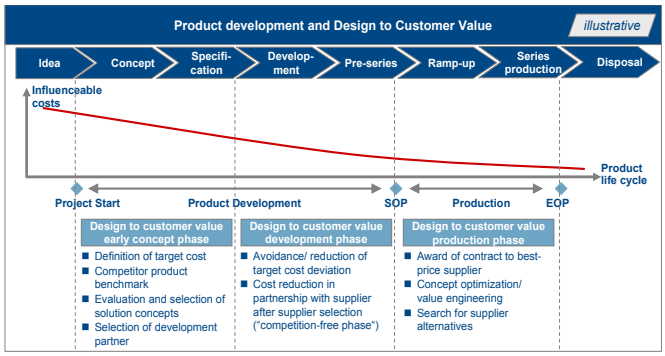

Fig. 4: The holistic "Design to Customer Value" methodology can be carried out at different stages of product development.

The "Design to Customer Value" methodology can be conducted at all stages of the product life cycle, from development to production. The potential for reducing product costs varies depending on the stage at which the methodology is applied. Generally, there is more scope to reduce costs in the early stage of the life cycle, when there are fewer restrictions.

Combining "Design to Customer Value" and Modularization

The outlined methodology is also an excellent basis for the development of modularization and product platform strategies. Often modularization initiatives are too much technology driven and thereby limited to incremental improvements of current product architectures and concepts. Arthur D. Little's experience shows that real breakthroughs which go far beyond standardization and reduction of variants can only be achieved through a market driven approach.

A thourough analysis of offered variants and segment specific customer requirements as well as competitors' product offerings always is the first step of any successful modularization effort. From this analysis target segments, scope of modular concept respectively platform and performance and functionality classes required are derived. An in-depth understanding of customer needs is the basis to define and classify modules. This is complemented by a complexity cost calculation and product analysis by functionalities which helps to identify relevant modularization parameters.

Module definition should be mainly driven by impact on customer need fulfilment and variety of options required by customers – technical factors should have lower priority, at least in the early phases of a product development.

Module boundaries and interfaces need to be defined in such a way that functions, which are influenced by specific customer requirements, are separated from functions which are "standard", i.e. identical across all variants respectively customer segments. Customers pay only for those functionalities or features which they really need for their applications. The product architecture needs to provide the flexibility to address those needs while using "standards" in as many parts of the overall product as possible.

Conclusion

Arthur D. Little's "Design to Customer Value" methodology for realizing sustainable reductions in product cost is best implemented on the job, with a cross-functional team working on a concrete product development task. Optimal results, i.e. products that fulfill customer needs precisely at the lowest possible cost, are achieved by combining an analysis of market and customer requirements with in-depth technical and commercial analysis.

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