Ve-design

Cost, Time, Reliability Optimization In Product Development

A White Paper for Senior Management

Optimize simultaneously in real time, product cost, time-to-market and reliability parameters during the product realization process.

An example demonstrates the relationship of reliability, product cost and product development time.

Ve-design, Inc

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Introduction Recent advances in decision support tools for product development and management make optimization for cost, cycle time and reliability available in real-time possible and practical. These issues for improving design team productivity were emphasized by the Aberdeen Group's June 04 report "Product Development in the Consumer Industries Benchmark Study". The report identified new product development is a leading driver of revenue, profit and market share growth for most companies. A companion white paper, July 05, by Ve-design "Best-Cost Best-Time Product Development" provided an example showing a 54% reduction in product cost and a 67% reduction in product cycle time. This report describes the added capability and benefits of adding a third parameter; reliability, in product development optimization.

The Current (Old) Process minimizes both the magnitude of the problem and opportunity since it limits the number of choices which in turn results in only a few plans for easy (manual) evaluation.

The Problems to be solved to obtain an optimal solution in terms of cost, time and reliability for product development involve the huge amount of data and the computational complexity. For manual approaches this is an impossible problem, The data need to be developed, the very large number of plans generated, then analyzed and then evaluated, this is a impossible manual task. A simple product may have many components (usually defined in a bill of materials (BOM)), alternative components, component manufacturers (usually defined in an approved supplier list (ASL)) and component suppliers/distributors, each with a unique cost and availability (data). Each set of component-manufacturer-supplier combinations results in a specific plan with its unique cost, time and reliability. For example a product design with 9 component parts, each part with two alternative manufacturers and each alternative part with five distributors provides a minimum of $(2 \times 5)^9$ (one billion) options (product plans)

To add to the problem component cost and availability data change almost daily, which means the optimal cost time plan also change with time.

The Benefits and Competitive Advantage Current product development processes limit the number of choices to a manageable few (for a manual solution). This also limits the range of potential solutions from the possible billions. The result is a very very small chance of obtaining a best, even a near best solution. Correctly solving this problem in terms of reducing cost and cycle time while improving reliability for product development has a great potential.

The VED Tool Set presented in this analysis utilizes a unique methodologies (that are proprietary, patented and with patents applied for). These tools enable the user/users to accurately estimate costs in a global sense that they should be paying for global sourcing/outsourcing. It can identify and measure potential bottlenecks in the Design Chain/Supply Chain, enabling users to find their cause and ultimately their cure. It also provides performance measurement of the entire product development effort and individual elements such as design, purchasing and manufacturing. Our experience indicates as much as 50% savings in cost and time while maintaining the absolute best reliability

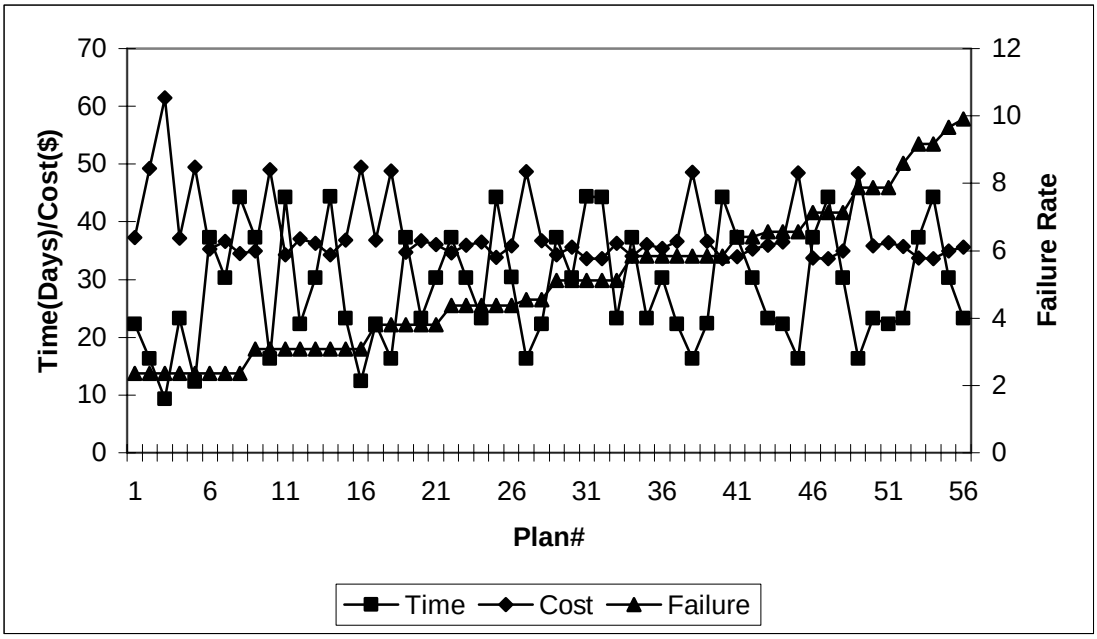
Application Example A current printed circuit board assembly (PCBA) was selected as the product development design to be analyzed for this test. This optimization analysis was performed on a simple assembly with ten components. The software scales very well for much larger and more complex designs.

Input Data. Design Data required are the bill of materials (BOM), approved supplier list (ASL), printed Circuit board (PCB) description and quantity. These data are used with manufacturer's and distributor's data to obtain price, availability and failure rate for components, as well as cost and availability for the bare circuit board and assembly.

Development of Plans. Plan validation, analysis and evaluation then determine best-cost best-time most-reliable plans. The number of potential plans varies from thousands for simple products to billions for complex products. Without the benefit of the VED analysis this would impossible to solve manually.

Results: Figure One graphically displays the cost-time-reliability analysis and optimization plan data.

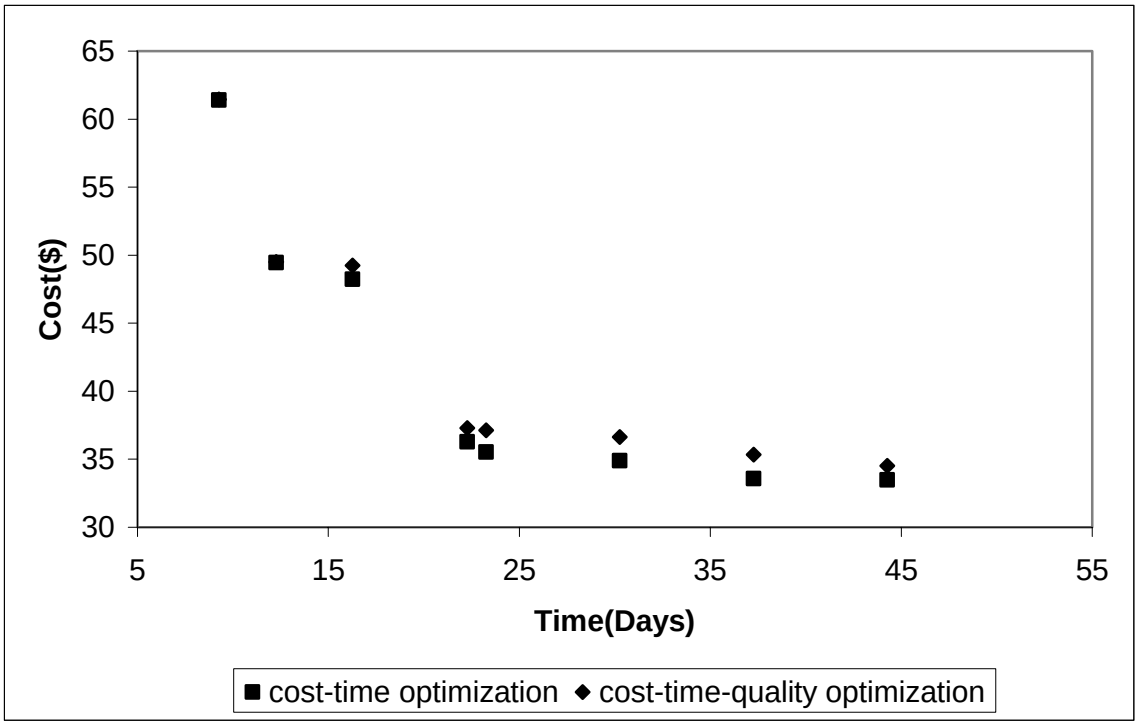
Figure 1



The best plan can be selected depending upon the desired outcome criteria. If the best reliability is the first criteria than plans can be selected depending upon whether cost or cycle time is the second or third criteria. In figure 1 plans with the lowest failure rate are shown to the left, plans 1 through 8. Plan 8 has the lowest cost and plan 3 has the shortest cycle time.

Figure 2 provides a comparison of the eight plans (solutions) with the lowest failure rate in the cost-time-reliability optimization to those plans in the cost-time optimization.

Figure 2



The optimal cost-time-reliability plans in this case exhibit slightly higher costs and similar cycle times while having the lowest possible failure rates based on the data.

For more information
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