Measuring Return on Investment

Although it can be difficult to measure the intangible benefits of simulation on product quality and brand, there are numerous ways to quantify return on investment (ROI).

The greatest cost of all may be the effect on a company's reputation if consumers believe that its products are not safe.

Reduce Warranty Costs

Even a few isolated product failures can damage an organization in the form of reputation, sales, stock price, warranty claims, legal costs and credit rating. Product integrity is emerging as a potential problem at a time when the cost of delivering a faulty product to customers has never been higher. The American Society for Quality estimates that each product recall costs an average $8 million-plus in direct costs alone. Fines of up to $15 million can result for failing to report potential product safety violations or defects. U.S. companies spend a combined total of over $2 billion a year defending product liability lawsuits according to the Public Services Research Institute. This number does not include actual settlements or jury awards, which average about $700,000 each. But the greatest cost of all may be the effect on a company's reputation if consumers believe that its products are not safe.

Consider the case of Pierburg, a leading German automotive supplier. It quantified the negative impact (on product quality) of reducing cost and time to market and determined that it would result in progressively increasing warranty costs due to lowered product integrity. The company, which was already using engineering simulation, instead boosted its investment in virtual analysis to improve quality and reduce warranty costs while meeting time and cost targets. The effects were not immediately apparent, as warranty costs climbed while products not subjected to engineering simulation were released in the marketplace. But in time, the warranty cost curve clearly indicated a systematic decrease: It more than halved the initial warranty costs, which largely exceeded the increase in total engineering simulation cost.

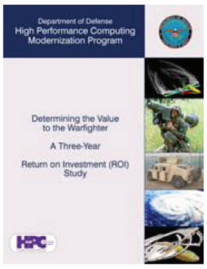
The difference between decreased warranty cost and increased engineering simulation investment is a direct indication of return on investment. Though decreased warranty cost may not be exclusively due to the large adoption of engineering simulation, the biggest, intangible impact of this new approach lies in the improved product quality and positive impact on the brand.

Cut Back on Prototypes

The most direct way to calculate savings induced by engineering simulation investment is to evaluate the cost of physical prototyping:

- Multiply cost of a prototype times typical number of prototypes during the design process
- Subtract cost of remaining physical prototypes after the virtual prototyping process

A strict ROI calculation should evaluate the engineering simulation investment and determine the ratio between the savings and the investment.



Portfolio	Investment	Lower Bound	Upper Bound
Armor/Anti-Armor*	$136M	$487M	$935M
CWO**	$417M	$5,625M	$9,927M
Air Vehicles***	$268M	$274M	$562M
Total	**$821M**	**$6,386M**	**$11,424M**
ROI		**678%**	**1,292%**

France-based Gamma Point has used this approach for plastic profile extrusion die design. A traditional process typically requires five to six trial-and-error experiments costing about $1,500 each. With simulation, the engineering team reduced the number of tests to only two. Consider this extrapolation: If a medium-sized extrusion company designs 50 dies per year, the savings could exceed a quarter million dollars per year, an ROI of 300 percent (considering the cost of software, hardware and engineering staff).

Decrease Time to Market

Many companies report reduced time to market as a result of using engineering simulation. Bringing a new solution to market earlier can generate additional revenue, which directly impacts the top line. The quantitative measure involves evaluating time to market via a traditional design approach compared to systematic, parametric engineering simulation — as well as the expected additional revenue generated by this new product during this period.

Dyson AirMultiplier™ Fan

Improve Staff Efficiency and Solution Quality

When engineering simulation is properly managed and the product development team has access to adequate data management tools, a designer quickly becomes more efficient. He or she can complete more projects during the same time period. The evaluation is a simple equation: Compare the cost of using a traditional approach for a set number of projects with the cost for the same projects using engineering simulation. The benefits go beyond cost savings to improved product quality.

Consider development of the award-winning Dyson Air Multiplier™ fan. Using an efficient simulation process, Dyson engineers were able to test more prototypes than they would have using a traditional design approach. You can evaluate the impact in a conservative way by reducing engineering costs to match the number of traditional prototypes. If you want to be more proactive, evaluate the impact on sales of this increased quality.

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