

# Design revolution

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A revolutionary approach to the design of consumer products - from automobiles to plasma TVs - could cut manufacturers' warranty costs significantly. Writing in a forthcoming issue of the *International Journal of Six Sigma and Competitive Advantage*, US researchers explain how manufacturers should simply design for reliability.

Tongdan Jin of Texas A&M International University and Yeliz Ozalp of Teradyne Inc, in North Reading, Massachusetts, have developed an optimization procedure to allow manufacturers to minimize the costs of replacing and repairing their [products](#) under customer warranty agreements. Their [design](#) for [reliability](#) (DFR) approach, if implemented in the early [development phase](#) of product design will allow manufacturers to proactively eradicate potential hardware, software, process and customer usage issues that lead to costly component and system failures.

The team points out that traditionally predicting which components, whether physical or software based are likely to lead to product failure that must be remedied under warranties is difficult. This is compounded by the fact that there are so many uncertainties associated with how, when and where a product will be used by the consumer.

They have devised an appraisal system that allows product designers to estimate which component and which non-component failures are likely to occur given particular operating temperatures and customer usage patterns. They have used this model to build an optimization program - a genetic algorithm - that can help a manufacturer formulate a strategy for

designing out potentially expensive flaws in the [early development](#) phase.

"The trade-off between the design budget and the warranty cost is compared under different design options," the researchers explain. They have tested their approach successfully in the optimal design of an automated semiconductor test apparatus.

"As system integration continues to increase and interactions among functional design elements get more complex, product reliability must be addressed when a product is still in the early development phase," the team explains. Of course, by improving reliability, the approach not only reduces the total costs of warranty services and replacements but improves customer satisfaction by enhancing the quality of the products being sold.

More information: "Minimizing warranty cost by design for reliability in product development phase" by Tongdan Jin and Yeliz Ozalp in Int. J. Six Sigma and Competitive Advantage, 2009, 5, 42-58

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