



Calculate Total Cost of Ownership

Get ahead of your constantly shrinking budgets and schedules by understanding the cost drivers of your test organization.

The aerospace and defense market has changed. Organizations and programs need to optimize product technology and the value of their business processes to win contracts. This is especially true now that contractors and suppliers are taking on more of the risk in project budgets and schedules.

Building consensus on how best to adapt design and test in the face of these changes can be tough. Using aging business models for test can lead to varied perspectives on funding across organizational silos or a rigid view that organizations must spend less on test by reducing budgets, shortening schedules, and/or lowering capital expenditures. These policies to reduce test expense often delay the delivery of projects and test sets to manufacturing because of extended implementations of new test solutions or stalemates of internal divisions trying to make decisions within large organizations.

How do you know if your organization is over- or under-invested in test? To answer this question, you need to identify a data-driven perspective of test expense. NI has

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Engineering Director, Tactical Radio Supplier

helped other aerospace and defense test organizations make significant changes to lower cost and deliver extraordinary value to operations using a total cost of ownership model.

Total Cost of Ownership

Total cost of ownership (TCO) is a business concept that helps you calculate the overall cost of owning or operating equipment, business units, or an entire organization. You can use this method for many purposes. In this case, TCO shows the relative cost of operating a test facility, team, or specific test set to evaluate the effects of new investments or methodology that could significantly lower costs. TCO has three cost components:

1. **Development costs** include the planning, hardware, and software tools that are used to validate the design, develop an initial solution, and justify the time and effort of the developers. These costs come from building new test sets that could range from a new multipurpose platform test solution for many products, to a dedicated tester for a specific product, or even to the deployment of a new product on an existing test platform. Development costs are often the smallest contributor to TCO, but they can be more significant when the tester is built for a broader purpose.
2. **Deployment costs** follow, and they include all the equipment and effort involved in making the test solution

ready for customers. The most obvious part of this is the capital expenditure needed to procure all the equipment and the engineering effort to assemble automated test equipment (ATE) and deploy software. You also have the cost of processing efforts, which often include hundreds of purchase orders and clerical sign-offs.

3. **Operational and maintenance costs** are generally the largest contributor to TCO, especially in aerospace and defense organizations, because test equipment is purchased on a 10- to 15-year service expectation. They are also the most overlooked costs when evaluating test systems and strategy. Operational and maintenance costs are so large because they don't stay the same no matter the age or purchase date of the test equipment. Aging test equipment, legacy components sparing, outdated power circuitry and equipment functionality, and rents for floor space all contribute to ongoing operational costs. Operations managers must weigh these costs against the risk and cost of production downtime should a test set component fail. Operational and maintenance costs also include operator wages and training, utility rates, installation of power or cooling to accommodate test equipment, and last, but certainly not least, maintenance costs. Maintenance costs can be anything from test equipment calibration, to component failures, to legacy component replacement. The engineering effort to change test program sets, insert new technology to avoid obsolescence costs, or upgrade to address changing requirements might be categorized as maintenance cost or as development cost depending on the roles and makeup of your test organization.

TCO Success

NI has worked with numerous companies over the last four decades to implement a financial model framework for quantifying TCO specifically designed for test organizations. In these engagements, NI gives insight into the data based on experience with tens of thousands of test projects. At the outcome of these discussions, NI is able to offer extensive recommendations on proper hardware and software tools, test software architecture, parallel test unit under test connectivity, and test data management.

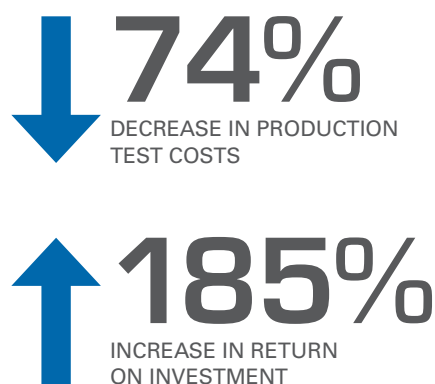
For example, NI has worked with several tactical radio equipment suppliers to create specific TCO models and understand their cost drivers. Because of the insights and recommendations NI provided during TCO model delivery, those tactical radio suppliers chose to standardize

on the NI test platform. One engineering director said of the TCO engagement with NI, "In our military business, performance and reliability are literally a matter of life and death. The National Instruments platform gave us the ability to significantly scale our production test throughput by 400 percent with ROI [return on investment] of 185 percent while rigidly maintaining the quality and performance standards that our military radios are known for."

The engineering manager who implemented the new test system added, "We successfully standardized on the NI platform to reduce our production test costs by 74 percent and will save millions of dollars this year and for years to come."

Quantified Business Impact of Test

TCO gives you a tool to quantify the financial impact of test on your organization. Additionally, it models the effects of changes by quantifying the ROI and payback period of investing internal research and development in the upkeep and modernization of ATE. This can lead to a minimized total cost of test, an improved cost-to-defect ratio, and, ultimately, an optimized test organization. The process of understanding and measuring your TCO presents an excellent opportunity to understand other decision makers in your organization and build consensus. Understanding the effects of investments in development, deployment, and operational and maintenance processes allows you to justify the budget to impact cost savings in your organization.





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