Cost of quality:

Are you making the grade?

How much is poor product quality costing your organization? One consulting firm specializing in cost of quality (COQ) developed its own report card to quantify these expenses. Here's a set of grades you can't afford to hide.

by Christine M. Taylor, Editor

Putting a price tag on defect-related losses may not be a fun task, but it's a necessary one. At Munro & Associates, Inc., Troy, MI, getting down to nitty-gritty numbers is practically an art form.

The consulting firm estimates that companies maintaining average quality levels spend approximately 25 percent of their sales dollars to remedy design and manufacturing defects. Companies with world-class quality—those boasting single-digit defective ppm (parts per million)—spend only 1 percent of sales dollars to handle defects.

Start at the beginning

Munro built its foundation on the importance of design for assembly (DFA), the phase in which product success or potential problems take root.

"We feel DFA is a strong tool in pursuing world-class quality," says Ivan Chambers, associate at Munro. "The focus is on the earliest stage of design—we like to call it the 'paper napkin phase.' Imagine a group of co-workers sitting at lunch. One of them comes up with a bright idea, takes a napkin out of a dispenser, and starts sketching. This is where DFA techniques must start."

Chambers, who helped lead the Texas Instruments, Defense Systems charge in winning the Malcolm Baldrige Award in 1992, says quality problems resulting from a specific design can be predicted.

"Evaluating the product design phase to predict potential problems truly fits what we've all been searching for—a prevention process rather than a detection process."

This design emphasis carries over into Munro workshops, where consultants encourage clients to formulate three different design alternatives for a problematic product:

• A design that is relatively **easy** to implement, requiring little validation and testing.

• A design that **requires additional** validation and testing, but is still within the organization's expertise.

• A **dream design** that challenges areas of expertise. If designed differently, the product would require a fundamental change, not only in the organization, but within its industry. This product would be a **breakthrough.**

Munro consultants encourage organizations to think about the dream design—a product able to achieve all of the company's goals and beyond.

"Stretch is a significant part of our philosophy," says Chambers. "Many organizations tend to benchmark within their own industries. That's very myopic. We challenge clients to stretch and think way beyond where they are and where their competitors are."

Report card

Complementing the consulting firm's DFA approach is the Munro Quality Report Card™ (MQRC™), which acts as a kind of quality scorekeeper.

"We've seen too many software tools

requiring too much time to retrieve useful information," explains Chambers. "At the 'napkin phase' of design, we don't want to spend a lot of time collecting data and trying to get to the thousandth decimal of accuracy—we just want to get pointed in the right direction."

The MQRC™ was designed to produce numbers rapidly based on input from client teams assembled in design-for-assembly workshops. Munro consultants find that two-thirds of the information needed for the Report Card was never collected, so clients are encouraged to estimate. Later, when actual data is retrieved, these estimates are usually not far from reality.

"In the past, our clients were coming up with ideas on gut instincts," says Chambers. "Now we're getting them to quantify those instincts."

The MQRC™ is relatively new, but after examining a cross-section of several industries, Chambers sees the same revelation with every client, whether they make 10 million or 200 units per year. The annual cost of quality total is usually significant enough to draw plenty of attention from all organizational levels.

"We understand the need to 'dollarize' this whole thing," says Chambers. "That's the language of management. It's also the language that everyone understands."

To "dollarize" defects, the Munro Quality Report Card™ scrutinizes three specific sources:

Parts - A number of defects can originate from parts suppliers. The data usually comes from incoming inspection.

Processes - This refers to activities occurring within the organization, mainly assembly and manufacturing. All other possible sources are also evaluated.
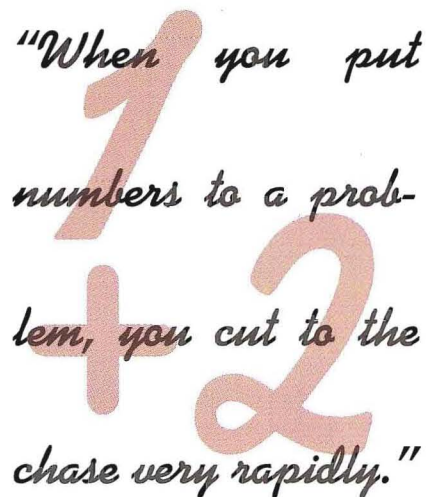
Performance - Despite perfect parts and perfect processes, a product can still fail to meet final specs. Until the root cause of failure is discovered, the problem is categorized as a performance defect. The root cause could be something originating from a supplier or process but all too often, it is simply lack of design margin.

Once the above areas are examined, all

data on incidents of defect known to happen under normal circumstances is collected and costs are assigned to each defect.

The Report Card can predict a product's true cost-of-defect containment, rolled yield (percent of production that will be defect-free), and relative sigma level (for benchmarking purposes). The card also calculates ppm quality to measure, prioritize, and track quality improvements on existing products and supplier parts.

A major benefit of the MQRC™ is its time-saving ability. It can quickly determine the most expensive defect—and less costly ones—within the cost for poor qual-

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ity. With this knowledge, a company can implement changes during the earliest design phase to either lessen that impact or eliminate it altogether.

"It's a lot less expensive to design out a problem than to deal with it after it's in production," Chambers adds.

Though it tabulates accurate results, the Report Card's simple approach makes it user-friendly. "If people have a method of measurement, then they can understand numbers," says Chambers. "Because we don't have to deal with opinions, we can end our discussions with resolution. When you put numbers to a problem, you cut to the chase very rapidly."

What's the score?

Munro consultants find that approximately 70 percent of inherent defects—those originating with suppliers and manufacturing processes—are a result of design. Only about 30 percent are under the control of the suppliers and the manufacturing process.

For example, one Munro client was considered by its customer to be world-class. The manufacturer received numerous awards but knew it had room for improvement. Interestingly, the only way the company achieved such favorable status with its customer was by sheer diligence in defect detection. the MQRC™ quickly exposed this fact.

"This manufacturer hadn't delivered a defective product to its customer in a year," says Chambers. "However, when we looked at that product, 42 percent of the units produced had at least one defect that was addressed somewhere along the line. The discovery verified the client's instincts that it had a world of opportunity to improve internal costs."

So far, client response to Munro consultants "digging for dirt," so to speak, has actually been favorable. The first pass through the MQRC™ is accomplished quickly; the most significant problem areas are tabulated. Response is usually, "That's not bad enough. Our situation is much worse—we have more work to do."

"Originally, I thought organizations would be protective of some information, but it's just the opposite. Once people get involved in this process, they realize it's their opportunity to paint a picture of things they've suspected for some time. Typically, a client may set me up with two or three individuals who provide information for the MQRC™. By the end of the day, we may have a dozen people in the same room.

"It's just amazing how this process gets a life of its own. People are hungry to expose this information so they can get their organizations moving in the right direction."