

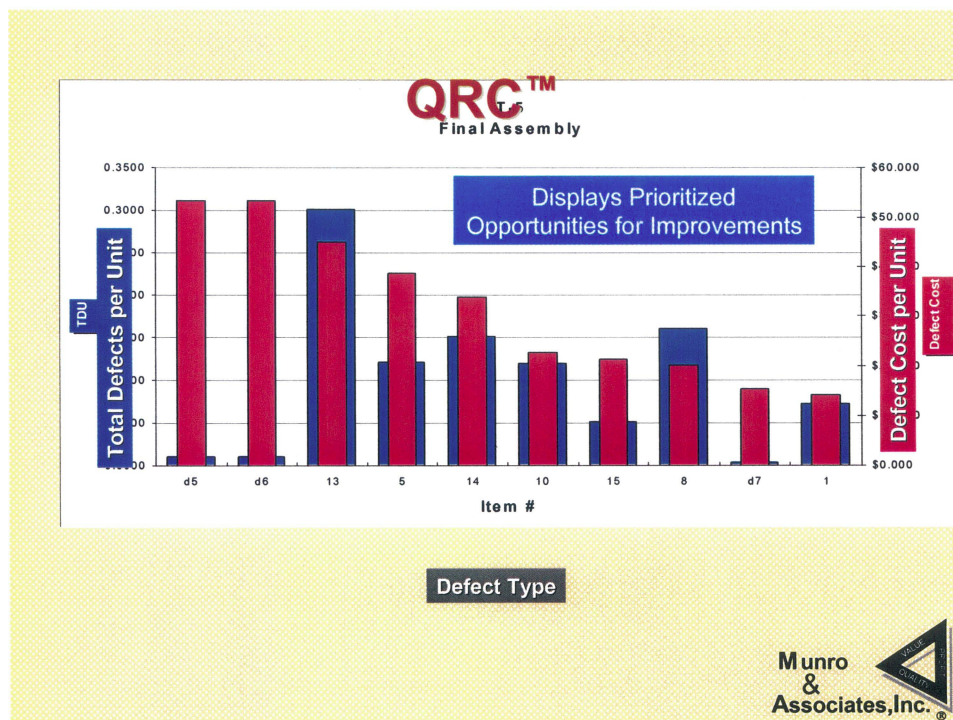


Quality Report Card™ Overview

The basis of what we do at Munro & Associates relies on our patented methodology called *Lean Design™*. This is a set of methodologies and principles that illuminates the path toward efficient and cost effective product redesign. A powerful adjunct to this is the Munro Quality Report Card™ (QRC™).

What is QRC™?

Developed by Munro associate Ivan Chambers, a Master Black Belt in Six Sigma, QRC™ is a software tool and an analysis process that provides a detailed and prioritized view of the cost of a product's quality and a prediction of the impact of planned changes. When a team has completed an analysis for a product, opportunities for quality improvement are highlighted for attention. As your quality improvement teams imagine ways to reduce or eliminate quality issues, the QRC reveals how much monetary return can be expected.

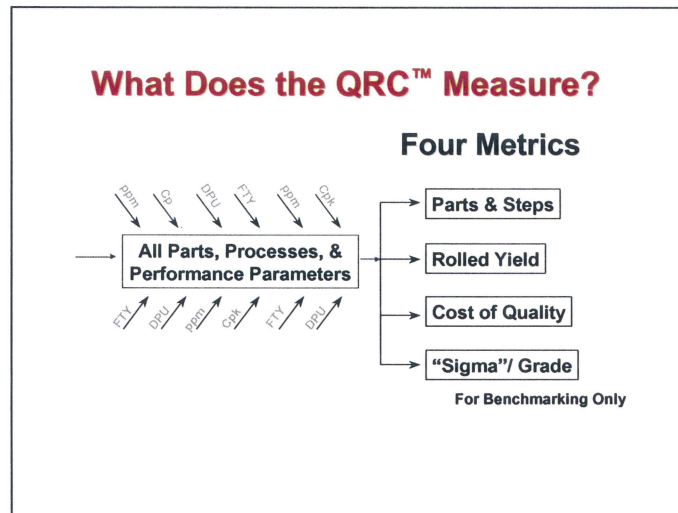


QRC™ provides a structure for collecting quality data and information to reveal summary measurements, which then prioritize opportunities for quality improvements that can be made by changes in manufacturing processes for existing products. However, QRC™ also provides a unique benefit of predicting quality for new product designs. Even if data are not initially

available at the conceptual state of a new product-design effort, Munro & Associates has many years of experience with thousands of products and processes that allow us to help companies make quality predictions with a reasonable level of confidence.

The software provides a structure for linked detail sheets to go down to any level of detail that is appropriate to indicate root causes of defects and to determine which ones have the most influence on total quality and cost. The software allows “pricing” of each defect type and includes algorithms to calculate the cost of quality for defects that are escaping from the lower levels up through the value chain. If a defect escapes from one level to another, the cost increases dramatically due to all of the “innocent” parts and assemblies that are affected, and the additional people and resources needed to deal with the defect. QRC™ also correctly calculates the burden that each good unit must bear in order to pay for the scrap that is generated. As new data become available throughout the product improvement process, QRC™ can be updated to provide ever greater accuracy.

What does QRC™ measure?



The four metrics QRC™ uses to calculate a company’s cost of quality.

Total Parts & Steps is a measure of the complexity of the product, comprising the total number of parts and process steps in the detail sheets, which represents the total opportunity count for this particular unit.

Total Defects per Unit is the average number of defects expected in each unit build.

Rolled Yield is the estimated percentage of production that would have zero defects without inspection, test, repair, and defect containment.

Cost of Quality per Unit is the calculated cost of all the quality activity (i.e., lost profit) per unit build.

The results are charted on the Munro Quality Report Card™, which includes the:

Total Annual Cost of Quality, which is the total yearly cost of quality for the annual production volume, and the

Dpmo, Sigma, and Grade, which are automatically calculated from “TDU” and “Total Parts & Steps.” These measurements match the widely accepted Six Sigma methods developed by the late Dr. Bill Smith of Motorola and are very valuable in benchmarking activity with the hundreds of organizations that have embraced the Six Sigma system.

When a QRC™ analysis has been completed, an **Executive Summary** report is generated which looks like this:

Munro Quality Report Card™

Executive Summary

Assembly (Unit) _____
Supplier _____
Annual volume _____

Company _____
Product _____
Date _____
Prepared by _____

Four Metrics

Total Parts & steps /Unit: **131**

Total Defects /Unit: **11.1%**

Rolled Yield: **11.1%**

COQ per unit: **\$700.59**

Total Cost of Quality Annually: _____

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For "Six Sigma" Benchmarking Only --

Sigma: **3.63** → Quality Grade: **C-**
(considering complexity)

Supporting Details _____

How much time and effort does it take?

For a typical product or subassembly of less than 300 parts, the QRC requires 3-to-5 days of dedicated effort of a select few people from a company’s manufacturing, quality, and product design organizations. A seasoned Munro facilitator directs the detailed analysis to discover the root causes of poor quality and assists in generating ideas to solve the problems.

Things needed for an analysis:

1. An itemized list of all parts in the assembly-part numbers, subassembly breakdown structure, and quantities for each part and subassembly.
2. All available defect data for similar products including manufacturing, supplier parts, processes, “out of box” failures, customer complaints, and warranty issues.
3. Experienced people who can provide estimates where data are not available.

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Some Example Results

INDUSTRY	PROJECT	PART REDUCTION	PROCESS IMPROVEMENT	COST REDUCTION
Aircraft	APU Exhaust	98%	72%	\$1.1million
Aircraft	Troop Door	21%	69%	\$51,000/ aircraft \$3.1 million / pgm.
Agricultural	Moisture Analyzer	68%	67%	31%
Automotive	Trunk Closeout	33%	39%	50%
Automotive	Front Door Module	47%	47%	\$38.89/door
Defense	Transceiver	84%	83%	77%
General Aviation	Bulk head assembly, installation & rigging	57%	60%	42%
Medical	Metered Pump	66%	81%	74%
Medical	Positive Pressure Ventilator	64%	76%	68%
Oil	Safety Valve – Oil Well	74%	94%	63%
Shipbuilding	Lube Oil Transfer Pump	96.5%	Engineering Labor Reduction: 83%	Labor Production reduction: 98%