

# Cost of Quality Improvement for Electronics Manufacturers

"What is the cost of quality?"

In studies carried out by industry experts<sup>1</sup>, the total cost spent on poor quality (e.g. test equipment, rework, scrap, etc.) has been estimated to be as high as 20% of a company's sales revenue. Quality costs are those costs incurred because "something wasn't done right the first time". These costs can be broken into several categories; however, costs due to Internal Failures are large and tangible. Internal Failures costs occur when a mistake is corrected inside the plant. These costs include rework, scrap, labor and work-in-progress (WIP) inventory associated with all repair loops.

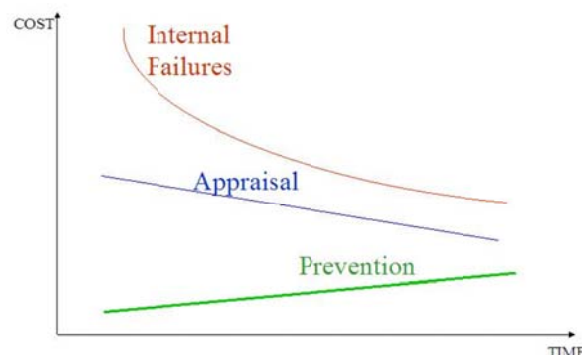
"Where are the opportunities to reduce costs and improve profits?"

"If something goes wrong, then there is an associated cost to put it right!" If the

time to put that something right can be reduced and/or eliminated, then there is an opportunity to drive down the cost of Internal Failures. However, before costs can be reduced, the impact of Internal Failures and the opportunities for them to be eliminated need to be clearly understood. Prevention systems are instrumental in reducing the cost of Internal Failures as shown in the diagram below.



## Prevention Systems Reduce Costs



The costs associated with poor quality can be reduced by implementing solutions that focus on preventing quality problems.

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<sup>1</sup> Reference Source: "Quality is free" by Philip Crosby

## "How does Derby help you reduce the Costs of Internal Failure?"

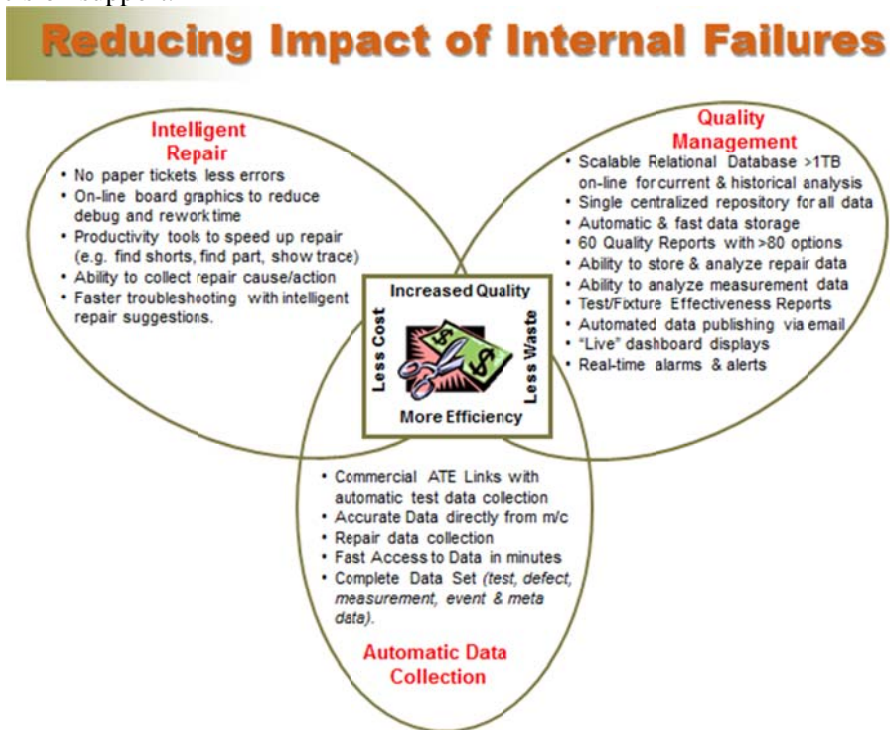
Derby offers a family of software applications that focus on improving decision support on the shop floor and across the manufacturing supply chain. The Derby solution provides tools that were specifically designed with the charter to assist electronics manufacturers in reducing the cost of Internal Failures. Two key software applications from Derby that directly drive down the cost of Internal Failures are:

### **Paperless & Graphical Repair**

Derby's Rework solutions (e.g. ReX & Quick Repair Lite) provide built-in productivity tools aimed at assisting repair technicians to reduce rework time with features such as Find Shorts, Show Parts/Traces, etc. By removing the need to attach failure tickets to a faulty board the rework process can be streamlined, repair data collection automated and root cause analysis improved. The ReX Intelligent Repair feature uses historical data to create troubleshooting hints that helps to reduce the time it takes to repair a failing board.

### **Quality Management**

Derby's Shop Floor Insight (SFI) solution (e.g. SFQ and SFM) are based on a data collection framework that was specifically designed to automatically collect and store appraisal (i.e. test) data from the shop floor in a predefined relational database. Removing the need for manual data collection from commercial ATE and the rework process significantly improves statistical analysis, access to measurement/repair data, root cause analysis and timely access to quality information. SFI enables users to quickly and accurately determine areas where internal failures are having an adverse effect on shop floor quality and performance. SFI also provides fast and effective methods to share information and create transparency (e.g. live dashboards, report scheduling, report emailing and alarms), which improves collaboration and decision support.



The primary benefit of implementing a Derby automated data collection and rework/quality management software solution is the reduction of rework, work-in-progress (WIP) and ultimately the cost of Internal Failures. Some key features that reduce Internal Failure costs are listed in table 1 below.

<i>Derby Feature</i>	<i>Feature Advantage</i>	<i>Cost of Quality impact?</i>
Real-Time SPC Charts, Alarms & Dashboards	Immediate visibility for everyone when yield, quality and performance issues occur.	Minimize impact when a failure occurs. Maintain high First Pass Yield levels.
Graphical Repair	Fast location of parts & shorts on a board.	Reduces rework time and operator skill level
Paperless Repair	No need to attach a repair ticket to a board.	Reduces handling time or retest if the ticket is lost.
Automated Test and Repair Data Collection	Accurate and complete access to test and repair data.	Eliminates manual data collection. Faster detection of problems.
Intelligent Repair	Reduce time to repair a failing board.	Reduced repair cost & WIP on the shop floor
Built-In Quality Reports	Automated statistical analysis that is accurate and accessible by anyone.	Improves root cause analysis. Prevents Internal Failures from occurring. Increased First Pass Yield
Test Loop Count Tracking	Accurate First Pass Yield. Ability to monitor excessive loop counts.	Fast detection of yield issues. Improves focus on the top problems.
Test Utilization Reports	Monitor/detect test performance issues.	Increases throughput and asset utilization
Fixture and Pins Reports	Monitor fixture usage and pin problems	Reduces false calls and poor test utilization.

Table 1 Derby Features that Reduce Internal Failures

### Profit Improvement Analysis (PIA)

The primary benefit of the Derby Solution is that it is focused at enabling electronics companies to drive down the impact and cost of Internal Failures. It is this cost saving opportunity that can be used to help justify the investment in an Information Management Solution. The Profit Improvement Analysis (PIA) summary below attempts to quantify the cost savings and ROI impact that a Derby solution would have on an electronics manufacturing process.

### Derby PIA Strategy

Although most cost-saving opportunities are visible, not all of them are easy to quantify. Therefore, the Derby PIA strategy concentrates on the more quantifiable cost saving opportunities, as shown in table 2. By only focusing on the cost saving opportunities that are easy to quantify (i.e. the conservative approach), the resulting PIA is easier to substantiate.

<i>Visible Impact</i>	<i>Intangible Impact</i>
Increased First Pass Yield	Decreased cycle times (or improved time to market)
Shorter rework time	Faster and more accurate data collection
Reduced scrap and WIP on the shop floor	On-time shipments
Increased test equipment utilization	Reduced external or field failures and RMA

Table 2 Cost Saving Opportunities

By successfully implementing a Derby solution electronics companies can reduce their cost of quality on average by an estimated 50K\$ to 250K\$ per year (see table 3 for key PIA data and assumptions).

<i>PIA Data</i>	<i>Typical Values</i>	<i>Improvements</i>
Board volume (for a medium to large site)	100K to 500K boards	n/a
First pass yield at incircuit test	75% to 85%	1% to 5% Increase
Fully loaded labor costs for a Technician	\$10/hr to \$15/hr	n/a
Average cost of a fully loaded board at Incircuit Test	\$50 to \$500	n/a
Average percentage of total boards scrapped	0.01% to 0.1%	0.05% Scrap Reduction
Average # of times boards loop around the test workcell	1.5 to 5 Loops	0.5 to 1 Loop Reduction
Average repair troubleshooting and repair time	1 to 10 mins	2 to 5 min. Reduction

Table 3 Derby Profit Improvement Analysis Data and Assumptions

### Conclusions

Poor quality can cost an organization up to 20% of its total revenue. Prevention solutions, such as Derby's Shop Floor Insight and Shop Floor Repair solutions can significantly reduce the costs associated with poor quality. Contact Derby to find out how we can assist you prevent internal failures and reduce your "cost of quality". Visit our web site for more information on Derby and its products at [www.derbyinsight.com](http://www.derbyinsight.com).