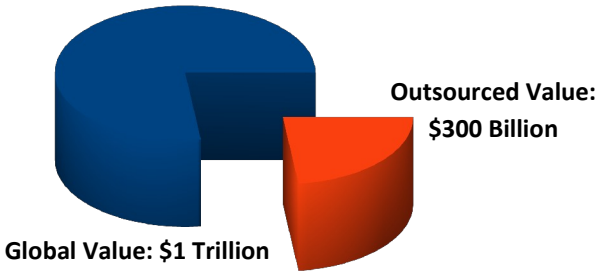
How to Win With Contract and Outsourced Manufacturing

"Trying to achieve even lower costs spells almost certain death for Electronic Manufacturing Services and Contract Manufacturers as we know them. They are already at the limits of margin and profitability."

-Editorial Director, Embedded Systems 2007

Global Electronics Market



Outsourced manufacturing is a de-facto matter of business` necessity for most Electronic OEM and ODM manufacturing companies. OEMs have used outsourced manufacturing to reduce overall costs by generating products and services from locations which have lower labor, materials, infrastructure and maintenance costs. It is estimated that in 2008 (source IDC) the assembly value of the global electronics market was close to $1 trillion dollars, with roughly $300 billion being outsourced. With this rising share of outsourced manufacturing, the cost-savings benefits are well known and proven. What is unknown and still a struggle to solve, however, is the state of the product's quality when shipped to the customer.

A part of that problem is how to strike the right balance of trust and transparency between the OEM and outsourced manufacturer in order to achieve the desired quality. Here are some excerpts taken from a 2006 Venture Outsource study:

OEMs were asked what outsourced manufacturing companies could do to improve overall trust:

1. "Be accountable and be able to share real-time data."

Outsourced Manufacturers were asked what they should be improving:

2. "Improve overall performance, including quality and delivery lead-time.
3. "Increase transparency while at the same time indicating that the company must be a profit-seeking enterprise if it is to serve its customers' long-term best interests."

In this whitepaper, we will explore issues of transparency on both sides of the relationship and some potential methods to ensure that product quality is always prioritized first to ensure long term customer satisfaction.

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The Landscape of Contract and Outsourced Manufacturing

The majority of Electronics Original Equipment Manufacturers who have a relationship with a contract manufacturer typically outsource the following functions and services:

- **Front-end design, engineering, prototyping**
- **Printed circuit board assembly (PCBA) and surface mount technology (SMT) work**
- **Box-build or systems integration**
- **Direct fulfillment and after-market services (repair, warranty, installation, customer invoicing)**

Some typical terms that you will see in the industry are:

OEM **(*O*riginal *E*quipment *M*anufacturer): OEMs provide OEM-branded electronics and related products to customer end-markets.**

EMS **(*E*lectronic *M*anufacturing *S*ervices*): Otherwise known as Contract Manufacturers, these companies offer supply chain services to OEMs. But in most instances, the electronics contract manufacturer does not own the intellectual property of the products it produces for the OEM.**

ODM **(*O*riginal *D*esign *M*anufacturers): ODMs offer supply chain services to OEMs but, in most instances, the ODM company does own the intellectual property of the products it produces for the OEM.**

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Finding the Right Balance

The supply chain is getting deeper and more sophisticated for electronics OEM's, but transparency is still a key issue. Most OEM's are still unwilling to truly share roadmaps and plans with outsourced partners due to concerns that vendors might use the information "against them". Most companies still don't trust outsourced vendors the way they trust internal employees, which is ironic since these vendor-customer relationships tend to last over five years while average employee retention is less than four.

Outsourced vendors are often afraid to be transparent – whether it is about their part quality, about their profit margins, about their capacity, or about their own roadmap. Contract manufacturers, for instance, have often been treated as an easily replaced commodity, which has led them to focus on low prices – often with hidden or unintended sacrifices in quality. From a CM perspective, what the OEMs want is impossible – the lowest prices and full transparency with perfect quality. Although OEMs say that they want everything, most vendors believe that price is paramount. Due to the pricing pressures, there are often bad business decisions made which impact quality, lead times, or communication.

As Edward Marshall said, "Speed happens when people…truly trust each other." And the electronics industry is all about time to market and deeper supply chains. Those companies who figure out how to trust their suppliers (and vice versa) will have a competitive advantage. Tom Peters, well-known business consultant, put it best when he said that "Trust is the issue of the decade."

> ***"Trust is the issue of the decade."***
>
> ***-Tom Peters***

But trust, like quality, can be hard to quantify. As such, it can be difficult to make financial decisions around trust and quality. For example, an OEM/ODM has one prospective CM bid a price of $100 per unit, but they have had quality issues, and the OEM/ODM is not sure how much to trust them. The other CM, which the OEM/ODM trusts to deliver high quality on-time, has a price of $150 per unit. Who should they pick? How do they quantify the "trust premium" and the "quality premium"? Stephen Covey, in his book "The Speed of Trust", tries to answer this question in detail. But he starts with a bottom-line, quantifiable formula involving trust:

- When trust goes down, execution is slower and cost goes up
- When trust goes up, execution is faster and cost goes down.

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In 1994 Cisco System's Manufacturing Team announced the strategic intent of being the undisputed world leader in Supply Chain Management. By 2001, Cisco had implemented a 'virtual factory' in which almost every function of production and fulfillment was performed through an outsourced network. These functions included Parts Procurement, Material Management, Sub Assembly Outsourcing etc.

In 2010, Cisco began to roll out the next phase of this virtual factory through an internally developed software solution called Cesium. Cesium allows the Cisco Manufacturing Team to connect virtually and tap into the manufacturing data of thousands of suppliers and manufacturers to achieve real-time visibility into quality trends. Cisco says that it can respond more quickly to quality trends and events with access to accurate quality data from its supply network (source Managing Automation April 09, 2010).

Cisco has no plans to market Cesium as a commercial offering, though they do recognize the advantages of maintaining such a solution. "We see quality as a competitive advantage for Cisco," said Roger Bhikha, Cisco's Senior Director of Systems and Component Quality. In addition to improved data-quality collection, Cesium is expected to improve Cisco's component-level compliance and traceability by 20%.

"We see quality as a competitive advantage for Cisco"

-Roger Bhikha
Senior Director of Systems and Component Quality
Cisco

As Cisco realizes the benefits of connecting to their Supply Chain with an automated data collection, analysis and database solution other companies do not necessarily have the financial and human resources required to develop an internal solution. These companies are turning to commercial solutions like IntraStage to deploy a similar solution to their Supply Chain to get the right level visibility and transparency to deliver quality products to the market.

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Technology can't solve the problem of getting OEMs and CMs to agree to a transparency mindset. Once they have that mindset, however, software technology can enable them to communicate faster and with more transparency, thus letting them find quality issues sooner and solve them faster

An example of such software technology is IntraStage, which consists of a robust/scalable database architecture and a web reporting engine. IntraStage has the ability to automatically retrieve data from any test station (whether located onshore or offshore at contract manufacturers), aggregate the data into a normalized database and is then able to provide hundreds of standard web based reports. In addition to the web based reports, users can easily use Matlab, MiniTab, MS Excel and JMP or other post processing tools to analyze the given data further; IntraStage can then feed that data into ERP systems like SAP, Oracle and Baan to achieve seamleass integration into the R&D and testing processes.

With software technology like IntraStage, both the Contract Manufacturer and OEM can now proactively look at product quality data and answer a variety of questions through dashboard views like in Figure 1.

1. How can Quality Control people look at yields due to different component batches?
2. Are any failures catastrophic or marginal? If marginal, what's going wrong? Is it the test limits, is it the original specification or is the OEM or Contract Manufacturer getting bad parts?

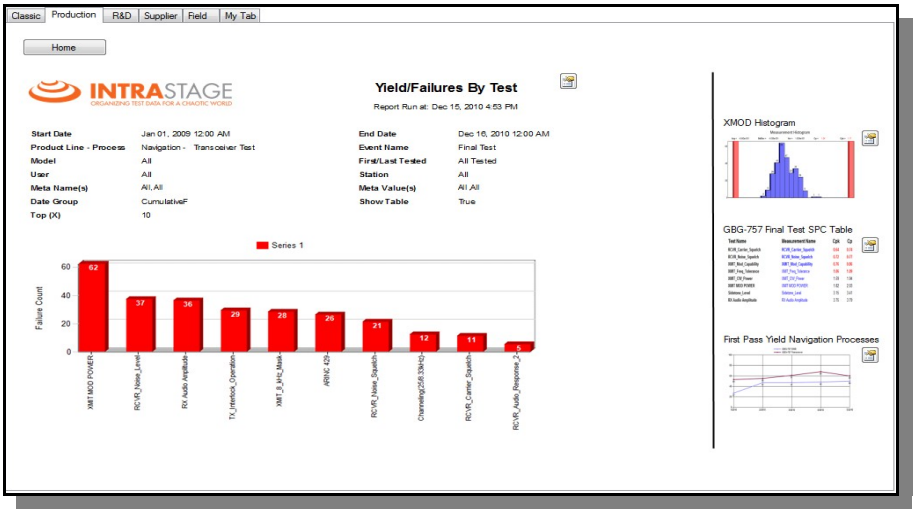

Figure 1: Example dashboard view of test failures, yield trends, histograms and SPC

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Firefighting

Inevitably, as trust builds over time between OEMs and contract manufacturers, there are and can be specific times when that trust can become strained. A particular problem may come up in New Product Introduction (NPI) or during steady state production; during either case, this will involve some heavy conversations on both sides to resolve the problem.

These problems become serious "firefighting" situations when time-to-market is delayed or shipments are being held up to important customers. Critical problems, like low yield and critical quality defects, are the main culprits in these firefights.

The process for most companies caught up in this whirlwind is to engage R&D, Manufacturing, and Quality department people from both the OEM and manufacturer side in Kaizen or committee settings to rapidly root-cause the problem. This would take the form of large meetings, and frequently key people would be flown to the problem manufacturing sites.

With a typical North American domestic business trip expense of $1000 (source: American Express 2009 Annual Global Travel Forecast) and international trip expense of $3400, these trip costs can quickly add up. This does not even include the daily loaded cost of employees for these firefighting sessions (which can be, on average, $1000 per day). A typical issue can easily run into the tens of thousands of dollars in costs for an OEM and contract manufacturer to diagnose, fix and verify.

Being able to get key product data (such as yields, test runs, etc.) can significantly reduce the cost of this resolution process. Providing access to this information through software technology like IntraStage would engage the right persons, at the right time (typically teams are engaged across different time zones) and allow for better collaboration across the sites, therefore eliminating travel.

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Conclusions

As we have discussed in this whitepaper, the challenge of open and transparent communication will always be there between an OEM and its Supply Chain Contract Manufacturer. As the overall goal is to ensure that the end customer gets the best quality product at the most effective price, the move toward jointly collaborating on product quality is not only necessary but feasible. This feasibility comes about by new technology solutions like IntraStage which can automate all the functions of gathering quality data, aggregating into a secure database and allowing all sides to participate in successfully delivering quality product to the customer.

About IntraStage

IntraStage is a Quality Management Software provider for companies who design and manufacture electronic products. We provide SPC, Yield, CP, CPK, and test data analytical tools by automating the retrieval, storage, mining and reporting of R&D, Manufacturing, Supplier and Field test data. Our clients choose us because we seamlessly integrate test data from different sources, lower their product design, manufacture and return costs by finding quality trends more quickly and accurately. Fortune 1000 companies rely on our business intelligence to keep them competitive when product quality and customer satisfaction are key differentiators.

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