Ball Aerospace & Technologies Corp.

Mission Assurance Challenges in Space Flight Projects – a Strategic Approach

Sherri Fike

October 16, 2012

Agility to Innovate, Strength to Deliver

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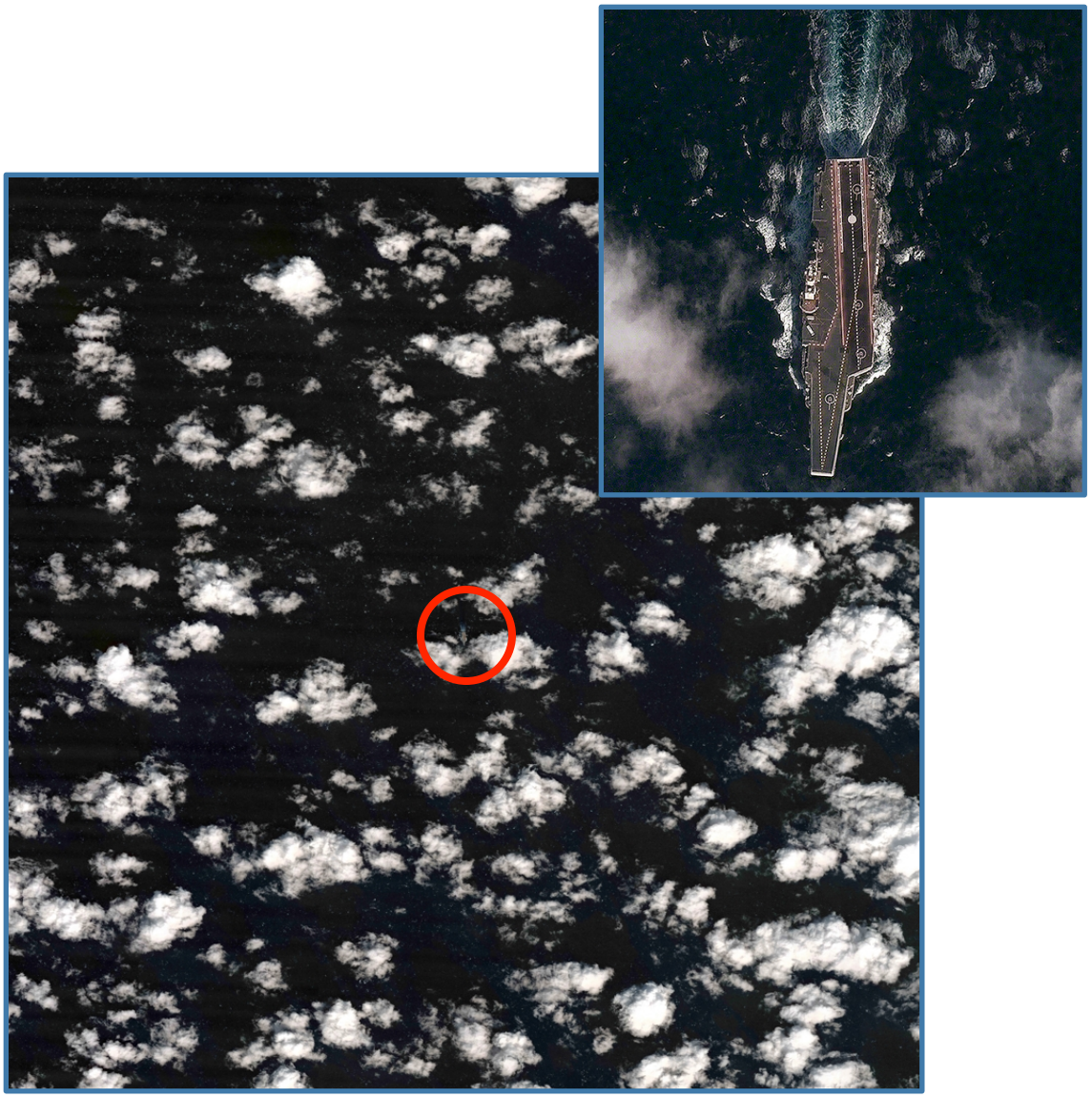
Agility to Innovate, Strength to Deliver

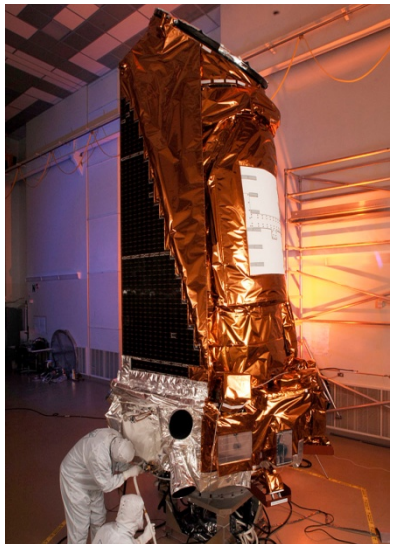


- National leader in technical innovation for more than 50 years
- Technologies for civil, defense, intelligence, commercial and international customers
- Leading subject-matter experts across broad engineering and science disciplines

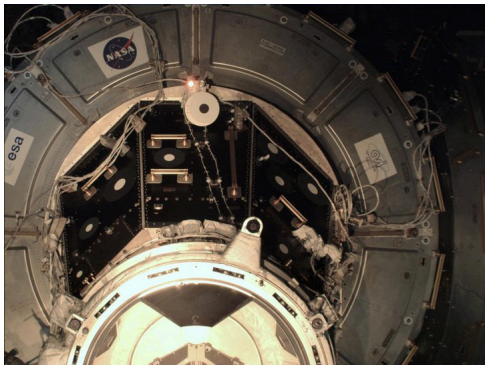
Recent Accomplishments

NPP Launch
October 28, 2011

SBSS Launch
September 25, 2010



Kepler Launch
March 7, 2009



STORRM On-Orbit Demonstration
May 30, 2011

STPSat-2 Launch
November 19, 2010

WISE Launch
December 14, 2009

Employee Satisfaction Linked to Culture and Aerospace

2011 sales: *$784.6 million*

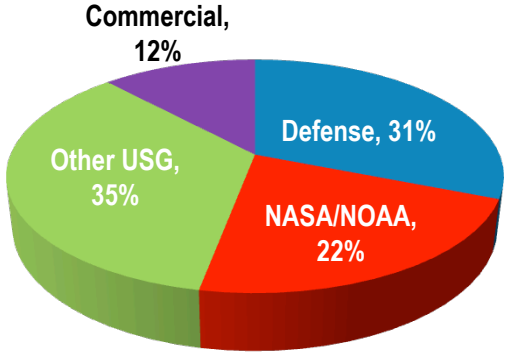
Employee statistics:

- 2,800 employees
- Average tenure 10 years
- Attrition <4%
- 30% of employees have advanced degrees
- Nearly 40% of employees have security clearances

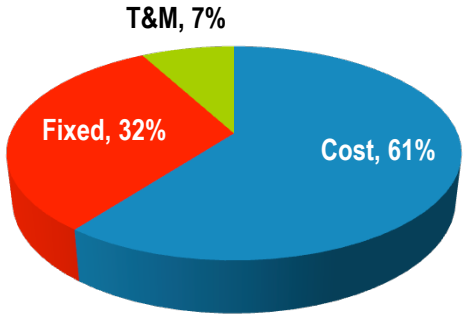
Over 1 million square feet of state-of-the-art facilities

- 25 clean rooms, covering 50,329 ft^2 in Boulder and Broomfield
- 64 controlled and closed areas, totaling more than 198,400 ft^2
- Leading-edge Detector Technology Center
- Advanced universal collimator assemblies for alignment and performance testing of optical systems
- First-class RCS/RF anechoic chamber to test antennas

Customer Mix

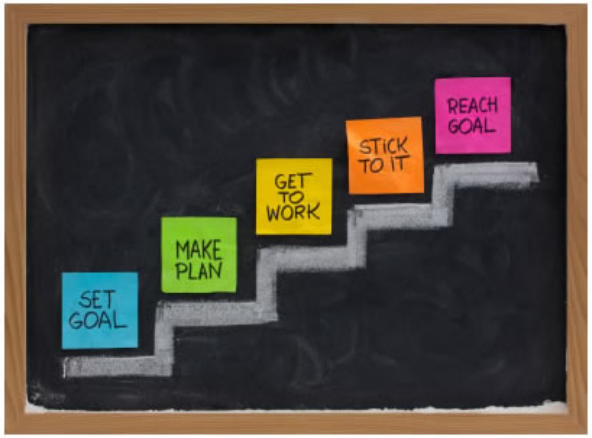


Contract Type



MA Challenges are Reflected in our Mission Statement

- **Promote accountability of process owners and continual process improvement across company**

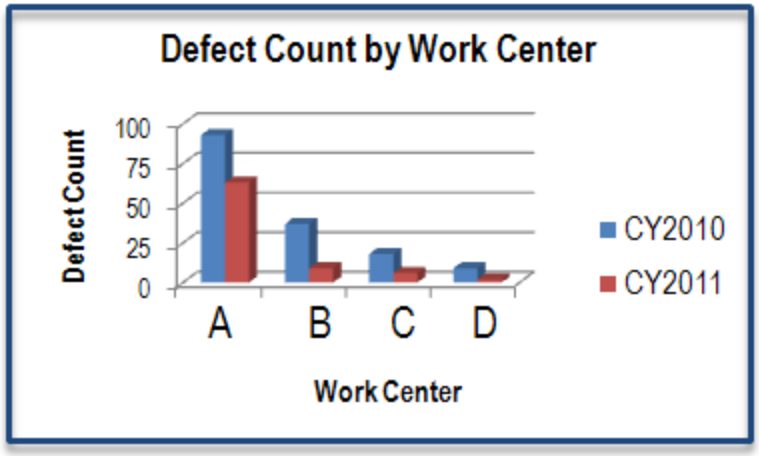


- **Provide data-driven approaches to problem solving and solution development**

Anomaly & Corrective-Action Tracking System (ACTS) is the Foundation of our Data

- Automatic data gathering process of non-conformance data collected by ACTS

- Standard fields enable queries of defects by attributes
  - Responsible Work Center
  - Root Cause
  - Part Number
  - Shop Order Operation
  - Supplier
  - Disposition

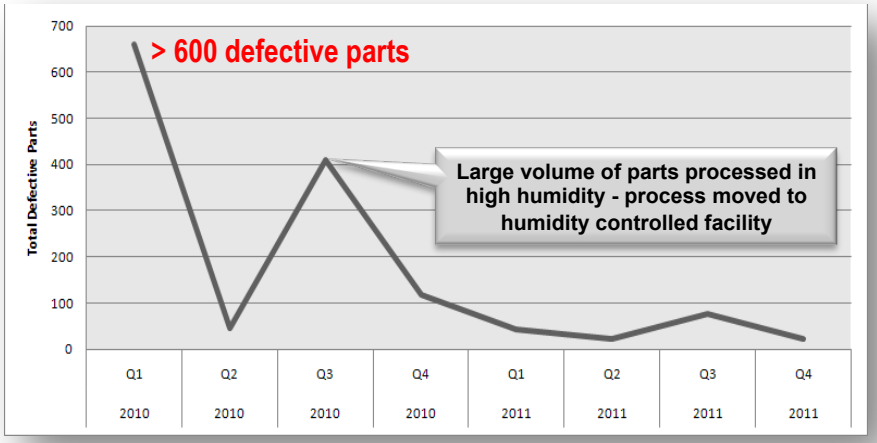


- Customizable charts and dashboards

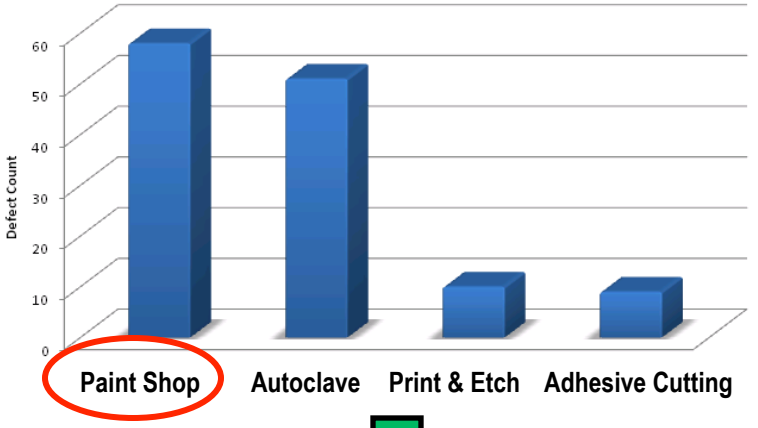
- Data refreshed with a click of a mouse

Quality and Manufacturing Collaboration is Essential

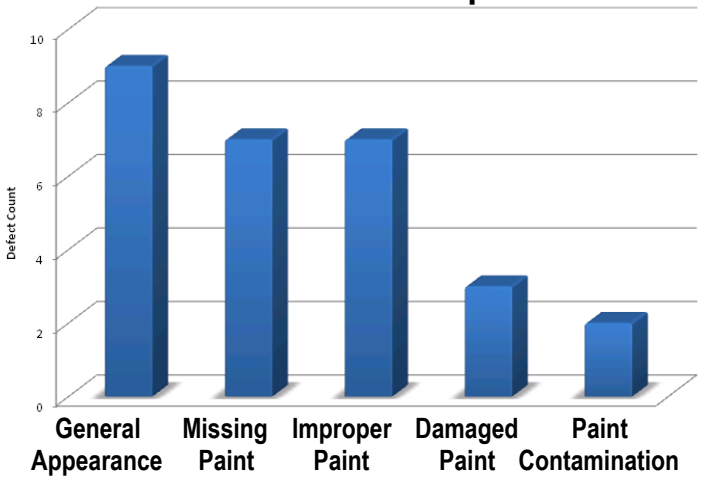
Manufacturing Shops Total Defective Parts



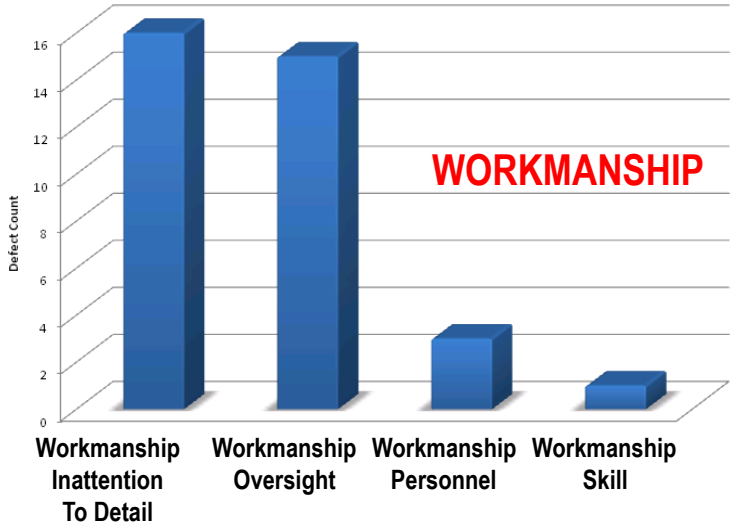
A Closer Look at the Manufacturing Shops



What are the Paint Shop defects?



What are the root causes?



Defect Analysis Can Lead to Simple Solutions

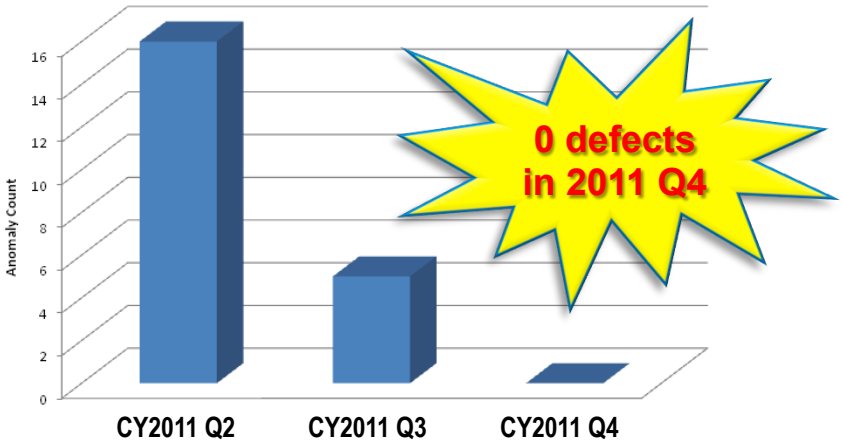
Why is *Workmanship* an Issue?

- Discussion between Operators and Work Center Manager
- Review of each anomaly report
- Difficult to paint undersides of parts due to poor lighting

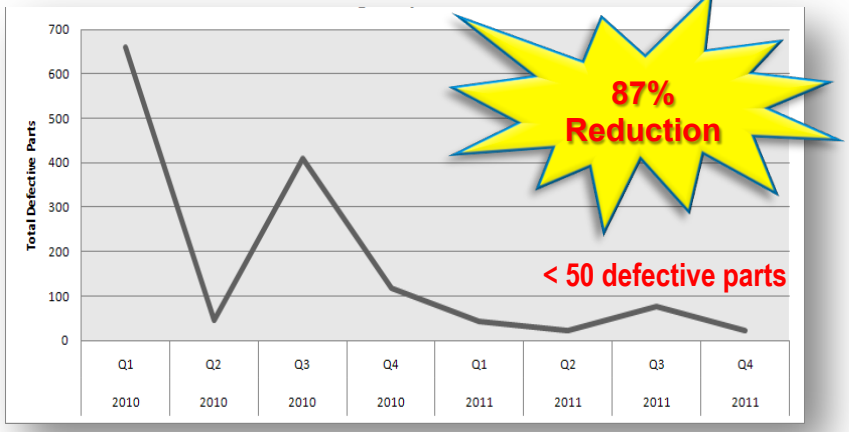
What Action was Taken?

Facility lighting improvements in 2011 Q3

What was the result in the Paint Shop?



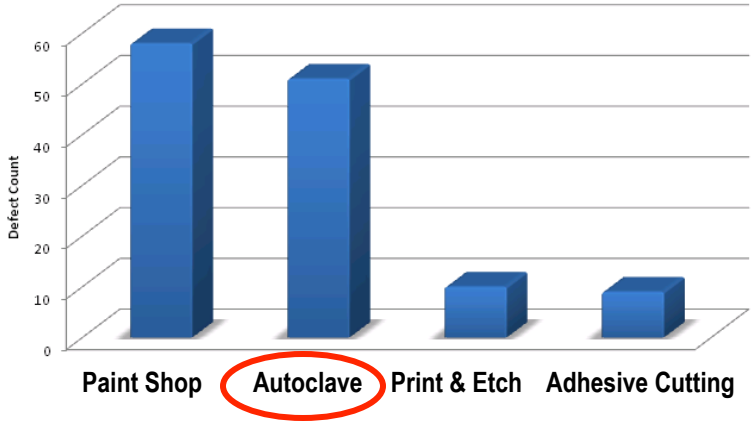
Manufacturing Shops Total Defective Parts



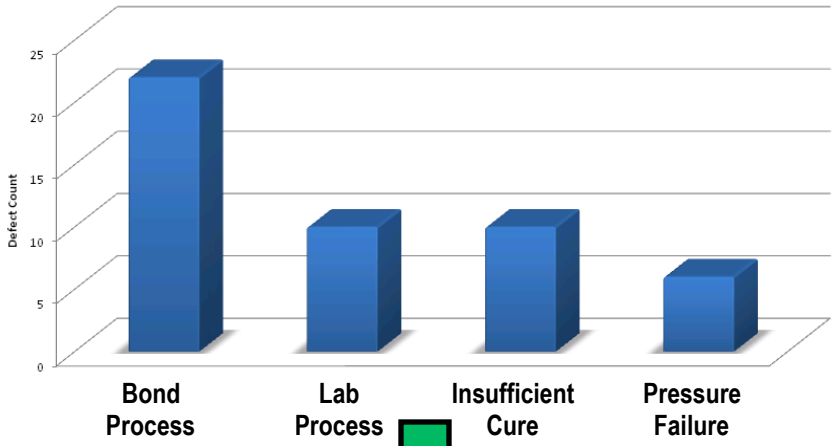
1,233 defective parts in 2010 166 defective parts in 2011

Defect Analysis Can Lead to Major Improvements

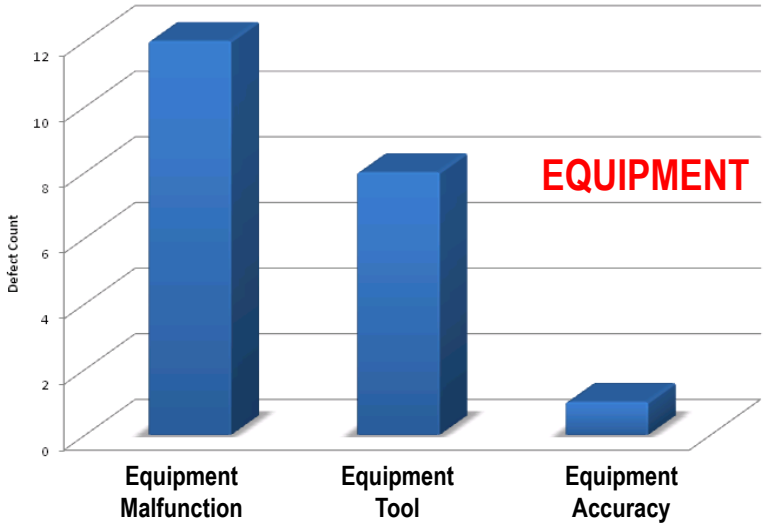
A Closer Look at the Manufacturing Shops



What are the Autoclave defects?



What are the root causes?



Why is *Equipment* an Issue?

- Discussion between Operators and Work Center Manager
- Repeated bonding issues
  - Tool causing vacuum leak failures
- Program provided tools connecting to vacuum ports
  - Different coefficient of thermal expansion for each program tool

Defect Analysis Can Lead to Company Solutions

What Action was Taken?

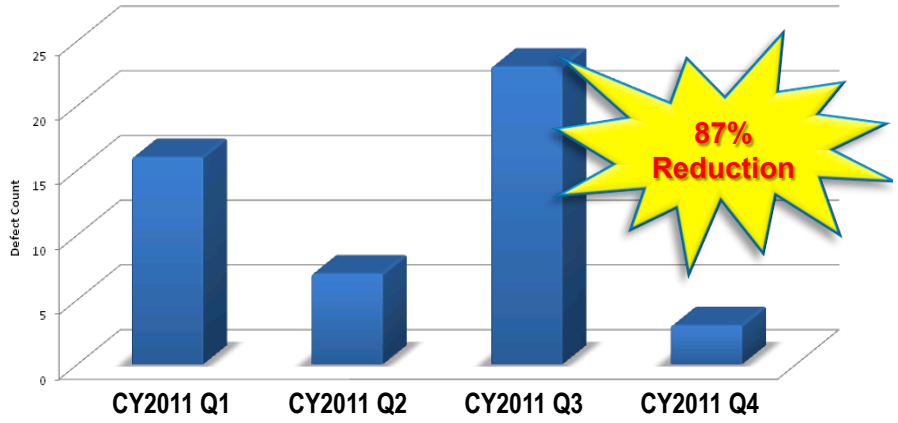
- Added tooling to Risk and Opportunity Management Plan
- Identified opportunity for improvement at Business Unit quarterly meeting

Business Unit Level Action

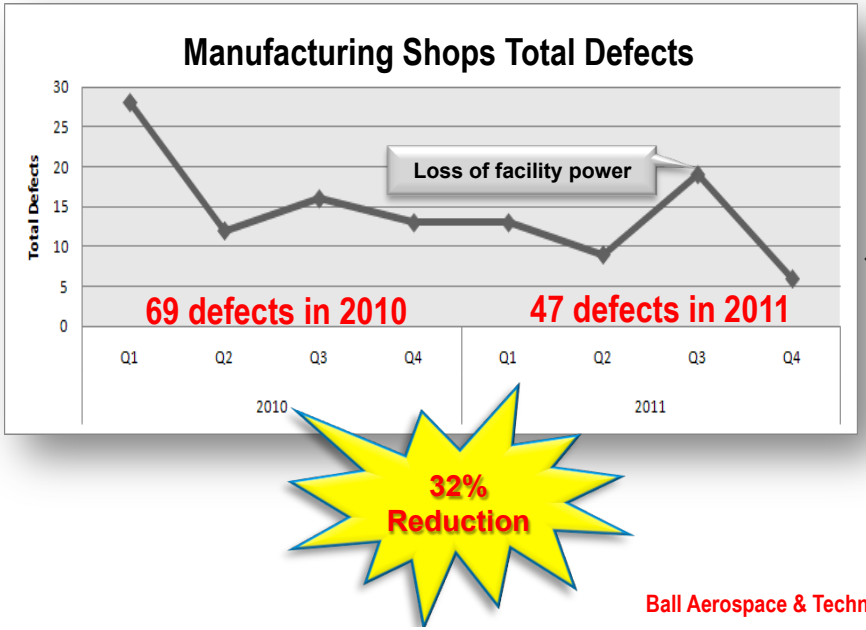
- Several work centers experiencing tooling issues
- Lack of tooling expertise on staff

Tooling Engineer hired in 2011 Q3

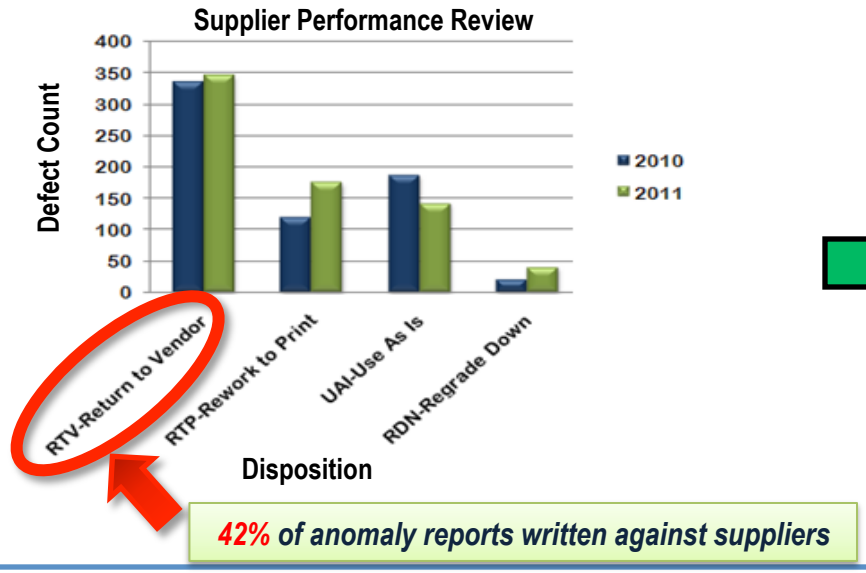
What was the result in the Autoclave Work Center?



Manufacturing Shops Total Defects

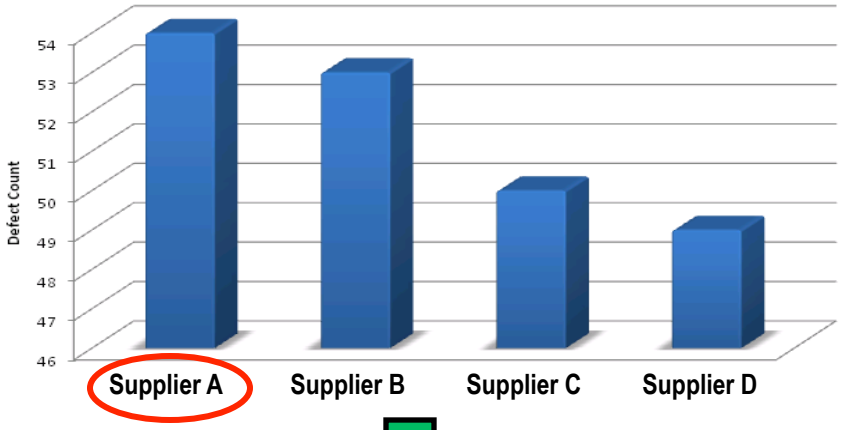


ACTS + Supply Chain Data = Improvements

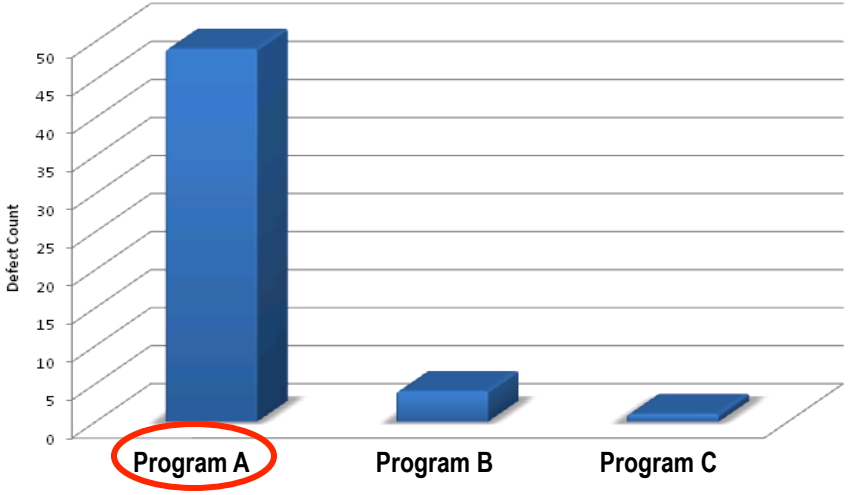


42% of anomaly reports written against suppliers

A Closer Look at the Suppliers at Cause



Which programs are procuring from Supplier A?

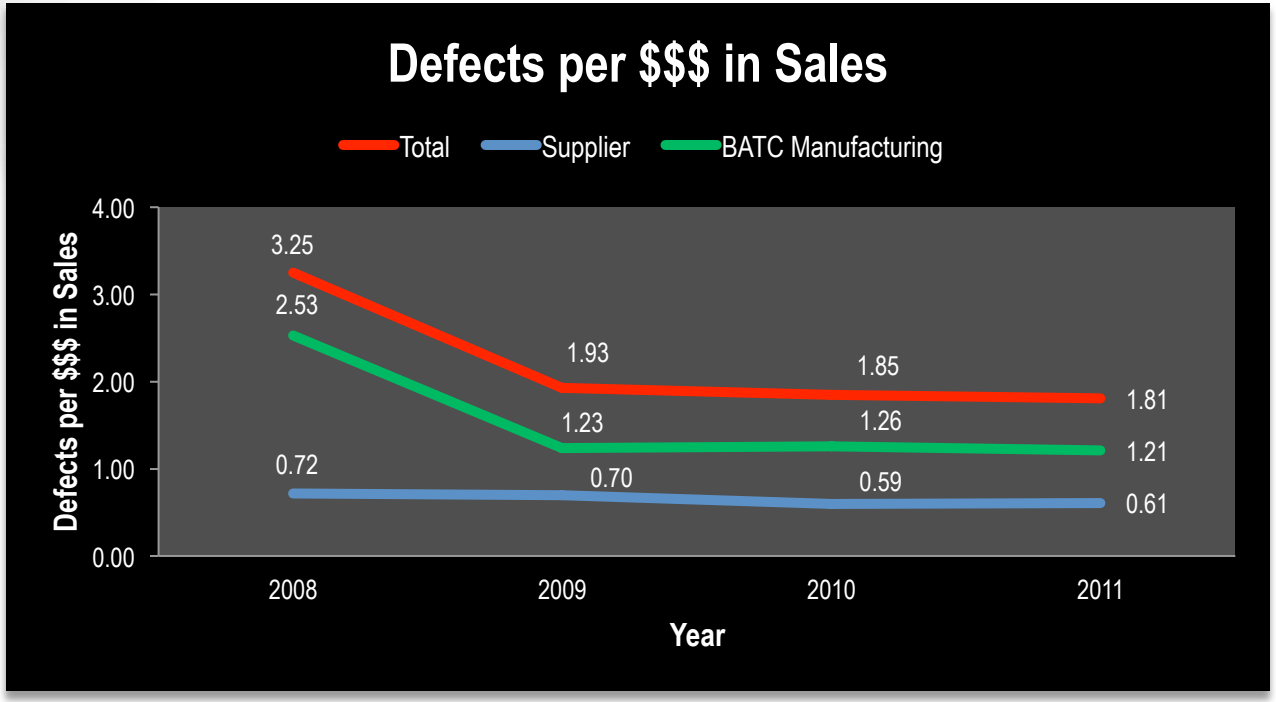


What Action was Taken?

- Increased communication with supplier
- Better flow down of requirements and acceptance criteria
- Program utilization of Supplier Corrective Action Requests (SCARs)

SCARs

ACTS + Financial Data = Increased Return on Investment



Knowing where the defects occur drive our focus to the real issues
Implementation of effective corrective action and preventative measures

Future Possibilities Are Endless

- Implement across all parts of business
- Look for cross business unit trends
- Add labor and material cost to the Data Cube
- Evaluate number of opportunities

Determine "Cost of Quality" and improve our business