

Quality Management I

<http://lbgeeks.com/gitc/pmQual.php>

June 9, 2008

- **What is Quality Management?**
- **QA Versus TQM Methods**
- **Data Gathering and Analysis**
- **Quality Documentation I**
- **Summary**

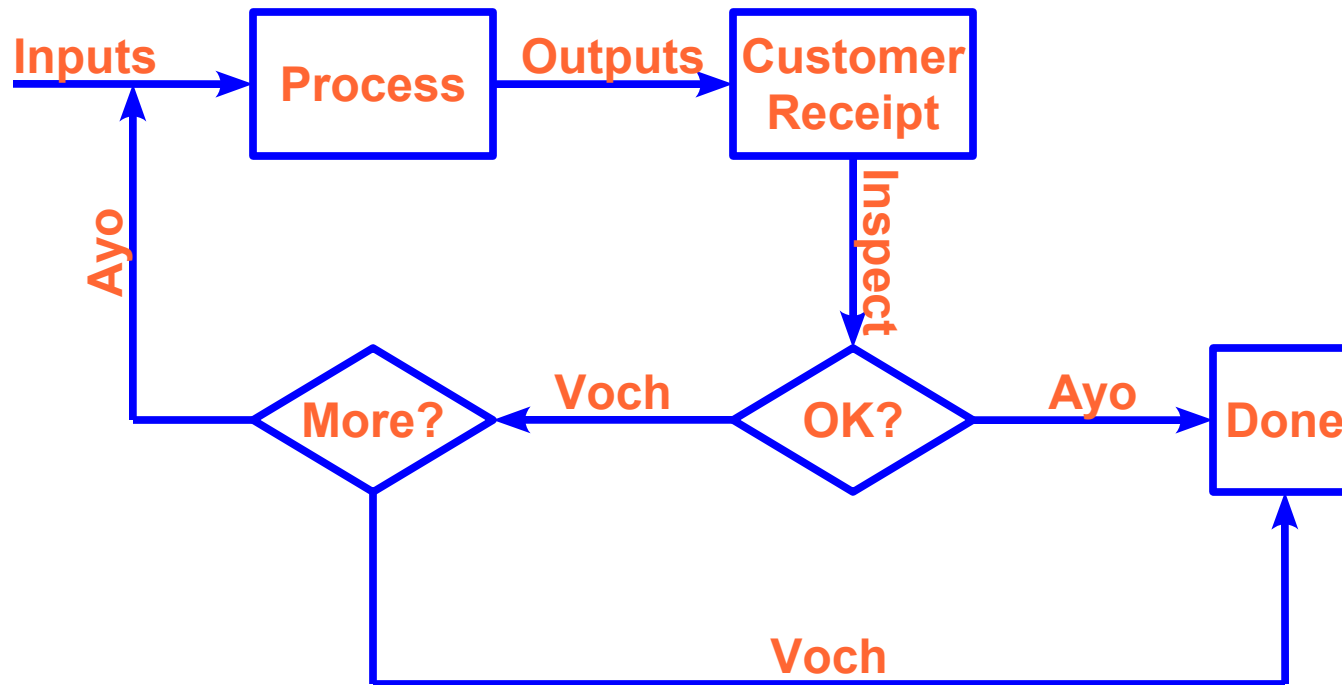
What is Quality Management?

- **Control production to always yield acceptable output**
- **Focus on production process (or create one if necessary)**
- **Reduce input, activity variances**
- **Result should be more acceptable output**
- **Control what matters most**

QA Versus TQM Methods

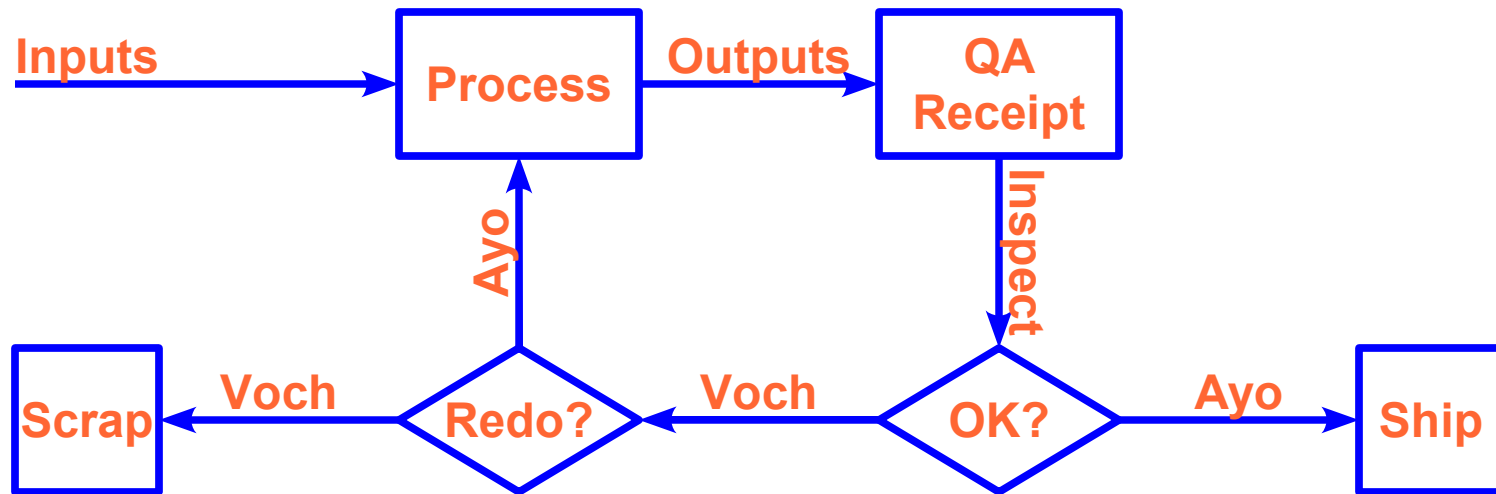
- **Quality Assurance:**
 - **Control activity at process output**
 - **Relies on inspection**
 - **Unacceptable output sent back for rework**
- **Total Quality Management**
 - **Control activity inserted throughout process**
 - **Entry, exit criteria ideal “hook” for this**
 - **Unacceptable output caught early**

No Quality Management



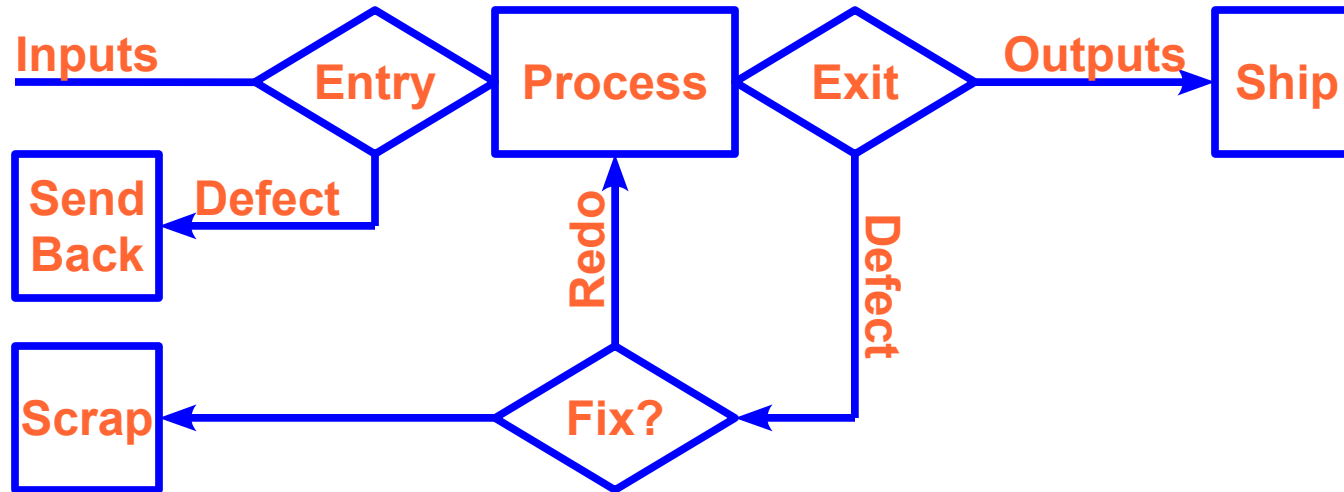
- **Customer bears inspection burden**
- **Customer may not order replacement**
- **Is producer really saving anything?**

Quality Assurance Example



- Inspection burden removed from customer
- Customer not shipped defective output
- Producer may recycle faults for rework

Total Quality Management Example



- Inspection distributed throughout process
- Poor input blocked from process start
- Multiple quality check points

Data Gathering and Analysis

- **Quality management needs inspection:**
 - **At output of last process**
 - **Or perhaps routine data during process**
- **Data collection centralized or distributed:**
 - **By people responsible for quality**
 - **By everyone involved in process**
- **Statistically significant sampling needed:**
 - **Granularity fine enough to evaluate process**
 - **Repetition enough to spot deviant trends**

Quality Documentation

- **Phase I:**
 - **Check Sheet**
 - **Histograms**
 - **Control Charts**
- **Phase II:**
 - **Ishikawa Diagrams**
 - **Pareto Charts**
 - **Scatter Diagrams**
 - **Flow Chart**

Check Sheets

- **Manual, real-time, quick data collection**
- **Performed by line workers**
- **Obtain measurements useful for internal process control**
- **Count of known potential defects**
- **Interpretation difficult unless other data used for collaboration**

Check Sheet Example

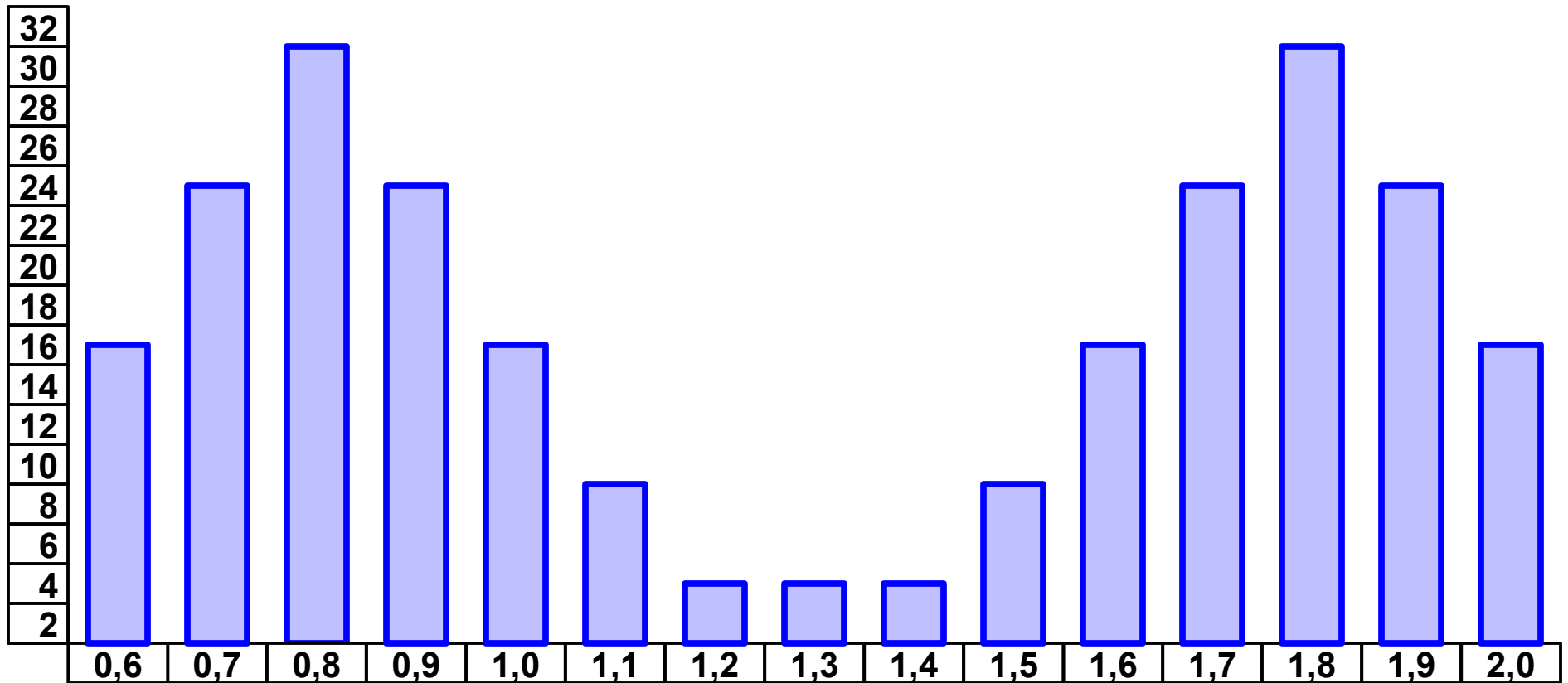
Date:	28 March 2008
Inspector:	Venkassyan
Customer:	Hye Surf Boards California, Inc.

<u>Count</u>	<u>Defect</u>
///	Wax too thick
///	Pin stripes not distinct
//	Pin stripes have gap
/	Paint bubbles
////	Paint chipped

Histograms

- **Quantize data into bins (or buckets)**
- **Different measurements within same bounded range are counted in same bin**
- **Linear, log, or exponential distribution provides different interpretation**
- **After sufficient sampling, real-time results show immediate range errors**

Histogram Example



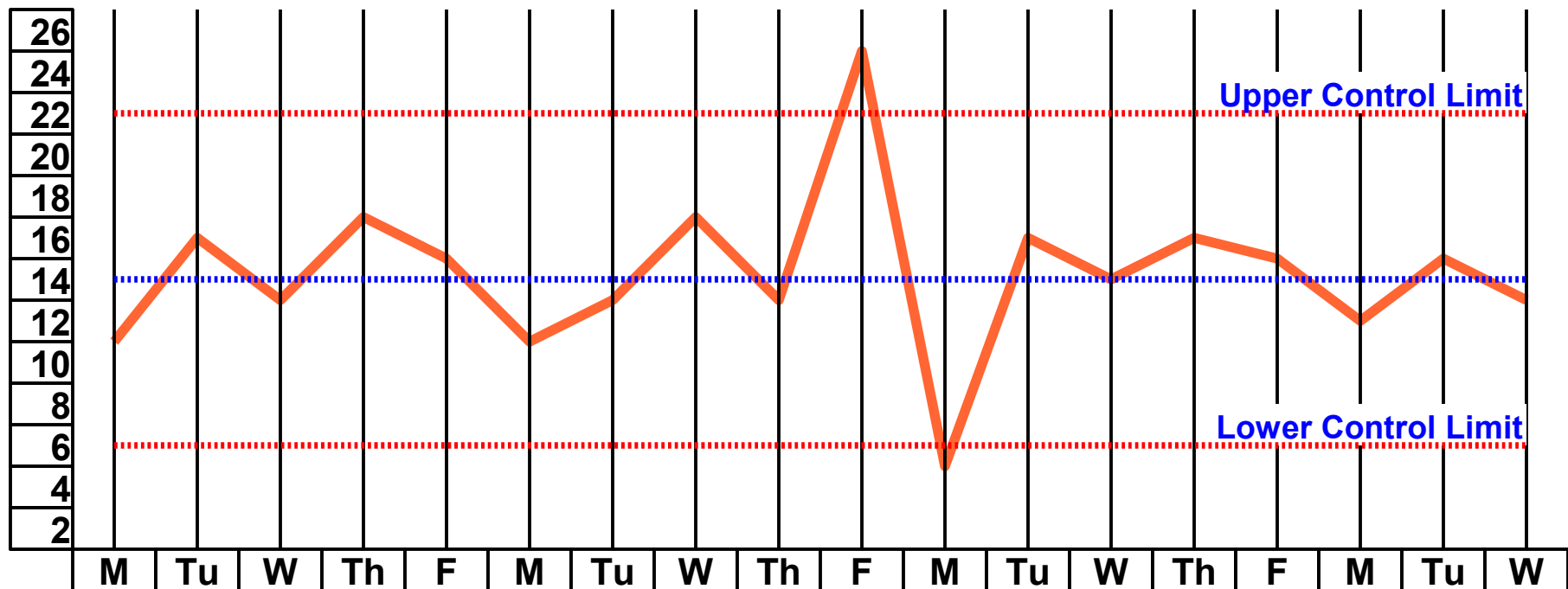
Part Width, Millimeters

Original samples taken to three significant digits

Control Charts

- **Developed by Shewart circa 1920**
- **Measure a quality characteristic relative to established mean**
- **Key indicators:**
 - **Center line, or the mean**
 - **Control limits, upper and lower bounds**
 - **Zones of interest (optional)**
- **Samples over constant time units**
- **Quickly identifies process failures**

Control Chart Example



Lines of Code Changed Over Time

Based on CVS check-in statistics

- **Quality management reduces process variations resulting in defects**
- **Performed either by customer, after work complete, or at entry and exit phase**
- **Statistically relevant data needed to spot problems in advance**
- **Quality documentation comes from manufacturing, but may have application to software projects**