IDMC

Cost of Quality

Part 5

Cost of Quality

Cost of Quality Topics

- Introduction.
- Understanding Quality Cost, Categories and Models.
- Hidden Costs.
- Benefits of a Cost of Quality System.
- Management Reports.

Why Use COQ In Process Improvements

- Most Quality Costs are NOT MEASURED, they are HIDDEN.
- Most Quality Costs captured are caused by upstream process failures.
- Any costs can not be captured effectively unless they are measured and reviewed.

Objectives of A COQ System

- Quantify the Problem in the Language of Management.
- Identify Opportunities for Cost Reduction.
- Reduce Customer Dissatisfaction.
- Expand Budgetary & Cost Controls.
- Stimulate Improvement.

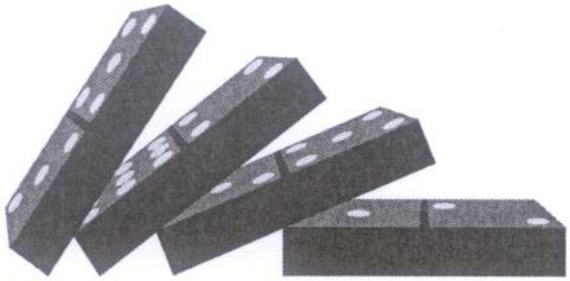
Why Quality Costs and Process Measurements?

- ✓ Evaluation of Business Strategies.
- ✓ Right Size Organization.
- ✓ Identify Key Indices.
- ✓ Focus on Key Business Processes.
- ✓ Better Assess Impact on Organization of Process Changes.

Jim Harrington said this about Cost of Quality

If you do not measure it you cannot control it.

Traditional COQ Categories



- Prevention
- Appraisal
- Failure
  - Internal failure
  - External Failure

Prevention Costs: Costs Designed to Keep Failures from Occurring

- Methods improvements.
- Training.
- Planning.
- Procedures.
- Quality improvement projects.
- Quality reporting.
- Data gathering and analysis.
- Preventive maintenance.
- SPC training costs.
- ISO 9000 training costs.

Appraisal Costs: Costs associated with the measuring, evaluating, or auditing of products or services.

- Inspections
- Process Audits
- Product Audits
- Testing and Test Equipment
- Receiving Inspection and Testing
- Reviews (Meeting Time)
- Data Collection
- Outside Endorsements
- Outside Certifications

Internal Failure Costs: Resulting from products or services not conforming to internal customer requirements.

- Re-work.
- Re-audit.
- Re-test.
- Defects.
- Unscheduled lost time.
- Excess Inventory.
- Obsolescence.
- Scrap.
- White Collar Mistakes.

External Failure Costs: Resulting from products or services not conforming to paying customer requirements.

- Warranty.
- Tech Support.
- Customer Complaints.
- Customer Bad Will.
- Customer Appeasement.
- Lost Business.
- Liability.
- Returns.
- Refunds.

Not Every Activity is a COQ Component

Value added activities are the investment required to produce a product or service. These are not part of the cost of quality.

- Order Entry.
- Sales.
- Purchasing Necessary Goods and Services.
- Standard Production.
- Installing New Service.
- Meeting Contractual Requirements.

Goals of A COQ System

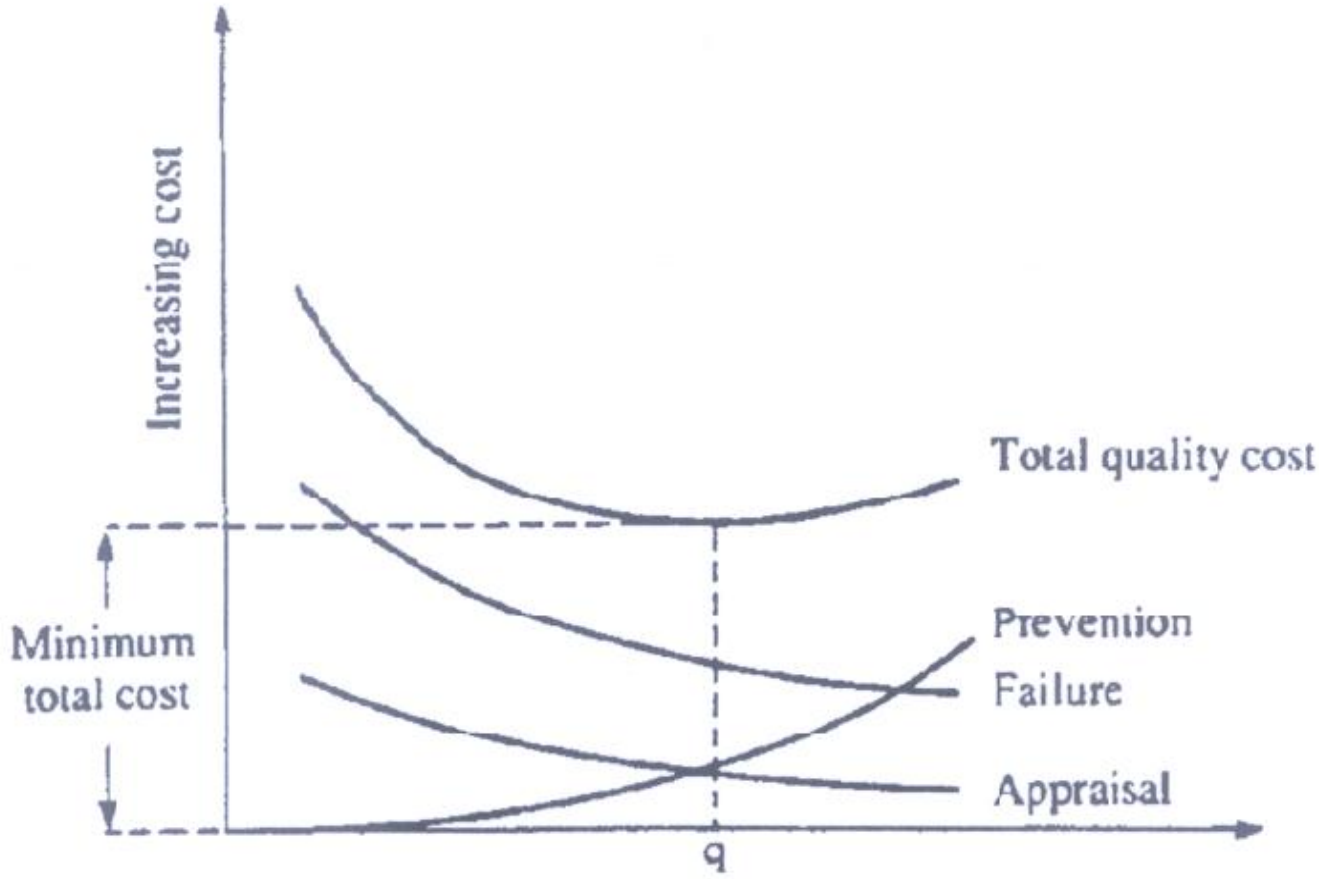
To Facilitate Quality Improvement Efforts that Will Lead to Operating Cost Reduction Opportunities.

Goals of A COQ System

Strategy – COQ Use

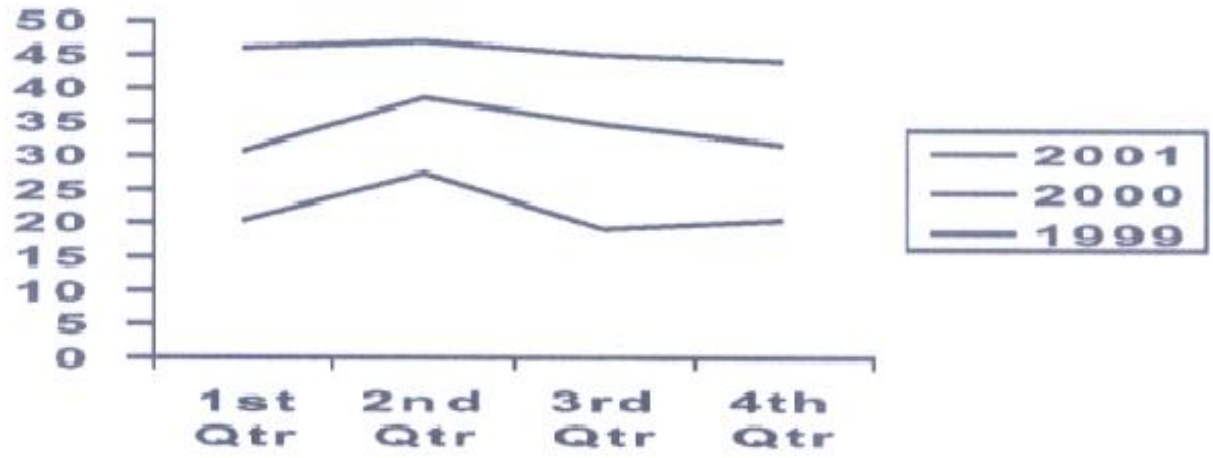
- Take Direct Attack on Failure Costs in an Attempt to Drive Them to Zero.
- Invest in the "Right" Prevention Activities to Bring About Improvement
- Reduce Appraisal Costs According to Results Achieved.
- Continuously Evaluate and Redirect Prevention.

Goals of A COQ System

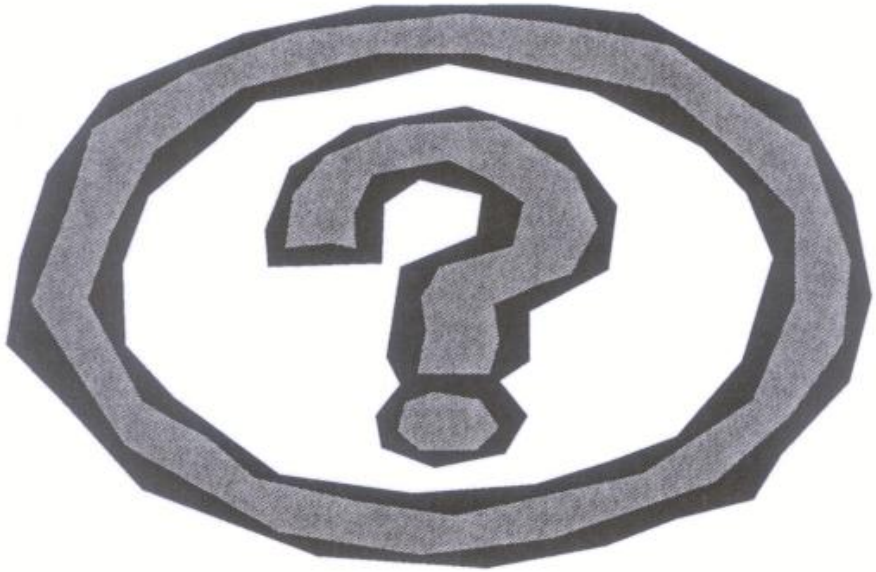


COQ Benefits

The Prime value of a Quality Cost System is in Identifying Opportunities for Improvement and then Providing a Measurement of that Improvement Over Time.



How Large is Your Cost of Quality?



Typical Industry Figures COQ as Percent of Sales

- Manufacturing: 20-30%
- Services: 30-50%
- Software: 40-65%

Harrington's Model

Direct poor-quality cost

A. Controllable poor-quality cost
    1) Prevention cost
    2) Appraisal cost
    3) No-value-added cost
B. Resultant poor-quality cost
    1) Internal error cost
    2) External error cost
C. Equipment poor-quality cost

Indirect poor-quality cost

A. Customer-incurred cost
B. Customer-dissatisfaction cost
C. Lost-opportunity cost
D. Loss-of-reputation cost

Beheiry's Model

1. **Productive activities:** making a product, designing a machine, writing a report, conducting financial analysis, selling a service, etc…… These are our budgeted operating costs.

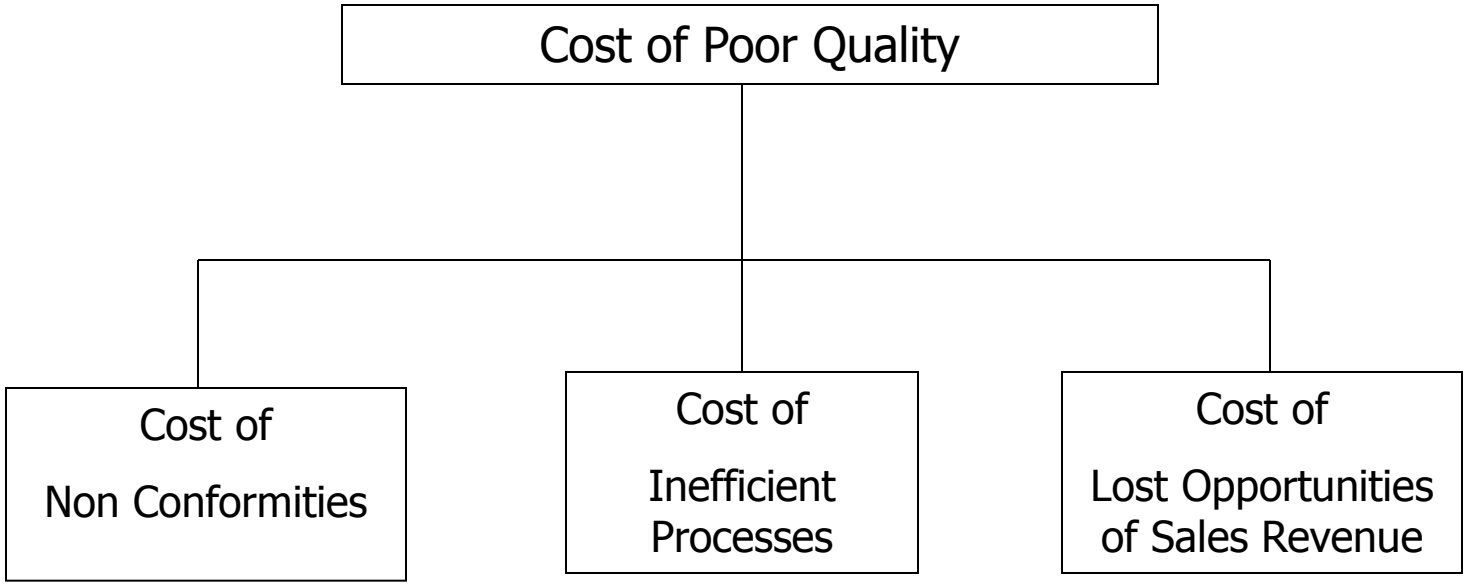
Beheiry's Model

2. **Preventive activities:** making sure that our processes and procedures will lead to the desired results (conformance to requirements) every time without breakdown. These activities would include such things as preventive maintenance, quality education and training, process proving, procedure verification, customer-orientation training, design review, etc.

Beheiry's Model

3. **Corrective activities:** finding where we went wrong (inspection after the fact) and then correcting the nonconformance (defect). This could include reworking or reprocessing a transaction, or if not possible, scrapping the old product/service and redoing the whole operation. Also, expediting the output to meet deadline requirements, computer reruns, excess inventories, downtime,service after service, warranty activities, obsolete material disposal, etc.

Gryna's Model



Wilson's Model

Non Conformance. This area covers the price paid by not having quality product.

Examples of this are:

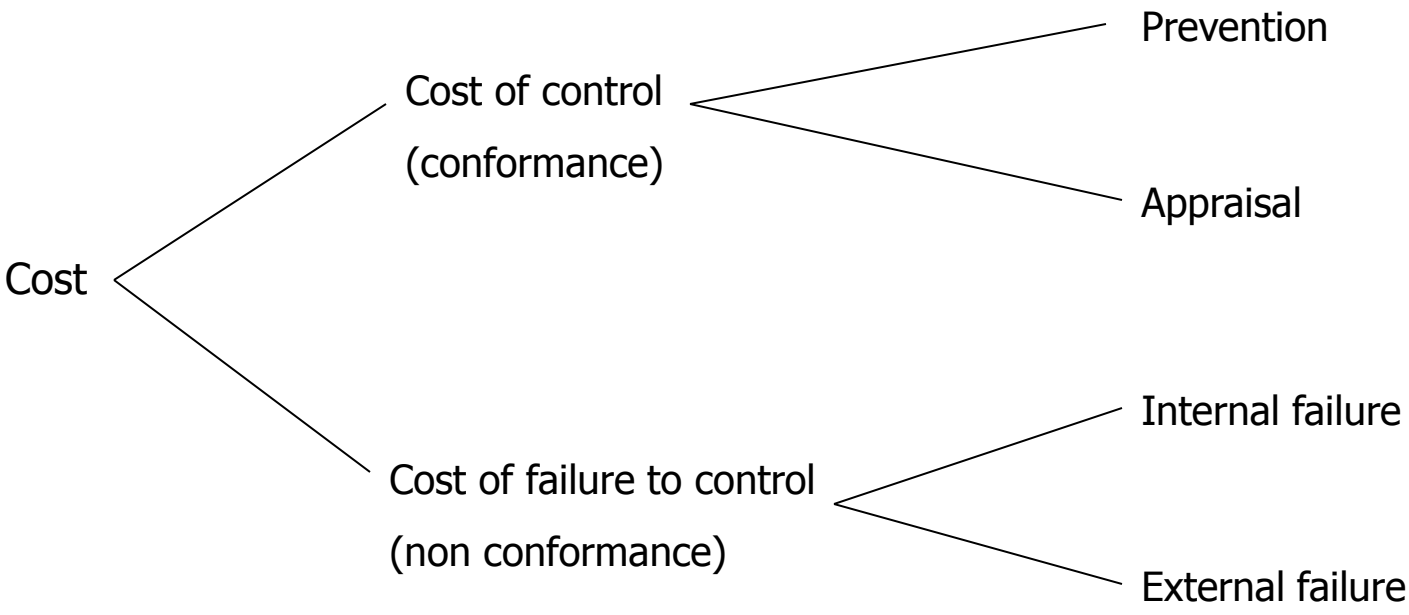
1) Rework. Doing the job over again because it wasn't right the first time.
2) Scrap. Throwing away the results of your work because it is not up to the required standard.
3) Waiting. Time wasted whilst waiting for other people.
4) Down Time. Not being able to do your job because a machine is broken.

Wilson's Model

Conformance. Conformance is an aim of quality assurance. This aim is achieved at a price. Examples of this are:

1) Documentation. Writing work instructions, technical instructions and producing paperwork.
2) Training. On the job training, quality training, etc.
3) Auditing. Internal, external and extrinsic.
4) Planning. Prevention, do the right thing first time and poka yoke.
5) Inspection. Vehicles, equipment, buildings and people.

Wilson's Model



Hidden Costs

A seemingly innocuous defect is traced through the manufacturing process at a window plant. At each point, the costs of wasted time and materials are calculated.

This cases study illustrates the hidden costs of poor quality and the ***Cost of Confusion*** *that results.*

Hidden Costs

	Activity	Costs $
1	The extrusion department makes 100 pounds of C-80019 extrusion that is defective. One flange is bent slightly inward. The defect is not detected. At this point, the extrusion has cost $1.16/lb.	$116.00
2	The extrusion moves through several additional processes including paint. It is stored, handled, and records are kept. The additional cost is $0.19/lb.	$ 19.00
3	An operator sets up a punch press to notch the ends. The setup requires 0.5 Hours @ $11.75/Hr	$ 5.88

Hidden Costs

4	An operator attempts to notch the extrusions. The bent flange prevents entry into the punch die. The operator calls for a supervisor and waits for 15 minutes. Operator cost is $11.75/Hr.	
5	Supervisor arrives. Operator and supervisor attempt to process the parts without success. Supervisor calls Diemaker. Both wait for arrival of diemaker. Total time is 20 minutes. Supervisor's time costs $14.75/Hr.	
6	Supervisor, Operator, and Diemaker discuss the problem and attempt to process without success. They decide to grind out the die so the extrusion with the bent flange will fit into it. All three work to remove the die and take it to the die shop. Total time required is 1.0 Hours. Diemaker's cost is $13.50/Hr.	

Hidden Costs

7	Diemaker grinds out die, returns to press and sets up the press. Total time 3.4 hrs.	$ 45.90
8	Diemaker, Operator, and Supervisor assemble to determine status. The operations seems to work. Diemaker and Supervisor go on to other activities. Operator prepares to process parts. Total time required 17.0 minutes.	$ 11.33
8 A	Scheduler spends 1.5 Hrs @ $15.75/Hr to change schedule and advise customers of change.	$ 23.63
9	Operator processes parts and carries them to the Assembly Department. Total time for the lot of 100-lb of parts is 50.0 minutes.	$ 9.79
10	Assembly builds windows with the defective parts. Many windows do not operate properly because of the bent flange. Assemblers spent 4.2 extra man-hrs attempting to make the windows operate. Assembler time costs $10.50/hr.	$ 44.10

Hidden Costs

11	An Inspector notices that some windows are difficult to operate. She confers with Assembler for 15.0 minutes and decides to call the Inspection Supervisor. Inspector rate is $12.75/Hr and Inspection Supervisor is $17.25/Hr.	$ 5.81
12	The Inspection Supervisor arrives and the Assembly Supervisor comes to see what the problem is. Four persons meet on this problem for 13.0 minutes and decide to call the Engineer. All wait for an additional 11.0 minutes until the Engineer arrives.	$ 21.28
13	The Engineer, Inspection Supervisor, Assembly Supervisor, Assembler, and Inspector confer for 25.0 minutes and determine a way to fix the problem. All then depart to other activities. The Engineer's time costs $26.75/Hr.	$ 34.27
13 A	Inspector documents event for 25 minutes.	$ 5.31
14	Assembler works for 3.9 hours to repair windows and then sends them to shipping and eventually to the customer.	$ 40.95

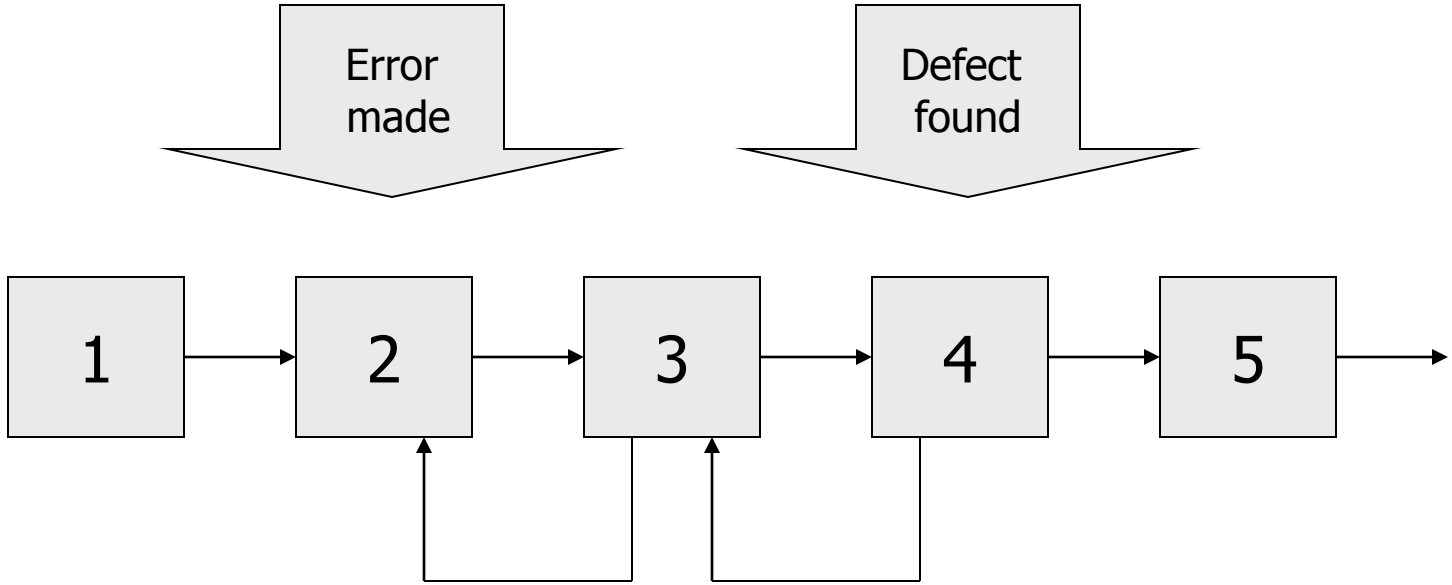
Hidden Costs

15	After 2 weeks, customer calls. Some of the windows worked OK until they were installed. Then the bent flanges caused additional problems. Customer requests a Field Service Engineer to fix the problems. Engineer spends 35 minutes.	$ 15.60
16	After many phone calls, it is decided to send a Field Service Engineer to the construction site. Times involved in making this decision: Engineer .....3.75 Hrs @ $26.75/Hr QA Supervisor.....1.75 Hrs @ $17.25/Hr Plant Manager.....1.75 Hrs @ $52.00/Hr Field Engineer.....1.60 Hrs @ $17.00/Hr	$248.70
17	Field Service Engineer spends 37.0 Hrs in travel to site, fixing problems, and reporting. In addition, Engineer spends 1.6 Hrs on the problem. The Sales Manager spends 3.4 Hrs @ $48.00/Hr. Travel costs $987.	$ 1822.00
18	Weeks later, the same part is run again. It is found that the die can no longer run parts that are in spec because it has been "relieved" too much. A similar chain of events occurs. Time required: Diemaker.....8.0 Hrs Supervisor .....0.5 Hrs Operator.....2.0 Hrs Engineer.....0.7 Hrs Inspector.....0.9 Hrs	$169.08
	Scrap Value @ $0.17/lb	$ -17.00
Cost of Original Error...$135.00 **Total Cost of Error.....$2673.31**		

COQ & Hidden Costs

- Hidden costs are Intangible Costs.
- **What you see is only part of what you have.**
- You must look below the surface for process savings.

COQ & Hidden Costs



The Total Quality Cost Impact

Must be Summed

What you See is only Part of What you Have

- Above the Surface
  - Scrap
  - Rework
  - Repair
  - Inspection
  - Test
- Below the Surface
  - Warranty and Recalls
  - Returns
  - Complaints
  - Corrective Action
  - Turnover
  - Injuries
  - Billing Errors
  - Shipping Costs
  - Material Delays

Workshop
Hidden Quality Costs

Background

Assume your workgroup is the Human Resources Department. Your quality requirements is to have zero turn over of personnel during the year.

In March a R&D engineer responsible for the design of the ABC product line resigns, feeling frustrated because marketing has constantly changed their design requirements. He must be replaced with an outside individual immediately, due to project scheduling.

Assignment

Please identify in the following format the tasks/impacts and the quality costs associated with replacing the R&D engineer.

Look at the quality costs on a company wide basis.

You have creative freedom. Make any realistic assumptions.