Spend Analysis and Specification Development Using Failure Interpretation

By Michael D. Holloway


6 11:43PM

1982…

Why Do You Buy What You Buy?

Price

Sales Representative or Distributor Relationship

Performance

Vendor Reputation

Added Services

Flexible Billing Terms

Quality

Delivery

Technical Support

EASE OF PURCHASING

Now Force Rank Why Do You Buy What You Buy. (no ties)

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Sales Representative or Distributor Relationship

Performance

Vendor Reputation

Added Services

Flexible Billing Terms

Quality

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Technical Support

EASE OF PURCHASING

Results of over 300 people polled (from Laborers to CEO's), They Ranked the Following:

Rank	Criteria
1	Performance – the product exceeds the required criteria compared to other offerings
2	Quality – the product performs consistently according to a required level of performance
3	Sales Representative or Distributor Relationship
4	Vendor Reputation
5	Technical Support
6	Price – a product is offered up at the lowest price
7	Ease of Purchasing – online catalogue available
8	Added Services – analysis, dashboards, seminars, customized solutions
9	Flexible Billing Terms
10	Delivery – Same day or next day

Results of over 300 people polled (from laborers to CEO's)

Rank	Criteria
1	Performance – the product exceeds the [illegible] criteria compared to other offerings
2	Quality – the product performs consistently according to a required level of performance
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83% Answered The Same!

Interesting Note

Salesmen and Purchasing Agents Ranked PRICE as the #1 Reason to Buy!

Hmmmmmm…..

What is Value?

$$\frac{\text{Performance (Function)}}{\text{Cost (to use)}} = \text{Value}$$

What Increases Value?

$$\frac{\text{Increasing Performance (Function)}}{\text{Decreasing Cost (to use)}} = \text{Increases Value}$$

What Reduces Value?

$$\frac{\text{Decreased Performance (Function)}}{\text{Increased Cost (to use)}} = \text{Decreases Value}$$

Define Performance

Far exceeds a level of expectation deemed as status quo…

GIORGIO ARMANI

Ferrari

Define Quality

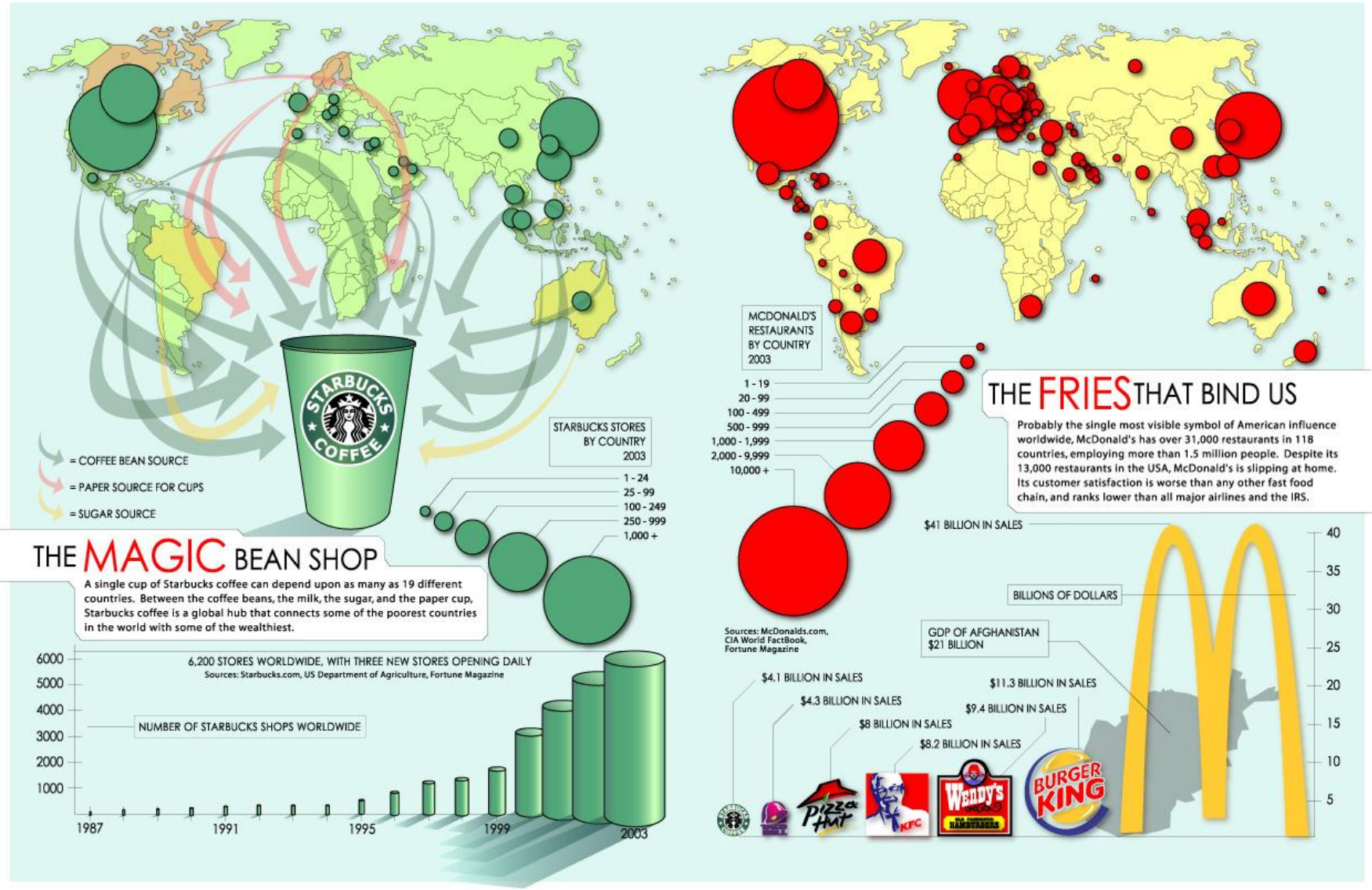
Product consistency according to a required level of performance…

HONDA

Snap-on®

Quality

Product consistency where ever you go…



Can You Have Both Performance & Quality?

ROLEX

PORSCHE

Brooks Brothers

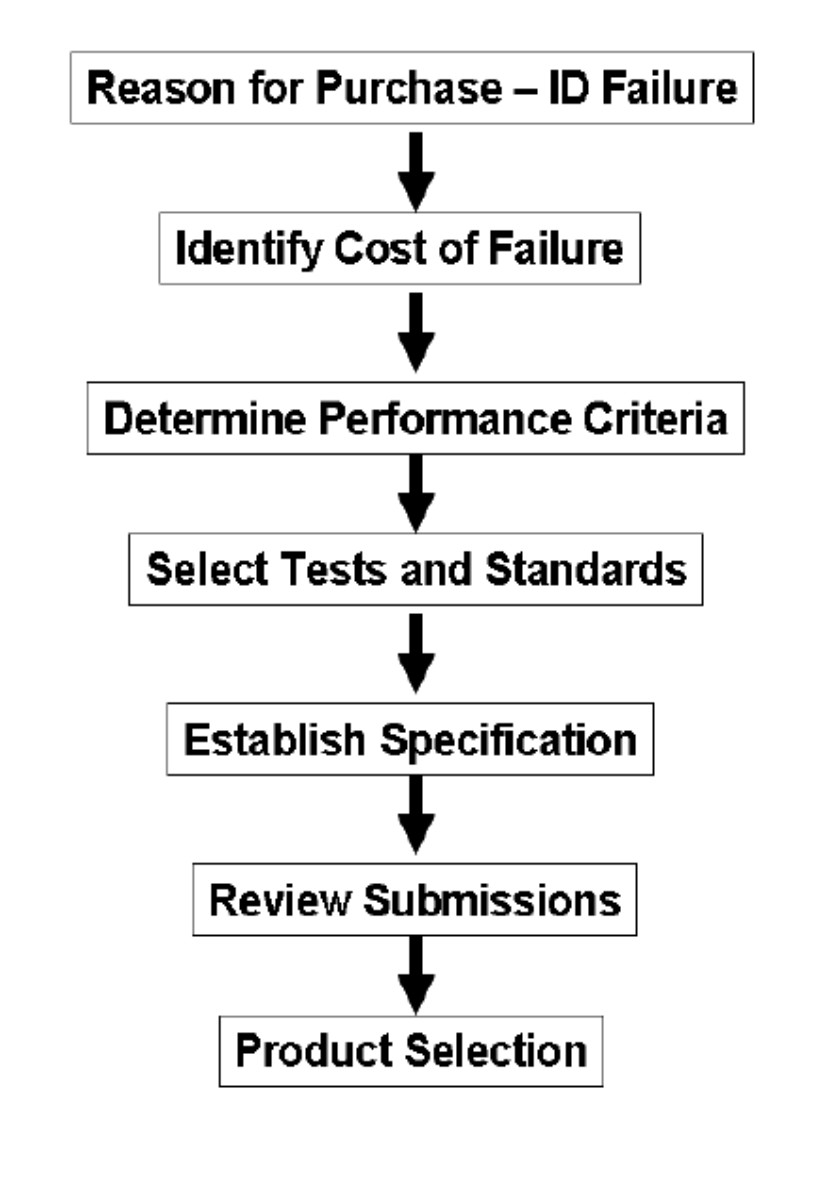
Smart Buying,
What Is It Going To Take?

Understand What Is Costing So Much!

What is the Cost of Failure?

What is the Price of Success?

A Proven Process to Save on Spending…



"Its an Excuse to do the Right Thing!"

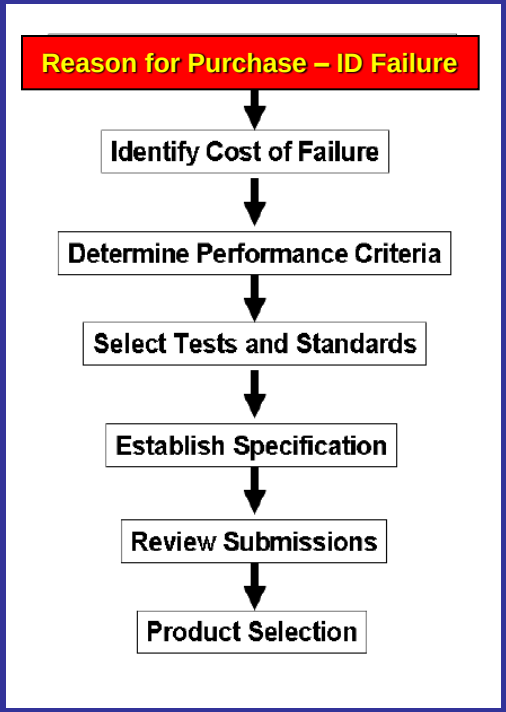
Spend Analysis & Specification Development

Reason for Purchase

To Replace, Replenish for

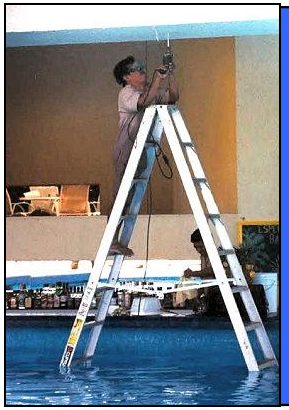
- **Safety**
- **Save Time & Labor**
- **Save on Costs**
- **Cosmetic & Design**
- **Internal / External**

What Did Failure Tell You???



Reasons for Failure

Methods



Man

Machine

Materials

Common Dynamics of Failure…

Change
- *Deformation*
- Wear
- Fracture
- Molecular Transitions

Influence
- Force
- Temperature
- Time
- Chemical

You Would Think Its Just Materials, Actually It Could Be All 4!

Cadence
- *Steady*
- Random
- Cyclic

Articulation
- Amplitude
- Frequency

Affect
- Inside to Out
- Outside to In
- All At Once

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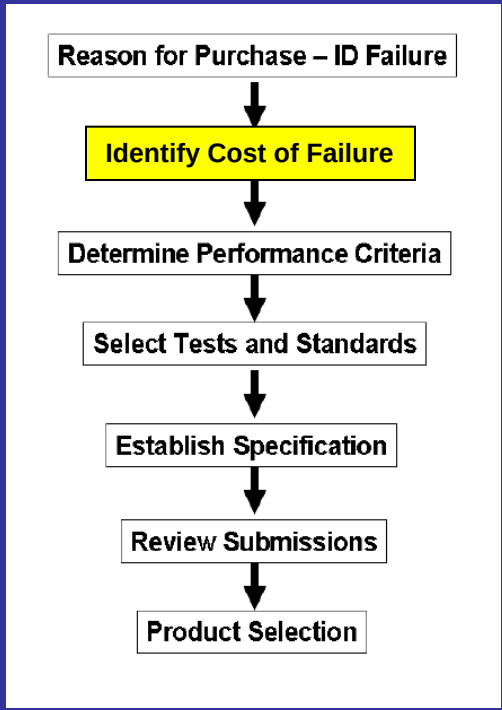
Identify Cost of Failure

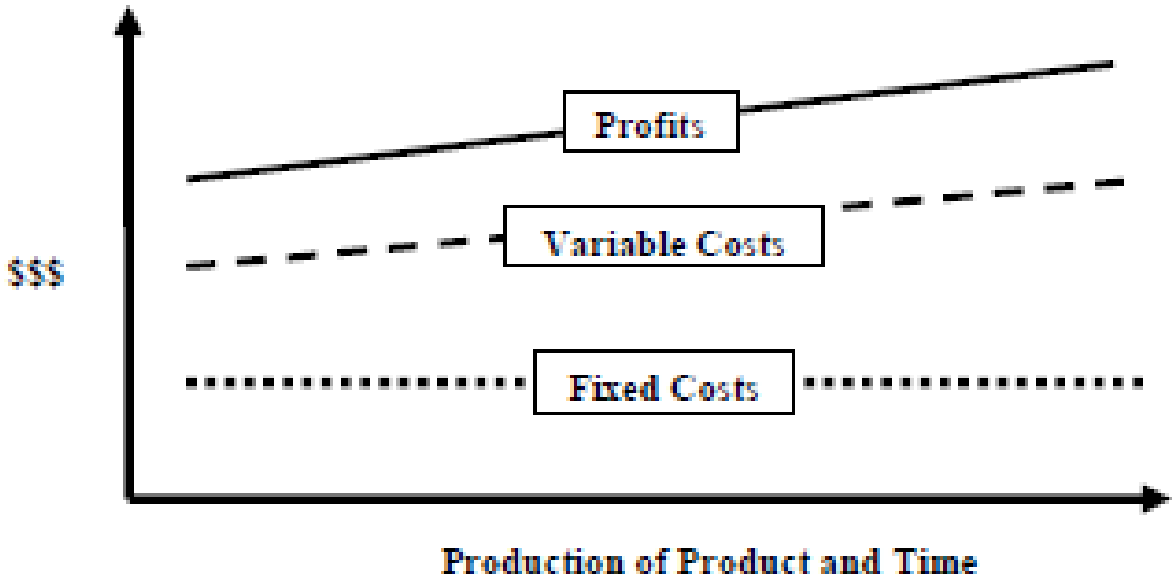
Basic Costs…

- **Direct**
- **Indirect**
- **Fixed**
- **Variable**



What Did Failure Tell You???

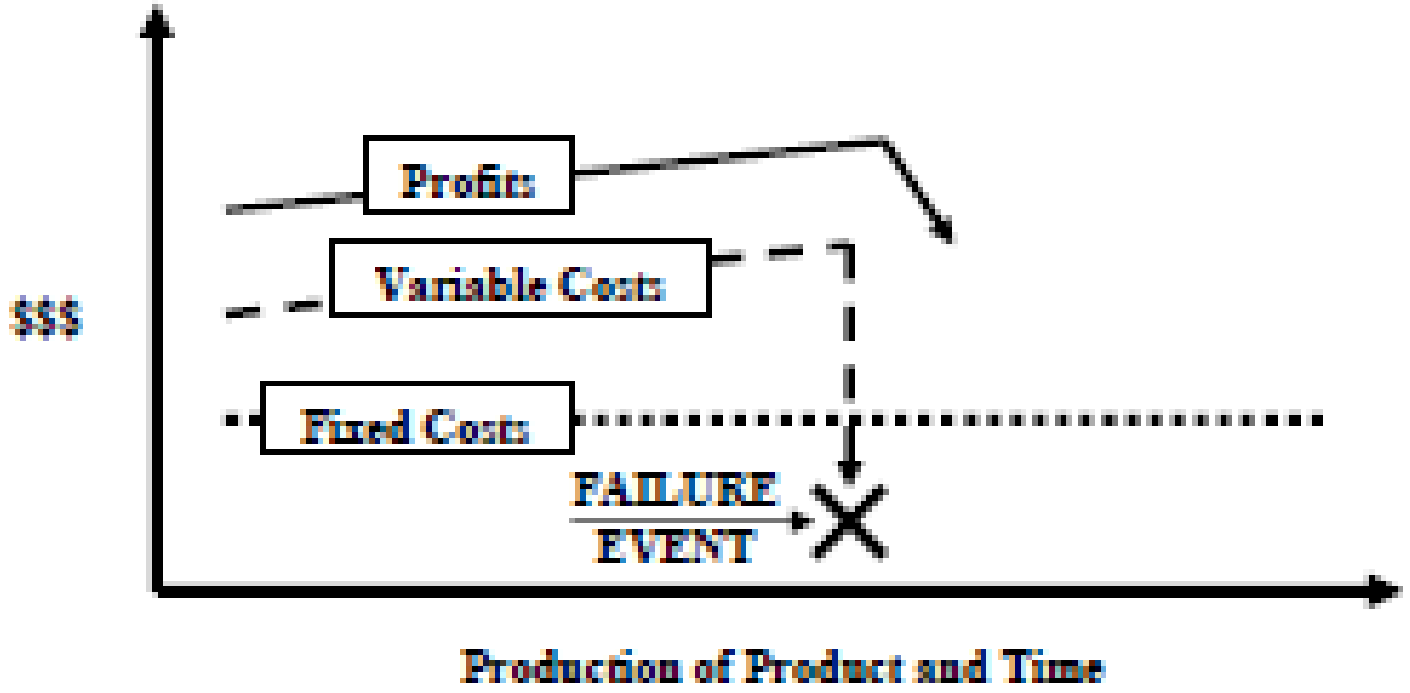
Cost of Value – Cost of Failure



What are some examples of your fixed and variable costs?

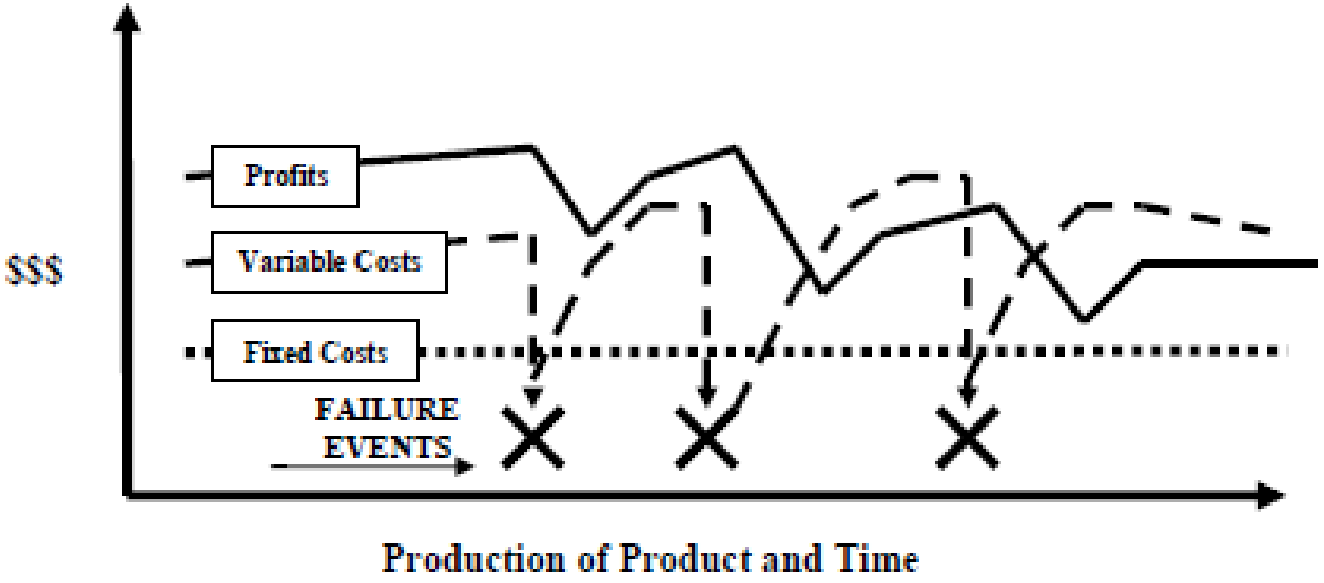
Cost of Value – Cost of Failure

Failure Event Occurs



Cost of Value – Cost of Failure

Multiple Failure Events Occur
Major Influence on Profits



Establish What To Fix First…

Examine the Data, Requires Time on the Floor

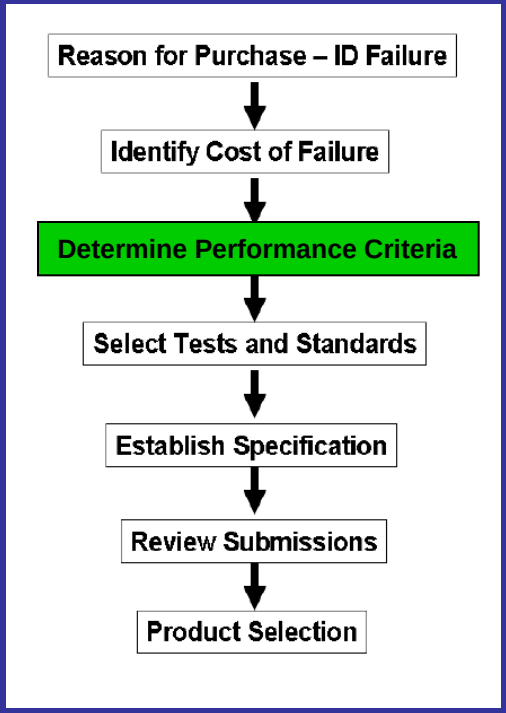
Incident and Reason	Frequency	Item/Part & Cost	Downtime Cost	Labor Costs	Additional Costs	Total Cost of Failure A*(B+C+D+E) = TCF
Bearing Failure on Rollers due to Premature Bearings Wear	96	$220 for bearing	4 hours at $1000/hr = $4000 for each failure	4 labor hrs at $78/hr = $312 for each Failure	Mis-Shipment fines of $7,045 Annually	96 * ($220 + $4,000 + $312) + $7,045 = $442,117
Hydraulic Pump Failure from Contamination – Poor Filters Used	4	$3700 for Pump $25 for Filter	8 hours at $1,000/hr = $8,000 for each failure	16 labor hours (2 man) at $78/hr = $1,248 for each failure	50gl of hydraulic oil = $900 ($18/gal) for each Failure	4 * ($3,725 + $8,000 + $1,248 + $900) = $55,492
Sensor Mis-reads due to Wire Fry	129	$7 for wire	1 hour at $1,000/hr	½ hr at $128/hr (electrician rate – billed for 1 hour)	$1,000,000 electrocution lawsuit settlement	129 * ($7 + $1,000 + $128) + $1,000,000 = $1,146,415
Blower Fan Motor Burn-out	52	$387 for motor	2 hour at $1000/hr = $2,000	2 hrs at $128/hr (electrician rate) = $256	$89,937 in Product Spoilage	52 * ($387 + $2,000 + $256) + $89,937 = $227,373

Spend Analysis & Specification Development

Determine Performance Criteria

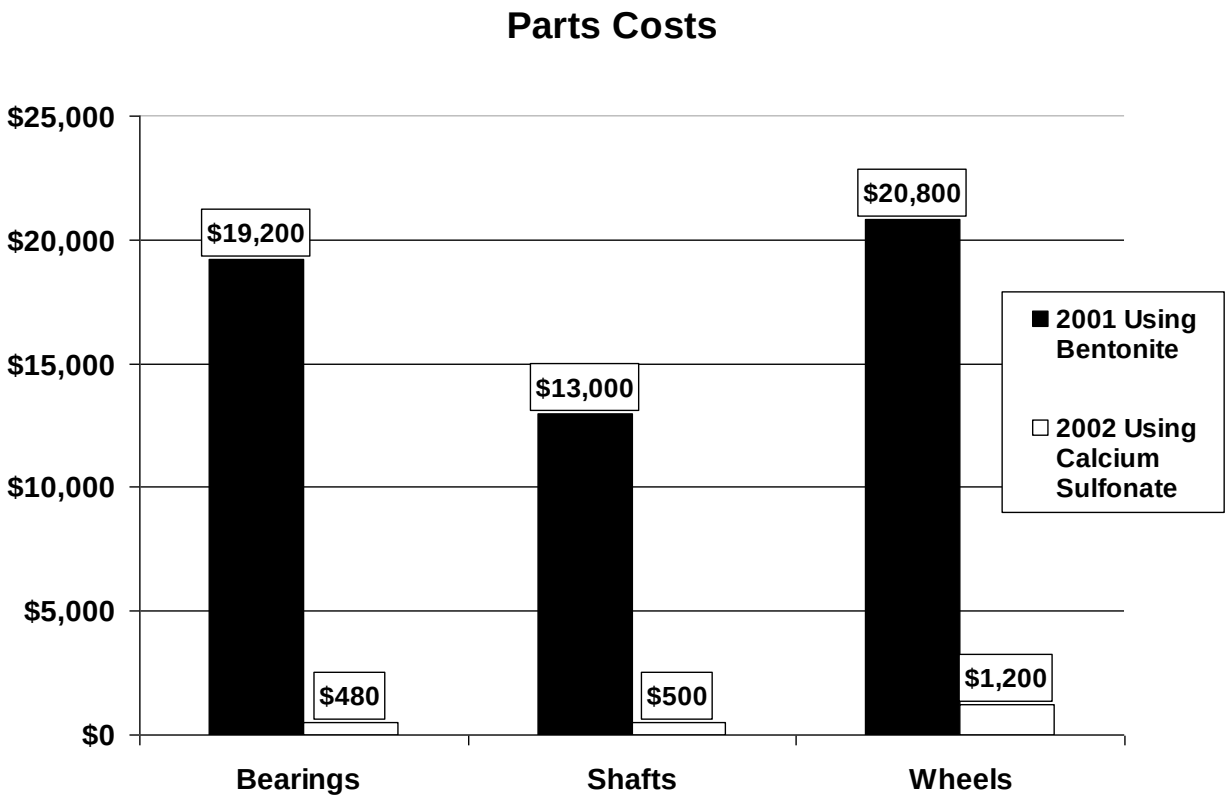
- **List Requirements**
- **Rank Requirement**
- **List Properties**
- **Correlate Properties**

What did Failure Tell You???



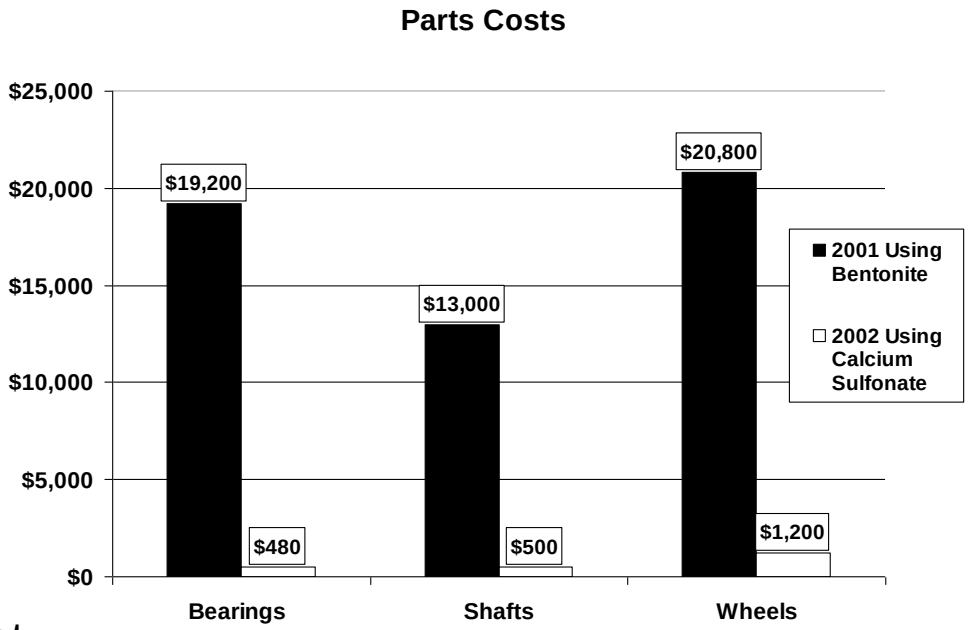
Example – Buying to Save, But Spending More?

Needed A Grease to Hold Up To Heat & Load



Results:	**2001**	**2002**
Bearing Replacements	$19,200.00	$480.00
Reworked Shafts ($250 ea.)	$13,000.00	$500.00
Kiln Car Wheels Reworked	$20,800.00	$1,200.00
Grease Usage (120# kegs)	59	34

Real World Example – Buying to Save



Grease Cost
2001 = $21,240 (7,080lb used at $3.00/lb)
2002 = $29,416 (4,080lb used at **$7.21/lb**)

Savings in Grease = **-$8,176 No Savings On Grease!**
Savings in Parts = **$42,644**
(Parts Alone $50,820 from $53,000 in 2001 to $2,180 in 2002)

Downtime & Labor…

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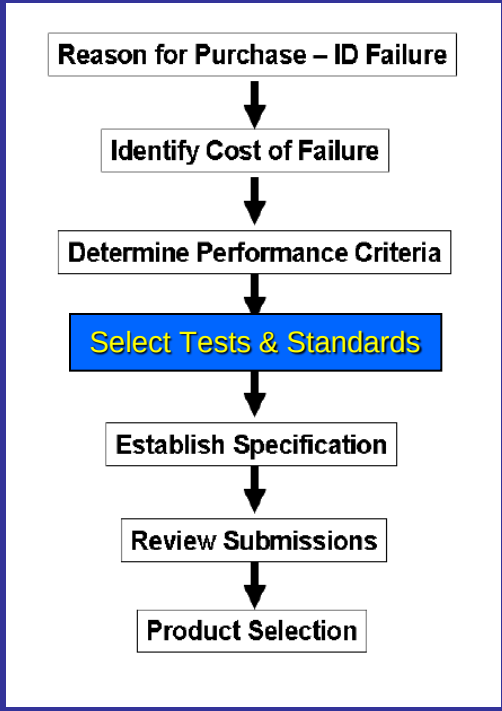
Select Tests & Standards

From Failure Modes, Use…

- **ASTM**
- **ASME**
- **Case Studies**
- **In-House Work**

What Did Failure Tell You???

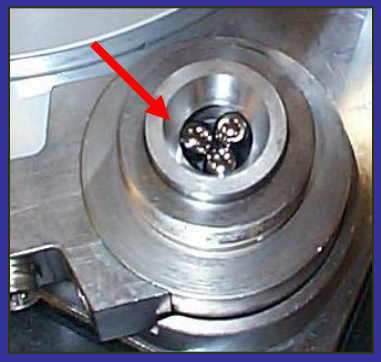


Property	*Test Method*	Description	Test Result Values
Shear Stability	ASTM D 217	Multistroke penetration	The lower the % change in the number, the more mechanically stable the grease
	ASTM D 1831	Roll stability	The lower the % change in the number, the more mechanically stable the grease
	ASTM D 1263	Wheel bearing leakage	Measures % loss in a wheel bearing application. The lower the number the better, above 5% will cause brake problems.
Oxidation Resistance	ASTM D 942	Bomb oxidation	Measures the oxidative life of the grease. The lower the % the better the oxidation resistance.
	ASTM D 3527	Wheel bearing life	The higher the hours, the longer the grease will last in high-temperature applications.
	ASTM D 3336	High-temperature performance	The higher the temperature, the better the grease will perform at high temperatures
Water Resistance	ASTM D 1264	Water washout	The lower the %, the less likely it will wash out
	ASTM D 4049	Water spray-off	The lower the %, the less likely it will wash out
Bleed Resistance	FTM 321.3	Oil separation (static)	Measures the % oil that may separate during storage and idle time.
	ASTM D 1742	Pressure Oil separation	Measures % oil that will separate when grease is under load.
Extreme Pressure / Antiwear	ASTM D 2596	Four-ball	Point contact, similar to ball bearings; the higher the number the greater load carrying.
	ASTM D 2509	Timken method	Line contact, similar to roller bearings; the higher the number the greater load carrying.
	ASTM D 2266	Four-ball (wear scar)	The lower the number, the more protection
Corrosion	ASTM D 1743	Rust test	Determines how well the grease keeps water and corrosives away from the metal surface. Static test.
	—	Emcor	Determines how well the grease keeps water and corrosives away from the metal surface. Dynamic test
	ASTM D 130	Copper corrosion	1A is the best rating, most are 1B, measures ability to protect yellow metals.
Pumpability	ASTM D 4693	Low-temperature torque	Measures the effort required to move the grease in a bearing at low temperatures. The lower the number the better.
	US Steel LT37	Mobility	Measures the grease flow at a given temperature at 150 psig. The higher the number the better; critical is 2 grams per minute.
Identification & Quality Control	ASTM D 2265	Dropping point	Measure the temperature the soap melts, used to help determine the upper usable temperature range.

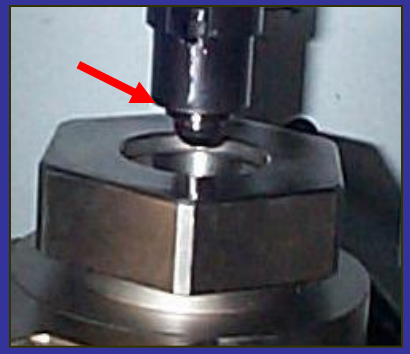
From Performance Criteria

Failure Mode	Selected ASTM Standard	Synthetic Bentonite	Calcium Sulfonate
Lack of extreme load handling of grease	4-ball Weld ASTM D 2596	380	1000
Lack of oxidation resistance of the grease	Bomb Oxidation ASTM D 942	12	<1

4-Ball Weld / Wear



Test Balls in Fixture



Forth Ball in Chuck

Bomb Oxidation

Samples Rack

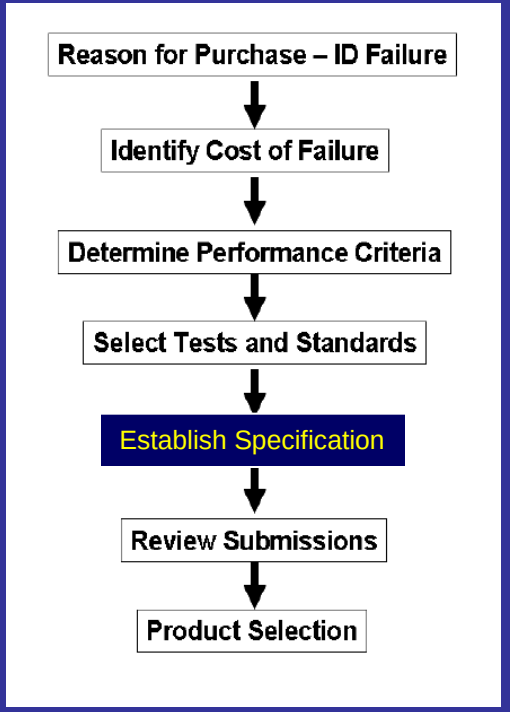
Chamber or "bomb"

Spend Analysis & Specification Development

Establish Specification

- **Product Performance**
- **Terms and Conditions**
- **Contractual Obligations**
- **Requirements of Reply**
- **Evaluation Process**
- **Selection Process**

What Did Failure Tell You???



Elements of the Procurement Specification

Introduction

- The Scope of the Requirement
- The Definition of the Product
- Functional and Data Standards Sited

Product Requirements

- Look and Feel Requirements
- Usability Requirements
- Performance Requirements
- Operational and Environmental Requirements
- Maintainability and Support Requirements
- Security Requirements
- Legal Requirements

Procurement Requirements

- Packaging Requirements
- Shipping Costs and Requirements
- Product Costs
- Documentation and Training Requirements
- Re-ordering Requirements

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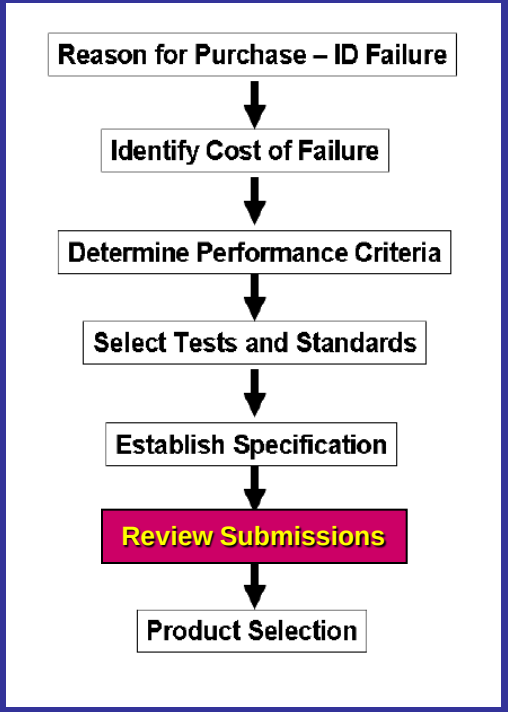
Review Submissions

List and Rank

- **Performance**
- **Responses**
- **Set-Up Case Study**

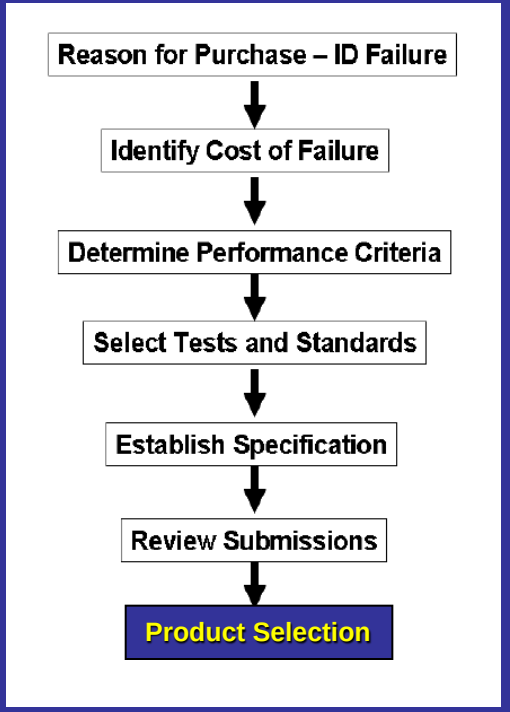


What Did Failure Tell You???

Spend Analysis & Specification Development

Product Selection

- **Submission Review**
- **Review Approval**
- **Notify Successful and Unsuccessful Candidates**
- **Audits**



What Did Failure Tell You???

Changing One Item Saved…

Cascade Steel - $125,000
Pilgrims Pride - $147,500
American Protein - $89,000
Westerville City School - $16,529
Lancaster ISD - $9.756
Hanson Brick - $65,873
INCO - $8,000,000
CC&V Gold - $838,500
Lafarge - $9,245
Dixie Pellet - $120,650
RFC - $24,341
Rubbermaid - $68,282
3Form, Steel - $210,420
Guardian Glass - $76,205
John Morell Pork - $39,837

Nestle - $87,376
Ohio Transport - $28,764
Fort Bend County - $97,750
Manfort Brothers - $251,487
Divide Oil – $171,937
City of El Dorado - $28,980
Buckeye - $38,597
East Texas Medical - $78,730
Frac Tech - $30,040,000
AllStar Fleet - $49,780
Lexington Transit - $454,760
Lindy Paving - $12,875
Bonneville Transloader - $148,420
Schultz Brothers Trucking - $184,450
A&A Trucking - $282,340

Last Question…

Would it be OK for the amusement park maintenance department to buy the cheapest bolts?

Repeating the Same Practices Ensures The Same Results…

Questions?

Thank You