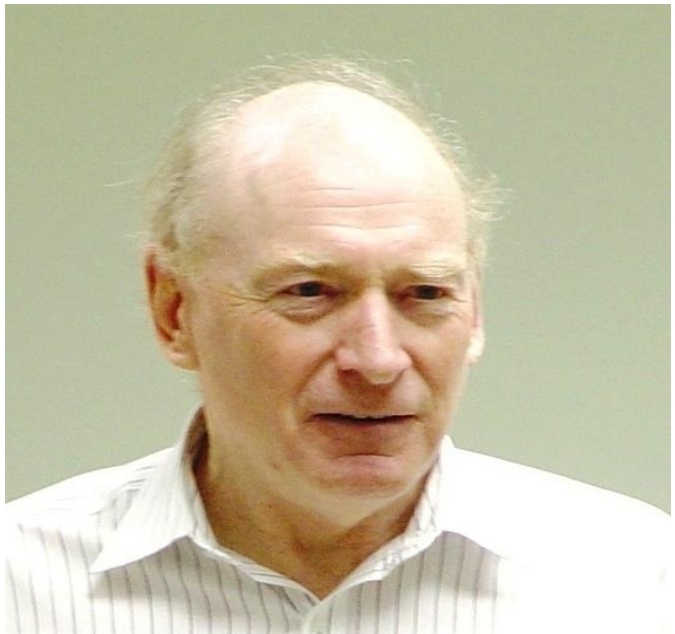
DataTrak Systems Inc – in association with PAMCo

Financial Management in Maintenance
January 2019



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The Objective of Maintenance?

? ? ? ? ? ? ? ?

- Reliability – Availability – Maintainability?

- To add value to the Organization

Value is measured by Financial KPI's:
= Higher Profit + Higher Cash Flow + Higher ROI
+ Higher Shareholder Returns + Higher Asset Retained Value

Profit

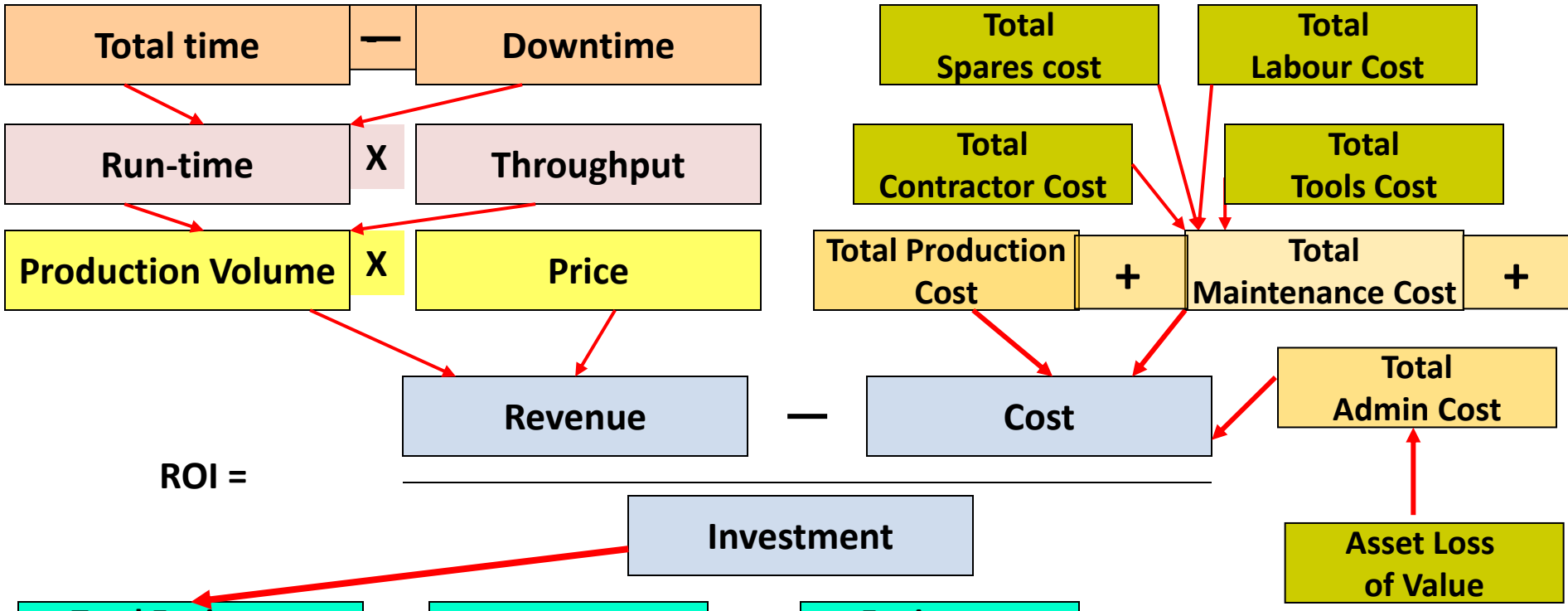
- Profit = Revenues — Costs

Short term – we can live with a negative Profit (=Loss), but ….

GOLDEN RULE #1

1. Profit can be negative only for a short period and
2. Only if we can show how we will make a profit in the future

ROI



Total Equipment Value	=	Equipment Cost	—	Equipment Deterioration		
Total Building Value	=	Building Cost	—	Building Deterioration		
Total Land Value	=	Land Cost	—	Land Deterioration		
Total Inventory Value	=	Total Operations Materials Value	+	Total Stores Value	+	Total Tools Value

What Happens IF????

Show the impact as ++ = or --

		Revenue	Cost	Investment	ROI
1	**You install new production equipment**				
2	**You install new environmental protection equipment**				
3	**You prevent a breakdown**				
4	**You incur a breakdown**				
5	**You increase your PM Program**				
6	**You decide to outsource your maintenance**				
7	**You improve your Spare Parts Management**				

ROI

1. Current and Future ROI are the most important indicators of business success
2. Positive ROI provides cash for future investment and future growth
3. ROI is very flexible – month – quarter – year – long term project; asset – project - division – plant – company

Golden Rule #2

1. ROI of new investment must > current overall business ROI
2. ROI of new Maintenance Projects must > competing investment proposals

3. Cash Flow

- The excess or deficit of cash received over cash paid out for a period or for a project

Cash Flow = Payments received from customers — Payments to staff and suppliers for operations — Payments to suppliers for capital investments

Golden Rule #3

Without positive Cash Flow…

-We can't pay employees

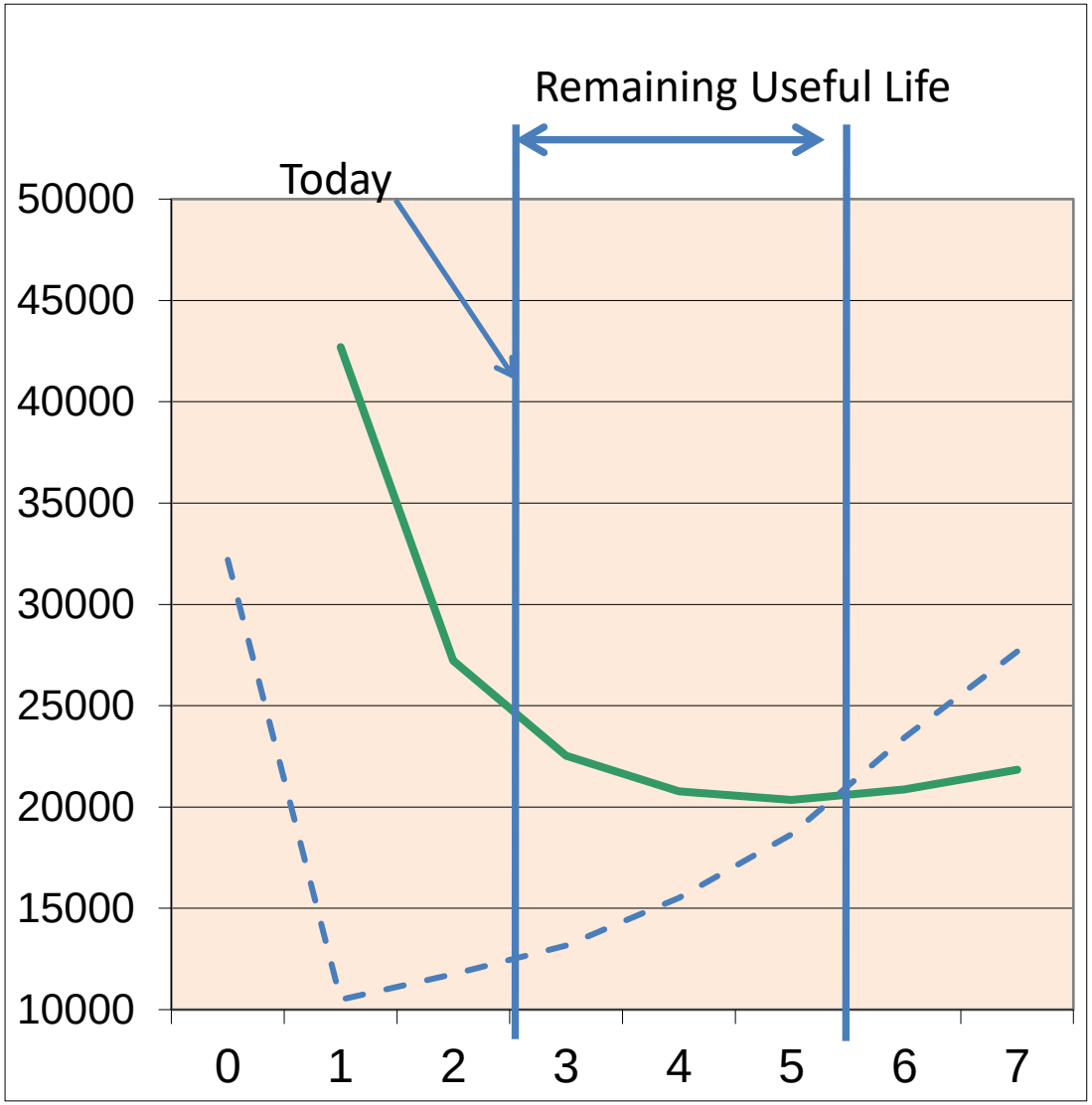
- we can't pay suppliers and contractors

- we can't pay taxes

- So we very quickly go out of business

4. Life Cycle Costing

1. Includes all Costs from Design to Disposal
3. Provides optimum asset replacement time
4. Provides the basis of comparison with alternative assets, asset management strategies



Golden Rule #4

In Life Cycle Costing, Focus on minimizing the lifetime cost per unit of output

Cost Reporting & Budgeting

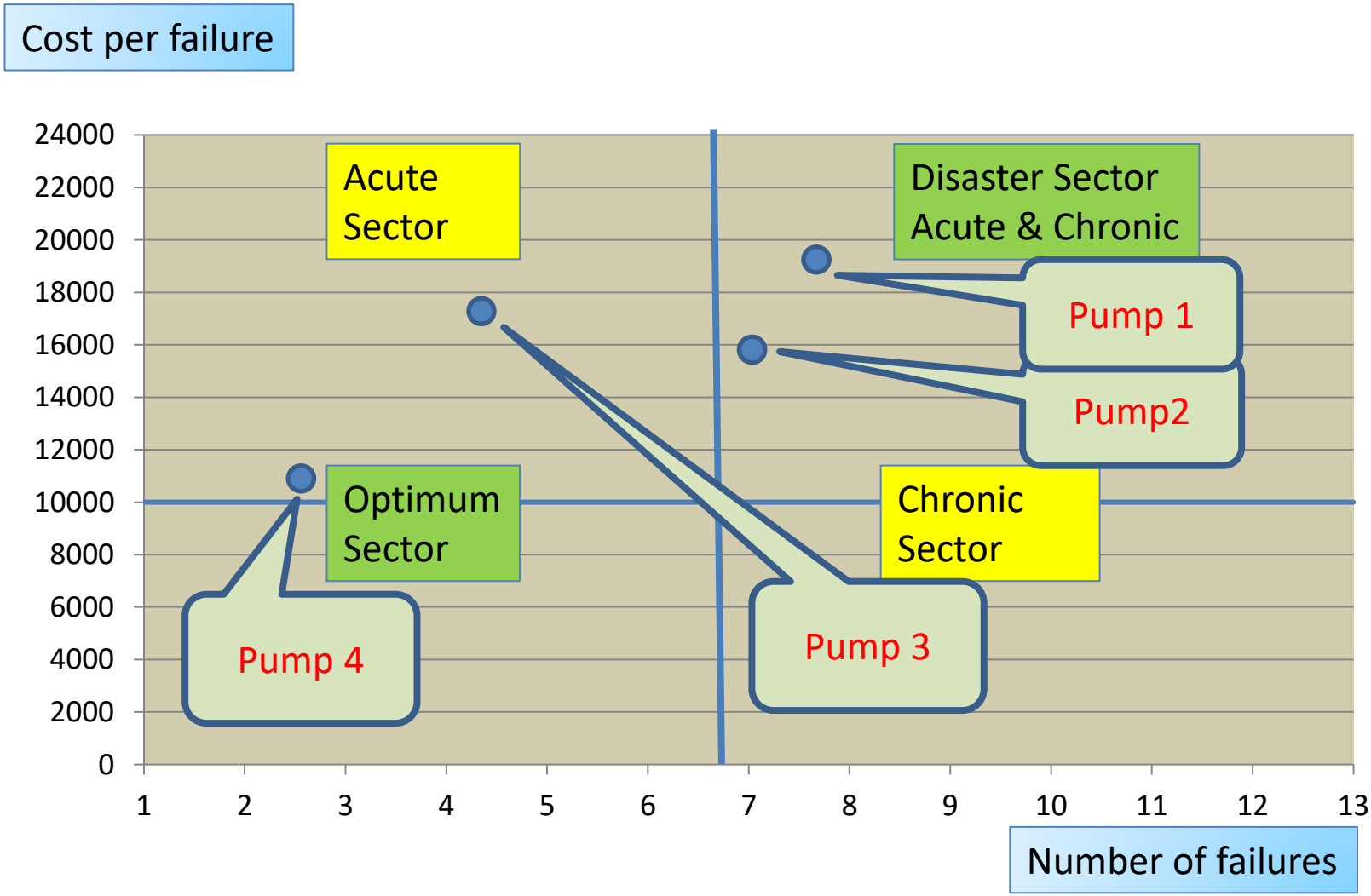
This should be your starting point for Production centres – Monthly and Annual Spending by type of Maintenance and by type of Resource

Equipment	Labour $	Materials $	Contract $	Tools $	Total $	Comments
#5 Boiler						Another breakdown last month! Should be solved by the major refurbishment
- Repair	15,250	12,440	Nil	300	27,990	
- PM's	3,240	4,500	nil	nil	7,740	
- Emergency	5,200	4,500	nil	Nil	9,700	
- Special	3,500	2,550	45,000	Nil	51,050	
Total	27,190	23,990	45,000	300	96,480	
Hot Press						
Indirect and Overhead						
Total						

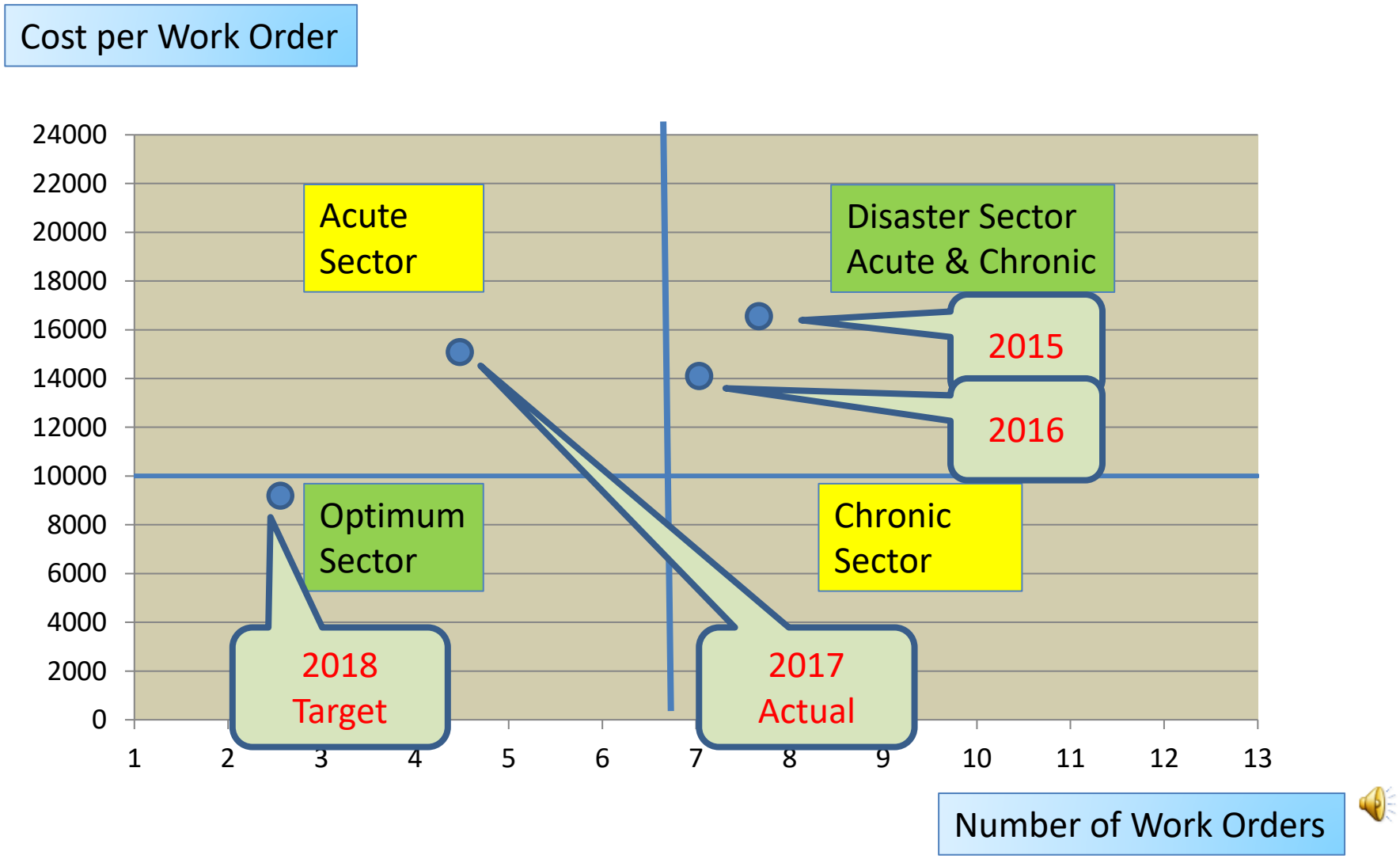
Add extra categories of maintenance as needed

Add extra categories of resources as needed

Proposed Failure chart – 1
Comparing Maintenance Failure Cost – 4 Pumps



Proposed Failure chart – 2
Pump Total Cost through Time



What questions should we ask?

- Why is the cost of failure of the pumps different?
- Why does the cost change through time?
- What can we learn from comparing maintenance and operations that can be applied to others?
- What is the value of investing in improvements?

Example of Asset Centre Budget

	Actual This year						Budget Next Year	
Equipment	**Lab $**	**Mats $**	**Contr $**	**Tools $**	**Total $**	**Comments**	**Change %***	**Total $**
#5 Boiler						**Completed a major refurb this year; will save on Reg Mtce $ and Em $ next year; need to boost PMs**		
- Repair	**15,250**	**12,440**	**Nil**	**300**	**27,990**		**-15%**	**23,790**
- PM's	**3,240**	**4,500**	**nil**	**nil**	**7,740**		**+10%**	**8,500**
- Emergency	**5,200**	**4,500**	**nil**	**Nil**	**9,700**		**-90%**	**970**
- Special	**3,500**	**2,550**	**45,000**	**Nil**	**51,050**		**-100%**	**Nil**
Total					**96,480**			**33,260**
Total								

Golden Rule #5

In Costing and Budgeting, Focus on Logic, History and Expected Use of the assets

- Rate increases:
  - -Labour rate 3%
  - -Materials prices 4%
  - - Contractor rates 3%

Risk is the Business of Maintenance.
Increased Risk = Decreased Value

Run Risk = Cost of Failure x Probability of Failure

Cost of Failure
= Cost of Emergency Repair
+ Cost of Lost Revenue or Profit
+ Penalty Costs, Reputation Costs, Fines and Reparations

Probability of Failure needs:
% Probability +
Time frame +
Confidence levels

Cost of PM =
Cost of PM Work +
Cost of Lost Revenue +
Penalty Costs, Reputation Costs, Fines and Reparations

Failure Cost Report

Equipment	Repair Cost	Failure Hours	Revenue Loss per hour	Total Revenue Loss	Penalty Cost	Total Failure Cost	No. of Failures	Cost per Failure
#5 Boiler	2,400	16	500	8,000	18,000	28,400	4	7,100
Primary Pump	12,000	6	15,000	90,000	56,000	158,000	2	79,000

Preventive Cost Report

Asset/ System	PM Cost	No. of PM Actions	PM Hours	Revenue Loss per hour	Total Revenue Loss	Penalty Cost	Total Preventive Cost	Cost per PM
#5 Boiler	800	8	4	500	2,000	5,000	7,800	975
Primary Pump	1000	4	2	15,000	30,000	19,000	40,000	10,000

Should we run and take the risk?
How much will we spend to remove it?

- Main factors that determine…
  - Guesswork
  - Emotion
  - Who shouts the loudest
  - Who represents the customer

What **should** determine….?
- Impact on the business

Risk in Maintenance: Risk Ratio Report

Asset	Cost per Failure $	Failure Risk %	Failure Risk $	Cost per PM $	Risk Ratio (or Payback ratio)
#5 Boiler	7,100	50%	3,550	975	3550 : 975 = 3.6:1
Primary Pump 2	79,000	10%	7,900	10,000	7,900:10,000 = 0.79:1

Golden Rule #6

- Understand and Calculate Risk
- Manage each Risk component
- Measure how Run Risk will change through time
- Compare Run Risk to the cost of Prevention

Quality vs Cheap Spares

Quality = durability + performance + reliability	**Quality Spare**	**Cheap Spare**
Number of hours, cycles, load etc	8000 hours	5000 hours
Output per hour, per cycle	10 units/hour	8 units/hour
Fewer breakdowns (number x cost)	3 x $15,000	7 x $10,000
Maintenance and Energy cost	$125,000	$185,000
Value = Cost per unit output		
Purchase Price	$250,000	$150,000
Life-time cost	$420,000	$440,000
Life-time cost per hour	$52.50	$88.00
Total volume output	80,000	40,000
Lifetime cost per unit Output	$5.25	$11.00

Cost of Sparing vs. Non-Sparing

Cost of Sparing		
Acquisition cost		$150,000
Procurement Process cost	10%	$10,000
Holding cost	20%	$20,000
Total Cost		$180,000

Cost of Not Sparing		
Failure cost		$600,000
Failure probability before Spare can arrive	10%	$60,000
Emergency buy cost	120%	$180,000
Expediting cost	20%	$36,000
Total Cost		$276,000
Is it worth sparing at 10% downtime probability?		

Golden Rule #7

- If you cannot prove that NO SPARES and CHEAP SPARES is higher cost, then that's what you will get!

From Maintenance KPI's to Business KPI's

1. From Availability Hours to $$
    1. This Year Actual Operating Hours - Last Year Actual Operating Hours x output/hour = $
    2. This Year Actual Operating Hours - This Year Target Operating Hours x output/hour = $
    3. Contribution to Revenue and Output through Availability Increase

Asset	This Year Actual Hours	Last Year Actual Hours	This Year Target Hours	Output /hour	Added Value vs Last Year	Added Value vs target
Compressr	3520	3460	3500	$120	60*120 =$7,200	20*120 =$2,400
Pump	3705	3550	3600	$235	155*235 = $36,425	105*235 = $24,675

2. From Failures to Failure Costs

Number of Failures last year – Number of Failures this year x average cost of failure

This Year Actual - This Year Target x average cost of failure

Contribution to revenue or profit from reduced Failures

Asset	This Year Actual # Failures	Last Year Actual Failures	This Year Target Failures	Ave cost of Failure	Added Value vs Last Year	Added Value vs target
Compressr	5	13	9	$1,835	8*1835 = $14,680	4*1835 = $7,340
Pump	2	6	4	$2,560	4*2560 = $10,240	2*2560 = $5,120

From Maintenance KPI's to Business KPI's

3. From MTBF to "Is Increasing MTBF good news?"

Output Value from an increase in MTBF – the cost of achieving it

Contribution to revenue or profit from changes in MTBF

Asset	This Year MTBF	Target MTBF	Output Value of extra MTBF	Added Mtce Cost	Added Ops Cost	Added Value vs Current
Compressr	5000 hours	6000 hours	120 * 1000 = 120,000	45,000	120,000	-45,000
Pump	2000 hours	3000 hours	235 * 1000 = 235,000	25,000	95,000	115,000

Consider also impact on equipment remaining useful life, amortization of design cost

Golden Rule #8

- Convert standard Maintenance KPI's into Business KPI's because that's what Executives Understand
- Use Output Value and Failure Costs as the core of your Business KPI's

Thank you
Please Email me with any questions!

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