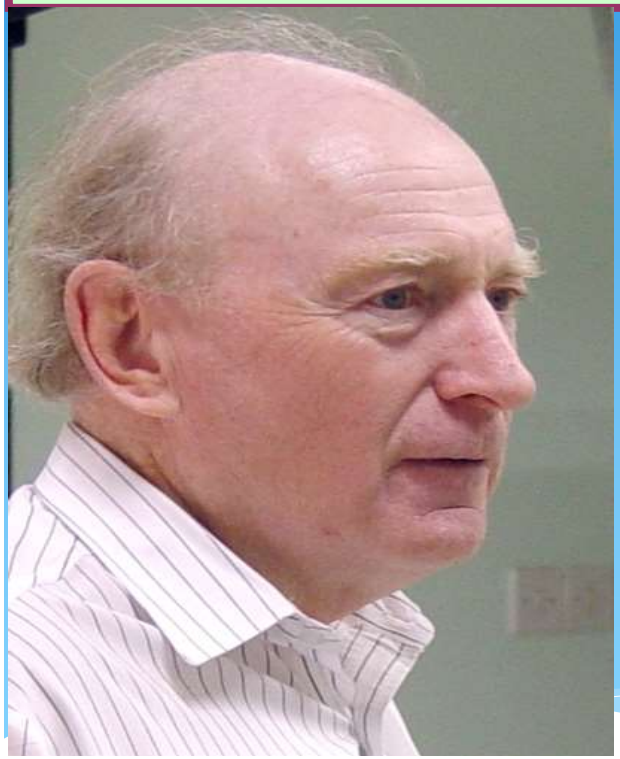
Financial Management in Maintenance
October 2016



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Today's Agenda

1. **Financial KPI's and how to use them**
2. Using Financial measures to Evaluate the success of your Project
3. Smarter Maintenance budgets
4. Using Risk to decide whether to PM or Run
5. Case Studies in Spare Parts

The Objective of Maintenance?

- To add value to your Organization

Q .– How do we measure value in our business?

A. – by increasing Return on Investment and by decreasing Risk

This means we have to show Maintenance is an investment in improved returns and greater outputs rather than a cost.

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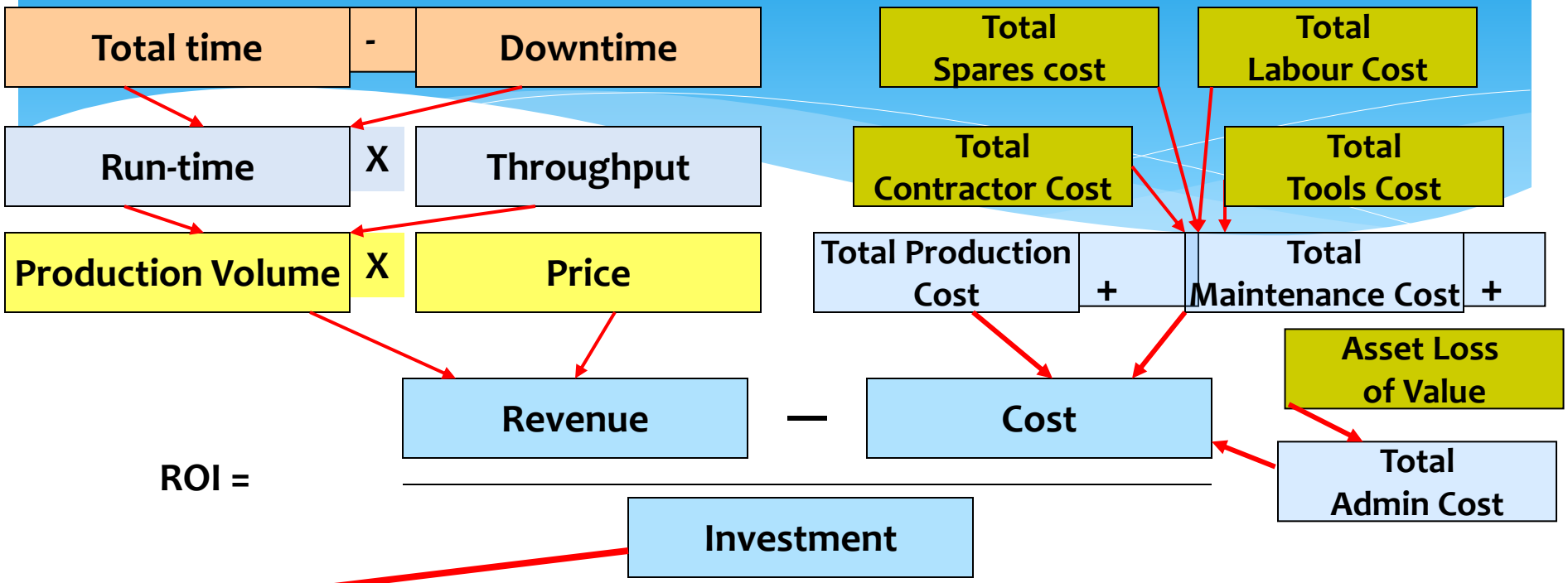
ROI



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 Spares Value	+	Total Tools Value

Basic Rules for Maintenance Investments

1. The returns from a project must be higher than the average return for the business
   - If average return for your business = 20%, then the project return must be > 20%

2. Internally, each department is in competition with other departments for the company's resources; so Maintenance must show a higher ROI.

Case Study

ROI Calculation: Impact on Maintenance Costs of Reducing Breakdowns from 45% to 10%

Tactic:	Preventive Maintenance %		Breakdown Maintenance %	
	Before	After	Before	After
% of Total	10%	45%	45%	10%
Cost of Maintenance	40,000	160,000	500,000	120,000
Cost of PM Program		220,000		
ROI = Cost Savings / Investment		(500,000+40,000) – (160,000+120,000 / 220,000 = 118%		

Note – excludes impact of Reduced Production losses and Reputation losses

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Case Study

Cost Reporting as the basis for Budgets

This should be your starting point for key equipments

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						
Total						

Add extra categories of maintenance as needed

Add extra categories of resources as needed

Case Study

Example of Asset Centred 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**
Hot Press								
Total								

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

Risk

=

Cost of Failure

x

Probability of Failure

Example – if the cost of Failure is $1m and the Probability is 10%, then the risk is $100,000

Our Business Decision:–

If the PM cost ($975) is less than the Risk of Failure ($3,550) should we do the PM or allow the equipment to keep running?

Cost of Failure

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

Cost of PM

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

Probability of Failure

Probability needs:

1. **A specific period of time (usually until the end of the current operating cycle)**
2. **A percentage number (e.g. 25%) based on:**
    1. **Asset condition**
    2. **Failure history**
    3. **Usage in balance of the operating cycle**
3. **A statement of how confident are we that we are right (95% confidence levels)**

Case Study

Failure Cost Report

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

Case Study

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 Circulation Pump	1200	4	2	15,000	30,000	20,000	51,200	12,800

Case Study

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 Circulate Pump 2	79,000	15%	11,850	12,800	11850 : 12800 = 0.9:1

1. Should we do the PM on the BOILER or let it run?
2. Should we do the PM on the PUMP or let it run?
3. If we let the PUMP run, how would you expect the numbers to change next week?

Spare Parts Calculator

1. Cost of having no Spare Part
   a. Extra cost of repair due to expedited spare part or locally sourced
   b. Extended cost of outage due to the delay in getting the spare part = Extra outage hours x outage cost per hour
   c. Impact on reputation, market share etc due to the extended outage
2. Cost of having the Spare Part
   a) Purchase price of the Spare Part
   b) Cost of holding the Spare Part (space, admin etc)

Case Study

Spares Report

Equipment /System	Extra Repair Cost	Extra Outage Cost	Reputa-tion Cost	Total cost of Zero Spares	Prob of Failure needing Spare	Risk of no Spare	Cost of Holding Spare
Spare #1	5000	20,000	*A	25,000	50%	12,500	2,500
Spare #2	12,000	16,000	*A	28,000	20%	5,600	50,000

Notes:

1. *A – Factors to consider in Reputation Cost – loss of market share, penalty for non-delivery of contract…..
2. For Spare #1 does it make sense to hold stock
3. What about Spare #2?

Spares and Equipment – Buy Cheap or Buy Quality?

- A continuing battle for Maintenance
- But…. If we cannot show that Quality is "better" then we deserve Cheap.

- Must show that the lifetime cost per unit for Quality is LOWER than for Cheap

- Example (for simplification, assume operating costs are the same)

Case Study

Factor	Quality	Cheap
Purchase Price	$100, 000	$50,000
Life-time - years	10	5
Failure Outages per year	1	3
Time of Failure Outages- days	1.5	2
Mtce Outages per year	3	4
Time of Mtce Outages – days	1	1
Output Units per day	100	100
Lost output units due to Failures	10 x 1 x 1.5 x 100 = 1500	5 X 3 x 2 x 100 = 3000
Lost output units due to Maintenance Outages	10 x 3 x 1 x 100 = 3000	5 x 4 X 1 x 100 = 2000
Value per output unit	150	150
Total Cost	150 x (1500+3000) + 100,000 = 775,000	150 x (3000 + 2000) + 50,000 = 800,000
Total Cost per year	77,500	160,000

Conclusions

1. The biggest single change facing Maintenance in the next few years is the requirement for Maintenance Managers to be Maintenance **Business** Managers
2. We must therefore be ready:
   A. To prove that Maintenance costs are an investment
   B. And that we are responsible managers of that investment
   C. To back this position with financial data and financial KPI's
   D. To argue our case with facts and logic

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