Pulse
IBM SolutionsConnect 2013

Maximo Failure Coding

Energy Australia's approach to success

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EnergyAustralia

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EnergyAustralia Operating Plants

Plant Name	State	Type	MW*
Mt Piper	NSW	Black Coal	1400
Wallerawang	NSW	Black Coal	1000
Yallourn	VIC	Brown Coal	1480
Tallawarra A	NSW	CCGT Gas	435
Hallett	SA	OCGT Peaking Plant	203
Waterloo	SA	Wind	111
Cathedral Rocks	SA	Wind	33 (66MW Total)
Iona	VIC	Gas Storage & Distribution	n/a

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TALLAWARRA POWER STATION

- 33 employees
- Opex ~$13 million/year
- 435MW Alstom GT 26
- Australia's most environmentally efficient, large-scale gas-fired combined cycle power station
- 65% less carbon dioxide emissions than the average Australian coal-fired plant

IONA GAS PLANT

- Commissioned in 1999
- 50 employees
- Opex ~$14 million per year
- Major Hazardous Facility
- AS4801 (Safety) & ISO14001 (Environmental) Accredited

HALLETT POWER STATION

- OCGP, peaking Plant
- Located near Clare Valley, SA
- ~ 5% of South Australia's installed capacity
- 12 gas turbines
- 8 employees
- Opex ~ $3 million/year

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WATERLOO WIND FARM

•37 Vestas V90 3MW turbines

•Maximum capacity of 111 MW

•1.8kms 132kV transmission line

•Full generation was achieved 2010

•Total cost in excess of $300 million

•Homes powered approx 46,000

•Tonnes of carbon abated 300,000

CATHEDRAL ROCKS WIND FARM

•50% EnergyAustralia: 50% ACCIONA Energy

•33 x Vestas 2 MW wind turbines. Maximum capacity of 66 MW. Homes powered approx 35,000

•Construction began in 2004, fully operational in 2007. Tonnes of carbon abated 150,000

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YALLOURN POWER STATION

- 3rd largest generator in Victoria
- ~ 20% of Victoria's electricity
- ~ 10,000 GWh/year
- Mine 17 million tonnes/year of brown coal
- 215 employees and ~ 300 contractors
- Opex ~ $150 million/year
- Stage 1 commissioned 1974/75/Stage 2 1981/82
- Capacity Factor ~ 89.5%
- First Victorian Power Station/Mine privatised 1996

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Our Maximo Journey..

Yallourn

Pre 1998	3 different CMMS Systems in 18 months
1998	Moved to Maximo 3.2
1999	Upgraded to 3.3
2003	Upgraded to 4.1.1

Other Sites

2007	Iona Gas Plant and Hallett Power Station on 4.1.1
2007	Hallett on 4.1.1
2009	Tallawarra implemented 6.2 on start up

Current Upgrade Project

2013	Upgrade Project to 7.5 across Energy Australia
Aug-13	Tallawarra "go live"
Nov-13	Yallourn "go live"
2014/15	Hallett, Iona & Wind Farms

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Yallourn's Business Rules/approach

- No customisation! – a little bit of "personalisation" is OK..
- Clear Business Rules – Procedures/Training - **Why** and **How**
- Get the most out of the product
  - Capture as much data as possible – Mhrs, $'s, History..
  - Use the data – the key is a good Reporting System
- Monitor use & effectiveness after implementation – review & retrain
- Ongoing commitment to continuous improvement
- Involve key users of the data in setup/decisions

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Why Use Failure Coding?

- Group like Failure modes across the entire plant for analysis
- Automates processing/history recording of many Work Orders over time..
- Ensure standard wording used through selectable lists – correct spelling!
- Guides users through a simple, logical & relevant fault reporting process
- Failure Classes are setup/associated with all relevant Assets;
  - On Selection of a Failure Class, relevant Problem codes are available
  - On Selection of a Problem Code, relevant Cause codes are available
  - On Selection of a Cause Code, a standard set of Remedy codes are available

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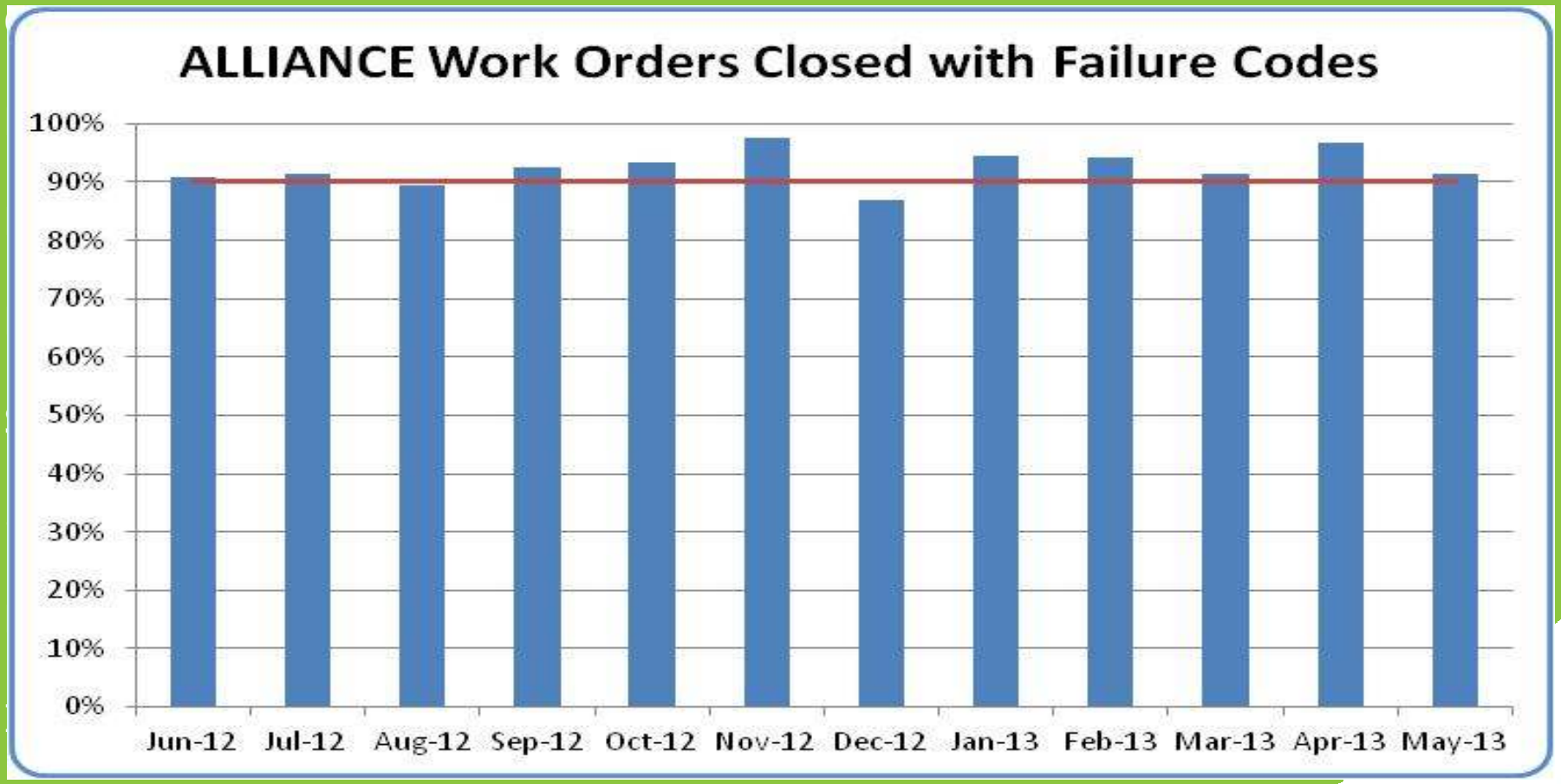
Rules for setup of Failure Coding

- 

- Monitor use/compliance

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What failure coding isn’t !!

- Not relevant for Work Types not associated with incurred or impending failures – (PM, MO, GP Work Types not relevant)
- Not always a full explanation of the failure detail/work done
  - Failure reporting remarks – what tradesperson observed, detail on how repaired is still important
- Rarely the Root Cause of the problem
  - Failures often require further investigation to obtain Root Cause
- Should not be a duplication of your Asset/Location Hierarchy

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Yallourn's Failure Coding approach – Failure Class

Failure Class – Class of Productive Unit or Maintainable Item that is being faulted

CRANE	All Cranes, Hoists, Lifts & Mobile Plant
STRUCT	All Structures, Supports, Foundations & Frames
VALVES	All Types of Valves and Dampers
VESSELS	All Pressure Vessels Including Pressure/Boiler Tubing, Tanks, Accumulators, Receivers, Strainers & Filters
NOTLIST	Not Listed - All Faults Not Appropriately Covered in the other Classes
CIVIL	All Buildings, Amenities, Drains, Roads & Associated Infrastructure
HEATEXH	Heat Exchangers - all devices that exchange thermal energy between fluids including condensers
PIPEDUCT	All Pipes, Ducts, Hangers, Expansion Joints & Burners
ROTATING	All Rotating Elements - All Motors, Pumps, Fans, Couplings, Gearboxes, Shafts, Seals, Wheels, Idlers, Pulleys, Brakes, Crushers & Bearings
CONVEY	All Material Conveying Equip - All Belting, Scrapers, Curtains, Spill Rubbers, Ploughs, Magnets and EDP Screw Conveyors & Mixing Bowls
EI&C	Electrical Instrumentation & Control - All High and Low Voltage Supplies including HV Reticulation, All Instrumentation and Control Equipment including Alarms and Protection and all Actuators

= Continuous Improvement

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Yallourn's Failure Coding approach - Problem

Problem – The reason why the plant/component was faulted
Initially what the Operator reported – can be updated by maintenance when better understood

ROTATING	ALL ROTATING ELEMENTS	PROBLEM	PROBLEM DESCRIPTION
		VIBRAT	VIBRATION
		LEAKING	LEAKING
		POOROP	LACK OF PERFORMANCE
		NOTLIST	NOT LISTED - NOT COVERED BY EXISTING CODES
		NOOPERAT	NO OPERATION
		HOT	HOT
		NOISY	NOISY
		LUBE	LUBRICATION
		POI	PLANT INTERIM OPERATING INSTRUCTION
		PLANT	PLANT INTEGRITY

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Yallourn's Failure Coding approach – Cause # 1

Cause – The cause of the fault
Completed by maintenance when finalising the Work Order

PROBLEM	PROBLEM DESCRIPTION	*CAUSE*	CAUSE DESCRIPTION
VIBRAT	VIBRATION	ALIGNM	ALIGNMENT
		LUBRICAT	LUBRICATION
		ELECTRIC	ELECTRICAL FAULT
		RESONANC	RESONANCE
		FOUNDAT	FOUNDATIONS
		MECHANIC	MECHANICAL FAULT
		LOOSEN	LOOSENESS
		NOFAULT	NO FAULT FOUND
		TRANSMIT	TRANSMITTED
		IMBALANC	IMBALANCE OF ROTATING ELEMENT
		RUB	RUBBING

Stops process

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Yallourn's Failure Coding approach – Cause # 2

Cause – The cause of the fault
Completed by maintenance when finalising the Work Order

PROBLEM	PROBLEM DESCRIPTION	*CAUSE*	CAUSE DESCRIPTION
LEAKING	LEAKING	GLAND	GLAND OR SEAL LEAKING
		CRACK	CRACK
		HOLED	HOLE
		NOFAULT	NO FAULT FOUND
		JOINT	JOINT

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Yallourn's Failure Coding approach - Remedy

Remedy – A brief summary of the work conducted to rectify the fault Completed by maintenance when finalising the Work Order

Ability to monitor & report on Quality issues

REMEDY	REMEDY DESCRIPTION
REPLITEM	REPLACED ITEM
OVERHAUL	OVERHAULED
REPPARTS	REPLACED PARTS
REPAIRED	REPAIRED COMPONENT
OILLUB	OILED/LUBRICATED
REWORK	REWORK
ALIGNBAL	ALIGNED OR BALANCED
CLEANED	CLEANED/CLEARED
RESETADJ	RESEST/ADJUSTED
RECALIB	CALIBRATE
NOFAULT	NO FAULT FOUND
RECONFIG	RECONFIGURE
INSTALL	INSTALL NEW

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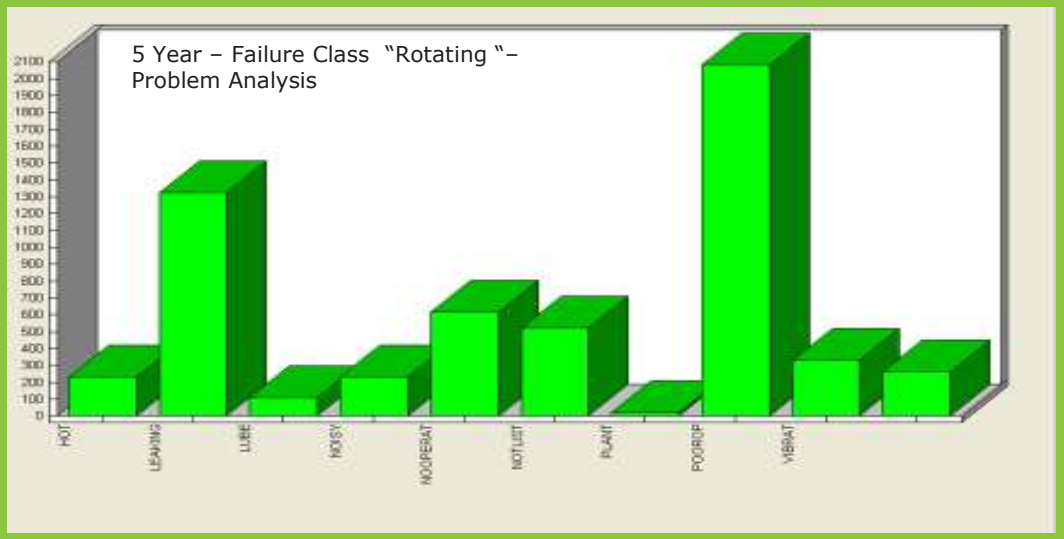
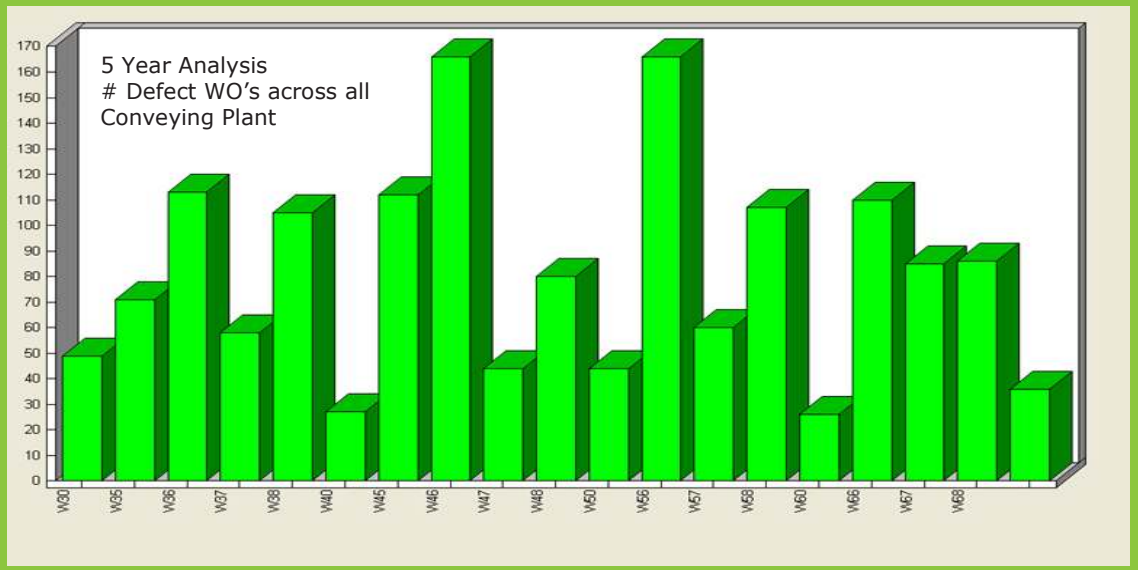
EnergyAustralia - Examples of Use



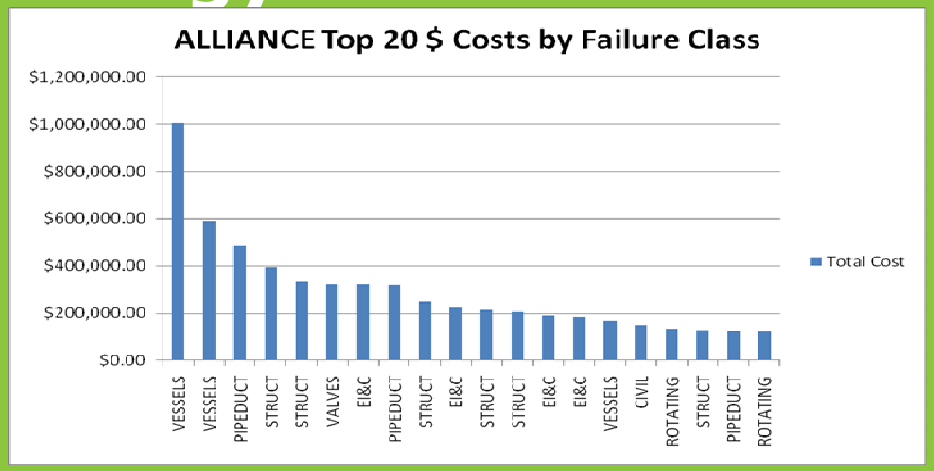
Failure Analysis..

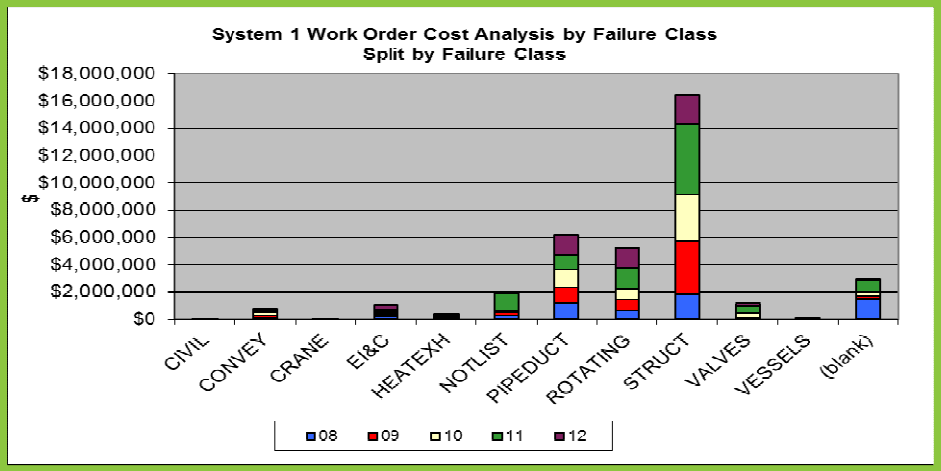
Reliability Analysis..



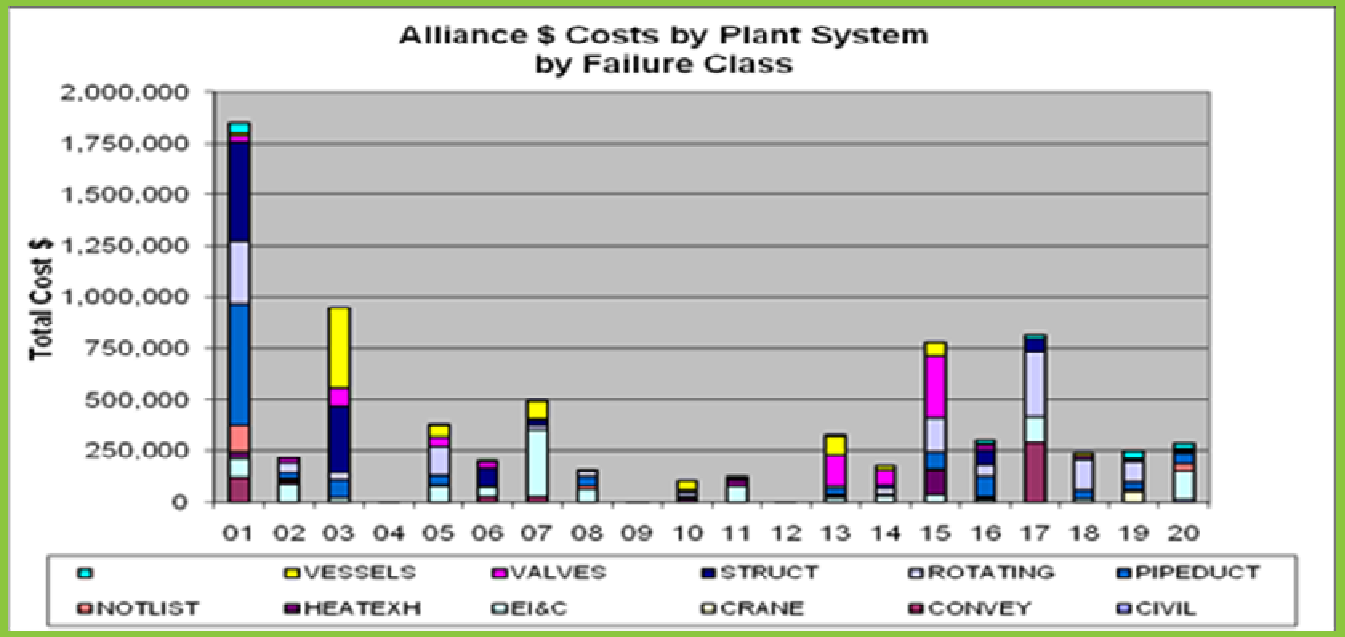
Comparison across similar plant..

EnergyAustralia - Examples of Use





Pareto Analysis..



Maintenance Strategy Reviews..

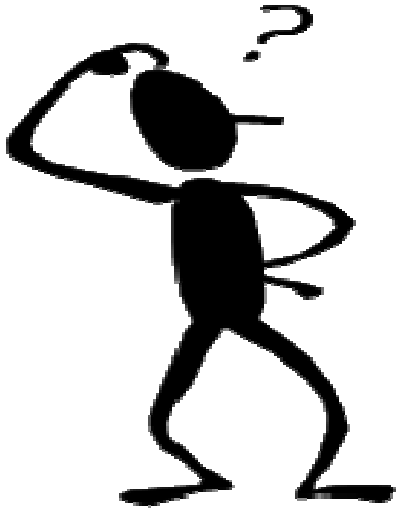
Cost Analysis..

Maximo Failure Coding – In Summary

When CMMS Systems are well utilised – the data captured including trending & analysis of repetitive failures and/or high cost events can be used to support maintenance continuous improvement.

When acted upon, long term plant reliability can be achieved!

The use of Failure Coding and efficient analysis of Failure Coding data is a key tool for Energy Australia in supporting this best practice approach…



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Thank You …

Questions