



RMS Criticality Assessment **Basic Overview**

2006

Criticality Assessment Basic Overview

Introduction

The importance of the rotating plant running health cannot be over emphasised for effective running of plant processes. With reliability teams being tasked with caring and looking after the daily running health of all rotating plant, it has been identified that a better understanding is required upon the effects of failure of any individual rotating plant asset.

Based upon the need to better understand the effects of individual asset failure, a rotating plant criticality study will show the resultant benefits:

- Focus the Reliability Teams application and resources.
- Provide a ranked asset list in terms of criticality.
- Better understand the impact failure of each individual asset, with respect to safety, environment, production, and maintenance.
- Identify and document the best and most appropriate maintenance technology to assess asset health.
- Identify asset health monitoring periods.
- Identify bottlenecks in the system.
- Assist in maintenance planning.

Study Overview

Firstly an asset list was compiled consisting of all rotating plants from the plant area for assessment, scoring and ranking. A plant walk-through is then undertaken in order to get a feel for the assets and systems in question, as well as assessing a production flow diagram.

Personal Involved

In order to carryout a study one key person is selected from the following departments:

- *Production*
- *Maintenance*
- *Planning*
- *Reliability*
- *Management*

Criticality Rulers

The and failure impact of each rotating plant asset, both locally and downstream in the system(s), is then assessed using the following criticality rulers:

- *Safety (SC)*
- *Environmental (EC)*
- *Production (PC)*
- *Cost of Repair (COR)*
- *Replacement Value (RV)*
- *Probability of Failure (PF)*

Each of these criticality rulers is weighted into five separate categories (each having an average of three rulers per category), with each category carrying a respective score.

For example, with respect to environmental a top score would represent a “major incident with prolonged effects to the public” and a down score would represent “no environmental implications”.

An asset score sheet was then used to record the respective weighted scores, with input being given by all concerned.

Asset Protection Plan

Having completed the asset scoring and ranking assessments), each individual asset is prioritised in order of criticality ranking, at which a basic failure modes and effects was carried out, followed by an asset protection plan being documented.

The asset protection plan provides a documented plan for protecting the respective assets against failure by applying the most appropriate techniques and intervals of measurement, at the same time as focusing on the areas that could impact most, namely the highest ranked assets.

Plant Criticality Overall Summary												
Asset ID	Asset Description	Area Location	Stby	ACS	PC	CCR	SC	EC	PF	RV	Ranking %	CAT
2700-3103	DRY REFINED CRYST. AGITATOR & HYDRAULIC DRIVE PUMP	DRAA		84	20	16	12	8	10	18	100%	A
2300-3181	DRYING AIR FAN	DRAA		78	20	14	12	4	12	16	93%	A
2300-3141-60	No.1 DRY REFINED CENTRIFUGE	DRAA		78	12	14	10	8	16	18	93%	A
2300-3151-60	No.2 DRY REFINED CENTRIFUGE	DRAA		78	12	14	10	8	16	18	93%	A
2300-3194	EXHAUST AIR FAN	DRAA		76	20	12	12	4	12	16	90%	A
2300-3172	SCREW FEEDER	DRAA		75	20	16	8	8	8	15	89%	A
2300-3171	DOUBLE PADDLE SCREW MIXER	DRAA		74	20	16	8	8	6	16	88%	A
2300-3186	COOLING AIR FAN	DRAA		72	20	12	12	4	12	12	86%	A
2300-3210	PRODUCT TRANSFER SCREW No.1	DRAA		68	20	12	8	8	6	14	81%	A
2300-3211	PRODUCT TRANSFER SCREW No.2	DRAA		68	20	12	8	8	6	14	81%	A
2300-2256	No.2 SALT LOADING SLUMP PUMP	DRAA		68	14	8	10	18	10	8	81%	A
2700-3110	No.1 DRY REFINED SLURRY PUMP	DRAA	Y	68	14	12	8	8	14	12	81%	A
2700-3111	No.2 DRY REFINED SLURRY PUMP	DRAA	Y	68	14	12	8	8	14	12	81%	A
2300-3221	BULK FILLING SCREW No.1	DRAA		63	16	12	8	8	5	14	75%	A
2300-3226	BULK FILLING SCREW No.2	DRAA		63	16	12	8	8	5	14	75%	A
2300-3202	FINES DISSOLVER AGITATOR	DRAA		60	10	12	10	8	6	14	71%	A
2300-3175	OVERFLOW ROTARY VALVE	DRAA		60	20	8	8	8	8	8	71%	A
2300-3191	CYCLONE SEPARATOR ROTARY VALVE	DRAA		60	20	8	8	8	8	8	71%	A
2300-2255	No.1 SALT LOADING SLUMP PUMP	DRAA		60	14	4	8	18	10	6	71%	A
2300-3161	DRY REFINED ML RECEIVER PUMP No.1	DRAA	Y	58	14	8	8	8	12	8	69%	A
2300-3162	DRY REFINED ML RECEIVER PUMP No.2	DRAA	Y	58	14	8	8	8	12	8	69%	A
2350-313	No.1 DRY REFINED CRYSTALLISER FEED PUMP (ON FX)	Old Salt Area	Y	53	11	8	8	8	10	8	63%	B
2350-314	No.2 DRY REFINED CRYSTALLISER FEED PUMP (ON FX)	Old Salt Area	Y	53	11	8	8	8	10	8	63%	B
2300-3206	SCRUBBER PUMP No.1	DRAA	Y	53	11	8	8	8	10	8	63%	B
2300-3207	SCRUBBER PUMP No.2	DRAA	Y	53	11	8	8	8	10	8	63%	B
2600-2315	No.1 DRYER WASH FEED PUMP (OLD SALT AREA)	Old Salt Area		50	8	8	8	8	10	8	60%	B
2300-3173	UNDERFLOW ROTARY VALVE	DRAA		48	8	8	8	8	8	8	57%	B
2300-3141-61	No.1 DRY REFINED CENTRIFUGE OIL PUMP	DRAA		46	12	8	8	8	2	8	53%	B
2300-3151-61	No.2 DRY REFINED CENTRIFUGE OIL PUMP	DRAA		46	12	8	8	8	2	8	53%	B
2300-3256	CONDENSATE COLLECTION TANK PUMP No.1	DRAA	Y	36	8	4	8	4	8	4	43%	B
2300-3258	CONDENSATE COLLECTION TANK PUMP No.2	DRAA	Y	36	8	4	8	4	8	4	43%	B
2300-3192	SCRUBBER GEAR ACTUATOR	DRAA		34	12	4	4	4	6	4	40%	B

Plant Criticality Overall Summary Cont...												
Asset ID	Asset Description	Area Location	Stby	ACS	PC	COR	SC	EC	PF	RV	Ranking %	CAT
2601-2172	S/ROOM BUILDING VENT FAN No.1	DRAA		20	4	2	2	4	4	4	24%	C
2601-2173	S/ROOM BUILDING VENT FAN No.2	DRAA		20	4	2	2	4	4	4	24%	C
2601-2174	IER BUILDING VENT FAN No.1	DRAA		20	4	2	2	4	4	4	24%	C
2900-3260	DRYER BUILDING EXHAUST FAN No.1	DRAA		20	4	2	2	4	4	4	24%	C
2900-3261	DRYER BUILDING EXHAUST FAN No.2	DRAA		20	4	2	2	4	4	4	24%	C
2900-3262	DRYER BUILDING EXHAUST FAN No.3	DRAA		20	4	2	2	4	4	4	24%	C
2900-3263	DRYER BUILDING EXHAUST FAN No.4	DRAA		20	4	2	2	4	4	4	24%	C
2900-3264	DRYER BUILDING EXHAUST FAN No.5	DRAA		20	4	2	2	4	4	4	24%	C
2900-3265	DRYER BUILDING EXHAUST FAN No.6	DRAA		20	4	2	2	4	4	4	24%	C
2900-3266	DRYER BUILDING EXHAUST FAN No.7	DRAA		20	4	2	2	4	4	4	24%	C
2900-3267	DRYER BUILDING EXHAUST FAN No.8	DRAA		20	4	2	2	4	4	4	24%	C

Asset Description	Overall Ranking %	CAT	ACS	Vibration Meas Points	Vibration Period (Months)	Ultra-Sonics	Oil Analysis (Months)	Temp Gun Monitor	Thermal Imaging (Months)	Visual Inspection	Notes
DRY REFINED CRYST. AGITATOR & HYDRAULIC DRIVE PUMP	100%	A	84	4	Online		Monthly	Monthly	Yearly	See SAP	Portable Vb on Agitator
DRYING AIR FAN	93%	A	78	6	Online		Monthly	Monthly	Yearly	See SAP	
Nb.1 DRY REFINED CENTRIFUGE	93%	A	78	5	Monthly		Monthly	Monthly	Yearly	See SAP	
Nb.2 DRY REFINED CENTRIFUGE	93%	A	78	4	Monthly			Monthly	Yearly	See SAP	
EXHAUST AIR FAN	90%	A	76	4	Online			Monthly	Yearly	See SAP	
SCREW FEEDER	89%	A	75	6	Monthly		Monthly	Monthly	Yearly	See SAP	Inspect slowbrgs Yearly
DOUBLE PADDLE SCREW MIXER	88%	A	74	6	Monthly		Monthly	Monthly	Yearly	See SAP	Inspect slowbrgs Yearly
COOLING AIR FAN	86%	A	72	4	Online		Monthly	Monthly	Yearly	See SAP	
PRODUCT TRANSFER SCREW Nb.1	81%	A	68	4	Monthly		Monthly	Monthly	Yearly	See SAP	Inspect slowbrgs Yearly
PRODUCT TRANSFER SCREW Nb.2	81%	A	68	4	Monthly			Monthly	Yearly	See SAP	Inspect slowbrgs Yearly
Nb.2 SALT LOADING SUMP PUMP	81%	A	68	4	Monthly		Monthly	Monthly	Yearly	See SAP	Run up monthly/ test
Nb.1 DRY REFINED SLURRY PUMP	81%	A	68	4	Online		Monthly	Monthly	Yearly	See SAP	
Nb.2 DRY REFINED SLURRY PUMP	81%	A	68	3	Online			Monthly	Yearly	See SAP	
BULK FILLING SCREW Nb.1	75%	A	63	4	Monthly			Monthly	Yearly	See SAP	Inspect slowbrgs Yearly
BULK FILLING SCREW Nb.2	75%	A	63	4	Monthly			Monthly	Yearly	See SAP	Inspect slowbrgs Yearly
FINES DISSOLVER AGITATOR	71%	A	60	5	Monthly		Monthly	Monthly	Yearly	See SAP	
OVERFLOW ROTARY VALVE	71%	A	60	4	Monthly		Monthly	Monthly	Yearly	See SAP	
CYCLONE SEPARATOR ROTARY VALVE	71%	A	60	4	Monthly		Monthly	Monthly	Yearly	See SAP	
Nb.1 SALT LOADING SUMP PUMP	71%	A	60	2	Online			Monthly	Yearly	See SAP	
DRY REFINED MIL RECEIVER PUMP Nb.1	69%	A	58	4	Online			Monthly	Yearly	See SAP	
DRY REFINED MIL RECEIVER PUMP Nb.2	69%	A	58	4	Online			Monthly	Yearly	See SAP	
Nb.1 DRY REFINED CRYSTALLISER FEED PUMP (ONFX)	63%	B	53	3	Monthly			Monthly	Yearly	See SAP	
Nb.2 DRY REFINED CRYSTALLISER FEED PUMP (ONFX)	63%	B	53	3	Monthly			Monthly	Yearly	See SAP	
SCRUBBER PUMP Nb.1	63%	B	53	6	Monthly			Monthly	Yearly	See SAP	
SCRUBBER PUMP Nb.2	63%	B	53	6	Monthly			Monthly	Yearly	See SAP	
Nb.1 DRYER WASH FEED PUMP (CLD SALT AREA)	60%	B	50	6	Monthly			Monthly	Yearly	See SAP	
UNDERFLOW ROTARY VALVE	57%	B	48	6	Monthly			Monthly	Yearly	See SAP	
Nb.1 DRY REFINED CENTRIFUGE OIL PUMP	55%	B	46	6	Monthly			Monthly	Yearly	See SAP	
Nb.2 DRY REFINED CENTRIFUGE OIL PUMP	55%	B	46	4	Monthly		3 Monthly	Monthly	Yearly	See SAP	
CONDENSATE COLLECTION TANK PUMP Nb.1	43%	B	36	4	Monthly		3 Monthly	Monthly	Yearly	See SAP	
CONDENSATE COLLECTION TANK PUMP Nb.2	43%	B	36	6	Monthly			Monthly	Yearly	See SAP	

Having completed an asset scoring and ranking assessment, each individual rotating asset is listed in order of overall criticality ranking. An assessment is then made on each individual asset, which involves carrying out a basic failure mode and effects analysis (FEMA) and applying experience gained over a number of man years to formulated an asset protection plan as presented above.

Based upon each assets criticality ranking, the above asset protection plan is designed to identify the most effective and appropriate monitoring technology and frequency, in order to best monitor the running health of all rotating assets.

Reliability Resource Plan

Having developed a protection plan for each individual asset, a resource plan is then developed to provide an overview of the reliability teams resource requirements in order to best implement and carryout the asset protection plan in practice.

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