Fluke Reliability

Why you must rank your assets for 'criticalness'

Frederic Baudart
Gregory Perry

Accelix™
Webinar Series

Meet the speakers

Frederic Baudart, CMRP

Lead SME Manager
Fluke Reliability

- More than 20 years of experience in field service engineering and predictive/preventive maintenance
- Joined Fluke in 2015 as a Product Application Specialist
- Thermal/Infrared Thermography Level 1-certified
- Certified Maintenance and Reliability Professional (CMRP)
- Focused on business global consulting services, reliability, and condition monitoring

Meet the speakers

Gregory Perry, CMRP, CRL

Capacity Assurance Consultant
Fluke Reliability

- Former maintenance practitioner (healthcare), 20+ years of experience maintenance & reliability experience – especially within CMMS realms
- Joined Fluke in 2016 as a CMMS Consultant part of acquisition
- Certified Maintenance and Reliability Professional (CMRP)
- Focused on CMMS implementation initiatives with 300+ CMMS implementations. Fluke Reliability subject-matter expert presenting at leading industry conferences

Agenda

1. What is Asset Criticalness?
2. Benefits of (what is the why)
3. Where is it applied?
4. Whom use it?
5. How is it applied?
6. Practical application/example

POLL QUESTION No. 1

What percentage of your assets should be ranked critical based on the risk of the business? **(Click only one answer)**

- Less than 20%
- 20% – 40 %
- 40% – 80%
- More than 80%

Key terms and definitions

- **What is an asset?**
  - Something that has potential or actual value to an organization – often referred to as physical assets
- **What is reliability?**
  - The probability that an asset or item will perform its intended functions for a specific period under stated conditions
- **What is availability?**
  - The degree to which a system, subsystem, or equipment is in a specified operable and committable state at the start of a mission, when the mission is called for
- **What is Risk-Based?**
  - Prioritization of resources based on economy of scale utilizing a risk matrix that evaluates the impact of the maintenance task on the probability of failure taking into consideration the consequences of failure.
- **What is criticalness?**
  - A state of critical urgency – an earnest and insistent necessity
  - Applying critical thinking to the equation by also considering the criticalness (state of being critical) of the environment at hand

What is an Asset Criticality Analysis?

Asset Criticality Analysis (ACA) is a fundamental decision-making tool to evaluate how asset failures impact organizational performance

- Systematically rank assets for the purpose of:
  - workflow prioritization
  - maintenance strategy development
  - other reliability-based or risk-based asset initiatives.
- It provides the basis for determining the value and impact a specific asset has on the production/operations process or systems, as well as the level of attention the asset requires regarding reliability strategy development (RSD) or strategies and plans (SP) for asset management.
  - Designed to rank and prioritize
  - Identifies most critical assets according to their criticalness
  - Unmasks operational risks

Benefits of an Asset Criticality Analysis

- **Knowing where to start**
  - Setting of priorities
  - Supporting the aim of ISO55000 for Asset Management from a RbM (risk-based) approach
- **Capacity assurance**
  - Proper maintenance ensures the capacity of an asset can be realized at the designed level
- **Proper maintenance adds value**
  - Appropriated maintenance strategies
- **Prioritized improvement activities**
  - When time and resource availability are often limited
- **Dynamic and prioritized asset hierarchy of maintenance repairs**
  - Delivering the greatest value to the organization compared to expensed costs

Where is an Asset Criticality Analysis applied?

- Selection of the correct maintenance approach starts with the Criticalness Assessment, a process that ranks equipment and classifies them by tier level. Resulting classifications are used to drive decisions on furthering maintenance strategy approaches, techniques, and resource allocation.
- Intent of scoring is to initially focus on the most critical (Top 20%) of organizational assets in order to determine optimum maintenance strategy by first performing Failure Mode Analyses so that condition-based maintenance (CBM) optimization and Asset Health can be more aptly applied
- Higher criticalness equipment should receive a more comprehensive methodology, such as a full-blown asset criticality analysis, FMECA/RCM, and more comprehensive maintenance approach as opposed to that of lower priority equipment. Maintenance tasks selected should be based on the failure causes and the individual failure patterns.
- Run To Failure (RTF) or basic maintenance based on team experience may be used on low cost, low priority equipment where the costs of preventing failure often exceed the actual costs incurred by the failure.

Criticalness ranking: tier levels

Tier	Details
1	Failure results in immediate impact to, or shutdown of, multiple operations or systems. This failure **will prevent capacity assurance** due to operational, environmental, or quality issues. Equipment assigned this cursory criticality ranking (Rime Code) typically will have no redundancy and identified issues must be addressed immediately to complete scheduled production targets and goals.
2	Failure results in limited production capabilities, or shutdown of, a single operation or system. Equipment assigned this ranking may have redundancy or established by-pass equipment or systems but **may limit capacity assurance.** Although this equipment could become highly critical if the redundancy or by-pass fails, identified issues should be planned and scheduled with a higher work order priority.
3	Failure results in impact to, or shutdown of, a single operation or system. Equipment assigned this ranking typically has **redundancy or established by-pass equipment or systems** to complete the production schedule.
4	Failure has **no immediate impact on capacity assurance**. Some of these assets may have the maintenance strategy of Run-to-Failure associated with them, while others require issues be addressed in a timely manner through the normal Planned Workflow processes.

Asset Criticality Analysis: Example

Criticality Assessment Criteria

Equipment Score (ES)

The Equipment Score is obtained by multiplying the results for the four factors: ES = Factor A x Factor B x Factor C x Factor D

Priority Score (PS)

riority Score is obtained by multiplying the results for the three factors:

ES = Factor E x Factor F x Factor G

FACTOR A

Effect on production Output (Factor A)	Factor Score
No significant impact/standby equipment is available	1
Minor impact on production. Unlikely to affect other areas of the plant	2
Failure would have significant impact on output and may affect other sections	3
Major impact on the plant's operations , failure would cause over 40% of plant production to stop	4

FACTOR B

Utilization (Factor B)	Factor Score
Equipment is used on an occasional basis	1
Equipment is required to function independently for up to 50% of available time	2
Equipment is part of a continuous process, required to function for a major proportion of the planned production time	3
Equipment is required to function for all of the planned time	4

FACTOR C

Quality (Factor C)	Factor Score
No effect on product quality	1
Minor effect on product quality	2
Critical effect on product quality and can result in major losses	3

FACTOR D

Effect on Safety or Environment (Factor D)	Factor Score
Little or no risk to the safety of people, equipment or the environment	1
Minor risk to people, equipment or the environment	2
Risk to people resulting in a lost time accident, significant damage to equipment or the environment , which requires notification to relevant authorities	3
Major impact on the plant's operations , failure would cause over 40% of plant production to stop	4

FACTOR E

Frequency of Failure (Factor E)	Factor Score
Failures are rare, less than once per year	1
Occasional failure between 3 and 12 months	2
Failure likely between 1 and 3 months	3
Frequent failures at least once per month	4
Frequent failures at least once per week	5

FACTOR F

Downtime/Repair Time (Factor F)	Downtime	Factor Score
Minor	0 - 30 min	1
Significant	30 - 120 min	2
Major	2 - 8 hrs	3
Severe	> 8 hrs	4

FACTOR G

Waste (Factor G)	Quantity	Factor Score
No waste is generated under normal operating conditions	0%	1
Small amounts of waste are produced by failure	2%	2
Waste is produced during production that is significant	5%	3
Quantities of waste are significant and warrant immediate attention	10%	4

The total criticality score is obtained by multiplying the Equipment Score Score:

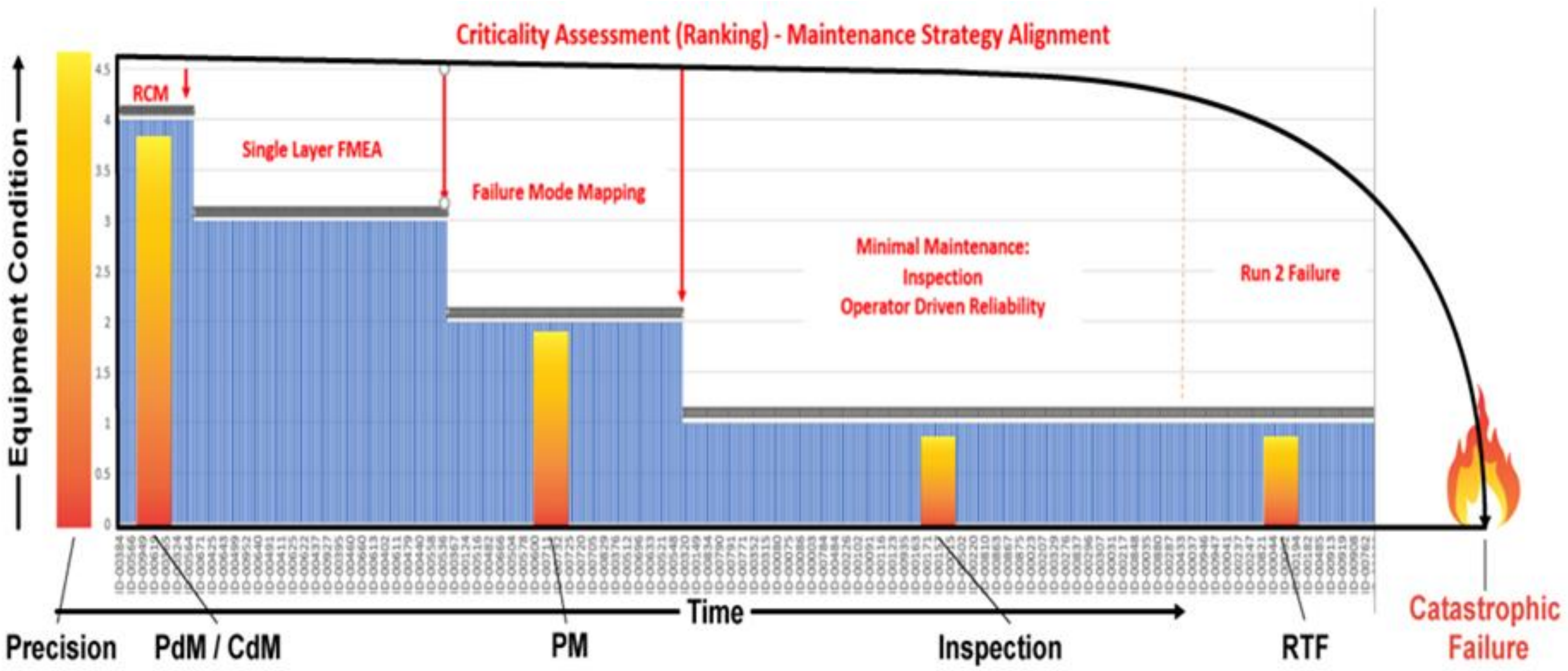
Criticality Score = ES x PS

Note: These descriptions and times demonstrate the principle. Individual companies may be required to amend/modify descriptions and times to meet their own situation.

Equip. Score	Priority Score	Total Score	Cat
AxBxCxD	ExFxG	ESxPS	A,B or C

FLUKE Reliability

Maintenance Alignment - PF Curve



FLUKE Reliability

How is it applied and by whom?

The overall purpose of a criticality analysis is to provide a ranked list of assets in the operational domain to determine the top 20% based on a standard set of criteria. The criteria are selected to represent the criticalness of the equipment to the facility considering the impact to and from multiple disciplined areas within an asset management domain - hence the name - criticality analysis.

Weighted scoring by category or criteria

- Operational severity
- Safety severity
- Environmental severity
- Single point of failure (key inclusion here)
- Maintainability
- Reliability
- Spares lead time

FLUKE Reliability

POLL QUESTION No. 2

Where/how would you benefit most to perform an ACA?

(Click only one answer)

- Better alignment with maintenance strategies
- Provide ability to escape from reactive maintenance
- Improve work execution
- Already completed and using for daily work

Practical applications: Not a one-size-fits-all approach

Facilities maintenance

- Fluke Park (Washington State)
- Main asset type (motor-pump skid, air compressor, HVAC systems)
- Foundational element to a new reliability culture
- Infusion of CBM modalities

A **Created a criticality analysis of Fluke Park equipment list**

B **Ranked critical analysis list**

C **Designed a Preventive Action test schedule and inspection routes**

List important assets			Rank the assets				Relative ranking system	
No.	Asset name	Asset type	Safety critical	Production critical	Repair cost	Environment Impact	Overall criticality	Criticality group
1	#1 Turbine generator	Turbine-gen	5	5	5	5	20	Star
2	#1a Boiler feed pump	Motor-pump	3	5	4	3	15	Critical
3	#1b Boiler feed pump	Motor-pump	3	5	4	3	15	Critical
4	#1c Boiler feed pump	Motor-pump	3	5	4	3	15	Critical
5	#1a Condensate pump	Motor-pump	2	4	2	2	10	Semi-critical

No.	Asset name	Asset type	Safety critical	Production critical	Repair cost	Environment Impact	Overall criticality	Criticality group
1	#1 Turbine generator	Turbine-gen	5	5	5	5	20	Star
2	#1a Boiler feed pump	Motor-pump	3	5	4	3	15	Critical
3	#1b Boiler feed pump	Motor-pump	3	5	4	3	15	Critical
4	#1c Boiler feed pump	Motor-pump	3	5	4	3	15	Critical
5	#1a Condensate pump	Motor-pump	2	4	2	2	10	Semi-critical

No.	Asset name	Screen	Diagnose	Correct/check	Criticality group
1	#1 Turbine generator	Electric/thermal daily	Vibration weekly	Alignment monthly	Star
2	#1a Boiler feed pump	Electric/thermal monthly	Vibration quarterly or as needed	Alignment yearly or as needed	Critical
3	#1b Boiler feed pump				Critical
4	#1c Boiler feed pump				Critical
5	#1a Condensate pump	Electric/thermal monthly	Vibration as needed	Alignment as needed	Semi-critical
6	#1b Condensate pump				Semi-critical
7	#1c Condensate pump				Semi-critical
8	#1a Circ water pump				Semi-critical
9	#1b Circ water pump				Semi-critical
10	#1c Circ water pump				Semi-critical
11	#1a Hydraulic pump				Semi-critical
12	#1b Hydraulic pump				Semi-critical
13	#1 Air compressor				Semi-critical
14	#1 Supply fan	Electric/thermal quarterly	Vibration as needed	Alignment as needed	Non-critical
15	#1 Exhaust fan				Non-critical
16	#1 Blower				Non-critical
17	# 1 Recirc fan				Non-critical
18	#1a Cooling tower fan				Non-critical
19	#1b Cooling tower fan				Non-critical
20	#1a Cooling pump				Non-critical
21	#1b Cooling pump				Non-critical

FLUKE Reliability

Practical applications: Not a one-size-fits-all approach

Manufacturing

- Food manufacturer in Midwest
- Asset type (gearbox, conveyors lines, motors, valves, pumps)
- Tracking OEE (production) and uptime (per line)
  - Have not performed a formal ACA.
  - Was only based on Tribal Knowledge
- Did not align maintenance strategies with criticalness
- Scenario:
  - Critical Valve in Water Tank (repeated failures)
    - Single point of Failure
    - Critical Parts not in inventory

FLUKE Reliability

Practical applications: Not a one-size-fits-all approach

Utilities

- WWTP on West Coast
- Typical asset types:
  - Raw sewage pump, separators, motors, digester systems
  - ACA not done but, on the roadmap
- Typical reactive environment
  - Have not completed an ACA
  - Deploying some CBM technologies
- Ready to move forward with an ACA to improve Preventive Action Maintenance Strategies

Questions

QUESTIONS?

?

Thank you!

Frederic Baudart, CMRP
Frederic.Baudart@Fluke.com
Lead SME Manager,
Fluke Reliability

Gregory Perry, CMRP, CRL
Gregory.Perry@Fluke.com
Senior Consultant,
Fluke Reliability

Next webinar: The rise of the connected worker: implications for maintenance and operations in 2021

BEST PRACTICE WEBINAR
Wednesday, Jan. 6, 11 a.m. ET

The rise of the connected worker: implications for maintenance and operations in 2021

As more plants move ahead with their digitalization strategies, individual maintenance and reliability professionals will find themselves becoming increasingly "connected" in 2021. But what does that actually look like? Where are the biggest differences, what are the speedbumps we should watch out for, and which opportunities are the most exciting?

Keith Larson, editor-in-chief of *Control* magazine, and **Ankush Malhotra**, vice president and general manager at Fluke Reliability, share their insights about what the coming year may hold for maintenance and operations professionals.

Keith Larson

Ankush Malhotra

FLUKE Reliability

To learn more about Accelix and our Webinar Series

SURVEY

Please provide feedback on this webinar by responding to our survey. Do you want a Certificate of Attendance?

WEBINAR SERIES

Visit this page to learn more about our Webinar Series: https://www.accelix.com/community/best-practice-webinars/

DEMO

Visit Accelix.com for a free demo of our Connected Reliability Framework.

FLUKE®

Reliability

THANK YOU AND HAPPY 2021!

www.fluke.com 1-800-850-4608

sales@accelix.com

Accelix™