

# SINGLE POINT LESSON: CRITICALITY ANALYSIS

From RELIABILITY EXCELLENCE FOR MANAGERS Course



## What is it?

A tool used to evaluate how equipment failures impact organizational performance in order to systematically rank plant assets for the purpose of work prioritization, material classification, PM/PdM development and reliability improvement initiatives.

## Why use it?

Formal criticality analysis, something other than a simple 1-5 ranking, allows reliability leaders to determine the leading characteristic that makes each asset critical, be that production throughput, maintenance cost, utilization rate, or safety impact, to ensure that reliability improvements are made based on risk rather than perception.

## What factors are critical for success?

The criticality analysis process should be executed in two phases. The first phase is the initial analysis which requires cross-functional input from Operations, Maintenance, Engineering, Materials Management and EH&S representatives. Cross-functional analysis is required to build buy-in and overcome perceptions of criticality. The second phase is evergreen, meaning that the criticality analysis process must be maintained and re-evaluated throughout the asset or plant life cycle period to determine when risk has been mitigated and the significance of each asset has changed.

## How do you use it?

- Step 1** Define those characteristics that will be used to analyze each maintainable asset. These characteristics should cover a wide range of business attributes, such as:
- Mission impact
  - Customer impact
  - Environmental, Health, and Safety impact
  - Ability to isolate/recover from single-point-failures
  - Preventive Maintenance (PM) history
  - Corrective Maintenance (CM) history
- Step 2** Each characteristic should then be weighted using a scale from 0 to 10 to identify significance to the business. The greater the scale the easier it will be to accurately identify “critical” assets, however, the total score possible should not exceed 100. By setting a limit of 100, you are re-enforcing the “weight” of each characteristic.
- Step 3** Add definition to each delineation point of the weighting scale to accurately score each characteristic.
- Step 4** Import asset hierarchy into criticality analysis tool.
- Step 5** Define the Primary Function for each asset to easily identify the impact of a single-point functional failure.
- Step 6** Analyze the effects of a single-point failure for each asset across all characteristics.
- Step 7** Calculate the composite score, or “Criticality Rating”, for each asset by dividing the raw score (sum of all characteristics) by the total weighted points possible, multiplied by 100.
- Step 8** Identify the top 10% - 20% “Critical” assets.
- Step 9** Looking back through the analysis, identify those characteristics that make each asset critical.
- Step 10** Identify those assets which are significant in areas like “Reliability”, cost, or replacement value and flag for PM/PdM development and/or reliability improvement initiatives.

Asset ID	Equipment Type	Description	Mission Impact	Customer Impact	Safety Impact	Environmental Impact	Regulatory Impact	Single Point Failure	PM / PdM History	CM History	Reliability	Spares Lead Time	Asset Replacement Value	Planned Utilization	Raw Score	Criticality Rating
CS16789	Caster	To pour molten metal into ingot casts at a rate of 495 tons per day	5	2	1	0	1	4	1	5	10	1	6	4	40	33.3
CS16791	Accumulating Conveyor	To accumulate cast ingot from the Caster at a rate of 165 tons per shift	5	2	1	0	1	3	1	1	5	1	3	4	27	22.5
CS16824	Cooling Conveyor	To cool molten metal in casts to solidify ingot within a 24 foot run	5	2	2	0	1	5	1	2	8	3	4	4	37	30.8
CS16852	Casting Wheel	To remove skim material from molten ingot casts before solidification	0	0	1	0	1	2	0	3	10	0	2	4	23	19.1
CS16882	Hydraulic Power Unit	To turn the Casting Wheel at a rate equal to the speed of the Caster	0	0	1	1	1	5	1	0	1	7	3	4	24	20
CS17031	Conveyor Scale	To verify the weight of ingot bundles exiting the Accumulating Conveyor	5	1	1	0	5	5	1	0	6	3	0	4	31	25.8