

Preparations

1. Define the project and gather information:

- What are the **goals** of this project?
- Gather all relevant **documents** available: people included, drawings, databases, spreadsheets, technical descriptions, specifications, environmental conditions, stakeholders etc.

2. Create the framework:

- Define the **purpose** of the FMECA.

What results do you want to find? The purpose can for example be creating barriers against failure, highlight critical components, Hardware/Software interaction issues, etc.

- **Structure.** Consider the purpose of the FMECA and the project targets/ mission success criteria and determine how to structure the analysis the best way. Hardware focus causes a different hierarchy than software focus.

- **The scope.** Rank each subsystem after their importance in the mission and decide which ones to include in the scope, if any. Limit the scope after the purpose of the analysis to a manageable size, more than 10 subsystems start to get big. Define the function of every subsystem concisely included in the scope regarding their purpose to achieve the mission success criteria.

- **Operational phases:** Decide what phase(s) (ex. launch, idle, imaging phase, etc) of the mission that are included in the analysis.

- **Time span** of the analysis. Decide if the whole lifespan is analyzed or only parts of it.

- **Gather the team.** Make sure to include people from each subgroup affected, and preferable a representative from the leadership. 5-10 people.

3. Determine ground rules of the analysis.

- Find general descriptions of the **concepts**: Failure mode, cause, effect and RPN.
- Define the **RPN scales**: Consequence, severity and potentially detectability.

- Design an **FMECA worksheet**. If applicable, reuse old worksheet from a comparable analysis.

Workshop and review

4. Start with **introducing** the FMECA. Explain clearly the purpose of the analysis and the scope. Define failure mode, cause, effect and RPN. However, remember it is a workshop, not a lecture. Consider handing out papers with a description of the scope as well as the definitions. Write it on a blackboard or power-point to make the process more visual.
5. Start with a limited **brainstorming** session, listing as many failure modes as possible. Write down the failure modes (in the right sheet?) according to subsystem or mission success criteria. We recommend using about 10 minutes per subsystem. Another approach could be 10 minutes per mission success criteria, if hardware structure is not determined.
6. If necessary, **sort** all failure modes considering hashtags like subsystems, phase, operational mode, etc. A good structure is important for the value of the FMECA on a later stage.
7. **Review** the failure modes in plenary. Ask if anyone has any failure modes to add. Discuss and find root causes, effects, RPN and countermeasures. Complete current failure mode before moving over to the next. Consider the option splitting the review into several groups, people without knowledge about the current failure mode wasting their time and loses focus.
8. Find a **critical RPN limit** and make sure all failure modes with a higher RPN have countermeasures to lower the RPN under this limit.
9. **Follow up** the review and planned actions. After actions are made, do a new review to confirm the new RPN are under the critical limit.

*These are recommended steps. An important success factor is being able to adapt to the workshop team. Departing from this approach might lead to better results.