Business Growth Hub

44 Factsheet

Process FMEA
(Failure Modes Effects Analysis)

You would use this approach as part of the design or review of your processes in the office or on the shopfloor.

Projected performance gain

Improved

- Ability to understand and quantify potential risks and effects of failure modes at each stage of a process
- More predictable and robust processes.

What investment is needed to understand the concept?

DIFFICULTY

Challenging

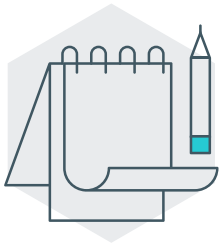
Best results will come from applying this approach with the support of an expert.

ACTIVITY

Team

Best results come from a team and expert guidance.

EQUIPMENT



None

No equipment is needed.

Process FMEA
(Failure Modes Effects Analysis)

Factsheet 44

Explanation of the concept

FMEA is an approach that came out of the Aerospace industry. It was developed to ensure that parts of aeroplanes were designed and manufactured in a way that meant they would not fail in use.

FMEA would typically be used when:

- There is a new technology or new process being introduced
- There is a current process that is being modified or improved
- There is a current process exposed to a new environment or change in physical location.

The approach is to look at each stage of the process and consider possible failure modes and the potential effect if these were to occur. A simple scoring mechanism is used to weight the failure modes:

- Severity
- Likelihood of occurrence
- Ease of detection.

The FMEA table shows how the data is captured.

Failure Mode and Effects Analysis (FMEA) Worksheet

Page		of	

System, Product or Process		Owner		Date	

BACKGROUND				RATING				COUNTERMEASURE			RESULTS			
Description	Potential Failure Mode	Potential Effect of Failure	Root Causes	SEV	OCC	DET	RPN	Owner	Due / Done	Action	SEV	OCC	DET	RPN

Process FMEA
(Failure Modes Effects Analysis)

Factsheet 44

An example of how to use the concept

A potential failure mode might be 'machine cutting tool becomes damaged'.

On a score of 1 (low / infrequent / easy) to 3 (high / frequent / difficult):

- **Severity** might be a 2 as it is a medium risk to the process
- **Occurrence** might be a 1 as it is unlikely to occur frequently
- **Detection** might be a 2 as it is not easy to detect.

Multiplying these scores together 2x1x2 = 4, gives the weighting. This is the Risk Priority Number (RPN).

A Root Cause would be identified and then a Countermeasure proposed. Based on the Countermeasure, the score would be recalculated.

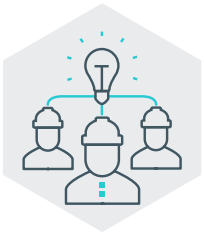
For example, the countermeasure is to check the cutting tool for wear at the end of each shift.

This might improve the detection score to 1, and the new weighting (2x1x1 = 2), down from 4 to 2, reducing the risk of failure and therefore the potential negative effect of the failure.

The higher the score, the higher the priority to find a countermeasure.

What action should I take?

1.



Gather together a group of people using the process.

2.

Explain the concepts behind FMEA.

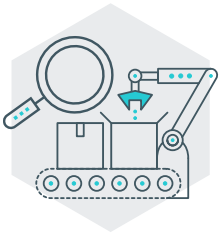
3.

Identify a process where FMEA can be trialled that is not too complicated.

4.

Apply process FMEA and record findings.

5.



Take the findings and consider applying to other processes.

Recommended resources

Bicheno, J. (2004). The New Lean Toolbox. Picsie Books. ISBN 0-9541-2441-3

Stamatis, D. H. (2014). The ASQ Pocket Guide to FMEA. American Society of Quality. ISBN 978-0873898881

For more advice, case studies and additional factsheets visit: www.businessgrowthhub.com/manufacturing

Business Growth Hub

European Union
European Regional Development Fund

In partnership with NORTHERN POWERHOUSE

GMCA GREATER MANCHESTER COMBINED AUTHORITY

Greater Manchester Local Enterprise Partnership

Failure Mode and Effects Analysis (FMEA) Worksheet

Page		of	

System, Product or Process		Owner		Date	

BACKGROUND				RATING				COUNTERMEASURE			RESULTS			
Description	Potential Failure Mode	Potential Effect of Failure	Root Causes	SEV	OCC	DET	RPN	Owner	Due / Done	Action	SEV	OCC	DET	RPN