

# FMEA-MSR

## Step 1: Planning and Preparation

Create a project description and a project plan. Define the scope of analysis, team, time and tool.

## Step 2: Structure Analysis

Visualize the scope of analysis alternatively as a structure tree or block diagram or digital model.

## Step 3: Function Analysis

Formulate and specify functions and function relationships in nets.

## Step 4: Failure Analysis

Visualize the error chain for each product function.

## Step 5: Risk Analysis

Use your knowledge and assign actions to causes and types of errors. Determine the Action Priority using severity, occurrence and detection.

## Step 6: Optimization

Identify risk-reducing actions and evaluate the risk again after their implementation.

## Step 7: Results Documentation

Make FMEA data available for reuse. Inform management (reports, key figures, risks, actions).

### Guideline for Team Members

- You are an expert: Offer expertise.
- Be there exclusively for the FMEA team meeting and prepare yourself. Your input is important for the success of the team.
- Respect the experts next to you – accept different options.
- The team is counting on you!
- Enquiries are not a sign of incompetence.
- Participate actively.
- Take responsibility.

## AIAG & VDA FMEA Alignment



## The 7 Steps of FMEA-MSR

Evaluation of the Severity Criteria			Evaluation of the Frequency		Evaluation of the Monitoring	
10	very high	Affects safe operation of the vehicle and/or other vehicles, the health of driver or passenger(s) or road users or pedestrians.	extremely high or cannot be determined	Frequency of occurrence of the failure cause is unknown or known to be unacceptably high during the intended service life of the vehicle.	not effective	The fault/failure cannot be detected at all or not during the fault handling time interval; by the system, the driver, a passenger, or service technician.  No response during the fault handling time interval.
9		Noncompliance with regulations.	high	Failure cause is likely to occur during the intended service life of the vehicle.	very low	The fault/failure can almost never be detected in relevant operating conditions. Monitoring control with low effectiveness, high variance, or high uncertainty. Minimal diagnostic coverage.  The reaction to the fault/failure by the system or the driver may not reliably occur during the fault handling time interval.
8	high	Loss of primary vehicle function necessary for normal vehicle operation over the intended service life.		Failure cause may occur often in the field during the intended service life of the vehicle.	low	The fault/failure can be detected in very few relevant operating conditions. Monitoring control with low effectiveness, high variance, or high uncertainty. Diagnostic coverage estimated <60%.  The reaction to the fault/failure by the system or the driver may not always occur during the fault handling time interval.
7		Degradation of primary vehicle function necessary for normal driving during expected service life.	medium	Failure cause may occur frequently in the field during the intended service life of the vehicle.	moderately low	Low probability of detecting the fault/failure during the fault handling time interval by the system or the driver. Monitoring controls with low effectiveness, high variance, or high uncertainty. Diagnostic coverage estimated >60%.  Low probability of reacting to the detected fault/failure during the fault handling time interval by the system or the driver.
6	moderate	Loss of secondary vehicle function.		Failure cause may occur somewhat frequently in the field during the intended service life of the vehicle.	moderate	The fault/failure will be automatically detected by the system or the driver only during power-up, with medium variance in detection time. Diagnostic coverage >90%.  The automated system or the driver will be able to react to the detected fault/failure in many operating conditions.
5		Degradation of secondary vehicle function.	low	Failure cause may occur occasionally in the field during the intended service life of the vehicle.		The fault/failure will be automatically detected by the system during the fault handling time interval, medium variance in detection time or detected by the driver in very many operating conditions. Diagnostic coverage estimated between 90% - 97%.  The automated system or the driver will be able to react to the detected fault/failure during the fault handling time interval in very many operating conditions.
4		Very objectionable appearance, sound, vibration, roughness or haptic.		Failure cause is predicted to occur rarely in the field during the intended service life of the vehicle. At least ten occurrences in the field are predicted.	moderately high	The fault/failure will be automatically detected by the system during the fault handling time interval, with medium variance in detection time, or detected by driver in most operating conditions. Diagnostic coverage estimated >97%.  The automated system or the driver will be able to react to the detected fault/failure during the fault handling time interval, in most operating conditions.
3	low	Moderately objectionable appearance, sound, vibration, roughness or haptic.	very low	Failure cause is predicted to occur in isolated cases in the field during the intended service life of the vehicle. At least one occurrence on the field is predicted.	high	The fault/failure will be automatically detected by the system during the fault handling time interval with very low variance in detection time, and with a high probability. During coverage estimated >99%.  The system will automatically react to the detected fault/failure during the fault handling time interval in most operating conditions with very low variance in system response time, and with a high probability.
2		Slightly objectionable appearance, sound, vibration, roughness or haptic.	extremely low	Failure cause is predicted not to occur in the field during the intended service life of the vehicle based on prevention and detection controls and field experience with similar parts. Isolated cases cannot be ruled out. No proof it will not happen.	very high	The fault/failure will be detected automatically by the system with very low variance in detection time during the fault handling time interval, and a very high probability. Diagnostic coverage estimated >99,9%.  The system will automatically react to the detected fault/failure during the fault handling time interval with very low variance in system response time, and with a very high probability.
1	very low	No discernible failure effect.	cannot occur	Failure cause cannot occur during the intended service life of the vehicle or is virtually eliminated. Evidence that failure cause cannot occur. Rationale is documented.	reliable and acceptable for elimination of original failure effect	The fault/failure will always be detected automatically by the system. Diagnostic coverage estimated to be significantly greater than 99,9%.  The system will always automatically react to the detected fault/failure during the fault handling time interval.