



FAILURE MODE AND EFFECTS ANALYSIS

Harley-Davidson is committed to ensuring the safety of our customers and surpassing their high quality expectations. We realize that accomplishing this demands that we emphasize defect prevention versus defect detection. Therefore, we are actively using statistical process control techniques to prevent the production of defective products. In addition to using SPC, the disciplined use of a technique to identify and prevent potential modes of failure must be stressed. Failure Mode and Effects Analysis (FMEA) is a technique that accomplishes exactly this.

The FMEA is a listing of potential failure modes and the causes of these failure modes. An FMEA helps to identify actions required to prevent defects and keep defective product from reaching the customer. Its purpose is to identify and eliminate potential product related process failure modes or continuously minimize the effects of those that cannot be avoided and to document the rationale for establishing a manufacturing or assembly process.

An FMEA of a new or revise process is encouraged to forecast, resolve, or monitor potential process problems. One of the most important factors of a successful FMEA program is timeliness. It is meant to be completed before failures occur, not after. Time spent in doing a comprehensive FMEA, when product/process changes can be most easily and inexpensively implemented, will alleviate crisis. A properly applied FMEA process is continuous and should be a team effort, involving manufacturing, engineering, and others with various areas of experience.

WHAT AN FMEA WILL DO

1. Systematize failure analysis.
2. Identify known and foreseeable failure modes, and their consequences.
3. Rank failure modes according to relative impact on the likelihood of occurrence, severity of failure, and probability of detection prior to complete failure.
4. Help focus engineering and manufacturing attention and corrective action on high-risk errors.
5. Help uncover oversights, misjudgments and errors.
6. Help establish priorities based on expected failures, severity of those failures and the likelihood of the failure escaping detection.
7. Provide a basis for problem follow-up and reporting of corrective action.

The key objective of using an FMEA is to systematize failure analysis and ensure that all possible failure modes for product, systems, or processes have been addressed.



The FMEA is presented in a format arranged to "tell the story" of what happens when an assumed failure occurs. It may be performed on complete products, components, sub-assemblies, or individual parts. The format reflects a "Cause & Effect" approach.

1. "Failure Mode"
2. "Effects of Failure" or consequences
3. "Current Process Controls" to evaluate the likelihood that a failure will escape detection.

The primary types of FMEA's are design and process. These are similar and are completed on a common form. Harley-Davidson may request FMEA's for designs or process operations. Suppliers will be responsible for completing a formal FMEA in accordance to the action items detailed in their PPAP requirements. Further information can be found in the PPAP section of this manual.

See *Potential Failure Modes and Effects Analysis (FMEA)*, Automotive Industries Action Group, (248)358-3003 or contact their internet address at www.aiag.org for additional information.