

Functions

For each item under consideration, the FMEA team identifies the primary functions.

A function is what the item or process is intended to do, usually to a given standard of performance or requirement. For Design FMEAs, this is the primary purpose or design intent of the item. For Process FMEAs, this is the primary purpose of the manufacturing or assembly operation; wording should consider “*Do this [operation] to this [the part] with this [the tooling]*” along with any needed requirement.

Some teams list every function separately, while others combine functions into one larger statement. It is a good practice to avoid long lists of functions with narrow differences, as it adds complexity to the analysis without adding value. It is helpful to list functions separately when they are significantly different. The more precise the description of functions, the easier it is to identify potential failure modes for preventive/corrective action. If specific characteristics are required, they should be included quantitatively as part of the functional description. Care should be taken to include interactions and interfaces between parts.

For System and Design FMEAs, the FMEA Block Diagram and Functional Block Diagram (if done) are both input to establishing the functions, and make this step considerably easier. For Process FMEAs, the Process Flow Diagram is input to the functions.

Thought-starter questions

When identifying functions for System or Design FMEAs, the team can be asked questions such as:

- “What are the primary purposes of this item?”
- “What is the item supposed to do? What must the item not do?”
- “What is the standard of performance?”
- “What functions occur at the interfaces?”
- “What safety-related functions are important for this item?”
- Any other questions that ensure all of the primary functions are determined. (reference “checklist of function types” below)

For Process FMEAs, the operation description is input to the function description, often in the form of “*Do this [operation] to this [part or assembly] with this [tooling]*”. There should be a standard of performance or requirement associated with each function description. The team can be asked questions such as:

- “Is the process function described in the form: do this [operation] to this [part or assembly] with this [tooling]?”
- “What is the primary purpose of the operation?”
- “What is the standard of performance of the operation?”
- “What is the operation intended to do? What must the operation not do?”

- Any other questions that ensure all of the primary process functions are determined (reference “checklist of function types” below)

Requirements

Requirements are measurable characteristics of a product function or its operation. A separate column may be included in the FMEA worksheet for requirements or they can be included in the function description. Functions may have multiple requirements.

In many situations, an existing document may contain detailed information about the functions that the item or step is intended to perform. For example, Quality Function Deployment (QFD) contains design requirements that should be considered in the DFMEA; Technical Specifications contain product requirements that describe the performance objectives and functions of product designs; and the Process Flow Diagram worksheet and Operator Instructions contain process operations that should be considered in the PFMEA.

Properly worded functions, including standard of performance or requirements, will make it easier to identify failure modes.

Checklist of Function Types

There are different *types* of functions. Basic functions fulfill the purpose of a product. Interface functions should be included when they are within the scope of the analysis. Additional functions may be added regarding safety, reliability, product appeal, laws and regulations, product installation, portability, storage, etc.

Here is a checklist of various types of functions to help ensure that no primary functions are missed when performing an FMEA. Choose the types of functions that apply to the given analysis.

- Basic functions (the primary purpose of a product, usually obtained from requirements or specification documents)
- Interface functions (from the FMEA Block Diagram or FMEA interface matrix)
- Safety functions (during manufacture or use)
- Reliability functions (life of the product)
- Product-appeal functions
- Ergonomic functions
- Human-interaction functions
- Legal and regulatory functions
- Functions relating to product installation
- Packaging and shipping functions
- Fluid-retention functions
- Service functions
- Storage functions
- Design for manufacturing or assembly functions