Online Student Guide

Error Proofing

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Learning Objectives

Upon completion of this course, student will be able to:

- Define Error Proofing from a Lean perspective
- Describe its business benefits
- Discuss how it can improve quality and reduce failures and omissions
- Understand and be able to apply the 6-Step error proofing process
- Explain how to implement Error Proofing for both office and manufacturing processes

Introduction

Error Proofing is also called Mistake Proofing, from the Japanese Poka-Yoke [poh kah yoh keh], sometimes pronounced Poka-Yoke [POH kuh YOKE] in English. It is a technique used to make failure—or potential failure—easy to detect, or to prevent it from occurring in the first place.

There are two primary types of Error Proofing, Prevention and Detection. Prevention analyzes the cause of a failure and takes action to stop that cause from occurring. Detection, on the other hand, identifies when a failure has occurred and prevents that failure from progressing through the process to create a defect.

Benefits of Error Proofing

The main benefit of Error Proofing, as the name implies, is to prevent or reduce errors. In any business environment, there are many opportunities for error. Human factors, such as fatigue, forgetfulness, insufficient training, and a lack of understanding are often the reason mistakes are made.

Workplace factors, such as unclear quality standards or misidentification of work items, can also lead to errors. Error Proofing focuses on ensuring that processes run without errors, even when human factors and other external conditions cannot be controlled.

Some examples of common errors in an office environment include: omitting important information when completing an application or other paperwork; processing the wrong item; losing or misplacing paperwork or other items; and skipping steps in a process.

In a manufacturing environment, examples of common errors include: setting up equipment incorrectly; losing or misplacing parts or other items; installing or processing the wrong item; skipping steps in a process; and making incorrect adjustments.
The source of an error is the least costly place to detect and correct a failure. Once a defective item is allowed to move past the source process, all time and money spent to continue processing the item is wasteful.

For instance, as a defective item moves through the process, time and money are spent on inspection and quality control checks that could have been avoided had the defect been identified at the source. Indeed, defects that reach the customer are the most costly of all.

Error Proofing seeks to control quality at its source through prevention or early detection of failures. If each process step produces product that is error free, inspection, rework, and repair loops can be eliminated. With these loops eliminated, each step can be focused on executing specific work activities rather than on identifying and fixing issues.

In addition to its primary benefit of reducing errors, Error Proofing also reduces both the time and cost associated with failure correction.

**Applying Error Proofing**

So far in this module we have explained the purpose and benefits of Error Proofing, and we have described the difference between Prevention and Detection. Now let’s discuss how to initiate and apply this Lean principle.

When initiating Error Proofing, it is important to select a team of people who regularly execute the work steps, because they are the ones who know the most about the work activities. Quality or inspection records will provide good information about common defects that are found, but the work teams have a level of familiarity with the process and errors that can only be obtained by making regular checks and paying close attention.

Each Error Proofing effort must focus on three primary phases within the life span of a defect: cause, failure, and defect.
Let’s look at an example of a defect to highlight each of its three phases.

Imagine that a person who has just moved to a new city uses an online mapping tool to locate a specific store. They enter the address information they have, and the mapping tool provides driving directions. However when they arrive at the destination provided by the mapping tool, they are not at the intended store. The defect in this case is the wrong destination provided by the mapping tool, and the failure is the mapping tool’s inability to recognize the desired store location. But what is the cause? A phone call to the store reveals the cause to be that the person did not have the store’s complete address.

The purpose of Error Proofing is to prevent the cause by detecting failures and defects before they escape to the next step in the process.

In our example, the cause may not have been completely preventable since the store cannot control where or how the customer obtained the address. However, the store can limit the likelihood of error by taking steps to help customers find them easily. For instance, they could publish a map or directions in all their advertisements and link directly from their website to a mapping tool. These are just a couple examples of Error Proofing techniques the store could use to prevent customers from using an incorrect address to find their location. Had this error been detected at the source, the failure would have been avoided, and the defect would not have occurred.

6 Step Error Proofing Process

The best way to detect and prevent defects from occurring is to follow a 6 Step Error Proofing process. Following the define, measure, analyze, improve and control flow, this process will: Identify and describe the defect and failure.

Once this is done, the current standard procedure is reviewed to determine if a deviation from the procedure caused the failure. From this, the root cause or causes of the failure can be determined.

Next, ideas will be generated and a solution chosen. The error proofing device or method will be developed, implemented and tested for effectiveness. The last step is to communicate and train people on the use of the new process.
Guiding Questions

As you document the error, there are several questions that can be used as a guide when investigating what went wrong.

These questions answer the When, Where, What, and Who, and look at the effect of a deviation from a standard, or documented process. It is important at this stage to gather the facts and not place blame. Also, don’t jump to conclusions. Follow the cause and effect chain to get to the root cause - that fundamental breakdown or failure of a process or product, which when resolved and corrected, prevents recurrence of the failure or problem. Any information that pertains to the defect should be collected and analyzed.

Solutions

You have just learned that Error Proofing focuses on three phases of a defect’s life span (cause, failure, and defect) to find solutions for reducing errors, and you have seen the 6 Step process for Error Proofing.

Now let’s look at how solutions are implemented. There are three key types of techniques, or mechanisms, used in Error Proofing.

The first type of technique is an alert, in which the process produces a warning signal when a failure or problem has occurred. An example of an alert that could be used in our previous illustration of the incorrect store address might be a mapping tool that returns a warning message when it is not able to locate an exact address.

A second type of technique is a control, in which the process automatically prevents a failure from moving forward until it has been corrected. Again, looking at our store example, the mapping tool may implement a control mechanism that requires the user to select a recognized address from a selection of similar listings.

The final type of technique used in Error Proofing is a shutdown, in which the process is automatically blocked or cut off when a failure is detected. Shutdown techniques are most often applicable in manufacturing environments. In our example, the mapping tool may require the user to start the request over until a recognized address is entered.

Office Error Proofing Techniques

Let’s recall the two primary types of Error Proofing discussed earlier, Prevention and Detection, as we look at how some specific techniques can be applied in an office environment.
Guides are used in an office environment to prevent information from being entered in the wrong place. An example is any paper form or electronic template that is used to collect a standard set of information, rather than relying on a blank note pad or other ad hoc form of communication. Guides, in this case, fall into the Prevention category because they are used to prevent the cause of a failure.

Checklists can be used to ensure all steps of a process are complete prior to advancing the item. An example might be a checklist that makes certain a project has met all its milestone requirements before proceeding to the next stage. Again, this technique is used to prevent the cause of failure from occurring.

Error identification and warning which provides notification of an abnormality falls into the category of Detection because it serves to prevent a failure from progressing. An example is the warning that appears when an electronic file is closed without saving recent changes.

Similarly, limit switches are used to detect missing or incomplete information. An example is an online form that cannot be submitted without all the required information. Another example that falls into the Detection category is a digital counter, used to ensure correct quantities are present. For example, digital or electronic reconciliation can be used to match a list of transactions to the day’s total. If the totals do not match, the failure will need to be corrected before it is allowed to progress.

Manufacturing Error Proofing Techniques

Now let’s look at how these same techniques might be applied in a manufacturing environment.

Guides can be used in a manufacturing environment to help prevent items from being placed in the wrong position or location. As we saw in the office environment, guides fall into the Prevention category because they stop the cause of a failure from occurring. An example is alignment pins that will only accommodate the correct part, properly aligned.

Checklists, which also fall into the Prevention category, help ensure each step in a work process is complete prior to advancing the item to subsequent steps. Examples include safety or changeover checklists.
Limit switches can be used to prevent and/or detect missing or incomplete items. For example, a filling operation might have a limit switch to keep the process running until it hits the correct weight. In this case, the limit switch would fall into the Prevention category because it prevents the cause of a failure from occurring. When used to detect missing or incomplete items, it would fall into the Detection category.

Digital counters can also fall into either category. For example, a digital counter can be used to ensure a machine continues running until a specific number of parts have been produced, or it can be used to identify when an incorrect quantity of product has been assembled.

Error identification and warning techniques that provide notification of an abnormality fall into the Detection category. An example is an alarm used to indicate a missing part or an empty bin.

**Summary**

So, what do you know about Error Proofing?

To summarize, you know that Error Proofing techniques can be very simple and cost effective. You understand that preventing failures is far more desirable than inspecting for defects because it leads to decreased lead time and processing cost. You know that Error Proofing can be applied in both office and manufacturing environments. And, finally, you understand that Error Proofing teams should be made up of people who regularly execute the work, because they are best suited to identify root causes and develop Error Proofing solutions.