

Mistake Proof Training (Poka-yoke)

Revision Date: 11/2/2015

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Mistake Proofing - Objectives



In this training course, you will:

- Understand Philosophy and our Goal
- Learn how to Mistake-Proof Operator Errors, using controls
- How Inspection fits in Mistake-Proofing
- Learn the three levels of Mistake-Proofing
- Take and “Pass” the Mistake-Proofing Test

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- ▶ Recognize that not just people, but machines and processes make errors
- ▶ Refuse to accept human error as an excuse for the root cause of a problem
- ▶ Use simple, creative, and cost effective ideas to overcome human and mechanical errors
- ▶ Establish a zero defects standard
- ▶ Recognize achieving zero defects is everyone's responsibility
- ▶ GOAL: Using wisdom and ingenuity to provide methods and devices that allow you to do your job 100% defect free -100% of the time.

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Everybody and everything can make mistakes. Mistake proofing helps us so we don't make mistakes.

These mistake proofing ideas we come up with can be simple. One group used a child's plastic pinwheel toy to help them ensure the air was on in one operation.

Human error is not an excuse we can use anymore. If a person makes a mistake, there's usually a problem with the process, not the person.

We all need to use mistake proofing as part of our Problem Solving Process. We need to work toward Zero Defects.

CONTROL - Through Mistake-Proofing

Control- respects the intelligence of people by removing judgment from the situations where errors are most likely to occur, such as:

- Lots of adjustments.
- Look-alike parts.
- Misunderstood instructions.
- Measurement error
- Similar configurations
- Multi-tasking
- Documentation
- Language



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Misinterpretation of Instructions:

SITUATION: You are the chief airplane washer at the company hangar and you ...

- (1) Hook the high pressure hose up to the soap suds machine.
- (2) Turn the machine "on".
- (3) Receive an important call and have to leave work to go home.
- (4) As you depart for home, you yell to Don, your assistant,

"Don, turn it off."

- (5) Assistant Don thinks he hears,

"Don't turn it off."

He shrugs, and leaves the area right after you.

- (6) Refer to the picture on the next page for the results.

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Remember rule #1, people make mistakes. Here's a perfect example of how if a problem isn't mistake proofed, problems could occur.

Mistake Proofing - *Operator Error*



Misinterpretation of Instructions:



How would you Mistake-Proof the error that drove the result above?

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Controls in place to automatically turn off the machine.

Mistake Proofing - *Operator Error*



Being Forgetful:

SITUATION: A doctor from Australia had difficulty starting his aircraft. The battery was dead. With the ignition on, a little choke, **and the brakes off**, he attempted to start the aircraft by swinging the propeller.

The aircraft started but since the pilot forgot to engage the brakes, the aircraft rolled away from him.

At high speed, the aircraft's titanium blade spinning at 85% maximum RPM, the aircraft got away from the pilot and mutilated six other parked aircraft in the hangar causing \$2,000,000 in damage!!

See result of error on next page!

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Same thing, Rule number 1. People make mistakes.

Mistake Proofing - Operator Error



Being Forgetful:



How would you Mistake-Proof the error that drove the result above?

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People do in fact make errors....

**In order to become a zero defects standard
business, we must mistake proof the
PROCESS.**

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Defect Elimination Fallacy - 100% inspection finds 100% of the defects


Please find and count all the F's on this page.

**FINISHED FILES ARE THE
RESULT OF YEARS OF SCIENTIFIC STUDY
COMBINED WITH THE EXPERIENCE OF
YEARS.**

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How Inspection fits into Mistake Proofing

Mistake Proofing 

Defect Elimination Fallacy - 100% inspection *finds* 100% of the defects

Please **find** and count all the **F**'s on this page.

There are 14 **F**'s on this page!!
(watermark behind paragraph)

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Adding inspection will HELP prevent the problem from escaping to the customer but it will NEVER mistake proof the problem because of RULE # 1. people make mistakes.

Mistake Proofing



Everyday Examples:

- ▶ Auto shut-off irons so we cannot make the mistake of leaving the iron on all day.
- ▶ Pause-and-serve coffee makers so the coffee stops brewing when the pot is removed.
- ▶ Automatic sinks in public facilities so the water cannot be left on when someone walks away.
- ▶ Circuit breakers that trip when they are overloaded.
- ▶ Three-prong outlets so we cannot make the mistake of wrong polarity.
- ▶ Buzzers in cars that warn you that you left the keys in the ignition.
- ▶ Interlocked circuits that automatically lock the car when you shift into drive.
- ▶ **Can you think of any others???**

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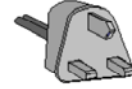
Mistake Proofing - Levels



Strategies to Stabilize Variation

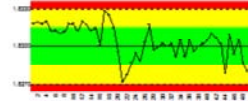
LEVEL 1 DEVICES

- Physical devices that prevent the error at the source.
 - Designing errors out up front through thorough quality planning.
 - One way fits, required actions in order to operate equipment, etc.



LEVEL 2 DEVICES

- Problem detected and corrected during the process
- Warning devices like Control Charts, buzzers, lights, alarms that require a human response.
 - E.g. Control Chart



LEVEL 3 DEVICES

- Helps prevent a defect from going onto the next operation
 - E.g. kick-out device on a gage checking bushing diameters
- May prevent an unsafe condition from happening even though an unsafe act has already occurred
 - E.g. oil drip pan beneath a machine).



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Level 1- BEST
Level 2- Good
Level 3- ok

We want level 1.

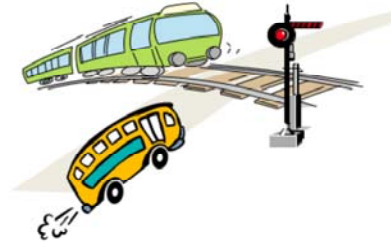
Mistake Proofing - Visual Devices



Indicator - Weak Alert



Signal - Better Alert



Control - Alert/Prevent



Guarantee - True Prevent



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Indicator is a Level III

Signal is a Level II

Control is a Level II (Could be a Level I but it still allows someone to drive around it)

Guarantee- Level I (What is missing from this level I? Guard rail to prevent bus from driving off bridge into train.

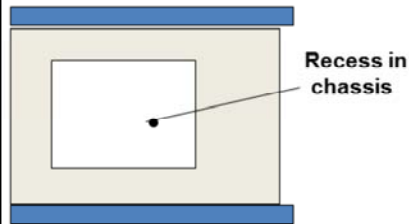
Mistake Proofing - Example (Level 1)



Process Description: A label is pasted into a recess in a molded chassis

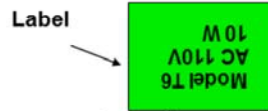
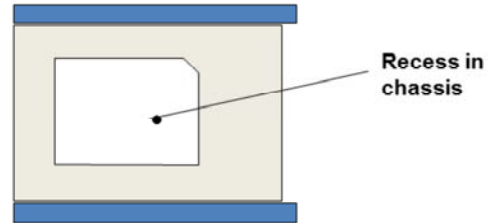
Before Improvement

The recess and the label were both rectangular. The label could be glued in upside-down.



After Improvement

A notch was made in the corner of the label, and in the recess of the chassis. Incorrect mounting is completely eliminated.



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Good example of a PROCESS improvement.

Mistake Proofing - Example (Level 1)

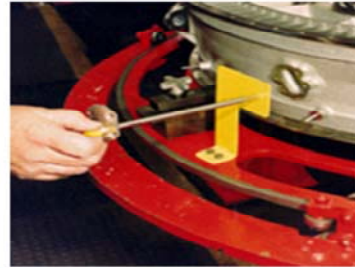


ERROR

Putting oil fill tube into wrong port.

LEVEL 1 DEVICE

Added physical Stopper Gate such that oil fill tube can now only be installed in the correct port.



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Control device put in place to prevent installation in wrong location

Mistake Proofing - Example (Level 1 & 2)

Example Level 1 & 2 Mistake Proof - Speedy Dry

UNSAFE ACT
Putting into speedy dry container various other shop debris.

LEVEL 2 DEVICE
Warning label to only dump used speedy dry into container.

LEVEL 1 DEVICE
Added physical screen such that only the speedy dry would be able to go into container.

Larger items collect at top of screen.



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Mistake Proofing - Example (Level 3)



The "Unsafe Act" or "Defect" has occurred; Oil leaking out of the machine.

The Drip Pan prevents the oil from getting onto the floor and causing an unsafe condition.

How could we do better?



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Alarm when leaking
Automated shut off for machine when leaking.

Mistake Proofing - Example (Level 3)



PPE may be considered a Level 3 M/P device for the "Mistake" or "Unsafe Condition" is still present (i.e., fumes, sharp blade, chemicals, etc.) but is minimized by the use of PPE.



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A opportunity for a defective part is still there but level III will help minimize the possibility of nonconformance

Mistake Proofing - Example (Level 1)



Physical Barrier - Resulting from a Forklift Accident



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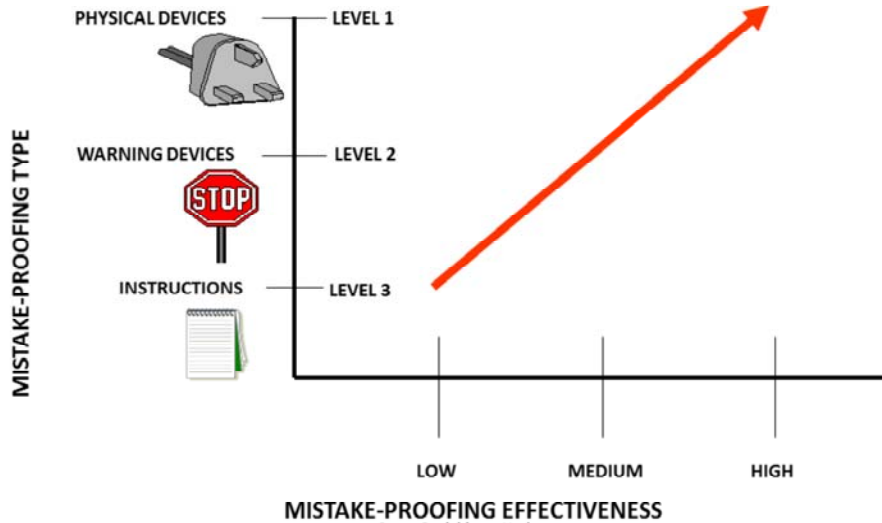
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Physical barrier to prevent forklift from injuring employees. Level I

Mistake Proofing




Mistake Proofing Effectiveness vs. Level



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The lower the mistake proof, the lower the effectiveness. Think outside of the box for simple solutions.

Mistake Proofing - Proofing Test



You should be able to answers "YES" to all

	<u>YES</u>	<u>NO</u>
<input type="checkbox"/> PREVENTS REOCCURRENCE?	<input checked="" type="checkbox"/>	
<input type="checkbox"/> COSTS \$0 - \$500?	<input checked="" type="checkbox"/>	
<input type="checkbox"/> MADE WITH WISDOM & INGENUITY?	<input checked="" type="checkbox"/>	
<input type="checkbox"/> SIMPLE TO USE?	<input checked="" type="checkbox"/>	
<input type="checkbox"/> EASY TO IMPLEMENT?	<input checked="" type="checkbox"/>	
<input type="checkbox"/> DURABLE?	<input checked="" type="checkbox"/>	
<input type="checkbox"/> EASY TO MAINTAIN?	<input checked="" type="checkbox"/>	
<input type="checkbox"/> DOES NOT HINDER OPERATOR?	<input checked="" type="checkbox"/>	

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Purpose: This slide gives some guidelines to follow when creating a Mistake Proofing device.

Main points:

- You want to be able to answer yes to all these questions to insure that you have an effective Mistake Proofing device.
- It's ideal if your device has all these features but, if circumstances arise and you are unable to obtain this level it may be acceptable (something is better than nothing).

Mistake Proofing - Effectiveness

NMG
AEROSPACE

NASTY TEST
GO AHEAD
TRY TO
MAKE IT
FAIL!



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Purpose: To inform the audience of a test that can be performed to insure the success of the Mistake Proofing **device**.

Main point:

- The nasty test is a test that we need to do during the design stage of the mistake proof device or as soon as close as we can to that stage.
- Its nasty because we want the operator to try and fail. They should use the device with the intent on trying to make it fail. If it is impossible to fail than you truly have a Mistake-proof device.

Mistake Proofing - Worksheet



Record #:	Level of Mistake Proof (Check One)		
	<input type="checkbox"/> Level III - Detects a mistake after it has occurred	<input type="checkbox"/> Level II - Alerts you as a mistake is happening	<input type="checkbox"/> Level I - Prevents a mistake from happening
Brief description of process and situation:			
Condition Before Improvement: Brief problem description plus if applicable sketch, photo or drawing		Condition After Improvement: Brief solution description, plus if applicable sketch, photo or drawing	
This Mistake-Proof has been communicated to the following departments/groups:			

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A great tool to show the before and after of a condition. This is a good success story to post so that others see what is being done.