Published by :
http://www.ijert.org

International Journal of Engineering Research & Technology (IJERT)
ISSN: 2278-0181
Vol. 5 Issue 04, April-2016

Verification of External Parameters of Residual Current Circuit Breaker to Ensure the Security of Packaging

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***Abstract*— The paper aims at objective for testing the product before packaging. The product so tested here is the AC type residual current circuit breaker. The testing deals with following parameters barcode, punch mark, toggle, locking clip and logo of the company. This testing in the industrial application is very essential to reduce risk of packaging the vague products.**

Keywords—Barcode,Punch Mark, Clip Presence,Switch And Logo

I. INTRODUCTION

The project deals with testing of residual current device before packaging of the product. It aims at checking the parameters like barcode, punch mark, clip presence, printing, and switch. Image processing is the major role in this process. It is used in industrial applications such as manufacturing industries.

Product testing seeks to ensure that consumers can understand which products is the best value. Product testing is a strategy to increase consumer protection. The process of product testing was the beginning of the modern consumer.

Product testing is accomplished by a testing department, an independent test plant, a government plant, etc. Often an existing test method is used as a basis for testing. As with growing technology engineers develop various kinds of test methods. These testing method subjects secure production.

Product testing have a variety of purposes, such as:

To verify whether the regulations and specifications of the contract are met . To determine the new product establishment on the track. Provide conceptual algorithm for the newer idea. Provide standard data for scientific, engineering, and ensure quality assurance functions. Provide a fundamentals for technical communication. Provide reports in evidence of legal proceedings . Help solve problems with current product. Help identify potential cost savings in products.

II. SCOPE

Barcode quality is more important today and forever. In the early days of retail scanning, a bad barcode was an inconvenience. Today a low standard barcode can be a huge liability. Barcode quality includes the quality of the printed barcode image and the encoded data in the barcode. You cannot rely on just a verifier to manage barcode quality risk.

Barcode Verification is the most easy way to ensure that you are printing good barcodes. Bar Codes are the cheapest and authentic way of entering data. Barcode attestation is the best way to ensure 100% scan ability. Clip presence for the product ensures that the product is the first time use and is the seal given by the company. It is the locking the product by the clip.

This project enables the device to be tested for the packing of the residual current device. These tests are very important according to the credentials of the industry.

III. RESIDUAL CURRENT CIRCUIT BREAKER

An Residual current circuit breaker, or residual current device, is a life-saving device which is designed to prevent from getting a deadly electric shock if touched something live, such as a bare wire. It can also provide some protection against electrical fires. There are three types of residual circuit breaker devices

Type **AC**: RCD for which tripping is protected from residual sinusoidal alternating currents.

Type **A**: RCD for which tripping is protected from AC, for residual pulsating direct current, with or without phase-angle control, independent of the polarity.

Type **B**: RCD for which tripping is protected as for type A, for residual sinusoidal currents up to 1 kHz, for residual sinusoidal currents superposed by a even direct current, for which results from rectifying circuit three-pulse star analogy or six-pulse bridge analogy, two-pulse bridge analogy line-to-line with or without phase-angle control, independently of the polarity.

By definition, AC current constitutes of positive and negative half cycles with respect to zero reference point, and an AC fault current flows towards earth at any point during either half cycle. An AC Type RCD will only trip in responds to either of half cycles of the AC earth fault current, whereas an A Type RCD will responds to both the half cycles.

IV APPLICATION OF RESIDUAL CURRENT DEVICE

RCDs are intended to provide protection against electric shock, which can result from a person touching an exposed live conductor (Direct Contact) or touching exposed metalwork which has a dangerous touch voltage (Indirect Contact).

International Journal of Engineering Research & Technology (IJERT)
ISSN: 2278-0181
Vol. 5 Issue 04, April-2016

According to IEC 60479, two key levels of electric current need to be considered with regard to shock protection.

V BLOCK DIAGRAM

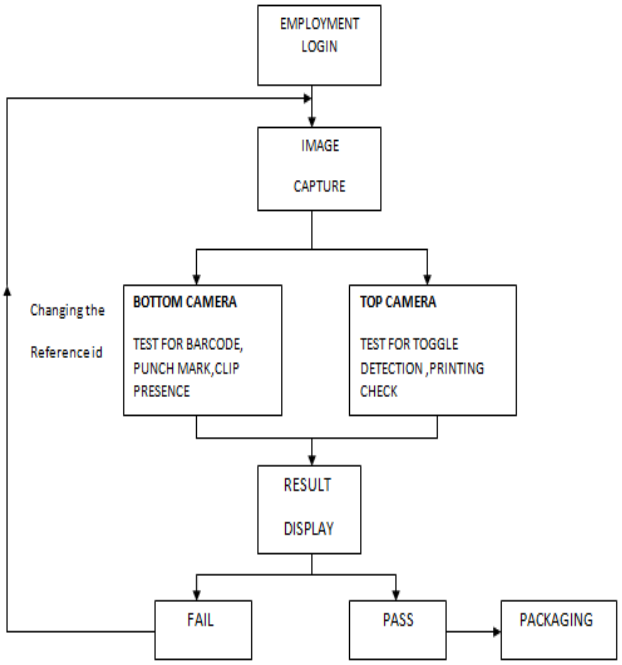

Fig 1: Block diagram

- Employment login:

In this step the operator will login using the user name and password. As the operator logins, and clicks the ok button, there appears the window where the operator as to enter the details of the product.Ex: reference id, barcode, sensitivity etc

- Image Capture:

After login step the operator places the product on the conveyor belt it moves towards the lab view vision module to capture the image.

- Front Image:

The front image consists of toggle detection and printing check of the product. Here toggle refers to on/off button or switch of the residual current device. This should be always off during testing and packaging of the product. Printing check refers to checking the logo of the company.

- Back Image:

The back image consists of barcode, punch mark and clip presence.

- Result:

The result of front image and the back image are monitored for comparison with the lab view database which is already stored the pc. The result is displayed on the screen.

Fig 2: Residual current circuit breaker device

VI IMAGING PROCESSING

- Imaging:

The image of the product is captured as front image and back image. The front area of the image consists of logo of the company, the switch. The back area of the image consists of barcode, punch mark, locking clip. Since the obtained image consists of noise factors and also having low intensity and low contrast. The obtained image has to be processed with image enhancements techniques to reduce noise factor, increase the intensity and contrast of an image

Consider an image of the product whose resolution is 256X256 which is an RGB image. The image in G-plane is used. Because in R-plane the intensity is too high, where the image is too bright. In the B-plane the image is more dark so we consider the image in G-plane where the intensity and contrast are balanced.

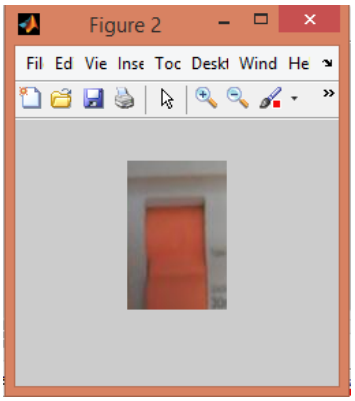

Fig 3: Image of a switch/toggle

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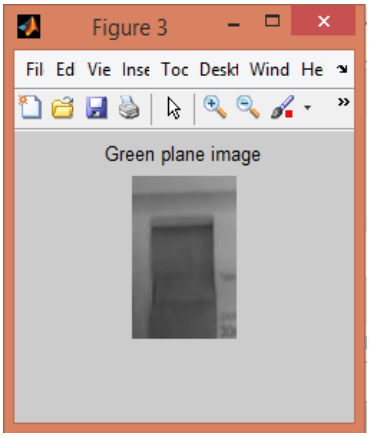

Fig 4: Green plane image of switch/toggle

- Filtering:

Filtering is the process of improving the visual impact of the information content in an image. The main objective of filtering is to removal of the noise and blurring of an image. We are using median filtering. Median filtering allows the preservation of image features and removal of impulsive noise. In this filtering the input pixel is replaced by median of pixels contained in the window around the pixel.

$v(m,n)=median\{y(m-k,n-l),(k,l)=W\}$

- Intensity Enhancement:

The intensity of the image is increased. Brighter image appears to be brighter. Less bright image appears to be bright.

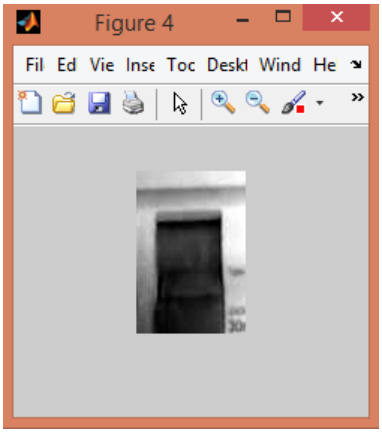

Fig 5: Intensity enhanced image

- Contrast Enhancement:

The technique for improving image contrast is among the most widely used in image enhancement processes. To produce an image with optimum contrast ratio, it is important to use the entire brightness range of the display medium.

VII RESULTS

- Verification of logo:

Once the image is processed for the above enhancements checks are to be taken .

To determine the logo presence particular area of the image is captured which is stored as test value and logo of the image is stored in the database when both the values are compared it indicates the logo is present .Else the logo is absent.

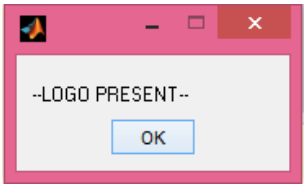

Fig 6: output for logo

- To determine the clip presence:

Area is calculated, if the area of that particular region is greater than the specified which means that the clip is present. Consider that the clip area is 1000 then when the image is captured, the captured area for the clip, Area>1000 which indicates that the clip is present. Else the clip is absent.

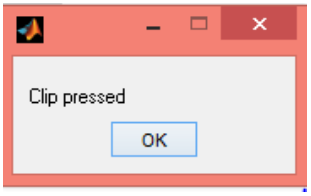

Fig 7: output for clip pressed

- To determine the punch mark:

The area of the punch mark is indicated as 1 , when the image is processed for punch mark that area >1 which represents that punch mark found. Else the punch mark not found.

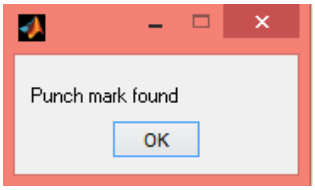

Fig 8: output for punch mark

- To determine the toggle condition:

To examine toggle to be off condition. The toggle in the off condition is indicated as 1 and the toggle in the on condition is represented as 0, 1. So when the image is processed for toggle, if the image captured is in the off condition then toggle is off. Else the toggle is on, which indicates as error.

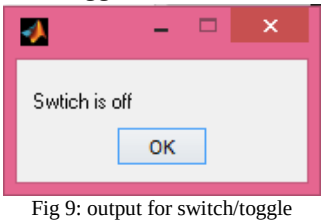

Fig 9: output for switch/toggle

- To verify the barcode:

For barcode the image is captured, the barcode which is present on the product is compared with reference value stored in the pc. If both matches then barcode is correct. Else incorrect result is indicated.

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ISSN: 2278-0181
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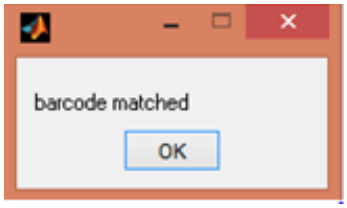

Fig 10: output for barcode matching"

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