

CLAIMS

1. A computer-implemented method for inspecting conditions of packaged products within a carton box (20), the method comprising the steps of:
 - 5 moving, by a conveying system (30), the carton box (20) to an inspection station (10);
 - capturing, by an image capturing device (12), at least one image containing the carton box (20) from an angle where the packaged products are exposed;
 - removing, by an image processing unit (70), background and the carton box (20) from the captured image such that only the contents of the exposed package products are
 - 10 remained;
 - segregating, by the image processing unit (70), the exposed packaged products into predefined amount of image segments; and
 - comparing, by the image processing unit (70), the image segments to identify for dissimilarity among the image segments based on a predetermined threshold value,
 - 15 whereby an occurrence of a dissimilar image segment represents a defect;
 - characterised in that the carton box (20) is removed from the captured image using a hough line transform technique, the technique comprises the steps of:
 - determining intersection points on an outer periphery of the captured image;
 - eliminating the outer periphery intersection points;
 - 20 repeating the above steps until a new outer periphery has four equal sides;
 - linking the intersection points to form a region of interest; and
 - removing the rest of the portions within the captured image such that only the region of interest is remained, whereby the region of interest represents the exposed packaged products.
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2. The method according to claim 1, further comprising the step of moving, by the conveying system (30), the carton box (20) through the inspection station (10) to a sealing station (40) in the event of no defect is detected.

3. The method according to claim 2, further comprising the step of ejecting, by a rejection station (80), the carton box (20) out from the conveying system (30).
4. The method according to claim 3, further comprising the step of sounding an alarm system (83) upon the detection of defect.
5. The method according to any one of claims 1 to 4, further comprising the steps of detecting, by a sensor (82), the carton box's (20) position; and triggering, by the sensor (82), the image capturing device (12) to capture the at least one image when the carton box (20) reaches the inspection station (10).
6. The method according to any one of claims 1 to 5, wherein the background is removed from the captured image using a background segregation algorithm, the algorithm comprises the steps of:
 - capturing, by the image capturing device (12), a background image of the inspection station (10) without the carton box (20); and
 - comparing, by the image processing unit (70), the captured image with the background image to remove the background.
7. The method according to any one of claims 1 to 6, further comprising the steps of:
 - applying a batch brand inspection algorithm (142) on the image segments to identify whether the packaged products are of the same brand;
 - applying an orientation algorithm (144) on the image segments to identify the packaged products are of the same orientation;
 - applying a missing inner algorithm (145) on the image segments to determine there is any missing packaged product;
 - applying a foreign object algorithm (143) on the image segments to detect any non-packaged products related object;
 - applying a sizing inspection algorithm (141) on the image segments to determine if

the packaged products are of the same size;

8. The method according to any one of claims 1 to 7, further comprising the step of providing polarized lighting towards the exposed packaged products to reduce light
5 reflection during the image capturing.

9. The method according to any one of claims 1 to 8, further comprising the step of obtaining, by a weighting measuring device (14), weight information of the carton
box.