

How we can compare the quality of embossing in an efficient manner using a test patch.

Embossing text, logos or other image features on folding cartons creates the perception of a high-quality product. The Embossing process, however, requires proper tools and the process parameters to be set up within a narrow range to achieve consistent and good-looking results. The use of Spectrophotometers and Densitometers to control color and appearance is state of the art today. The quality control of embossing features is now becoming more and more important. The most important parameter for high quality embossing is the embossing depth. Low embossing depth will not show tactile effects on the packaging. If embossing depth is too deep, the cardboard may rupture and the package is damaged. The target therefore is to setup the process parameters such as the embossed features are as deep as possible but the cardboard will not be damaged.

Embossing Depth is the difference in height between two surface levels: the non-embossed cardboard surface and the embossed area. But cardboard is not as stiff as steel and can show a warp. Similarly, the surface is not perfectly plain but more or less rough due to the fibers. The same is valid for the embossed area. This makes it necessary to measure at several locations and to calculate an average for the embossed area and non-embossed area. One surface measurement and one embossed area measurement is not representative for embossing quality control at all.

The CREASY EGUIDE-PRO developed by PERET GmbH supports the operator in measuring embossing depth. The device scans over an area of approximately 10mm by 70mm capturing 640,000 depth measurements. Based on these measurements a 3D image is created. The software automatically detects cardboard surface and embossing area, calculates the height difference, and displays the embossing depth in microns. Many companies dealing with embossing are using the CREASY EGUIDE-PRO Device on a daily basis.

The CREASY EGUIDE-PRO measures any type of embossing or sub-regions of larger embossing features. Embossing features with small lines can not be embossed as deeply as larger areas as small lines are prone to rupture the substrate. Larger embossing areas have to be embossed more deeply to create a proper tactile effect. The CREASY Software allows the specification of different target depths and tolerances for different embossing scenarios.

The substrate and embossed features are not completely rigid and makes it essential to always position the sample the same way and in exactly the same position below the measuring instrument. This assures that the identical area is measured. The scanned area needs to contain both embossed and non-embossed areas, requiring the operator to pay close attention while using the system.

In order to make the handling faster and less sensitive to positioning PERET has developed the Embossing Test Patch. Similar to a color control wedge, the Embossing Patch represents the quality of the other embossed features on the card board.

Therefore, the Embossing Test Patch has to represent the behavior of fine lines and tiny features as well larger areas subjected to high tool pressures. The Test Patch needs to represent more than one depth as the embossing features will have different depths depending on the design of the feature. Further the Test Patch needs to be as small as possible to fit into the gluing flap while being large enough to be representative for measurements. Finally, the positioning on the EGUIDE-PRO table and scanning should be quick and easy to support an efficient quality control procedure during production.

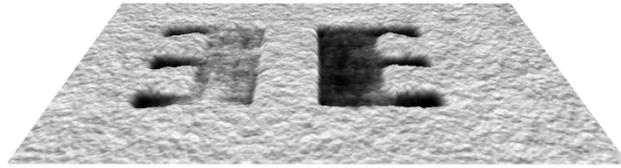
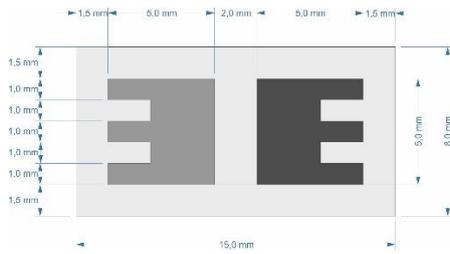


Figure 1: Test Patch Definition Figure 2: Scanning Image of Test Patch

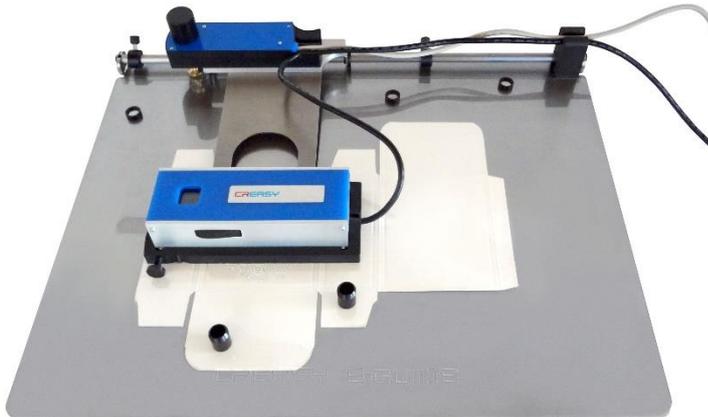


Figure 3: CREAMY EGUIDE-PRO

The Figure 1 shows the geometry of the Embossing Test Patch. It fits into an area of 15mm by 8mm and contains two elements that will be embossed with different depths. The depth of one element should be slightly less than the minimum depth of any other embossing feature on the card board. The depth of the second element should be slightly deeper than the depth of any other embossing feature on the card board.

Each of the two elements are composed of 3 fine lines and small distances between the fine lines. The behavior of the cardboard between the fine lines can also deliver information about the embossing process. Further, the larger area will support the tools against high pressure and delay a break through of the entire element.

During production the two elements are scanned in one pass. The depth of any embossing feature on the card board box will lie between the two depth measurement values.

Figure 2 shows the resulting scan of the Embossing Test Patch measured with the CREAMY EGUIDE-PRO. The fine lines will emboss more deeply than the larger areas, which can easily be seen in the image.

Field tests have shown a good correlation of Embossing Test Patch depth to the embossing depth of other features like text or logo on the same card board box. The specification of the embossing depth for the test patch is sufficient to guarantee a constant embossing process and a high-quality final product. The measurement process is more efficient and repeatable than checking a random embossing feature. The identical Test Patch can be used for any packaging and any card board allowing the embossing behavior to be compared between jobs. Using the identical Embossing Test Patch for every job quickly give you insight into the process and the different behavior of the same tool with various material can be analyzed and understood.

The Embossing Process now can be a fully controlled process. The technology is available and the usability fits any production process. The procurement for packaging can now specify embossing depth and verify that products are within the specification.