Cardboard box with tear-strip/ inner foil bag

The crackers are packed in a metallised foil inner bag in a cardboard box with a tear- strip opening mechanism.

Figure 1 Cardboard box with tear-strip and inner foil bag is studied.

Focus area
The opening procedure for the cardboard box is to grip the tear-strip marked by an indentation in the top of the packaging and pull it open. The bag is sealed so two sets of wings appear and are opened by separating them as the sealing is peel-able.

The basis for analysing this packaging will be opening strategy and end user studies. It is especially important to find out whether the end users use the opening mechanisms correctly. Furthermore it is interesting to study whether the tear-strip makes a clean tear without breaking as this is often a problem. The peel-ability of the sealing is also studied. The manageability is studied through opening strategies and end user studies. In connection with this the use of graphics and form as an aid for the opening strategy is also studied. The physical force needed for opening is examined as well.

REFFERENCE TO GUIDELINE: Physical force, Graphics and choice of colour, Opening strategy, End user studies.

Form
A lot of end users know the tear-strip opening mechanism. This tear-strip though would benefit from a larger grip surface in order to be easier to get a grip on. Furthermore the foil bag could benefit from improvement regarding opening friendliness.

Design
The tear-strip on the cardboard box is marked “TEAR HERE”. However, it is not very obvious due to the choice of colour blending very much in with the other graphics of the packaging. This could be made clearer by using a sharper contrast and larger print.

Mechanical test
The mechanical opening force was measured using a traction bench (see Figure 1). The mechanical measurement of the tear-strip pulling corresponds very well with the end users actual actions in order to open the packaging. The mechanical test of the bag’s opening is different than the one described in the beginning. This is due to the fact that the end user study was conducted after the mechanical tests and was a preliminary suggestion of how the end user opens the packaging. This illustrates how important it is initially to have insight in how the end user handles the packaging before choosing the mechanical test method.

The pulling force was measured to 5±0.6N for the tear-strip on the cardboard box and 2.5±2.4N for the ripping strength needed for the bag.

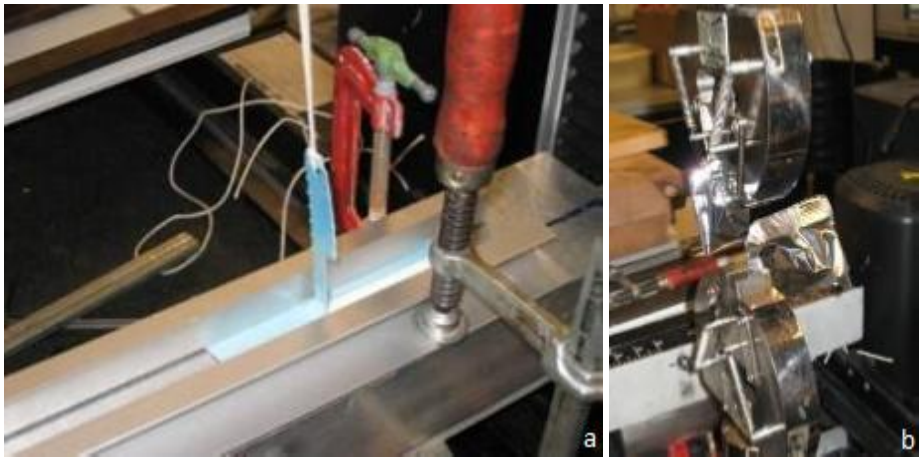

Figure 2 Mechanical measurement of the pulling force of a) tear-strip in cardboard box (1. step) and b) ripping strength for the foil bag (2. step)-

End user's physical force needed

A calculation model has been developed for the guideline estimating the end user's critical force needed related to different packaging types. This is not a statistically valid model but it can be used as a practical help in choosing dimensions and opening force needed. By inserting the measured mechanical values, the critical force needed by the end user can be estimated. In this case we are able to see how many men and women in different age groups are able to open the cardboard box by pulling a flap with the dimensions present on the cardboard box. The model for flaps and bags are applied as this is the most comparable for the opening strategy for the cardboard box and the foil bag. By inserting the force needed to open the bag (5N) which is the largest force needed when box and foil bag are compared the model estimates that practically all men and women regardless of age can open the packaging (Figure 3). Further information on the model and background data can be found in the guideline under "Calculation of critical force".

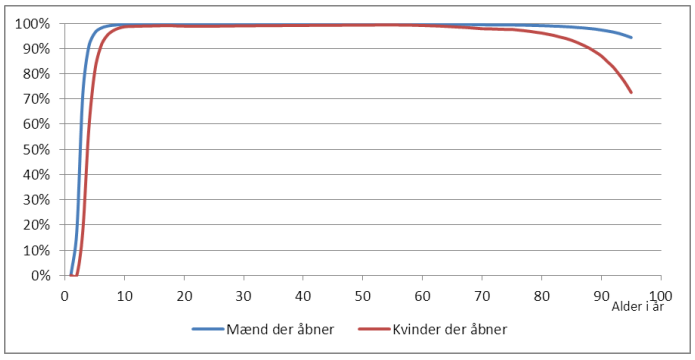

Figure 3 Share of men and women able to open flaps and bags (opening mechanisms similar to the tear-strip and the foil bag), a 1 cm long flap with an opening force of 5N (Model based on data from DTI, UK 2002)

End user test

In relation to an evaluation of the new technical specification "DD CEN/TS 15945:2011 Packaging. Ease of opening. Criteria and test methods for evaluating consumer packaging" user tests were conducted in 2008 at Danish Technological Institute with this type of cracker packaging. Test users consisted of 30 randomly chosen elderly people in the age group of 50-90 yrs. Of these 1/3 was men and 2/3 were women. Half of the group had a physical ailment, e.g. arthritis in the hands. The group was asked to open the packaging

and then evaluate how easy or difficult they found it on at scale from 1 to 5 where 1 is very easy and 5 is very difficult or impossible to open. The result is depicted in Table 1.

The study surprisingly showed that more than 25 % did not find the packaging easy to open in spite of the low amount of strength needed to open it. The explanation is that this is a double packaging which a lot of end users found unnecessary and difficult. Especially the tear-strip has a bad reputation. Several end users fought to get a good grip on the tear-strip because they didn't employ the good technique of pushing the box edge making the top flip up in order to get a finger under it. Furthermore a lot of the end users were prejudiced concerning that the inner would need scissors in order to open easily. Most of them used the described opening strategy and therefore further instructions weren't necessary.

Table 1 End user test of how the cracker box was to open on a scale from 1-5, where 1-2 is easy to open and 4-5 is difficult or impossible to open. The test group consisted of 30 persons, men (M), women (F), with (D) or without (N) physical ailments affecting their hands. Number of persons in the group is given in parentheses

End user's evaluation of the cracker box	MD (1)	FD (11)	MN (8)	FN (10)	Total (30)
Difficult to open	0 %	9 %	0 %	0 %	3 %
Easy to open	0 %	73 %	88 %	70 %	73 %

Conclusion

In spite of the mechanical test showing that this packaging didn't require much strength to open, more than 25 % of the end user group in the study didn't characterize the packaging as being easy to open. This is primarily due to the fact that it is a double packaging and that the tear-strip often breaks in the opening process. If scissors had been available they would have used it to open, even though this wasn't necessary (a fact they didn't realise until they had tried opening without any scissors available).

Thus in order to improve this packaging entirely new opening mechanisms are required where especially the tear-strip is improved or replaced by some other method. Integrating the inner foil bag in the outer packaging making it one single packaging would also increase the user-friendliness.

These suggestions to improvements are pretty obvious. If the company requires more unorthodox or innovative solutions we suggest that a workshop for idea generation is held (see User-friendly Packaging - Guideline for the industry).