

Cold cuts in a hard plastic packaging with easy-peel top foil

This packaging is a thermoformed plastic tray with flexible top foil equipped with flap and easy-peel for easy opening. The opening flap is a triangle dimensioned $1 \times 1 \text{ cm}^2$. Some types of the packaging are equipped with a small knob separating the two layers of the flap.

Focus area

The opening mechanism of this cold cut packaging works by lifting the flexible top foil off the tray. This starts by lifting the flap in the corner

of the packaging. The base for analysis can therefore be mechanical measurements and end user studies of the opening, both concentrated on the use of force needed. On top of this a design analysis of the packaging concerning graphics and choice of colour, design and end users' opening strategy should be conducted.



Figure 1 Cold cuts plastic tray with flexible top foil, opening flap (1X1 cm) and easy-peel.

REFERENCE FOR GUIDELINE: Physical force, Design, Graphics and choice of colour, Opening strategy.

Form

Empirically the size of the flap is a bit short of what has earlier been stated the optimal size in relation with easy-opening. In The Danish Centre for Assistive Technology's report from 1999 they recommend that the flap should be quadratic and min. $2 \times 2 \text{ cm}^2$. The conditions get even worse if a particularly hard welding is used to keep the materials together.

Design

It is a well-known fact that a lot of end users find it difficult to identify the corner where the opening mechanism is placed. Furthermore it can be difficult to separate top and bottom film.

Mechanical test

In order to simulate the end user's opening force it is important to choose an arrangement simulating the real opening situation closely. When measuring the pulling force needed for the cold cuts tray a pulling force of $9 \pm 1.7 \text{ N}$ was measured (Figure 1). The mechanical test is considered to present the end user's action based on observations and the measured pulling force is therefore considered to be valid. In the mechanical test 10 subjects were tested, and of these one requested a significantly higher pulling force (17.5 N). If this is a representative spot check it means that 10 % of this type of packaging has a harder welding and thus are more difficult to open.



Figure 2 Mechanical measurement of the pulling force needed to open a cold cuts tray with flexible top foil and easy-peel (separation of top and bottom film).

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. Based on dimensions and force measured the model illustrates which people potentially could have difficulties opening the packaging.

A pulling force of 9 ± 1.7 N means that the larger part of both men and women can open the packaging (see Figure 3a). The one packaging out of the 10 tested requiring more pulling force entails quite another number of men and women who can open the packaging. The calculation model is able to show what this change means in a simple way. The change means that all age groups of both sexes potentially will experience difficulties in opening the packaging (Figure 3b), and more than 60 % of all women will not be able to open it. Therefore it is not only important to produce a packaging which is easy to open but it is also essential to conduct a quality control that ensures the opening force to be at the appropriate level. If the packaging is too difficult to open a potential dangerous situation may occur as the end user often will turn to using tools such as a knife or scissors (User-friendly packaging - Guideline for the industry). Further information on the model and background data can be found in the guideline under "Calculation of critical force".

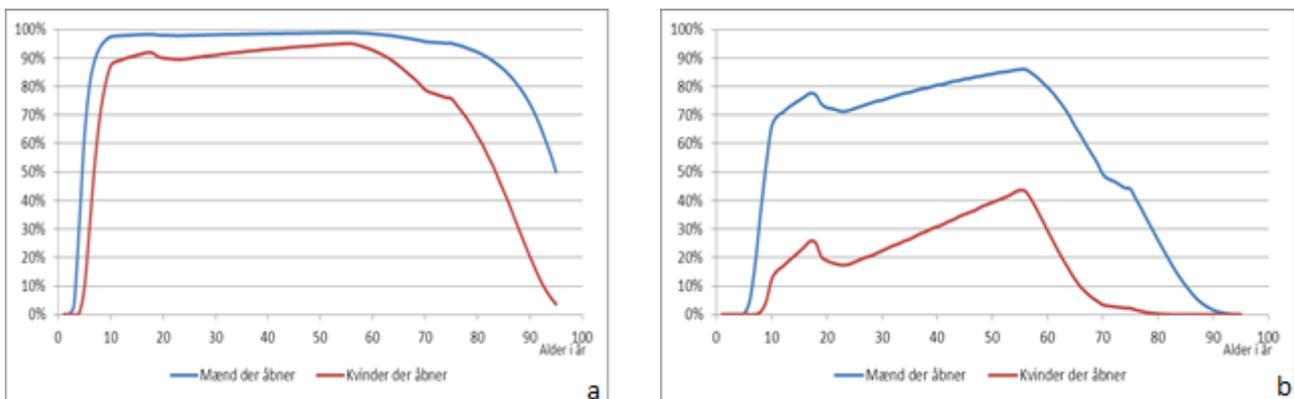


Figure 3 Share of men and women able to open the thermoformed cold cuts tray with welded lid using flaps (1×1 cm² triangle). The opening force is 9 N (a) and 17.5 N (b) (Model based on data from DTI, UK 2002).

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 cold cuts tray. Test users consisted of 29 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.

Most of the test persons – both with and without ailments – experienced difficulties in opening this packaging. Several of the test persons were prejudiced that especially this packaging would be tough to open. Among the 29 test persons only one 66 yrs old man evaluated the packaging to be difficult to open. This can be due to the fact that this type of packaging sometimes will be harder welded as was also the case in the mechanical test. The situation becomes further complicated by the fact that men's fingers are

larger than women's which makes it even harder to obtain a good grip on the flap when it only measures 1x1cm² (triangle).

Table 1 End user test of how easy the cold cuts tray with welded lid and easy-peel 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 29 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 users' evaluation of the cold cuts tray | MD (2) | FD (11) | MN (8) | FN (8) | Total (29) |
|--|--------|---------|--------|--------|------------|
| Difficult to open | 0 % | 0 % | 13 % | 0 % | 3 % |
| Easy to open | 100 % | 91 % | 63 % | 100 % | 86 % |

Conclusion

Offhand this packaging doesn't present a considerable problem for the end user regarding opening. The end user studies as well as the mechanical test, however, showed the need for a frequent quality control in order to avoid the occasional hard to open packaging. Moreover the end user perception of cold cuts packaging is poor. Therefore, any changes that a company might do have to be communicated to the end users in order to benefit optimally from them. In this case it's even more important to keep the number of poor pieces of packaging down if the end user shouldn't get the impression that this packaging doesn't always deliver what it promises concerning easy opening.

Another initiative could be increasing the size of the flap in the corner. If it were to be increased to e.g. 20 mm tests in the model using the force needed for the hard welded packaging (pull force 17.5 N) show that the share of persons able to opening the package will rise significantly (Figure 4). Thus the cold cuts tray would have been made significantly easier to open. Other simple improvements could be upgrading the graphics making it more obvious to the end user to see where the opening is.

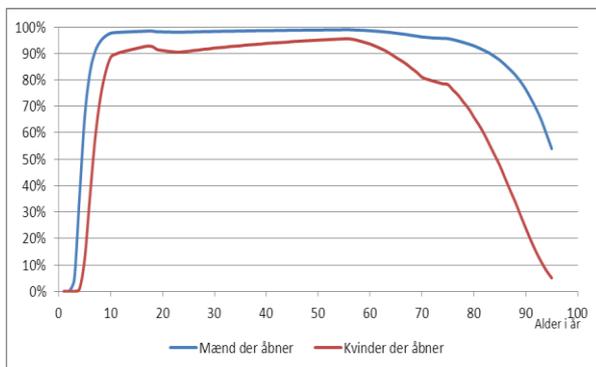


Figure 4 Share of men and women who are able to open the thermoformed cold cuts tray with welded lid using flaps (2x2 cm² triangle). The opening force is 17.5 N (Model based on data from DTI, UK 2002).

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).