TRIZ Case study

Improving the opening of the Bitesize Pouch at Mars

Introduction

In 2003, Mars (at that time called Masterfoods) decided to launch a new packaging for its bitesize product range. By bitesize is meant a product that can be eaten in one bite. Some of the products included in this category and made by Mars are M&M's, Maltesers, Minstrels, Revels and more recently, Mars Planets.

The packaging change consisted in the move from a standard pillow bag (that was the main format used in this category at that time) to a standing Pouch.

Picture 1: Pillow Bag

Picture 2: Pouch

The change had several aims that at the end should result in increased sales for Mars:

- Move from a horizontal pack to a vertical pack to get better visibility on shelf
- Enhance the sharing experience by allowing the Pouch to stand on a table with a wide opening where consumer could put their hand in to take the product (or pass it around to friends)
-Have a straight and easy opening that could be reclosed with a sticker (which is attached at the back of the pack)
-Make the tear strip (upper part of the Pouch) easily removable so it does not block the hand getting inside the Pouch and does not alter the aesthetic of the Pouch once open.

A multi disciplinary team worked on the project and identified the best packaging machine and the adequate packaging material to deliver the concept.

The straight opening was given by a micro perforated line put on both sides of the Pouch next to the easy opening line printed on the design.

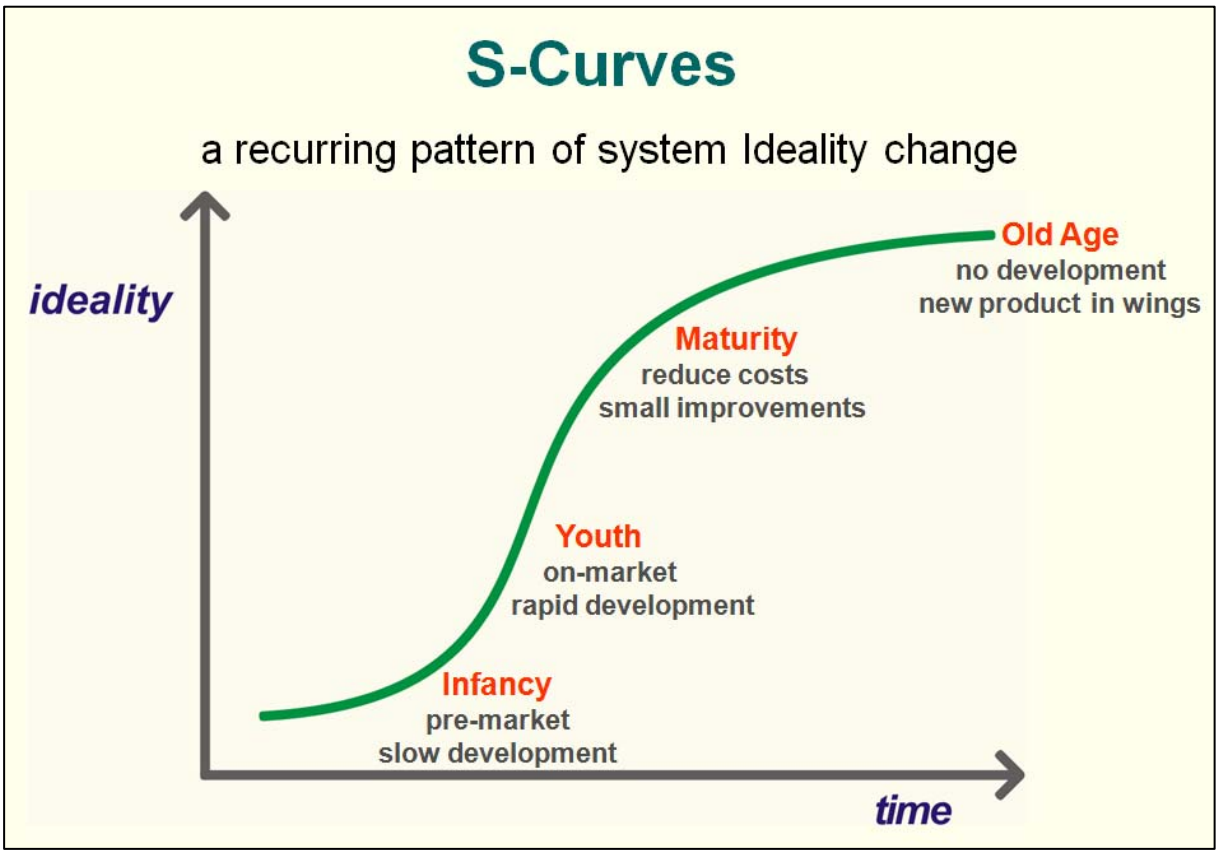
The new packaging was launched and the expected result happened quickly: increased sales and a success in the market.

This concept changed the way people were looking at the Bitesize segment and most of our competitors started to bring to the market their own version of the Pouch or even copied our product by buying the same packaging machine.

The whole market was affected and this change created a shift from standard pillow bags or poor standing bags to more premium packs.

The problem

As it is often the case with new concepts, some work had still to be done to move the concept along the S-Curve:



Picture 3: S-Curve (Oxford Creativity Copyright)

The pack that went out on the market was still in its infancy stage and was not perfect. We had one major consumer attribute that was not successfully reached, mainly the straightness of the opening. We had some work to do to move the packaging along the S-Curve and bring it to its maturity stage.

The problem we had was that when the consumer was tearing the pack open, the opening lines that were created inside the material were not always following the perforations. The tear lines were going into erratic directions creating a big gap between the front and the back wall of the Pouch. As a result, it was nearly impossible to remove the tear strip. In parallel, the aesthetic of the Pouch itself (after opening) was awful.

Picture 4: Opening problem

Picture 5: Uneven Tear

Picture 6: Tear Strip

In picture 5 above you can see an illustration of the issue. In this case, the back tear followed the perforation line, but the front tear went astray and moved down towards the lower side of the Pouch. As the result, it is nearly impossible to remove the tear strip (it is attached on the side by at least a two centimeter seal) and the aesthetic is not nice at all.

This problem was enhanced when the Pouch had a Euroslot on the top:

Picture 7: Pouch with Euroslot

At that time we developed a method to check the opening performance and the results were far from satisfactory:
-Straight opening: 5% (Euroslot: 0%)
-Torn Strip removed easily: 0% (Euroslot: 0%)
-Average distance between front and back line: 15 mm (Euroslot: 30 mm)

We tried to solve the problem, as most people do naturally and instinctively, by using the standard trial and error method; i.e. you try one thing, then if it does not work, you try something else. Although this method is a result of the natural evolution of our mind through time, it is not perfect and could require an important amount of time and iterations before getting to the right solution.

As Genrich Altshuller is quoting it to the point in his book “The Innovation Algorithm”: “*During the process of evolution, our brain learns to find approximate solutions to simple problems. However, it does not develop mechanisms of slow and precise solutions to complex problems.”*

The issue that we had was that this opening problem was impacting one of our key consumer attribute and we had to solve it quickly.

When we were in the trial and error phase, we - of course - involved our suppliers in the process. But we were all stuck by the fact that we could do very little to the material itself. At that time (as it is still the case today), a lot of different film structures and combination of films were available on the market which had oriented tear properties. The issue we had every time we moved to these solutions was that they

affected the line efficiency (we were generating friction problems) or we lost the heatseal properties we needed. Changing the film structure was not the right direction.

The perforation we had on the film was not helping neither. The tear did not follow it. We tried of course to play on the quality of this perforation. But without success.

All these attempts were supported by brainstorm sessions. But again, as Altshuller is illustrating it in his book "*Brainstorming does not eliminate chaotic searching. In reality it makes searching even more chaotic. The absurdity of brainstorming as a searching process is compensated for by its quantitative factor – problems are attacked by a large team. Any gain here is achieved only through the reduction of inefficient attempts along the direction of the Inertia Vector*".

The way we were tackling the problem was not bringing a real step change. We were struggling. We needed to get away from the film and the perforation.

To be quick, efficient and successful, we needed something different, something powerful, something able to direct our problem solving search in a more heuristic way. TRIZ was this method.

Solving the Problem with TRIZ

In 2004, when we used TRIZ to solve the opening issue, it was neither unknown, nor new to Mars. Some people (including myself) were already trained by one of Altshuller's disciple (Victor Fey) and the method had been used to solve a problem in our coffee machine segment (Four square).

But as it happens often with most of the trainings in most of the companies, the competence tends to be lost because it is not used. People work as they always did, in emergency mode, in trial and error mode, in brainstorm mode. Sometimes they think it would be too long to use a specific problem solving method – or too difficult. This was my feeling as well about TRIZ at that time. The training I had got around 1999 was quite heavy (five days in a row) and left me with a feeling of heaviness and complexity. It is only when I got the Oxford Creativity training in 2007 that I started to really understand TRIZ, its essence and how quick and easy the method was. The books of Altshuller I read in between were good contributors as well. But let's go back to 2004.

As previous trained TRIZ people we knew that using the method would certainly bring a solution to our problem. The time elapsed between my own training and 2004 was too big for me to lead this work. In fact we were lucky because the manager I had at the time was himself a TRIZ convert and TRIZ addict and took upon himself to lead the TRIZ work. He was trying to get the TRIZ culture and thinking process inside

Mars (as I am doing it now – which shows that Triz can be contagious once its essence is understood).

So, in a rainy and dark day end of September 2004, we went to a meeting room and used the TRIZ method.

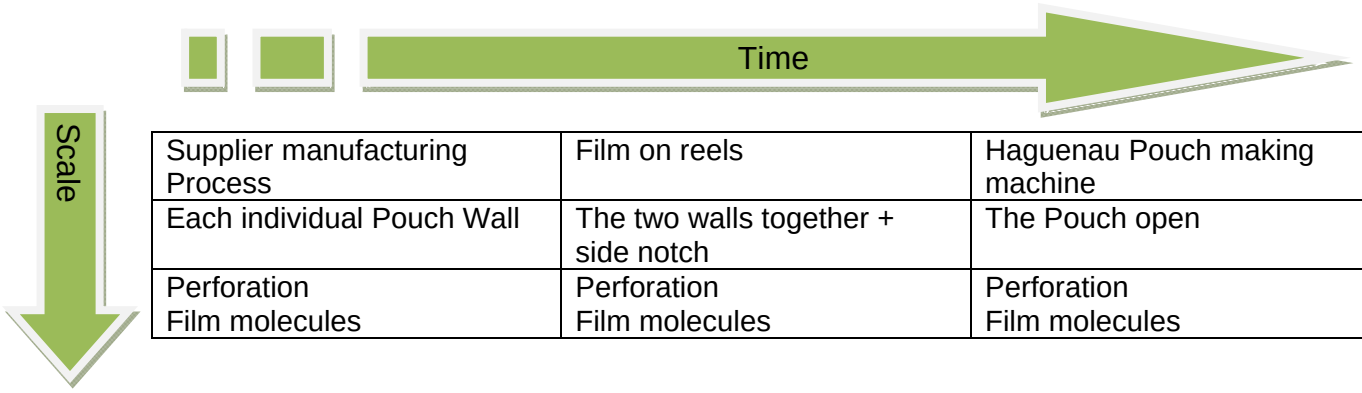
Finding concepts with TRIZ:

The first thing we did (and that you do in the TRIZ approach) was to set the problem and understand what we wanted (Ideal Outcome):

1. I want the material to tear horizontally, but it tears either towards the top or towards the bottom of the Pouch
2. I want to tear the material horizontally, but the tear stops when it reaches the Euroslot
3. I want that the tear to follow the shape of the Euroslot, but it stops on the Euroslot
4. I want the tear to follow the sealing line, but it stops on the Euroslot
5. I want to two walls to be under tension, but only one side of the Pouch is under tension when we tear
6. I want the tear on the two walls of the Pouch to arrive at the same position on the other side of the Pouch, but they get away from each other. When the two tears arrive at the same position, it is really easy to remove the tear strip. The bigger the distance between the two tears, the more difficult it is to remove the tear strip.
7. I want the tears to go through the side seal of the pouch (to remove the tear strip), but when the tear lines are not at the same position, it does not work.
8. If the two walls are close to each other (upper part of the Pouch), the tear is straight. The more we go down in the Pouch height, the farther are the walls from each other (the product is making the walls to separate – belly of the Pouch).
9. When we have a Euroslot, the tear line is lower on the Pouch, the distance between walls is bigger and thus, the tear is worse. This is why the situation is worse with the Euroslot.

To simply formulate the Ideal Outcome, we can say that:
-To be able to remove easily the tear strip, both tears (at the front and back side of the Pouch) must attain the opposite lateral seal at the same position (same height).
-To ensure a straight tear, the two walls must be as close to each other as possible (the distance between the walls impacts the tear direction).

Now that we had an idea of the Ideal Outcome and what was happening during the tearing action, we decided to map our system within the TRIZ Time-Scale matrix so we had a clear overview of our system, the super-system, the sub-system and their relation to each other:



Supplier manufacturing Process	Film on reels	Haguenau Pouch making machine
Each individual Pouch Wall	The two walls together + side notch	The Pouch open
Perforation Film molecules	Perforation Film molecules	Perforation Film molecules

To solve the issue, we then used the TRIZ 76 Standard Solutions and checked what we could do in the different parts of the system to make the tear being straight.

Stop a harmful action being harmful: change the object so it is non-sensitive to the harmful action:

To change the object so it becomes non-sensitive to the harm, we need to move the Pouch two walls into only one. When the two walls are together, the tear is straight. To do this we had the following ideas:

System Level:

- Put coldseal on each side of the wall. When they touch each other, they become one
- Seal the area where you want the tear to happen (heatseal or ultrasonic seal)
- Extract the air so both walls are close to each other
- Use a zipper
- Use a multi-layer laminate (Triplex)
- Use static electricity
- Velcro
- Void inside the Pouch to attract the walls together

Sub-System:

- Use a non deformable material
- Use more rigid material
- Change the material orientation (molecule level)

Add another action to intensify/ supplement the effect/ action or add a new (second) field which is more easily controlled

The idea here is to improve the efficiency of the perforation for its current action is insufficient: the tear does not follow it.

Super-system Level (supplier process):

- Fancy cut system (increase the number of perforation lines)
- Laser cut (new field)
- Change the shape of the cuts (seesaw type like on boxes)

System Level:

- Cut completely one part of the laminate instead of just perforating it
- Make half cuts like on cardboard
- Change the position of the tearing notch

Stop a harmful action being harmful: Counteract the harmful action with an opposing field:

Super-System Level (Pouch making machine):

- Create a thickness in the side walls to stop the tear getting down
- Weaken the material at the side seal level so we can remove the tear strip even if the tears on each wall do not come to the same position on the opposite side.
- Add material or glue during Pouch forming process

System level:

- Add something on the side walls to guide the opening
- Use the reclose sticker to guide the opening
- Remove the glue on partial areas to block the tear line
- Use two different glues
- Stress cracking: high or low temperature effect, with or without pressure
- Change the shape of the Euroslot

For this exercise, we used only 3 of the 76 Standard Solutions that we mixed with some of the 40 principles of the Contradiction Matrix (segmentation in particular).

The next step was then to meet our suppliers and check how we could put these concepts into industrial solutions.

Industrialization of the concepts:

When we met our suppliers, we explored the different concepts one by one and checked what we could do to solve our issue:

I) Material:

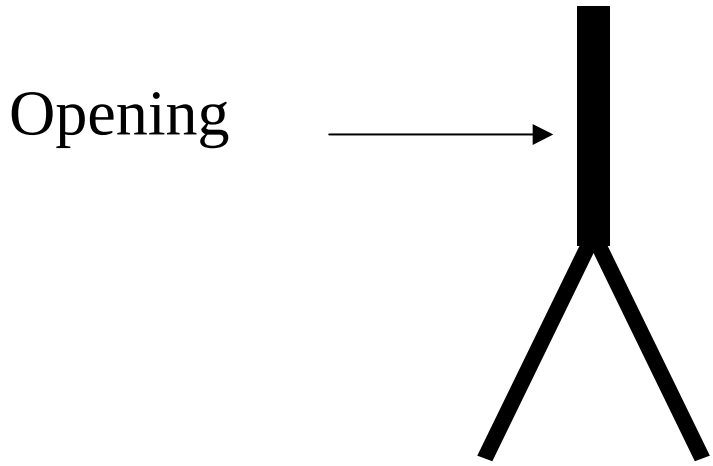
I.1) Orientation (no bubble effect):

The idea was to check if we could block the bubble effect generated by the blown extrusion process to make one of the material used in the structure. We supposed this effect to make the tear go down (it looks like it is following a bubble shape).

I.2) Rigidity:

- Thicker film
- More rigid film
- More layers

II) Make the two Pouch walls getting close together (walls glued after the pouch is made):



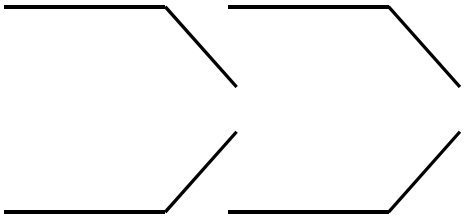
- Using Cold Seal points.

III) Guiding the opening better:

III.1) Improvement of micro-perforation:

- Cutting a different layer
- Cutting different sides in an alternate way
- Cutting all sides at the same place (total perforation after lamination)
- Several parallel lines

- Other knife width
- Other knife shapes (easy opening system on boxes).



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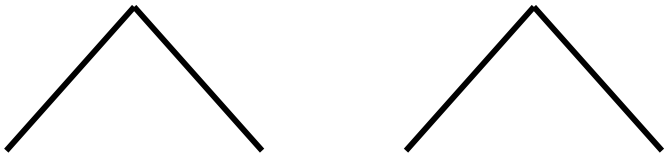
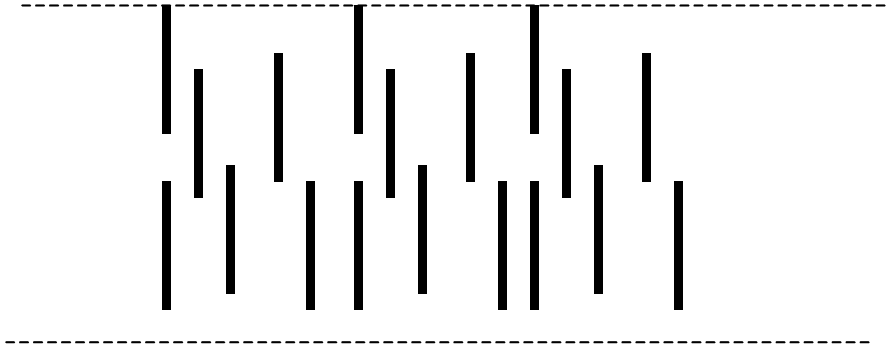
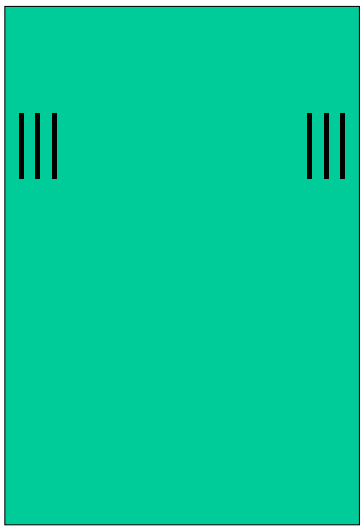


- Segmentation of holes: multiplication of holes (like fancy cuts). This is coming back to multi-lines.
- Vertical lines: multiplicity of vertical line to create tension differential.



- Vertical lines at the edge of the pouch to improve the tearing of the top part of the pouch.



III.2) Material stress to get an opening orientation:

- Using the cutting reel on the line at the supplier to crush locally the film in the easy opening area.
- Heating the cutting reel (material stress).

IV) Creating artificial thicker areas (to guide the opening like a ruler):

- Thicker lamination glue areas.

- Increase the glue weight to check impact on rigidity.
- Change glue type.
- No glue at all in the opening area.

- Hardening varnish.
- Combination of glue and varnish

The winning idea and the validation

A lot of work has been put into action to test and validate these ideas. I will not spend my time here to discuss about every one of them. The most original, clever and easy to implement idea was the one that is guiding the opening and blocking the tear to get away from its intended path: the absence of glue in the laminate. This is the one that we implemented.

The most difficult in this development was to convince some of our suppliers to test it. First they rejected the idea (psychological inertia). Then they did a first timid trial, then a second one and then the solution was validated.

The final concept was to add three lines on each of the side walls (to cover for Pouch forming variation). The tear was happening in the middle of the area. Each time it started to get away from a straight line, it fall inside the glue free are and then was guided by it.

Picture 8: The result

Picture 9: The result

On Picture 9, the effect of the Glue Free Lines is clearly visible.

Patenting the Idea

As the principle was quite unique and to ensure a proper protection, we decided to patent the idea:

(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 1 746 043 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
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(51) Int Cl.:
B65D 65/40 (2006.01) *B65D 75/58* (2006.01)
B32B 7/06 (2006.01)

(21) Application number: **05291526.1**

(22) Date of filing: **18.07.2005**

(54) **Easy-open package made of two-or-more ply laminate including adhesive-free lines**

(57) The package comprises at least one wall of laminate having two plies bonded together by an adhesive wherein at least one adhesive-free line is arranged between said two plies. This adhesive-free line(s) provide an easy-open feature. The package may be a bag or a pouch having two main walls comprising each one or more adhesive-free lines (17, 18) arranged in correspondence to each others.

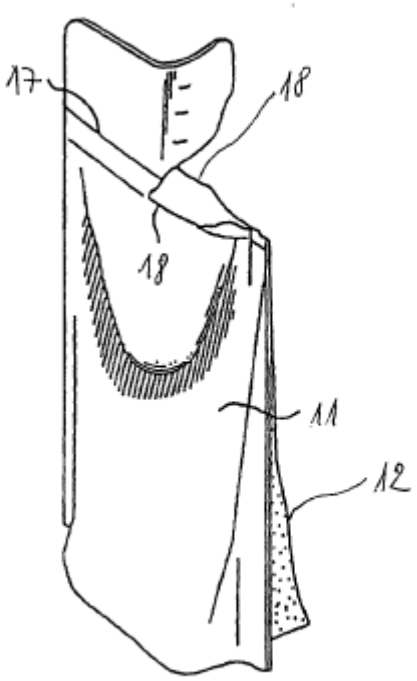
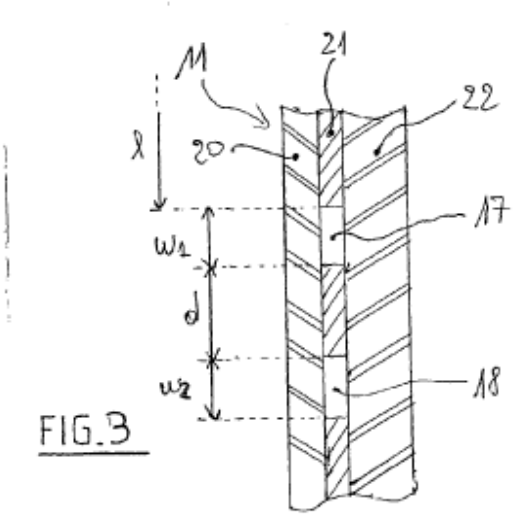


FIG. 2



This system is on the market for some time now on an M&M's Peanut Pouch.

The Future

As for all systems, invention and creativity are a journey along the S-Curve and the adventure never finishes.

When we wanted to move the system to another design (M&M's Crispy that has a blue background and M&M's Plain that has a brown background) we were faced with another aesthetical problem: under a dark color, the glue free lines are visible and impact the visual aspect of the pouch. This was not acceptable for marketing.

We then had to develop another solution that I cannot develop here for confidentiality reasons. This new solution is on the market and has not only solved the aesthetical problem, but has also improved the opening efficiency.

Conclusion

I hope that this example has showed and convinced you that TRIZ is the powerful and innovative problem solving method it claims to be.

Since that day and after a new training with Oxford Creativity, I have made it one of my basic development, problem solving and innovation tools. I used it to solve some other packaging problems, develop new packaging concepts and lead innovation towards a new direction.

The example above is only illustrating some of the aspects of the method. TRIZ has some other tools that I did not speak about here: The trends, the ideality of a system, the functional mapping, etc. The combination of all these tools is now helping us bringing creativity to a new level.