

Innovative Packaging for Pest control product

Context

- The Pest Management Service sector is evolving, because of regulation and demanding customers.
- Developing innovations, ever better products, reducing environmental impact are key goals in this industry.



What is the problem?

Some bait boxes are subject to porosity, water loss, fragility, stress cracking

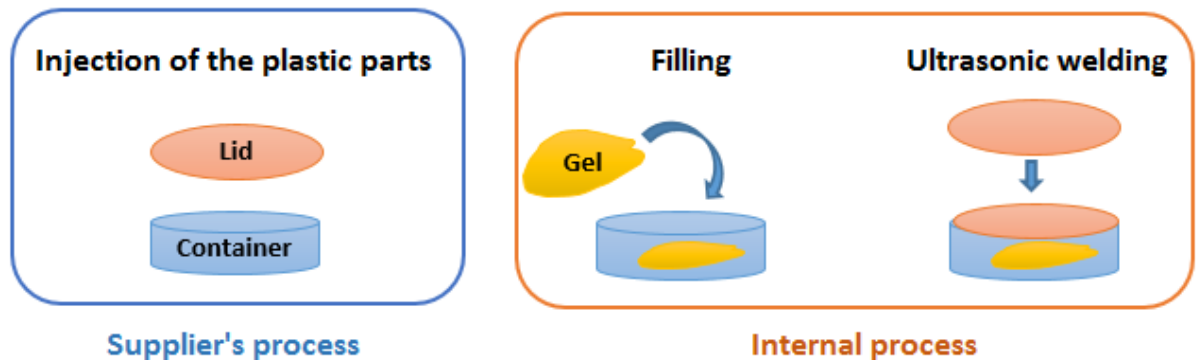
The seeker wants to (in this order):

1. Stop all potentiality of porosity of the plastic material in order to avoid effects such as water loss (leading to “swelling of the polystyrene box “ , “the boxes become sticky”)
2. Eliminate all risks of chemical interaction between the plastic and the formulation

While keeping the same functional principle and design of current bait boxes

What is the context (in which the solution should work)? (Specific details)

- Production process



- Container
 - Molded, to include opening device
 - Junctions, where the wall thickness is $\sim 200 \mu\text{m}$ - to produce a locally restricted breakable part
- Filling - plastic material will come into contact with product that contains:
 - Water
 - Mild acids (such as citric acid, pH 5.5)
 - Proteins
 - Polar solvents (such as polyols)
 - Mono-, Di- and Triglycerides (such as plant oils) partly unsaturated
 - Carbohydrates
 - Sugars
 - Preservatives
 - Flavor components
- Lid sealing
 - Ultra-sonic welding

What are the desirable characteristics? (Price, Speed, compliance with standards ...)

Financial:

- Box < 14 cents/box (after filling & sealing)
- No increase above 10%
- Suppliers in western Europe

Technical: plastic material must

- During the production process
 - Be useable for injection molding process
 - Be useable for ultrasonic welding (eventually heat sealing)
 - Must maintain the same functionality of the bait box (breakable tabs: a thin wall thickness, e.g. 200 µm, to produce a locally restricted breakable part), insuring a long and full stability of the formulation
 - Security “No cut when box opened”
 - Same ease of use (end-user opening experience) “easy opening”

- At room temperature within 3 years and in contact with the biocide formulation
 - Be water vapor proof (negligible loss of moisture during 3 years)
 - No gel leakage
 - Water evaporation
 - No change in elasticity (become brittle)
 - A material resistant over time to the chemical formulation of the pest control product. The duration taken into consideration for the resistance of the box to the chemical formulation would be typically 3 years

Design options

- The design of the box might slightly change, to suit the needs explained above.
 - A two-layer design would be acceptable for instance
 - Additional coating could be also considered to fill the porosity of the box
- No or limited production process change
 - No/Limited box design change
 - No/limited sealing process change
 - No mold change (preferred – not a blocking point)

Environmental:

- It would be a plus (“nice to have”) after the other criteria
 - Bioplastic – or any material which is biodegradable
- Keeping the same (even improving) the same environmental parameters than today
 - No toxic element

Selection criteria - Level of achievement of the desired solutions (proof of concept, idea, finished product ...)

Different solutions are possible. Find below their order of preferences

1. No box design change
 - a. Other plastics
 - i. Multi-layer
 - b. Lid/cap changes (welded)
 - c. Limited change in production process
 - i. Opening device change
 - ii. Not impact on the safety utilization
2. Box design change
 - a. Mix plastic film + box
 - b. Metal is not excluded (but cost impact is key)
 - i. This could impact the process

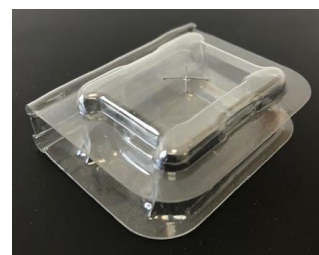
Performance

- Water permeability
 - Goals: less than 10% (after 3 years, weight loss)
- Resistance to solvents
 - Contact plastic – solvents
 - Interaction tests (visual stress cracking + sealing tests)

Existing Solutions that won't be considered for this challenge

Solutions already considered and not validated include:

- Thermo – molded



- Materials to be excluded:
 - Glass
 - ...

Proposed format for the writing of the solution

The solver should write a solution following the Frame described below:

- Choice of solution

- c. No box design change
 - i. Other plastics
 - 1. Multi-layer
 - ii. Lid/cap changes (welded)
 - iii. Limited change in production process
 - 1. Opening device change
- d. Box design change
 - i. Mix plastic film + box
 - ii. Metal is not excluded (but cost impact is key)
 - 1. This could impact the process
- Performance
 - Level of porosity reduction obtained (water permeability)
 - Goals: less than 10% (after 3 years, weight loss)
 - Level of chemical interaction reduction attained (resistance to solvents)
 - Contact plastic – solvents
 - Interaction tests (visual stress cracking + sealing tests)
- Business/Market potential (big picture/estimated)
 - Costs
- Detailed explanation of the solution
 - Free format

Rewards

		Design changes & limited changes on production process	Design changes & NO changes on production process	NO Design changes & NO changes on production process
Water permeability <10% after 3 years AND Resistance of plastic (no stress cracking, no leakage)	Theoretical solution	3 000	8 000	12 000
	If Proven solution (3 years)	9 000	18000	35 000

The maximum reward would be **35 000€**

- For selected theoretical solutions, the payment will be upfront
- For proven solutions, the payment will be as follows:
 - 50% of reward after accelerated test (12 weeks at 35°C) success
 - 50% at the end of the first 12 months of test at ambient room temperature storage

~~50% of reward after accelerated test (12 weeks at 35°C) success and 50% at the end of the 1 years at ambient room temperature storage.~~