

Designing a Bottle with a Flavouring Located in the Cap

Public Summary

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The goal of this project was to design a drinks bottle with a flavouring located in the cap. Furthermore, the product should be designed in the style of racing; this is because the client has a personal preference and affiliations towards this. Some of the most important research questions that had to be answered in order to achieve this goal were:

1. How will the mechanism work?
2. How can the product design be made appealing to the buyer/consumer?
3. How can the product be mass producible?

To answer these research questions, firstly research was done into the target audience, stakeholders, competitors, similar mechanisms and the desired racing styling of the product. Based on this research and the needs of the client, a list of requirements was made as a foundation for the design of the product.

Firstly, design was done on the mechanism for dispensing the flavouring, referred to as the “bottle cap mechanism”. During the design process, it was decided to incorporate the use of a capsule in the final product; the capsule would contain the flavouring and the bottle cap mechanism would dispense the flavouring from the capsule into the bottle. The main benefit of using the capsule is that the user is able to take multiple capsules with them whilst they are on the go, enabling them to use the product multiple times to flavour their drinks.

Secondly, the bottle was designed. It had been decided that the bottle to accompany the bottle cap mechanism would be bought in bulk from a wholesaler for a more straightforward production process. However, for the sake of the completeness of the project, a conceptual design of the bottle was also made. Lastly, a carrying case for the capsules that are used in the final product was designed.

After the design phase was concluded, the bottle cap mechanism was tested; the testing that was done was a combination of strength testing and functionality testing; the strength testing was done using calculations and simulations, whilst the functionality testing was done using a 3D-printed prototype of the bottle cap mechanism. From the strength testing it was concluded that the design was strong enough to withstand the forces it would be put under during use. However, the functionality testing exposed a flaw in the design: the product was not successful at dispensing the liquid from the capsule.

Based on this, the bottle cap mechanism was redesigned, three times, to ensure a functioning product. In the end, a functional design for the bottle cap mechanism was reached. In figure 1, a render of the final design of the bottle cap mechanism and the bottle with a conceptual label is depicted.

After the product was thoroughly tested, it was determined how the product should be produced. The product should be able to be manufactured in bulk, meaning that the production of the product should be on a large scale. To determine the desired production method for the bottle cap mechanism, firstly research was done into the production method with which a normal bottle cap is produced, which is injection moulding. Injection moulding is generally regarded as a great production method because with injection moulding it is cheap to produce products in large quantities, however, not all products are suitable for injection moulding. So, if the bottle cap mechanism is deemed to be suitable for injection moulding, this would be a very beneficial.

After thoroughly analysing the bottle cap mechanism, it was deemed to be suitable for injection moulding. However, the design had to be adjusted slightly to be optimal for injection moulding, because otherwise some troubles might arise during the manufacturing of the product. An example of the type of adjustments that were made is removing sharp edges, so nothing that influenced the functionality of the product.

Since it was decided that the bottle to accompany the bottle cap mechanism would be bought in bulk from a wholesaler, the analysis of the production process of the bottle was less extensive than that of the bottle cap mechanism.

Lastly, the costs of the production process were calculated to give an indication of what it would cost to produce the product. This was done by calculating the production costs of the bottle cap mechanism and determining the costs of buying the bottles from a wholesaler. This information is of course crucial to know when starting a business.

In the end, the project can be regarded as a success; the goal of the project of designing a drinks bottle with a flavouring located in the cap was realized, and a functioning design was reached. With the addition of the testing that was done and the production method including the costs that were determined, an extensive foundation was laid for the production of this product by the client.



Figure 1: The design of the bottle and the bottle cap mechanism