

# Light and eco-friendly structure design of an instant noodle bowl

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**Abstract.** Instant noodles have become a very common food in recent years, and because of its convenience and affordability, it is now one of the most profitable products in the food industry. While it is a very convenient food product to carry around, its packaging tends to be inconvenient and not eco-friendly. The packaging of instant noodles can be categorized into two different types: The first is small, and very light, packed in plastic bags, requiring that customers supply their own bowl in order to enjoy the food; the other is packed in a paper, or Styrofoam bowl, usually with additional space in the bowl for customers to add water. The dimensions of the bowl make it less portable, and the construction materials are not eco-friendly. We build a model design that combines the benefits of each packaging type (Fig.2). The size remains as small as the plastic bag type, while simultaneously having the expandable space of the bowl type. The proposed model is made compact during shipping, but its foldable design allows the customer to readily reconstruct it into a bowl for use. Using recycled paper and PE film for materials, we have ensured that, with the use of special recycling technology, the packaging is 100% recyclable. The result is an eco-friendly, light, and purposeful design.

## 1 Introduction

Today, technological advancements in transportation have come to provide individuals with countless opportunities for both domestic and international travel. For those who travel often it can be easy to miss the comforts of home. For these flight crewmembers, or jet setters, the convenience and familiar comfort of instant noodles make them a popular choice. The traditional instant noodle however, lacks convenience due to its packaging.

Instant noodles were invented by Ando Momofuku, a Taiwanese immigrant living in Japan. The inspiration for inventing instant noodles came when Momofuku observed that the queues for ramen restaurants were incredibly long. The traditional instant noodle packaging can be divided into two kinds: bowl and bag. Each packaging type has its pros and cons. We developed a design that combines the strengths of each type into one—a light

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packaging containing a foldable bowl structure. This packaging is also made of recycled paper and PE film to achieve the goal of eco-friendly manufacturing.

## 1.1 Traditional instant noodle packaging analysis

### 1.1.1 Bag-packed instant noodles

The first generation of instant noodles was packed in small bags. The resulting product is very small, light, and easy to carry around. This method, however, requires the consumer to inconveniently travel with a bowl in which to assemble the ingredients to make the food.

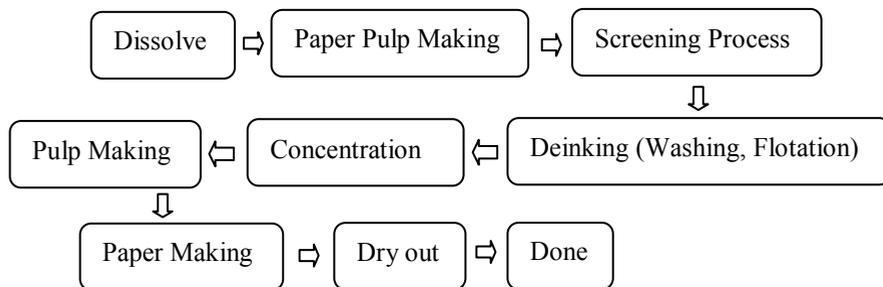
### 1.1.2 Bowl-packed instant noodles

The bowl-packed instant noodles were also invented by Ando Momofuku in 1791. The reason for Momofuku inventing the bowl-packed instant noodles was to attract Americans, who, at that time, would commonly only have plates in their home. For them, making this style of Asian cuisine could be very inconvenient. The first generation of bowl packaging was made with polystyrene, but its high cost made the retail price 3 times higher than that of the bag-style instant noodles. People refused to pay that much, encouraging Momofuku to make slight changes to the ingredients, and the tableware, to make it popular.

## 1.2 Recycled paper with PE film

The recycled paper procedure and technology have now well developed. In recycled paper tableware, for example, the technology today allows for 60-70% reuse of the recycled paper. This means that 60-70% of recycled paper can be remade into eco-friendly products.

By using this recycled material with PE films, we are now able to make a new and eco-friendly bowl. After the bowl has been used, it is able to be recycled repeatedly, until it is impossible to be reused. This concept allows people to enjoy the convenience with little harm to the planet.



**Fig. 1.** Procedure for Recycling and Reproducing Paper Tableware.

## 1.3 Bio-degradable packaging

Our target is to make the whole product a degradable or recyclable item, so the materials we choose must satisfy this condition. Today, many bio-degradable materials are available,

and because we are using the material in contact with food, we require one that does not contain harmful chemicals. For the wrapping, we chose a bio-degradable plastic made of Starch, Polylactic Acid and fiber protein. The use and composition of this material differs very little from traditional plastic, except in the ability to be degraded by Aerobic microorganisms, water, and oxygen in the soil to form carbon dioxide and water. This crucial difference ensures that we achieve the target of being eco-friendly, while simultaneously protecting the food from bacteria.

## **2 Design and methods**

We have completely redesigned the traditional instant noodle bowl. As previously discussed, the recycled paper material chosen for the bowl is perfectly suited to a folding structure. The folding structure could be very difficult if we did not calculate the size right. After lots of hard work, we came up with a foldable structure that we think is the best result.

### **2.1 Size**

Our goal is to make this product very easy to carry. Therefore, keeping the size and appearance minimal is a fundamental characteristic of the design. According to our research, similar products on the market waste too much space on the width. This design can efficiently reduce the length and give the noodles room to stretch. Still, it occupies too much space in our luggage. To rectify this, we minimize the size of the paper bowl down to a size that is almost equal to that of the noodles: The common size of instant noodles is 15 cm x 15 cm x 1.5 cm, and we made our design 15.5 cm x 15.5 cm x 2 cm.

### **2.2 The individual packaging of the noodle**

The packaging of instant noodles can be divided into two categories: those with individual packaging and those without. The reason for some companies choosing to give the noodles additional individual packaging is to guard against bacteria, or other potential health risks. We think this step in making a food product is very important. Therefore, we chose a bio-degradable material for the packaging of the noodles. This not only achieves our goal of using eco-friendly materials, but also gives customers an added degree of safety.

### **2.3 Eco-friendly tableware**

Our design background of this product is to let people carry it easily and the concept of easy and convenient is that there is no need for extra preparations. Therefore, it is necessary that tableware is included in the product. Generally, when people eat instant noodles, they will use chopsticks, and a spoon, but the existing disposable tableware of these two items are neither eco-friendly, nor convenient.

A spork which combines the functionality of the spoon and fork, is the most practical tool for this situation – allowing the customer to enjoy the noodles without any inconvenience.

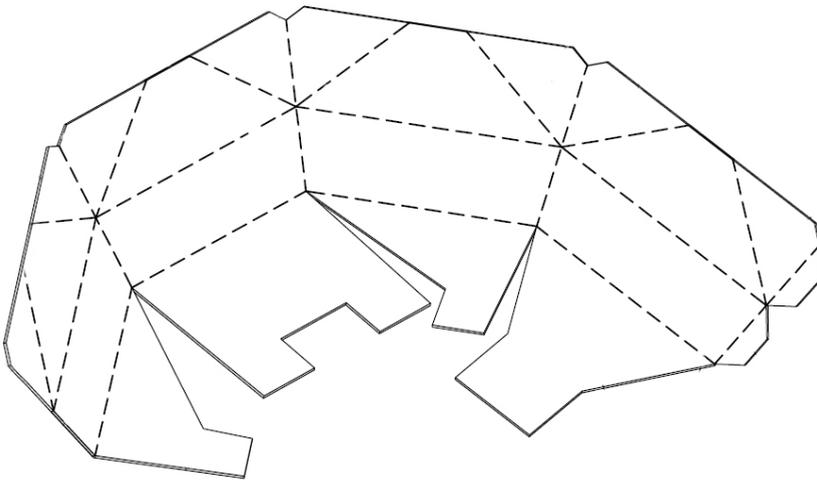
To achieve the condition of eco-friendly, we chose to make the spork out of the same recycled paper and PE film as the bowl. By doubling the layer of paper, the spork was made stronger and easier to hold.

## 2.4 Folding structure

The most unique quality of this product is its folding structure. These folding structures allow the instant noodle box to remain very small. The fold design can be separated into three parts.

### 2.4.1 Overall structure

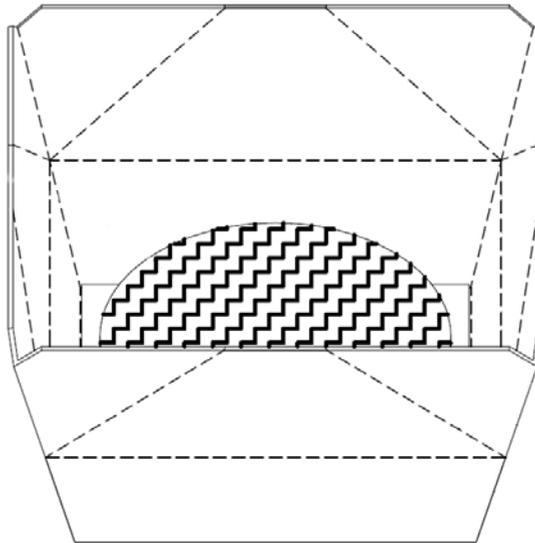
The design can be described as a waterproof, eco-friendly paper divided into the folding structure. Every face has a layer on the upper, and lower side. Each upper layer is connected by the connector, and the lower layer has seams to form a water proof surface after putting PE film on.



**Fig. 2.** The overall structure of the foldable instant noodle bowl.

### 2.4.2 Unfolded state

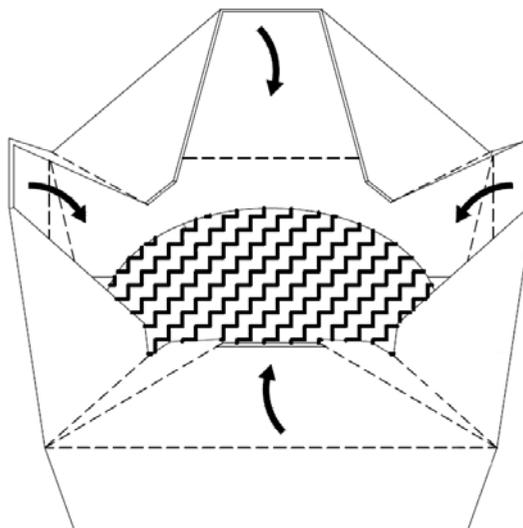
When the bowl is in the unfolded state, which means functioning state it provides customers with a large, wide space in which to pour hot water, and gives the noodles room to expand. The unfolded state can be seen as a wide, hollow square, or pillar shape. After unfolding the upper layer, the box can be extended to almost double along its length. Each face is connected to each adjacent side to prevent hot water from spilling out.



**Fig. 3.** Unfolded state of the instant noodle bowl.

#### 2.4.3 *Unfolding (folding) state*

To unfold the bowl, a customer simply needs to lift two sides of the layers. Due to the design of the connectors, each side will be easily lifted at once. Additionally, when the bowl is being folded in the factory, the supply chain only needs to lightly press the side of the connectors to fold the box.

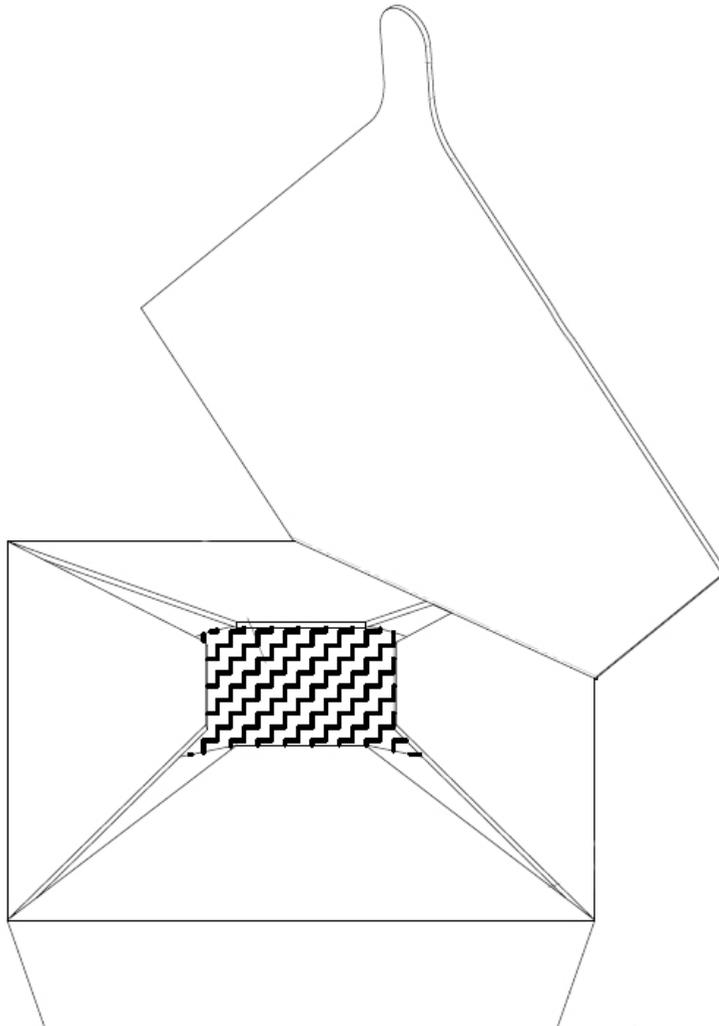


**Fig.4.** Unfolding (Folding) state of the instant noodle bowl.

#### 2.4.4 *Folded state*

Because of the folding structure, when the box is in the folded state it is impossible to completely seal the contents. To prevent from dirt and bacteria, the noodle itself has individual packaging as mentioned earlier.

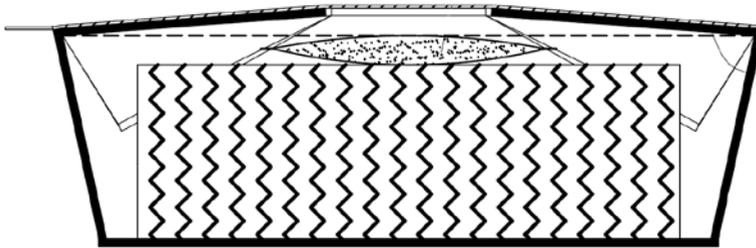
On the surface of the box, a lid is designed to seal up the box. This lid is composed of aluminum foil to protect the food from exposure to direct sunlight.



**Fig.5.** Folded state of the instant noodle bowl.

#### 2.4.5 *Side view of the box*

By looking at the side view of the box, we can readily observe the folded state. The connectors will lie on top of the noodles, and it is demonstrated that the size of the box is almost as the same size as the noodles.



**Fig.6.** Side view of the folded instant noodle bowl.

### 3 Conclusions

No one wants to travel with heavy luggage. Commuters of all kinds are seeking a light package, or material, for their goods and food items. Reducing the size of the instant noodle bowl not only provides a lighter choice to customers, but also results in better profit margins for the manufacturer. The compact size of the product allows manufacturers to ship larger quantities, resulting in increased sales, and reduced carbon emissions. Additionally, the small size of the packaging can also be used to store other foods, not just noodles. Therefore, transporting food to the third world, or people trapped by natural disasters can be lot easier too.

All eco-friendly materials also reduce the harm to our injured planet, helping the next generation realize a better future.

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