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# Temperature Sensitive Food Stickers

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ENGL 21007

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**01**

**Problem**

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# Food Waste

Food waste is a significant global problem that contributes to a range of environmental issues. It refers to food that is fit for consumption but is consciously discarded at the retail or consumption phases.



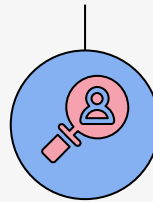
# Food waste can lead to...



*Greenhouse  
gas  
emissions*



*Unnecessary  
consumption  
of water and  
energy*



*Inefficient  
use of  
agricultural  
land*



*Problems*

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# Solution

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# Temperature Sensitive Stickers

These stickers incorporate temperature-responsive materials that change color.



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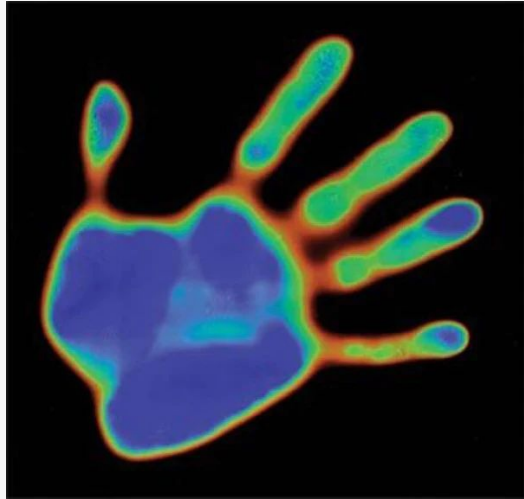
**02**

**How does it work?**

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# Thermochromic Paper

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The stickers will use thermochromic paper that is irreversible / permanent after exposure to unfavorable temperatures.

Thermochromic paper contains microencapsulated pigments that react to temperature changes.

These stickers will change color when the product has been exposed to temperatures outside its optimal storage range.

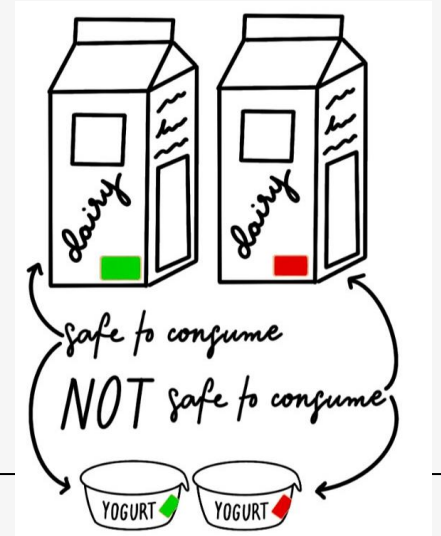
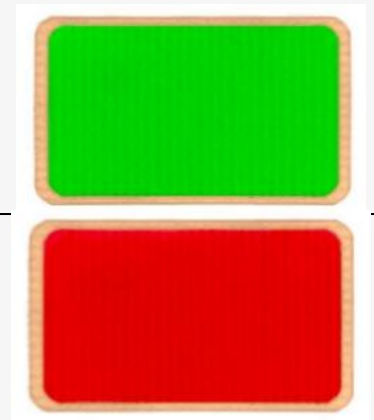
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# Color Display

	Display Color	Status
Initial Color	Green	Safe to Consume
Exposure Color	Red	Not Safe to Consume

Upon exposure to temperatures of 44°F and greater, thermochromic paper changes color



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03

**Benefits**

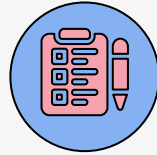
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# Our product will benefit...

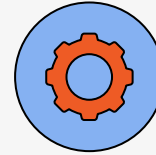
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*Manufacturers*



*Retailers*



*Consumers*

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# Manufacturers

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- Enhance food safety
- Improve storage rooms

# Retailers

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- Improve inventory management
- Enhance customer trust
- Reduce waste



# Consumers

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- Improve purchasing decisions
- Improve food safety
- Reduce waste at home

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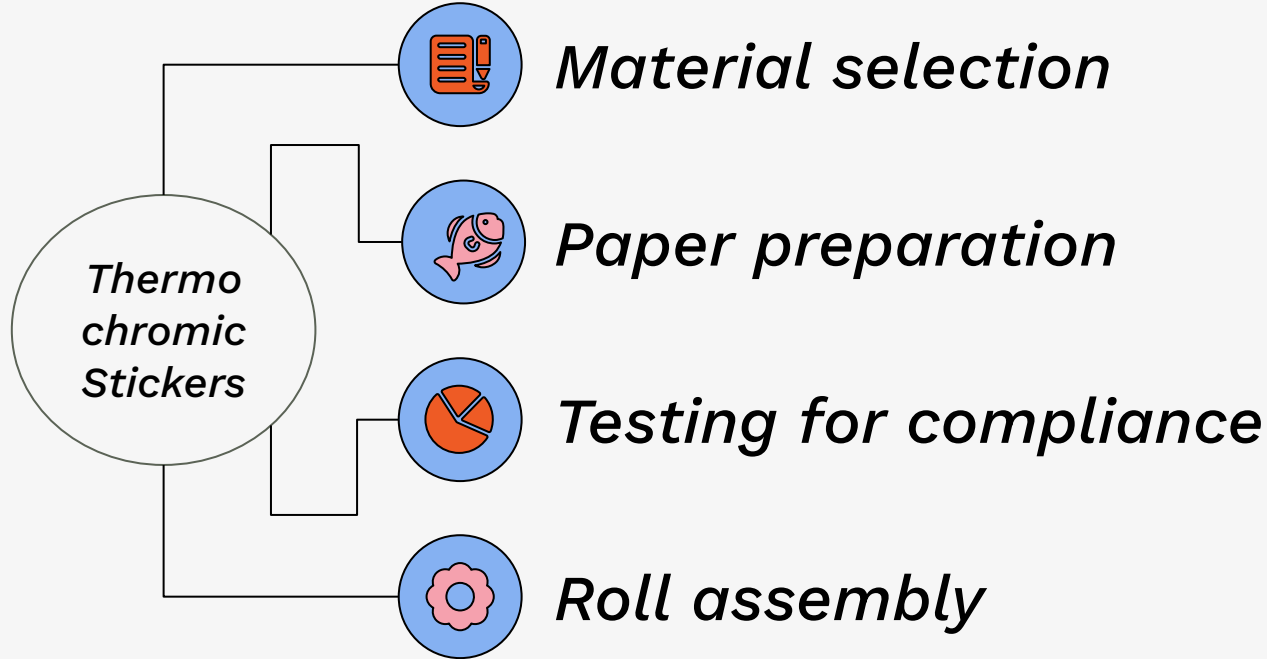
**04**

# **Manufacturing**

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# Manufacturing Process

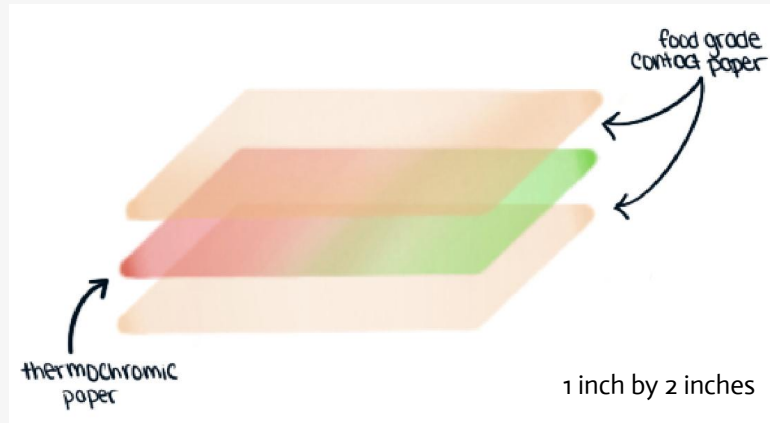
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# Technical Description

Separated by Layer



Assembled Product



(thermochromic paper is white in this picture for visual purposes)

Upon exposure to temperatures of 44°F and greater, thermochromic paper changes color

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**05**

**Plan**

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# Cost

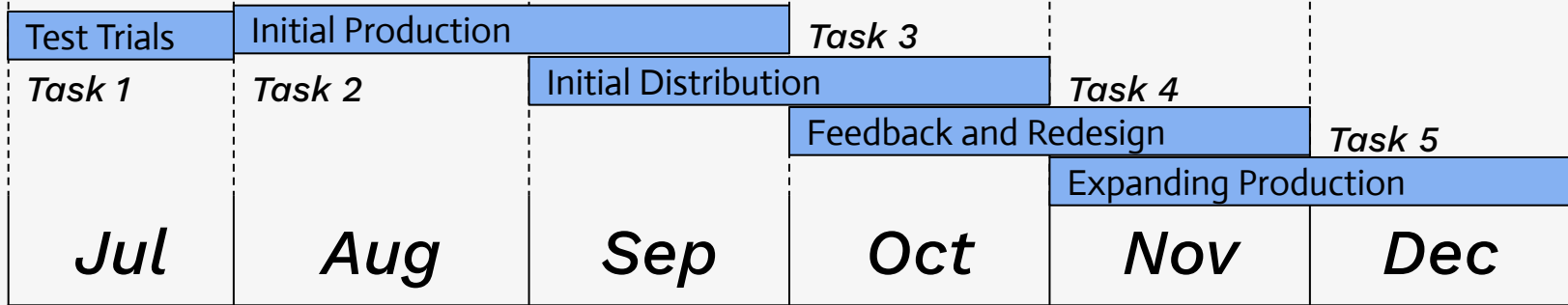
Cost of Materials	
Materials	Cost (\$)
Food Grade Contact Paper	\$100/roll
Thermochromic Paper	\$200/roll

Cost of Materials for One Sticker	
Materials	Cost (\$)
Food Grade Contact Paper	\$0.002
Thermochromic Paper	\$0.004

Other Expenses		
Expense	Purpose	Cost (\$)
Warehouse	Rent	\$5,000/month
Equipment	Printing	\$500/month

# Task Schedule

<i>Tasks</i>	<i>Description</i>	<i>Time Period (2023)</i>
Task 1	Test Trials of the Food Stickers - Standard Design is developed	July 1st-July 31st
Task 2	Initial Production	August 1st-September 30th
Task 3	Initial Distribution - Stickers are sent to some retailers and manufacturers	September 30th-October 31st
Task 4	Feedback and Redesign - Receive feedback and redesign	October 1st-November 30th
Task 5	Expanding Production - Distribute to all retail and manu.	November 1st-December 31st



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Q&A



# Sources

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- <https://www.sciencedirect.com/science/article/abs/pii/S0260877423000687>
  - <https://www.diva-portal.org/smash/get/diva2:887704/FULLTEXT01.pdf>
  - <https://www.marketsandmarkets.com/Market-Reports/thermochromic-material-market-253699772.html>
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  - <https://www.mdpi.com/2076-3417/10/22/8095>
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