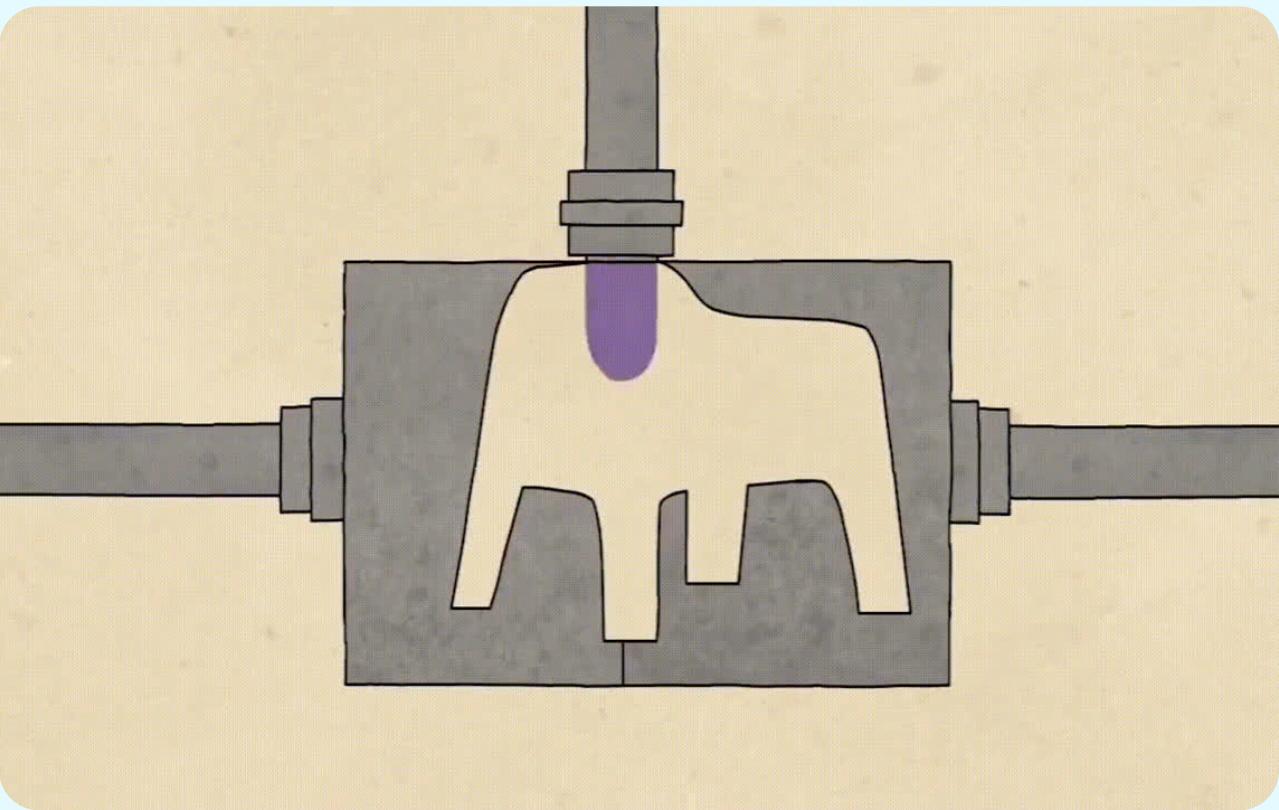


INJECTION MODELING

GROUP 3
by Tralalero-Tralala

Group 3

Time: 2025.10.21



content

01

Material

02

**Chemical
Transformation**

03

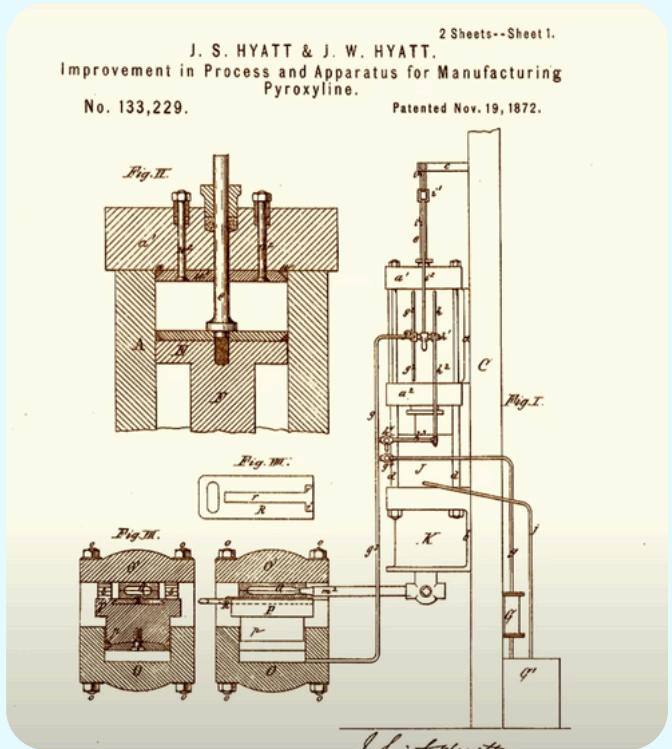
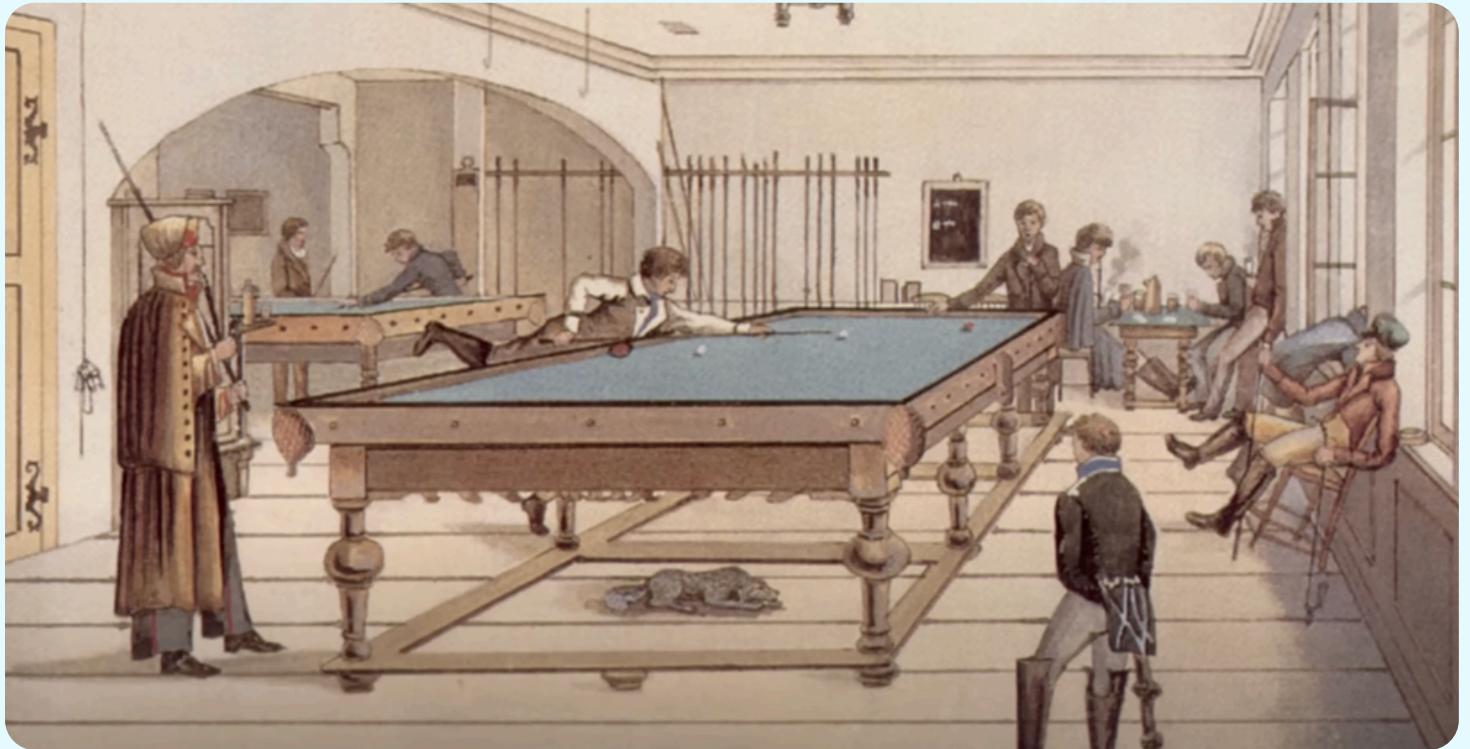
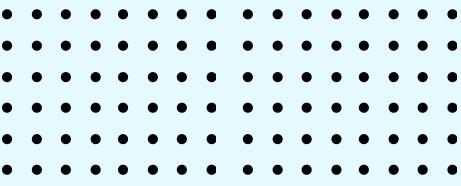
**Injection
Modeling process**

04

Lip balm case

Fun Facts

Personal Introduction & Motivation



Injection modeling and billiards

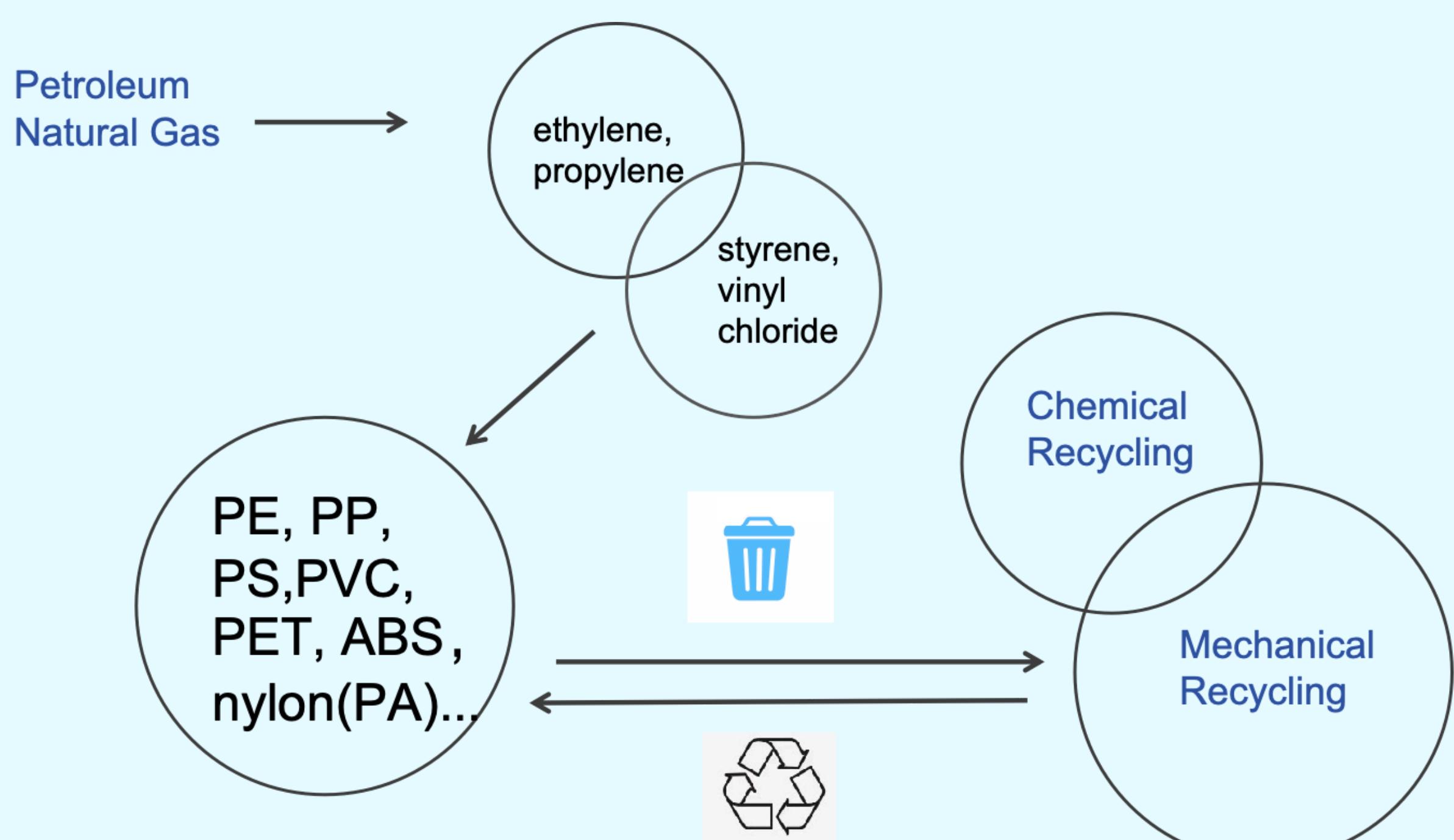
In the 19th century, billiards were made of ivory collected from African ivory. This dealt a devastating blow to the elephant population, so a billiard manufacturer offered a \$10,000 reward to find ivory substitutes. This prompted John Wesley Hyatt to develop the first plastic - celluloid - for making billiards, which is the birth of plastic injection molding.



01

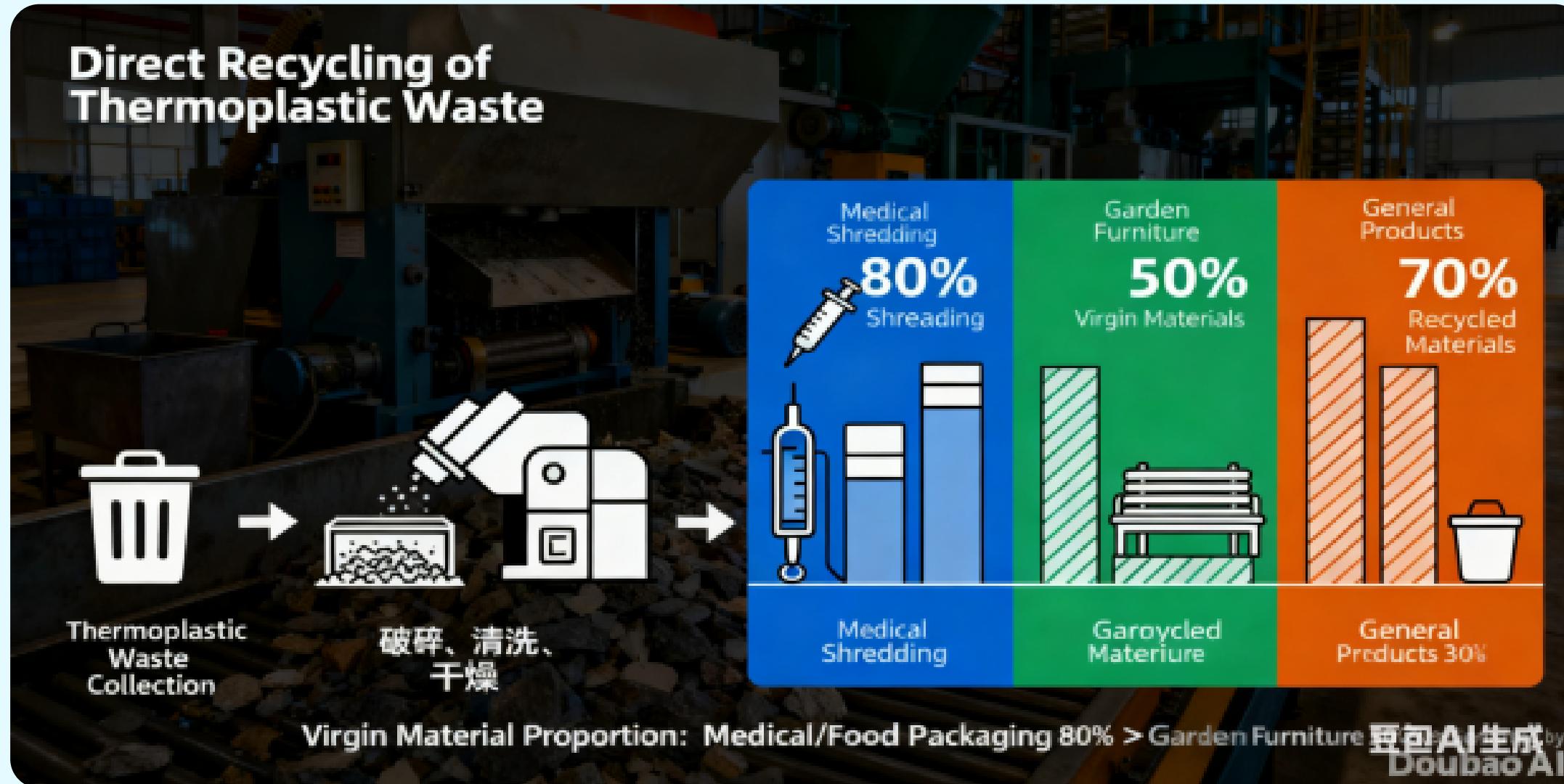
Material

Before manufacturing



01 Material

Environmental Impact

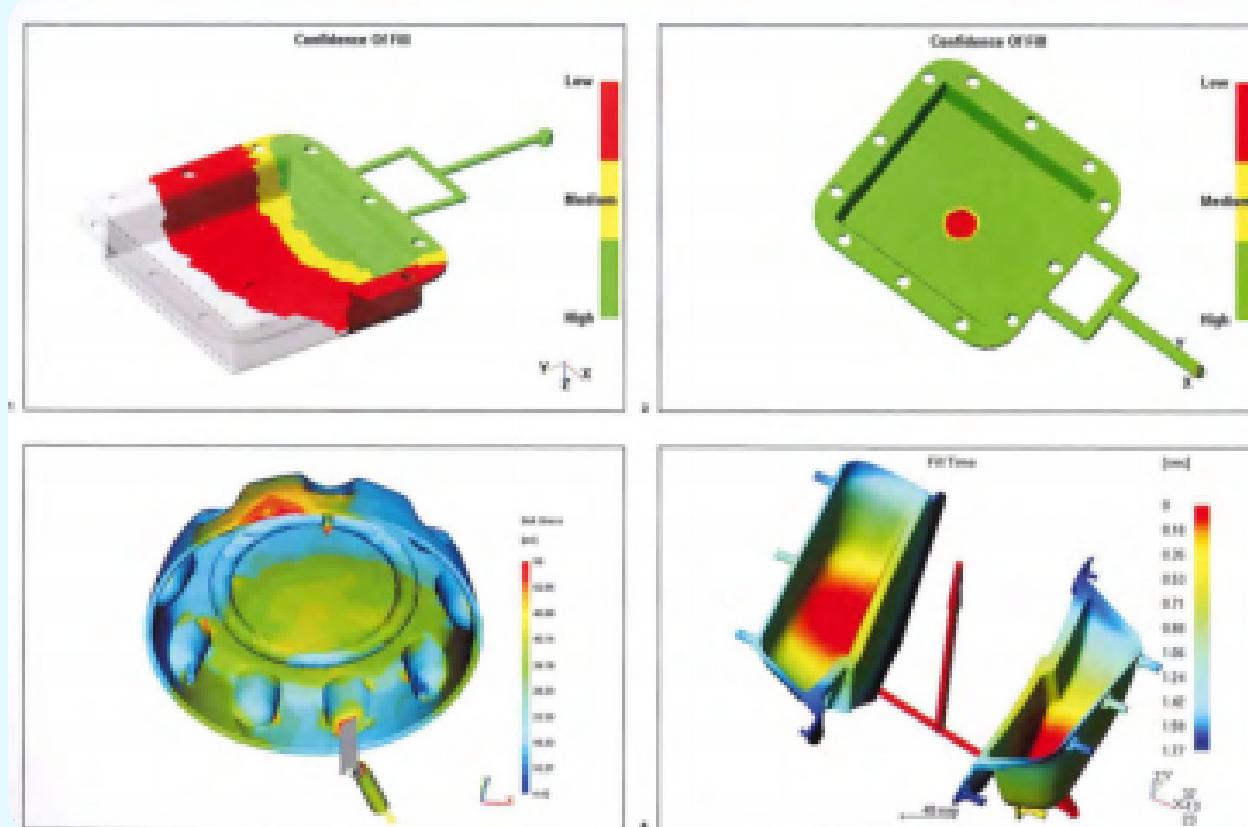
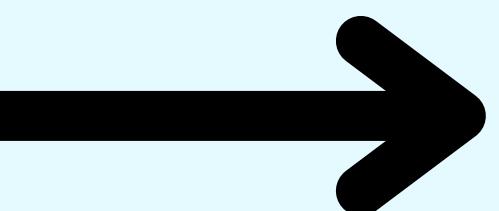


Thermoplastic scrap can be directly recycled in this process. Some applications, such as medical and food packaging, require a high level of virgin material, whereas garden furniture may require only 50% virgin material for adequate structural integrity, hygiene and colouring capability.

01

Material

Moldflow analysis



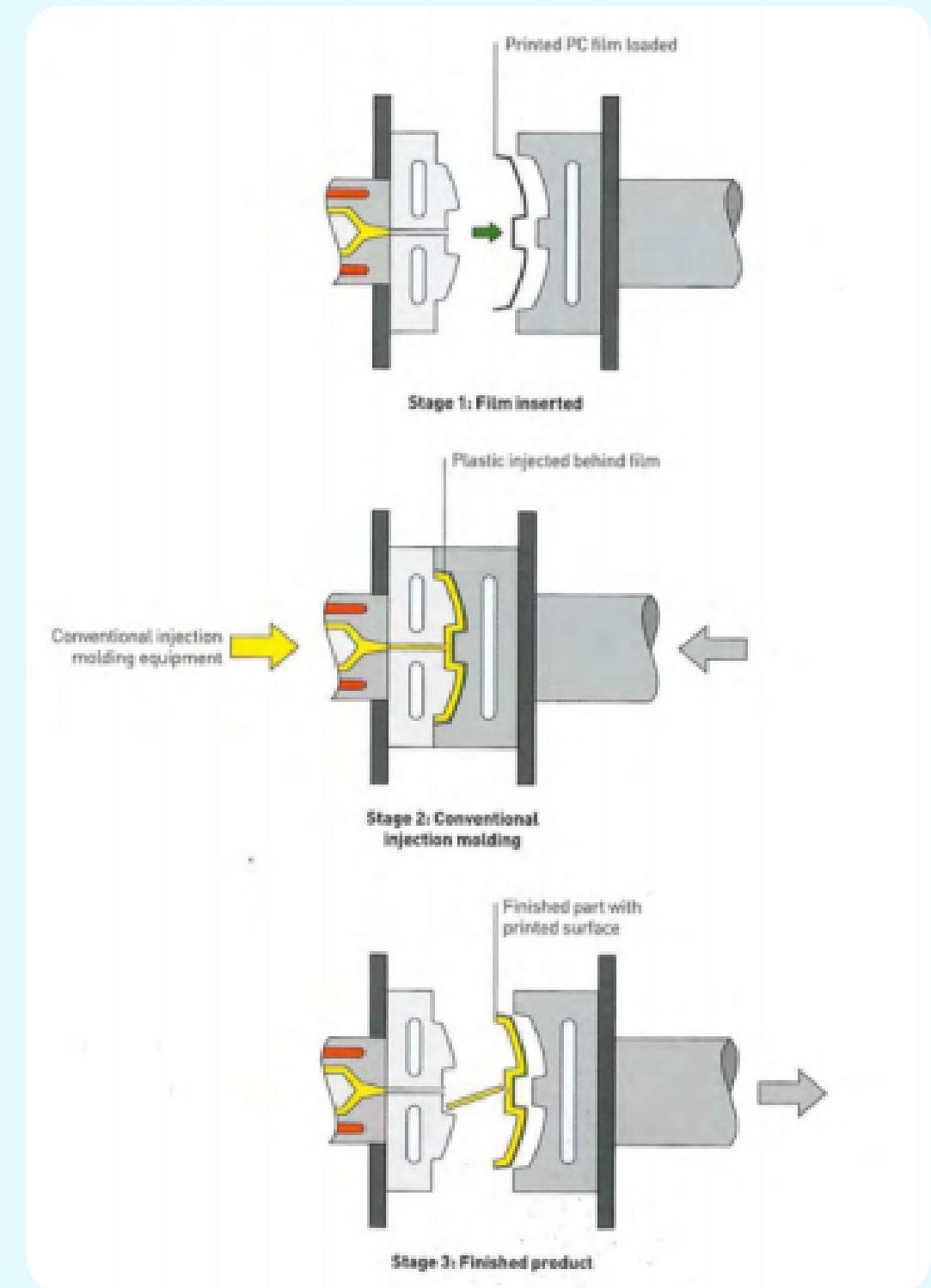
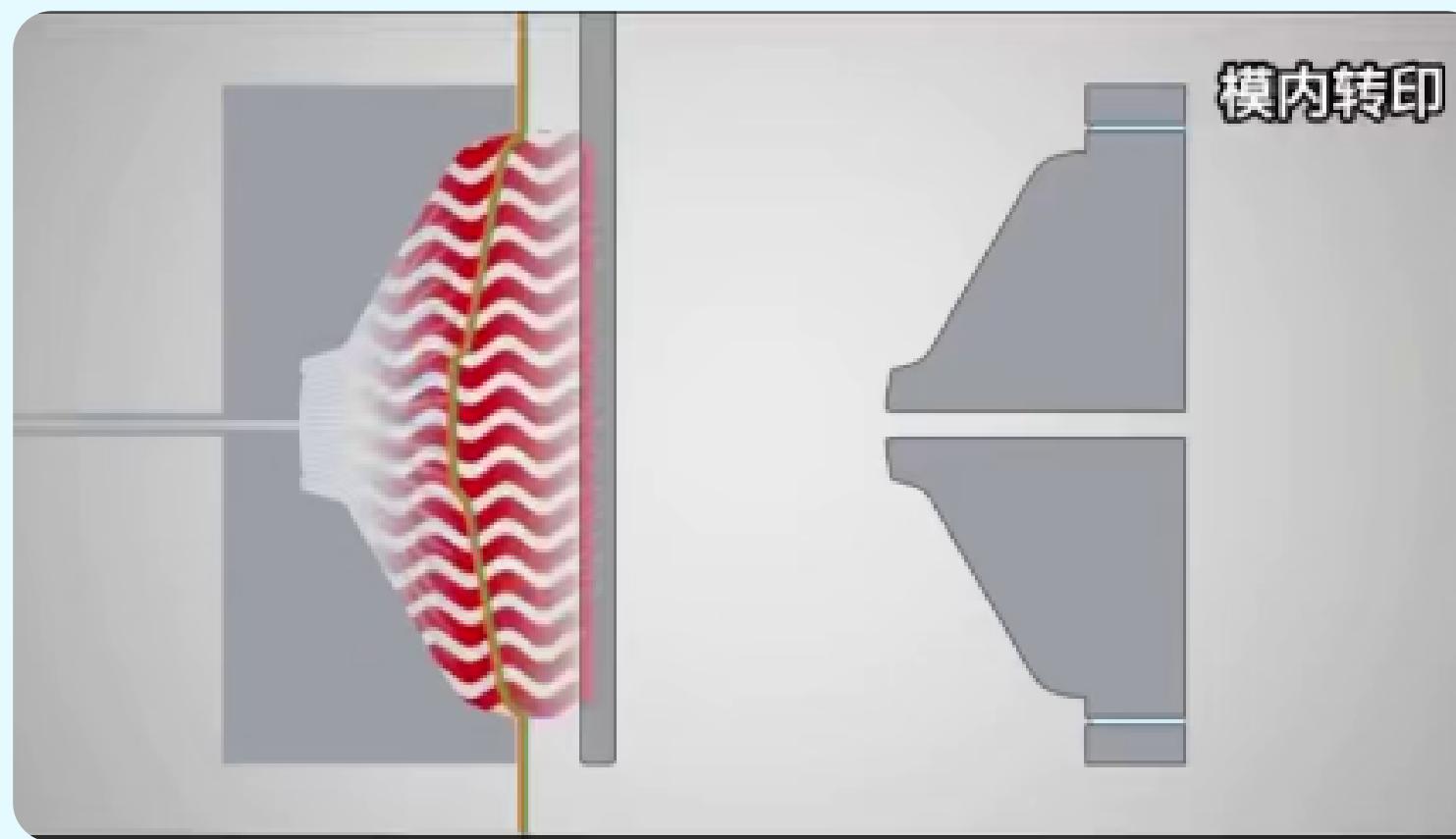
This reduces the costs and time delays associated with otherwise unforeseen manufacturing problems. It also maximizes the efficiency of production and can reduce material consumption with significant savings.

01

Material

In-Mold Decoration Process

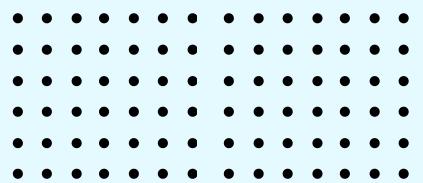
Apply print to plastic products during injection molding, thus eliminating secondary operations such as printing and spraying.



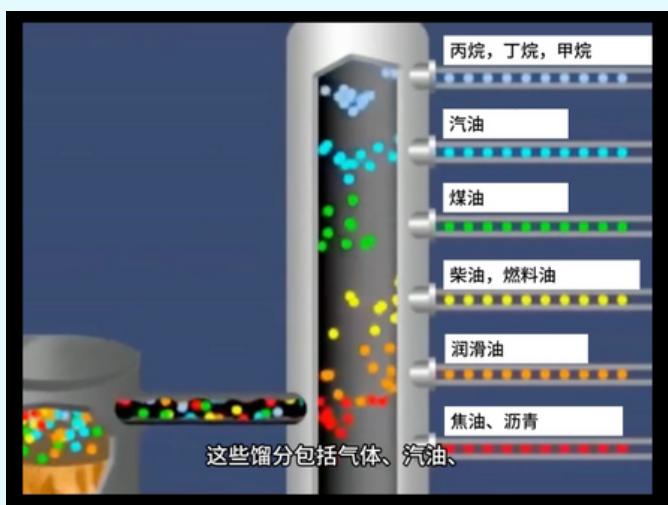
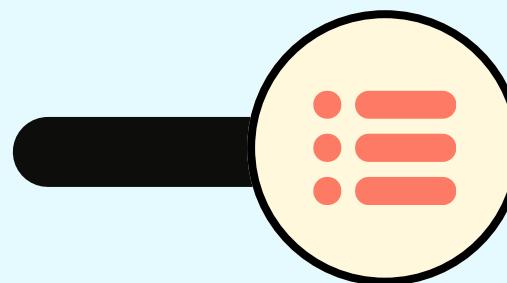
02

Chemical Transformation

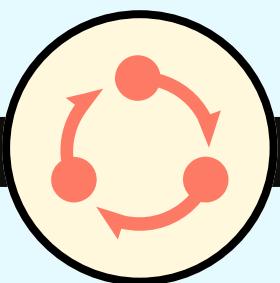
The Journey from Crude Oil to Plastics



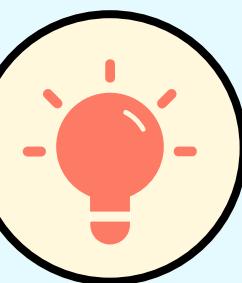
Oil refining and distillation



Cracking and aggregation



Granulation



当然, 如果你没有相应的催化剂的话

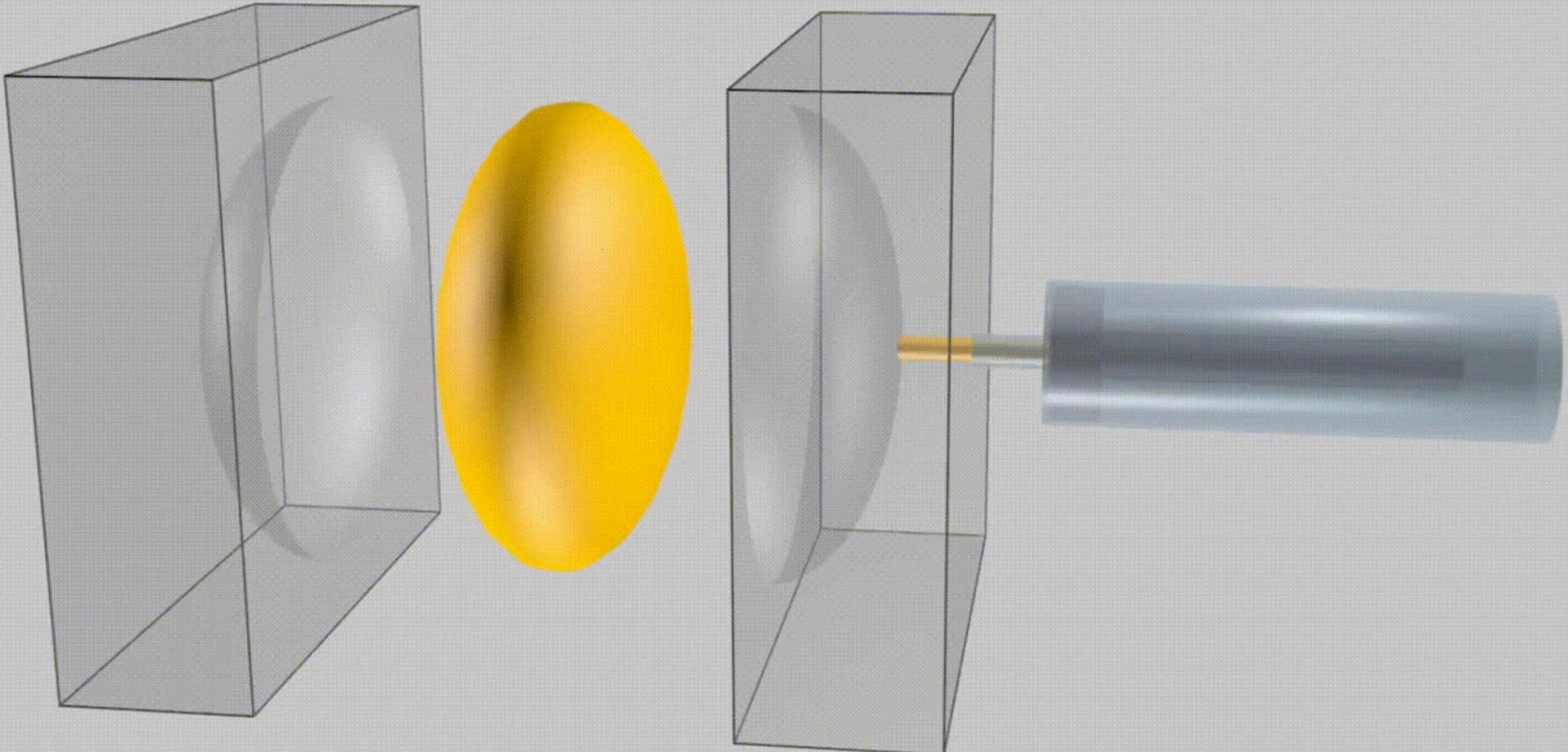
Chemical recycling



03

Injection modeling process

From granules to finished products

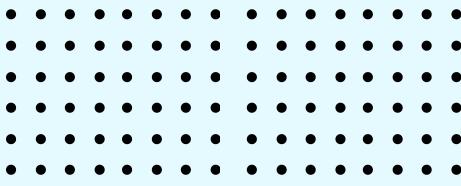


Melting plastic, injecting it into a mold, cooling it and out popping a plastic product.

03

Injection modeling process

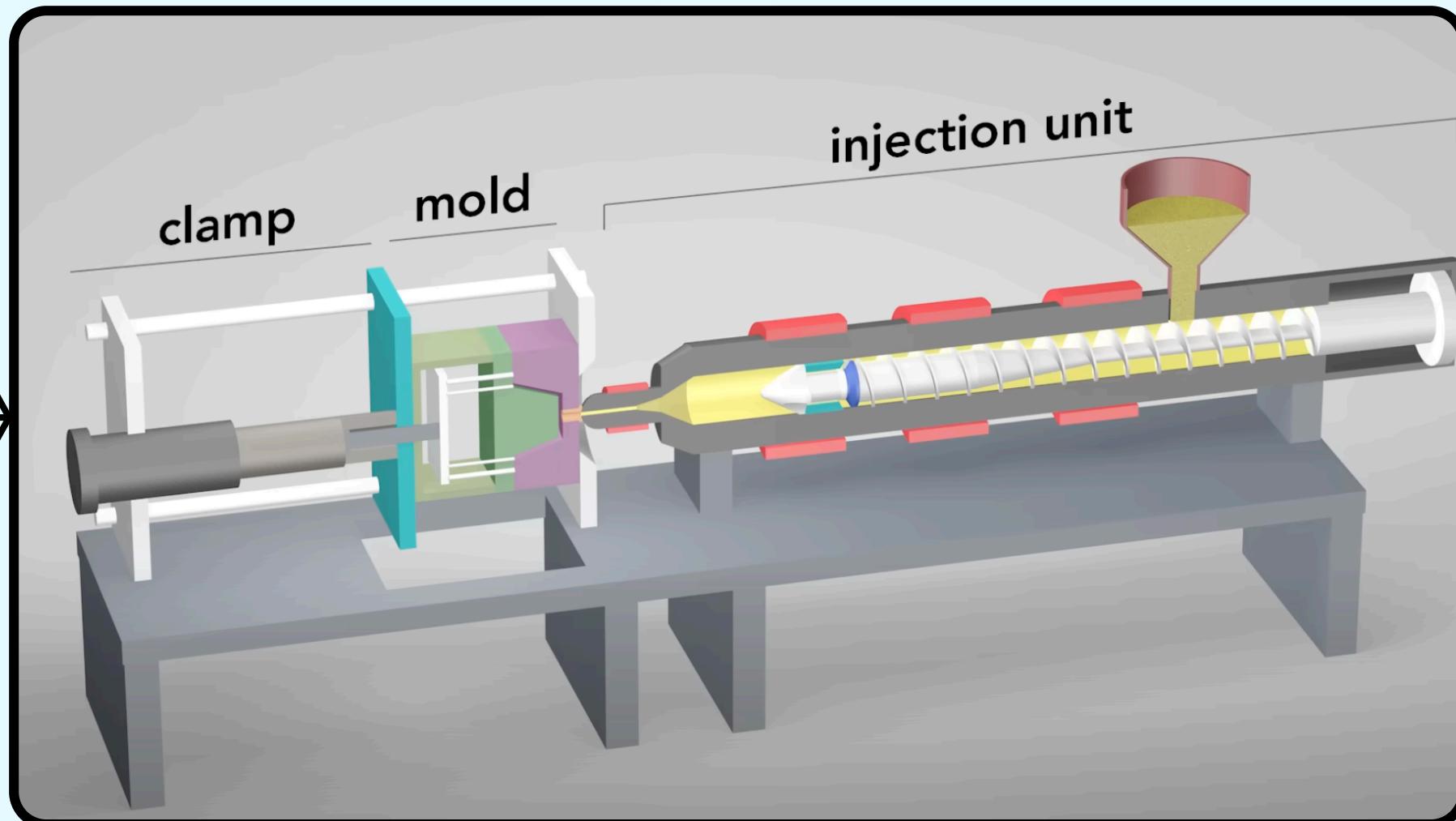
From granules to finished products



1. the injection unit

2. the mold

3. the clamp



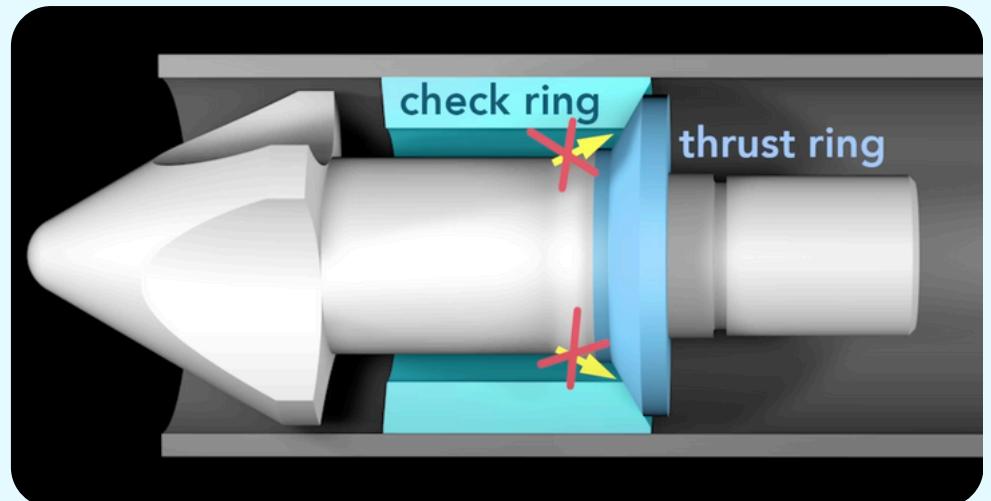
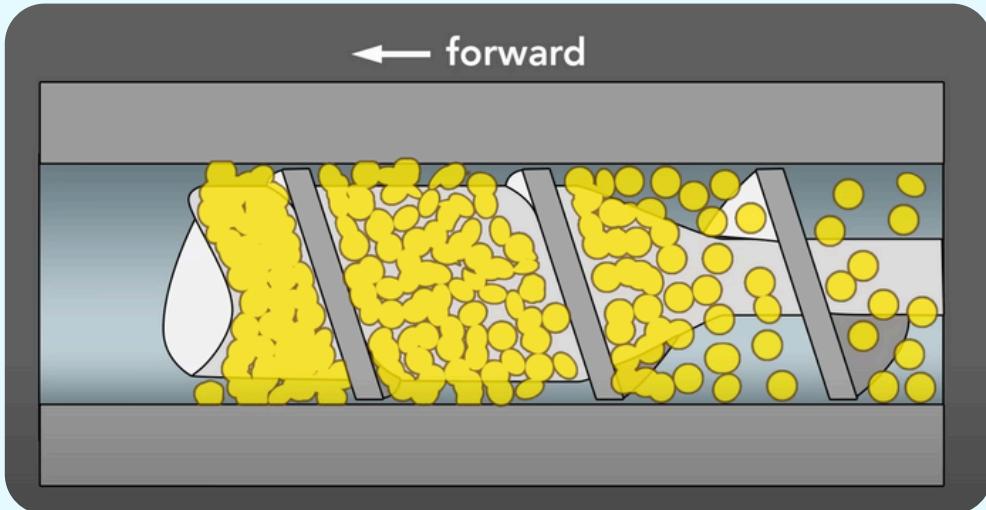
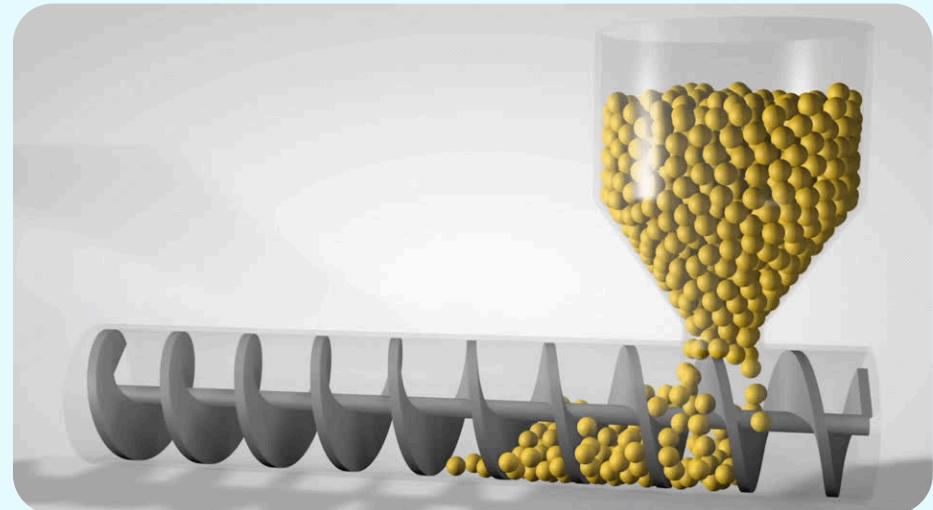
The Injection Machine

03

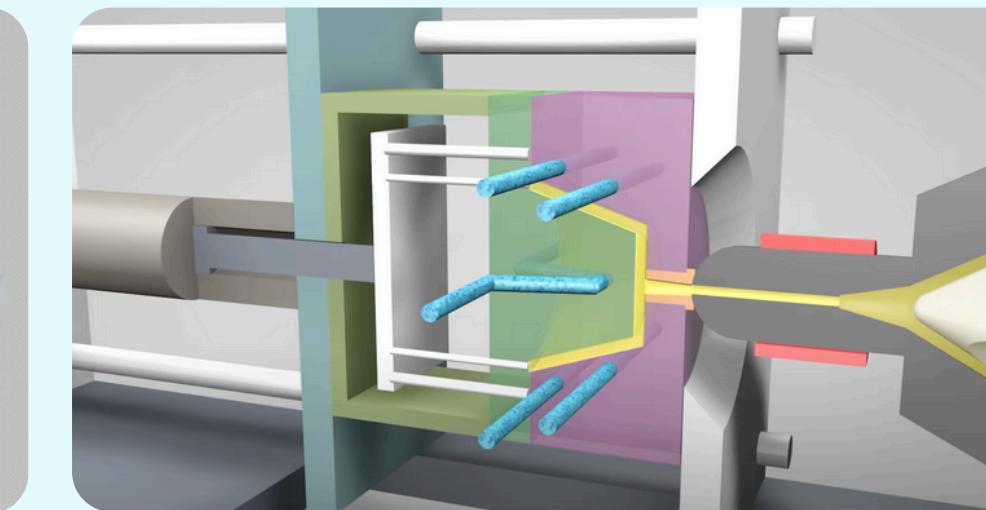
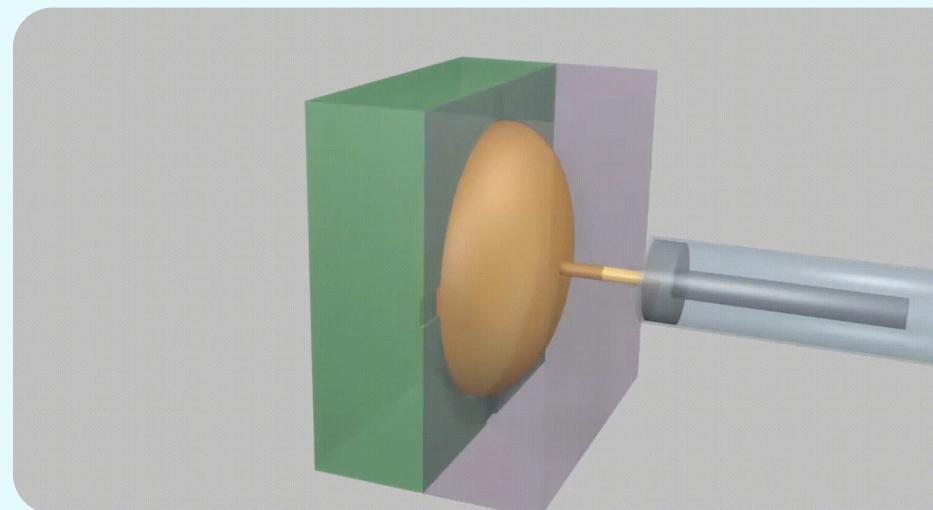
Injection modeling process

From granules to finished products

Melting and
Injection



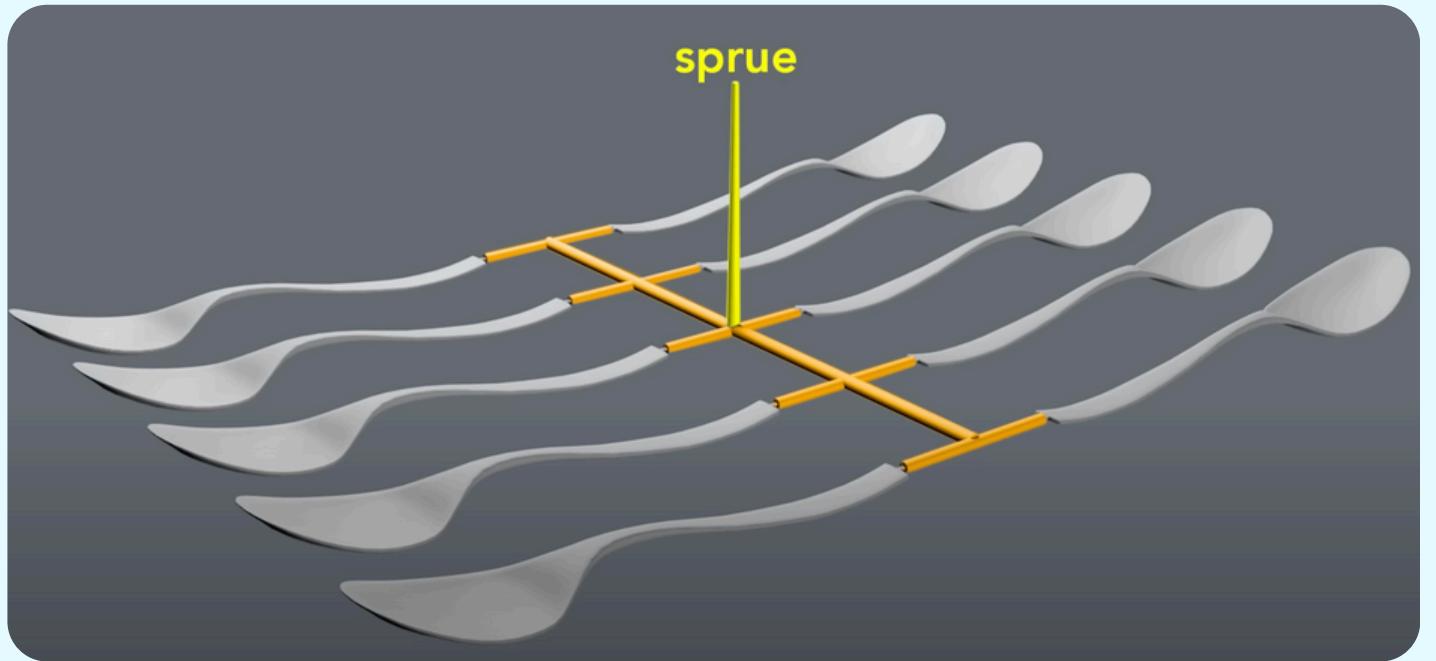
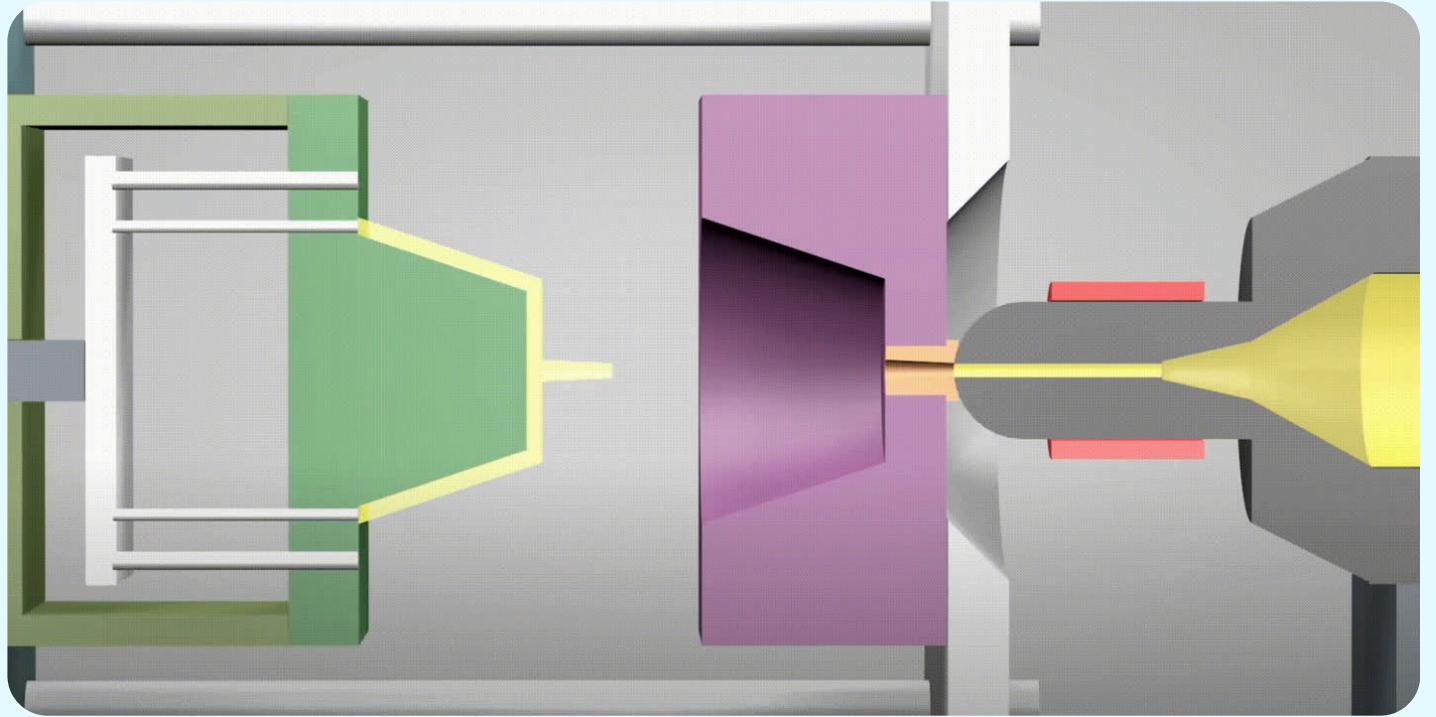
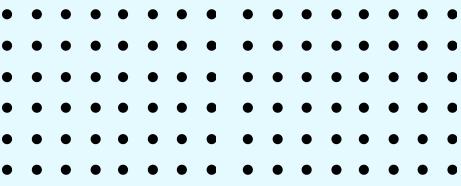
Cooling and
Out popping



03

Injection modeling process

From granules to finished products



04

Lip balm case

an example of injection modeling



1

From crude oil to plastic: polymerization

2

Reprocessing of plastic pellets

3

Melted and injected into molds for shaping

4

Surface finishing and appearance processing

5

Assemble the casing based on structural design

6

Test

04

Lip balm case: Material

Material

ABS →



PP →

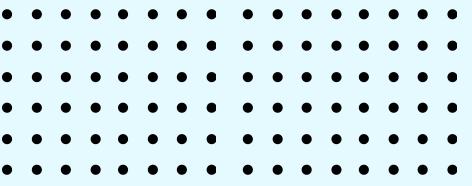


- Lipstick cases are typically made from ABS (Acrylonitrile-Butadiene-Styrene) or PP (Polypropylene) materials, as they offer good surface gloss, impact resistance, and are suitable for subsequent decorative treatments such as plating and spraying. ABS is commonly used for high-end lipstick cases, while PP is often chosen for lightweight or recyclable structures.

04

Lip balm case: Production of ABS

Production of ABS

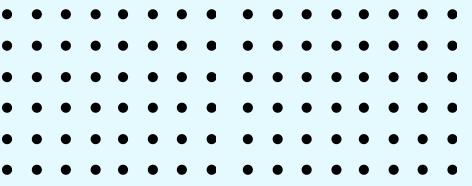


- The manufacturing of ABS begins with naphtha obtained from petroleum refining, which undergoes steam cracking to produce styrene, acrylonitrile and butadiene monomers. These monomers are combined through free radical or emulsion polymerization reactions to form thermoplastic polymers with rubber-like toughening structures. This polymerization process is completed in chemical enterprises and granulated to form injection-molded particles.

04

Lip balm case: Compounding

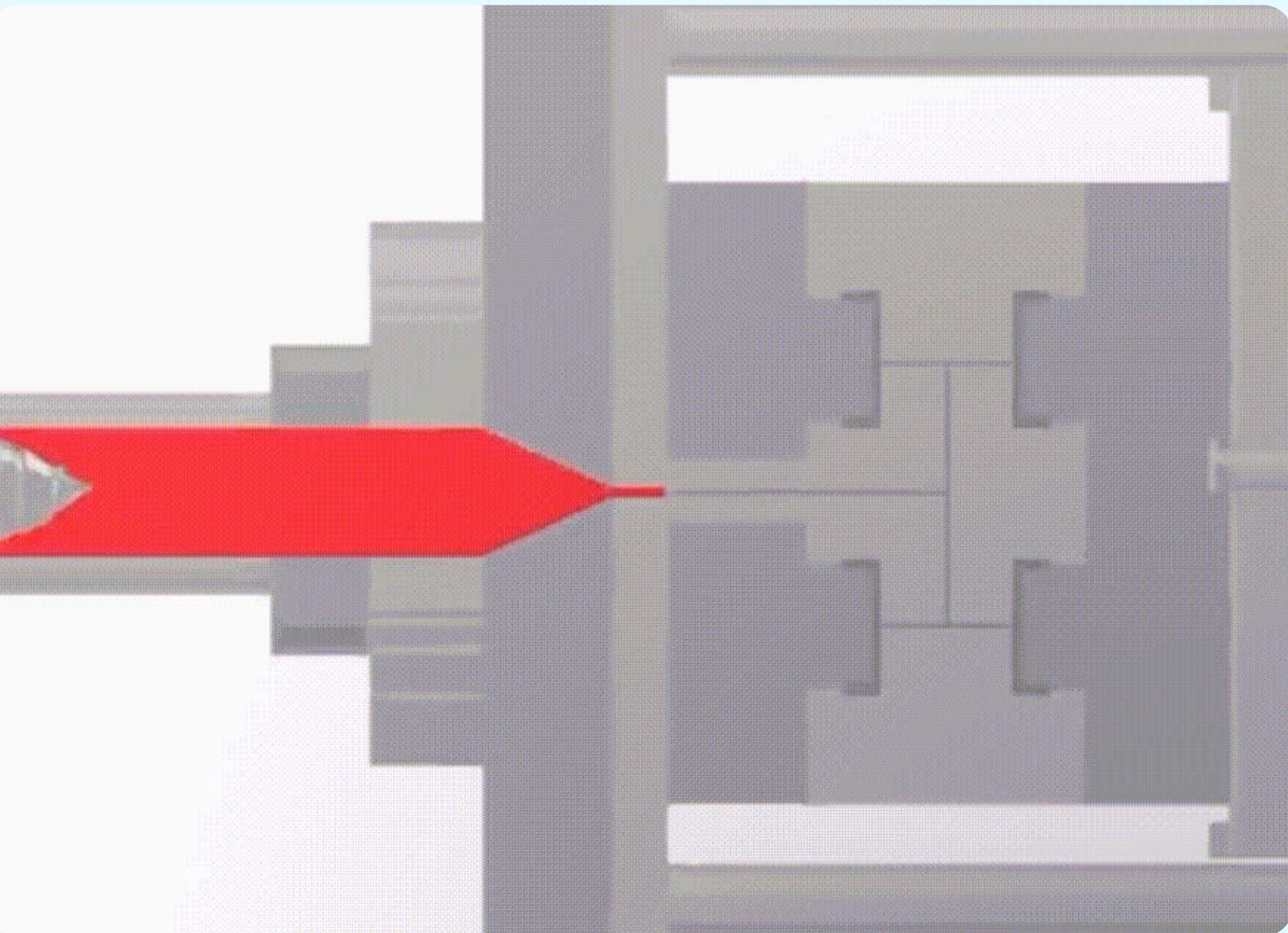
Compounding



- Before entering injection molding, the particles are mixed with color masterbatch, UV absorber and food-grade safety additives to ensure that the shell is odorless, non-toxic and meets skin contact standards.

04

Lip balm case: Injection Molding

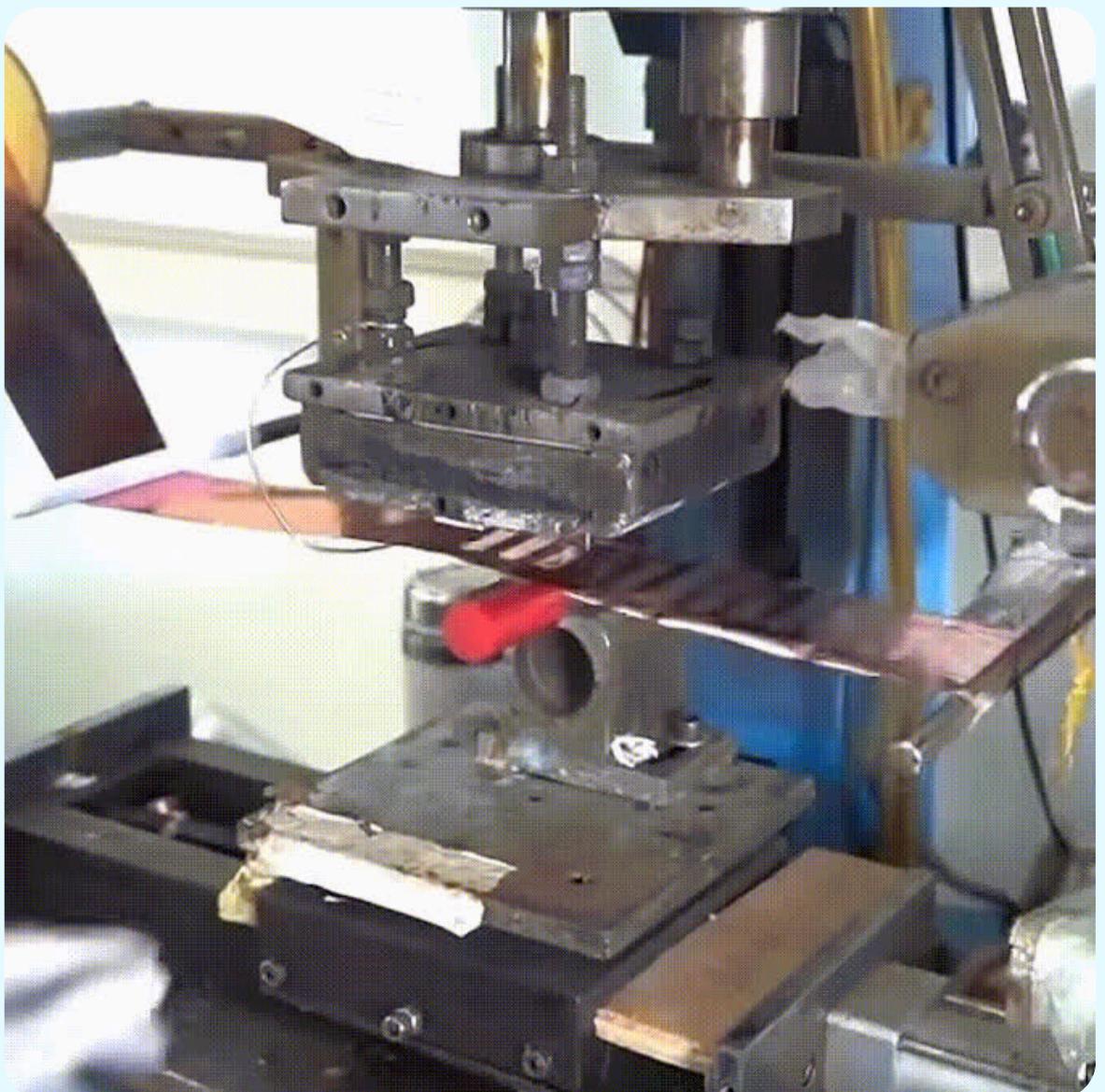
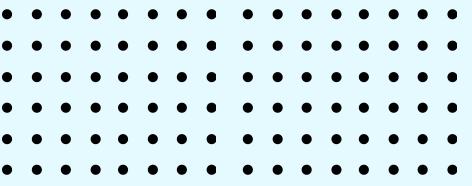


- The particles are heated to 200-250 °C in the injection molding machine to melt, and then injected into the metal mold under high pressure by the screw to form shell components (outer cylinder, inner core, screw seat, etc.). After cooling, the parts are pushed out by the ejector pins. The entire process requires control of material temperature, mold temperature and cooling time to prevent warping and shrinkage.

04

Lip balm case: Decoration

Decoration

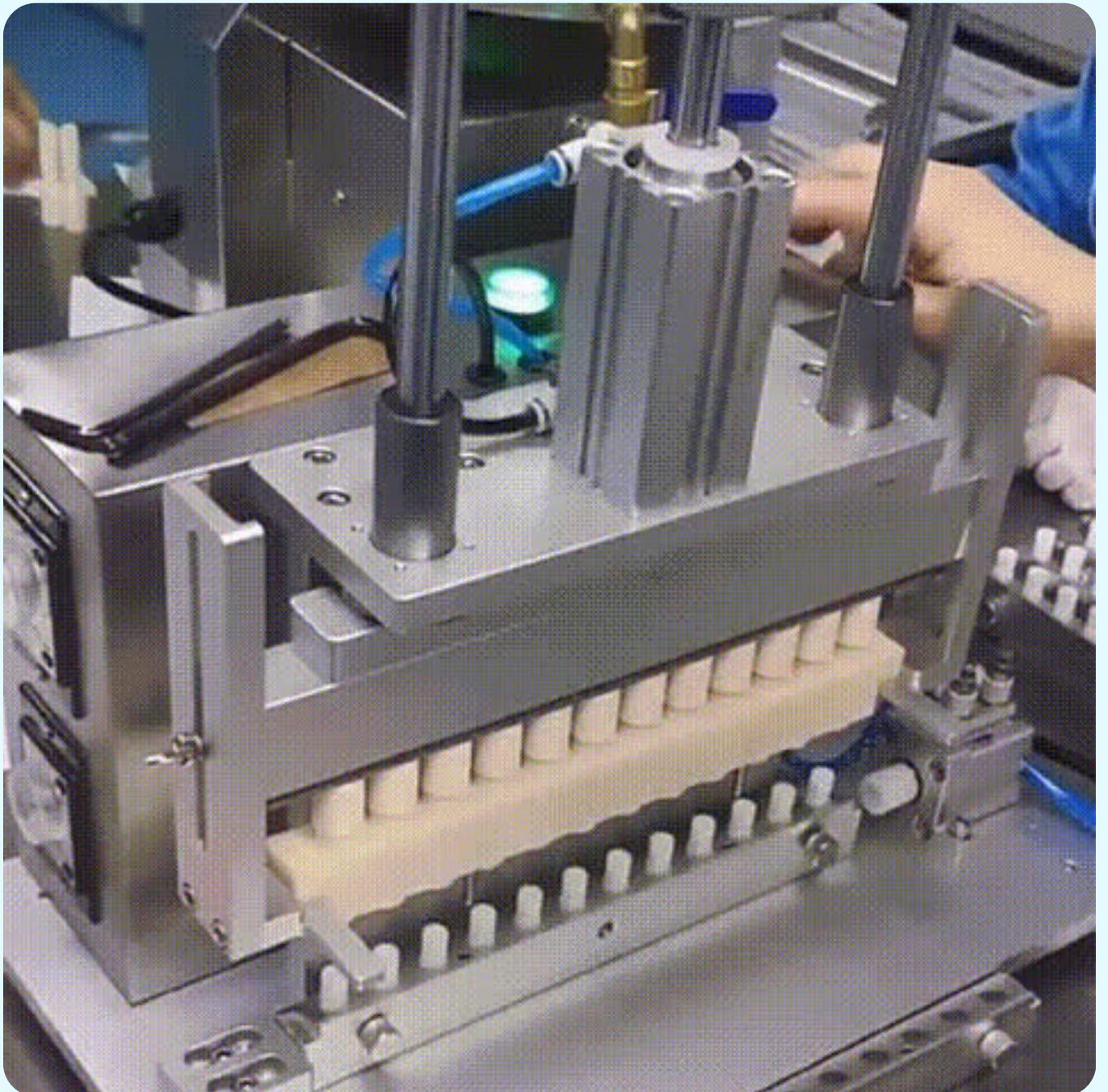
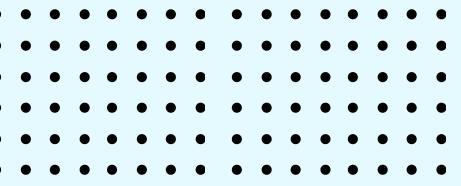


- Most molded cases undergo special surface treatments to showcase unique brand designs, such as spray painting, plating (e.g., imitation gold or chrome), screen printing, or hot-stamping logos.

04

Lip balm case: Assembly

Assembly



- The lip balm case is assembled from multiple injection-molded parts such as the outer shell, inner sleeve, push screw, and rotating base. The paste is lifted and lowered through a rotating structure.
- Manufacturers usually adopt glue-free mechanical snap or threaded structures to ensure structural stability and facilitate large-scale production.

04

Lip balm case: Test

Test



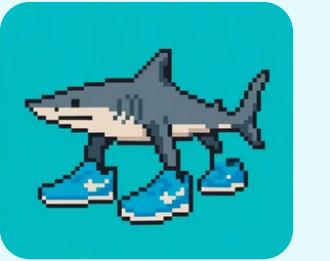
Quality Control and Regulations

All plastics used for lipstick cases must pass specified tests to ensure no harmful monomers are released. Factories are generally required to follow Good Manufacturing Practices for cosmetics.



Environment and Recycling

The recycling rate of lipstick cases is extremely low because their multi-material construction makes them difficult to process through conventional plastic recycling systems. According to a report by the Ellen MacArthur Foundation, only about 14% of global beauty packaging is recycled.



THANKS!

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