Hollow Chocolates (Eggs) - Moulding and Filling

Brunner
Schokoladenformen
Chocolate Moulds
INTRODUCTION

Chocolate hollow figures seemed to be a vanishing market segment when tablets with origin controlled chocolate and pralines with exotic fillings entered the market.

There are a lot of reasons for this success: Hollow chocolate figures are the ideal seasonal gift. They are quite versatile and can be scaled for specific customer groups:

- Handcrafted by local confectioners for customers who like regional manufactured products.
- Colorfully decorated to give a smart appearance—sometimes so beautiful that it is hard to bring oneself to eat them.
- Wrapped in foils—colorful like comic figures or elegant to emphasize the brands chocolate quality.
- Filled figures with chocolate lentils or cellophane-wrapped eggs with pralines or “bonbons” like the more than 100 million a year sold traditional Easter gifts in Brazil and Italy.
- Liquid filled liqueur pralines shaped like walnuts, barrels or other shapes

There are a lot of reasons to expand your chocolate business with hollow figures. The following essay gives an overview of manufacturing processes.
1. Manual flood filling process

You need two-part hollow figure moulds with an open basement. Both mould halves are joined together and fixed with clips (image 1).

The mould is hold with the open basement upside. It is completely filled and then turned upside down, so that the chocolate flows out but leaves a layer of chocolate on the inner mould walls (image 2).

This is repeated until the required wall thickness or weight is reached. However reaching a repeatingly exact weight is difficult. After the final filling/reversing the mould is cooled. Finally the basement is made by placing the mould with the open side on a layer of chocolate (image 3).

It is possible to do colourfully decorated hollows with these moulds. The coloured chocolate will be applied as first step before the two mould halves are joined. To obtain clear distinct borderlines between different colours some moulds are equipped with decoration grooves. For a chocolate- confectioner the main investments for starting this kind of production are moulds and possibly tools for packaging. Moulds in numerous designs are available from different suppliers.

2. Spinning processes

2.1 Stand Alone Spinning Process

2.1.1 Stand Alone Spinning Process for “Self Supporting Moulds”

Self-supporting moulds are two part moulds, which are kept together with a number of magnets. The cavities are perfectly leak-proof so that the hollow chocolates do not show any burrs at the separation line. The moulds are attached to the magnets of the spinning machine with a metal part that is fixed to the mould. The spinning machines are available as for small businesses with at least 4 arms up to industrial drum type spinners with up to 100 arms.
The process starts with separated mould halves. One side is filled with chocolate and then the other side is put on top of it, completely encapsulating the liquid chocolate. Then the complete mould unit is fixed on the rotators of the spinner. The spinner moves slowly and spreads the liquid chocolate all around the inner surface of the cavities. Some customers heat the moulds at the beginning of the process to ease the flow of the chocolate. Vibrations may be applied and support the even spread of the chocolate. During the spinning process the moulds are cooled and after 8-20 Minutes of spinning the moulds are removed and put into the cooler. Demoulding is done manually.

Advantages:
This process is the most efficient way to produce hollow figure manufacturing without automatic line components. The mould handling is quite easy as there are just two parts which fit exactly together.
2.1.2 Stand Alone Spinning Process for „Frame/ Insert Mould“ Systems
2.1.2.1 Systems with interlocking, joint link frames

Spinning process and equipment are the same as the above mentioned. The mould concept is different. It consists of a frame and a two-part insert mould.

The steps of the procedure are:

• Deposit chocolate in one mould side.
• Join it with the other mould side with the help of magnets and centering pins.
• Place the complete mould into the lower side of the frame.
• Lock the frame just by closing it like a book and press until it is locked.
• Attach the complete unit to the magnet of the spinning machine.
• Spin it for around 8-20 minutes.
• Take frame/ mould unit from the spinning machine.
• Open the locker of the frame and release the mould.
• Move mould into the cooling.
• Bring frame to the start of the procedure- it can be used again at this time.
• After cooling: Separate both mold sides and demould the hollow figures.

Advantages:
Moulds are cheaper than self supporting spinning moulds because they contain less magnets and do not require the metal angle. The investment for the frames will be paid back quickly.

Some insert moulds can also be used in a Collmann / Jensen line which is described later.
2.1.2.2 Systems with magnet-containing frames (BLUEFLEX®)

The system consists of a two-side frame with a grid that separates the frame into sectors (e.g. or more sectors). Magnets are integrated in frame and the grid. A metal stripe is attached on side of the frame that holds the complete at the magnet of the spinning machine. moulds are also two-sided, fit exactly into the but do not contain magnets.

The procedure is:

- Put one side of the mould into the correspon ding side of the frame. If the figure is too high just use a second lower frame part to avoid the cavities touching the working area.
- Deposit chocolate into the cavity
- Close the mould by putting the second mould side over the lower side.
- Fix the complete unit by attaching the upper frame side. Magnets will hold the frame closed with the mould in between.
- Attach the complete unit to the spinning machine
- Spin it for around 8-20 minutes
- Take frame/ mould unit from the spinning machine
- Take away the upper side of the frame (you find enough finger notches or overlapping grips to do this comfortably)
- Take out the complete mould and put into the cooling.
- Bring frame to the start of the procedure- it can be used again at this time
- After cooling: open the mould and de-mould the hollow figure.

Advantages:
The insert mould is much cheaper than the self-supporting moulds as it does not contain magnets at all. The investment in frames will pay back after 3-5 sets of moulds (depending on quantities). The insert moulds are just 1.0 – 1.5 mm thick which allows short cooling times and reduces material cost. The complete system of frame and mould is extremely flexible and allows the better manufacture of articles which are prone to breakage.
2.1.3 Spinning of Single Cavities with the „BLUEFLEX® Carrier“

The BLUEFLEX® Carrier is the most flexible system for hollow figure spinning. The system consists of a frame which holds exchangeable carriers for double sided single cavities. The carriers are exchangeable to allow the manufacture of hollow articles in different sizes.

The use of single cavities in a standard format avoids expensive tooling costs and uses the direct result of a newly developed hollow figure. It even allows hollow figures to be customized with a logo or a seasonal greeting message. The single cavities are fixed in the carrier with a manually operated screw system.

Advantages:

Compared to all other systems the tooling costs are extremely low. Delivery time after the product design phase is quite short.

The system is the most efficient system for individual hollow figures at small batches. The BLUEFLEX® Carrier allows small batch manufacture of prototype and pre-market series.
2.2 Integrated Spinning Lines
2.2.1 Chained Lines

2.2.1.1 Lines of type “Collmann Hydo” or “Jensen”

Both lines were developed in the 1960’s to allow the automated manufacture of hollow figures. They cover the complete moulding process: Mould opening, chocolate depositing, mould closing, spinning, cooling, demoulding and transport of finished hollow articles to a packaging machine (wrapping).

Both systems were manufactured until the 1990’s but many of them are still in use. Some were refurbished and upgraded with up-to-date automating technology.

The core of the system consists of revolvable carriers which are chained and carry metal frames. These frames are equipped with mould carrier frames containing a rubber seal that flexibly presses both mould sides smoothly together. The opening and closing mechanism of the frame unit is completely automated. During filling, cooling and other linear operations the frame unit does not rotate. Only when it arrives at the big drum type spinner the chained carriers plug in a rotation system.

The moulds are equipped with magnets and center pins to provide an exact and perfectly tight sealing. In a completely automated system the moulds are attached to the metal frame with magnets.

The moulds can be designed in a way that they also fit the interlocking frame system described in 2.1.2.1. That allows using the same moulds on both systems.

There is still an amazing amount of these reliable lines in work. Occasionally they can be found on the websites of used equipment resellers.
2.2.2 Chainless mould lines
2.2.2.1 Hinge-book mould lines for hollow figures

Options: Solid and soft fillings

These spinning lines work with injection moulded, hinge book moulds which run unchained but completely automated through a complete moulding and spinning line. The moulds are kept together with magnets and have a metal stripe attached that is used to pull the moulds at some spots of the line. The hollow articles can be filled with surprise toys or other solid fillings. Therefore the mould is opened after an initial but not complete cooling.

2.2.2.2 Disjoined double mould lines for hollow figures

Options: Soft and liquid fillings
The complete unit is then locked by a spinning carrier. It fixes the moulds with four spring-loaded bars.

3. Cold Stamping System

Cold Stamping systems work completely different than all the spinning/rotating systems that were described before. They create exactly defined chocolate shells. These can be shells for pralines, tablets and bars as well as hollow figures. To create a hollow figure/hollow article two shells (front and rear side) are manufactured, separated and then connected by melting the shell rims and pressing them together in the containing mould. Double moulds are required.
4. Options

4.1. Filling
4.1.1. Solid Fillings

Typical solid fillings are surprise toys for children or other chocolate items like sugar coated lentils or pralines.

4.1.1.1 Divider Sheet System

This system also works for spinning moulds. After spinning the moulds will be partly cooled so that the chocolate is still viscous but not completely hardened. Then the mould is opened quickly. With a kind of perforation effect the chocolate figures break exactly at the separation line into two shells.

The filling can be added, the separation line is slightly melted, the mould is closed again and cooled finally.
4.1.2 Liquid Fillings

Liquid fillings can only be used if the hollow article (like a ball, walnut, barrel etc.) is manufactured with a completely integrated shell. The mould is opened in a way that the articles all stick in one side of the mould. A hole is punched into the top of the articles through a pre-formed hole-shape. The liquid is then filled in through that hole. After filling the hole is closed by a drop of chocolate before it is finally cooled.

A similar system uses nob-sheets to create the pre-formed hole-shape. The sheet is attached to the mold side with the hole by magnets or a frame. After spinning the plate is removed and the filling is done in a similar way with the difference that the mould remains closed until the end of the process.
4.1.3 Soft Fillings

Depending on the viscosity during filling any of the procedures described before can be used for soft fillings like nut creams, nougat, ganache etc..

4.2 Decoration

Generally decorating is done with coloured chocolate or chocolate masses. Colouration is done before spinning or cold stamping. For a perfect look with clearly separated decoration areas, moulds require raised decoration borders.

Decoration at the central part of the article is easier as the cavity in the mould has a horizontal orientation in this area. At the outer areas the orientation is more vertical. The coloured chocolate may follow gravity and may blur. This needs to be considered when designing the hollow figure.

4.2.1 Manual Decoration

Coloured chocolate is applied with a brush, a decoration tube or a syringe needle. Different colours can be applied and need to be cooled before depositing the main chocolate. After filling the main chocolate, flood filling or spinning will be done as described before.
4.2.2 Decoration with Robot

Instead of manual decoration a robot can deposit the coloured chocolate. For each colour you need one robot so that this process is mainly used for high quantity productions. The moulds need to be designed in a way that they can be fixed in a specific position. For standard spinning moulds an adapter frame can be used for this purpose.

Image courtesy of HACOS

4.2.3 Decoration with CAD Depositors

CAD Depositors are a popular solution for high-quality and high-speed decoration.

For high volume requirements each colour requires one CAD depositor. Moulds move through the different stations of an integrated moulding line and stop for decoration. The complete depositor plate with a certain number of nozzles moves extremely quickly and deposits with a high precision concerning position and volume. In order to accelerate the mould rate per minute it may be necessary to use two CAD depositors to apply one color.
5. Wrapping

To wrap hollow figures may have aesthetic effect but it also provides some practical advantages. The foil shelters the chocolate against fingerprints and moisture. Additionally you can avoid any other additional packaging which is needed if decorated products are displayed visibly (boxes with windows, clear pouches…)

5.1. Flat foil wrapping
5.1.1 Manual wrapping

For small quantities wrapping can be done manually. Usually the foil design is single-coloured. This simple, but aesthetic design stands for upscale hollow figures with high quality chocolate. Crinkles can be smoothed manually and the flexibility of manual wrapping allows nearly all hollow figures to be wrapped.

5.1.2 Automated wrapping

Automated wrapping with flat foils is the most common method for seasonal hollow figures but also for articles like surprise eggs. To allow a reliable industrial wrapping process, the figures need to be designed in a way that allows easy wrapping. Sharp edges and extreme transitions of cross sections should be avoided. Otherwise the result will be ugly crinkles or a wrapping process with frequent foil rupture.

The process is performed by machines equipped with a number of pre-shaped clamping devices. These devices press the foil against the chocolate coming from different directions and angles.
5.2 Pre-shaped foil wrapping

Pre-shaping of foils can be done as a service for a chocolate manufacturer. Alternatively the shaping process can be done by the manufacturer.

The process requires two sides of packaging foil. The figure is placed into the lower side, the upper side is put over it and then the overlapping flat part of the foil will be cramped.