

CCMMTM

Continuous Compression Moulding Multilayer

Compression goes multilayer:
The advantages of technology for
your single-serve capsules





CCMM™: COMPRESSION TECHNOLOGY GOES MULTILAYER

SACMI CCMM™ is the multilayer compression technology developed by SACMI that extends the advantages of compression to multilayer capsules. Barrier layer consistency gives the capsule outstanding oxygen barrier properties. Minimum tie layer and EVOH quantities and maximum versatility in terms of material

choice complete the solution.

The possibility of reducing the quantity of base material used in the process means manufacturers can, in fact, keep ahead of any changes in standards concerning progressive plastic waste reduction or greater use of recyclable/reusable materials.

PERFECT TIE LAYER CONTROL

Tie layer control is more effective compared to alternative technologies as it allows the main material layers and tie layers to be managed separately. The quantity of adhesive is so low that it is not mixed with the main material, thus preserving its purity and optimising the used quantities of barrier layer material and adhesive alike.

PERFECT PROTECTION OF THE AROMA

Capsules made with CCMM have outstanding oxygen barrier properties. This is because it's possible to insert even several barrier film (EVOH) layers to protect the delicate organoleptic properties of the coffee without having to act on the secondary packaging with protective wrapping.

CCMM

CONTINUOUS COMPRESSION MOULDING MULTILAYER



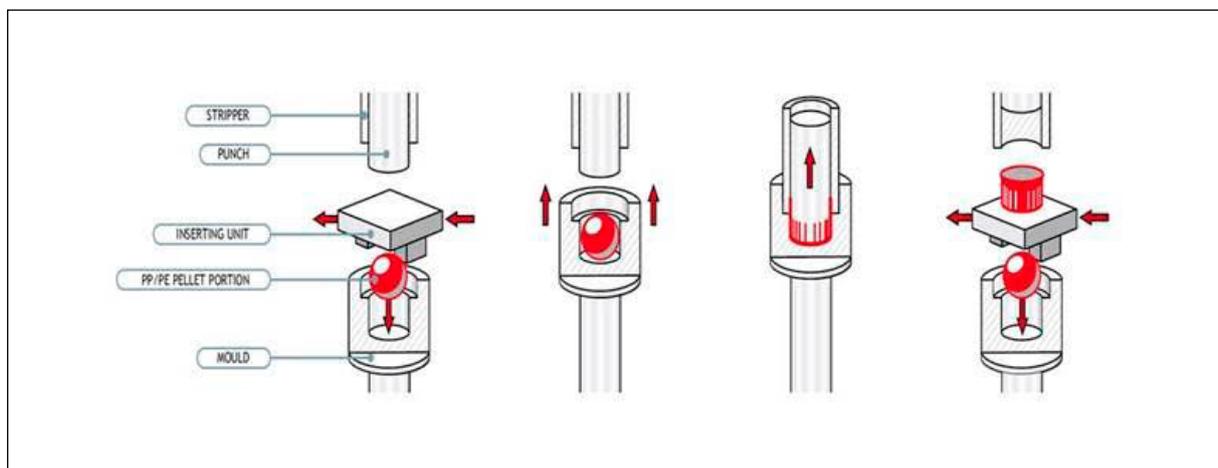
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Continuous compression moulding: introduction

Compression moulding is a FULL MOULDING and HIGH PRESSURE PROCESS (similar to injection moulding). The polymer is fully melted into the

extruder and fully mixed and homogenized. The pressure applied on each moulding station exceeds 400 kg/cm².



1 SHORTER CYCLE TIME and therefore higher productivity. The lower extrusion temperature allows the cap to be cooled in the mould more quickly.

3 HIGH SPECIFIC DENSITY thanks to even moulding pressure and lower temperatures. This results in mechanical properties and a consistency that are unattainable with injection.

5 EASY, FLEXIBLE MAINTENANCE due to independent moulds. Maintenance is performed on spare stacks off-line, thus avoiding machine downtimes.

2 LESS ENERGY CONSUMPTION due to lower extrusion temperatures. Since the plastic is colder, less energy is needed to cool it.

4 CONSISTENCY has become a major issue in beverage bottling where cap-related plant stoppages can no longer be tolerated.

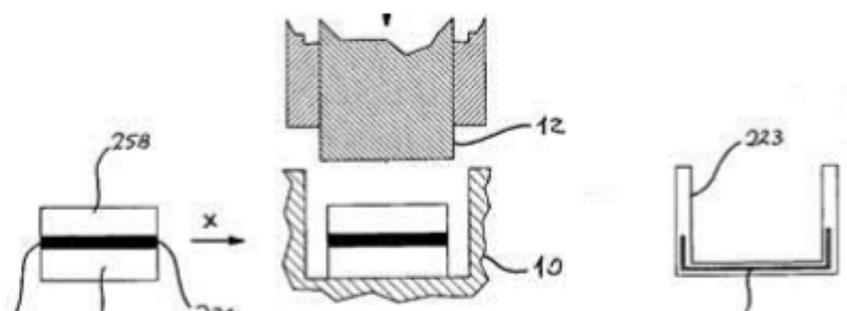
6 QUICK COLOUR CHANGEOVERS can be completed rapidly without having to clean a hot runner (absent in the compression process).

Multilayer compression moulding: the innovation

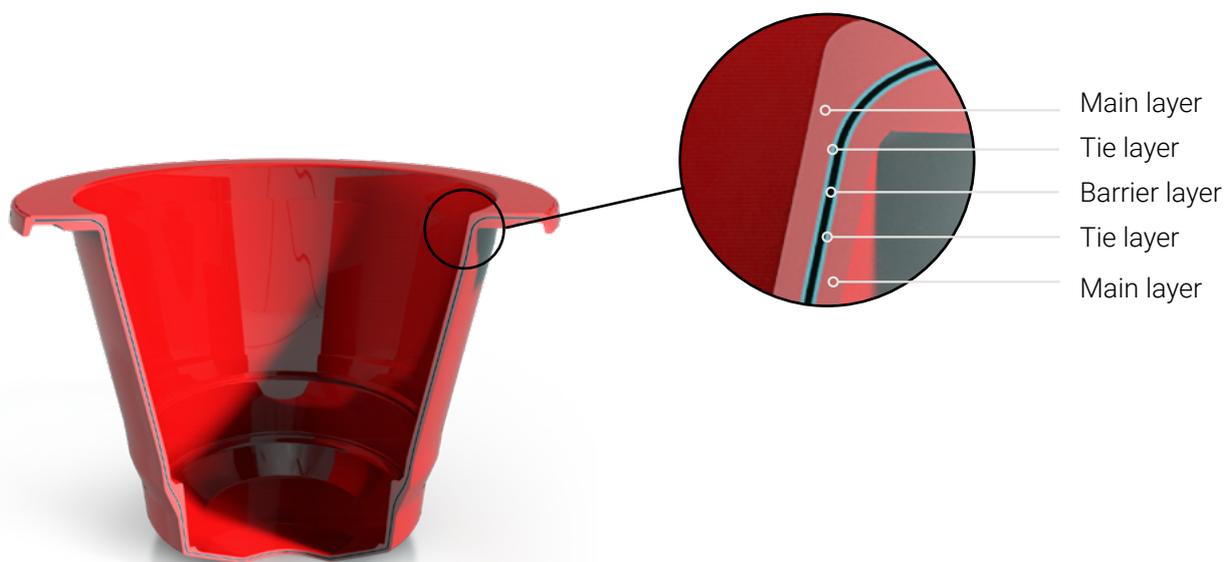
The concept is to extrude a flat pellet of multilayer material and insert it into a standard compression mould (not applicable in the injection process).

A continuous work cycle is carried out, during which a flat multilayer pellet is cut, placed in an

open mould, formed into a capsule and ejected onto a conveyor belt where real-time inspection takes place. The structure and positioning of the barrier layer does not change in the transition from pellet to moulded part.



EXAMPLE OF A 5-LAYER MULTI-MATERIAL CAPSULE MADE WITH MULTILAYER COMPRESSION MOULDING (CCMM)



Process

Multiple extruders, equipped with volumetric pumps, melt different materials. The co-extrusion block aligns the molten materials precisely in a

defined continuous multilayer flow. The transfer system cuts, transports and inserts a precise plastic multilayer dose into the mould.

Co-extrusion system

Multilayer dose

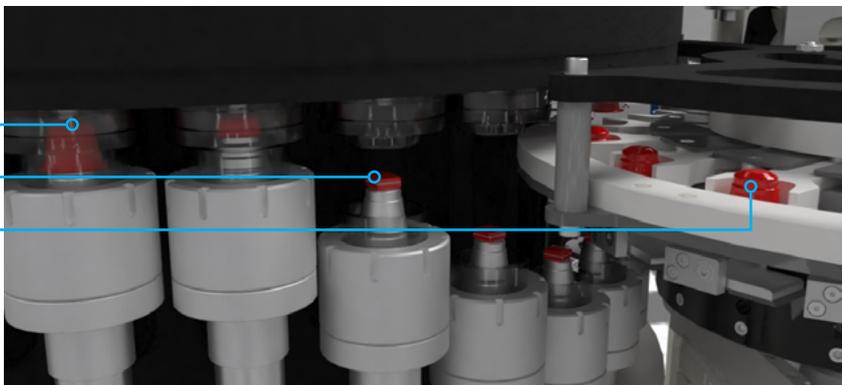
Transfer system



Capsule moulding

Multilayer dose

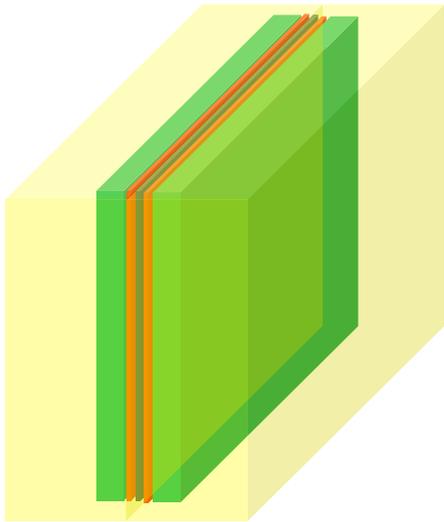
Multilayer capsules



In-line control of 100% production



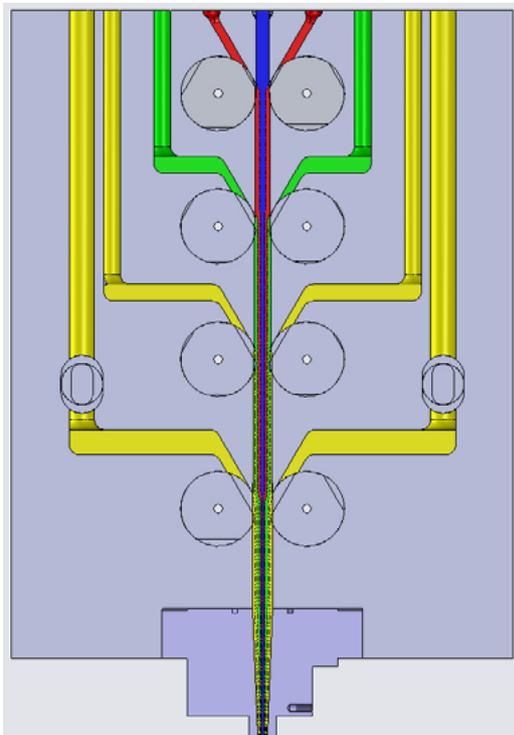
Layer distribution



MULTILAYER DOSE

Compared to co-injection, compression allows for a separate tie layer in the co-extrusion head. With co-injection it is necessary to mix the adhesive with the main material.

That's why the tie layer amount used in compression moulding is lower than in co-injection.



CO-EXTRUSION HEAD

Flexible system that allows splitting of the extruder flow to obtain different configurations and layer sequences.

The picture shows only one of the possible configurations.

Advantages

TOLERANCES:

dimensions of compression-moulded capsules are within a narrow tolerance range.

NUMBER OF LAYERS:

it is possible to obtain capsules with a flexible number of layers, from 3 to n.

CRYSTALLINITY:

the degree of crystallinity in the final product can be tuned to achieve good mechanical strength.

TIE-LAYER QUANTITY:

the tie-layer is not mixed in with the main material and the layer quantities needed to obtain good adhesion are lower compared to other techniques.

FILLER:

filler high-loading

	MATERIAL FLEXIBILITY	NUMBER OF LAYERS	EVOH DISTRIBUTION	SCRAPS	GEOMETRY FLEXIBILITY
Thermoforming	*	*****	***	*	***
Co-injection	***	*	*	*****	*****
Compression	*****	*****	*****	*****	***

FLEXIBLE SINGLE HEAD MULTILAYER MOULDING SYSTEM:

we can develop new designs rapidly, assessing different materials, layer combinations and different mould configurations.

WIDE RANGE OF INSTRUMENTS:

the vast array of instruments in our laboratory helps speed up product development. These include:

KNOW-HOW:

SACMI has been studying coffee brewing systems for several years; we have acquired in-depth capsule design and process optimization know-how.

- Differential Scanning Calorimetry (degree of polymer crystallization)
- Dynamometric Mechanical Analysis (modulus determination at different temperatures)
- Microscope (layer thickness and distribution evaluation, dimensions)

A sustainable technological process

1

Less energy consumption

The continuous multilayer compression process is simpler to manage than rival moulding technologies, involves significantly lower energy consumption and operates at lower temperatures.

2

Consistency

Unlike other moulding technologies, distribution of the barrier material remains consistent and repeatable even with low EVOH percentages. Furthermore, the number of layers can be managed flexibly and independently via an extrusion head.

3

Materials get a second life

The low percentage of barrier material needed to obtain protection against external substances could allow products made using continuous multilayer compression technology to be fed back into so-called "mono-material recycling streams".

4

Zero raw material waste

Thanks to compression technology the raw material is first optimised, cutting waste to zero and thus boosting process sustainability.

[Contact us to find out more](#)

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