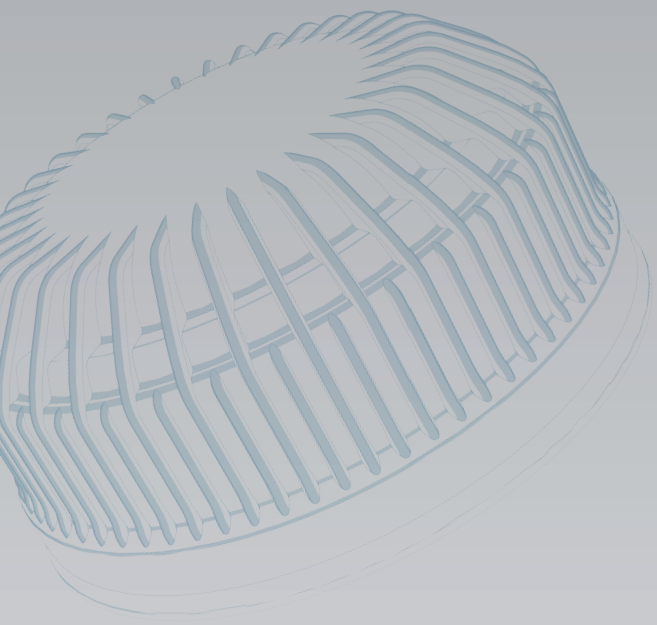
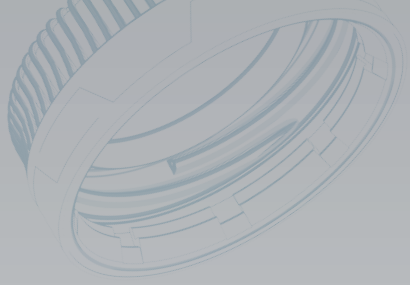
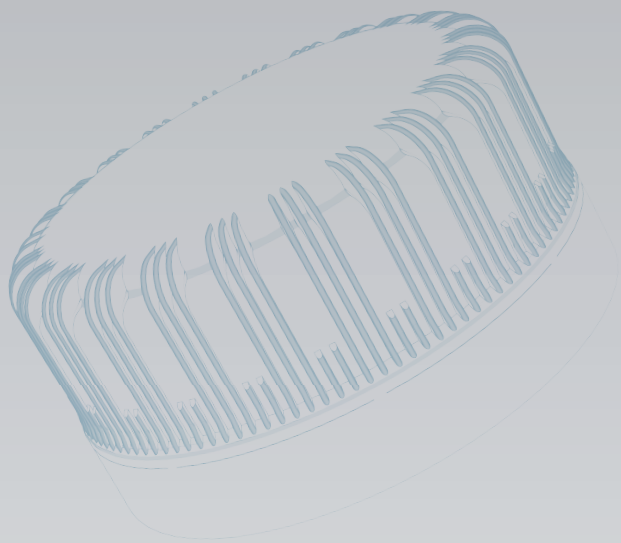
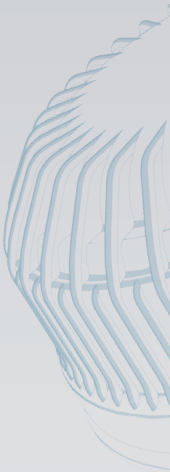






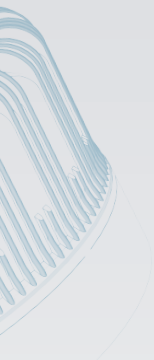


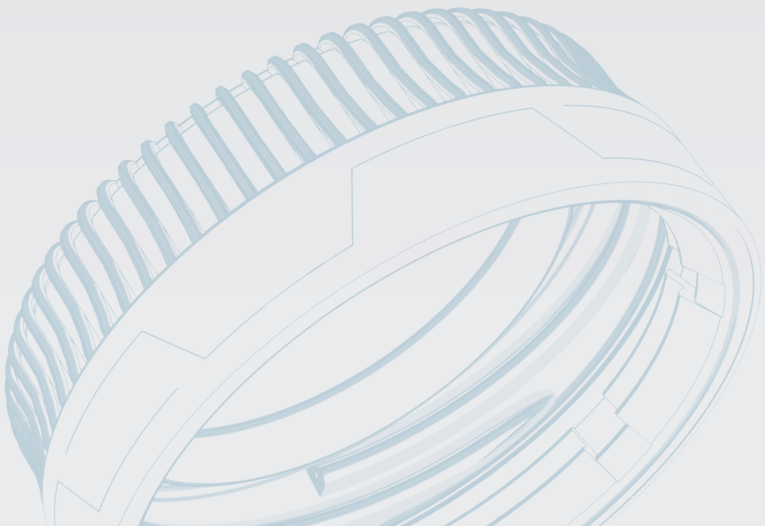
# CCM

## Continuous Compression Molding
## 连续压塑成型

The advantages only compression molding can deliver for plastic closure manufacturing

塑料瓶盖压塑成型解决方案





SACMI

ENDLESS INNOVATION SINCE 1919

# CCM
## Continuous Compression Molding

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# CCM roots

Expertise in technologies, processes, and manufacturing.
Comprehensive solutions thanks to unrivalled cap and preform know-how.
Constant support from SACMI to drive your business projects forward.

# CCM的根基

技术、工艺和制造方面的专业知识。
凭借卓越的瓶盖和瓶坯生产技术，为用户提供全面的解决方案。
萨克米(SACMI)全方位的支持，推动您的业务持续向前发展。

# Compression molding

## A CLEAR-CUT CHOICE

CCM stands for Continuous Compression Molding, the compression technology devised by SACMI and currently the standard of reference for the production of plastic bottle caps. Thanks to a simple and reliable continuous process, this technology delivers results in terms of productivity and quality unattainable using other methods.

The absence of a hot runner and the low extrusion temperatures positively impact cycle time, energy consumption and ease in color changeover.

The molds of the CCM press are independent, each weighing just a few kilos and individually replaceable in minutes. And because they're positioned around the circumference of a carousel, both molding pressure and thermoregulation are essentially uniform.

# 压塑成型

## 明智之选

连续压塑成型设备CCM由萨克米设计和研发，以其高效可靠和灵活多产的特点广受好评，产品品质上乘，主要采用压塑工艺，适用于生产塑料瓶盖。

无热流道机械结构和较低的挤出温度为缩短循环时间提供可能，此外，低能耗和产品换型便捷同样可圈可点。

萨克米连续压塑成型设备CCM的模具独立安装在设备的主转盘内，即成型压力和温度调节基本达到一致，每个模具的重量仅有几公斤，数分钟内即可完成模具更换。



## LET CCM TACKLE PRODUCTION OF THIN CAPS

The new range of CCM presses is designed to achieve the highest efficiency and ease of maintenance for the production of lightweight and ever thinner caps.

The SACMI CCM has a larger window of accessibility compared to other technologies and offers a wider array of applications and choice of raw materials.

## PROFIT FROM A STABLE, REPEATABLE AND CONSTANT PROCESS

Since the molten plastic flows from just one nozzle, variability in cap weight is greatly reduced. In addition, low extrusion temperatures allow the production of cooler caps less subject to alterations in size.
The cooler the cap, the lower the shrinkage, and as a result there's less size variability.

## 轻量化瓶盖解决方案

萨克米连续压塑成型设备CCM适用于生产更轻薄的塑料瓶盖，为全球饮料和包装市场提供高效卓越的轻量化解决方案。

与其他生产工艺相比，萨克米塑料瓶盖压塑成型设备CCM更多样灵活，适用于各类树脂原料，可以生产各种不同瓶盖。

## 高效运行和持续生产带来收益

在管理和控制瓶盖重量方面，由于熔融树脂原料来自同一个出料口，使瓶盖质量均匀统一。此外，在瓶盖冷却时，较低的挤出温度，对瓶盖尺寸影响较小。

瓶盖温度越低，收缩率就越小，尺寸变化也就越少。



# SACMI: your 360° supplier

# 萨克米：全方位的供应商

For 70 years, SACMI has been developing complete multi-platform and multi-material packaging solutions to meet the needs of water and beverage producers worldwide.

The SACMI Technology Laboratory is certified by the main international brand owners. We are a significant part of international bodies and actively contribute to the definition of market standards.SACMI provides complete solutions that include product and technology design, machines, molds, and technological know-how covering the various stages of manufacturing. As far as beverage caps are concerned, SACMI has already developed more than 500 different versions of closures for customers all over the world.SACMI is at your side to help you take advantage of the opportunities of a constantly evolving market. For any capping need, SACMI has the solution for you

70年来，萨克米一直在开发完整的多平台和多材料包装解决方案，以满足全球水和饮料生产商的需求。

萨克米技术实验室获得主要国际品牌商的认证。我们是国际饮料包装行业的主要成员之一，积极参与市场标准的制定。萨克米提供完整的解决方案，包括产品设计、设备、模具和涵盖制造各个阶段的技术开发。就饮料盖而言，萨克米已经为世界各地的客户研发超过500种盖型，帮助您抓住不断发展的市场机遇，并为您提供各种瓶盖解决方案。



**WATER CAPS**
**水盖**



**HIGH CSD CAPS**
**碳酸盖(高盖)**



**LOW CSD CAPS**
**碳酸盖(矮盖)**



**HF CAPS**
**热灌盖**



**CAF CAPS**
**无菌盖**

# SACMI R&D

# 萨克米研发中心

## DRIVING BUSINESS GROWTH THROUGH ENDLESS INNOVATION

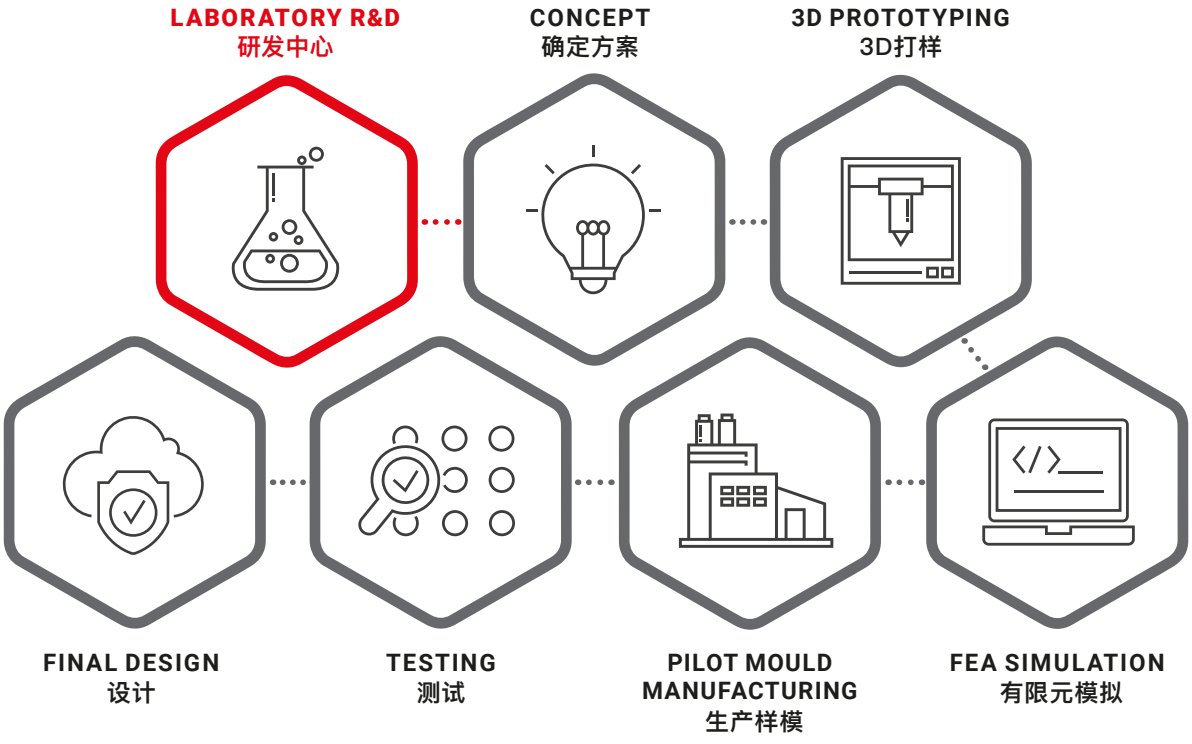
## 通过不断创新 推动业务增长

Technological research is fundamental because it allows us to satisfy better deep-rooted needs, such as eating and drinking healthily.

Research and development at SACMI are dedicated to two main areas: technical solutions and technology. The optimal combination of these two aspects forms the basis of SACMI's offer, which is to continually provide customers with a TCO (Total Cost of Ownership) that is not just competitive, but sets them apart in the industry.

技术研发至关重要，因为它使我们能够满足更深层次的需求，如健康饮食。

研发部致力于提供技术解决方案和技术革新，是萨克米赢得市场的关键所在，同时也为客户提供更具竞争力的总体拥有成本(TCO)有效方案。





# CCM profitability

CCM sets the standard for flat-top cap manufacturing:
The highest output per cavity, together with consistent product quality.
The lowest specific consumption, plus fast and simple maintenance.
The most straightforward, reliable, and profitable solution.

# CCM 盈利能力

CCM为平面塑料盖制定标准：
每个模腔的高产量，以及确保产品均匀统一。
较低的单位能耗和快速简单的维护。
直接、可靠、可持续的解决方案。

# Introduction

Compression molding is a high-pressure molding process: the polymer is melted, mixed and homogenized inside a plasticizing unit.
A device draws doses of polymer in the exact weight of the product and inserts them into the molds. The pressure applied to each mold can reach values of about 400 Kg/cm$^2$.

**HIGHER PRODUCTIVITY**

Thanks to a shorter cycle time. The lower extrusion temperature allows the mold to cool the cap faster.

**ENERGY SAVINGS**

Due to the lower extrusion temperature. With less energy needed to heat the plastic, less is required to cool it.

**PRODUCT WITH BETTER MECHANICAL PROPERTIES**

Because plasticizing occurs at low temperatures and with no hot runner, the raw material maintains its characteristics and product performance is improved.

# 简述

压塑成型，即高压成型工艺，聚合物在塑化单元中熔化，混合和均质处理。

等量粒料被均匀挤出，并被投入到模具中。施加在每个模具上的压力可达到约400Kg/cm²。

**高产**

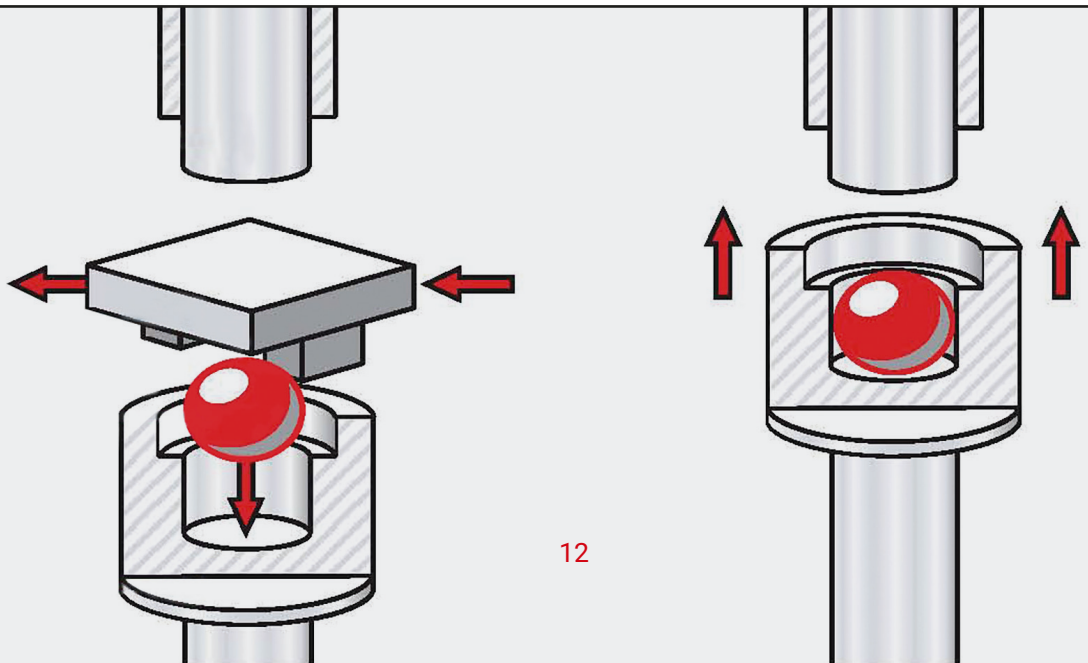
较低挤出温度使瓶盖更容易冷却，所需循环时间则更短。

**节能**

较低挤出温度意味着所需的能耗相应减少。

**机械结构优化**

因采用无热流道机械结构，塑化时挤出温度较低，原料保持其特性同时，产品性能进一步得到改善。



**CONSTANT WEIGHT AND SIZE OF THE PRODUCT**

It is a winning feature of this technology, exceeding the best results of injection molding. A cooler product exiting the mold means less shrinkage and therefore less size variability.

**RAPID, EASY MAINTENANCE**

Thanks to independent molds. Molds are replaced quickly and individually; maintenance is performed at the stand while the machine is operating.

**FAST, ECONOMICAL COLOR CHANGEOVER**

The simplicity of the plasticizing unit and the absence of the hot runner speed up color changeover and considerably reduce waste of raw material during and after color switches.

**产品均匀统一**

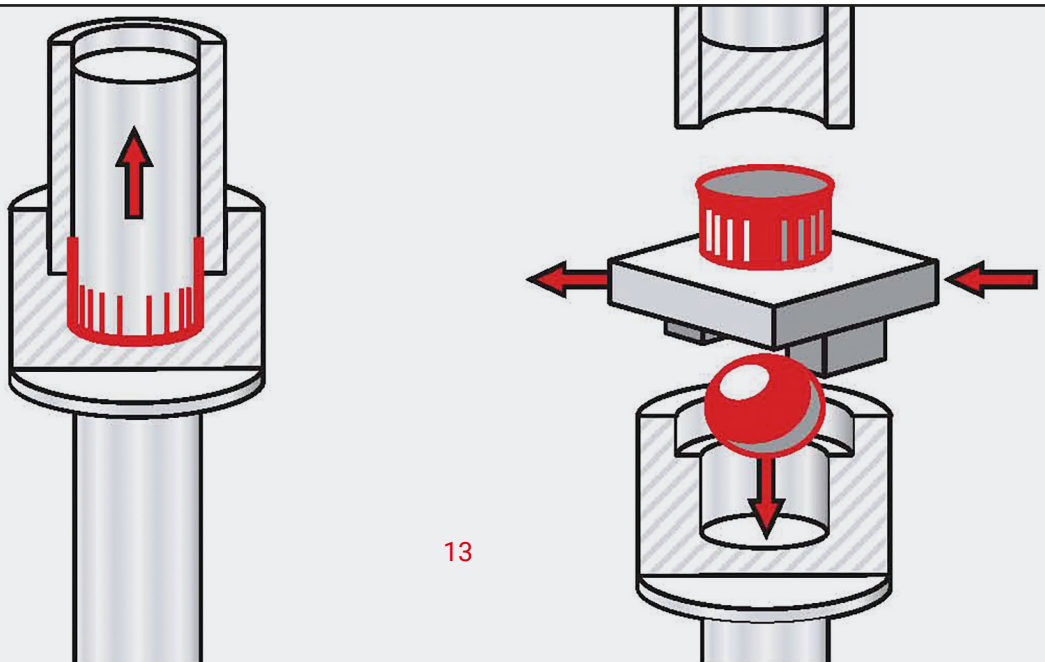
压塑工艺不同于注塑，从模具中取出瓶盖时已经处于较低温度状态，这意味着收缩率较小，对尺寸的影响也更小。

**易于维保**

归因于独立模腔，模腔易于更换，即使在设备运行时，也可以进行维护保养。

**换色简单快速**

塑化单元简化和机械结构无热流道，在更换颜色时更有利于减少废料。



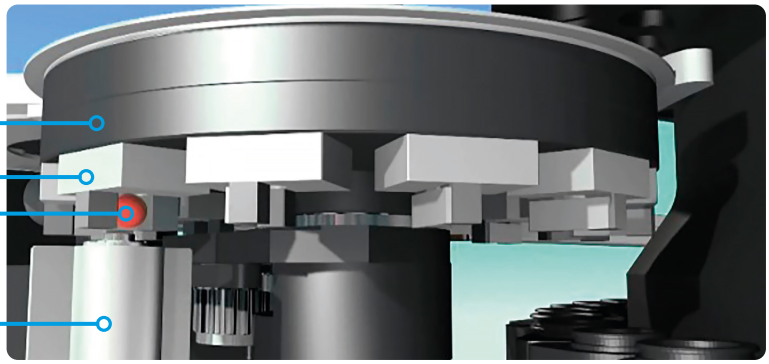
# Process 工艺

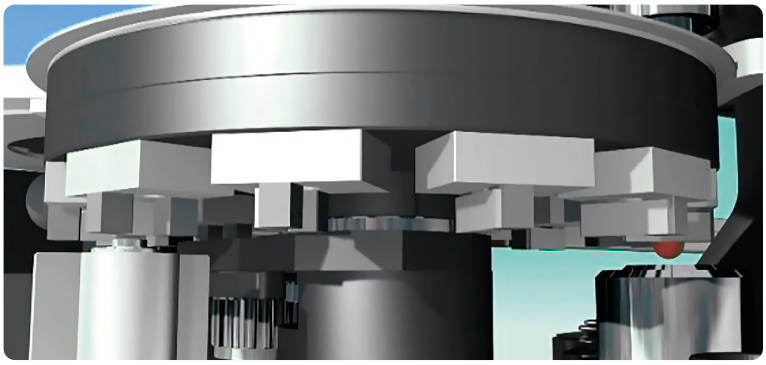
CUTTING AND INSERTING CAROUSEL
刮料和投料转盘

CUTTING AND INSERTING EQUIPMENT
刮料和投料设备

PELLET OF MELTED POLYMER
聚合物塑化单元

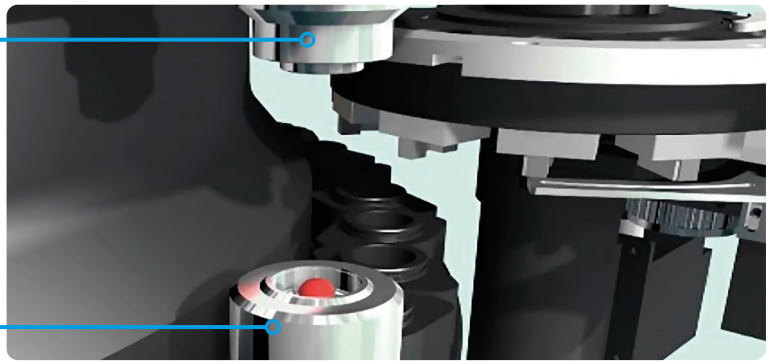
MELT NOZZLE
喷嘴

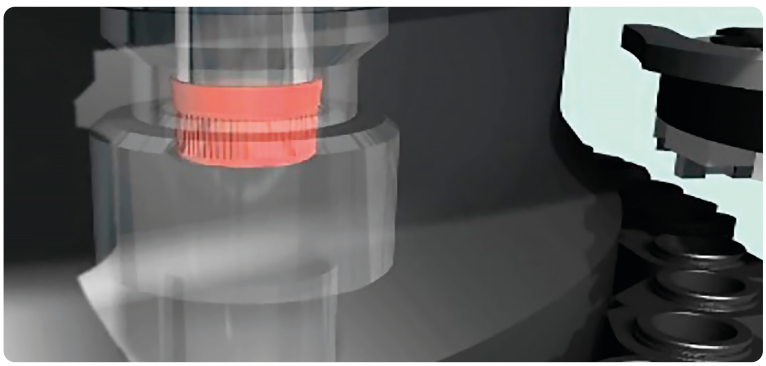




UPPER MOLD
上模

LOWER MOLD
下模





# Advantages 优势

**EXTRUDING PLASTIC AT LOWER TEMPERATURES**

Consumes less energy. This means that product cooling takes the same time using less energy, or else is faster using the same energy.

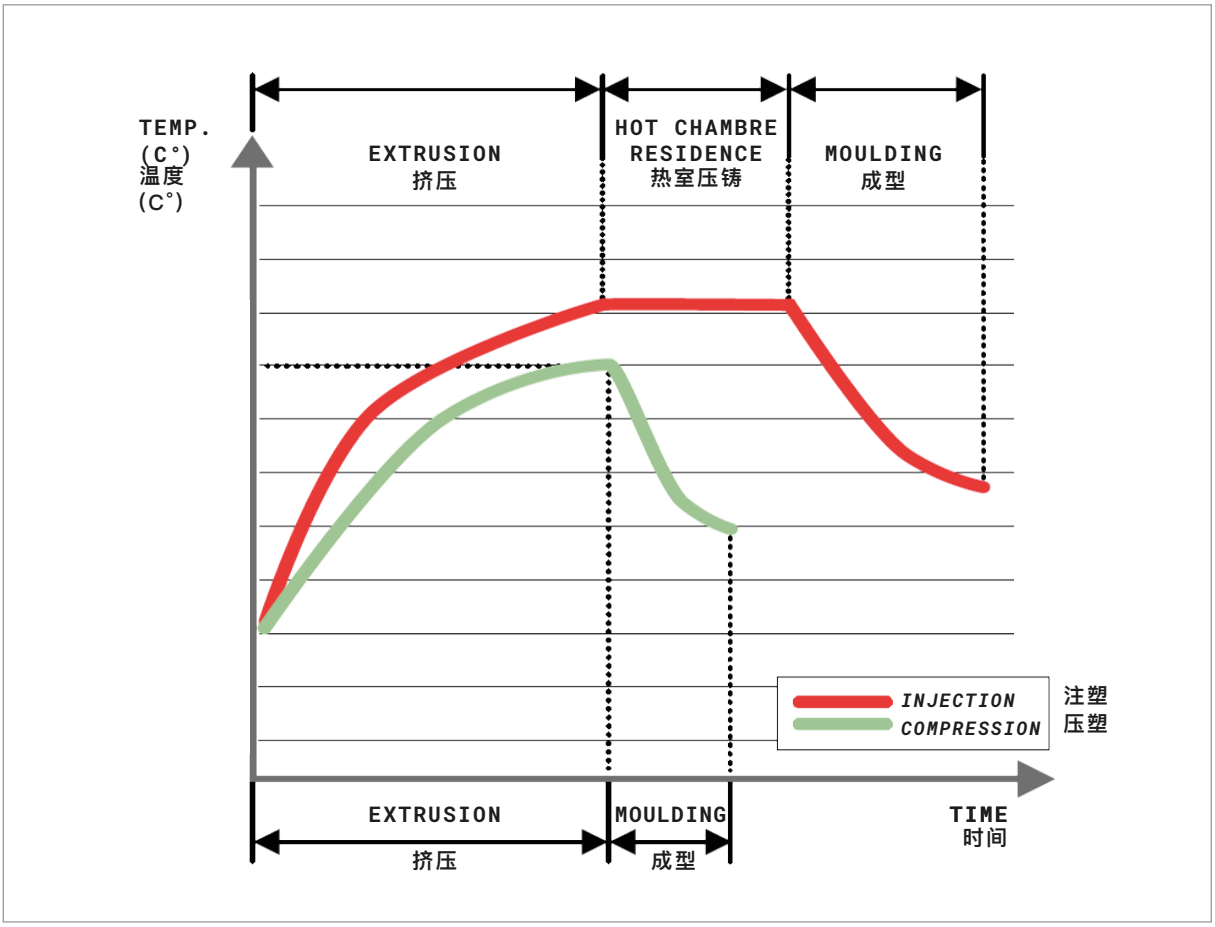
Typical energy consumption of a full manufacturing line including CCM molder, ancillaries and slitting machine: 0.55 KWh/kg*.

**calculated at maximum extruder throughput, not including thermoregulator pump".*

**在较低温度下挤出塑料**

消耗能源量减少，这意味着产品可以使用更少的能源进行冷却，或者在使用同样多能源的条件下，冷却更快速。
包括制盖机，辅机以及切环设备在内的整条生产线能耗为0.55 KWh/kg*

*按照挤出机最大吞吐量计算，不包括温度调节泵。

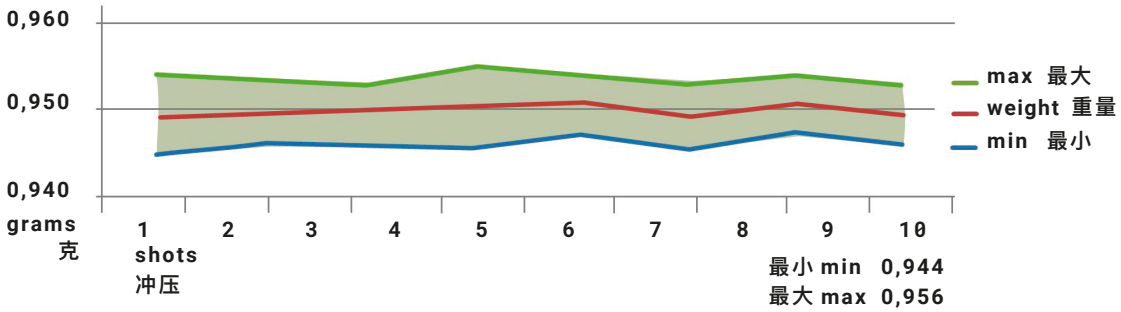


## CONSISTENT PRODUCT WEIGHT

With compression molding all molds (and cavities) are filled with the same quantity of plastic through the same channel: there is no hot runner, just one nozzle. All molds are identical in compression; there are no peripheral, upper or lower cavities.

## 产品重量一致性高

在压塑成型时，所有的模具（以及下模腔）注入等量原料：没有热流道，只采用一个喷嘴。所有模具压塑过程完全相同，产品均匀统一，确保品质。




Measurements at Customer's facility, performed out of 480 samples
使用客户工厂设备，测试480个样本。

## CONSISTENT PRODUCT SIZE

This because compression molding temperatures are lower. To obtain the same product, CCM produces cooler caps compared to injected molded caps. The cooler the product, the lower the shrinkage, and the less the size variability.

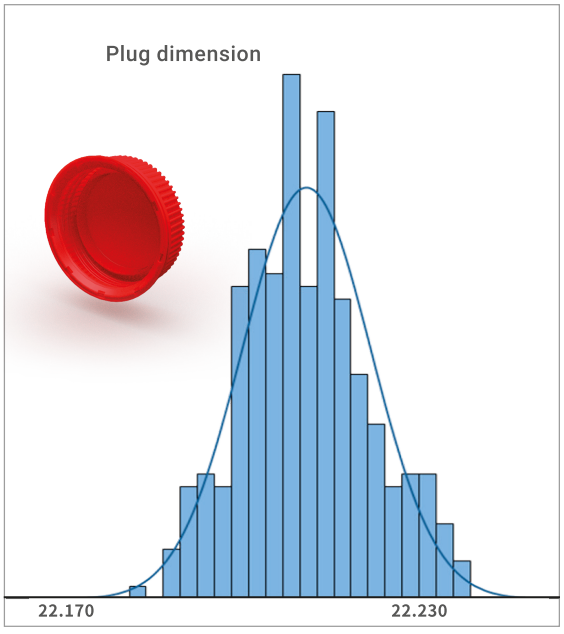
## 产品尺寸一致性高

压塑成型时温度较低。与注塑工艺相比，连续压塑成型设备CCM在生产瓶盖时温度较低。瓶盖温度越低，收缩率就越小，尺寸变化也就越少。

**Plug dimension of AB26W closure**

*624 caps sampling along 12 hours production*

*Sample mean= 22,21 mm*
*St. Dev. = 0,01 mm*




**AB26W瓶盖内塞规格**

*12*个小时生产中抽样
*624*个瓶盖

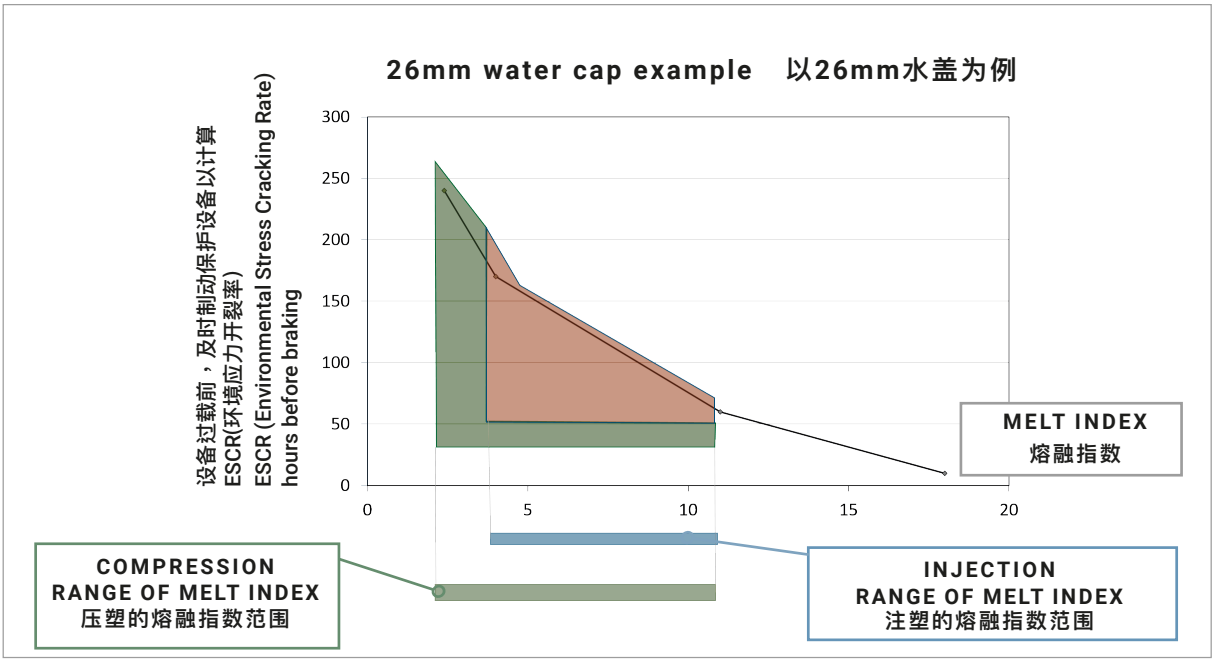
样本均值*=22,21 mm*
标准差*= 0,01 mm*

## WIDE RANGE OF PROCESSABLE RAW MATERIALS

CCM presses allow the use of plastics with greater viscosity (lower MFI) and with higher stress cracking resistance (ESCR). This is possible because the plasticizing unit has no hot runner, so no energy is required to push the plastic through the many channels and narrow nozzles. In addition, the use of more viscous materials with better mechanical features allows for thinner and lighter caps with the same performance.

## 原材料应用范围广

连续压塑成型设备CCM适用于较大粘度、较低熔融指数(MFI)和更高抗应力开裂的塑料原料(环境应力开裂率ESCR)。因塑化单元没有热流道，所以无需推动塑料进入过多通道和喷嘴。此外，若采用较大黏度的树脂原料，不影响产品性能的同时，可以使瓶盖更轻更薄。



# Simply digital

Pellet insertion is digitally monitored; the operator receives real-time indications of the precision and accuracy of this process.

A vision system controls the position of each inserted pellet (see the center of the photo); it provides statistics on each insertion equipment. Automation makes it possible to manage the insertion parameters simply and graphically, optimizing maintenance in a predictive way.

An incorrect adjustment is immediately detected in the form of a change in the position of the inserted pellet before the problem manifests itself.

Drifts beyond the threshold of acceptability result in a suggestion for cleaning or maintenance before the problem occurs.

Adjustment times for size or material changes are reduced by up to 50%.

# 数字化

智能监督系统管理和控制投料，并向工作人员发送生产过程数据报告。

视像检测设备监督每一个投料位置(详见图例)，即提供每一次投料的数据，自动生成投料参数和图表，工作人员可以根据投料参数确定是否对设备进行预防性维护保养。

在问题出现之前，因检测到投料位置的变化，工作人员即刻知道设备在调整时发生错误。

当投料偏移超出可接受范围时，在问题发生之前，工作人员可以对设备部件进行清洁或维护保养。

换型或换料的时间将有望减少50%。



# SACMI COOL+™ patent

## THE MOLD COOLING STANDARD

### WHY

COOL+™ enables you to increase production by up to 50%, compared to standard molds, allowing a faster return on investment for the entire production line.

### HOW

All parts in contact with molten plastic actively contribute to cooling.

There are no sliding seals for the coolant, as they are not always reliable and can cause friction.

### WHAT

SACMI COOL+™ is a patented mold which boosts CCM presses performances, because it provides the best heat exchange and unbeatable cycle times.In addition, SACMI COOL+™ molds can be easily inspected for maintenance operations.

# 萨克米COOL+™ 专利

## 模具冷却标准

### 理由

与标准模具相比，改进的冷却性能可以确保产量增加50%，允许整个生产线更快地得到投资回报。

### 如何

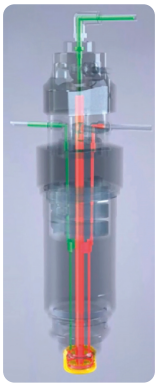
模具内部改进的冷却液循环系统确保与塑料接触的所有部件都得到冷却（内模和外模）。

没有用于冷却液体的滑动密封件（密封件不可靠且会引起摩擦）。

### 概述

萨克米COOL+™是一种专利模具，可提高CCM压盖机的生产性能，它提供更优异的热交换和无与伦比的循环时间。此外，萨克米COOL+™模具易于维保。







## CMFLOW™

The CMFlow™ extrusion unit is the most advanced, most effective compression molding solution:

It reduces energy consumption by up to 9%, depending on the cap format.

CMFlow™ extruders can reduce black spots by up to 50%, processed resin remaining equal.

CMFlow™ extruders allow plastics to be processed at lower temperatures, enhancing the benefits of compression molding technology.

## CMFLOW™

CMFlow™挤出装置是可靠高效的压塑成型解决方案：

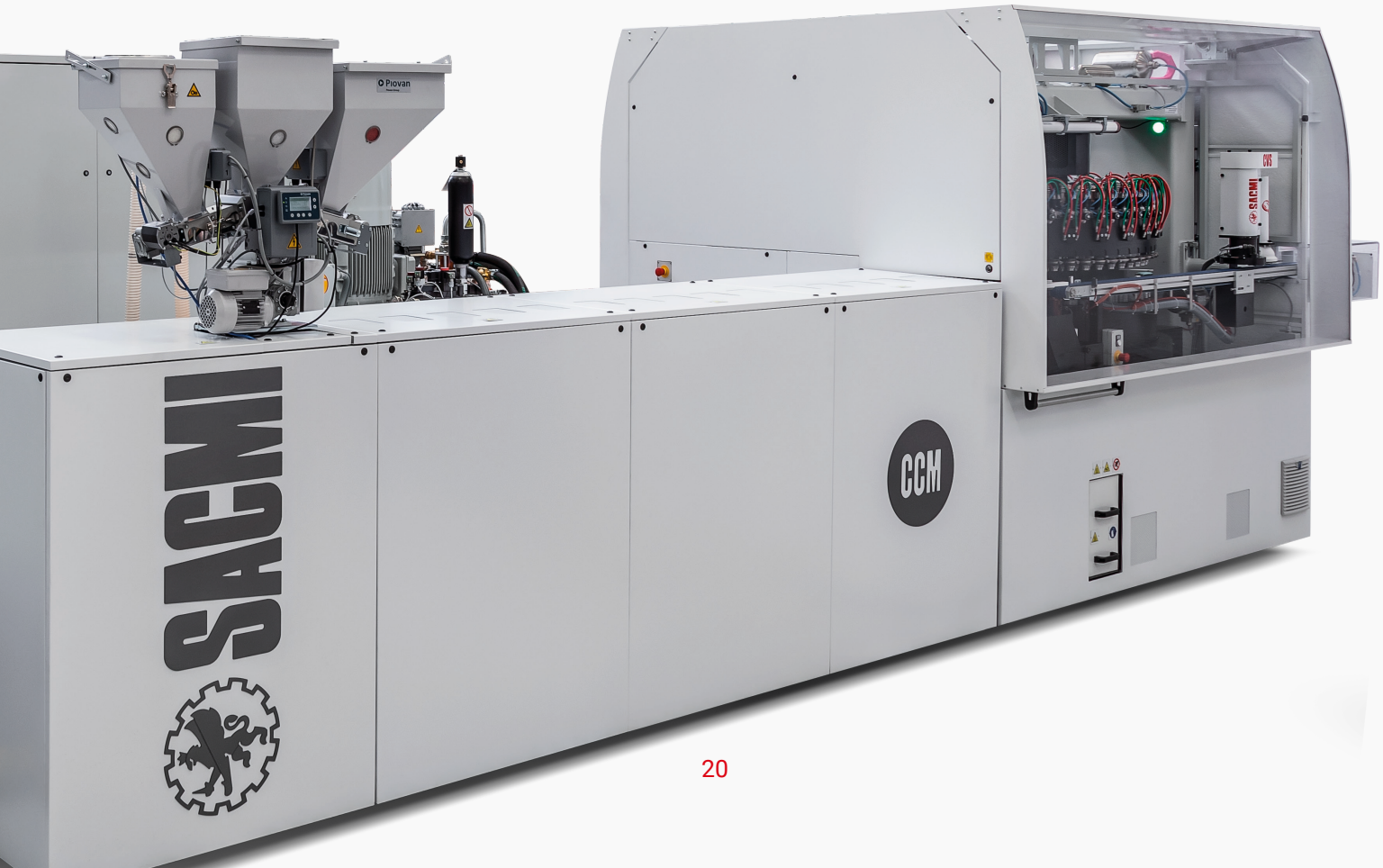
根据不同盖型，可减少能耗9%。

CMFlow™挤出机可以减少50%的黑点，加工树脂保持不变。

CMFlow™挤出机允许塑料在较低的温度下进行加工，提高压塑成型技术的优势。

SACMI

CMFLOW™



# Technical Data 技术参数

| | CCM24SD | CCM24SF | CCM32MC | CCM48SF | CCM64MD | CCM80SB | CCMM32A |
|---|---|---|---|---|---|---|---|
| Raw material 原材料 | PP - HDPE - LDPE - PS - PET - PC - BIO | | | | | | |
| SACMI SMART PACK™ | / | 热销中 | | | | | |
| Max ø (mm) 最大直径 (mm) | 41 | 41 | 52 | 41 | 52 | 41 | 60 |
| Max height (mm) 最大高度 (mm) | 25 | 25 | 25 | 25 | 25 | 25 | 45 |
| Number of cavities 模腔数量 | 24 | 24 | 32 | 48 | 64 | 80 | 32 |
| Max prod. Capacity (pcs/ minute) 最大产能 (个/分钟) | 600 | 1000 | 1066 | 2400 | 2850 | 4000 | 800 |
| Electrical power average (kw/kg) 平均功率 (kw/kg) | 0,58 | 0,40 | 0,40 | 0,38 | 0,40 | 0,37 | 0,80 |
| Overall dimension (mm) 总尺寸 (mm) | 6400x2360 | 7600x2550 | 7800x2850 | 8000x2850 | 9000x3500 | 9300x3200 | 8700x2850 |
| Min cycle time (s) 最小循环时间 (s) | 2,4 | 1,44 | 1,8 | 1,2 | 1,35 | 1,2 | 2,4 |



# Post processing: slitting, folding, lining

High profitability: higher productivity by moulding a simpler cap.
High slitting consistency: just one tool slits all caps.
High flexibility: one blade set changes the tamper band slitting pattern.

# 后道加工：切环、折边、加垫

高盈利能力：因模具设计简单，更有利于提高生产率
切环一致性：一把刀片进行切环，精度更高。
灵活可靠：通过更换刀片可以更快速经济地更改切环模式，提高设备的灵活性和机动性。

# Slitting and folding the tamper-evident band

# 防盗环切环与折边

WE MAKE YOUR MANUFACTURING EFFICIENT BY PROVIDING ULTRA-RELIABLE FLEXIBLE MACHINES THAT HAVE LONG BEEN THE INDUSTRY BENCHMARK

我们的设备一直以来都是行业标杆，其超强的稳定性能够保证您的高效生产。

## THE TECHNOLOGY

We help you to choose the most suitable and convenient suitable and cost-effective for your cap, whether tethered or traditional configurations.

Slitting the T.E. band out of the mould is a simpler, quicker, and more accurate operation that offers higher productivity because of a greater mould simplicity and availability. Flexibility is greater because the slitting pattern can easily be changed simply by replacing the blade.

## 技术

我们可以帮助您为瓶盖选择合适的防盗环，无论是传统瓶盖或连环盖。

成型后切环是更简单快速和精确有效的方法，因模具设计简单实用因此具有更高的产能。通过更换刀片更改切环模式的方法足以体现出色的灵活性。



## ADVANTAGES FOR THE CUSTOMER

**Reliability**, as demonstrated by hundreds of customers and thousands of installations worldwide.

**Outstanding flexibility:** the combi SFM can perform scoring and folding or folding and scoring processes according to cap morphology.

**Size range:** 18<Ø<63mm (73 mm for SCM and FLM), 10<H<25 mm.

**Output up to:** 180,000 caps/hour.

## 我们能够为客户带来以下优势：

**可靠性：**通过全球数以百计的客户，以及数以千计的安装服务得到印证。

**杰出的灵活性：**根据瓶盖需求，切环折边设备SFM可兼具切环折边功能，也可单独进行折边或者切环。

**尺寸范围：**18 <直径<63mm(73 mm适用于切环机和折边机), 10<高度<25mm。

**产量**高达180,000个瓶盖/小时。

**Unbeatably fast** cutting tool changeovers.

**Perfect cutting repeatability** thanks to spindle rotation via a dedicated servo motor.

**Ergonomic design**, making all components easy to access and cleaning-adjustment-size change-over tasks extremely simple.

**Native integration** with SACMI CVS154 vision system, **in-line inspection.**

**Remote support** via machine automation.

**换型简单快捷**

**切割重复性强，**主轴通过专用伺服马达旋转，品质上乘。

**符合人体工程学的设计，**易于清洁和尺寸转换异常简单。

与萨克米视检系统CVS154整合进行**在线检测**

通过机器自动化进行**远**程服务支持



# A process that adapts to all types of cap

# 一种适用于各类盖型的加工工艺

## MAXIMUM FLEXIBILITY

Comprehensive SACMI solutions include the widest range of band slitting configurations, from traditional to tethered, both standard and customized, to ensure your customers enjoy the best user experience.

In situations of extreme uncertainty and fast-paced market change, a post-processing production line for the band slitting after molding, makes it easy to change settings patterns simply by changing the slitting tools, leaving the mold unchanged:

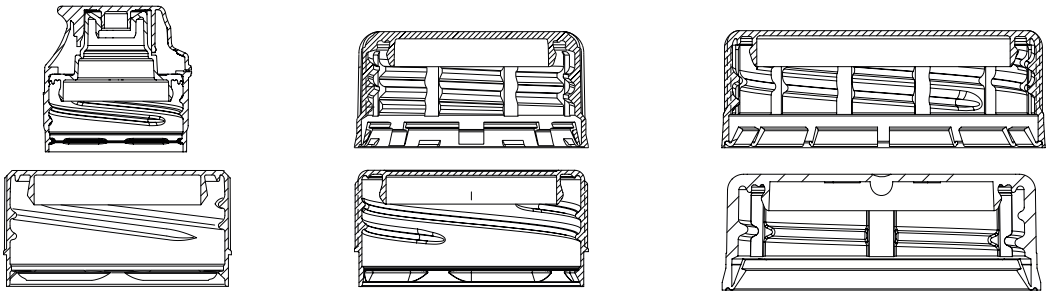
- from tethered band to conventional band and vice versa
- when changing the slitting pattern of a traditional band
- from traditional band to tethered band with a vertical slit for returnable bottles and viceversa

## 最大灵活性

萨克米解决方案适用于对传统瓶盖和连环盖等各类塑料瓶盖进行切环和折边，包括标准和定制瓶盖，确保极佳的消费者用户体验。

当面对市场波动和不确定性时，后道生产线只需更换切环工具，即可轻松更改切环模式，而模具保持不变：

- 从铰链式防盗环到传统型，反之亦然；
- 更换传统型防盗环的切环模式时；
- 从传统型到带有竖切铰链式，以用于可回收容器，反之亦然。



*Post-molding slitting of the tamper evidence band is suitable for various bottle cap models and is independent of the molding technology.*

瓶盖成型后切环适用于各种盖型，独立于瓶盖成型技术。

## SEIZE EVERY OPPORTUNITY

Slitting the tamper evidence band downstream from the molding process is a manufacturing solution that offers more advantages compared to producing the band in the mold.

## 抓住每一个机会

与防盗环模内成型相比，瓶盖成型后进行防盗环切环是一种解决方案，具有更多优势。

### Profitability

**Higher productivity** by molding a simpler cap

**Maintenance is limited** to a simpler mold

**Easy handling** of slitting tools

### 盈利能力

因模具设计简单，更有利于**提高生产率**

仅对较为简单的模具进行**维护**

切环工具**易于操作。**

### Opportunities

**Minimal impact** on capping lines

**Easy switch** to and from tethered patterns

**Simpler tasks r**equire a shorter learning curve

### 机会

对瓶盖生产线的**影响较小**

切环模式**轻松切换**

**更简单的任务**需要更短的学习曲线

### Readily adapt to market changes

**Intrinsically open** to new materials and slitting patterns

**Extreme flexibility** when changing the slitting pattern

**Slitting is independent** of the molding technology

### 随时适应市场变化

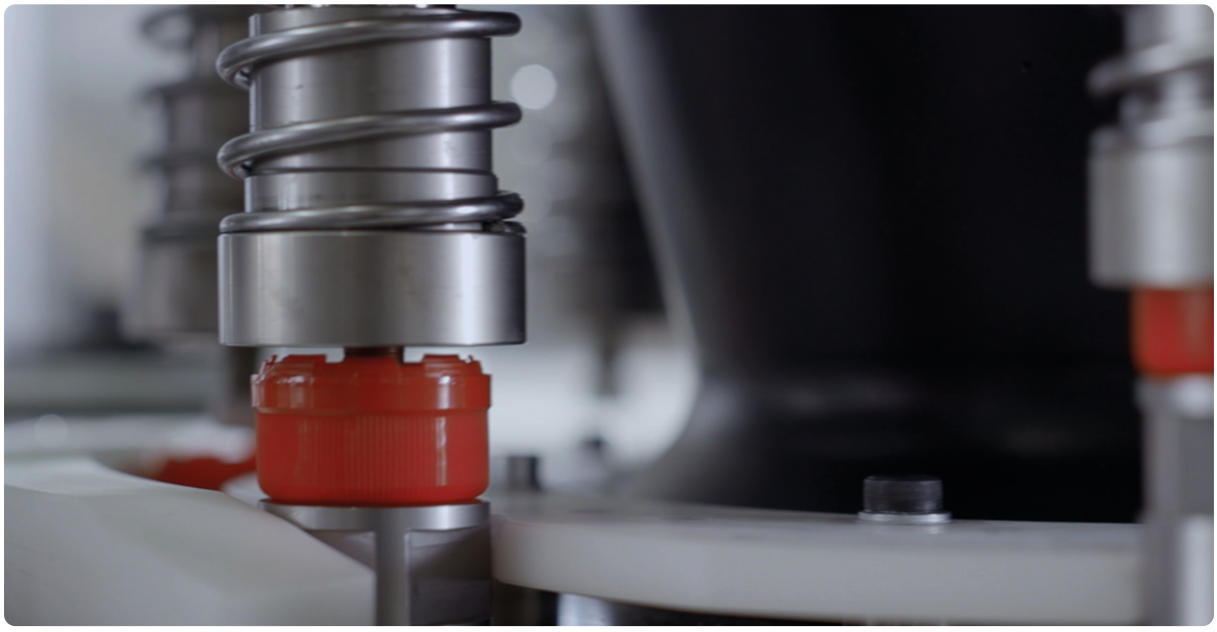
本质上对新材料和切环模式持**开放态度**

更改切环模式时具有**极大的灵活性**

**切环**独立于瓶盖成型技术







# Technical data 技术参数

| | | SCORING & FOLDING 切环与折边 | | | SLITTING 切环 | | FOLDING 折边 |
|---|---|---|---|---|---|---|---|
| | | SFM15M | SFM12 | SFM12 | SCM12 | SCM12 | FLM12 |
| | | | | 6头 可选 | | 6头 可选 | |
| Nominal max. closure diameter 瓶盖最大标准直径 | mm | 43 | 63 | 63 | 73 | 73 | 73 |
| Max. closure height 瓶盖最大高度 | mm | 25 | 25 | 25 | 25 | 25 | 25 |
| Output rate 产量 | pcs/ min 个/ 分钟 | up to 3000 | up to 2200 | up to 900 | up to 2200 | up to 900 | up to 2200 |
| Average absorbed power 平均吸收功率 | kW | 8 | 8 | 8 | 3.5 | 3.5 | 3.5 |
| Compressed air consumption at 0,5 Mpa 压塑空气消耗0.5Mpa | Nl/ min Nl/ 分钟 | 230 | 230 | 230 | 230 | 230 | 230 |
| Smart Pack | | Available 热销中 | Available 热销中 | Available 热销中 | Available 热销中 | Available 热销中 | Available 热销中 |

*Feel free to contact us to obtain a tailor-made plant configuration*

请随时与我们联系以获得个性化的定制方案

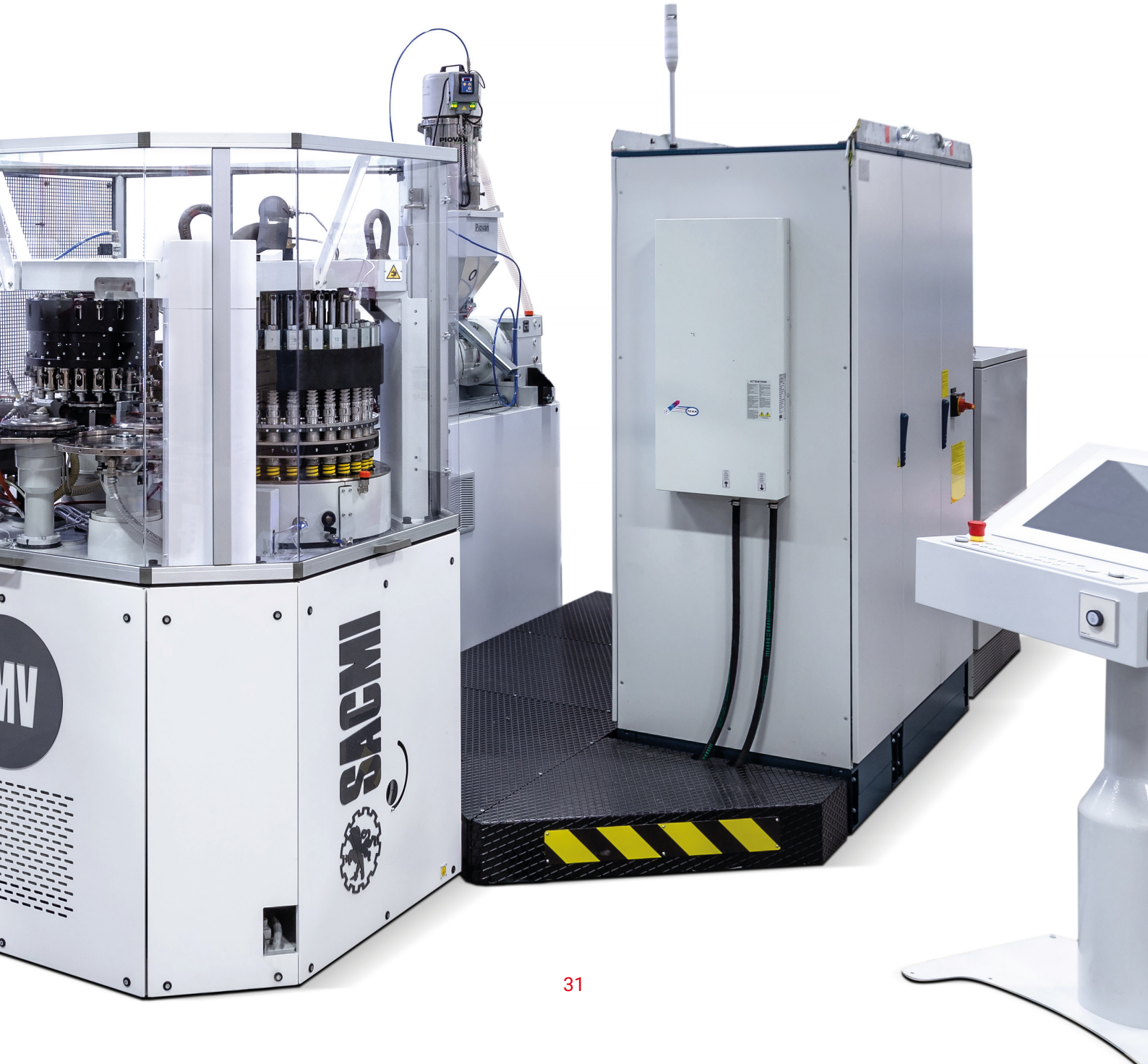
# Lining of the plastic cap

# 塑料盖加垫

In order to ensure proper sealing and retention of $CO_2$ levels with highly carbonated beverages we mould a PE/EVA liner into the cap's shell. For that purpose SACMI has developed two distinct and separate technologies, whose name is self-descriptive: in-shell moulding and out-shell moulding.

为确保碳酸饮料良好的密封和二氧化碳的含量，需在盖壳中加入PE/EVA内垫。为此，萨克米开发了两种独特技术:内垫盖内成型和盖外成型。




SACMI

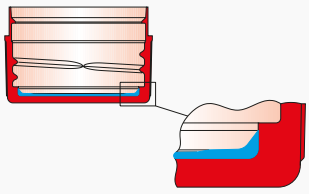
## IN-SHELL MOLDING

1. The plastic compound is plasticized using a continuous extruder and cut into pellets of the same weight as the gasket.
2. The pellets are inserted into the caps' shells.
3. A set of punches mould the pellets to obtain liners with the required profile. The liner sticks to the shell.
4. One or more vision systems provide feedback on process correctness and check the quality of liners and shells.

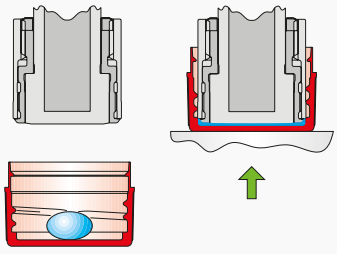
## 内垫盖内成型

1. 使用连续挤出机对塑料化合物进行塑化，并切割成与垫片重量相同的粒料。
2. 切割粒料置入盖壳内
3. 粒料经过模压后与盖壳融合
4. 一个或多个视检系统对加工过程进行监督和实时反馈，并检测瓶盖和内垫质量。

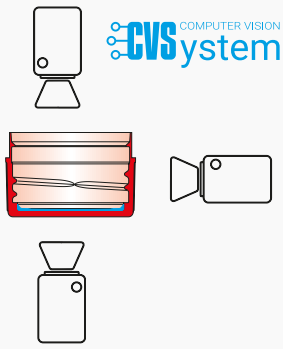
**In-shell molding**
**内垫盖内成型**



**Production key steps**
**生产关键步骤**



**Quality control**
**品控**




| IN-SHELL MOLDED LINER 内垫盖内成型 | | | | | | | |
|---|---|---|---|---|---|---|---|
| | Cap ø range (mm) 瓶盖直径 (mm) | Cap max height (mm) 瓶盖最大高度 (mm) | Moulding punches 模腔数量 | Max. output rate (caps/min.) 最大产量(个/分钟) | Specific consumption (kWh/kg) 单位能耗 (kWh/kg) | Comp. air consumption (Nl/min.) 压塑空气消耗量(Nl/分钟) | Machine weight (kg) 设备重量 (kg) |
| **PMV224** | 22-33 | 15-24 | 24 | 1600 | 0,97 | 1500 | 5200 |
| **PMV230** | 34-43 | 15-24 | 30 | 1200 | 0,95 | 1200 | 6400 |

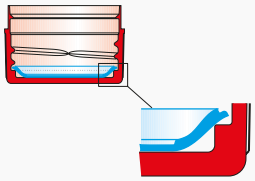
## OUT-SHELL MOLDING

1. The plastic compound is plasticized using a continuous extruder and cut into pellets of the same weight as the gasket.
2. Each pellet is positioned on a transfer shuttle.
3. A set of punches mould the pellets on the shuttles to obtain liners with the required profile.
4. The liners are picked from the shuttles and inserted into the caps' shells. The liner "floats" into the shell between the pressure block diameter and the thread's beginning.
5. One or more vision systems provide feed-back on process correctness and check the quality of liners and shells.

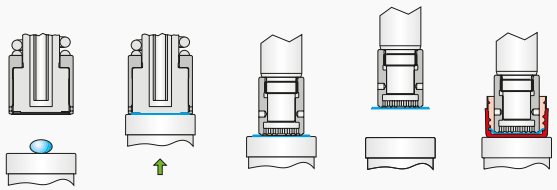
## 内垫盖外成型

1. 使用连续挤出机对塑料化合物进行塑化，并切割成与垫片重量相同的粒料。
2. 每个粒料都放置在转移台上。.
3. 模腔在转移台上模制粒料，以获得具有所需轮廓的内垫。
4. 从转移台上取出内垫，并将其置入瓶盖内。内垫添加到内部盖面与最上圈的螺纹之间。
5. 一个或多个视检系统对加工过程进行监督和实时反馈，并检测瓶盖和内垫质量。

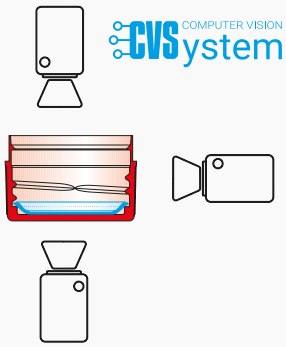
**Out-shell molding**
**内垫盖外成型**



**Production key steps**
**生产关键步骤**



**Quality control**
**品控**




| OUT-SHELL MOLDED LINER 内垫盖外成型 | | | | | | | |
|---|---|---|---|---|---|---|---|
| | Cap ø range (mm) 瓶盖直径 (mm) | Cap max height (mm) 瓶盖最大高度 (mm) | Moulding punches 模腔数量 | Max. output rate (caps/min.) 最大产量(个/分钟) | Specific consumption (kWh/kg) 单位能耗 (kWh/kg) | Comp. air consumption (Nl/min.) 压塑空气消耗量(Nl/分钟) | Machine weight (kg) 设备重量 (kg) |
| **PMD230** | 28-38 | 15-24 | 30 | 1200 | 0,95 | 3000 | 5200 |



# Process digitalization and optimization

CVS: embedded vision inspection system for process and quality control.
SMARTPACK™: digitalizes manufacturing to make it more profitable and sustainable.
SMARTCARE™: maximizes performance through AI-driven pattern recognition.

# 流程数字化与优化

CVS: 嵌入式视检系统用于监督加工过程和质量。
SMARTPACK™: 通过数字化转型提高投资回报率
SMARTCARE™: 通过人工智能驱动模式提高性能

# CVS 152 in CCM

**Embedded vision system in the SACMI CCM compression press.**
The CVS152 inspects the cap and quality-controls the CCM molding process.

Configurable with from 2 to 9 cameras on the CCM output belt, the system inspects all characteristics of the cap, including small flashes on the tamper evidence band via a specific image acquisition group.

The CVS152 can include a belt downstream from the CCM, with cameras to check the external part of the panel and its flatness.
Furthermore, the CVS152 provides defect statistics by cavity number.

# 检测瓶盖成型 CVS152

**嵌入式视检系统安装在压塑成型设备CCM上。**

CVS152检测瓶盖和对成型过程进行质量监督。

该系统可在CCM输送带上配置2到9个摄像头，通过特定的图像采集组检测瓶盖和防盗环毛边。

CVS152可以安装在CCM输送带出口处，用于检测瓶盖外部和瓶盖平整度。

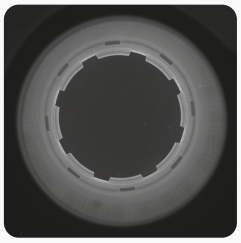
此外，CVS152可以通过识别模号统计缺陷数据。



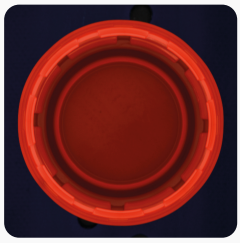
**Quality controls embedded in cap manufacturing line**
**瓶盖生产品控方案**



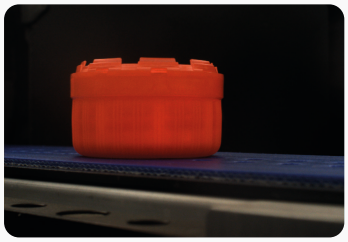
Thread
螺纹

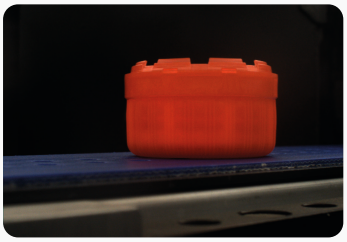


TE Band
防盗环



Bottom
内部盖面



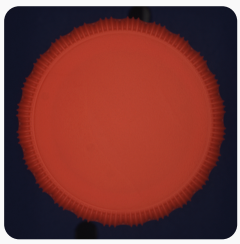




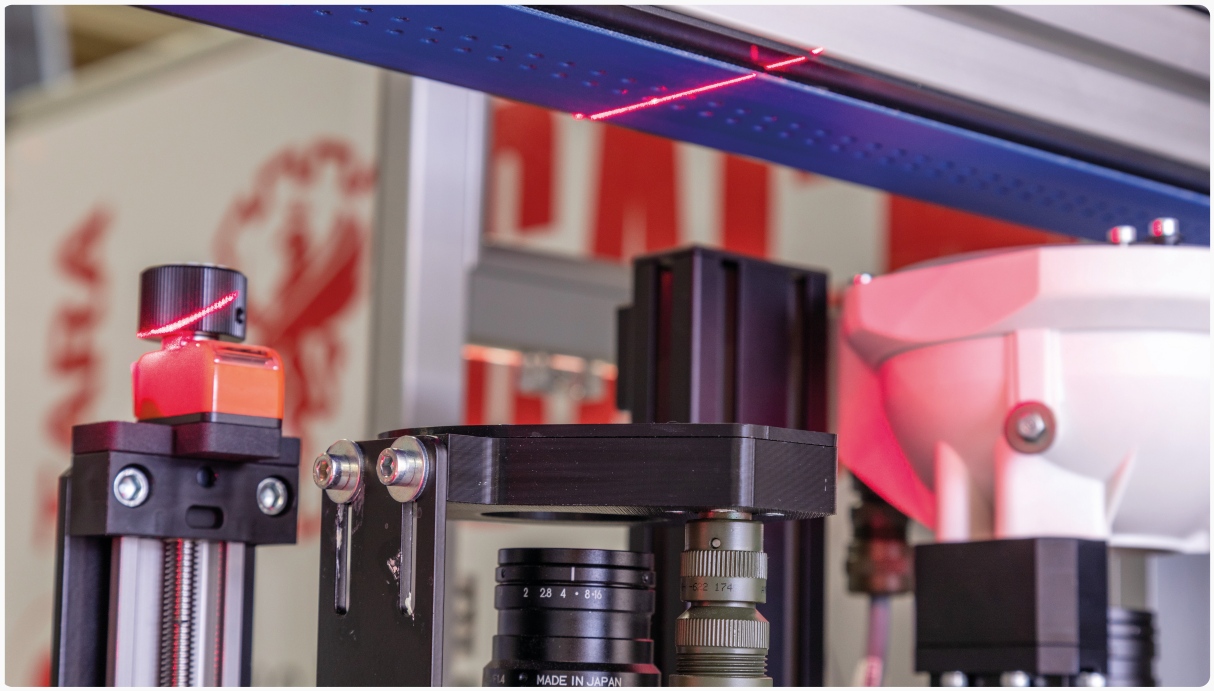
360°



Planarity
平整度



Bottom
外部盖面



# CVS 154 for slitting and folding

**Vision system embedded on the outlet conveyor of SACMI machines for:**

- folding (FLM)
- folding-slitting (FSM)
- slitting-folding (SFM)

Its basic configuration consists of 2 imaging cameras to inspect the functional part of the cap: this set-up can be expanded with a patented imaging unit to verify the presence of slitting and proper alignment of slits.

Highly useful for checking the integrity of complex slits (e.g. those used for **tethered caps**).

# 检测切环与折边 CVS154

**安装在萨克米设备输送带出口处的视检设备适用于：**

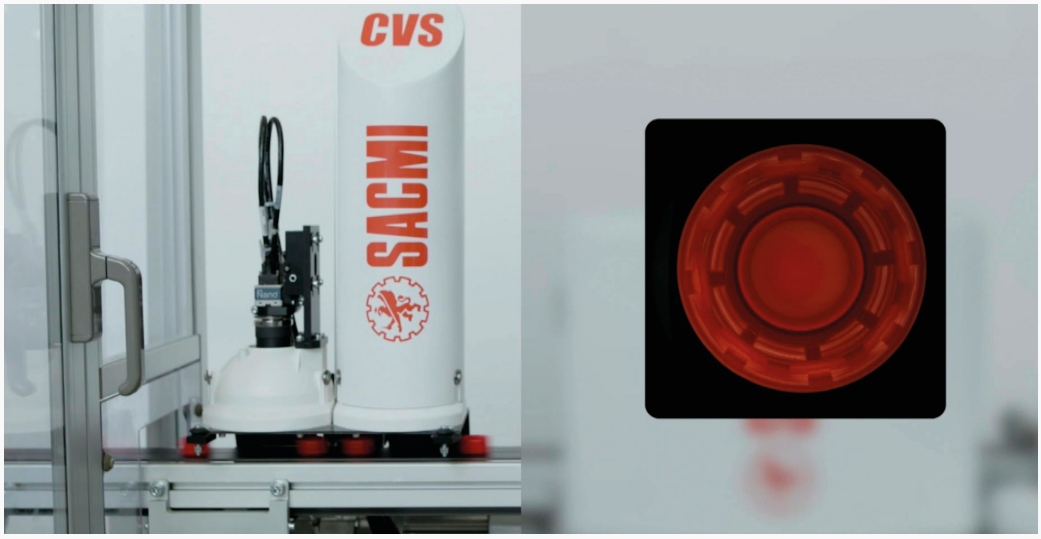
- 检测折边（折边设备FLM）
- 折边–切环（折边切环设备FSM）
- 切环–折边（切环折边设备SFM）

其基本配置包括2个摄像头，用于检查瓶盖的切环与折边：可以通过专利成像单元进行扩展，并确保前端与末端的切割位置准确对齐。.

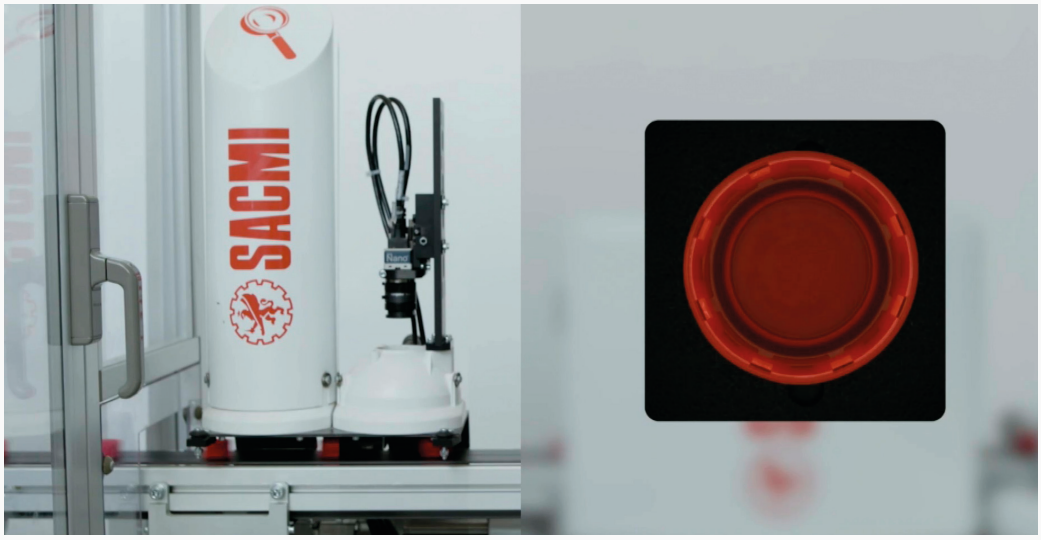
检测切环（例如用于**连环盖**防盗环）的完整性。



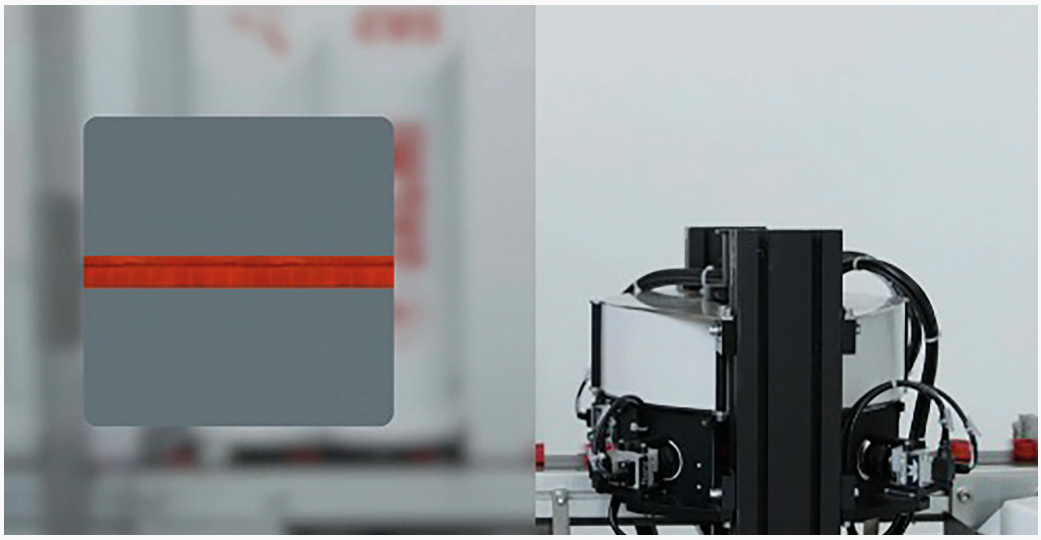
**Quality controls embedded in cap manufacturing line**
**瓶盖生产品控方案**




**Product side**
**瓶盖侧壁**




**Body and TE Band**
**盖身和防盗环**



**360°**

# CVS 153 in PMV

**Vision system embedded in SACMI PMV lining machines.**

The CVS153 is configurable and can mount up to 3 cameras to inspect the liner produced by the PMV itself; it also inspects the functional part of the cap.

Thanks to the backlight-equipped imaging unit installed on the transfer carousel, the CVS153 can also inspect liners that have the same color as the cap.

# 检测内垫 CVS153

**视检系统安装在萨克米加垫设备上。**

CVS153可根据不同需求进行灵活配置，最多可以安装3个摄像头用于检测内垫。

传送转盘上配备背光成像单元，CVS153可以检测与瓶盖颜色相同的内垫。






Furthermore, the CVS153 provides defect statistics by tool number, providing immediate feedback on the liner molding process.

此外，CVS153可以通过识别模号提供缺陷统计数据，为内垫成型过程提供即时反馈。

# CHS

**Plastic cap inspection and sorting machine**

The CHS can easily be integrated downstream from any manufacturer's production machine and can be used off-line to reprocess batches with defects.

The CHS features up to 7 cameras to check both functional and decorated sides (bottom and side wall) at rates of up to 4,500 caps/min.

# CHS

**检测塑料盖和理盖设备**

CHS适用于安装在各大制作商的设备下游，可以离线检测。

配备多达7个摄像头，检测速度每分钟4500个瓶盖，适用于检测瓶盖内部、外部和盖面印刷。

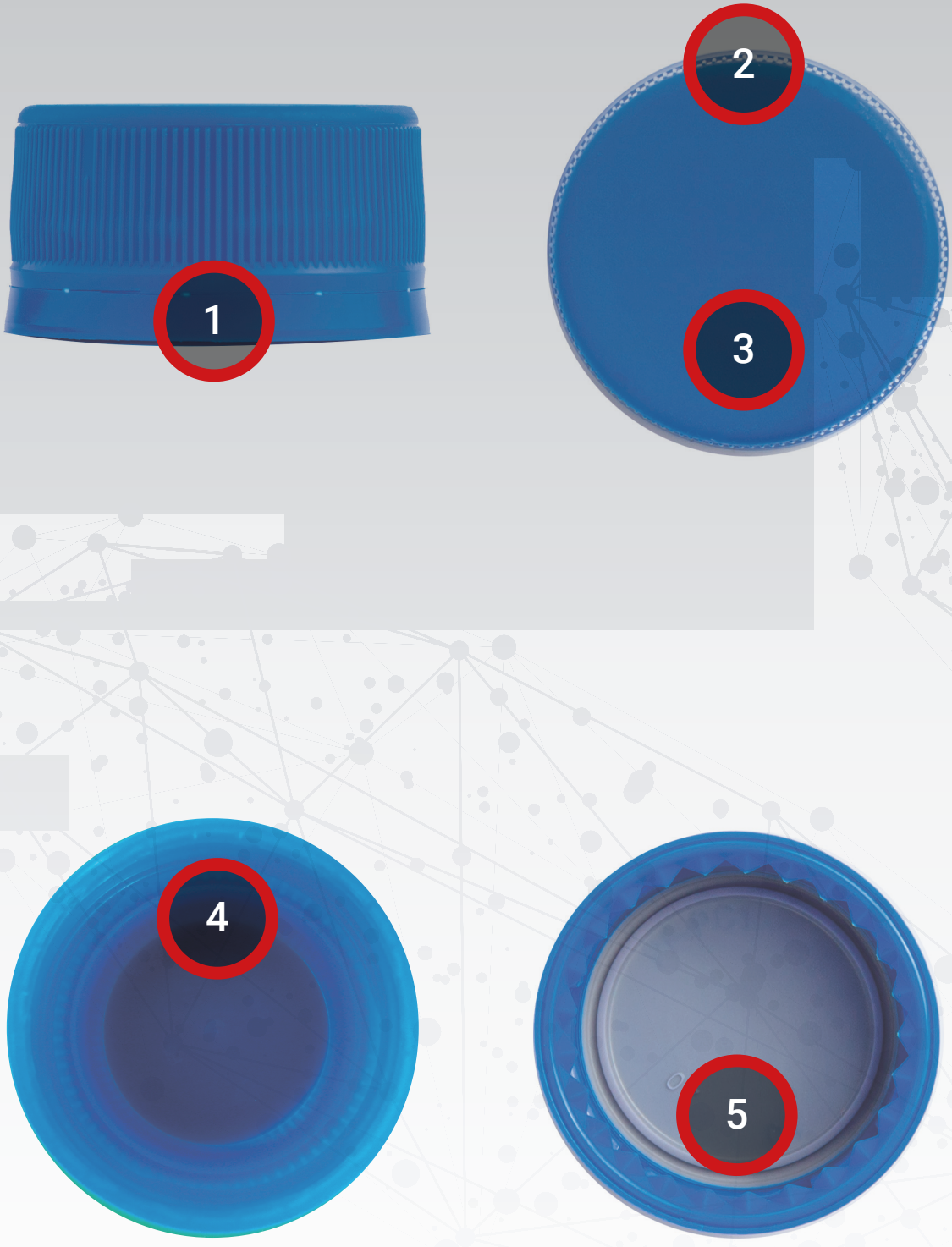





Thanks to the innovative CVS360-3D module, the CHS can reconstruct 3D objects as 2D images precisely, eliminating any distortion that might stem from perspective, lens, cap shape or surface reflection.

得益于创新的CVS360-3D模块，CHS可以将3D画面精确重构为2D图像，消除可能由视角、镜头、外观或表面反射引起的失真。

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## INSPECTION CRITERIA
可检测的产品缺陷包括

| | | |
|---|---|---|
| 1 | **Inspection of the sidewall**<br>**检测瓶盖侧壁** | TEB and bridges, Contaminations, Black specks, Discoloration<br>防盗环和桥点、污染、黑斑、异色 |
| 2 | **Inspection of the artwork:**<br>**检测盖面** | Contaminations/stains, Black specks, Wrong colours/colour variations, Mixed caps, Printing off-centre, Registration errors<br>污染/污渍、黑斑、错色/色差、叠盖、偏离中心 |
| 3 | **Inspection of the shell:**<br>**检测瓶盖** | Short shots, Colour variations, Contaminations, Ovalization/ Diameter, Deformation, Flashes on top ring, Broken TEB, Cavity number reading, Cavity-related statistics, Alarm by cavity number, Sort by cavity number<br>缺料、色差、污染、椭圆化/直径、变形、飞边、防盗环、识别模号、通过模号统计缺陷数据等 |
| 4 | **Inner inspection of single piece caps**<br>**检测单片盖内部** | Deformation in plug seal, Flashes in plug seal, Flaws in plug seal, Thread, Black specks, Contamination<br>内塞变形、内塞飞边、内塞缺陷、螺纹、黑斑、污染 |
| 5 | **Inner inspection of two pieces caps:**<br>**检测双片盖内部** | Liner presence/absence, Bubbles, Voids, Flashes, Black spots, Contamination, Liner flaws, Thread<br>是否已经加垫、气泡、微孔、飞边、黑点<br>污染、内塞缺陷、螺纹 |

# SMARTPACK™

## DIGITALIZING THE MANUFACTURE TO MAKE IT MORE PROFITABLE AND SUSTAINABLE

**WHY**

- Maximize OEE
- Increase the availability of the line
- Minimize and simplify interventions on process and equipment

**HOW**

- Digitalizing your process
- Speaking the language of the operator
- Handing skills burden, cost and variability over to the machine automation

**WHAT**

Premium onboard hardware and software to ensure:

- effective
- fast
- accurate

actions on process

**The SMARTPACK™ advanced features maximize flexibility and real-time adjustment precision during production.**

# SMARTPACK™

## 通过数字化转型提高投资回报率

**理由**

- 设备综合效率(OEE)最大化
- 提高生产线利用率
- 尽量减少和简化对工艺和设备的干预

**如何**

- 加工过程数字化
- 使用操作员的语言
- 将技能负担、成本和可变性转移到机械自动化上

**概述**

高级软硬组件，确保：

- 高效
- 快速
- 准确

对流程的操作

**SMARTPACK™高级功能在生产过程中最大限度地提高灵活性和实时调整精度。**



SACMI SMART PACK™

Pellet insertion
投料

Smart management of
原料智能管理

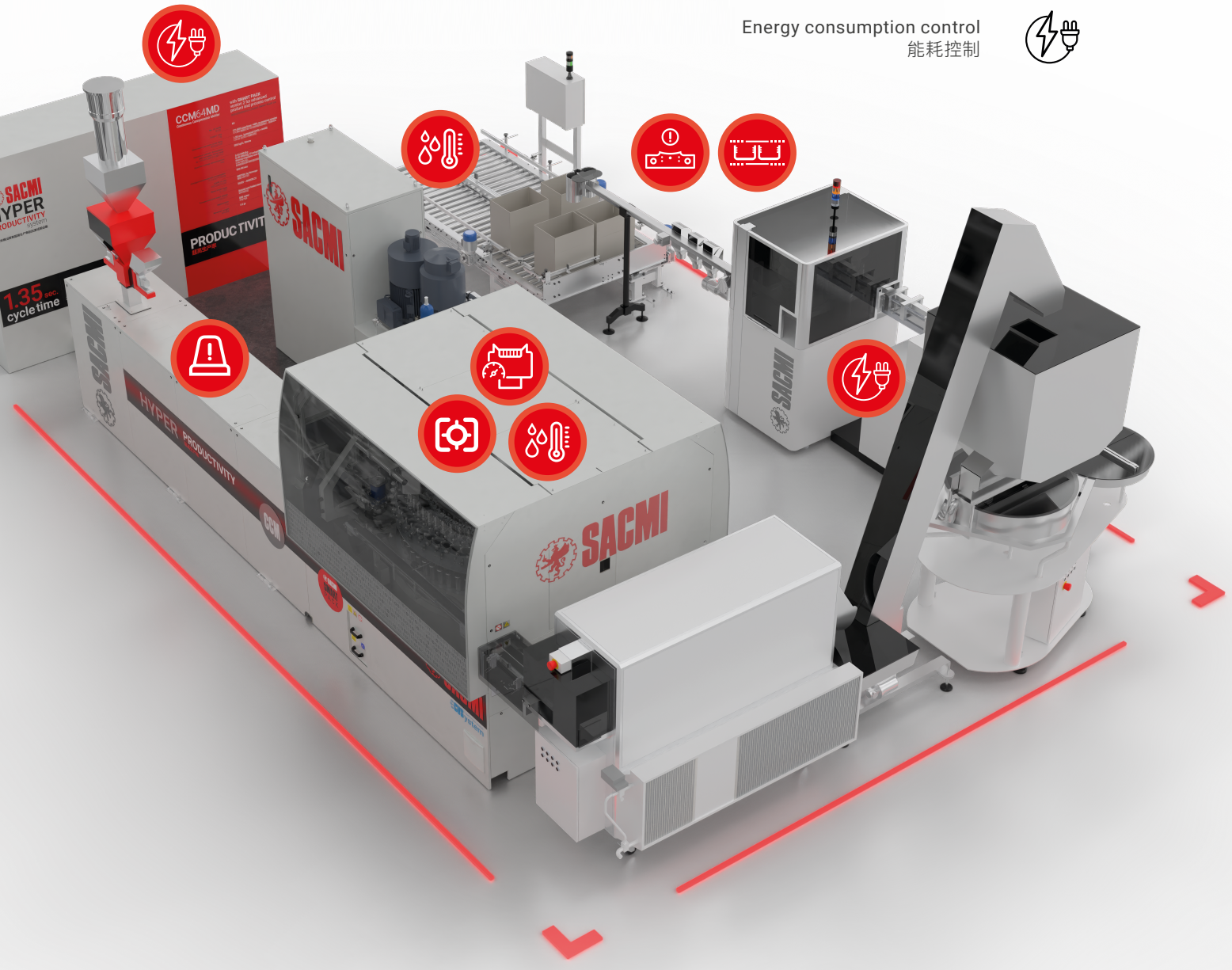
Thermic management
温控

Hydraulic system
液压系统

Process controls
过程控制

Wear and drift management
磨损和参数偏移管理

Energy consumption control
能耗控制



# SMARTCARE™

## MAXIMIZE PERFORMANCE THROUGH AI DRIVEN PATTERN RECOGNITION

### WHY

To make your best decisions, based on objective data, predicting the behavior of your equipment.

### HOW

- Monitoring the health status of your machines in the mid-long term,
- collecting data from machines equipped with SMARTPACK™
- analyzing data with cloud computing resources and proprietary AI algorithms.

# SMARTCARE™

## 通过人工智能驱动模式提高性能

### 理由

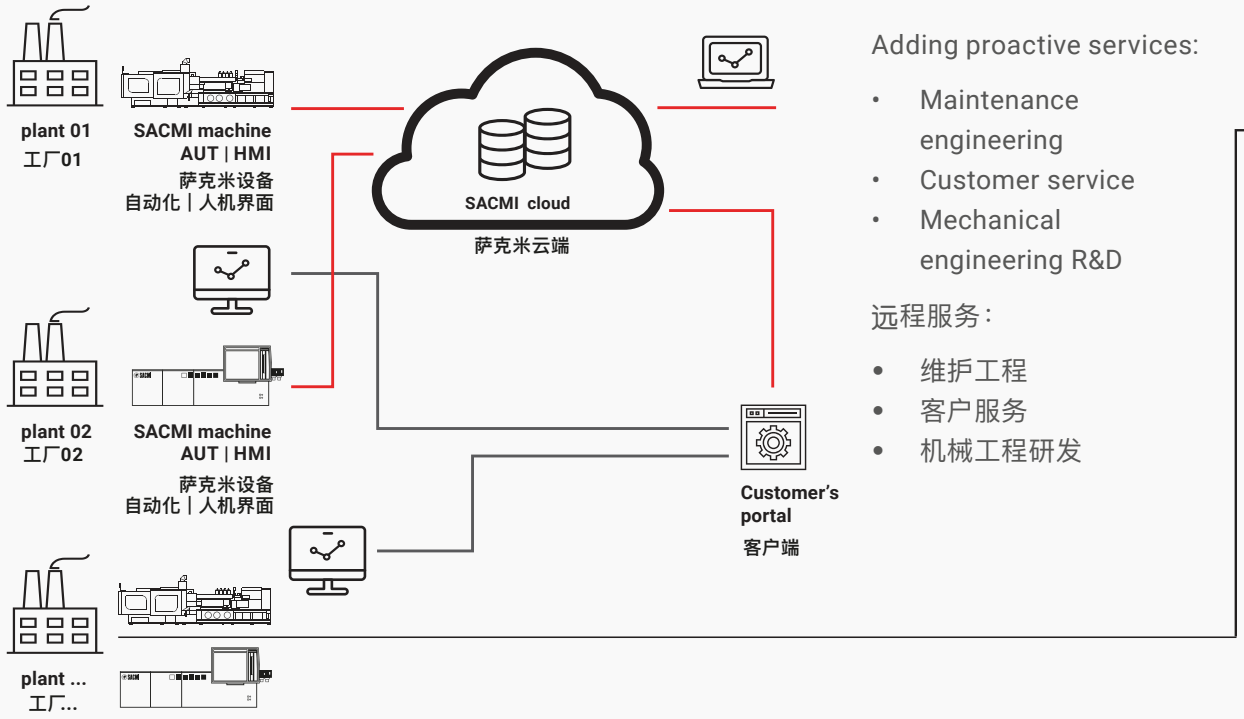
根据客观数据，预测设备的行为，做出适当和合理的决策。

### 如何

- 监测设备中长期健康状况
- 设备搭载SMARTPACK™系统用于收集数据
- 使用云端资源和AI算法分析数据

### CUSTOMER MANUFACTURING PLANTS
### 客户工厂

### SACMI MONITORING ROOM
### 萨克米远程管理中心




Adding proactive services:

- Maintenance engineering
- Customer service
- Mechanical engineering R&D

远程服务：

- 维护工程
- 客户服务
- 机械工程研发

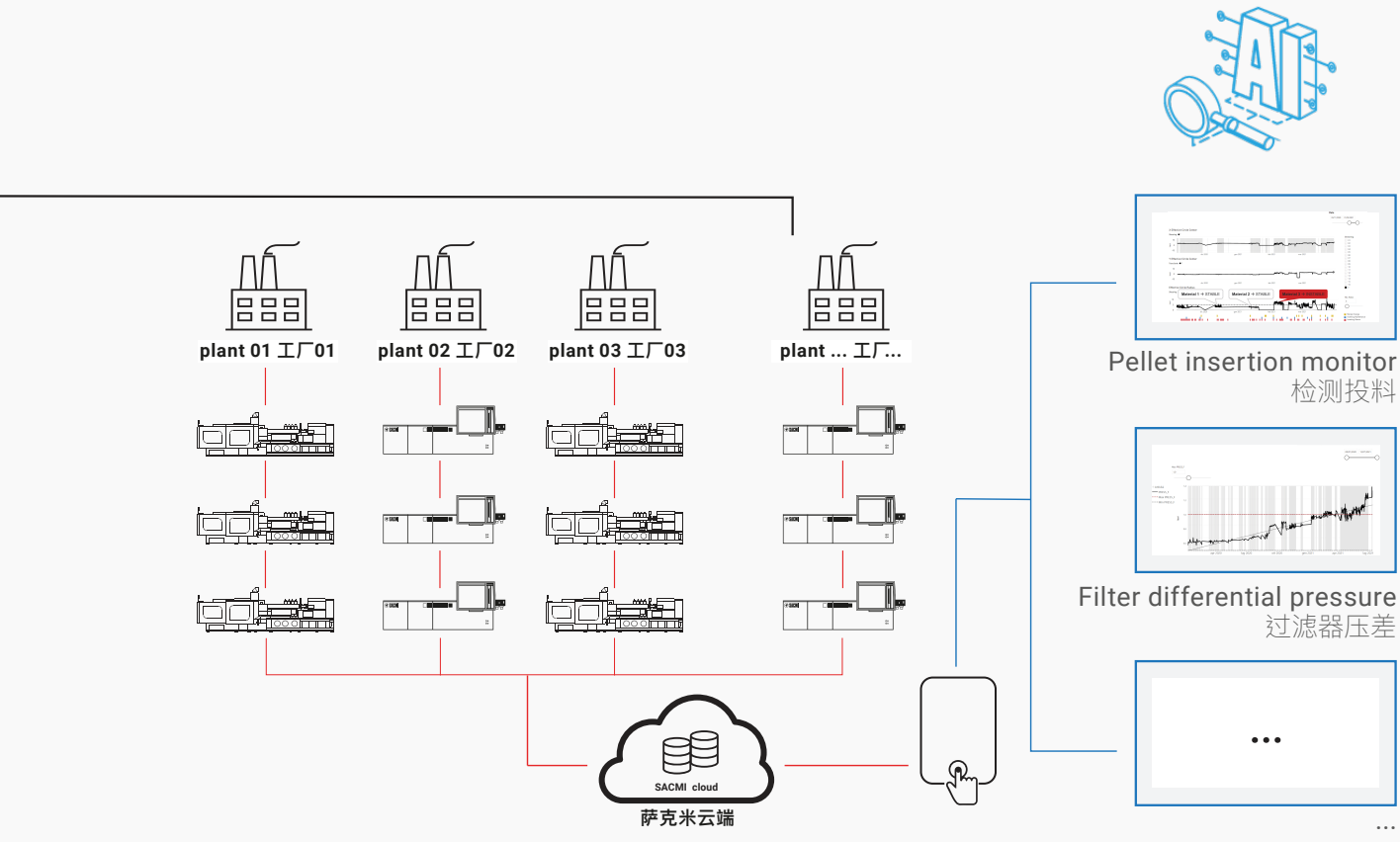
SACMI SMART CARE™

## WHAT

SMARTCARE™ is an advanced digital service based on cloud technology, it is available for machines connected to the IoT platform, so to provide KPIs and information that managers turn into economic value.

## 概述

SMARTCARE™是一种基于云端技术的先进数字服务，可用于连接到物联网平台的设备，从而提供关键绩效指标和信息，帮助管理者将其转化为经济价值。



# The benefits of the SACMI manufacturing line

1. Enhance your process controls, thanks to the latest generation of TwinCAT automation.
2. Prevent economic and reputational damages, detecting incorrect resins.
3. Up to 9% reduction in plasticizing energy consumption, thanks to the new CMFlow© extruder.
4. Optimize maintenance and save time and money, thanks to the control and analysis of the hydraulic oil and refrigerant mixture.
5. Increase mold life by preventing condensation.

   Reduce unexpected stops thanks to the detection of mold cleanliness.

   Prevent thermal drifts, by detecting and analyze the temperature of manufactured caps.

   Inspect the whole surface of the cap, both internal and external.

   Reduce the adjustment time up to 50% through the pellet insertion digital controls.

# 萨克米生产线的优势

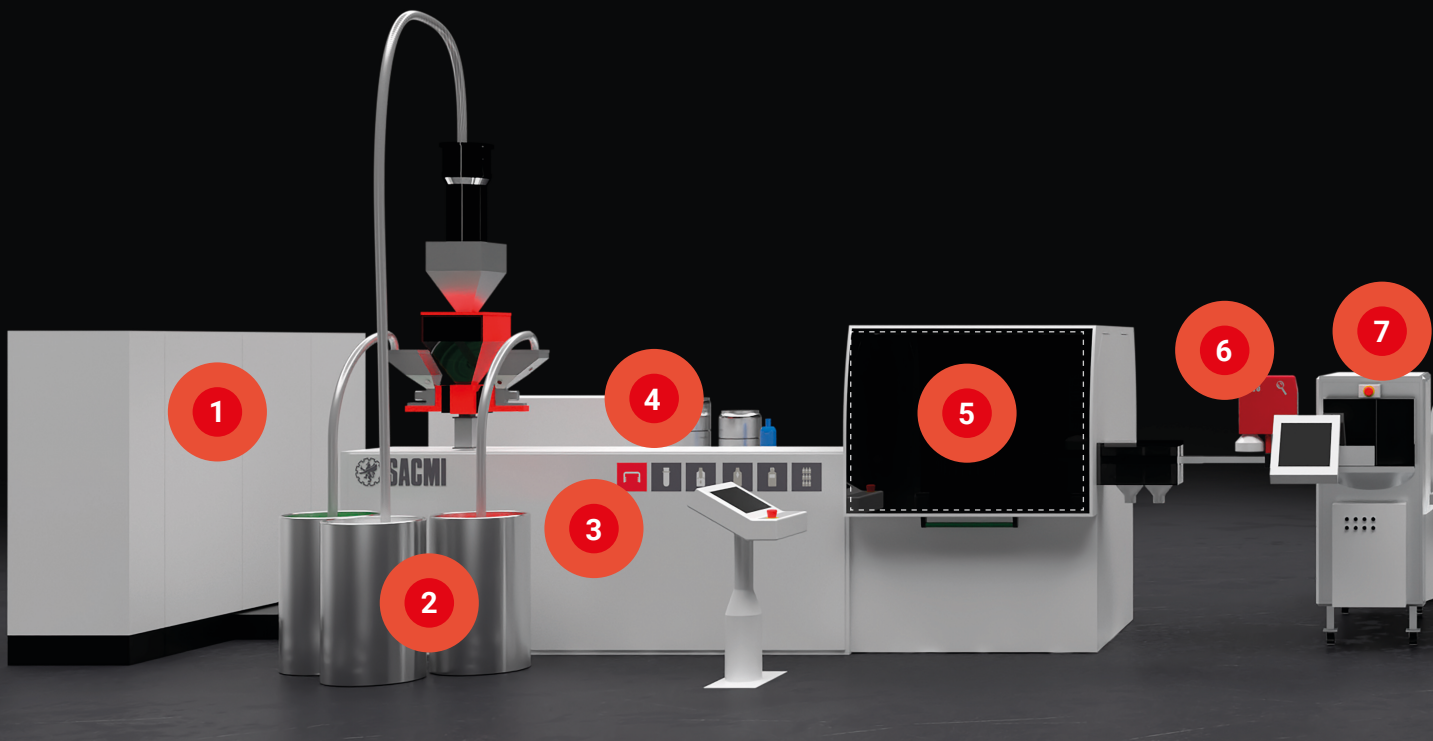
1. 全新TwinCAT自动化软件，进一步加强对生产过程的管理和控制。
2. 检测树脂原料的准确性，预防经济损失和防止品牌声誉受到影响。
3. 采用CMFlow©螺杆，降低能耗9%。
4. 控制和分析液压油和制冷剂混合物，优化维护保养，节省时间和成本。
5. 有效防止冷凝，延长模具使用寿命。

   对模具清洁进行监督和分析，有效减少设备停机的发生。

   对瓶盖温度检测和分析，预防投料偏移。

   检测瓶盖内部和外部盖面。

   对投料控制和分析，减少50%设备调整时间。

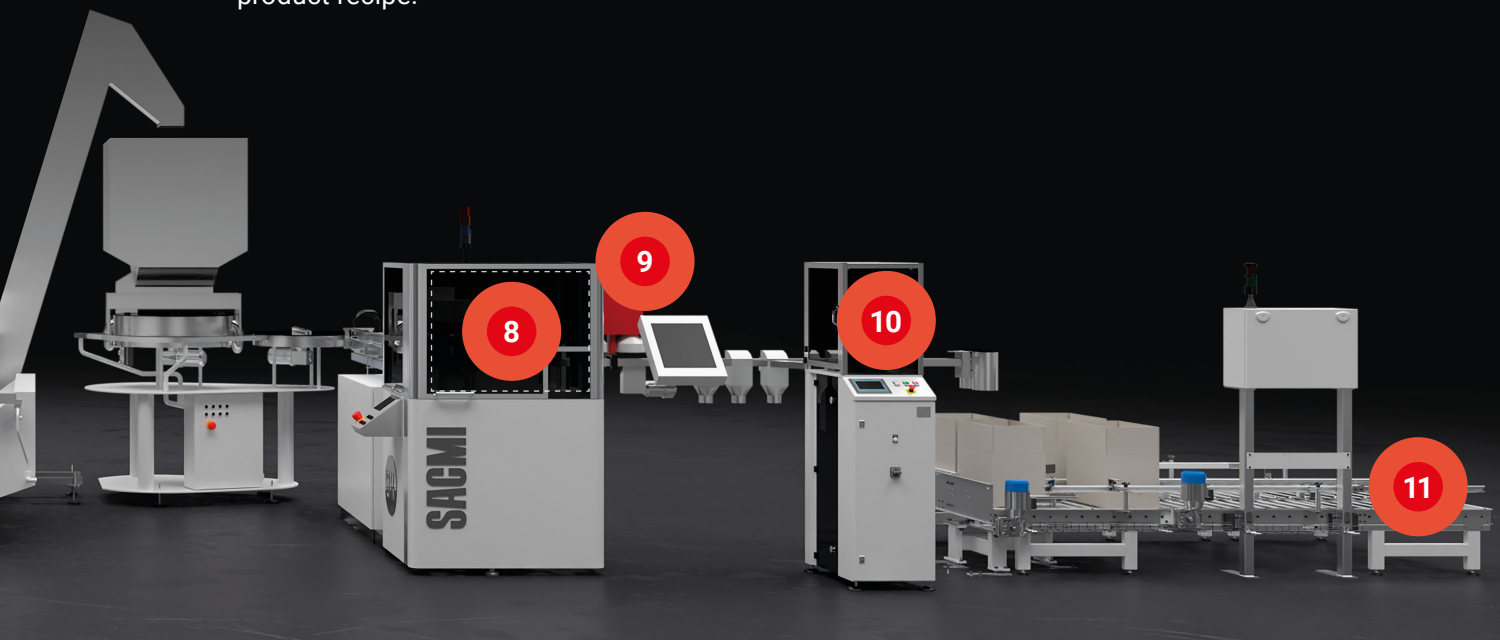


Predict the inserting carousel maintenance thanks to detecting drifts on each inserting equipment.

6. Drift prevention and time saving by measuring the concavity and convexity of each cap produced.
7. Prevent problems related to cap temperature downstream of the CCM; the cooling tumbler self-adjusts according to the product recipe.
8. Save time and money adjusting the band cutting parameters by following the results of the PFMC (Pull Force Machine CVS-CUT) controls.
9. Save time and money thanks to the integrated inspection process, taking advantage of the defect-spindle and defect-mold relations.
10. Prevent band slitting problems through in-line control of the bridges break force and inspecting the cutting zone at the highest high resolution.
11. Prevent loading of incorrect boxes, thanks to the handling module fully integrated with the product recipe.

投料时检测原料是否发生偏移，并预判设备是否需要进行维护保养。

6. 检测盖面是否平整无凹凸，预防投料偏移，节省时间。
7. 根据生产线配置自动调整模温以确保瓶盖充分冷却。
8. 根据拉力检测设备(PFMC CVS-CUT)的测量结果，自动调整防盗环切环参数。
9. 在加工过程中，对已发生缺陷的上下模腔进行检测和分析。
10. 在线高清检测切环区域和控制瓶盖断环拉力，预防防盗环在切环时可能产生的切环问题。
11. 生产线模块化配置，预防发生装箱错误。



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