

Rigid packaging 4.0

The advantages
of digital transformation
for cap & preform
production lines

瓶盖和瓶坯生产线数字化
转换的优势



SACMI

ENDLESS INNOVATION SINCE 1919

The key benefits of a profitable digital r-evolution

可盈利数字化改革的核心优势

DIGITALIZING PROCESSES IS PROFITABLE, AS SACMI DEMONSTRATES WITH THE 4.0 DEVELOPMENTS BEING APPLIED ON ITS PET CAP AND PREFORM PRODUCTION LINES

萨克米PET瓶盖和瓶坯生产线4.0技术应用，数字化工艺让利润具有可持续性

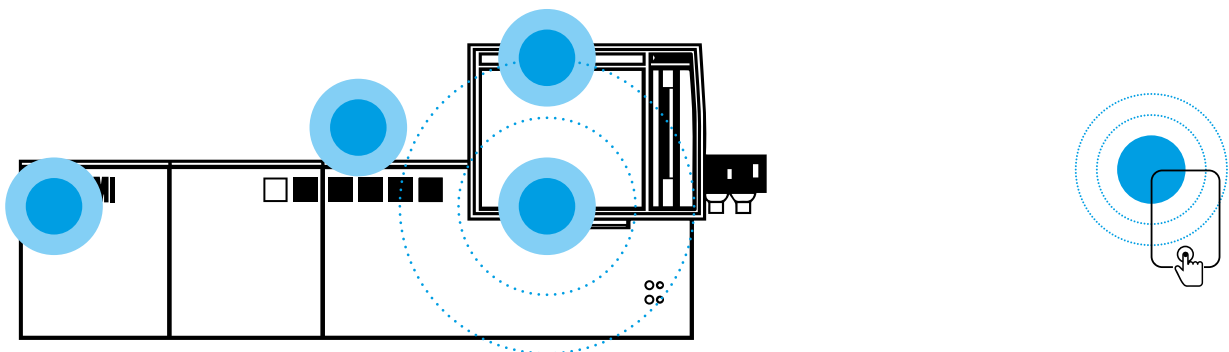
SMART PACK

ON-BOARD PREMIUM FEATURES

Ensures process stability and continuous production, through intelligent monitoring of machine's data and behaviour.

高级功能上线

智能监测系统实时监控数据和管理加工过程，确保设备持续生产和稳定运行。



HERE

MANUFACTURING EXECUTION SYSTEM

Maximizes the availability of machines and lines through:

- profitable maintenance planning
- optimal production schedules

生产执行系统

设备和生产线改良和优化旨在：

- 可盈利维修计划
- 生产计划优化



SMART CARE

IN-CLOUD IOT PLATFORM AND SERVICES

Maximizes machine performance, monitors KPIs and runs machine health checks using AI analytics to predict the necessary maintenance tasks.

物联网云平台和服务

设备性能最大化, 监控主要业绩指标(KPIs), 确保设备稳定运行。采用人工智能技术分析和监督设备运行, 并提供可预见性维护保养建议。

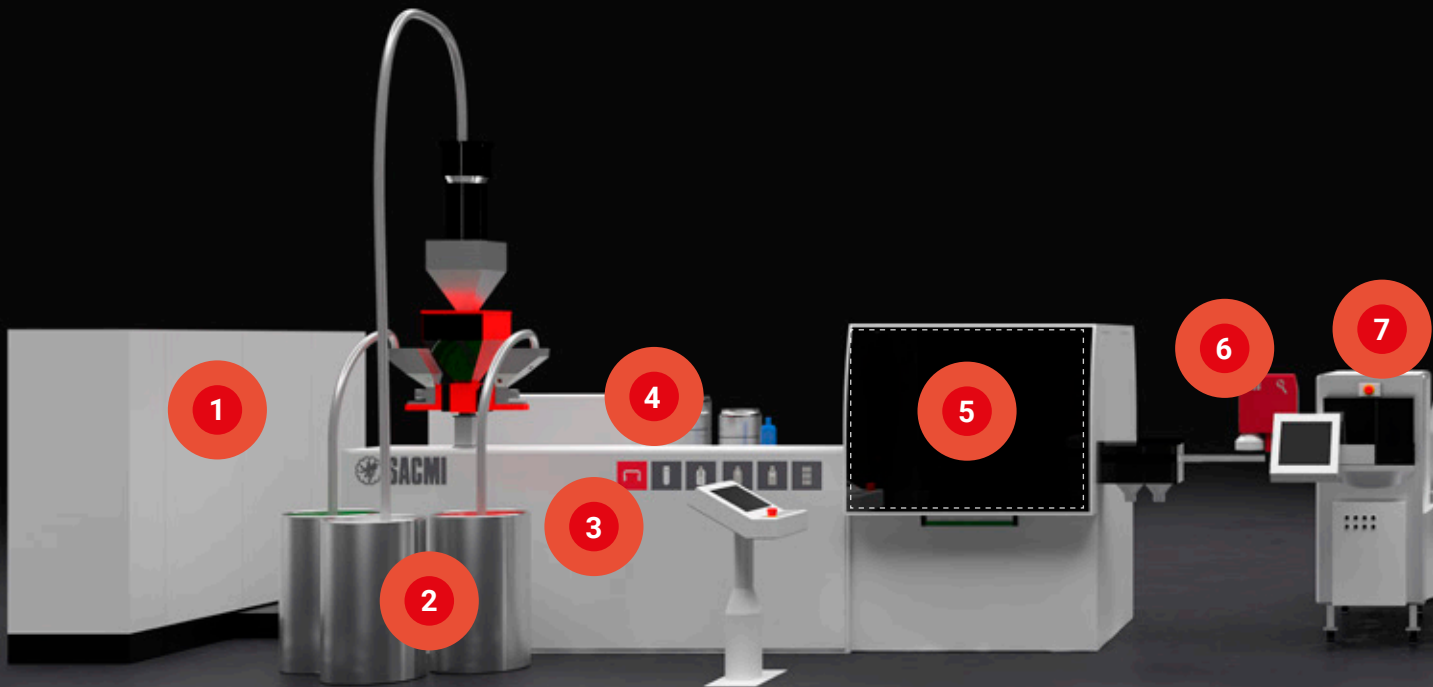


The benefits of the SACMI 4.0 manufacturing line

萨克米4.0生产线的优势

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.

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。
检测盖顶和盖底(瓶盖内部和外部)。
对投料控制和分析, 减少50%设备调整时间。

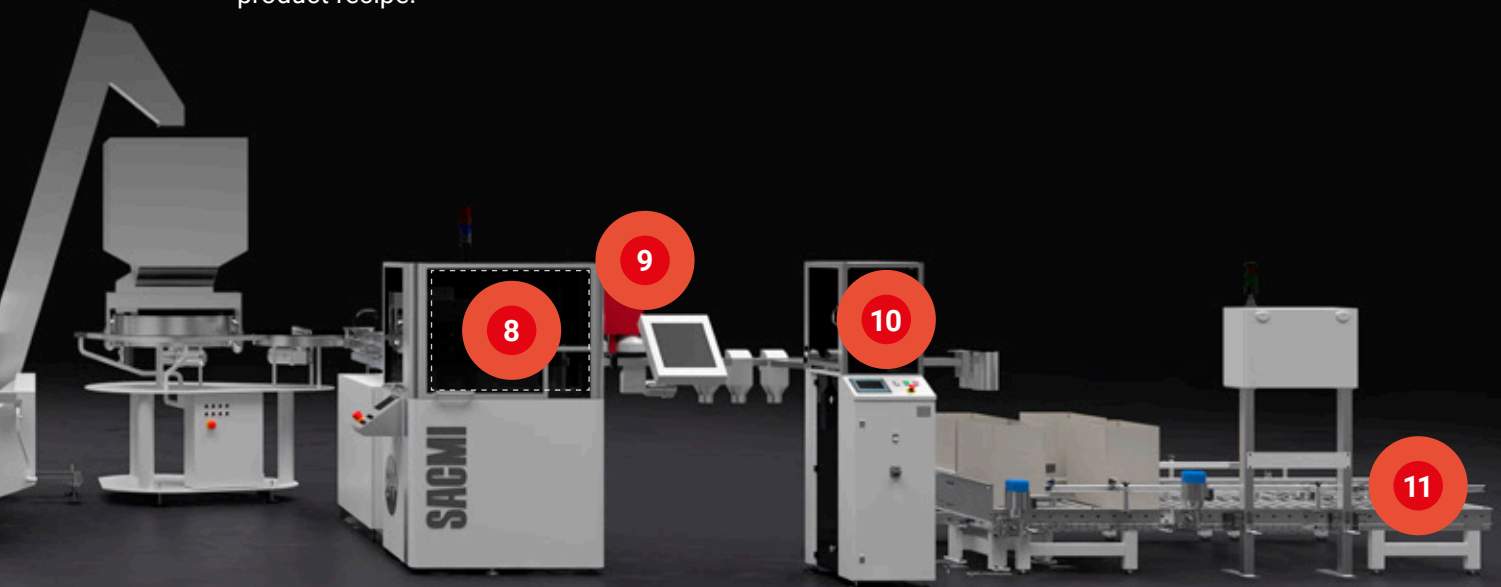


Predict the inserting carousel maintenance thanks to detecting drifts on each inserting equipment.

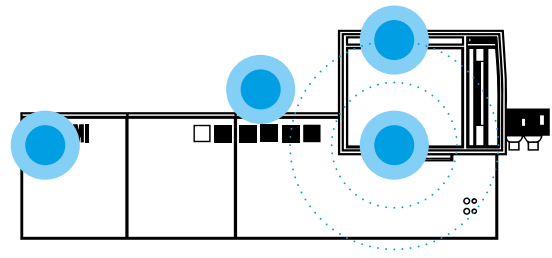
6. Drift prevention and time saving by measuring the concavity and convexity of each cap produced.
7. Prevent problems related to cap temperature downstream of the CCM; the cooling tumbler self-adjusts according to the product recipe.
8. Save time and money adjusting the band cutting parameters by following 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. 检测盖顶是否平整无凹凸,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。



Smart Pack



ON-BOARD PREMIUM FEATURES

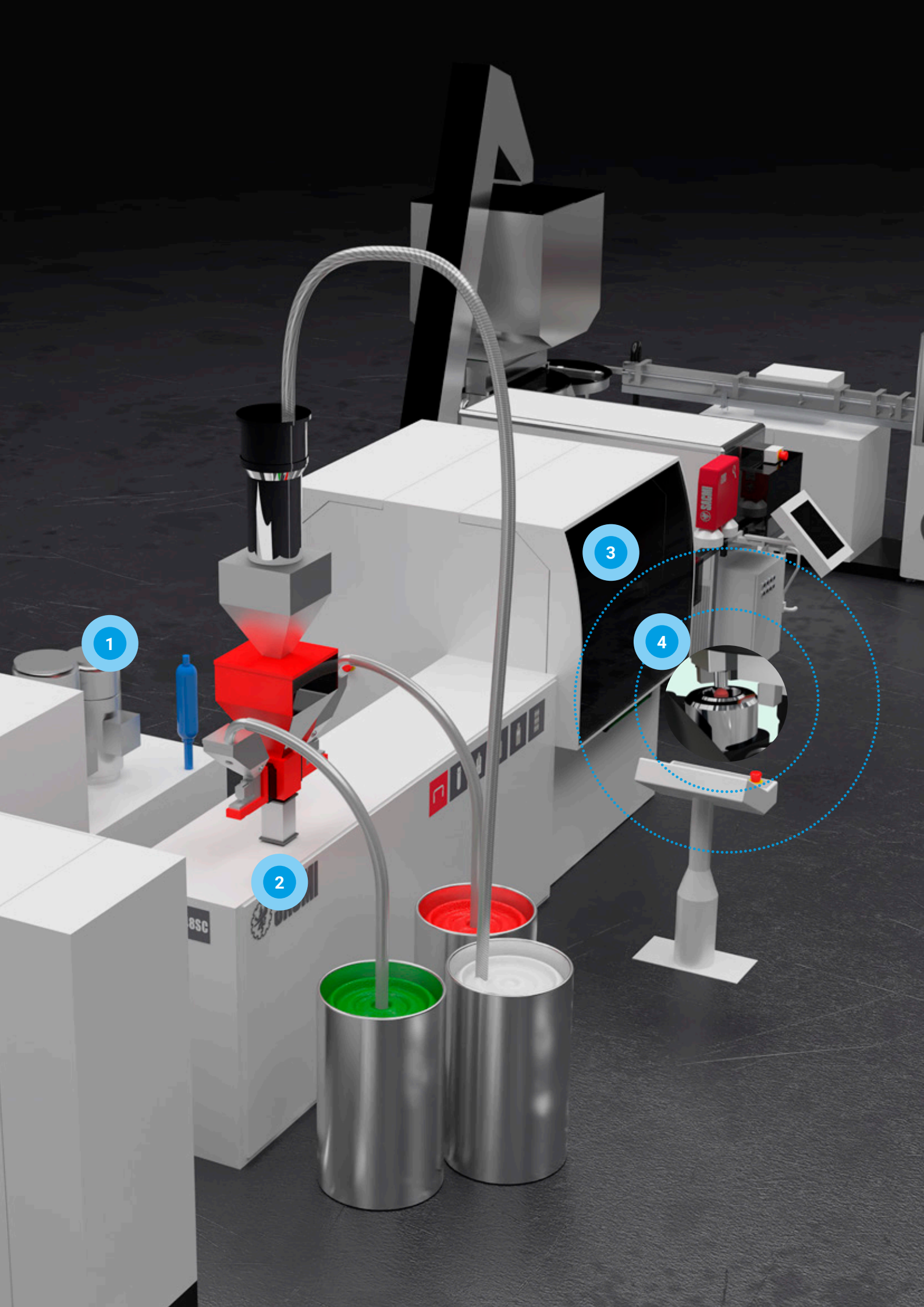
The advanced sensors and controls on board the machine play a pivotal role. On SACMI CCM cap manufacturing lines this translates into several benefits for the customer.

1. **Hydraulic system preventive maintenance costs reduced by up to 66%.** Prevention of problems caused by the decay of hydraulic oil thanks to accurate control of its physical and chemical variables.
2. **Longer mold life through the effective prevention of condensation. Prevention of problems caused by decay of the coolant mixture** thanks to precise control of its physical and chemical variables.
3. **Prompt recognition of incorrect resin loading**, preventing the critical domino effect generated by this error.
4. **Up to 60% shorter pellet insertion times** thanks to digital control of the variables involved. Prevention of the most common malfunctions related to wear or incorrect settings.

高级功能上线

设备上先进的传感器和控制装置起着关键作用。萨克米塑料瓶盖压塑成型生产线CCM为客户带来许多益处。

1. **液压系统预防性维护成本减少多达66%。**精确控制液压油的物理和化学变量，防止液压油变质引起的问题。
2. **有效防止冷凝，延长模具的使用寿命。**由于精确控制冷却剂混合物的物理和化学变量，防止冷却剂混合物变质引起的问题。
3. **及时识别错误树脂的加料，防止该错误产生严重的多米诺效应。**
4. **由于数字控制所涉及的变量，可缩短多达60%的投料时间。**可预防因磨损或不正确设置导致的常见故障。

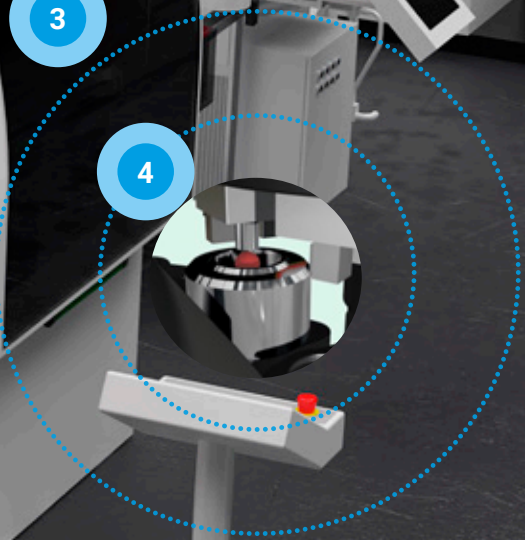


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FEEDBACK ON THE PROCESS, SOME EXAMPLES

SACMI makes the digital revolution in cap and preform production lines effective and efficient by embedding artificial vision in the production process.

In the 4.0 configuration, SACMI CVS systems (developed specifically for each Rigid Packaging process and product) are integrated into both the production machines and their processes.

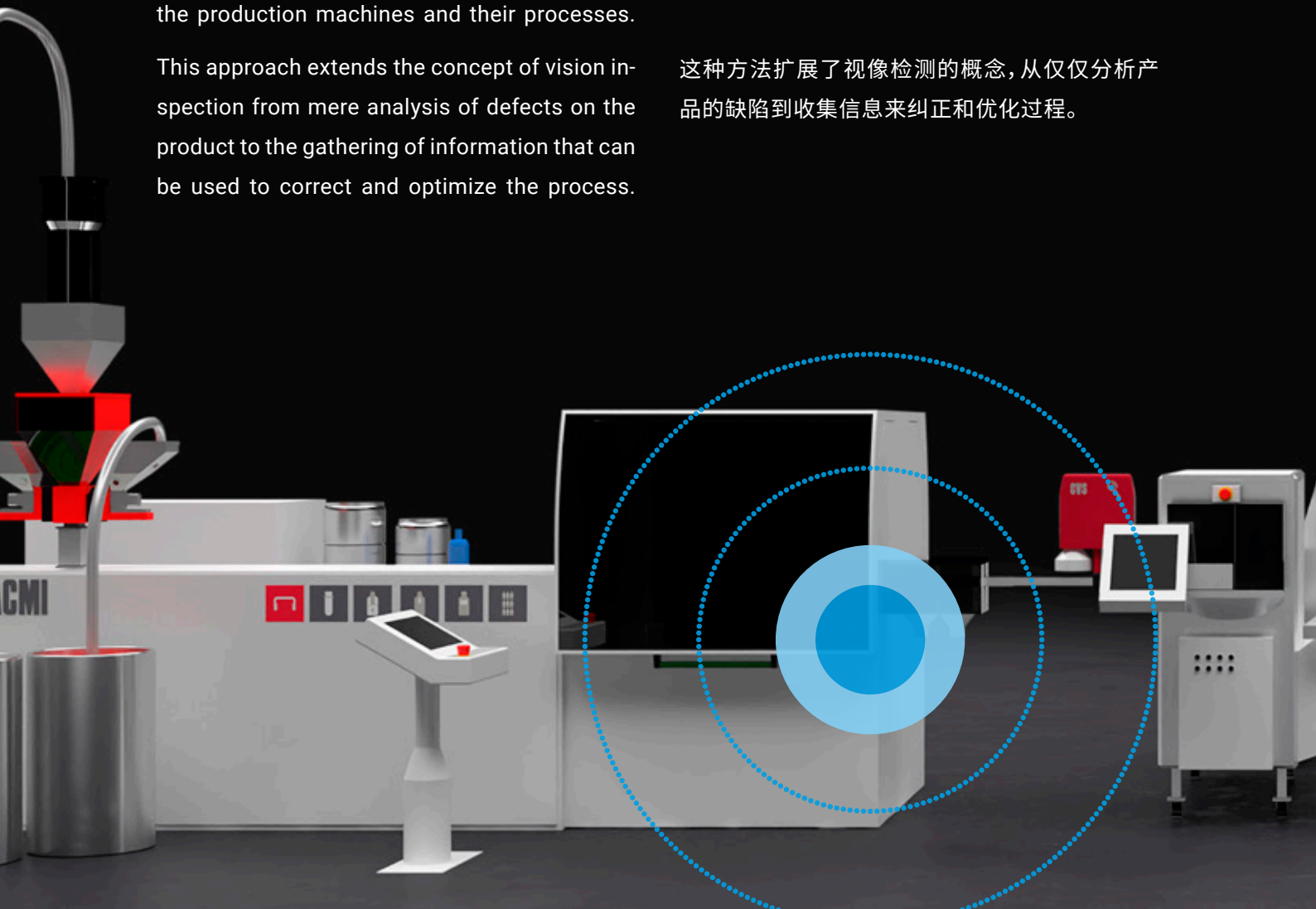
This approach extends the concept of vision inspection from mere analysis of defects on the product to the gathering of information that can be used to correct and optimize the process.

工艺反馈, 案例分析

萨克米在生产过程中采用人工视觉技术, 对于瓶盖和瓶坯生产线而言, 数字化革命呈现卓越和高效。

在4.0配置中, 萨克米视像检测系统(专门为每个硬包装工艺和产品开发的系统)被集成到生产设备及其生产过程中。

这种方法扩展了视像检测的概念, 从仅仅分析产品的缺陷到收集信息来纠正和优化过程。



For example, in cap production the detection and analysis of specific defects, such as incomplete or flash caps, causes the control system to respond by correcting several process variables, including molding pressure.

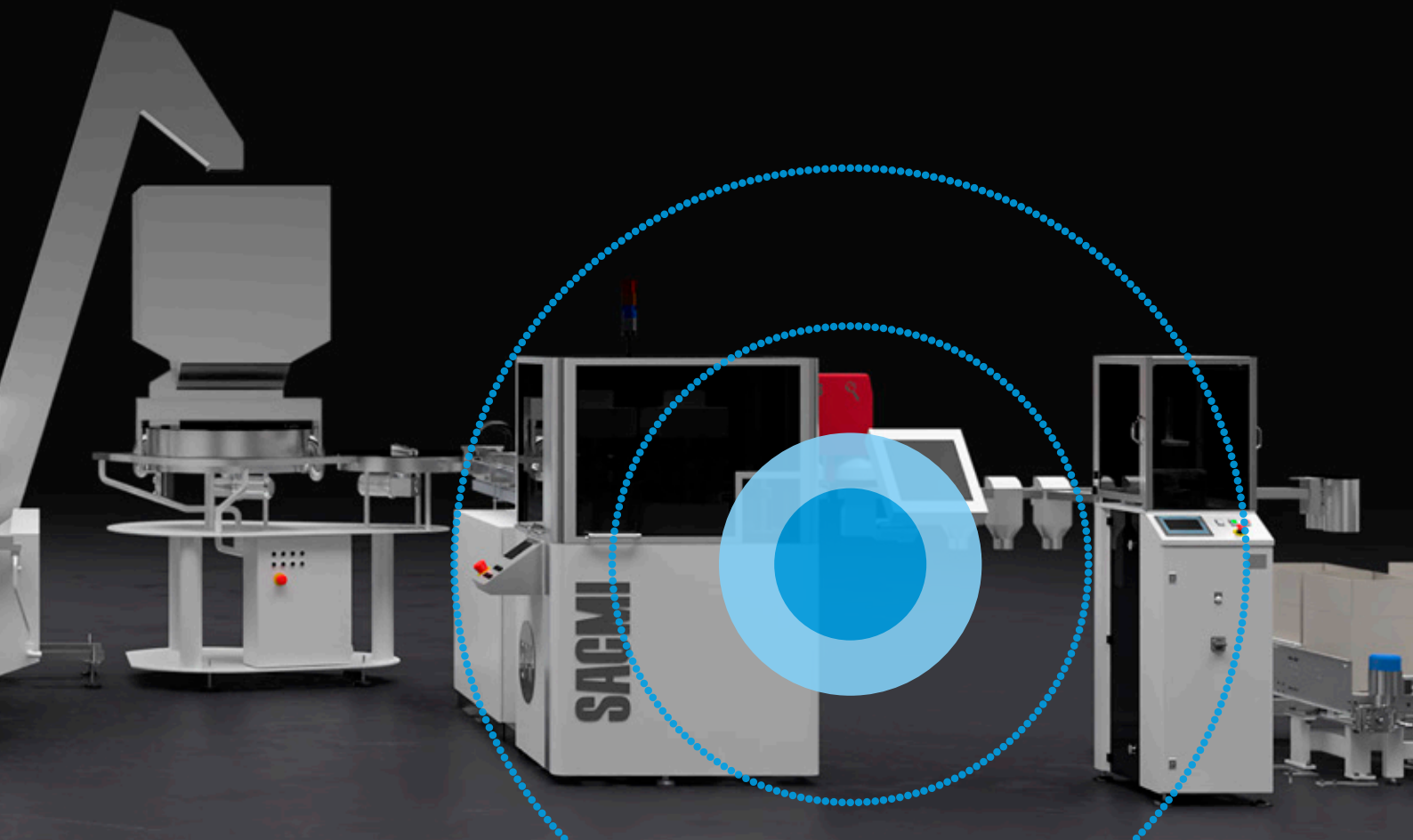
Another example of deep integration between control systems and process machines is the relationship between the SFM (Slitting & Folding Machine) slitting machine and the PFMC (Pull Force Machine CVS-CUT) machine.

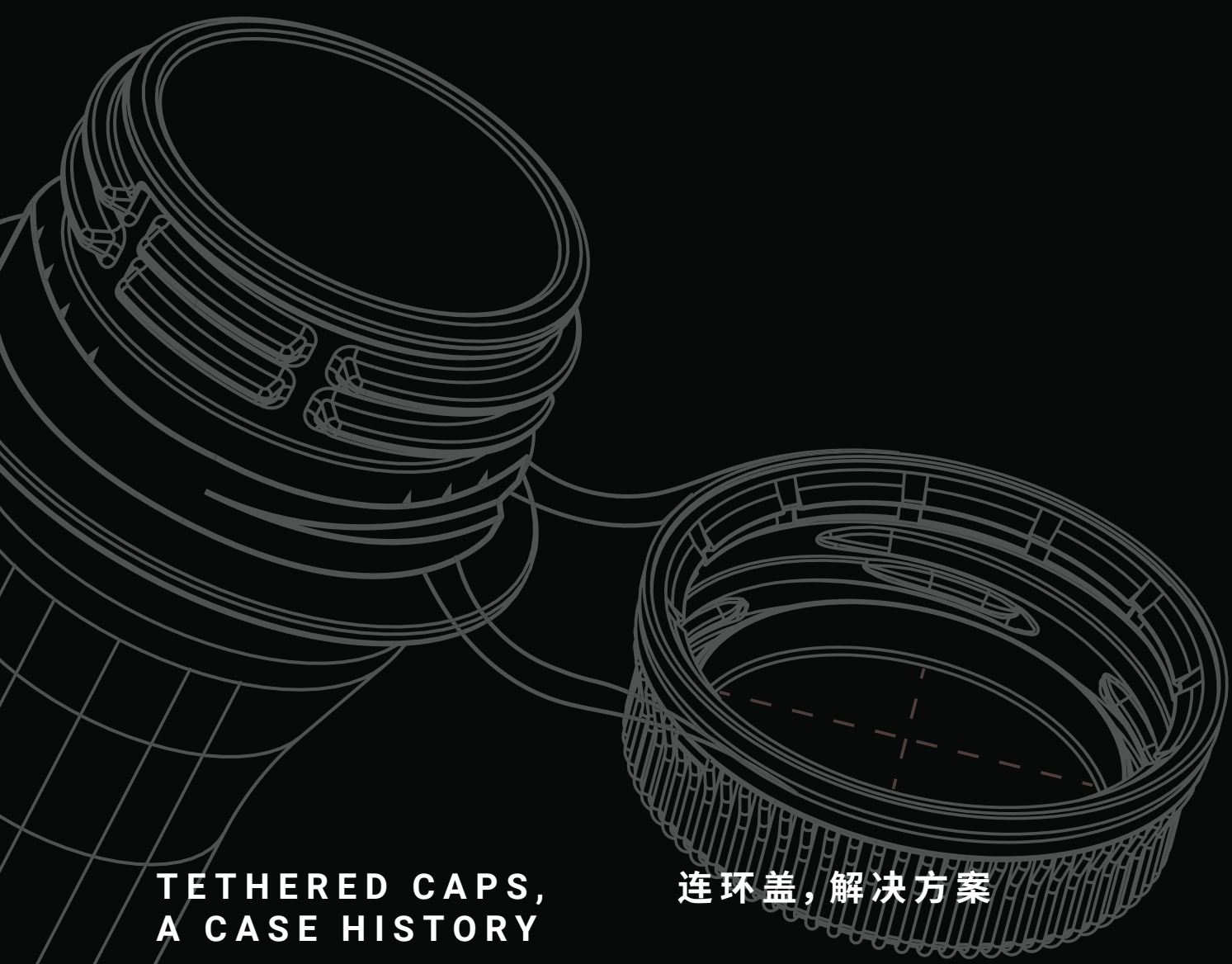
If analysis of the force vs time graphs confirms the need for slitting correction, typically to compensate for blade wear, the SFM can independently adjust key parameters such as the position and temperature of the slitting tools.

例如,在瓶盖生产中,检测和分析特定的缺陷,如不完整的瓶盖或瓶盖飞边,会引起控制系统应答校正几个过程变量,包括模压压力。

另一个例子是切环折边设备(SFM)和断桥拉力检测设备(PFMC)之间高度整合,控制系统和设备紧密结合。

若因刀片磨损,经拉力检测和生产时间图表的分析后,确认需要进行切环校正,切环折边设备可以独立调整刀片位置和温度的主要参数。





TETHERED CAPS, A CASE HISTORY

Tethered cap manufacturing is an area where SACMI's 4.0 revolution in cap production lines has yielded considerable success.

SACMI goes beyond compliance with EU directive 2019/204 by proposing effective, exceptional solutions that seize all the opportunities this mandatory transition brings with it.

The SACMI line includes the Pull Force Machine (or PFMC): this spot-checks the band-breaking force, providing customers with enhanced support in this transition towards tethered caps.

连环盖，解决方案

连环盖生产是萨克米在瓶盖生产线上取得4.0改革的一个巨大成功。

萨克米遵守欧盟第2019/204号条款，提供有效和杰出的解决方案，紧抓这一强制性过渡带来的机遇。

萨克米生产线包括拉力检测设备(PFMC):该设备可以抽查防盗环拉力值，为客户在向连环盖过渡的过程中提供强有力的支持。除破坏性检查外，

In addition to this destructive check, the PFMC performs a detailed inspection of the slit zone using an ultra-high resolution linear camera.

拉力检测设备(PFMC)使用超高分辨率的线性相机对切环区进行详细检查。

The results of these inspections offer many benefits, such as:

检测的优势在于,例如:

- allowing accurate monitoring of the slitting process
- making self-adjustments of upstream machines possible (i.e. SFM Slitting & Folding Machine)
- preventing any process drifts
- effective planning of both preventive and corrective action

- 允许精确监控切环过程。
- 使得上游装置或设备(如切环折边设备SFM)的自动调整成为可能
- 防止任何偏移
- 对预防和纠正进行有效计划



HERE

MANUFACTURING EXECUTION SYSTEM

SACMI HERE is a platform specifically designed for industrial ceramic and packaging processes.

Interfaced with the ERP - the factory management system - HERE allows:

- **real-time control of key performance indicators (KPIs)**
- **monitoring/tracking of individual production lots**, with the ability to plan **individual lots** starting from the order (ERP) and on **multiple lines**
- **planning of maintenance**, again on **multiple lines**, thus optimizing tasks and supplies

With SACMI HERE, customers can, wherever they are, keep track of plant status, supplies, machine stoppages and their causes.

All via a single, user-friendly interface that can be accessed from any fixed or mobile device connected to the company network.

生产执行系统

萨克米智能协助系统(HERE)是一个专门为工业陶瓷和包装工艺设计的软件平台。

与ERP - 工厂管理系统对接:

- **主要绩效指标(KPIs)的实时控制。**
- **监控/跟踪单个生产批次, 能够从订单(ERP)开始在多个生产线上计划单个批次。**
- **在多条生产线上确定维护保养方案, 优化任务和供应。**

萨克米智能协助系统(HERE), 无论何时何地可以跟踪设备生产、供应情况、机器停产及故障原因。

所有这些通过一个单一的、易于操作的界面, 可以从任何连接到公司网络的固定或移动设备进行访问。



here

SACMI

Continuous Compression Moulding
Vision System
Cooling
Scoring and Folding
Pull Force CVS CUT
Scal Slitting Module

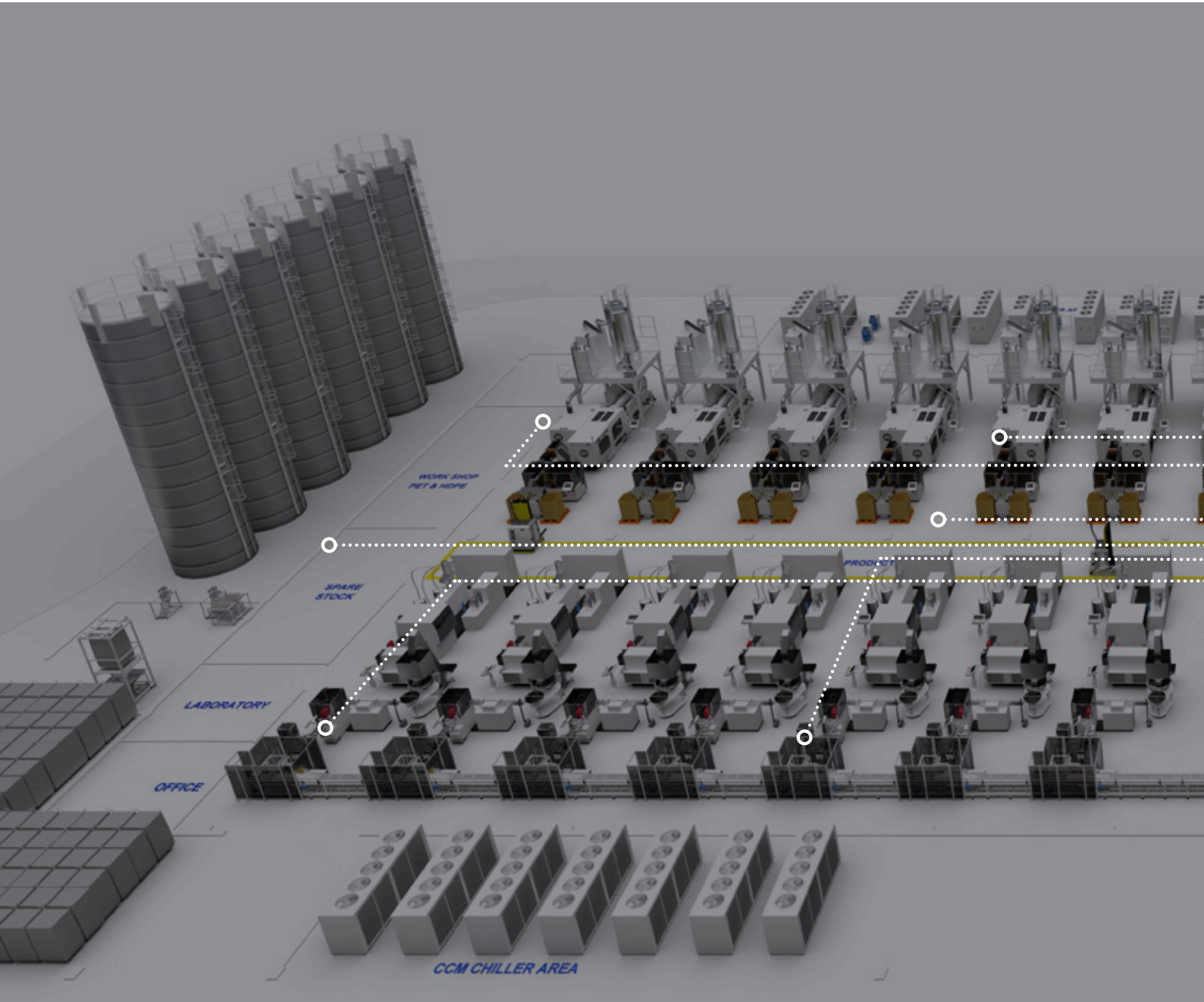
COMPLETATO PRODUZIONE IN ATTESA



ONALIZZA

SACMI PREDICTS
PROBLEMS BEFORE
THEY CAN HAPPEN

萨克米设备具有预判功能



HERE lets you accurately plan production and maintenance on a single platform.

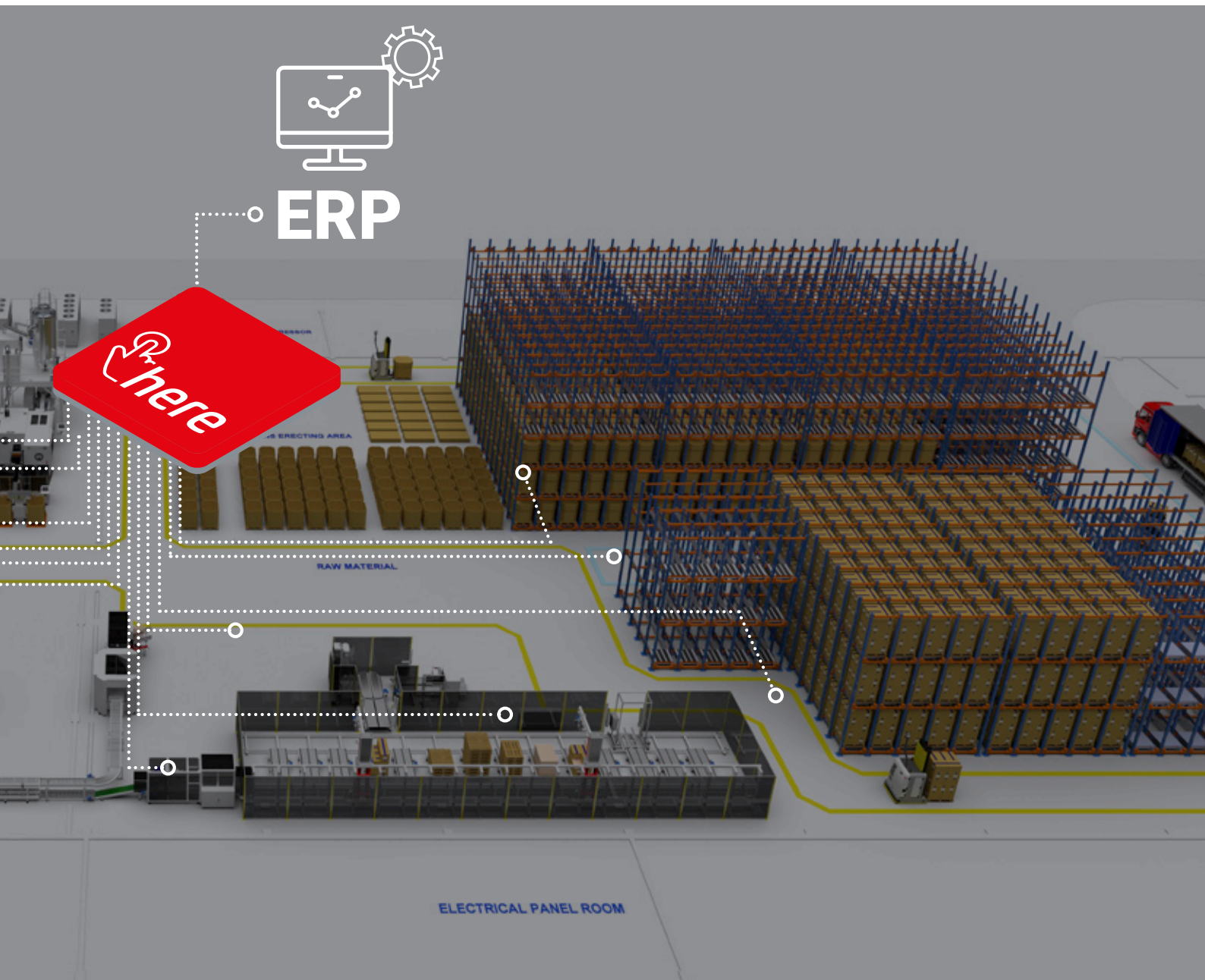
This means you can minimize changeover times or group maintenance tasks together, reducing their impact on production.

SACMI HERE allows you to interconnect individual machines and entire production departments, establishing a new approach to order planning, production, and maintenance.

智能协助系统(HERE)允许在单一平台上准确进行计划生产和维护。

意味着减少了换型时间,或将维护任务分组或绑定,从而减少对生产的影响。

萨克米智能协助系统(HERE)允许连接单台设备,也可以连接整条生产线,建立订单计划、生产和维护计划和方法。



Smart Care



IN-CLOUD IOT PLATFORM AND SERVICES

SMART CARE runs continuous, in-depth, medium/long term health checks on your machines.

It takes advantage of AI algorithms to analyze huge amounts of data collected in the cloud.

It allows you to objectify the value of technology; it also lets you set different user profiles, and even define specific KPIs for different members of personnel, from plant manager to maintenance manager.

It has only one purpose: to help you make the best decisions.

Why choose Smart Care?

Decide how to run your machines, when and how to intervene, according to analysis of actual parameters such as:

- KPIs (availability, MTBF, MTTR...)
- causes of shutdowns, such as machine alarms or relevant process data
- process variables, analyzed either individually or by logical group

物联网云平台及服务

全新智能监督(SMART CARE)系统可以实时管理和控制设备,确保生产持续稳定进行。

利用人工智能算法分析并在云端服务器收集数据。

智能监督(SMART CARE)系统允许从工厂经理到设备维护保养经理对设备进行各项设定,从而为特定工作人员制定其主要业绩指标。

智能监督系统旨在为用户提供更卓越更高效的解决方案。

为什么选择智能监督(Smart Care)?

根据实际参数分析,决定何时以及如何干预使设备生产持续稳定,例如:

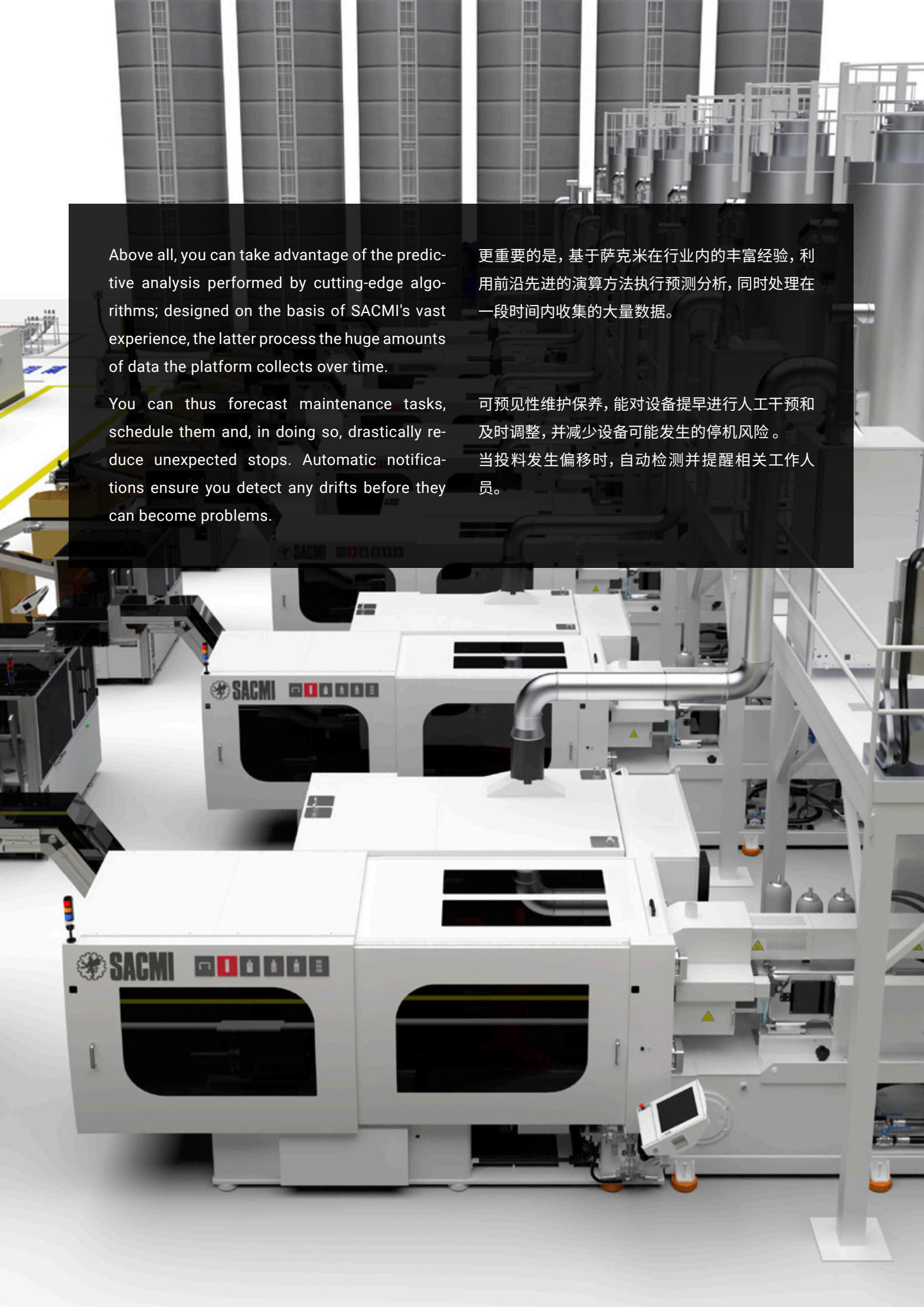
- 主要业绩指标(KPIs)、设备产能、平均无故障时间(MTBF)及平均维护时间(MTTR)...
- 停机原因,如设备报警或相关的加工或生产数据。
- 加工变量,单独或逻辑组分析。

Above all, you can take advantage of the predictive analysis performed by cutting-edge algorithms; designed on the basis of SACMI's vast experience, the latter process the huge amounts of data the platform collects over time.

You can thus forecast maintenance tasks, schedule them and, in doing so, drastically reduce unexpected stops. Automatic notifications ensure you detect any drifts before they can become problems.

更重要的是，基于萨克米在行业内的丰富经验，利用前沿先进的演算方法执行预测分析，同时处理在一段时间内收集的大量数据。

可预见性维护保养，能对设备提早进行人工干预和及时调整，并减少设备可能发生的停机风险。当投料发生偏移时，自动检测并提醒相关工作人员。



WHAT DOES SMART CARE OFFER?

In-cloud architecture meets the highest security standards.

Wherever you are, you can obtain a detailed overview of the production process, energy consumption, machine availability, downtimes and their causes. You'll find everything you need laid out on a user-friendly panel that can be consulted whatever your location, on any device, ensuring maximum portability.

In addition to the SMART CARE platform, SACMI offers a Premium service. This provides additional performance by providing proactive prob-

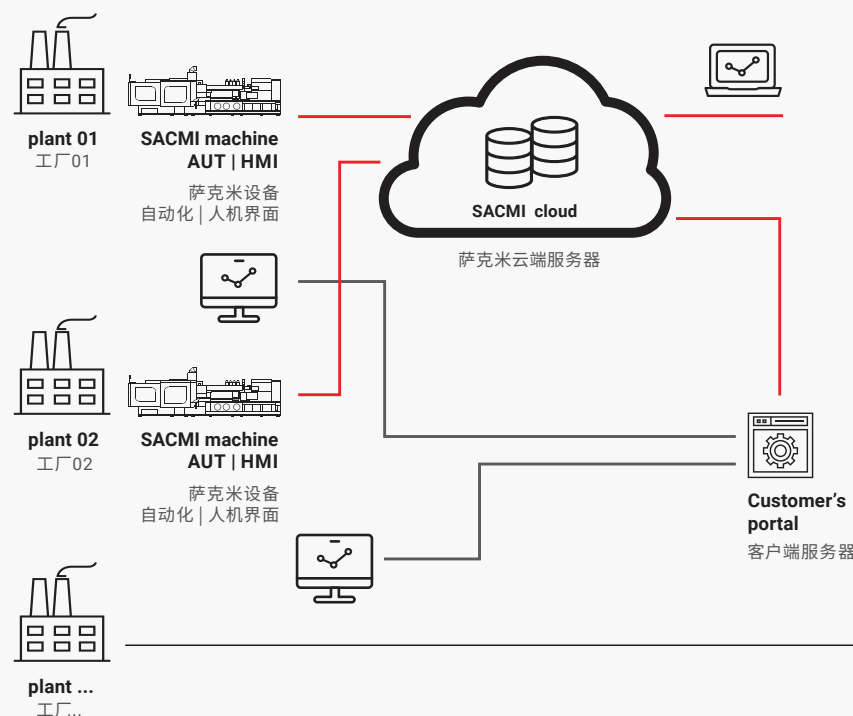
智能监督 (SMART CARE) 能为您带来什么?

物联网云端平台安全高效可靠。

无论身处何地，均可以获得生产过程、能源消耗、设备产能、停机时间及相关原因的详细描述，所有信息都显示在一个操作面板上，无论何时何地，在任何设备上都可以查看。

除了智能监督 (SMART CARE) 平台，萨克米还提供远程支持和远程服务。与培训人员相反，远程支持的专业工作人员具有解决疑问和排除故障的

CUSTOMER MANUFACTURING PLANTS 客户工厂



SACMI MONITORING ROOM 萨克米远程监督管理中心

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

lem-solving features, supporting customers remotely and guiding expert operators (as opposed to trainees).

This Premium service aims to maximize the efficiency of your plant by identifying the causes of ineffectiveness and analyzing parameters or any discontinuity of operation that might stem from changed machine behaviors that require correction.

The fee includes SMART PACK sensor package updates to ensure the latest release is always in use, ensuring the technology on your machines is cutting-edge at all times.

This additional service is based on an analysis of the machine data/behavior detected by SMART CARE.

作用, 在设备生产加工时提供附加值。

远程服务旨在通过识别无效原因和分析参数或任何可能有需要纠正的设备行为改变引起的操作中断来优化生产效率。

远程服务包括智能监督传感器确保设备中软件始终保持更新。

远程支持基于智能监督系统(SMART CARE)检测到的机器数据/设备行为的分析。

