

Project Teorema: from Industrial IoT to Servitization

**CARPIGIANI**



TECHNOLOGY FOR A SWEETER LIFE

Founded in **1946**, Carpigiani quickly established itself as the **market leader** in the **production of machines for gelato and soft serve**.



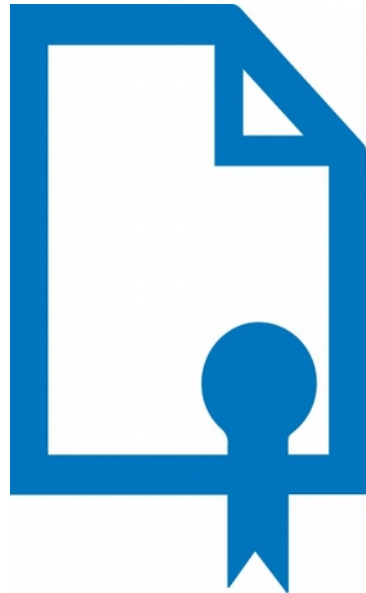
As the culture of Italian ice cream spread across the globe during the 1960s and 1970s, **Carpigiani began to expand rapidly all over the world**, opening its first overseas branches and developing a sales network of exclusive dealerships which have since guaranteed widespread distribution and continuous, prompt support for end users.

In **1989** Carpigiani became part of **Ali-Group**.



**Every day
100 million people
all over the world
eat gelato made with
Carpigiani machines**





- > **170** Inventions currently applied
- > **400** Patents Internationally Granted



Most Important R&D Cooperations:

University of Bologna: Food Technology

University of Ferrara: Computer Science

University of Padova: Engineering
Thermodynamics

ENEA Italian National Agency for New
Technologies, Energy and Sustainable
Economic Development : LCA

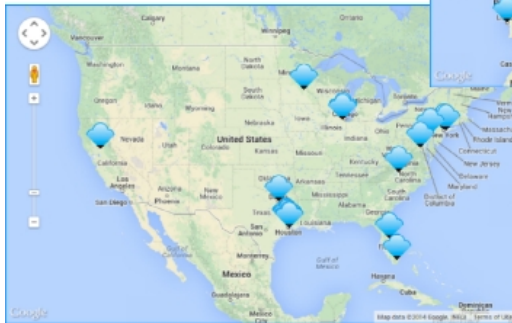
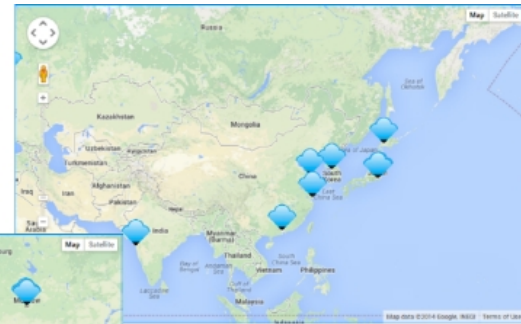
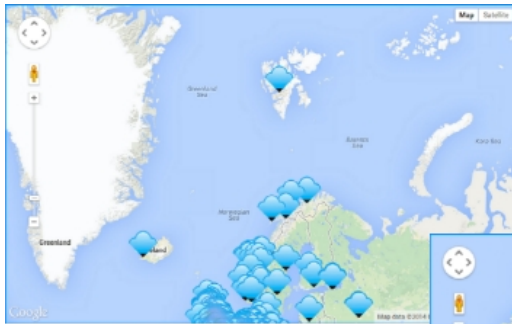


- **complex** machines
- **heavy** duty
- lifecycle higher than **10 years**

AFTER SALES – THE PROBLEM



- **High quantity** of installed machines (more than 150,000)
- **Geographical distribution**



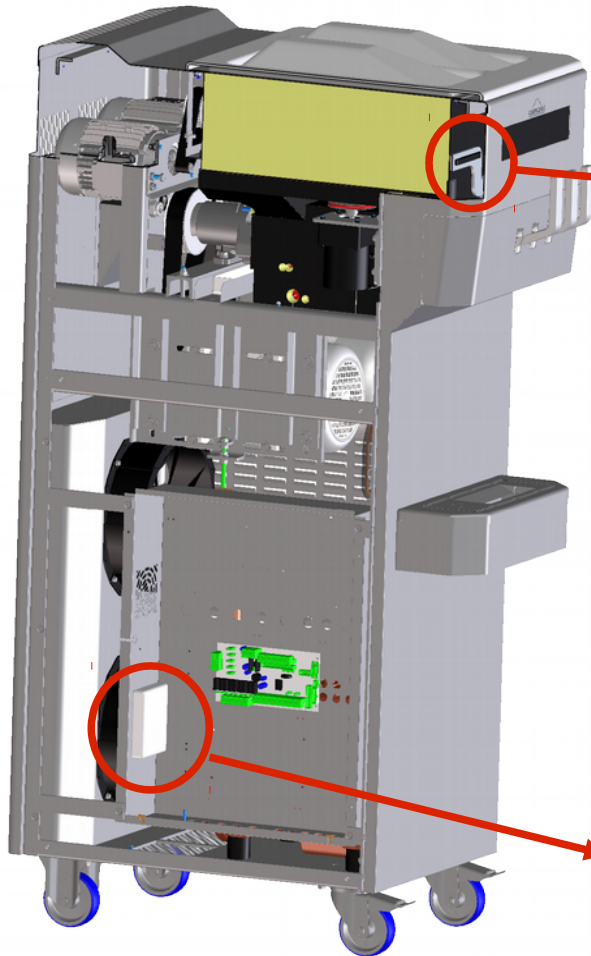
AFTER SALES – SCENARIO



Longyearbyen, Svalbard Islands (NOR), where the transport is carried out with boats, skidoos and helicopters.

To summarize: **very high maintenance costs.**



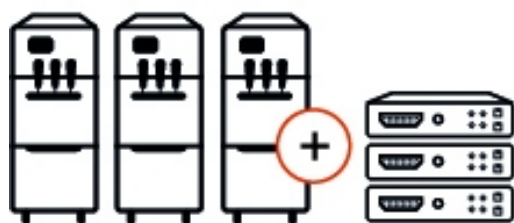


GSM antenna

A machine equipped with **Teorema** has an additional hardware which is composed by **GSM antenna** and **electronic board**, which is continuously communicating with the **CPU** board.

Teorema electronic board

TEOREMA – SYSTEM ARCHITECTURE



Remote
Monitoring Kits

**DATA ACQUISITION
AND REMOTE CONTROL**

Central Monitoring
and Control Station

**DATA MANIPULATION,
ANALYSIS AND STORAGE**

**MANAGEMENT
INTERFACE**



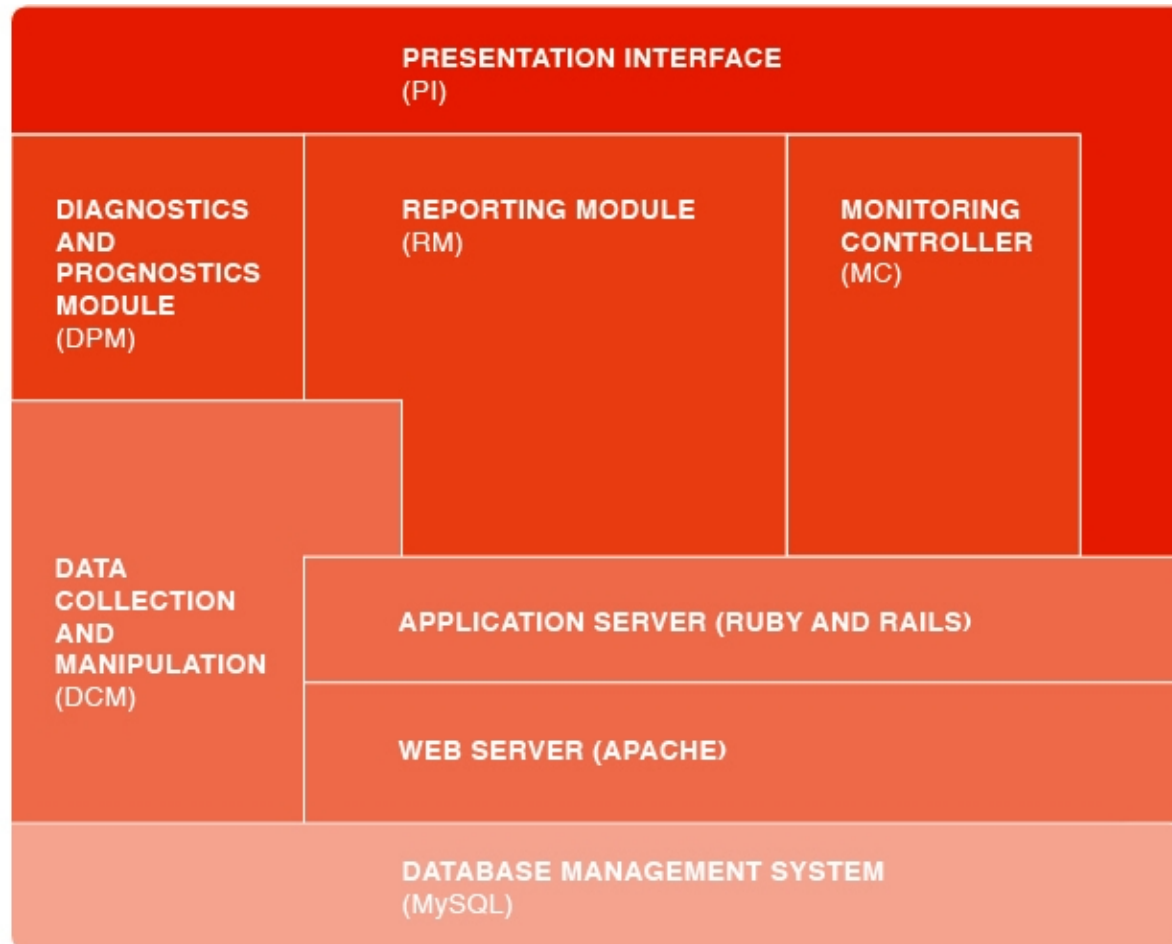
Carpigiani
Customers



Carpigiani Technical
Support Personnel



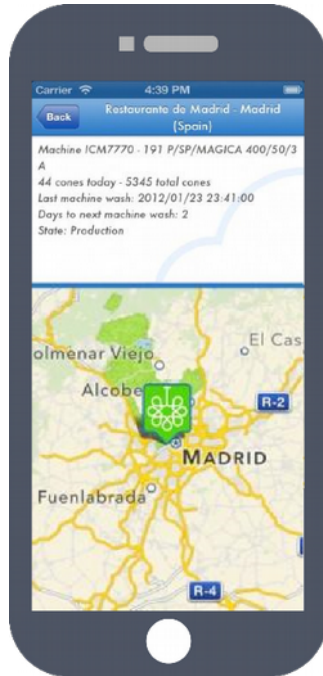
TEOREMA – SERVER ARCHITECTURE




TEOREMA – DATA ACCESS



Mobile



Web



- Home
- Administration
- Dashboard
- Machines
- Locate machines
- Customer Reporting
- Reporting
- Help
- Contact us

Current Language: English
Current Theme: None

Logout

Machine summary			
Machine Serial Number	ICM770 - DISABLED	Material Code - Model	IC50M2102 - V0L 3 8PFA 400/50/3 W
Restaurant name	Carregan Galois Museum	Location (City, Country)	Avoca Emilia, Italy
Address	Via Emilia 45, 40011 Avoca Emilia	Restaurant phone	
Contact			
Machine Installation Date		Teorema Installation Date	
WebGate Serial Number	0102254	Machine Firmware	00.00.00
SIM Operator	Telenor	WebGate Firmware	0.0.0.200
SIM ICCID	894030011000070208	SIM ID	5229
Activation	Is it installed in Sweden?	SIM P Address	10.80.12.167
Connection status		Actions	
Events status	Number of available events	Actions	

[Click here to check the connection status](#)

Manage the Programming Table		
Update Firmware on WebGate	Update Firmware on CPU Board	

Connections history	Events history	Tickets history																																																																		
	<table border="1"> <thead> <tr> <th>Session's begin timestamp</th> <th>Session's end timestamp</th> <th>Session Type (Number of acceptanc)</th> </tr> </thead> <tbody> <tr><td>2014-09-29 03:20:30 +0200</td><td>2014-09-29 03:20:30 +0200</td><td>Alarm (Signal Detected) [1]</td></tr> <tr><td>2014-09-29 03:28:12 +0200</td><td>2014-09-29 03:28:14 +0200</td><td>Alarm (Signal Detected) [1]</td></tr> <tr><td>2014-09-29 03:59:11 +0200</td><td>2014-09-29 03:59:13 +0200</td><td>Alarm (Pause End) [1]</td></tr> <tr><td>2014-09-27 03:00:35 +0200</td><td>2014-09-27 03:00:37 +0200</td><td>Alarm (Pause End) [1]</td></tr> <tr><td>2014-09-26 02:58:05 +0200</td><td>2014-09-26 02:58:07 +0200</td><td>Alarm (Pause End) [1]</td></tr> <tr><td>2014-09-26 03:53:22 +0200</td><td>2014-09-26 03:53:24 +0200</td><td>Alarm (Pause End) [1]</td></tr> <tr><td>2014-09-24 02:53:07 +0200</td><td>2014-09-24 02:53:09 +0200</td><td>Alarm (Pause End) [1]</td></tr> <tr><td>2014-09-23 02:52:01 +0200</td><td>2014-09-23 02:52:02 +0200</td><td>Alarm (Pause End) [1]</td></tr> <tr><td>2014-09-21 02:50:26 +0200</td><td>2014-09-21 02:50:28 +0200</td><td>Alarm (Pause End) [1]</td></tr> <tr><td>2014-09-20 20:24:34 +0200</td><td>2014-09-20 20:24:35 +0200</td><td>Alarm (Signal Detected) [1]</td></tr> <tr><td>2014-09-20 20:17:08 +0200</td><td>2014-09-20 20:17:10 +0200</td><td>Alarm (Power On) [1]</td></tr> <tr><td>2014-09-20 02:47:00 +0200</td><td>2014-09-20 02:47:02 +0200</td><td>Alarm (Pause End) [1]</td></tr> <tr><td>2014-09-19 02:44:24 +0200</td><td>2014-09-19 02:44:26 +0200</td><td>Alarm (Pause End) [1]</td></tr> <tr><td>2014-09-18 02:30:46 +0200</td><td>2014-09-18 02:30:48 +0200</td><td>Alarm (Pause End) [1]</td></tr> <tr><td>2014-09-17 02:49:08 +0200</td><td>2014-09-17 02:49:10 +0200</td><td>Alarm (Pause End) [1]</td></tr> <tr><td>2014-09-16 02:40:22 +0200</td><td>2014-09-16 02:40:24 +0200</td><td>Alarm (Pause End) [1]</td></tr> <tr><td>2014-09-15 02:49:59 +0200</td><td>2014-09-15 02:49:57 +0200</td><td>Alarm (Pause End) [1]</td></tr> <tr><td>2014-09-14 02:52:36 +0200</td><td>2014-09-14 02:52:38 +0200</td><td>Alarm (Pause End) [1]</td></tr> <tr><td>2014-09-13 02:46:03 +0200</td><td>2014-09-13 02:46:05 +0200</td><td>Alarm (Pause End) [1]</td></tr> <tr><td>2014-09-12 02:51:14 +0200</td><td>2014-09-12 02:51:15 +0200</td><td>Alarm (Pause End) [1]</td></tr> <tr><td>2014-09-11 02:48:28 +0200</td><td>2014-09-11 02:48:30 +0200</td><td>Alarm (Pause End) [1]</td></tr> </tbody> </table>	Session's begin timestamp	Session's end timestamp	Session Type (Number of acceptanc)	2014-09-29 03:20:30 +0200	2014-09-29 03:20:30 +0200	Alarm (Signal Detected) [1]	2014-09-29 03:28:12 +0200	2014-09-29 03:28:14 +0200	Alarm (Signal Detected) [1]	2014-09-29 03:59:11 +0200	2014-09-29 03:59:13 +0200	Alarm (Pause End) [1]	2014-09-27 03:00:35 +0200	2014-09-27 03:00:37 +0200	Alarm (Pause End) [1]	2014-09-26 02:58:05 +0200	2014-09-26 02:58:07 +0200	Alarm (Pause End) [1]	2014-09-26 03:53:22 +0200	2014-09-26 03:53:24 +0200	Alarm (Pause End) [1]	2014-09-24 02:53:07 +0200	2014-09-24 02:53:09 +0200	Alarm (Pause End) [1]	2014-09-23 02:52:01 +0200	2014-09-23 02:52:02 +0200	Alarm (Pause End) [1]	2014-09-21 02:50:26 +0200	2014-09-21 02:50:28 +0200	Alarm (Pause End) [1]	2014-09-20 20:24:34 +0200	2014-09-20 20:24:35 +0200	Alarm (Signal Detected) [1]	2014-09-20 20:17:08 +0200	2014-09-20 20:17:10 +0200	Alarm (Power On) [1]	2014-09-20 02:47:00 +0200	2014-09-20 02:47:02 +0200	Alarm (Pause End) [1]	2014-09-19 02:44:24 +0200	2014-09-19 02:44:26 +0200	Alarm (Pause End) [1]	2014-09-18 02:30:46 +0200	2014-09-18 02:30:48 +0200	Alarm (Pause End) [1]	2014-09-17 02:49:08 +0200	2014-09-17 02:49:10 +0200	Alarm (Pause End) [1]	2014-09-16 02:40:22 +0200	2014-09-16 02:40:24 +0200	Alarm (Pause End) [1]	2014-09-15 02:49:59 +0200	2014-09-15 02:49:57 +0200	Alarm (Pause End) [1]	2014-09-14 02:52:36 +0200	2014-09-14 02:52:38 +0200	Alarm (Pause End) [1]	2014-09-13 02:46:03 +0200	2014-09-13 02:46:05 +0200	Alarm (Pause End) [1]	2014-09-12 02:51:14 +0200	2014-09-12 02:51:15 +0200	Alarm (Pause End) [1]	2014-09-11 02:48:28 +0200	2014-09-11 02:48:30 +0200	Alarm (Pause End) [1]	
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- ▶ **Machines' real-time monitoring with “on-demand” connections.**
- ▶ **Software and working parameters set update.**
- ▶ **Periodic or on-demand reporting, with possibility to customize.**
- ▶ **Remote diagnostics and prognostics.**
- ▶ **Integrated with Company's ERP and CRM systems.**
- ▶ **Many different types of data managed.**
- ▶ **Data transmission via encrypted protocol.**



▶ Technical data:

- Temperatures and pressures of refrigeration plant
- Motors and compressor status
- Mix level and temperatures
- Software version

▶ Working data:

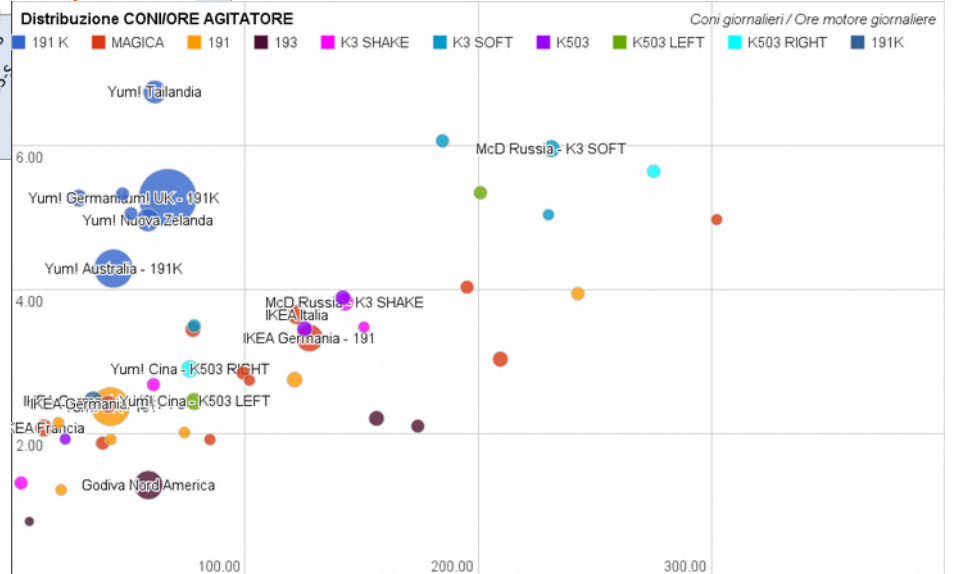
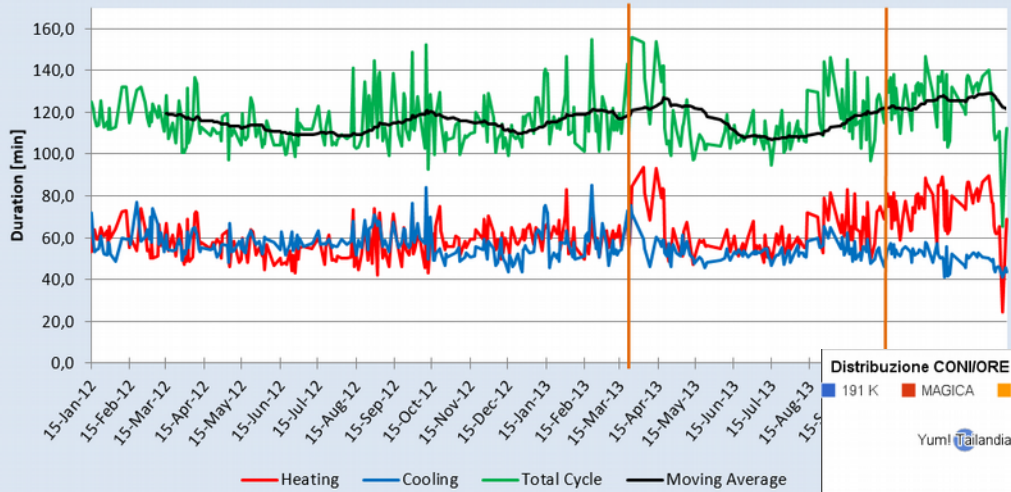
- Pasteurization cycles completion
- Alarms related to machine and product
- Days to machine wash
- Value of product consistency

▶ Production data:

- Number of cones produced or batch freezer cycles
- Working hours of beater motor and compressor

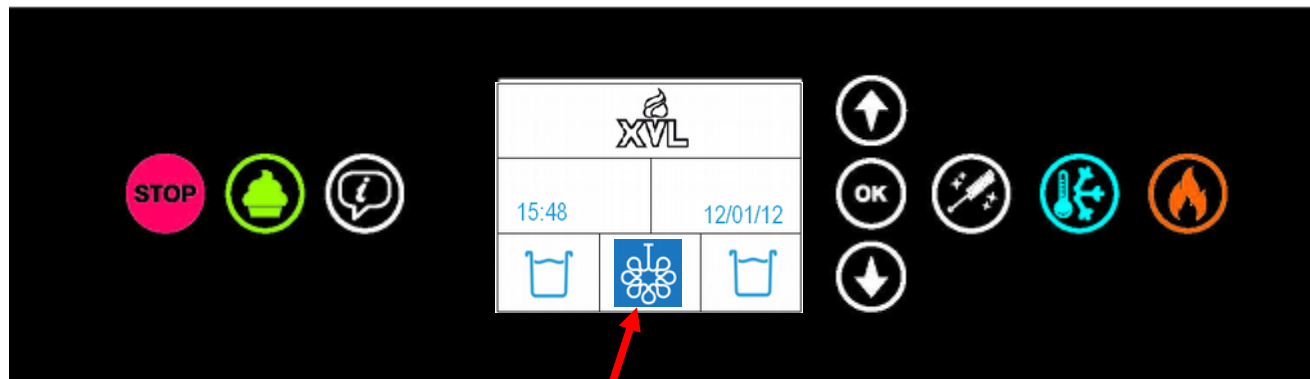


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The icon **Teorema** on machine's HMI let the customer ask for a service call without calling the technical service. When the customer press the icon, the machine automatically activates a service call by opening a new ticket on Carpigiani CRM.



Teorema Icon

Taking things one step further, Carpigiani see **Servitization** as the next logical progression in the evolution of Teorema.

The concept of servitization has been around since the late 1980s, but is currently experiencing a boost thanks to new capabilities such as networked, intelligent products. The basic idea of servitization is that manufacturers move from a model based on selling assets toward a model in which they offer a service that utilizes those assets.

Examples: HILTI “Fleet Management” and Rolls-Royce “Power by the Hour”.

- ▶ **Information and Communication Technologies (ICT).**
- ▶ **Industrial Internet of Things (IIoT).**
- ▶ **Customer Relationship Management (CRM).**
- ▶ **“No service, No sale” Approach.**
- ▶ **Skilled people within the Company to properly develop, sell and support service offerings.**

- ▶ **Well established examples of servitization exist.**
- ▶ **The product platform can be critically important.**
- ▶ **Information and Communication Technologies are key, but as a component in a tightly integrated system.**

THE WORLD OF CARPIGIANI SERVICE EXPLORE THE BENEFITS FOR YOUR BUSINESS

6 PARTS AND SERVICE

ORIGINAL PARTS AND THE VERY BEST SUPPORT FROM EXPERT ENGINEERS

8 EXTENDED WARRANTY

EXTEND YOUR WARRANTY, STAY WORRY-FREE

10 PREVENTIVE MAINTENANCE

TAKE CARE OF YOUR MACHINE, PROTECT YOUR BUSINESS



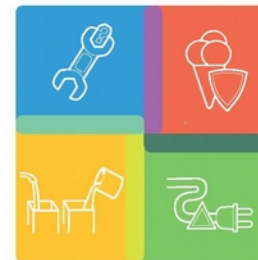
FOUR PACKAGES, TAILOR-MADE TO IMPROVE YOUR BUSINESS

14 CARE PLUS
Pre-empt and prevent downtime.

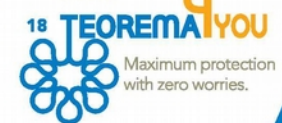
15 SAFETY PLUS
Relax in the knowledge your gelato is safely and hygienically prepared.

16 EFFICIENCY PLUS
Less waste, more profits.

17 ENERGY PLUS
Reduced consumption is better for you and the environment.



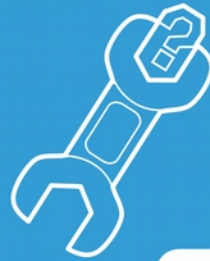
ONE COMPLETE PACKAGE CONTAINING ALL THESE BENEFITS WITH



Maximum protection with zero worries.

CARE PLUS

Prevents the risk of breakage or downtime



SAFETY PLUS

Guarantees a product is completely safe



EFFICIENCY PLUS

Intelligently manages refills and cleaning



ENERGY PLUS

Avoids energy wastage



Care Plus is an optimal maintenance program to prevent breakages and downtime.

Care Plus knows the workflow of the machine and anticipates servicing to lengthen its lifetime.

The system monitors the life of the machine based on actual use (not time) and schedules the substitution of critical parts only when necessary.



Safety Plus ensures constant attention to all aspects of food safety and hygiene. It controls each phase of the work cycle (i.e., pasteurization, production, conservation, cleaning) ensuring all standards for HACCP are met.

It also provides detailed reports that document the compliance and supplies all the information necessary to answer any enquiries during a health inspection.



Efficiency Plus helps to organize the operative management of the cleaning and refill cycles, based on the consumption and actual production volume, to avoid waste. The system identifies the operative workflow and cleaning days, indicates the correct amount of mix to add according to the wash cycle chosen, and so helps to save mix and avoid washing the machine due to incomplete pasteurization.



Energy Plus analyzes all the details of the production needs and can advise how to save energy. It will always recommend the most efficient use of the machine, based on the actual business needs. The system indicates if the machine is ready to produce or has to be switched to conservation according to the specific needs of the customers and communicates daily average consumption.

In this context, the term **Servitization** refers to the new business models enabled by **Teorema**. In fact, this approach produces new, invaluable knowledge that can support many phases of the machine management process and that can profoundly change the after-sales business model.

Traditionally, due to the worldwide distribution of their machines, Carpigiani outsources the after-sales maintenance of machines to specialized local companies. The introduction of the Teorema e-Maintenance allows Carpigiani to manage all these activities directly.

Discover more on
[carpigiani.com](https://www.carpigiani.com)