TekTherm

The Precision Oven

DISTFORM

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The Precision Oven

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Sous-vide cooking

Delicate control of temperature and time determine the quality of food preparation.

Sous-vide cooking differs from traditional cooking methods in two key aspects: first, the raw food is placed inside a heat-resistant bag with little or no air. The second key is to boil the food for a certain period of time at a temperature that is lower than normal, always constant and under control. The process is normally performed using technology capable of guaranteeing a high degree of cooking stability and homogeneity such as that provided by the immersion thermostat or the TekTherm precision oven.

Sous-vide cooking was first attempted in 1974, when Georges Pralus used it to prepare a duck liver terrine. However, this cooking method became more widely known thanks to the publication in 2003 of the book titled "La cocina al vacío" (Sous-vide cooking), written by Joan Roca and Salvador Brugués, complete with technical details and recipes.

Among the advantages of sous-vide cooking is the preservation of the organoleptic qualities of foods, since it impedes the evaporation of volatile substances and loss of internal juices. It also prevents oxidation of sensitive foods and reduces the proliferation of aerobic microorganisms.

Controlling the time and temperature is essential in obtaining the ideal cooking point for each type of food. It is vitally important to control these cooking parameters as precisely as possible. This is now possible thanks to the innovations found on the market that address this cooking precision.

Vegetables are usually boiled, which diminishes their colour and taste, or baked, which leaves them too dry. When using sous-vide cooking, we should remember that fibres hydrolyse at 85ºC and starch and cell walls soften at between 80ºC and 85ºC.

In meat and fish, the cooking conditions depend on the proteins. Fish proteins are bound together more loosely than meat proteins; cooking occurs from a temperature of 45ºC and thus the release of fluids contained in the muscle fibres, consisting mostly of myosin.

Collagen strength in meats requires higher cooking times and temperatures. In general, the recommended temperature is approximately 65ºC.

Modern day cooking and cooking in the future is unthinkable without taking into consideration sous-vide and precision cooking.

Planning Cooking

Ensuring safety and profitability

As occurs in all business, good planning and management will provide greater profitability. It will also guarantee the necessary food safety.

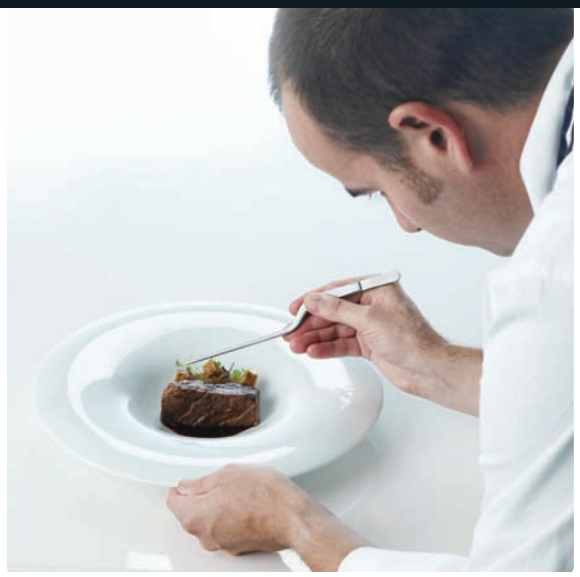
It is essential to work safely, as the products offered to the customer are vulnerable to bacterial contamination and can therefore intoxicate our guests. This is evidently not in our interest. Fortunately there are means and methods of organisation to prevent these risks, ensure that intoxication does not take place and provide the absolute safety required of our products.

In addition, organisation is vital to obtain the maximum profitability from our business. This is achieved by controlling production costs, purchases, personnel management and so on.

However, good planning does not ensure the quality of the finished product. We may be able to guarantee safety and profitability, but the other two fundamental ingredients are missing: the chef's technique and the technology to develop it.

The Technique

The Chef's knowledge is what is most important.



The chef's knowledge of cooking techniques is extremely important if we want to obtain superb results. The chef will decide what the dish is to be and the type of cooking required. In the end, it is the chef who must leave his mark and not a machine, thus obtaining dishes with a distinct personality. This makes the recipe unique, enriching the world's cooking tradition, with all its personal and cultural variants reflected in each creation.

It is the chef who develops the art of cooking day after day with his desire to surprise and to provide gastronomic experiences of all kinds. Cooking is an exercise in creativity, humility and service, resulting in a work of art to be admired and tasted. There is something unique in the creative act, in a work of art that:

1 **Covers the basic need of feeding ourselves**
2 **Helps us to take care of our health**
3 **Gives us a touch of pleasure every day of our lives**
4 **Allows us to share all this in the company of friends**

In sum, it is essential to provide our chefs with the best technological instruments so they can perform their creations with the highest level of excellence and precision. Is it as easy as providing the chef with a technological instrument that will do what is asked of it, with precision.

Technology

Without precision instruments, we cannot be ensure good results

Distform provides the instruments necessary to develop cooking techniques at the highest level.

The new technology offered by **Distform** is the result of the work of a multidisciplinary team consisting of engineers and chefs from a multitude of business models. This has led to the development of advanced technological solutions for cooking processes in kitchens.

Distform is the first company to introduce the PRECISION concept in kitchens, both in processes and cooking parameters, that guarantee excellent end results.

This reaffirms our commitment to develop instruments at the service of chef techniques, technology that constantly improves the chef's control over processes to ensure homogeneous, rapid and high quality production.

PLANNING
COOKING
+
CHEF'S
TECHNIQUE
+
PRECISION
TECHNOLOGY

FOOD SAFETY

ORGANOLEPTIC QUALITY

Heat

Heat is the transfer of energy between different bodies.

What is heat?

Heat is the transfer of energy between different bodies, or different areas of the same body that are at different temperatures. This flow occurs until the two points or areas at different temperatures are equalled; in other words, until they reach a state of equilibrium.

Not all food is heated in the same way, or at the same speed; this depends on several factors, such as the shape, thickness, composition, etc. Therefore, each food presents more or less resistance to a change in temperature when heat is applied to it; this is known as calorific capacity.

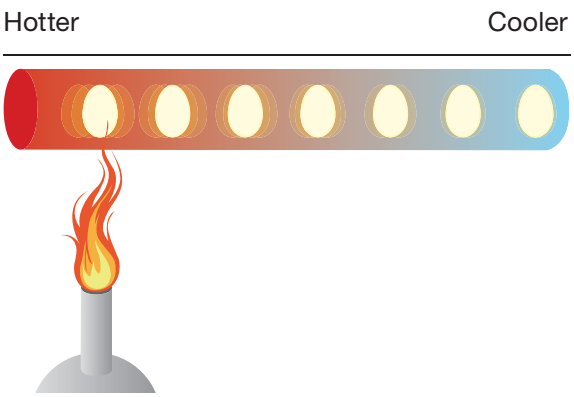
Heat transmission

Heat can be transmitted in three different ways: By **conduction**, by **convection** or by **radiation**

Thermal conductivity:
the transmission of heat caused by thermal contact between two or more bodies. It is the transmission of heat between bodies at different temperatures that, as mentioned above, tend to reach a state of equilibrium. This type of transmission occurs in solid elements.

Thermal convection:
This only occurs in fluids (liquids or gases) and involves the movement of these fluids. The transportation of heat is inseparable from the movement of the medium itself. The transfer or flow of energy takes place until all the fluid becomes thermally homogeneous, equalling the two extremes and reaching a state of equilibrium. This is the type of transmission that occurs inside an oven.

Thermal radiation:
This is the transmission of heat that occurs due to electromagnetic waves. It is the only case in which heat is transmitted into space.



The importance of precision in cooking temperatures

How different temperatures affect the same food.

Precision is extremely important in cooking.
The effect of not having technology available to perfectly control temperatures can make the difference between offering a great product or a mediocre product.

We are going to see examples of the importance and effect of different cooking temperatures in several foods:

Eggs at low temperature

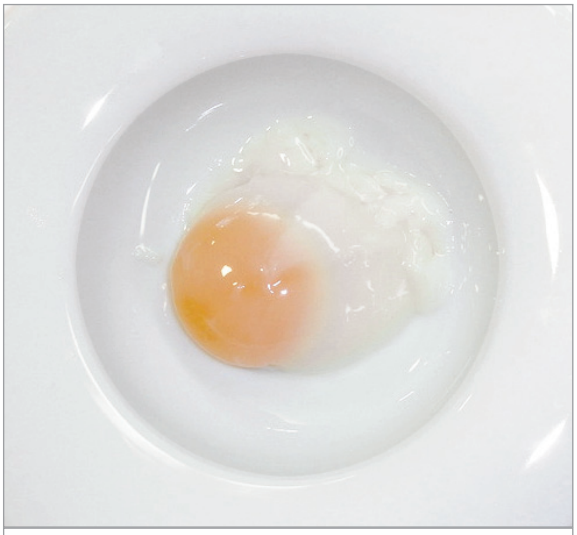
In the case of eggs cooked at low temperatures, note that only one degree of difference in temperature results in completely different textures. This means that we need high precision cooking technology to be able to cook these eggs if we want a complete oven load of eggs to turn out the same and to be able to repeat the operation over and over again. The chef knows exactly how long he wants to cook the eggs and at what temperature because this is where the added value lies. But, what will he use to do the actual cooking? What instruments does he have?

Fish

Exactly the same thing occurs with fish. In addition, fish is very sensitive to different temperatures, which affect juiciness and texture as well as loss of volume. When we speak of loss of volume, we are speaking of costs, a fundamental parameter for any business that wants to be competitive.

Meat

When we ask our customer how he wants his meat cooked, can we ensure that it will be cooked with precision or just the way he wants it? Meat is also sensitive to temperature variations, with different results every 5ºC. We will therefore need technology that is capable of accurately controlling cooking points, so we can offer our customers meat that is always cooked just the way they want.



Effects of temperature on food

cocina advance

Lorena Jericó
Technical manager

When food is subjected to a heat source, the structure of the food undergoes changes, therefore modifying its colour, taste and texture. The organoleptic result will vary depending on the temperature and the medium used to cook each kind of food. The juiciness and taste of dark fish cooked at 45ºC will be much more notable than if it is cooked at 50ºC .

Temperature control plays a very important role in all kitchens. All cooking techniques require knowledge of the temperature applied to the food in order to determine the speed at which the food is being cooked; and to calculate the moment to stop the process in order to obtain the most appropriate cooking point.

There are two components in living things that significantly influence structure changes when they are cooked. These are collagen and enzymes.

Enzymes, taste enhancers

Enzymes are a type of protein that accelerate chemical reactions in all living things. All food contains enzymes that continue acting after slaughter or harvesting, therefore altering its properties. An increase in temperature accelerates the speed of enzyme action. However, when a certain temperature is reached, the enzymes cease to act. This temperature is approximately 65º for meat and 55º for fish.
Cooking meat and fish for an extended period of time at temperatures that favour enzyme activity achieves better organoleptic results:

- Taste enhancement: extracting particles that contribute aroma and taste.
- They improve texture: weakening muscle fibres and collagen.

This is one of the main reasons why temperature control is essential in the low temperature cooking process: a change of only a few degrees is enough to block enzyme action. Enzyme action should be allowed to continue by cooking at low temperatures, in order to extract the best qualities from each type of food.

Collagen, the ally in meat and fish

Collagen is a protein present in animal muscles, tendons, spines, bones and skin. When a piece of meat or fish rich in collagen is cooked, the

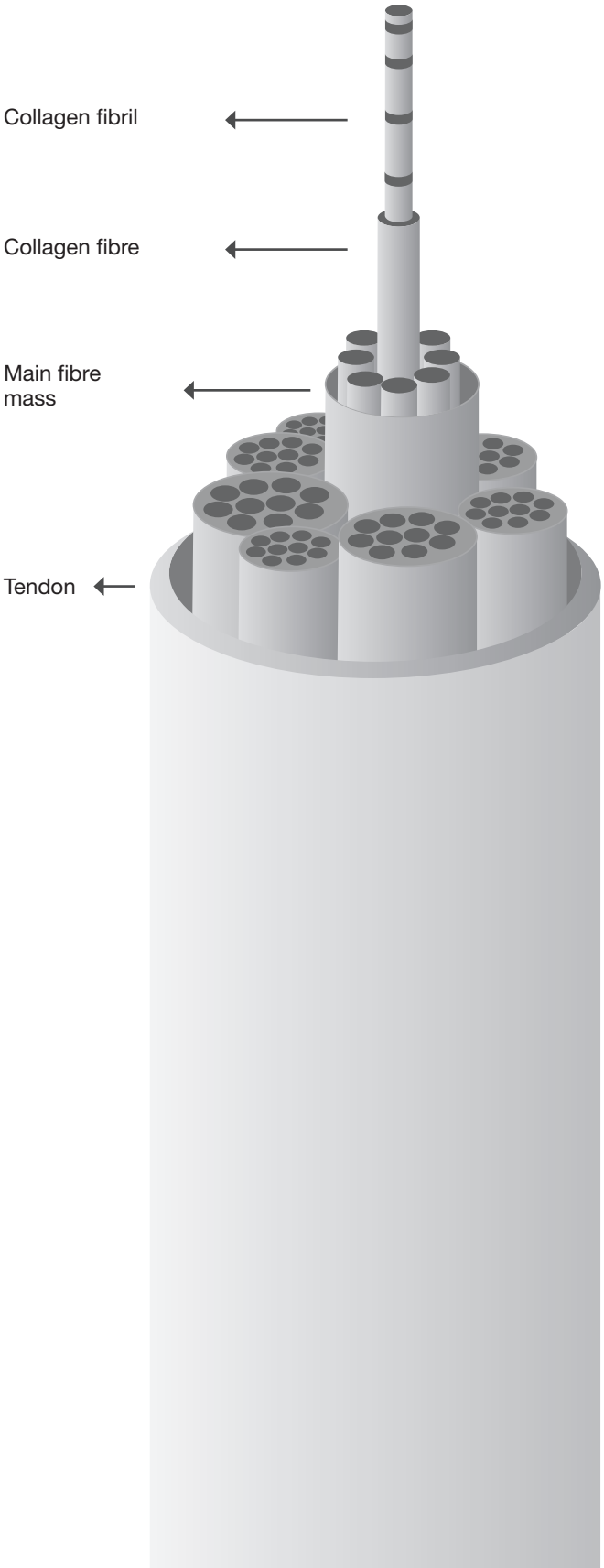
collagen turns into gelatin at between 50 and 70ºC. However, if the temperature is too high, the thermal shock causes the muscle fibres to contract resulting in loss of humidity. Meat and fish rich in collagen should be cooked slowly in order to transform the collagen into gelatin and to prevent the fibre from releasing water.

Low temperature cooking weakens collagen starting by the action of enzymes and heat. The result is food that is juicier, with better texture and greater savouriness. Even parts that are hard to chew turn into food apt for children and the elderly.

Conclusions

For these processes to be efficient and repeatable, it is essential for the food to receive heat in a constant, homogeneous manner. At such low temperatures, heat transmission should be carried out through a wet medium, such as cooking with water vapour or immersion in water itself. This prevents dehydration and ensures that the heat reaches the food homogeneously.

Moreover, the temperature must be constant, since variations of even a few degrees are enough to impede enzyme action before expected and contract collagen before it has been sufficiently weakened. Cooking requires precision, homogeneity and knowledge of the raw materials being used.



Precision Technologies TekTherm

The precision of an immersion thermostat combined with the productivity and convenience of an oven.

TekTherm

is the technological solution provided by **Distform** for precision cooking

TekTherm is the result of years of investigation and work in conjunction with famous cooks, such as Joan Roca in the gastronomic field, and Jorge de Andrés in banquets, groups or organised restaurant activities.

This is the most precise technology available on the market, designed on the basis of the scientific premises mentioned above and intended to obtain excellent results. This is a High Precision Oven for low temperature cooking, although it is capable of working at up to 180º.

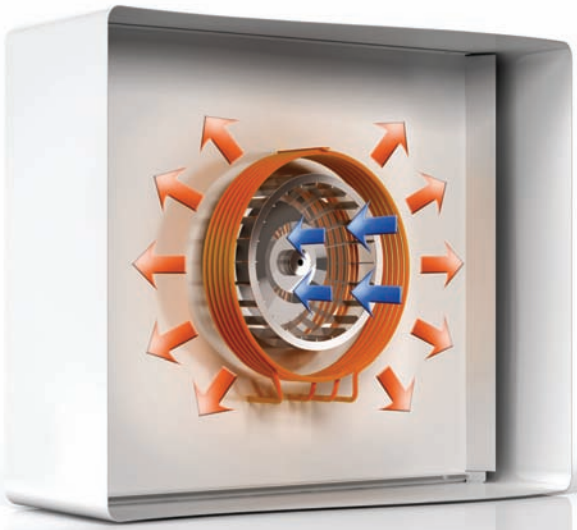
Many cooks consider it the successor of the immersion thermostat, because of its greater precision, cooking homogeneity, comfort, versatility and reliability. The TekTherm is not a delicate laboratory instrument, but a technological machine designed for use in professional kitchens.

How is an oven chamber heated?

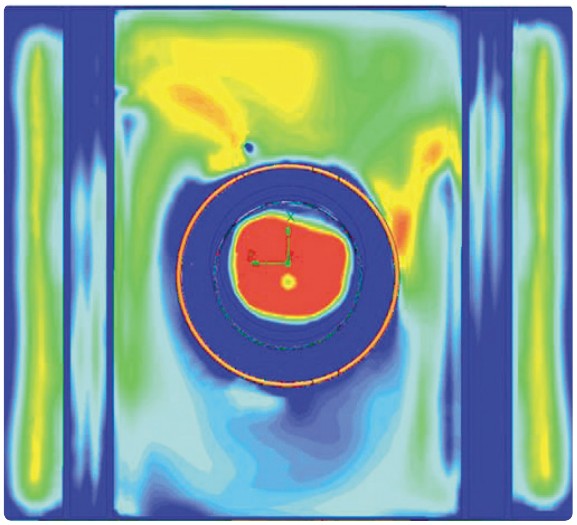
An oven chamber is heated by resistors through which a large amount of air is made to flow by means of a fan. But how is the temperature needed by the chef controlled inside the chamber?

In traditional ovens, the temperature is regulated by a mechanical component known as a contactor, which allows the current to pass to the resistor and heat it, thus heating the oven chamber at the same time. This contactor lets current pass through, depending on the temperature read by a probe inside the chamber. This traditional system is subject to significant temperature swings within the chamber. In other words, the temperature is not constant, but rather to the contrary; there are swings of up to 7 degrees over the desired temperature. Therefore, this does not provide us with a precise instrument and will not achieve excellent results or precision cooking.

TekTherm uses TSC precision technology (Patented by Distform) to provide the necessary energy each second so the oven does not undergo temperature swings and remains precise at exactly the right temperature with minimum oscillations (+ -0.2ºC). This precision and thermal stability in the chamber is essential to obtain uniform cooking results with the exact degree of juiciness and texture that we want. If the oven chamber is not capable of maintaining a stable temperature, it is impossible to obtain the desired results, insofar as excellence, repeatability and homogeneity are concerned. With TekTherm, however, this is possible.



The oven chamber heating system.



Thermodynamic study by finite elements

How TekTherm controls temperature.

This patent is the result of the work and investigation of the R+D+I team at Distform and professional chefs.

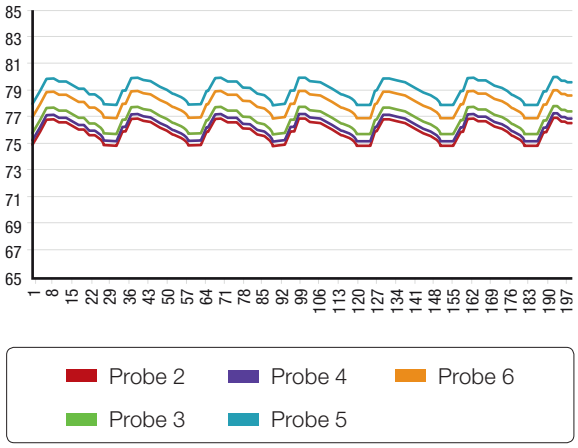
Technology TSC

THERMAL STABILITY CONTROL

The technology, patented by Distform, that provides precision for cooking

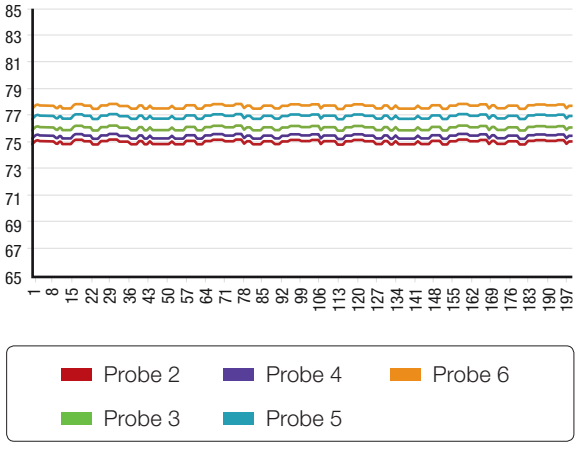
After rigorous investigations, Distform has been able to develop a unique market solution that provides oven chamber stability. This solution improves on laboratory precision devices such as the immersion thermostat.

Therefore, we now have a patent that provides chefs with cooking control like never before.



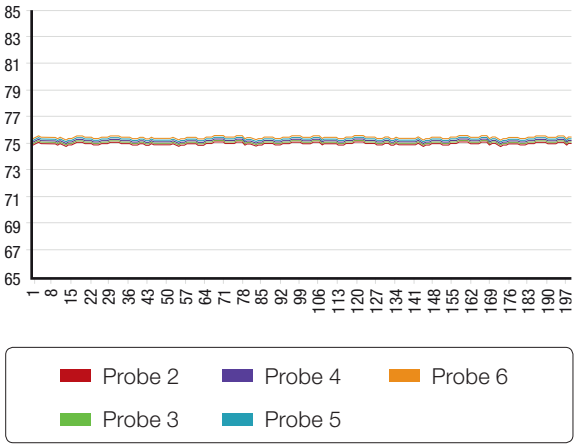
Operation graph of a traditional combi oven

Note the temperature swings in the chamber. How can we guarantee perfect cooking results with this array of temperature swings?



Operation graph of an immersion thermostat

The immersion thermostat is more precise, but it loses homogeneity when working with loads or with a water containers larger than one Gastronorm 1/1.



Graph of TSC

THERMAL STABILITY CONTROL

The technological solution patented by Distform TSC Thermal Stability Control provides high temperature stability in the cooking chamber, with minimal temperature swings and excellent homogeneity throughout the chamber.

Multidisciplinary team consisting of technicians and chefs

6GN Oven

	Temperature	100% Humidity		0% Humidity	
		Stability	Homogeneity	Stability	Homogeneity
Low temperatures	30°C	+ - 0.2°	0.8°	+ - 0.2°	0.8°
	60°C	+ - 0.2°	0.6°	+ - 0.2°	0.6°
	90°C	+ - 0.2°	0.7°	+ - 0.2°	1.4°

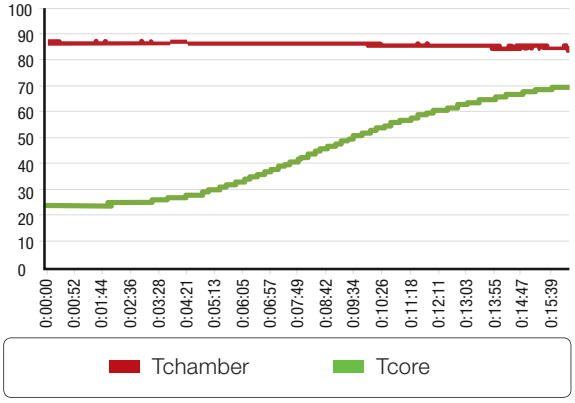
Test performed in the TekTherm 6GN loaded with 6 GN 1/1 trays 65 mm deep.

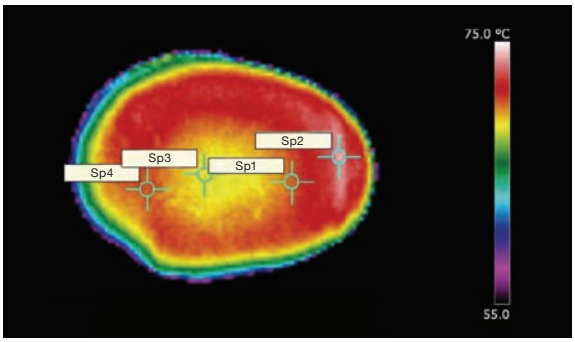
Predictive cooking

TekTherm calculates the thermal inertia of foods.

All foods have an ideal cooking temperature, at which the organoleptic properties and texture of the food are optimised. If this ideal cooking point is exceeded, food quality diminishes (destruction of enzymes, loss of organoleptic properties).

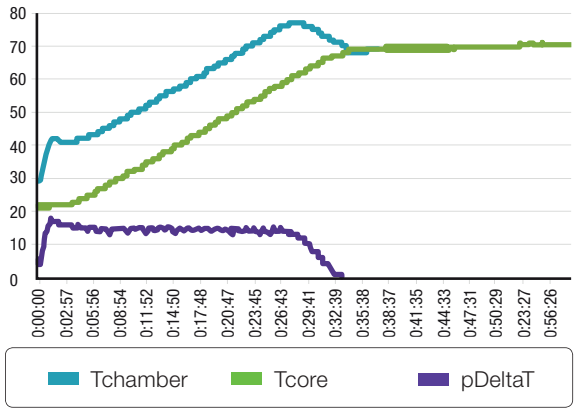
In **traditional cooking**, the food, which is generally refrigerated or tempered, is placed in the cooking chamber at a high temperature. Due to convection, food temperature is gradually increased until the desired cooking point is reached, controlled by a temperature probe inserted in the food. The large difference in temperature between the chamber and the food causes intense degradation of the outer layer and subsequent loss of properties. In addition, due to the thermal inertia of the system, once the cooking process has ended, food temperature continues to rise and exceeds the ideal cooking point.
The figure below shows a thermographic image of food cooked with this method.

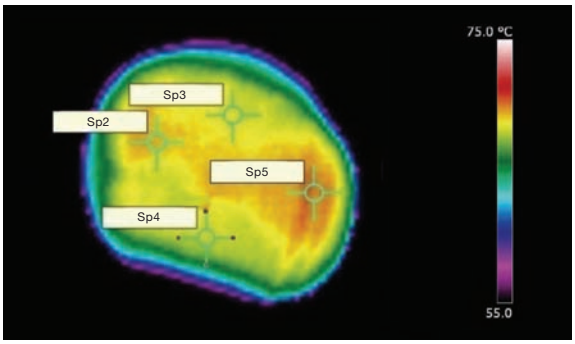




A difference of up to 8ºC between the outer layer and the core of the food can be seen

Predictive cooking provides a solution to this problem. In this cooking method, the oven adapts the chamber temperature to the food temperature by means of a probe, taking into account the desired cooking temperature. When the cooking process ends, the chamber and core temperatures are identical and the cooking point remains the same until the chef decides on the next step.
By combining **predictive cooking** with cooking algorithms such as DeltaT and TSC temperature control TSC, the cooking point of each type of food is placed under maximum control: a minimal thermal gradient in the food and precise cooking. This results in a degree of homogeneity for each food type that was previously unthinkable. The thermographic image shows the excellent degree of homogeneity throughout the food section.





A difference of only 1ºC between the outer layer and the core of the food can be seen

Cooking at low temperatures

Temperature affects food at many levels

Initially, products were subjected to high temperatures simply to make them edible. Now, however, the ideal is excellence in the product and final result. The objective is to achieve the best organoleptic properties of the food as possible.

As explained above, temperature affects food in many ways. Therefore, temperature control is vitally important for good results. Cooking at low temperatures, primarily between 50º and 85º degrees, preserves the quality of foods. When it is combined with long cooking periods, incredible results are achieved, such as unmatched textures.

This cooking method requires maintaining the temperature constant throughout the process, which is key, and one of the elements provided by TekTherm. A technology designed for kitchens that combines the precision of an immersion thermostat with the advantages of an oven.

Range TekTherm

The top range of high precision instruments on the market for excellent quality cooking results.

TekTherm T06

Capacity: 6 GN 1/1
Distance between supports: 70 mm
Frequency: 50 Hz / 60 Hz
Power: 7.5 KW
Thermal precision: TSC

TekTherm T10

Capacity: 10 GN 1/1
Distance between supports: 70 mm
Frequency: 50 Hz / 60 Hz
Power: 7.5 KW
Thermal precision: TSC

TekTherm T20

Capacity: 20 GN 1/1
Distance between supports: 65 mm
Frequency: 50 Hz / 60 Hz
Power: 15 KW
Thermal precision: TSC

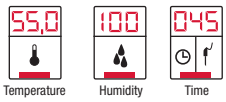
Recipes

Fragrance oil Cinnamon or orange

Ingredients

100 g Sunflower oil
1 Orange peel
1 Cinnamon stick

Cooking parameters



Preparation

Peel the orange and remove all the white from the peel. Package with the oil and cook at 55° C for 45 minutes.

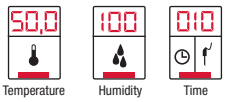
Remove the cinnamon and grind in blender until the orange is finely ground.

Codfish at low temperature with vegetable ragout

Ingredients

500 g Desalted codfish
Garlic oil
Vegetable ragout:
1 Onion
1 Red pepper
1 Eggplant
2 Tomatoes
1 Garlic clove
Olive oil
Salt

Cooking parameters



Preparation

Divide the codfish in portions of 100 grams and package with garlic oil. Cook at 50° C for 10 minutes.

Cut all the vegetables into cubes and simmer, add salt as needed.

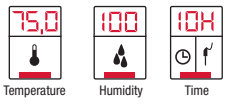
Mix the codfish with the vegetable ragout.

Pork jowl with octopus

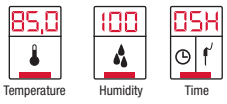
Ingredients

Pork jowl:
1 Pork jowl
Salt and pepper
Sweet pepper
Octopus:
1 Octopus 4-5 Kg.
1 Kg. Cooking salt
½ Kg. Sugar
¼ Kg. Paprika
Oil

Pork jowl cooking parameters



Octopus cooking parameters



Preparation

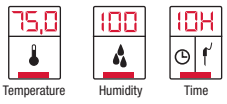
Pork jowl:
Add salt and pepper to the jowl and vacuum package. Cook at 75º C for 10 hours. Cool quickly afterwards. Slice the jowl and brown on a grill until crunchy.
Octopus:
Clean the octopus. Place in mixture of sugar, salt and pepper for 20 minutes. Wash. Blanch in boiling water and cool with water and ice. Place in vacuum bag with a little oil. Cook at 85º C for 5 hours. Cool quickly afterwards. Cut the octopus into portions and package for later regeneration.
Finish:
Regenerate the octopus at 80º C for 10 minutes. Place the crunchy jowl over the octopus and dress with a little olive oil and paprika.

Spring shoulder of lamb with nuts

Ingredients

1200 g. spring lamb
Garlic
Rosemary
Salt and pepper
Smoked eggplant puree
Dark lamb broth

Cooking parameters



Preparation

Cut the lamb into portions, add salt and pepper and brown slightly greased in oven. Vacuum package with two garlic cloves and a branch of rosemary. Cook the lamb at 75º C for 10 hours. After this time, bone the lamb and fill with mixture of nuts. Use plastic film to make cylinders and reserve in refrigerator.
Cut the lamb into portions and package individually for regeneration at 70º C for 15 minutes.
Finish:
Once the lamb is regenerated, brown on a grill and serve the smoked eggplant puree and some of the lamb sauce.

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