Reverse Engineering
of an Ice Cream

how to design or replicate an ice cream

diego celotto

INTRODUCTION

Are you a Company operating in the Ice Cream Sector that wants to obtain a better performance of its Products?
Do you want to design a perfectly structured Ice Cream from scratch or, for example, "replicate" that industrial Ice Cream that the public likes so much?
So, read this short article, connect to the website www.articagel.it, go to the GELATO CREATOR page and, finally, draw your own conclusions.

Enjoy the reading!

Diego Celotto

WHAT IS THE REVERSE ENGINEERING?

In recent years, more and more frequently, new technologies have appeared on the market, not immediately identifiable by the general public, which have had a significant impact on the development of new products.

This is the case, for example, of the *reverse engineering*.

The *reverse engineering* is part of this family of innovative methodologies which, starting from the original model of a product, allow, through analytical and digital acquisition phases, to trace its mathematical description, drastically reducing the time taken for its realization.

In order to compete on the global market, the new products, characterized by an ever shorter life cycle, must be characterized by a high "added value".

And the main elements of differentiation of a product, with the same raw materials, are the speed of evolution of the project and the quality control of the different production phases.

The *reverse engineering*, therefore, allows manufacturers to analyze the design of a part (or in whole) of the object under analysis, in order to replicate it or make changes or improvements.

The *reverse engineering* is also called *back engineering*, or "reverse design" as the RE teams work "in reverse" with respect to the original design process, starting from the final result and then tracing back to the mathematical description of the product, thereby reducing way the time taken for its realization and completely avoiding the R&D processes.

THE BIRTH

The term *reverse engineering* originated in computer science, invented in 1953 in a short story by Arthur C. Clarck (from which the film "Paycheck", with Ben Affleck), when companies no longer had to fear the simple "pirates of the copy", who illegally duplicated their software, but a much more insidious enemy, the" reverse engineer ", a "specialist" able to manipulate, analyze and reproduce a software (in some cases, with results superior to the original), using basic tools such as: debuggers, disassemblers and decompilers, and other complementary modules, decrypters, unpackers and hexadecimal editors, to bypass some protection systems included in the executable code, access restrictions, and customization of "embedded" systems.

THE ADVANTAGES OFFERED BY THE REVERSE ENGINEERING

The *reverse engineering* offers several elements of great importance for the manufacturers.

For example, it allows you to reduce the business costs by identifying and correcting obsolete products for the presence of weaknesses.

Accelerate the product innovation by analyzing existing designs to increase his performance, update the features or reduce the production costs.

Frequently, the *reverse engineering* is used to avoid infringing the copyrights on a product or to try to circumvent a patent.

In addition to this, in order to optimize the production and obtain competitive advantages, the Companies focus on the *reverse engineering* rather than promoting the "research" in the scientific sector.

THE PRINCIPLES

Without dwelling on the multiple uses in the various industrial sectors, let's examine the main characteristics that the *reverse engineering* must possess.
The first specific quality is the Universality.
This particular technology must be "applicable" to any type of product belonging to a specific class (electronics, mechanics, ...), without being affected by the external environment.
It must then be Accessible, meaning by this term not only the "difficulty of use" but also the costs of its operation: a *reverse engineering* whose passive costs exceed the real resulting benefit is of no use.
And finally, the most important attribute: the Reproducibility.
The application of the *reverse engineering* to the achievement of a predetermined objective must not be "conditioned" by the human factor and the materials used.
Only the simultaneous presence of these prerogatives can allow a product to acquire "added value", with a reduction in the production times and a reduction in the costs, favoring its position on the Market over its "competitors".

THE REVERSE ENGINEERING FOR THE ICE CREAM

"*If it is true that the Coca-Cola formula is secret, it is also true that no Company has ever been forbidden to make the reverse engineering of a food product to the point of producing competitive or even better ones*".
The case of Pepsi-Cola is a significant example.

In the Ice Cream Sector, the boundary between the *reverse engineering* of an existing product and the design of a new Ice Cream is very thin, and the processes are almost overlapping.
Excluding the design of a product based on food characteristics, the so-called "balancing", since there is no scientific correlation between the structure and nutritional values of Sugars, Fats and Proteins of an Ice Cream, the identification of the formulation of an Ice Cream, with certain characteristics structural (consistency and creaminess) and sensorial, it must, on the other hand, proceed through a holistic vision of the "ingredients system".

For this purpose, the innovative **Gelato Creator Software** (http://www.articagel.it) has been created which, having identified the Ice Cream to "replicate", meets certain Ice and Creaminess requirements, and in relation to the measured Temperature and Overrun, combines a first phase of "project", in which the quantities of each ingredient chosen are automatically determined, with a final phase of "analysis", for the improvement of the structural and sensorial results, with the obtaining of an Ice Cream exactly conforming to that looked for.