

Summary of history and rapid description of my inventions.

If I have to summarize the history of my inventions, I will say first of all that they are essentially oriented towards dentistry and that for the most part they have been the subject of patent filings, lectures or publications all over the world and industrial production.

I have often been asked why I have used patents (and not publication's) to protect my inventions. I did both. There are 3 reasons for patent's, the first is that the patent has the advantage of assuring you (with a few errors) as imposed on you by the patent rule, that you are proposing something that will be useful to your colleagues (dentists in my case), the second is that, Since I am neither wealthy nor academic, to find the funds necessary to make my prototypes, I needed a minimum of protection to reassure investors. Finally te last one, more than an international publication, patent examiners are relentless censors who allow you to be pretty sure that what you are proposing is an entirely new process or product.

My first real invention is **dental CadCam, the first artificial intelligence process (IA)** applied to our profession and probably to medicine in general. Respecting the principles of our master **Alan Turing**, I imagine, described and published between 1970 and 1973 then demonstrated in 1983 a process combining an optical impression associated with a computer (and its software and its memories) and a numerically controlled machine tools is able to carry out alone, without human intervention, a diagnosis or a prosthesis having as information only the form (of the tooth preparation) of the patient.



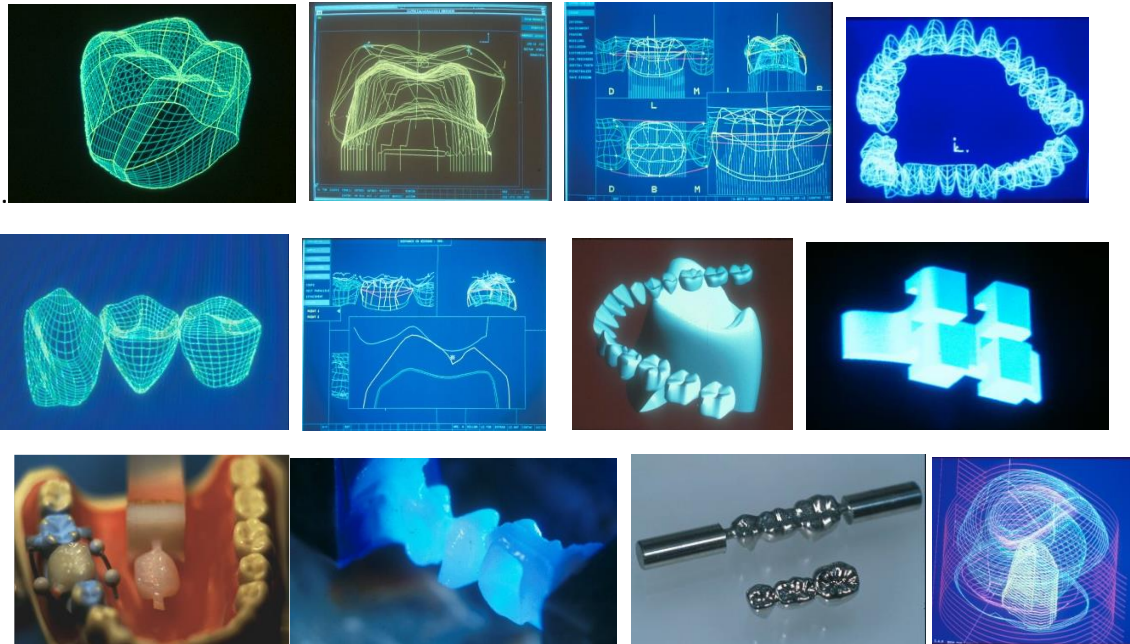
If the complete process is described in my 1973 thesis, (including the principle of the cloud and the internet that did not really exist), I did not patent it until May 1980, because I did not know at 22 years old the importance of patents.

This invention led to the public presentation of a first model of feasibility in 1983 and then the production in 1985 (still live and in public) from the world's first crown by CadCam applying the principles developed between 1970 and 1973. It will result in the first, only and true dental CFAO system marketed between 1986 and 1992, the « Duret Système » of Henson International system



The result of this patent filed on 9 May 1980 (patents # 20 & #23) will follow three very important patents (patents # 30, #31 and #36) filed in April and November 1982 which describe the entire procedure for operating a dental CAD system for the prosthesis fixe and removal, ODF, surgery.... These

three 1982 patents are considered, by those who take the time to read them, as the basis of all the dental Cad Cam processes and software used today that it is to the new of the optical impression, CAD software, machining or **preforms of materials**.



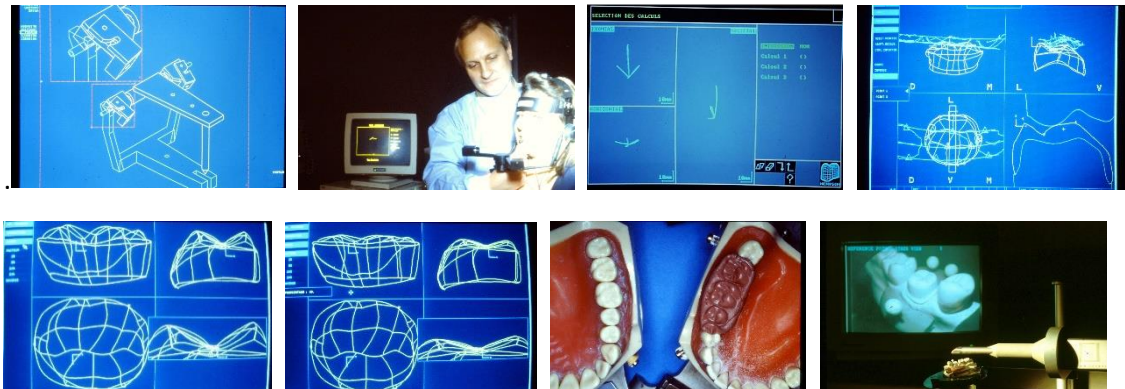
Beyond the variants in optical Print techniques that we find in my patents from 1984 to 1987 (patents #49 and #67, #85) you will find especially in patent #98 the description of the system presented for the first time in 1984 with its method called phase profilometric in **conical projection and multiview** which will be used by all IOS systems until the appearance of confocal systems in 2007.

It will then be **2010 before I introduce the first IOS (intra Oral Scanner) without structured light in the world after having introduced in 1983 the first IOS with structured light in the world** (thesis of 1973 then patents of 2010, 2011 and 2012). This IOS is still in operation and is represented by the Condor camera (patents #288, #298 and #299). It will soon allow **the introduction of the introduction of the world's first optical impression Tray (IOT) carrier** thanks to Invisart (2018 patent) and the use of **Augmented Reality (AR)** to transform the HMI of current dental CadCam devices by making them fully transparent to the clinician (2014 #331 and 2015 #340 pates).

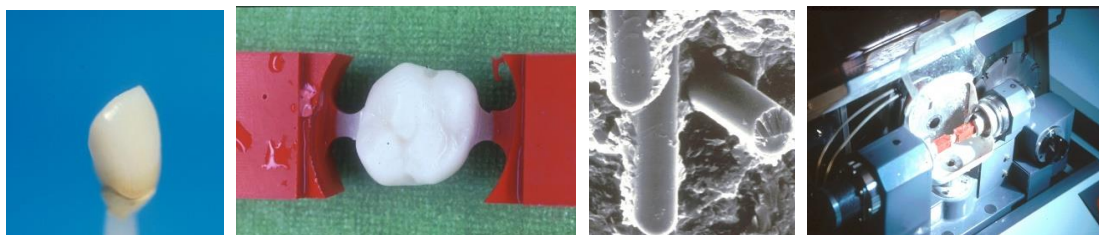


But let's go back to 1982. It goes without saying that after solving the problem of static occlusion (patents #30, #31 and #36) we would move towards the dynamic occlusion and the **first digital articulator** (1984) then **the first facial arc connected with the CadCam software** called Access Articulator (patent #119 to be attached to the Soleau letter of 1988 #400). The view correlation systems (patent #121) would also allow us **to link the views together, but also to assemble them in**

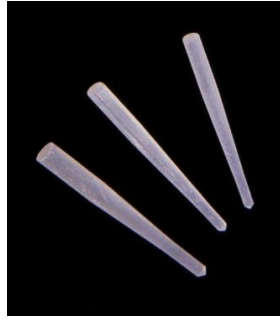
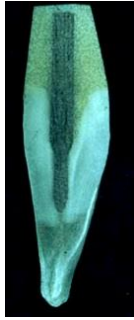
static occlusion at the time of the mouth impression. (Technique taken up by cerec 2, 10 years later to realize its first occlusal surfaces!). This patent was finally to be completed by an **extension used today by implantology** systems (who forget to mention me) in order to follow implant placement (patent #156 of 1992)



That says CadCam says Materials. After having described the preforms in my patent of April 1982 (#35) and addressed the circular preforms used today with or without colored areas (patent #56 of 1984) we directed our **work towards Zirconia with the company Desmaquet in 1984** (first time in dentistry) and then put on the market the first **heterogeneous composite 3D oriented and structured** under the name of Aristée in 1987 (patented by contract with the company Spad). This led us to define a range of **specific and interchangeable tools** in 1988 (Brevet # 126) and a **revolutionary coloring system** (patent #137) using the same machine tools and the same support. This was the logical continuation of our 1988 patents (#402 and #403) on **dental spectrometry** (shade Scan of my friend JM Decaudin of the Compagny Bertin) whose principle is still copied today, until in the IHM made at the time.



It was by developing this revolutionary material that we came up with the idea of no longer putting the fibres in the 3 directions of space that we had developed in Aristée (as are the collagen or elastin fibres in dentine and enamel), but to put these fibers of carbon then fibers of glass in parallel to build posts with behavior close to the root (patent #139 to #141) that is **how were born the first physiological fiber posts** in the world under the name of Composipost. They are always very successful.



This continued success is also reflected in my invention of **fast polymerization introduced in 1997**. When I launch my first **Plasma lamp (Apollo)** I want to break dentists' habit (like me !!) of waiting almost 2 minutes to polymerize a composite with halogen lamps (patents #184 and #186). It was a general lifting of the shield of all material manufacturing companies and Academic University. I dared to propose a device capable of passing the polymerization in the mouth from 2 minutes to 6 seconds in the interest of the dentist and the patient! With the introduction **1 year later of my first LED lamp** (patents #191, #193, #206, #207), and especially of the second, the MiniLed, in 2002 (patent #217) which still sells today twenty years later, the success was immediate and the rapid polymerization became inevitable.

Who would still use a halogen lamp and stay in the mouth for 2 minutes to polymerize their composites, especially if the **exposure time is automatically** calculated to ensure good polymerization (patent #256) ?



It was with the development of heat in the curing lamps that I came up with the idea of proposing a new method of bleaching teeth in 2000. Since it is possible to move the Fluorine in children's teeth by electrophoresis and the hydrogen peroxide molecule has a smaller steric volume, I invented (patent #223, #238 and #239) **the only process today that allows an active penetration of the Hydrogen ion into the tooth to whiten it, but also the only one that allows, by inversion of polarity, to remove the ions H+OH- that have not reacted** considered as very harmful to the tooth pulp.



Of course, like any inventor, I was interested in other applications such as adapting my optical impression to make **individual hearing aids** and adapted to the ear ducts of each patient (patents #202 and #203) but also :

- a process of **sealing prostheses** allowing them to be removed easily, resulting from the impression of hurting my patients in my office (patent #57),
- a **process of recovering waste directly** from my studies of Henson's machine tools (patent #174),
- a **method of anesthesia** (patent # 203) by Pelletier effect
- or even a method of **bacterial sampling by zone** more due to my memory of working at the research center of the armies (CRSSA see publication's) between 1975 and 1980 with (brilliant and friendly) Olivier Colonel Chreach than my work at USC. (patent #159).

Finally there is a patent to which I am very attached and which may seem strange in all these inventions, it is the patent RX (patent #50 of 1983). **It may also seem pretentious for me to place myself among the inventors of radiovisiography (or RVG)**. Yet it seems to me that I can claim it, because by wanting to create a dynamic movement with radiography (to follow the acts of endodontics or surgery) while limiting the doses of X-ray for the patient, I imagined the use of my Cad Cam CCD, optical fibers and the scintillator in the mouth. I did this in mai 1983 by associating, in a new process, the precision of the RX with dynamic ultrasonic monitoring. I describe 2 months before the founder of this technology, Trophy, the RVG in drawing no. 10 of this 50 patent. I did the first présentation in congress in april 1984 (IRIES). I encourage you to discover these documents I am unveiling today (patent documents #50b).

As you can see, my work was copied, used and even patented a second time 20 or 30 years later. Some even tried to stop me from using my inventions on the pretext that he had patented them (like some recent case of holding in CadCam forgetting that their study on prior art was false and that my patent and my writings pre-dated all their work!).

Not liking conflict, like many inventors of the heart, I let it happen and that is why I did not reveal, for example, the story of the RGG. At the time I committed myself morally not to embarrass the one who is considered as its inventor. I do not regret this, because Francis Mouyens is a colleague of a very high moral quality who has always paid tribute to my work on the CadCam.

On the next page you will find all my patents. I will let you browse or search for them since I have attached the deposit numbers, the countries and the "filed date".

Sincerely.