Medical

Professor Alain Carpentier **Artificial heart**: early stages performed at Cetim

One day, Professor Alain Carpentier decided to take on a challenge: replacing a defective human heart with a mechanism able to beat inside a patient's rib cage for years at the necessary rhythm to meet the patient's body requirements.



test bench before undergoing animal testing.

on a specially designed

Towards human implantation

In 1993, the project entered a new phase with the arrival of an industrial partner, Matra-Défense, which miniaturised the prosthesis and performed the integration of the electronics. This led to the creation of the Carmat company, which initiated the first human experimentation phase in December 2013. Today, Cetim continues to work in the field of medical

devices, especially joint implants and, more recently, on the design of a painless mammography unit.

OUR CLIENT

Professor Alain Carpentier, a French surgeon and cardiologist who works in the cardiovascular surgery and organ transplantation department of the Georges-Pompidou European Hospital in Paris, France.

"Today, we can no longer conceive of technological advances without having a sacred alliance between science and medicine".

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uring the 1980s, Professor Carpentier, known for his innovations in heart valve repair, dreamt of creating a prosthesis that could be entirely placed inside the rib cage, would respect the human physiology and would be able to function unfailingly for several years. When he requested assistance from Cetim in 1985, his project seemed utopian. The necessary motor or smart control technologies were still in their early stages. However, Cetim decided to take up the challenge with support from Anvar (the French agency for innovation and research).

A functional prototype

It took one year to make a physical mock-up whose purpose was to validate fundamental choices: a membrane system, enclosed within a titanium shell, operated by pumps powered by rotation reversing motors.

Three more years were necessary for the implementation of several functional prototypes. Then, Cetim developed the electronic control of the actuators and implemented medical regulation of the cardiac output.

The next step consisted in testing the prosthesis





Cetim has natural abilities which allow it to steer multidisciplinary



internal and external specialists with a

view to designing complex technological solutions.

