A COMPLETE INDUSTRIAL PROCESS TO RECYCLE CCA-TREATED WOOD

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ABSTRACT

Concerned by the evolution of the EU regulations on wood waste, Xavier Beaumartin, President and General Manager of Beaumartin SA, a Family Group, leader of the wood impregnation industry in France, decided in 1992 to equip its 10 running plants with: "treated wood waste recycling systems". That decision was in direct line with the historical tradition of innovation of this company, which started producing mine posts and railway ties in the early years of the Nineteenth Century.

If, when we started to study the problem, ten years ago, the recycling of treated wood waste was just the concern of a manager, looking for the future of his company, it has become today the concern of many people. In fact, in the meantime, it has indeed been a big evolution of rules and mentalities. Today, people is concerned by the use of Arsenic to treat wood and the rules on treated wood and wood waste have changed. Today, the treated wood waste is classified as "dangerous waste" in the EU and the use of creosote or CCA is restricted to a few very specific professional uses. The same evolution can be observed in the US.

Today, "the Chartherm process" is developed at an industrial level, with an industrial plant able to recycle CCA-Treated wood or any other kind of wood waste, whichever be its type or level of contamination, at a rate of 1500kg (3000 pounds) per hour, 10,000 MT per year, producing a "clean graphitic carbon powder" at a minimum rate of 425 kg (850 pounds)per hour, 3000 MT per year.

Which is why, the problem of the treated wood waste becoming huge every day and Chartherm Process being today recognized worldwide as the only system developed at an industrial level, able to recycle CCA-treated wood and any other kind of treated or contaminated wood waste, we receive every month requests from everywhere to know about our system. We have serious contacts with people interested by Chartherm, who come from all over Europe but also from America. We are currently negotiating the building of a new Industrial Chartherm plant in France and two license agreements with wood waste operators of the EU.

INTRODUCTION

The "Chartherm" project started from scrap at the end of 1993, when Xavier Beaumartin, General Manager of a Family Company dedicated to the making and preservation of wooden poles and railway sleepers, since the 1830's, hired Jean-Sebastian Hery, an Industrial Automation Engineer.

Xavier Beaumartin was concerned by the evolution of the European rules on wood waste. He decided to put in place a treated wood waste recycling solution, to have it ready when the European Commission will require the wood treaters to recover the old treated wood (as a condition to be allowed to sale new treated wood).

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HYSTORY

The initial idea was to adapt an existing wood waste recycling system to the needs of Beaumartin Group. After a fully dedicated nine months study of all the available wood recycling technology existing in Europe, America, Japan and Australia, we had to accept the evidence: the offer of wood waste recycling systems was unsatisfactory and totally unable to solve the problem at an industrial level. Then J-S Hery was commissioned to develop and build a new complete solution, able to recycle every treated wood waste, whatever be the kind of treatment, particularly CCA.

Observing the most difficult task was to recycle CCA treated wood, we decided to make a strong research on that particular subject. We collected and studied the published experiments already carried out on that matter and met different Authors of these works all around Europe and North America. A first theory was then built and an agreement was reached with Prof. Van den Bulk of the KUL (Leuven Catholic University) in Belgium, to carry on some experiments. The first trials were made on a laboratory scale pilot by Mrs. Lieve HELSEN.

By the end of 1994, after six months of trials, the encouraging results Mrs. Lieve HELSEN obtained, on our idea to "mineralize the wood at low temperature", served as base to built a second more sophisticated laboratory scale pilot at the Bordeaux University of Sciences. After several modifications the "Chartherm Process" could be developed and a Patent was registered by May 1995.

Then, to continue the development of the process, one first working scale prototype was built at a Beaumartin plant, near Bordeaux, quickly replaced by a second one of a bigger size and a lot of technical improvements. During one year, a dedicated team made trials and modifications on the prototype, on an everyday base. By September 1996, a prestigious French Engineering Company (Bertin Technologies) qualified the "Chartherm" process, by ending a three months complete study of the whole system. Based on that study, the Beaumartin Company decided to pass to the next step: the fabrication and set up of a "Chartherm" industrial plant.

It took one year to build the first "Chartherm" industrial plant. Nine more months to tune it and by September 1999, we were able to start the working trials.

Unfortunately, by December 1999, with the dismissal of Xavier Beaumartin as President and General Manger of the Group, for personal reasons, and in the absence of any heir interested in continuing the management of the Company, the Beaumartin family group decided to sell "all their industrial activities", to concentrate their efforts on forestry (more than 100,000 thousand acres) and vineyards (several "Chateaux" in the Bordeaux region). As a consequence,. "Chartherm" project was put on standby.

Trials and tuning started again by September 2000, with a reduced team, to get the industrial "Chartherm" plant to an operational level, in order to sell it. Tests and analysis done in October 2002 show the industrial "Chartherm" plant was operational. Ready to be sold. Put on standby.

In the meantime, an EU Directive, classified all the treated wood waste, including poles and railway sleepers, as a "dangerous waste" in all EU. This Directive coming in to force on Jan 1st, 2002

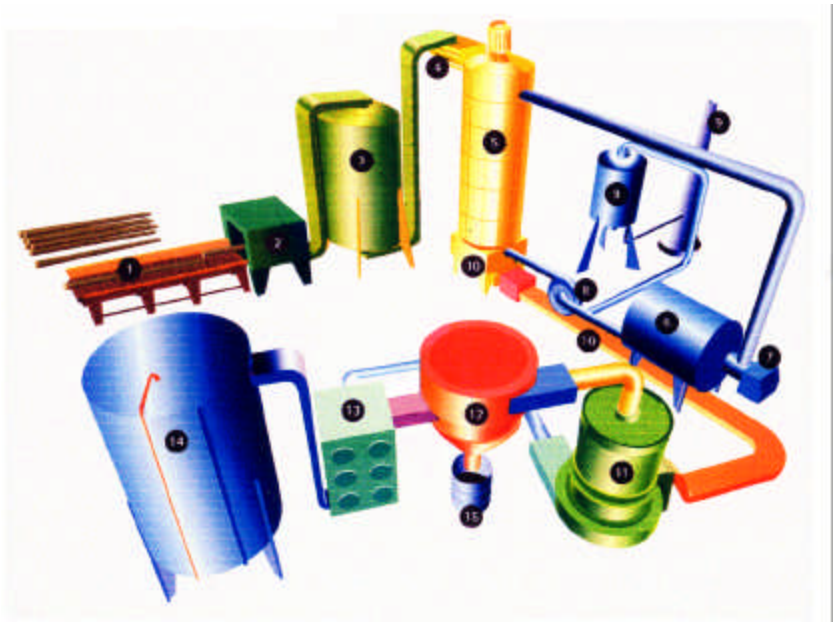
Some months later start the talks with different candidates interested to buy it and in January 2003, THERMYA acquired from Beaumartin Group the whole "Chartherm" project, including patents, brands, prototypes and the industrial plant, located at Saint Médard d'Eyrans, near Bordeaux.

HOW CHARTHERM WORKS ?

The "Chartherm Process" is basically a "wood waste recycling system", able to operate with any contaminated wood waste, whichever be the kind of toxic contaminating the wood and the concentration level of this contamination. This means "Chartherm Process" is able to recycle wood even if it is contaminated with different toxics at the same time, like a painted CCA and Creosote treated wood piece.

"Chartherm Process" is a wood waste recycling system which doesn't need a previous sorting to classify the wood by type of contamination. I does not either requires a previous withdraw from the wood the eventual metallic inclusions it may have.

Three steps complete the Chartherm process:: "wood crushing", "thermal treatment" and "separation" (to clean and purify the carbon).



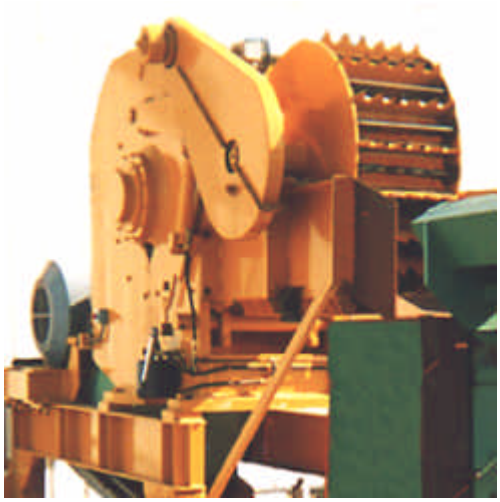
CHARTHERM®
TREATED WOOD RECYCLING

The Crushing

We have developed our own crusher to be able to work with all kinds of wood, whatever be their length or hardness, even if they include small metallic parts like bolts, screws or small steel plates.

In only one step, the crusher reduces the wood from its original size to two inch long splinters, able to be introduced in the thermal processor.

The crusher is able to work at a rate of 12 MT to 18 MT per hour, depending on the transverse section and the hardness of the wood.



The Thermal process

Coming from a heat generator, hot gases (370°C), with a low oxygen content (<1.5%), are injected thru a grid, at the bottom of a thermal reaction column, full of crushed wood.

By controlling the difference of pressure at the top and bottom of the column, a decreasing stratified gradient of pressures and temperatures is obtained, from bottom to top of that column. So the temperature at the top of the column is always below 65°C.

The thermal choc produced by the contact of hot gases on to the crushed wood, at the bottom of the column, breaks the Hydrogen bonds, which liberates groups of organic molecules and causes the evaporation of the organics of the wood.

These mix of gases and vapors of organic molecule groups, are pushed up thru the column, where the crushed wood cools them and provokes their condensation.

When all the organics are evaporated from the mineral matrix of the wood, at the bottom of the column, it only remains, a mineral residue with a high content of carbon (95 to 99%), which holds all the other minerals present in the wood at the beginning of the process, including heavy metals and other toxic minerals.

This mineral residue is recuperated thru the grid at the bottom of the column, as the top of the column is refilled with more crushed wood.

By progressing in its way down into the column, the crushed wood heats and part of the organics, condensed on it, crack and evaporate to condense again at a higher step in the column. This phenomenon is repeated and repeated again until the organics become so light they do not condense again and make their way to the top of the column.

Which is why, only the lighter organic gases, with a high content of hydrocarbons, can reach the top of the column.

From the top of the column the hydrocarbon gases are dried and sent back to the heat generator. That way the wood generates enough hydrocarbon gases to maintain the system in auto-combustion.

The Separation step

The mineral residue is grounded to a thin powder (<15µm) and introduced into a pneumatic centrifugal, where the carbon is separated from the other minerals.

The clean carbon is packed into airtight big-bags of 800 kg, while the other minerals are put into metallic drums.

Balances of the process

• The ecological balance

the volume of polluting elements is reduced to the initial dimension.

• The energetical balance

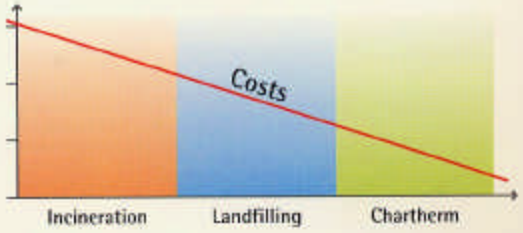
a positive overall balance : quantities expressed in Kilowatts per ton of wood.

	Crushing	Charterisation	Separation	Total
Energy consumption	– 8	– 953	– 85	= – 1 046
Energy production		+ 810	+1 890*	= + 2 700
Energetical balance				+ 1 654

* Equivalent to 250 kg of clean charcoal with a calorific power of 8500 kcal/kg

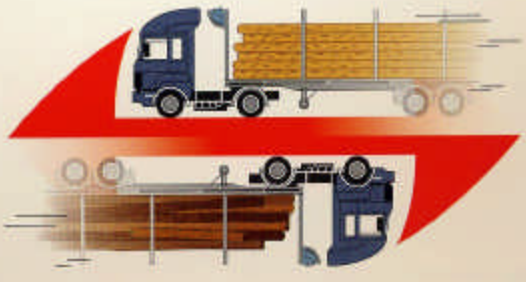
• The economical balance

realistic costs to the user, less than those involved in incineration or dumping in a landfill.



• The operational balance

Beaumartin, a complete service : the treatment of wood from the beginning to the end.



CHARTHERM

THE CARBON PRODUCT

The clean carbon issued from the Chartherm process is 99% pure. It has a graphitic structure and a calorific power of 6500 kilocalories per kilo. These characteristics allow to use it in a wide range of applications, from fuel powder to fireworks.

The application makes the price.

Each particular application of the carbon powder requires a specific characteristics particle size curve. The separation step of the Chartherm industrial plant allows to modify the characteristics of the clean carbon particle size curve, to adapt it to a specific application.

The most obvious (but not the best) application for the Chartherm clean carbon being to replace Carbon Black, with advantage.

In 2002, the average World market price of the Carbon Black was $0.82 / kg. (€728 / MT)

In 2002, the World market demand for Carbon Black was 3,500,000 MT

The Chartherm industrial plant is able to recycle 1,500 kg/hour of wood waste.(10,000 MT/year)

For each 1,000 kg of wood waste, Chartherm produces 280 kg of clean carbon.(2,800 MT/year)

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