



EUREKA EU1176 PROJECT

CONTENTO TRADE SRL

Technological innovation for the environment

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Production of granulates through the use of mud and solid tanning
residues as raw material



BRIEF DESCRIPTION:

Partners:

Vomm srl, Via Curiel 251, Rozzano, Italy
Contento Trade srl, Via Zorutti 84, Campofornido, Italy
CTC - Centre Technique Cuir Chaussure Maroquinerie, Lyon, France
Costil - Tanneries de France, Pont Audemer, France
Lafarge Coppee Recherche, France

Objectives:

The production of ceramic granulates through the use of mud of washing of tanner effluents and compact residues of tanning treatment, as raw materials; the use of a prototype machinery for an optimized treatment necessary to their moulding.

It includes:

The aggregates produced in research-field show advantages compared to the traditional ones. With a reduced water absorption (which is characteristic of their ceramic/vitreous structure), they keep their thermal conductivity even in hard use conditions and in strong humidity.

These aggregates are produced from the waste mixtures with high organic content, and show good energy saving prospect compared to traditional aggregates.

OBJECTIVES:

Production of ceramic granulates through the use of mud and solid tanning residues as raw materials and set up of a pilot plant for the optimal execution of the raw working for producing granulates. The main points to take into account are the following:

1° Objective

Producing ceramic expanded granulates prepared treating thermally a mixture made of mud, ashes, clipping and trimming residues with a maximum of 30% of clay.



The produced granulates are chemically inert because the included heavy metals can't be removed by external agents, thanks to an homogeneous glassy mass lightened by the presence of little empty micro-cells with close surface.

The produced granulates will be tested with other products (hydraulic binder, additives, etc) to verify the quality of the obtained mortar and light concrete.

The physical mechanical characteristics of the new hydraulic conglomerates will be superior to the ones of the conglomerates with the same density obtained from expanded clay.

The use of these conglomerates will be done without any negative effect for many decades: for this aim the chemical compatibility between the matrix (hydraulic binder) and the dispersed phase/aggregate will be object of a specific and deep study.

2° Objective

Set up of a pilot plant for the production of a large quantity of raw granulates ready for being baked in an oven and demonstration of the feasibility process both from the technical point of view and from the economical point of view.

The plant should be adapted to produce granulates of regular dimension and density. The regularity is an essential quality for the product commercialization.

The dimension of the granulates can vary the diameter from 0,5 - 1,5 mm to be applied to the mortars and plasters, while for the lightweight concrete the diameter can vary from 5 to 15 mm.

STATE OF THE ART

Tanning bovine hides, sheep skins and goat skins lead to produce large quantities of solid waste containing an important concentration of trivalent chromium used for tanning processes.

In France it's estimated that 12.000 tons/year of tannery waste are produced and landfilled. This is not a satisfactory solution because they contain up to 55% of water and the organic content is about 90% on the dry matter.



Moreover tannery produces large quantities of waste coming from the water purification treatment for the working leads, that contain the 50% of organic content on dry matter, and the total quantity in France is about 27.000 ton/year, for which the final destination is always the landfill. As a matter of fact it's impossible to valorise this waste in agriculture as the chromium content is ten time over the limit value.

Italy is a very important leather producer, the largest in the world with India. The respective quantities for bovine hides and sheep and goat processing are 106.000 tons of tanned waste and 277.000 tons of waste water treatment sludge a year.

For Europe the total amount of tanned waste is 208.000 tons a year, and the annual quantity of sewage sludge exceeds 500.000 tons. In France, the regulation concerning landfill sites aims to eliminate all organic waste even containing toxic substances. In France and in Italy is more and more difficult to create new landfills.

Several jointed treatments facilities for wastewater coming from tanneries can be found as well in France and Italy.

MAIN INNOVATIONS

The main application of the light aggregates in the building industry deals with thermal treatment or the lightening of structures and manufactures. From this point of view the most important characteristic for aggregate is a good thermal conductivity that, for these materials, is strictly connected with density and with water adsorption.

The produced aggregates will have a low water adsorption that is typical of their glassy-ceramic structure, maintaining their thermal conductivity also in severe use condition and in presence of high humidity. Actually the lightweight aggregates are obtained by noble raw materials (fireclay, perlite, etc) or high quality recycled products (vitreous slag, glass scraps, etc...).

These aggregates, on the opposite, are obtained from a mix of residues with high organic content and so have very good possibilities of energetic saving for their production compared to the traditional aggregates.



RESULTS OBTAINED:

Tannery mud represent at the moment a heavy environmental problem in Italy, France and also in all Europe, none of the process tested till now for their recycle has been industrialized.

The lab studies carried on within the project Eureka EU 1176 demonstrated that it's possible to obtain lightweight ceramic aggregates according to the project requirements using tannery mud with clay binder or also with opportune mix residues.

The problem that now we must face is represented by the transposition into a pilot scale of the obtained results. As regards raw working the problem has been solved studying and testing some arrangements on the Vomm turbo desiccators in the testing room.

The researches performed at European level to individuate an industrial-size or a pilot oven, able to satisfy all the necessary requirements gave a negative result, even if carried out by experts companies as Lafarge.

So it was decided to plan and realize , at the end of Eureka project, a two phase pilot oven, equipped with two equi-current burners, that could respect all the requirements. The realization of this furnace will be financed by the EU within a Life project because of its big potentialities in the waste management sector.

MARKET PERSPECTIVES:

At the moment there aren't precise data on the global market of lightweight aggregates in Italy France and Europe ; on the opposite the study and evaluation of the market is one of the main activities of this research.

On the basis of some assertion of lightweight producers, it's possible to estimate that at Italian level the annual consumption of lightweight aggregates is about 1 million of m³ (about 500.000 tons), even if a small decreasing in the last two years has been recorded. So the value of this market can be estimated in about 50 millions of euros.



Vice versa, there are some global data about the availability of tannery wastes in Italy and Europe:

- ✓ wastes from leather working: 106.000 ton/year in Italy; 208.000 ton/year in Europe.
- ✓ mud from effluent treatment: 277.000 ton/year in Italy; 500.000 ton/year in Europe

The residues of hide workings have, usually, a very high content in organics, while the mud have usually a water content of about 40% and an organics content of about the 25% of the dump weight. In the process, both the organic fraction and the water can be removed, and so it's possible to evaluate that the market need will be in any case superior to the production of lightweight aggregates with this process.