GENERAL INTRODUCTION

The system to recover the scrap material after working the bitumen membranes through a lamination system generates a new product which does not have a specific name and which contains, in various amounts, all the components of the membranes from the reinforcement to the various finishing components.
For this reason it cannot be called "recovered mix" since this is not an exact definition.
We have therefore registered this new product brand name:

bitumo

Specifically " Bitumo " is the result obtained by treating the waste with a system similar to lamination registered as a patent as:

" Method and equipment for the cold recovery of the waste product deriving from the production of bitumen membranes "
Industrial invention application n°. MI2009A 001880

CAVINATO costruzioni

LOXO

boato international

Objective

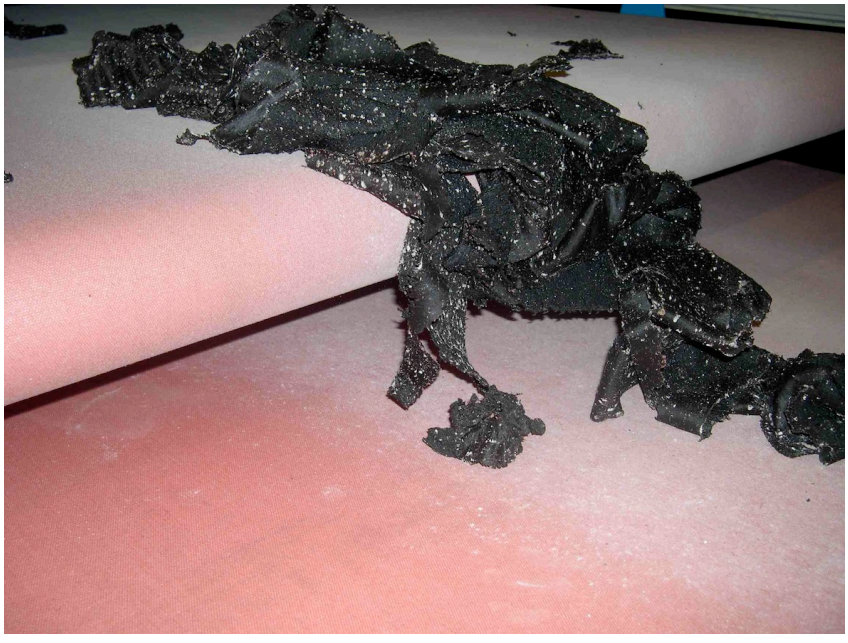
The objective of the Neerg Plant (the equipment) is to recover 100% of the waste in order to re-use it as component in the production process.
In order the whole waste to become recyclable, both the reinforcement and the inert waste shall achieve a dimension which does not jeopardize the production cycle and the quality of the products, as well.
To obtain this result, the waste shall be laminated until obtaining a thin layer.
The bituminous membrane as inner roll or part of it goes through a pair of contra-rotating rolls and therefore, it is subject to a remarkable deformation, i.e.:

- the polyester reinforcement frays and the fibres, it consists of, come untied
- the fibreglass reinforcement breaks and splits into very small segments
- the slate and grit material is pressed and reduced to its lowest values in such a way that it can be considered as "filler"

It is however essential to make a fundamental distinction between the waste which has been accumulated for years and the one which is produced everyday.
The accumulated waste has almost certainly lost most of its physical- chemical characteristics it had when produced, while the "fresh" waste is able to keep all the aforementioned characteristics.
For this reason, the main goal shall be a constant reinsertion of the whole daily waste in the production process.

Of course, the best economic results are achieved by recycling the Bitumo in the same base mix it has been obtained from and possibly in the same percentage of waste.

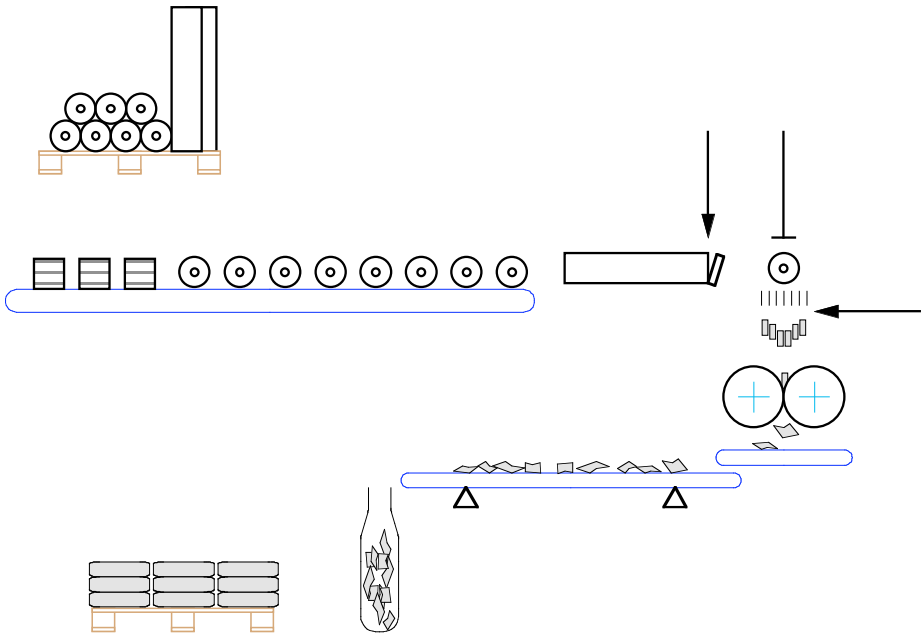
This process allows Bitumo's features to be better applied; actually, the cold treatment Bitumo is submitted allows its physical characteristcs to be only partially changed, while keeping the chemical properties of the mix it contains.



Bitumo - Neerg Plant Outlet

Operational Diagram

The following picture shows an operational diagram related to the Neerg Plant.
Since most of the waste is created as a roll, the system has been principally developed for treating such waste typology.
As to other types of material, such as recovery material from waterproofing, laboratory samples, material combined with insulated parts, and/or material from filters or small sized material, we suggest that parts having either square or rounded shape, as well as dimensions similar to standard roll's, are created by utilizing a piece of membrane as covering.



Rolls Loading System

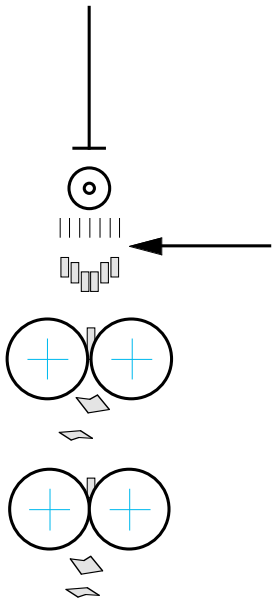
The operator loads the rolls to be worked, horizontally.
The form of the roll is not important, oval, round or any other form.
The maximum dimensions of rolls which can be loaded are 300 mm. in diameter by 1200 mm. in length.
The length of the conveyor depends on the space available, keeping in mind that the machine can treat 350...500 kg/hour.
When conveyor system is empty, 2 rolls are still inside the equipment, which allows the operator sufficient time to carry out the loading/unloading operation.

Roll Cutting

Once the roll has been taken from the conveyor, it is raised up and inserted into a channel. By using a special pusher, the roll is moved to the next phase which is called "multi cutting" In this phase the roll is cut in slices then pushed through a series of blades.
This type of cutting reduces the membrane to a dimension which is then accepted by lamination system.

Lamination

The definition " lamination " is not totally correct but it is acceptable.
Lamination is generally a transformation of a semi-worked metalic piece.
During lamination the surfaces of the rollers and the surfaces of the laminating piece slide against each other.
This movement nullifies in one point (the neutral point or non slidepoint) where the periferic speed of the roller becomes equal to the surface of laminating pieces. At this point the lamination force is at its maximum: as the section of the laminating piece diminuishes, the unit force increases.
In the case of a relatively soft material like the membrane, or in the case of the pasta used in lasagna, the movement generated tends to transform the structural form of the compound.
The various tests have resulted in a productivity penalization due to the single lamination process, because the pieces coming from the multi-cut system are usually rejected, in the event they have a thin layer being equal to 0.25 mm.
This phenomenon especially occurs in case of elastomer-based material or materials having a high polymer content; if poor, dry materials or materials being coated with slate are used, the aforementioned phenomenon is less likely to occur.
If a two-laminator system is utilized, i.e. the first one having 3 mm clearance and the second one having 0.25 mm, the lamination time of a "portion" weighing approximately 2.5 kg, which is in a single process equal to 25..30 seconds, in a double process amounts to 10..13 seconds.
Clear reject phenomena have not been found and the contribution to productivity of the utilized material typology has only occurred in a relative way.



Weighing and Packaging

A series of conveyor belts carry the BITUMO to a weighing system composed of 2 independent tracks.
While one track slowly accumulates the material, the other transfers it to the packaging machine where the weighed amount is packaged in 2 sheets of PE.
The weight of the bags is variable and can be set according to the type of BITUMO being packaged, since the different types have very different physical aspects, which account for the differences in the specific weight.
The physical aspect does not depend exclusively on the constitution of the compound of the two principal families, APP and SBS, but also on the superficial finish and the hardness of the material.
Even on the same roll, if an aged one, differences can be noted between the border and the center.
Some materials swell notably, others tend to accumulate, some others come out of the lamination process in very long strips, other in sizeable pieces like " corn flakes ", someones are sticky while others perfectly detached.
The track system guarantees the correct conveyance of all these different types.

Piling Device - Paletizer

The finished bag weighs about 50 liters and measures 40 x 80 x16 cm., and can be put on pallets, 3 bags side by side for each layer on standard Europallets.
From a chain conveyor which functions as warehouse, the empty pallet is introduced into the piling area.
After the piling process it is transported to the storing area.
The lengths of the conveyors also in this case depend on the space available in the department keeping in mind that the BITUMO approximately doubles in volume and that a pallet on average weighs about 0.50..0.65 T/m³.