

ROOFING MEMBRANE COMPLETE RECYCLING : A GLOBAL EXPERIENCE

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KEY WORDS:

Recycling ; ISO 14001 ; EMAS ; Roof Waste

ABSTRACT:

Some steps, such as waste sorting, waste collection, the concern to avoid waste generation, ...are presently deeply anchored in the spirit of all the actors of the building sector and more particularly for the waterproofing membrane producers.

The article presents the experience the IMPERBEL GROUP has built up during the recent 10 years, both in its production process by reducing the waste and the development of innovating recycling techniques, and on the field by constant research of a well controlled management of the waste flow issued from the application of the a.m. membranes.

We will also develop the constraints linked to the administrative management of the waste issue (running license, border crossing transfer file, etc...).

Within the framework of this global approach, the implementation of management tools such as quality standards (ISO 9002) and environmental norms (ISO 14001 and EMAS) represent determining factors to reach the fixed goals.

There has been no production waste dumping any more since 1999.

Although the waste from bituminous waterproofing is black and apparently valueless, the experience of IMPERBEL GROUP shows it can lead to a global economic and ecological solution. But It depends on the involvement of all the actors at all the levels. The story has just begun ...

RÉSUMÉ

Certaines démarches, telles que le tri des déchets, la collecte, le souci d'éviter la production de déchets sont à présent bien ancrées dans l'esprit de tous les acteurs du secteur du bâtiment, et en particulier, celui des fabricants de membranes d'étanchéité.

L'article présente l'expérience acquise par IMPERBEL GROUP au cours de ces dix dernières années, tant au niveau de la production, par la réduction de ses déchets et par le développement de techniques innovantes de recyclage, que sur le terrain par la recherche d'une gestion organisée du flux des déchets issus de l'application des dites membranes.

Nous évoquerons également toutes les contraintes liées à la gestion administrative de cette problématique (permis d'exploitation, dossier transfert transfrontalier, etc...)

Dans cette démarche globale, les implémentations des outils de management telles que les normes de qualité (ISO 9002) et environnementale ISO 14001 et EMAS) auront constitué des vecteurs déterminants pour atteindre les objectifs fixés. Depuis 1999 aucun déchet de production n'est mis en décharge.

Bien que les déchets de production d'étanchéité bitumineux soient noirs et sans valeur apparente, l'expérience d'IMPERBEL GROUP témoigne qu'il est possible de trouver des pistes vers une solution globale économique et écologique. Elle implique cependant la participation de tous les acteurs et ce à tous les niveaux.

L'histoire commence seulement

ZUSAMMENFASSUNG

Einige Schritte wie die Trennung von Abfall, Abfallsammlung, das Vermeiden von Abfallerzeugung... sind zum heutigen Zeitpunkt fest in den Gedanken aller Akteure der Baubranche verankert, vor allem bei den Herstellern von Wasserabdichtungsmembranen.

Der Artikel stellt die Erfahrung dar, die die IMPERBEL GROUP

im Laufe der letzten 10 Jahre gesammelt hat, sowohl beim Herstellungsverfahren durch die Reduzierung von Abfall als auch bei der Entwicklung von innovativen Recyclingtechniken und auch auf dem Gebiet einer konstanten Suche nach einer gut gesteuerten Verwaltung des Abfallflusses, der von der Anwendung der oben genannten Membranen erzeugt wird.

Wir werden ebenfalls die Verpflichtungen untersuchen, die mit dem administrativen Management der Abfallerzeugung verbunden ist (Betriebslizenzen, grenzüberschreitende Transferdokumente, etc....).

Im Rahmen dieses globalen Ansatzes stellt die Einführung von Managementhilfsmitteln wie Qualitäts- (ISO 9002) und Umweltnormen (ISO 14001 und EMAS) einen bestimmenden Faktor dar, um die festgesetzten Ziele zu erreichen.

Seit 1999 hat es keine Lagerung von Produktionsabfall mehr gegeben.

Auch wenn der Abfall aus bitumenhaltigen Wasserabdichtungen schwarz und scheinbar wertlos ist, zeigt die Erfahrung von IMPERBEL GROUP, daß es möglich ist, eine globale wirtschaftliche und ökologische Lösung zu finden. Doch das hängt vom Einsatz aller Beteiligten auf allen Ebenen ab. Die Geschichte hat gerade erst begonnen ...

RESUMEN

Delle pratiche, quali la raccolta differenziata, l'impegno a limitare al massimo la produzione di rifiuti, ecc. sono già profondamente radicate nello spirito dei professionisti del settore edilizio e in particolare dei produttori di membrane impermeabilizzanti.

L'articolo illustra l'esperienza acquisita dal Gruppo IMPERBEL nel corso degli ultimi dieci anni: a livello della produzione, la quantità di rifiuti è stata ridotta e sono state sviluppate tecniche di riciclaggio innovative; sul terreno, la gestione strutturata dei rifiuti originati dall'applicazione delle suddette membrane ha costituito l'oggetto di una ricerca costante.

Ci soffermeremo inoltre sui vincoli amministrativi in materia di

rifiuti (licenza di esercizio, documentazione per il trasporto transfrontaliero, ecc.).

Nell'ambito di questo approccio globale, l'implementazione di strumenti gestionali come gli standard di qualità (ISO 9002) e le norme ambientali (ISO 14001 e EMAS) costituisce il fattore chiave per il raggiungimento degli obiettivi fissati.

Dal 1999 i rifiuti industriali non vengono più depositati nelle discariche.

Benché i rifiuti prodotti dagli impermeabilizzanti bituminosi siano neri e apparentemente senza valore, l'esperienza del Gruppo IMPERBEL mostra come si possa comunque arrivare a una soluzione economica ed ecologica. Tutto dipende dal coinvolgimento degli attori del settore, a tutti i livelli.

E questo è soltanto l'inizio...

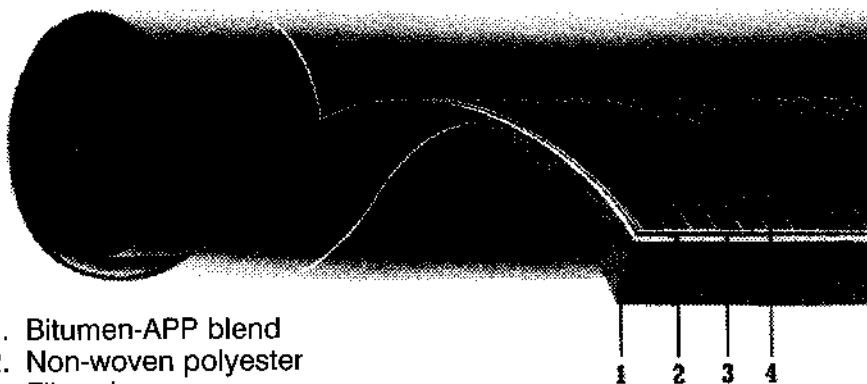
INTRODUCTION

The Group has committed itself into Quality and Environmental Care programmes for several years. It obtained the ISO 9002 certification in 1993, the ISO 14001 certification in 1998 and the EMAS registration during that same year.

One of the major problems The Group has always had to cope with is no doubt that of the integrated management of waste output during the production process of its membranes and in a less important way of waste generated during application on the job sites and, in a later stage from roof demolition.

The constraints linked to recycling this type of product are very important: the product contains reinforcements made of polyester and non soluble glass, it is black and sticky and above all has a poor added value.

Nevertheless the company decided to take initiatives into durable development and to invest into long lasting solutions.



1. Bitumen-APP blend
2. Non-woven polyester
3. Fibreglass
4. Batch number

EXPERIENCE

In this chapter we will describe the successive stages the company went through during the 10 recent years in order to reduce, and to recycle its production waste.

STEP 1 Reduction of production waste

Since the implementation of a quality and prevention management system, the staff involvement at every level, the continuous control and improvement of production processes, the quantity of waste has been decreasing for the ten past years. But despite all these efforts, there remains still a certain quantity of waste. This waste is mainly coming from production lines start ups or when the reinforcement rolls are changed. The quantity of waste inherent to production process is valued at about 1.4 % of the quantities entering production.

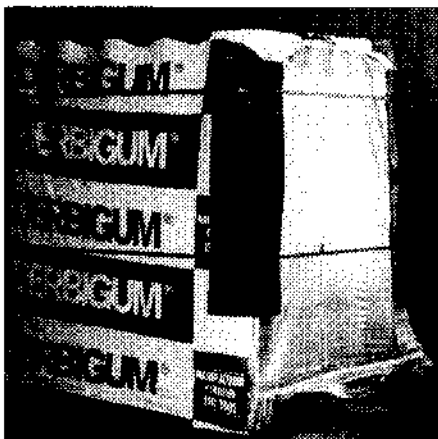
STEP 2 Re-using waste

Parallel to the developments in order to improve the production process, we have also been looking for alternative paths and developed by-products derived from the use of membrane waste. For example the manufacturing of cant strips, protection strips for rolls on pallets tightened with steel bands.

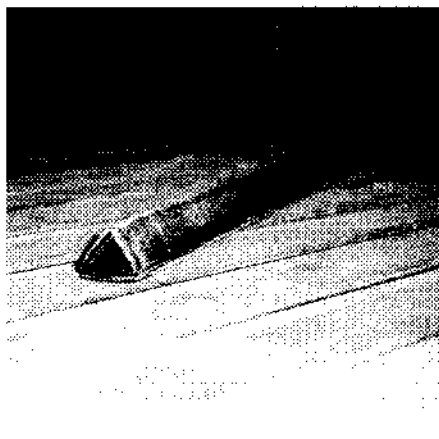
The production of such products is rather "marginal" because the market they cover is rather limited. But the originality of the

solution is enabling research towards sectors outside the building sector.

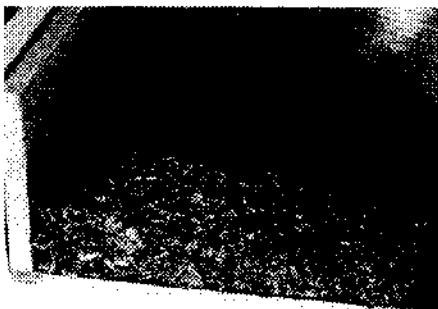
The re-use covers about 25 % of the production waste.



Packaging protecting corners



Cant strip



Cant strip + slope compound



Derbilist - aesthetic finition

STEP 3 External recycling

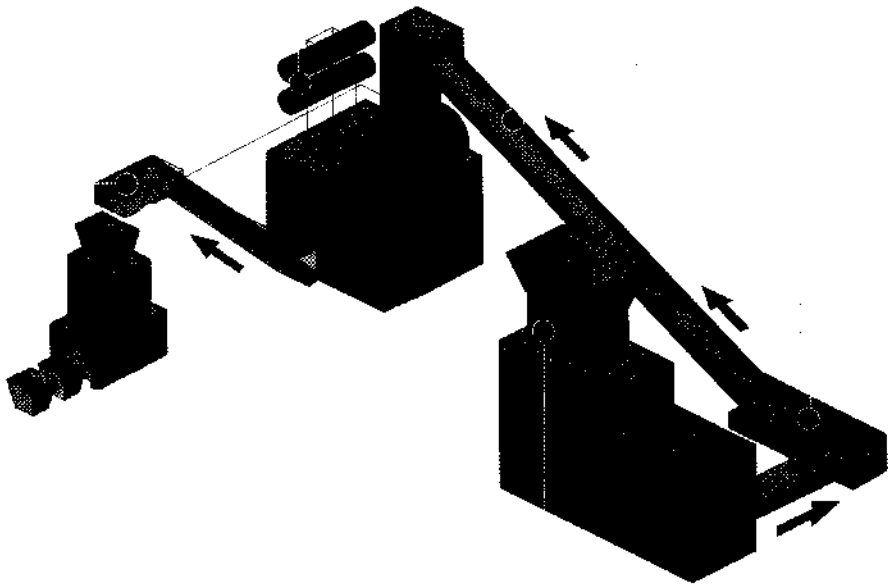
The company also developed a network of contacts within the road sector. The recycling possibilities of bituminous membranes in fine ground particles are interesting but of poor added value (value of the replaced bitumen). For instance, we reached encouraging results for the preparation of blends like mastic asphalt. External recycling covers only about 10 % of the production waste.

STEP 4 Internal recycling

The company has very recently built a complete waste recycling processing unit for waterproofing membrane wastes. This unit is running since June 1999 and recovers a 100 % of the remaining production waste. The production waste is entirely reintroduced within the production of membranes which it originally came from. This way, after treatment, the waste is considered as a new raw material. Since the beginning, the company has recycled more than 1200 tons of waste.

The industrial process consists in three stages: first stage is the cutting stage, the second is the fine grinding of the material and finally a so-called fiber separation stage (it is an innovating process combining hot extrusion and shearing through a die especially designed and adapted to our products) .

The waste recycled through this process is completely reintroduced into the manufacturing cycle which it originated from. This way the economic balance is favourable as the waste is valued as being a new raw material. The average cost of operation corresponds to approx. 75 % of the price of fresh raw material.



Recycling unit 1. Cutting 2. Grinding 3. Defibering (recycling)

STATE OF ART

The recycling process developed by The Group makes it stand out compared to other current techniques in two ways. On the one side there is no necessity to proceed to a mixing stage with pure bitumen, which limits the recycling possibilities (for example: production choice for secondary membranes). On the other hand it does not generate in its turn any waste.

In other words, 1 kg waste is valued and transformed into 1 kg raw material to be recycled.

But one should take into account the specificity of our waterproofing membranes for which the technique has been elaborated.

Indeed, the membrane is not slated, which constitutes a significant advantage. Further developments are run so as to improve the technique and increase the performance regarding slate products and the whole range of waterproofing membranes.

THE RECYCLING OF ROOF WASTE

1. Quantities concerned

Today we estimate the quantity of waste generated during the application of membranes on the roofs at about 1 to 5%. The recoverable quantity of waste from roof demolition is difficult to evaluate, the current situation being very complex. Indeed it is not unusual for some roofs to have several waterproofing plies which are not necessarily compatible. Besides, what about the intrinsic quality of the blend they are composed of? What was the application method used for the membranes, what was the supporting deck, how to dissociate the different building materials... etc? What about responsibilities during demolition; the producer, the owner or the roofer? The problem must be analysed in a global approach both on the spot and case per case.

2. Ruling

For the moment there is no such thing as particular legislation related to the management of production waste or application

waste for roofing membranes in the E.C.. Waste disposal has to meet no obligation: the majority of producers and roofers are authorised to dump their waste. The dumping costs on the other hand can vary depending on the geographical situation (different area taxes which can vary extremely)? and/or different political situation (legislation changes per country).

The Dutch model is an example. Indeed the legislation will be modified thoroughly in order to reach the goals from an environmental point of view: no more dumping! Consequently the producer and consumer must find solutions within a very short delay. Therefore it is interesting to note that producers have got together into an association so as to gather not only their knowledge on that matter but also in order to grant their affiliates practical tools to meet the legislation requirements for every day's obligation.

The solution proposed by our company:

The company will be shortly facing the obligation to recover its waste and decided to set up in association with a collecting company an overall solution. The organisation consists in proposing solutions for each stage of the process. The producer plays a key role in the organisation. It implies the co-operation of each party involved:

- Establish a contract between collector/producer and collector/roofer (environmental commitment contract).
- All participants take part and are well informed (distributors, roofers).
- Waste is sorted out on the job site (waste is cut to dimension, downgrading procedures, and control downstream).
- Proposal of consignment packaging.
- Regional and national collection and storage.
- Waste logistics and transfer towards recycling centre at the producer's plant.
- Transfer document administrative organisation (flow management from the material owner to the user).
- Authorisation request and extension of exploitation permission.
- Selective sorting and recycling into the production.
- Information of the acting persons (cost transparency).

The solution worked out is interesting in more than one aspect: the collector can also offer his service for the management of the whole range of waste existing at the contractor's (and not only restricted to the membrane waste). This gives an economic driving force.

The most important obstacle was to solve the difficulties linked to paper administration for border crossing waste between the regions within the Community.

It took 10 months and crossing a wide range of difficulties to finalise the complete file. The solution proposed in Holland will serve as a pilot project and will later on probably be extended to the whole European market.

WHAT IS AT STAKE?

To integrate the ecological issue within the constraints of the company has become more than an economic challenge. Today it is a market requirement.

1) Ecological advantages

The essential benefits are no doubt the ultimate elimination of dumping and waste valorisation (either through reusing or through recycling) as new raw material. We directly contribute to the reduction of fossil raw material consumption.

2) Life Cycle Assessment (LCA)

The analysis of the lifecycle of products used in the building sector might seem painstaking but the knowledge one can withdraw is precious and can in some cases highlight the environmental assets of one product compared to another. In our case, waste management and the demonstration of possible recycling are, if taken into consideration, elements contributing to the improvement of the environmental score. This can also be related to the performance of our membranes in terms of durability (more than 25 years).

3) Competitive advantages

The sector of bituminous waterproofing membranes is more

and more suffering competition from the synthetic membranes, with the aspect of recycling being most often used as a competitive argument. The global strategy we followed has comforted our company and the whole sector not only towards the market but also improved our image.

THE ECONOMIC ASPECT

Costs:

- Training and information
- Waste selection, sorting (during production, on the job site and in the recycling unit)
- Consigned packaging and waste collection
- Transfer (transport between regions and countries)
- Recycling (investing in a recycling processing unit, energy, running costs).
- Global management

Benefits

- Raw material recovery (valorisation at the cost of bituminous blend)
- Recovery of dumping costs (transport, taxes, ...)
- Image
- New markets

It is yet still difficult to establish a reliable global, measurable economic balance. But as far as production waste is concerned, the data tend to show a very good balance today. This advantage might still increase in the coming months in view of the rising prices of raw materials. Similarly, the progressive and constant increase of dumping costs is also to be taken into account as economic incentive.

Besides, it is not impossible that in a near future it will become more and more difficult and even prohibited to dump this type of waste although it is inert. It was very important to anticipate and find durable solutions.

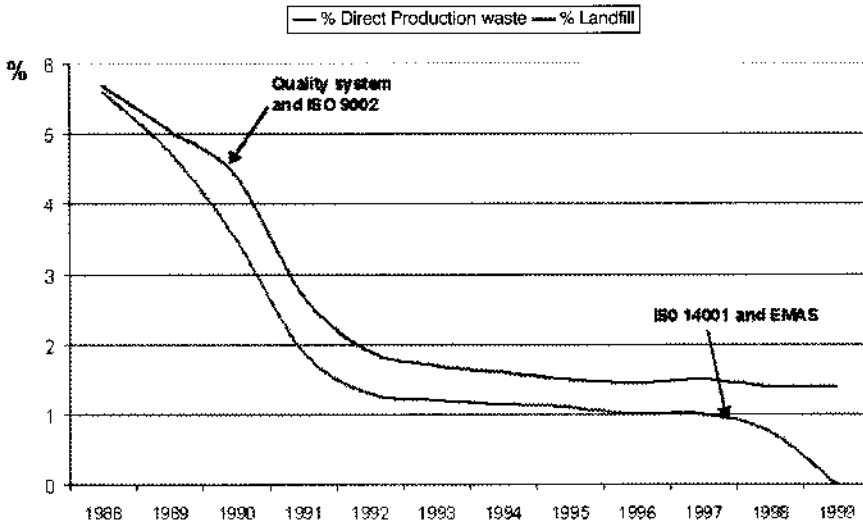
GENERAL PARTICIPATION

The environmental approach fits in a durable development and requires the participation at every level from the production worker up to the roofer on the job site. It requires an environmental policy with precise goals and without concessions.

To achieve these results, the company used all the management tools it had at its disposal among which Total Quality system, ISO 9002, ISO 14001 and EMAS.

The events pointed out onto the graph very clearly indicate the boosts brought by the implementation of such systems both onto production waste cuts as on the dumped quantities.

The environmental goal we had fixed ourselves has been reached: 0 kg dumped waste ; 100 % recycling (internal and external)



CONCLUSION

The testifying experience acquired by our company in the field pleads for an integrated waste management.

The global solution to the waterproofing waste issue not only required the elaboration of innovative technology adapted to the product specificity but also the implementation of new working methods associating all the actors. For the company the solving of this issue has turned out into opportunities.