

Metallized Sails

- Metalfilms, a company specialising in the metallization of plastic films, textiles and paper mainly used in the packaging industry, has designed and produced a special film for sails. The use of such metallized film on sails offers three major advantages:
 1. High electromagnetic wave reflection and therefore high RADAR visibility of a vessel from other ships and boats in general
 2. UV ray protection, which may damage the films and aramid fibres typically used in sails
 3. Infrared reflection, which reduces heat and therefore deformation of the sails

Note: the invention was filed under No. EP19179263.9



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TITOLARE/I: • METALFILMS S.r.L. 100.0%
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TITOLO: VELA E IMBARCAZIONE MIGLIORATE

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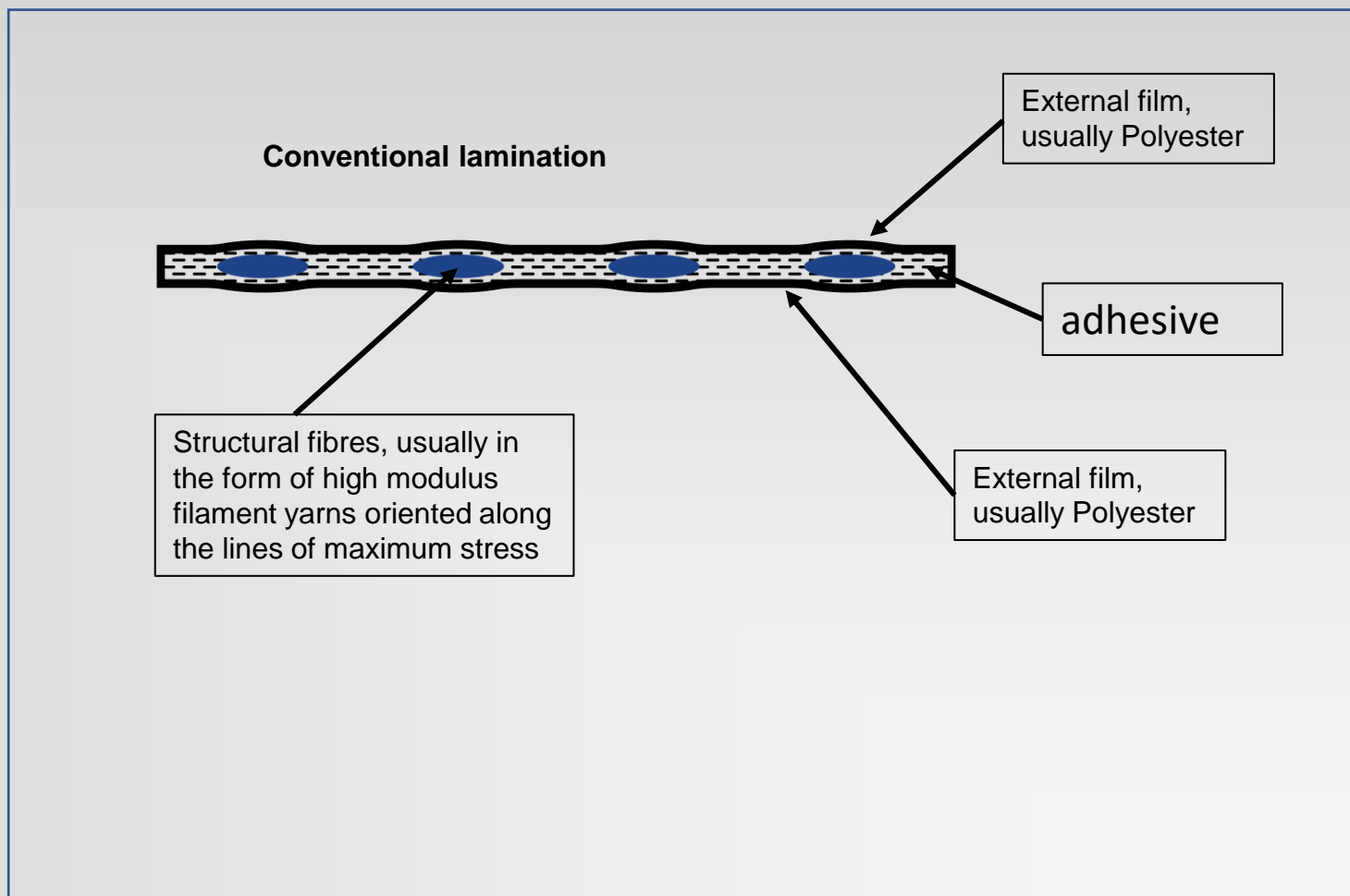
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Il Dirigente della Divisione
Loredana Guglielmetti

The Making of a Modern Sail

- Modern sails typically have a sandwich structure made of different materials. A high modulus fibre skeleton is usually placed between two polyester films to avoid sail deformation caused by the wind. The idea of our invention is to metallize one of the two layers to obtain radio wave reflection, or to metallize both the external layers to protect internal fibres from sunlight, i.e. from ultraviolet waves, which are responsible for the limited durability of modern sails.



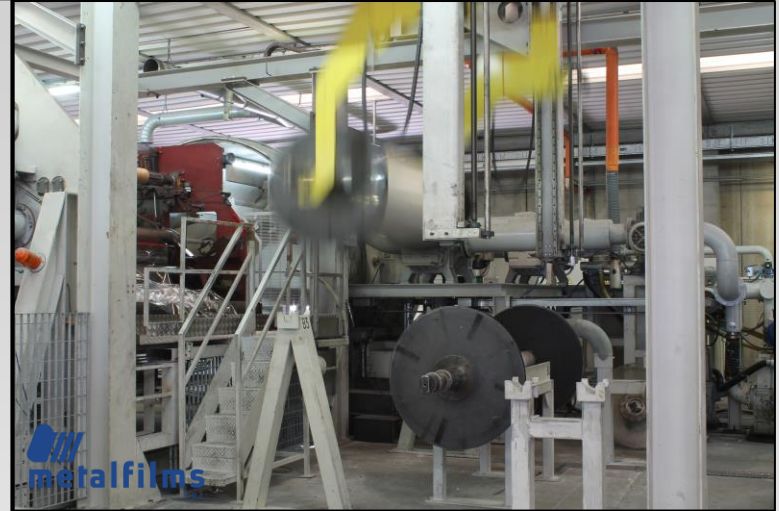
The Metallization Process

Metallization is obtained through the PVD (Physical Vapor Deposition) process. In this case, it consists in a molecular deposition of aluminium on a film suitable for metallization. High-purity aluminium is evaporated in the absence of air so that the vapours can deposit on the chosen substrate, thus forming an extremely thin and uniform aluminium layer. The coating is typically 0.015 micron (15 nanometres) thick, corresponding to about 30 milligrams per square meter in weight (i.e., 1 g every 33 sqm of film, which is irrelevant considering the total weight of a sail)

Metalfilms carries out two activities: metallization and glass processing.

The first one consists in the contract metallization of any type of film being 7 to 800 microns thick, such as OPP, CAST, LDPE, HDPE, PET, PVC, PS, OPS, NYLON, as well as PAPER, CARDBOARD, FABRIC, TNT, biodegradable films amongst others. Metallized film is typically used in food packaging, graphics, paper products, constructions, clothing, agriculture, but also in all those sectors requiring barriers against heat, light, UV rays, gas and steam as well as the preservation of the characteristics of a given substrate.

The second one consists in the processing of flat glass for applications requiring small-sized tempered glass. The raw material consists of large glass plates which are processed according to the designs provided by the client. Metalfilms therefore carries out contract works by producing tempered glass plates typically intended for lighting purposes as well as for diving masks, lightswitches, plates and other uses.



...critical stages of the project

- One of the main difficulties in the production of this invention was to find a material being suitable for sails and also having a metallizable surface producing minimum light reflection after metallization, so as to avoid dazzling effects for sailors. After one year of work and tests, we chose to metallize a 20 g Polyester TNT reel from a renowned Japanese manufacturer. This material was not easy to metallize but had already been used to make sails.

...the first sails

- This new material was then assembled by a company specialized in making sails. Our first metallized sails went to the vessel Comet 45s, whose owner was the project designer, and they turned out to be very aesthetically pleasing. It was decided to preserve the typical colour of metallization, so as to give the sails a sporty look. The metallized surface can also be painted with other colours.



...the first tests

- A test at sea was then carried out to verify radar visibility. Two vessels very similar to each other and sailing at the same distance from the Radar source were compared. Once radar sensitivity was reduced, Comet 45s turned out to be much more visible, with its metallized sails, than First 44.7, although the latter was equipped with a radar reflector.
- As for the UV barrier, laboratory tests showed an actual protection from harmful ultra-violet rays, therefore a longer durability of the sail is expected.



Comet 45s

First 44.7

High sensitivity gain: both vessels are visible



Comet 45s

Medium sensitivity gain: First 44.7, equipped with radar reflector, disappears from the screen



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