

# Window Films

## Don't miss out on this business opportunity

Richard Kirchner; CPFilms, a division of Solutia Inc.

### A product whose time has come

Although window films have been available as a means of enhancing the performance of glass and glazed areas in buildings for well over half a century there is still a surprising lack of awareness amongst both end users and specifiers of the advantages and benefits resulting from the use of these technically advanced products. With the ever-increasing contemporary concern for energy saving as well as health and safety in the workplace and the home, window films can help property owners and building managers save money; and also protect, secure, and enhance the working and living environment.

### A little history

Amongst those with nothing more than a passing acquaintance with the product, a commonly used remark to describe window film is "ah, you mean sticky back plastic!" Like most over-simplifications of the highly technical, this brief phrase does nothing to explain the complexity and variety of the products that are now available from a wide range of suppliers.

Several of the current major manufacturers of window film can trace their early forays into the production of coated films as far back as 50 years or more. The early pioneers, for the most part based in North America, experimented with methods of metallising, dyeing, and adhesive coating different flexible substrates as a means of offering reflective and protective coatings in a number of industrial applications, including the NASA Space Projects of the 1960's. Considerable resources of scientific research and development were required



to ensure that today's advanced window films would offer guaranteed and durable performance under testing conditions.

### Window Film Technology, or "What You See Is What You Get"

Whether a window film is used to reduce solar heat gain, improve safety and security, produce 'one way mirrors', or to reduce fading, it is essential that high quality is always provided to the customer. This quality objective requires strict quality control of the raw materials, manufacturing processes, final product, packaging and warehousing. The number and types of tests used to verify that the window film product is fit for purpose are at least equal to that of other, more traditional industries. In fact, quality control has to be even stricter compared to some industries because window film will be used as part of the glass/glazing. The human eye can see defects as small as 25 microns (0.025 mm or 0.001 inches), so optical quality is essential for an unobstructed view through the window

### Manufacturing excellence : an amazing combination of technologies

#### Window Film Technology – Components

The performance and durability of the window film selected is determined by the types and quality of the components and construction used. The essential components include:

- Protective Release Liner – a film, usually polyester, which is used to cover the adhesive and protect it from contamination before installation
- Adhesive – high quality, low or zero distortion adhesive that adheres the polyester film to glass; types used for automotive installations retain high adhesion even on double curved glass
- Polyester Film – a strong, high clarity, high quality plastic film – more than one layer may be used with a laminating adhesive to produce a multi-layered structure



- Scratch Resistant Coating – a hard acrylic coating that provides protection for the polyester against scratching and abrasion
- Dyes, metals, alloys and UV inhibitors are added to produce the specific properties desired. All components must have high optical quality to allow undistorted vision through the glass + film.

Figure 1 shows a standard window film – this has eight layers and has had at least seven manufacturing processes; quality control of raw materials, manufacture and end product adds further to these processes.

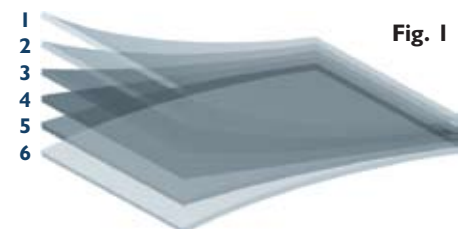


Fig. 1

1. Release liner
2. Adhesive with UV absorbers
3. Clear or tinted polyester with UV absorbers
4. Metallised Aluminium or other metal alloys
5. Clear Polyester
6. Scratch resistant coating

### Window Film Technology – Manufacturing processes

Manufacturing processes, each requiring care to ensure the highest quality is obtained, include:

**Coating:** Material is transferred from a container onto a large roller, then from the roller onto the surface of polyester film.

Examples include scratch resistant surfaces and adhesives.

**Laminating:** A film coated with adhesive is adhered to a second uncoated film, using a roller system to press the two films together.

**Metallising:** A roll of polyester film is wound round a water-cooled roller in a large metal chamber, and the air is pumped out to

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produce a vacuum. Metal – usually aluminium – is evaporated onto the cold surface of the film; very few metals evaporate in a vacuum so sputtering is used for other metals. Metallising is a rapid process compared to sputtering.

**Sputtering:** Equipment very similar to metallising is used, but a metal or alloy target is bombarded with positive ions to knock (sputter) atoms of metal out of the target and onto the cold film surface. A large number of different metals and alloys can be sputtered. Metals used in sputtering, such as nickel, can also have extra resistance to corrosion.

**Colouring:** Colours may be added to the adhesive before coating onto the polyester (as above) or the polyester film may be deep dyed. The colour produced is usually a mixture

of different dyes; in general, better durability is obtained using deep dyeing processes.

### Today's Selling Opportunities

There are 3 main areas of application for Performance window films in buildings.

Firstly, and most relevant for anyone involved with the reduction of the twin problems of heat and glare through glazing, Energy Control window films reject and filter out a high proportion of the sun's radiated energy by reflecting specific wavebands in the solar spectrum. Different types of films are offered depending on whether the reduction of glare or heat is the main priority. With the latest advances in manufacturing processes it is now possible to produce films which reject 50% or more of the sun's energy whilst permitting a high level of uninterrupted visibility through the window.

Proven energy savings can be demonstrated on air-conditioned buildings which have been fitted with Energy Control film with paybacks of no more than a few years. This makes window film an extremely cost-effective "Green" solution for reducing energy consumption in buildings.

Secondly, and increasingly demanded in today's hostile world, safety and security window films can protect ordinary float glass in buildings against sudden breakage through

accidental or violent causes such as vandalism, terrorism, and storm damage.

Safety films are also used to protect expensive glass surfaces against scratching and graffiti.

Finally, window films are also used in a wider and wider variety of decorative and protective applications, particularly in the retail, leisure, and hospitality sectors, where corporate identity and design of physical facilities are critical to business success.

In short, Glass Performance Films can add turnover and profit as an extra offering in the product portfolio of any business involved in the specification, supply, and fitting of window treatments, blinds, and shades.

Acknowledgement is made by the writer to the European Window Film Association for use of published material on window film manufacturing.



# Is it level?



In line with our last report on alternative measuring devices, we have a look at alternative 'spirit' levels.

All blind fitters will say that the important part of fitting a blind is making it look right and level in the environment to which it is fitted. Taking note of the levels at the window and whether any external features will impact on how the blind looks is very important. Most people have an opinion on a item that is not level, 'that doesn't look right!'. A fitter may use a spirit level to check levels, but has technology improved this everyday piece of equipment? What are the alternatives on offer and what additional features do they have?

Most if not all levels have a bubble in a tube, this being the cheapest and probably the most effective way of finding a level. Electronic levels monitor the bubble and can accurately determine where the bubble is in relation to the tube it is encased in. This information is displayed on an LED screen and can be stored for later reference.

The problem with the standard level is the reliance on the operator to get it right. If the bubble is in the middle then it is level, you hope. There is no reference other than 'rack of eye'. Now I am not saying that anybody using a spirit level is going to get it wrong, but what if you want more than level? Maybe you would like to know how many degrees and possibly minutes from level the surface is? Could you

find a 10° or 45° angle, of course you could always measure and work out the angle, but if you could find the angle at the press of a button, how good would that be.

### Electronic level and angle device

'Digital electronic level that measures internal and external angles precisely.' It might be a statement for a commanding piece of equipment, but it does do exactly what it says it will. Put the level to any surface and the angle is displayed. Special features include extendable bevel for measuring angles in difficult to reach locations and angle bisection mode for mitre cuts. Use it for roof slopes, conservatories, windows, and fitted furniture, etc.

What can you expect from an electronic level? Illuminated LC display, sometimes on both sides; angle measurement display in degrees (°), auto hold when LCD is not visible, useful when working in shadow or hard to reach areas; an automatic shut-off, if not used for a few minutes the display powers-down; extra facilities like angle bisection for mitre cuts, even a hold mode and of course a battery state indicator.



### DigiLevel Compact



A pocket-size digital spirit level with electronic tilt measuring, plus both horizontal and vertical vials.

It features a tilt angle displayed in degrees (°), slope (% = mm/m) or pitch (ins rise/ft run). A sound is emitted at horizontal, vertical and at 45°. The device has a illuminated LC digital numeric display with slope angle and battery state indicator. The display can be read even when level is inverted for overhead measurements. You can even display the current operating temperature shown in °C for a few seconds when switched on. A memory holds the last reading until you switch off.

### iPhone - iLevel



And for those with an iPhone there is an applet called iLevel that allows you to use your iPhone as a spirit level or angle. The application is a visual level gauge: put the iPhone on its side to display the angle, a bubble is shown in a tube to give the operator a visual gauge. You can even hold the iPhone to a surface and press the hold button to register the angle. It may be a talking point, but we don't think it will as useful as the electronic levels mentioned above.