



# Which Type of Vinyl Product is Right for Your Particular Application?

## What is Vinyl

Most vinyl films are made from the same basic raw materials. It begins with a polyvinylchloride (PVC) polymer, which is simply basic plastic, and is by nature, relatively rigid. Other ingredients are added to the PVC, such as plasticizer to make it flexible, pigment to create the desired color, as well as other additives to help achieve specific properties such as UV absorption or thermal stability. Each of these raw materials can be selected from a wide range of quality levels. Of course, for a film with limited durability, often the least expensive raw materials are chosen.

Apart from the type of raw materials that are used at manufacturing, the manufacturing process itself and the type of plasticizer used create the main differences of vinyl films. Vinyl films can either be made by “Calendering” or by “Casting”. Each of these processes renders different qualities of films, with the casting process generally resulting in better quality film. The grade of plasticizer that is used to give the film its flexibility will also greatly affect the quality of the film.

Basically, different types of vinyl will last different amounts of time. Cast vinyl is a more expensive, thinner vinyl which will last longer, whereas Calendered vinyl doesn't last as long, is a thicker vinyl that is more suitable for temporary solutions and is therefore less expensive. So an economy “calendared” film should not be used for a long term application and a high-performance cast film is overkill for something that will only be used for six months to one year.

CanMilAir Decals can provide designs in any combination of three different formats:

1. Self-adhesive, computer-cut, “cast” vinyl. This is a premium high-performance product available in a range of solid colours. This is typically used for single-colour lettering, but simple multi-colour designs can be created by “layering” one colour on top of another, using special registration markings to aid in the exact placement of each layer for very accurate alignment.
2. Self-adhesive, computer-cut, “paint mask” vinyl. This is a special low-cost calendered material with excellent conformability properties. This material has a less aggressive adhesive backing, allowing it to be removed once the design has been painted onto the intended surface. Careful attention must be given to the drying times and second coat times of the paint used which is especially critical when painting layers on top of each other. Perfect for small service stencils.
3. Self-adhesive, computer-cut, “digitally printed” vinyl graphics. This is a process using a large-format solvent printer to print designs onto white calendered vinyl. The vinyl material is then fed into another large format machine to laminate a gloss (or satin finish) UV protective layer onto the vinyl. The design is then fed into a third large format machine to “contour-cut” the design to finished shape. This is perfect for complicated multi-colour designs such as flags, roundels or squadron crests.

CanMilAir Decals uses only the highest quality equipment and materials:

- Our self-adhesive vinyl is imported from the world leader in the industry from Wales, UK .
- The large-format cutter-plotter, solvent printer and cold laminator used to process the vinyl are all state-of-the-art machines in the vinyl industry.
- Significant investment in up-to-date computer processing, data storage and data management, graphic design software, multi-monitor display and work-flow management.

## Cast Films

Cast, or high-performance, films are considered to be a premium product with excellent durability and conformability characteristics. The term "cast" refers to the manufacturing process of this type of vinyl. Making a cast vinyl film is a lot like baking a cake. The process begins with a list of ingredients added to a churn in a predetermined sequence and mixed to ensure consistency. The liquid mixture is then poured onto a casting sheet and is then processed through a series of ovens which allows for the evaporation of the solvents until a solid "film" is left behind. The film is then wound up in large-diameter rolls for subsequent adhesive coating. The casting sheet determines the texture of the film.

Because the vinyl is poured on the casting sheet in a relaxed state, this material offers very good dimensional stability. This process also allows the film to be very thin which helps with the conformability of the product. Cast films are commonly used on commercial and recreational vehicles; military, civil and general aviation aircraft or maritime vessels where a "paint-like" finish, that will last a long time, is desired.

### Advantages of cast films:

- Shrinkage is the lowest of all vinyl. Since the film has not had any stress applied during the manufacturing process it does not try to resume or shrink back to its original form.
- Durability of cast films is higher due to the manufacturing method and the raw materials used.
- Cast films can be made very thin which produces a conformable product that allows application over substrates with rivets, corrugations, and complex curves.
- Cast films maintain their color and other properties better than other vinyl films. This results in better performance of pigments and UV absorbers.

## Calendered Films

Like cast, calendered film also gets its name from the manufacturing process. Calendered vinyl is formulated with similar raw materials as cast vinyl, except that no solvents are used. The batch is mixed and heated to a molten state that resembles pizza dough. Once the film reaches this state it is extruded through a die and is then fed through a series of rollers. These polished steel rollers progressively squeeze and stretch the vinyl into a flat sheet. Because the film is stretched into shape, it has some degree of memory and therefore is less dimensionally stable than cast vinyl films. This means that when a calendered film is exposed to heat the film will have a tendency to shrink or pull back towards its original form. Calendered films also tend to be thicker (usually 3 to 4 mils) than cast films because of the limitations of the process. This process is extremely fast and is ideal for bulk production runs making this film relatively inexpensive.

The quality of calendered films can range from economy to intermediate with durability of one to five years. These films generally are not recommended for vehicle applications because they are thicker, less conformable and less durable than cast films.

### Advantages of calendered films:

- Greater production yields equals less cost.
- Stiffer/thicker film means easier handling.
- Thickness of film increases resistance to abrasion.

Summary		
Attribute	Cast	Calendered
Durability	8 + years **	< 5 years **
Conformability	Excellent	Fair
Dimensional Stability	Excellent	Fair
Overall Cost	High	Low
Outdoor Usage	Excellent	Fair
Thickness	2 mil (0.002")	3 mil (0.003")
** This will be longer on "indoor-only" applications		