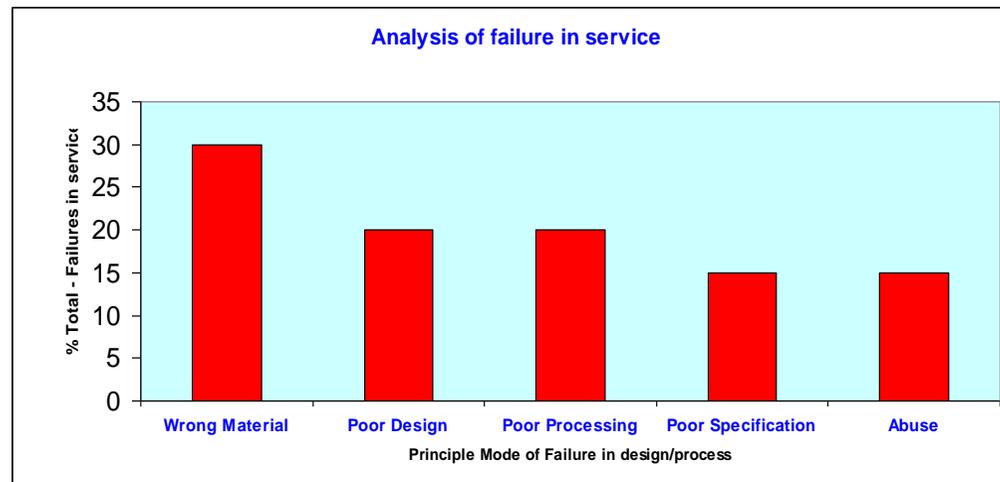


Acrylic or Polycarbonate

Designers Dilemma

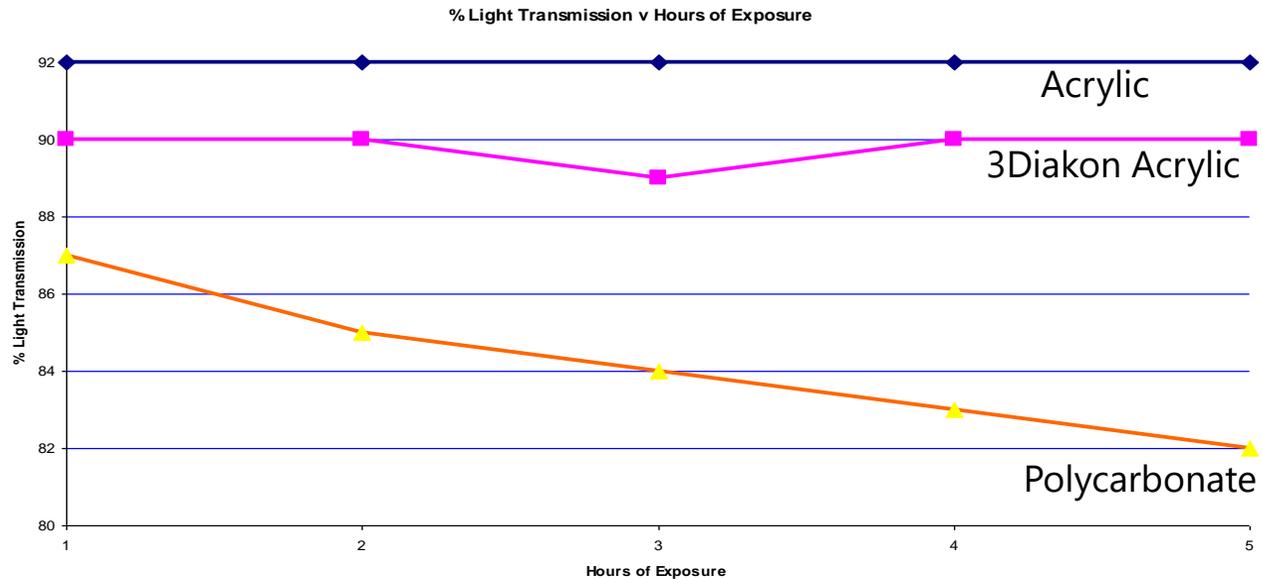
- No single material has all the characteristics required
- Balance short term and long term needs of processing and the product.
- Main causes of plastic product failure below demonstrate the **importance of material selection** as well as the design of the product and the quality of the processing.



Acrylic: outstanding inherent resistance to UV degradation.

Polycarbonate: modest UV resistance: cannot match the performance of acrylic even when UV-stabilised

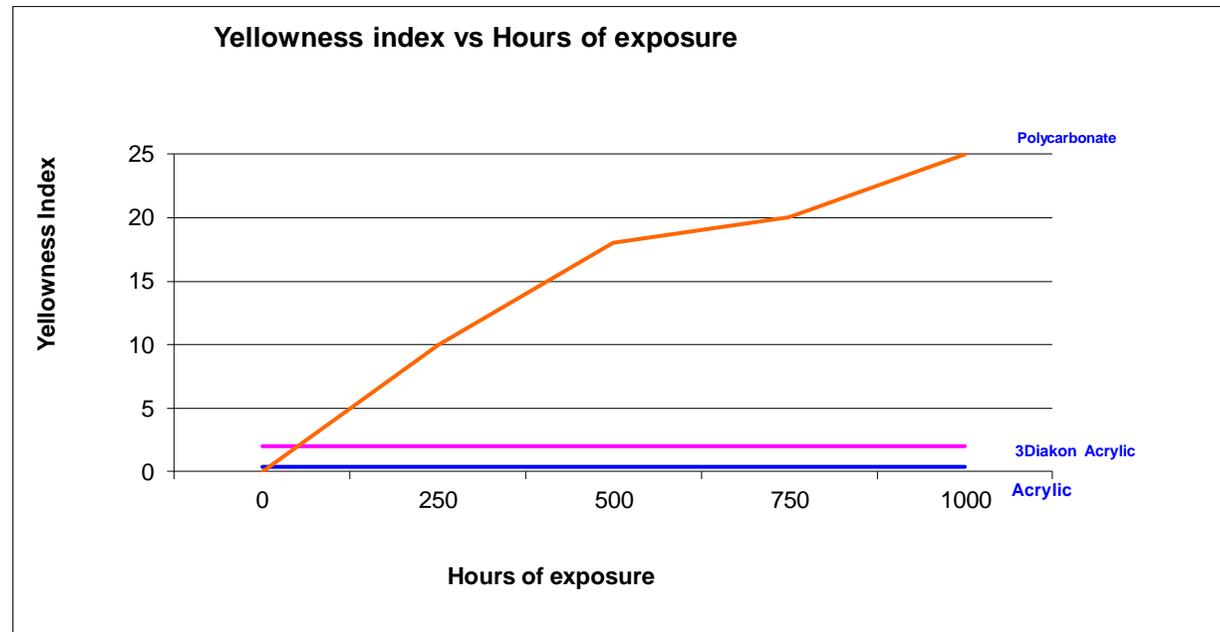
Light transmission data below show that the performance of polycarbonate over time is **inferior** to acrylics, gradually reducing in light transmission over time



Colour

The inherent UV stability of acrylic, combined with careful pigment selection, shows acrylic to be the preferred material where colour and colourfastness are key design features.

Yellowness index below shows how colour can be affected by UV degradation over time



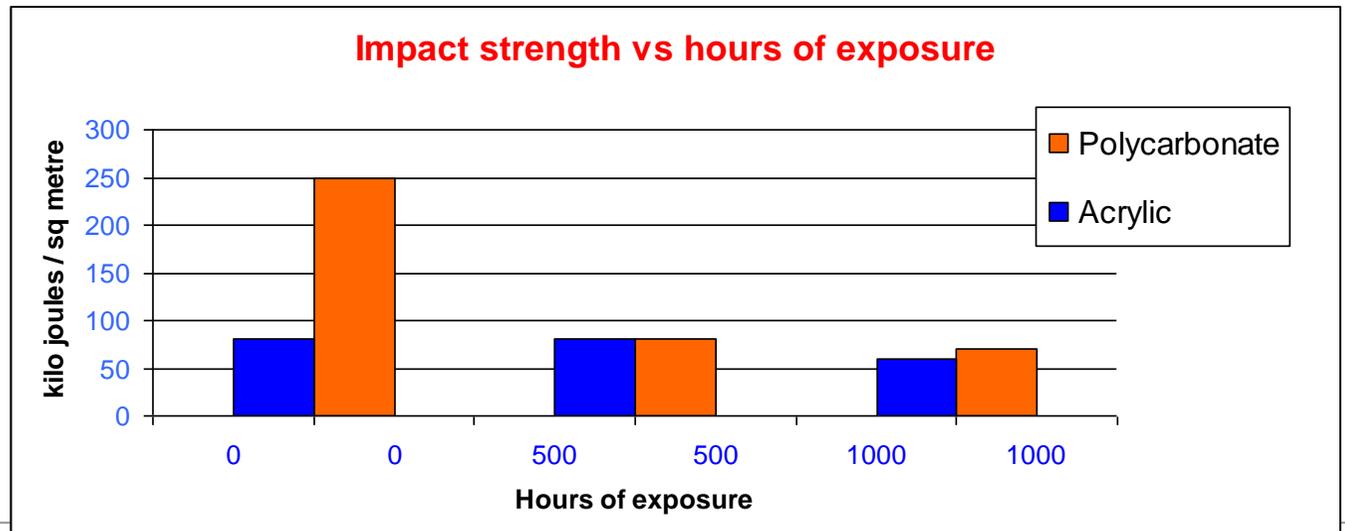
Toughness

Outstanding quality of polycarbonate is its inherent resistance to fracture under impact loading. (think of riot shields)

However, such high energy protection a rare requirement and under more common impact conditions the toughness of polycarbonate can now be matched by toughened acrylic , potentially making it a viable alternative.

Thankfully, polycarbonate riot shields rarely see the light of day. UV degradation seriously reduces the durability of PC. Preliminary accelerated weathering analysis as shown reveal a marked reduction in polycarbonate toughness with UV light exposure. This is one reason acrylics one are chosen for aircraft glazing.

BELOW: Impact strength vs hours of exposure



Hardness is typically measured in terms of ease of indentation. acrylic performs best, showing greater resistance to indentation and surface abrasion than polycarbonate.

Extremely difficult to inflict fingernail scratches on acrylic, which is one reason why acrylic is used in applications such as point of purchase, cosmetic packaging and piano keys.

Material Preparation

Acrylic needs drying before processing BUT part strength is not affected by the moisture level

Drying conditions are typically 2-4 hours at 80 deg C to give a moisture level below 0.1%.

Polycarbonate must be dried to below 0.02% because any residual moisture reacts to degrade the material, severely reducing the strength of the finished part. Aesthetically, the part might appear to be normal with no indication of problems until failure occurs in service.

Typical drying conditions for polycarbonate are 120 – 150 deg C for 2 – 4 hours, and the material must then be maintained above 120 deg C in the machine hopper.

Melt Processing

Acrylic is a thermally stable polymer with typically a 100C processing window (180 – 280 deg C).

Polycarbonate has a smaller processing window, generally between 260 and 320 deg C. Above their processing windows both materials will begin to decompose.