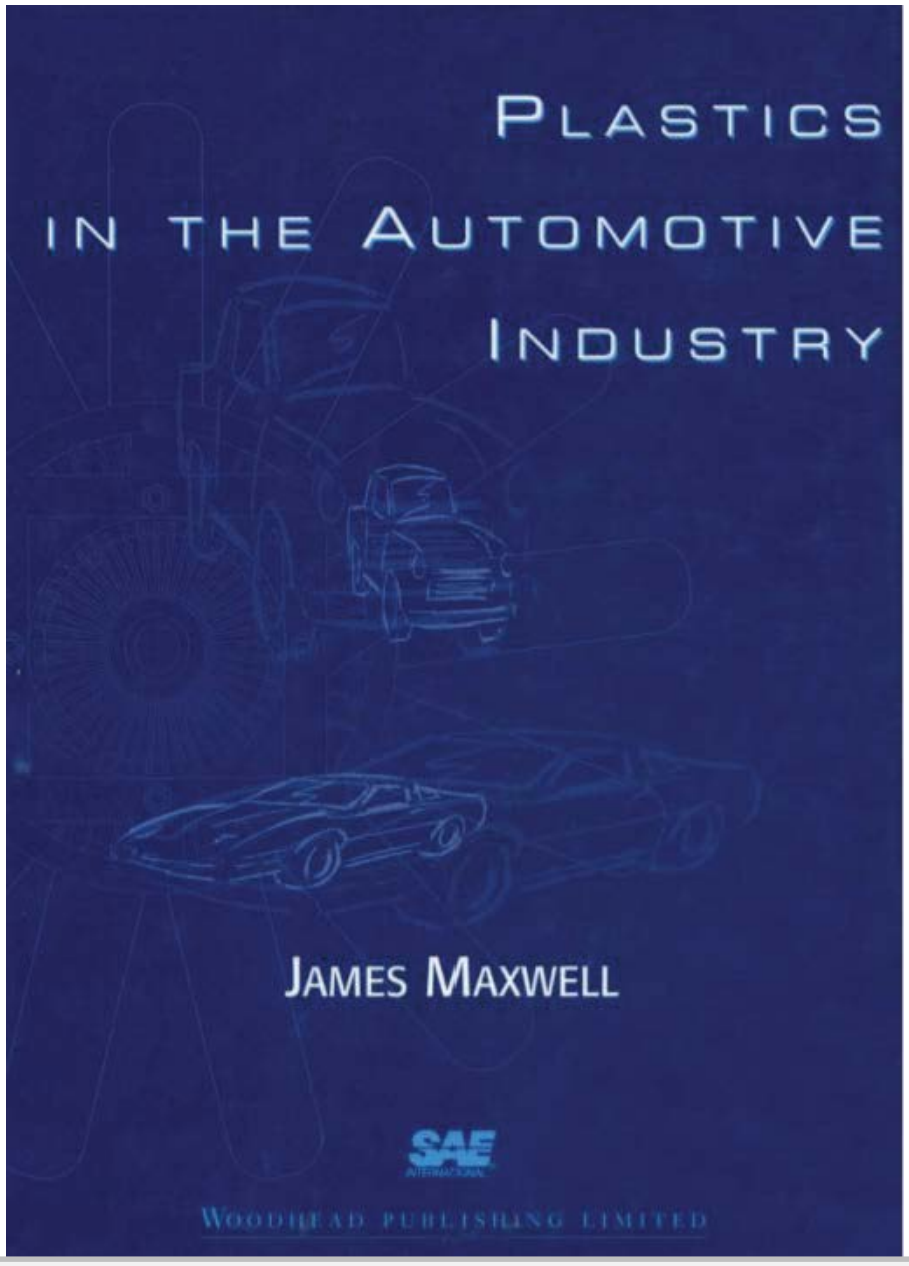

Plastics in the automotive industry

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the Mercedes 190 and Volvo 300 series, for example, and for the grilles located on the rear wings of the 1988 Nissan Bluebird.

The cowl panel grille, between bonnet and windscreen, can be a more demanding application. It needs to be resistant to weather and hot air, but more difficult to achieve in this very long, thin moulding are good mould filling and dimensional stability. Glass reinforced nylon has been used, but amorphous plastics offer lower shrinkage and thermal expansion and so are more suitable. ASA and ABS are widely used, or PC/ABS blends where greater heat resistance is needed (see Fig. 5.18).

Similar properties are required in the rear trim (applique) panels between the tail lighting, usually featuring ABS and ASA (Fig. 5.17). An integrated styling effect has also been achieved by using an acrylic moulding to link the two acrylic lenses.

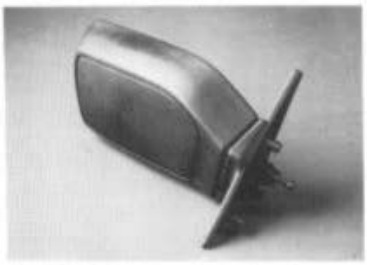
Spoilers

Rear spoilers tend to be the hallmark of the high performance top-of-the-range models, wherein aerodynamic refinements can be claimed. Production numbers are therefore relatively small, which explains why R-RIM PUR is the most commonly used material for rear spoilers, either produced in black or painted off-line in body colour, using very flexible PUR paints. Front spoilers are exposed to high wind forces, and consequently the material needs rigidity as well as toughness (see Fig. 5.19). Spoilers are increasingly becoming standard items, needed in much larger numbers. Injection moulded mineral-filled PA and PBT are used, along with blends such as PC/PBT, as well as SMC and R-RIM PUR. The problem of combining high rigidity and high impact strength in one component has been solved in the case of the 1993 Renault Safrane by using a thermoplastic elastomer for the impact-vulnerable spoiler base.

Mirrors

The door-mounted rear view mirror with a plastic body, now a virtually universal feature, was a French innovation, introduced with the Renault 14 in 1976. The great majority of today's mirror housings are moulded in glass reinforced nylon, in a variety of formulations based on both PA 6 and PA 66. Black UV-stabilized grades are normally used, with body colours an added refinement for high series models (see Fig. 5.20). Reinforced nylon is used because of the mechanical performance requirements of remote-controlled mirrors, especially the creep resistance needed for the mechanisms to survive the touch-up ovens. The precise grade selection depends on whether die-castings are used for any of the structural elements (still the

5.19 Front spoiler of Ferrari F40 in a polyurethane integral skin system (courtesy Dow Plastics).



5.20 Ford mirror housing in glass fibre reinforced nylon (courtesy ICI).

case with most designs). Bayer have taken the development to its logical conclusion by designing a mirror housing in nylon 66 reinforced with 33% glass fibre, which excludes metal entirely.

Materials other than nylon are increasingly entering this field. Plastics from BASF are used in the novel double mirror design for a Kaess-Bohrer Setra bus. The foot housing and the housing for both mirrors are injection moulded in ASA/PC blend, and the whole assembly is encased in vacuum-formed ABS.

Door handles

Exterior door handles need the same kind of properties as mirror housings. Glass reinforced nylon is popular in Europe; however glass reinforced PBT and polyarylamide are used for certain Ford, Peugeot and Volvo models, and acetal homopolymer for some truck cab handles (see Fig. 5.21). Initial

5.21 Iveco truck cab handle in acetal homopolymer (courtesy Du Pont).