



Enhancing supply chain choice through improved material knowledge

White Horse Plastics is known as a moulder of technical parts, processing a wide range of thermoplastics with a bias towards engineering materials. As a second tier supplier to the majority of major automotive manufacturers WHP is not unfamiliar to its customers as a partner in development. Both experience and tooling expertise are bolstered by strong relationships with leading materials suppliers¹, whose additional expertise reinforces the overall strength of the supply chain.

This case study describes how WHP used a part currently in production as a benchmark to investigate the benefits of using long fibre technology. The objective was not necessarily to identify a direct substitute for the part involved but rather, to assess the potential of the material for different applications.

The challenge

As anyone involved in the automotive supply chain will understand, there are constant pressures to reduce prices year on year in order to remain competitive, whilst continuing to improve product performance.

¹P WHP is one of a limited number of development companies working directly with a major European polymer supplier to benefit the industry as a whole.

The emergence of long fibre technology provided a material with a relative density of 1.22 over that of glass filled nylon at 1.36 in this case. This led to the suggestion that parts might be manufactured more cost-effectively due to a component price/mass advantage, as well as providing physically lighter mouldings with useful engineering properties.

Long fibre also appeared to offer a number of other advantages – in particular that of lower component warpage when compared with short fibre reinforced plastics. However, the requirement for any real alternative was to match or exceed the current properties of the short fibre filled polymers commonly used in structural applications.

The appraisal

In order to fully understand the capabilities, advantages and disadvantages in the use of this material WHP selected the Ford Focus C170 lower housing as the subject of a number of practical appraisals including:

- Load deflection (stiffness)
- Component distortion (as moulded)
- Proving test cycle (for gearshift housings)
- Component weight verification
- Processing needs and effects
- Design considerations

In addition WHP was able to enhance their feel for the Polypropylene based material by studying other attributes from empirical data such as:

- Acoustic behaviour
- Moisture sensitivity
- Thermal expansion
- Chemical resistance

These appraisals, though conducted mainly at room temperature, provided comparisons with the current component not only in the use of materials, but also related to total processing requirements and costs.

Potential advantages identified include:

- Low coefficient of expansion (similar to metals)
- Lower component distortion
- Potential ability to improve physical properties of base materials (creep, flex modulus)

...specific to Polypropylene:

- Potential reduction in component weight
- Low moisture sensitivity compared with Hygroscopic materials
- Acid environment capabilities
- Possible 2 shot advantages
- Some natural resonance and damping advantage.

Potential downsides are:

- Where temperatures exceed 120c
- Where abrasion is a consideration
- Where integral bearings are required
- Not suitable for class 1 finishes

Other considerations are the 'today'

price of developing polymer, typical component design constraints and the need to make minor modifications to both moulding machine and tool design in order to process effectively.

The results of this feasibility study have provided the team at WHP with an insight into the use of long fibre materials which point to a number of potential applications, but also highlight some 'perhaps nots'. It is hoped that sharing this information with customers will help them to make informed decisions by increasing their knowledge of materials for structural applications.



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