

HexMC[®] GUIDE

1. Introduction

This guide has been compiled to introduce HexMC[®] to potential users. It will explain the benefits of using HexMC[®], how it is processed, the properties of the material and potential applications.

2. Benefits of HexMC[®]

Why use HexMC[®]?

The lower weight and higher specific properties that composite materials offer over metals are well documented.

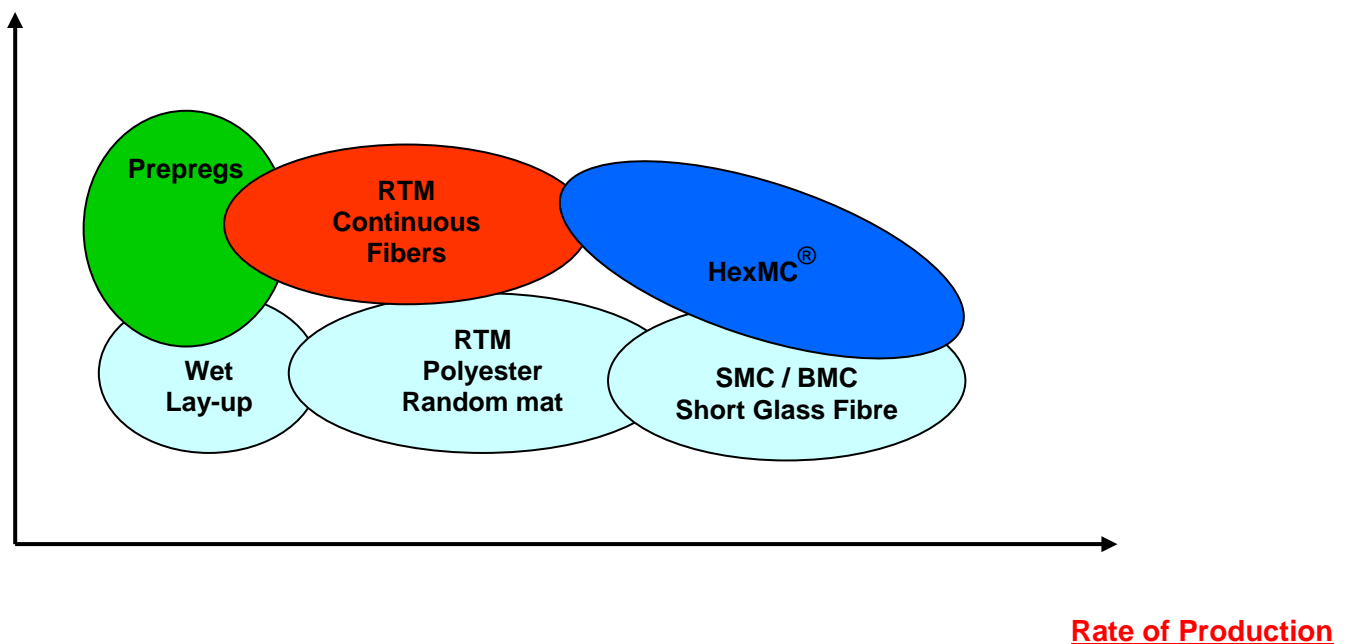
HexMC[®] enables composite parts to be manufactured for:

- Applications where complex 3-D shapes limit the use of typical fibre reinforced matrices/reinforced laminated composites ;
- Parts with abrupt change of cross-sectional thickness ;
- Applications where co-curing of elements is desired, i.e: metal inserts or mixing with other materials, etc... ;
- Use with automated production process similar to SMC moulding ;
- Production of parts with zero material waste.

HexMC[®] versus other technologies

The position of HexMC[®] technology, in terms of performance and production volumes, is compared to other fabrication processes below.

Performance



Product presentation

- [Epoxy](#) sheet moulding compound made of :
 - [Carbon high strength](#)
 - Bundles of 50 x 8 mm
 - 2000 gsm
 - 460 mm width
- Fibre volume content close to [60 %](#)
- [Fast curing](#) epoxy system



Roll of HexMC[®] material



HexMC[®] material

3. How to use HexMC[®] ?



HexMC[®] is ideal for the production of high volume components. Within industrial production facilities, high mechanical performance and high consistency can be achieved.

- For high volume production, the use of metallic moulds is necessary due to the high pressures and high temperatures required for shaping and curing HexMC[®].

Moulds are typically made of carbon steel. The surface can be nickel or chrome plated for optimum surface finish.

Mould design and technology are quite the same as for Sheet Moulding Compound processing.



- HexMC[®] is delivered in rolls. It is sufficiently pliable and tacky to be cut, stacked or rolled to form a mould "charge". The charge is placed inside the compression mould. Under temperature and pressure, the material flows and fills the mould, and then cures.

- Depending on the specific part to be moulded, the moulding pressure is between 50 and 150 bars at a temperature between 110°C and 125°C.

- The exact curing conditions are dependant on tool and part design. Typical cure cycle is 15 minutes at 120°C. According to part thickness, cure time can be adapted with the following rule: 1 mm more equal 1 minute more (ex: 20 min @ 120°C for 15 mm, 30 min @ 120°C cure cycle for 25 mm and above) .

For thicker parts, it is possible to keep a similar cure time and to complete polymerisation/cure by post-curing.

- HexMC[®] can be combined with a prepreg and/or laminate to increase the strength and stiffness of the part. Similar techniques can be used to meet specific cosmetic requirements.

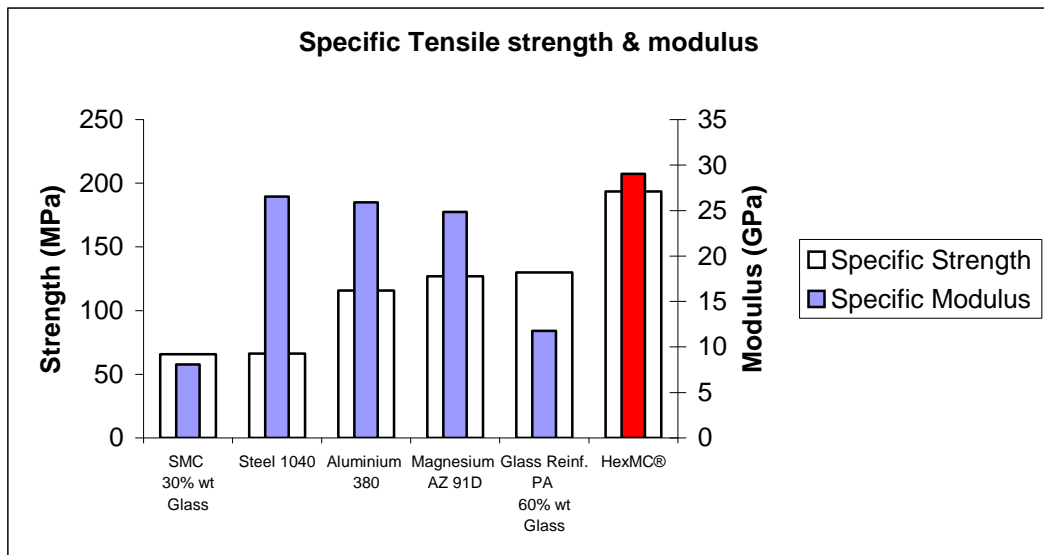
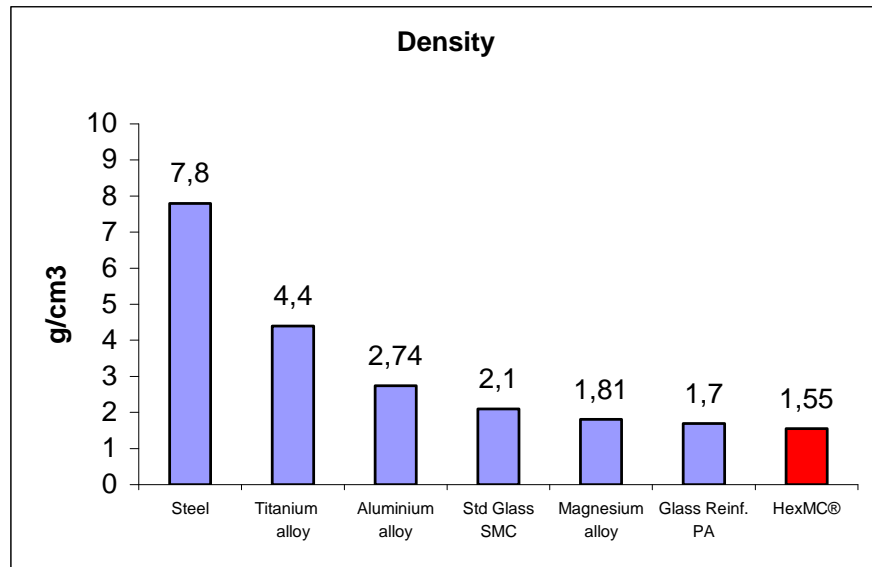
- HexMC[®] is formulated with an internal release agent, so the mould only needs to be coated with release every 5 parts (depending on part shape and mould design).

- Hexcel's Applications Technology group, with offices in Europe and in the USA, can support customers and provide expert advice on HexMC[®] in the following areas:

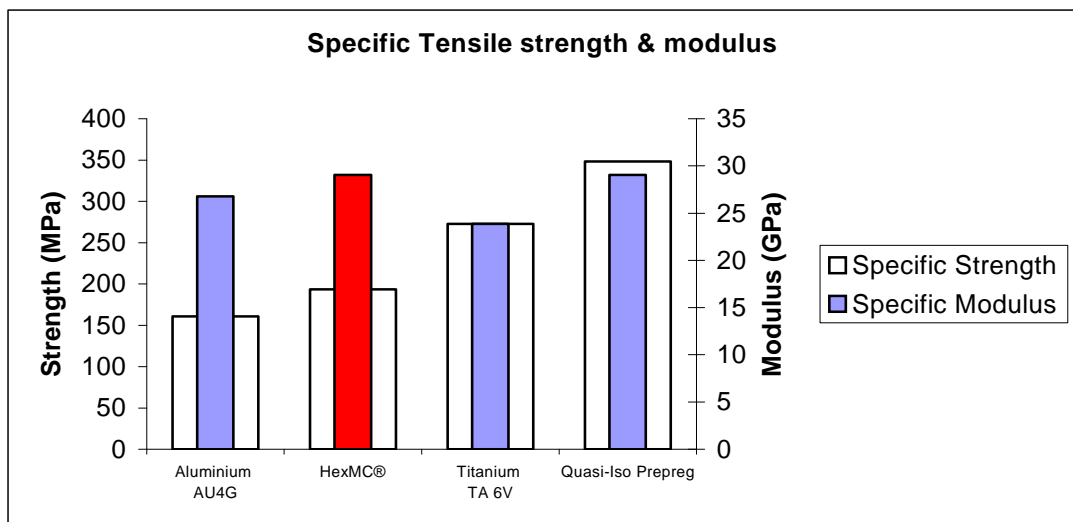
- ✓ Designing of parts and moulds
- ✓ Mechanical and physical testing of HexMC[®] for specific requirements
- ✓ Customizing of moulding process
- ✓ Customizing of pre and post moulding steps

4. Mechanical properties

HexMC[®] properties compared to castable metals, mouldable reinforced plastic and medium strength steel.



HexMC[®] compared to aerospace grade metals and a quasi-isotropic carbon/epoxy laminates.



Note : For more information, a specific product data sheet has been issued on the HexMC[®]/C/2000/R1A
 Revised October 2008
 Dagneux