



Fibres (un)limited

By Dr Filip Keulemans

The use of glass fibres for the reinforcement of dental polymers was already proposed in the early 1960s. At that time, the response was that the process to reinforce polymethyl methacrylate dentures with weaves of glass cloths was far too slow for everyday use. Although prefabricated carbon and glass fibre-reinforced posts were introduced in the mid-1980s, a major breakthrough came with the development and introduction of continuous, unidirectional pre-impregnated glass fibre-reinforced composites (FRC prepreps) in the early 1990s. Key features of this new group of FRCs are:

1. High fibre fraction (≥ 50 vol%)
2. Excellent wetting and impregnation of the fibres by the resin matrix
3. Available as an uncured prepreg (a fibre reinforcement that is pre-impregnated with resin)

From that moment on, FRCs became

more accessible for dentists and dental technicians and rapidly gained popularity. This was not only because they blend perfectly with contemporary treatment approaches such as tooth tissue preservation, metal-free and tooth-coloured restorations, but also due to the versatile fabrication procedure of FRC restorations. They can be fabricated immediately into the mouth of the patient (direct approach) or chairside (semi-direct approach) by the dentist and at the dental laboratory (indirect approach).

The resin matrix of most dental composites and FRCs comprises a cross-linked polymer such as Bis-GMA, TEGDMA or UDMA. A special group of FRCs polymer formulations are those that form an Interpenetrating Polymer Network (IPN). An IPN is a network formed by combining two or more polymers, which do not merge by chemical reaction but by interpenetration. For dental FRCs only



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