

## MACRO-LOCK OVAL DEVELOPMENT STORY

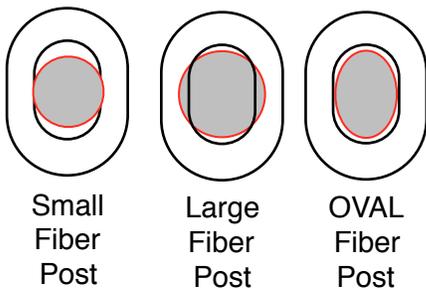
Root canals are rarely round; oval spaces are more common than round ones. In many cases endodontic treatment, and re-treatment, leave an over-prepared, compromised tooth with an ovoid and profoundly tapered space.

An anatomical study from 150 scanner sections from patients intended to receive treatment by implants confirmed the high frequency of teeth presenting oval root sections. Practically all mandibular teeth are concerned. On the maxilla only molars and central incisors escape this rule, with rather round sections (Cheleux, 2007). Anatomical study by Papathanassiou, (2005) confirms this.



Circular post systems are only effective in the most apical portion of the post space, because the majority of prepared post spaces demonstrate considerable flare in the occlusal half (Rosenstiel).

Moreover, post-placement in oval shaped root canals implies the sacrifice of dental tissue to adapt the canal shape to the post, thus resulting in decreased root strength. (Coniglio, 2008)



Small  
Fiber  
Post

Large  
Fiber  
Post

OVAL  
Fiber  
Post

Similarly, when the root canal is elliptical, a parallel-sided post will not be effective unless the canal is considerably enlarged. Adapting a oval space to accommodate a round post often requires sacrifice of sound dentin tissue, thus resulting in decreasing root strength (Grande, 2006).

Circular posts are commonly employed, and resin cement is used to compensate for their lack of adaptation to the canal walls. However, cement thickness may be a critical factor affecting the clinical performance of fiber posts (Grandini, 2005); it is correlated with the fit of the post within the post space with greater adaptation to the canal walls resulting in reduced cement thickness.

In summary, ideal adaptation is difficult to obtain when using a round fiber post in a canal with irregular anatomic configuration. (Scotti, 2013)

Many attempts to improve the adaptation of pre-formed fiber posts to the canal anatomy have been tested, such as combining small multiple posts in a single root canal, relining a pre-formed fiber post in combination with a dual curing resin cement to create an anatomical post, or modeling/carving cylindrical fiber posts to give them a shape as close as possible to the anatomy of oval root canals through the use of a diamond bur (Signore, 2011). While they may be effective, these require either multiple steps or multiple materials and interfaces.

Study data suggests that restorations with accessory posts or non-circular (oval) fiber posts have a higher survival rate in comparison to conventional round fiber posts (Baldissara, 2010).

Er, et al determined with finite element analysis that oval fiber posts are preferable to circular ones, in oval-shaped canals, given the stress distribution at the post – dentin interface.

This is a starting point for RTD, the French company that originally patented fiber posts. In 2001, RTD introduced a unique double-taper post design (DT Light-Post), which addressed the emerging flare dimensions in root canal treatments of round canals. This shape had displaced the parallel fiber post as the gold standard of fiber posts. In 2007 RTD, in collaboration with Acteon/Satalec, introduced an elliptical - shaped fiber post (Ellipson) which was linked to a proprietary ultrasonic tip. The concept was initially met with great enthusiasm, however the need for specific machinery and expensive tips proved expensive and impractical for most dentists. Furthermore, the post was available in only one size and was not truly oval-shaped.

Capitalizing on the growing popularity of its Macro-Lock brand, RTD created a "hybrid" post wherein the apical section is fitted to the existing system drills, but the post emerges into the widest flare available in a prefabricated post (metal or fiber or ceramic), while at the same time offering a parallel and oval coronal section of 6 mm length. This was developed with input and the direction from practicing clinicians, academics and endodontic specialists in North America, South America and Europe.

