

# Hands on with the new reciprocating motion file system

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The frontiers in dental technology are constantly in a state of flux. Today's instruments will become tomorrow's news, as metallurgical principles and manufacturing techniques continue to push the envelope. All of the major dental companies are actively involved in surpassing the boundaries of science and technology. This is especially true in shaping root-canal systems.

## Science and technology

Choosing a file system can be quite frustrating. The market is awash in choices. Most major dental companies confuse this issue by offering a plethora of options; one company offers more than ten distinct file lines. How does one choose? What are the parameters used to make the choice?

Dentists base their decisions on any or all of these:

1. price;
2. ease of use;
3. the number of files in each system;
4. safety;
5. what the company representative recommends;
6. the file system already in use when the dentist bought the practice.

As a practising endodontist I want a file system that is a combination of cutting-edge technology, ease of use and safety. The TF Adaptive system satisfies all of those needs for me. TF Adaptive files are manufactured from a single piece of triangular-shaped nickel-titanium (NiTi) wire, manufactured through a proprietary heating, twisting and cooling process, which then undergoes a wash process that minimises handling of the file. Minimal handling of the file in the manufacturing stage increases its ability to withstand torsional and cyclic stresses. This twisting creates a super-elastic file. First-generation NiTi files are lathe cut. Scanning electron microscope studies show that during the manufacturing process these files develop microcrystalline fracture lines, which under torsional



Fig. 1\_ The TF Adaptive system and small files.

According to the American Association of Endodontists, 41,000 root canals are performed each day worldwide. In the US, 15 per cent of people still avoid any kind of dental treatment. Statistics point to the need for endodontic treatment. In a busy generalist practice, most endodontic treatments are referred to the specialist. Since the middle of 2006 and the change in world economics, an increasing number of general dentists have begun performing endodontic treatment in the office. Academically, most dentists had limited exposure to endodontics during their student training; therefore, their confidence in performing endodontics in their office is low.

The goal of this article is to aid the reader in choosing a shaping system that is easy to use and simple in design with a focus on safety. Leonardo da Vinci once said, "Simplicity is the ultimate sophistication." The TF Adaptive system (Axis | SybronEndo) epitomises that concept (Fig. 1).

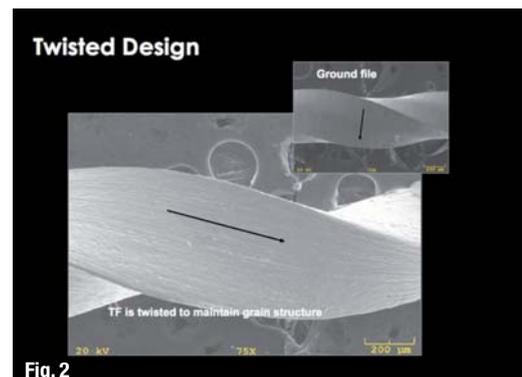


Fig. 2\_ The grain structure of a TF vs. lathe-cut (ground) file.



Fig. 3

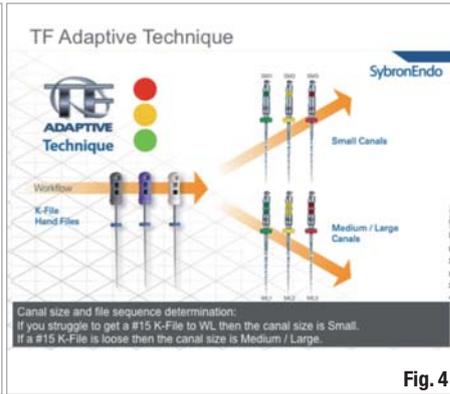


Fig. 4



Fig. 5

stress can lead to fatigue and fracture (Fig. 2). Thus, files with this property can lead to premature obturation under stress.

In any dental procedure, success is most likely when the clinician treats with confidence, competence, consistency, and most importantly, common sense. TF Adaptive files are designed primarily with safety in mind, and are used with the Elements Motor (Axis | SybronEndo). This motor is the brain of the system, employing a complex algorithm that detects file loading (Fig. 3).

TF Adaptive files are designed to decrease torsional fatigue, which occurs when a file locks in the canal during rotation. In addition, the amount of cyclic fatigue the file can undergo is increased owing to reciprocation algorithms in the Elements Motor, thereby increasing safety.<sup>1</sup>

The TF Adaptive system allows for 600 degrees of interrupted rotation when unloaded. When a load is detected, the file can rotate 370 degrees in a clockwise motion followed by 10–50 degrees of counter-clockwise motion. During clockwise rotation, debris is moved up and out of the canal, minimising apical extrusion of debris and decreasing post-treatment discomfort compared with the WaveOne system (DENTSPLY Tulsa Dental Specialties).

### Clinical impressions

One of the first things I noticed is that the shaping ability of the file continues the tradition of the Twisted Files (TF) shaping system (SybronEndo). Reciprocating motion adds a layer of safety that is unparalleled. Initially, it takes a short time to become used to the interrupted motion of the file. Thereafter, the beauty of the technique is its simplicity and ease of use. You place the file into the canal in a single, smooth motion. Once you feel the engagement, you remove the file from the canal and wipe it clean, looking for any visible changes in the flute. Then you irrigate the canal fully and if needed re-enter the canal with the same

file or move on to the next file in the shaping sequence (Fig. 4).

The system is colour-coded to mirror that of a traffic light. It is easy for your staff too, and markedly decreases the amount of stock you need to keep on hand to perform endodontics.

I found the files to be very easy to use. I found the shaping sequence logical and clinically relevant. The goal is to prepare the apex to at least a #35. This enables me to know that my irrigation protocol using the EndoVac (SybronEndo) will allow my irrigants to reach the apex in sufficient concentration to clean the root-canal system safely (Fig. 5).

The TF Adaptive system increases the clinician's ability to safely, predictably, and efficiently shape the root-canal system. It is a quantum leap in technology that offers unparalleled metallurgical advances, combined with motor technology, to create the safest shaping system currently on the market.

### Conclusion

As a clinical endodontist, I am always looking for a file system that will offer me a way to shape the root-canal system easily, predictably and most of all safely. Over the years, I have come across and used a myriad of file systems, each one promising to be the latest and greatest. Some were very aggressive, some were very stiff, and others tried to be one file fits all. Since incorporating TF Adaptive into my practice on a daily basis, and analysing the science behind the technology through a thorough review of the literature, I believe that TF Adaptive and reciprocating motion offers me the safest, most consistent way to shape a root-canal system.

### Reference

1. Gambarini et al., Influence of different angles of reciprocation on the cyclic fatigue of nickel-titanium endodontic instruments, *Journal of Endodontics*, 38/10 (2012): 1408–11.

**Fig. 3** The Elements Motor has pre-sets for TF Adaptive, TF Classic, the M4 motor attachment, and K3XF, and offers custom-speed settings.

**Fig. 4** Sequence recommendations for TF Adaptive.

**Fig. 5** The EndoVac apical negative pressure irrigation system.

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