MAILLEFER

ProTaper Ultimate™

Performance unlimited

dentsplysirona.com/protaperultimate

Brochure

Clinical video

Deep Shape by

Tip card

Step-by-Step sequence

Clinical research Fact file

Dentsply Sirona

ProTaper Ultimate™ Solution

A solution combining the latest generation of ProTaper files, enhanced disinfection and dedicated obturation that works seamlessly together.

Shaping

STANDARD

Slider 016.002v

Shaper 020.004v

F1 020.007v

F2 025.008v

F3 030.009v

LARGER AND STRAIGHTER CANALS ONLY

Slider 016.002v

FX 035.012v

FXL 050.010v

Motor settings: 400 rpm / 4-5.2 Ncm

Cleaning

Upon removing any given file, clean and irrigate with the Irrigation Needle

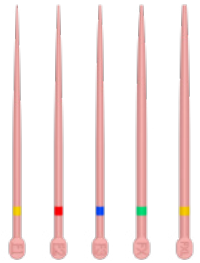
Irrigation Needle

SmartLite® Pro EndoActivator®

Obturation

Absorbent Points

Conform Fit® Gutta-Percha Points



AH Plus® Bioceramic Sealer

Shaping

1 Slider-Shaper-Finishers sequence to
cover a full range of anatomical situations

Deep Shape by

Slider

Can be used directly to **start the glide path** in the majority of cases*

K-File FREE

Shaper

Enhanced cutting efficiency and hauling of debris in the coronal two-thirds

1 Shaper

Finishers

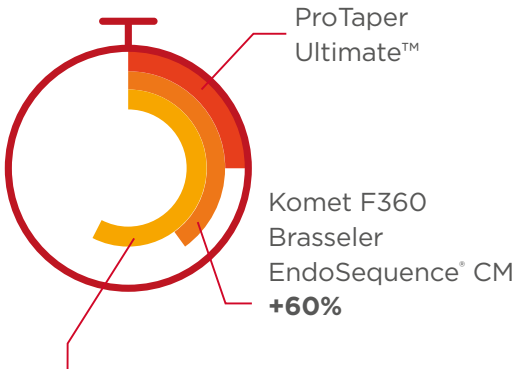
In the apical third, give you the **flexibility for the most challenging anatomies,** without breaking or unwinding

0 Unwinding

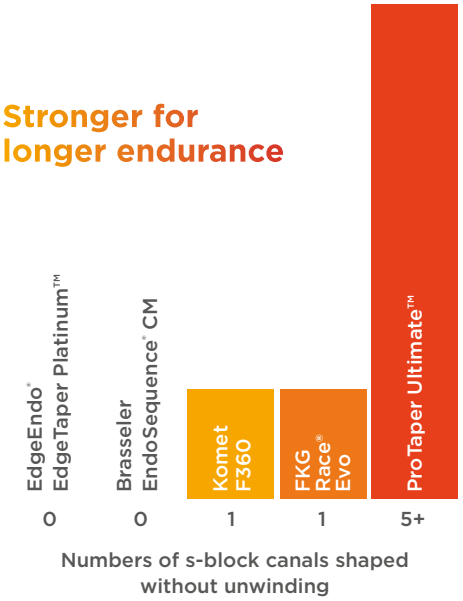
Our difference

100%
of users consider that ProTaper Ultimate™ files provide a predictable root canal preparation*

Shaping time



Stronger for longer endurance



60% faster than Komet F360 and Brasseler EndoSequence® CM
130% faster than EdgeEndo® EdgeTaper Platinum™

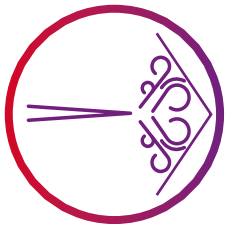
* According to a user evaluation

Cleaning

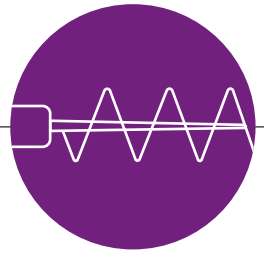
More than **25%** better cleaning efficacy vs. sodium hypochlorite soak without activation*

Irrigation Needle

The irrigation needle **curves and flex easily** providing an efficient cleaning and disinfection until the apex

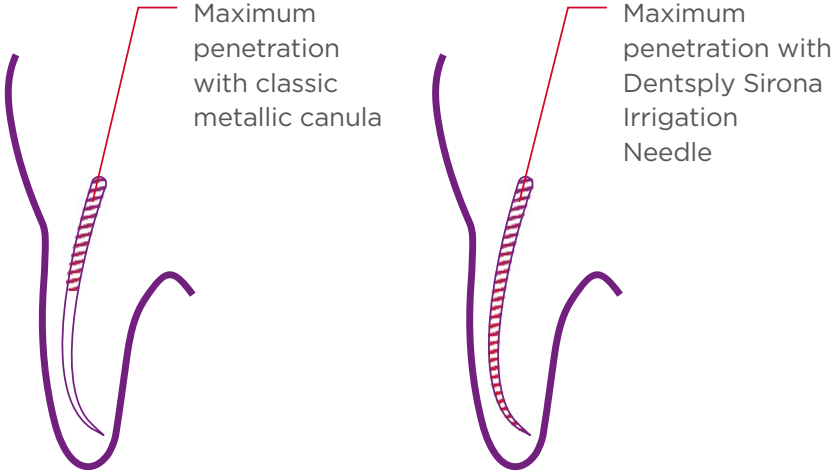


EndoActivator

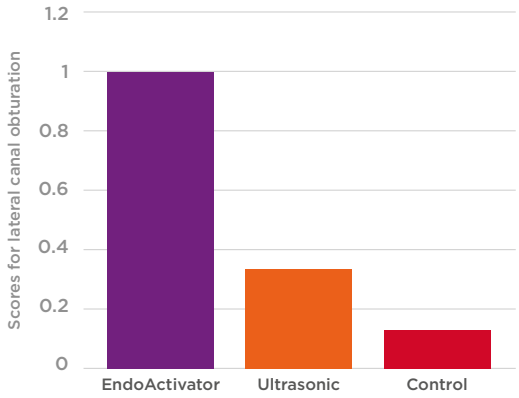


Activated fluids promote deep cleaning and disinfection facilitating 3-D obturation and long-term success

Our difference



Comparison of mean scores for lateral canals obturated



The EndoActivator® provided better obturation of lateral and accessory canals and resulted in less remaining debris**

* Only applicable for EndoActivator®

** A quantitative and qualitative analysis of ultrasonic versus sonic endodontic systems on canal cleanliness and obturation Valerie Kanter, DMD, Emily Weldon, DMD, Uma Nair, DMD, MDS, Claudio Varella, DDS, MS, Keith Kanter, DDS, Kenneth Anusavice, PhD, and Roberta Pileggi, DDS, MS, Gainesville, FL UNIVERSITY OF FLORIDA. (Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2011;112:809-813)

Obturation

Obturation with ideal fit
100% of the time

Bioceramic Sealer

Biocompatible
and does not stimulate periodontal tissue

60%
faster set time

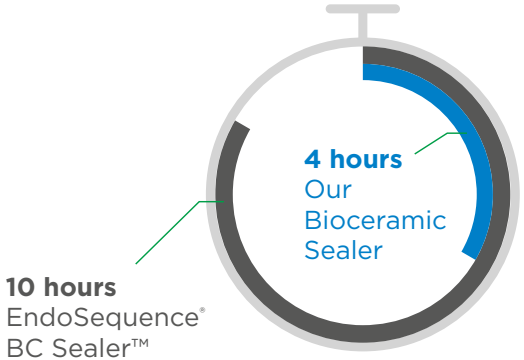
Conform Fit®
Gutta-Percha Point

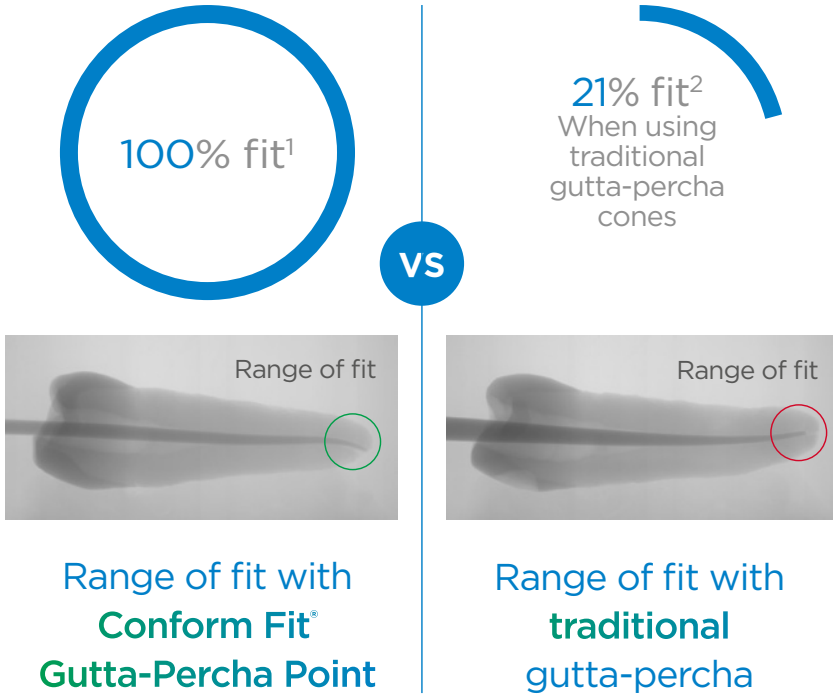
Less waste and saves time
because the first cone fits everytime

Precision injected master cone

Our difference

Setting time



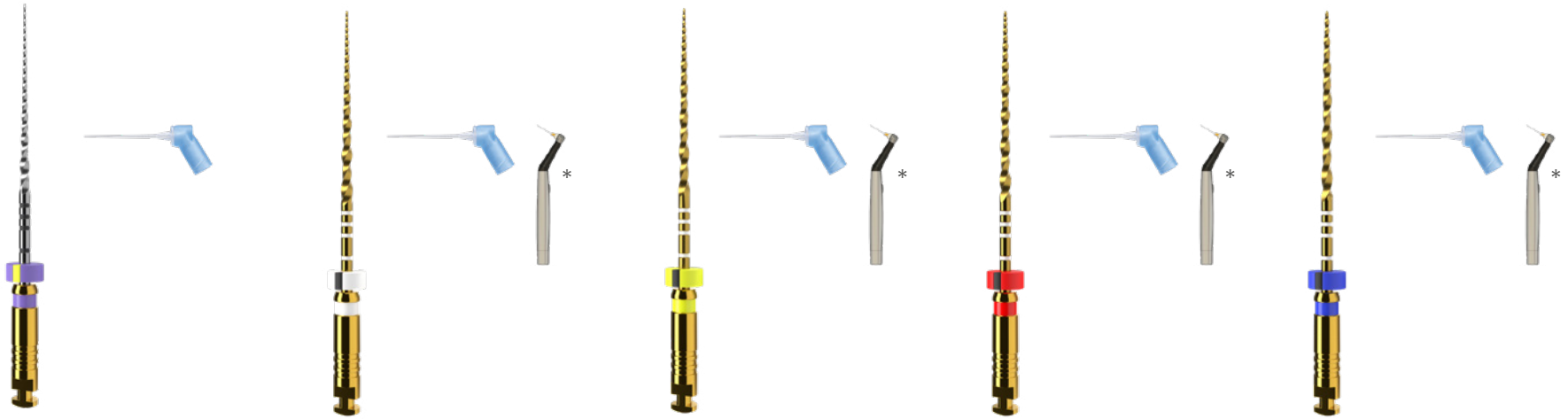


Range of fit with **Conform Fit® Gutta-Percha Point**

Range of fit with **traditional** gutta-percha

1 On 28 mold cavities
2 28 random cones

Step-by-step Guide **ProTaper Ultimate™ Sequence:**



Slider 016.002v | **Shaper** 020.004v | **F1** 020.007v | **F2** 025.008v | **F3** 030.009v

- Lubricants such as NaOCl, EDTA, ProLube, Glyde™ shall be used.
- The use of radiographs in combination with an apex locator and a tool for adjusting the silicone stopper to the correct working length is the appropriate method of working length determination.
- The ProTaper Ultimate™ instruments can be used with an outward brushing motion in all canals, especially those that exhibit an irregular cross-section, or with a light inward pecking motion to progressively advance toward the working length.
- Always cradle the handpiece in the webbing between the thumb and index finger. Avoid pushing; let the files passively progress and follow the Slidepath.

Motor settings: 400 rpm / 4-5.2 Ncm

* SmartLite® Pro EndoActivator® coming soon

Step-by-step Guide **ProTaper Ultimate™ Sequence for larger and straighter canal only:**

Slider 016.002v

FX 035.012v

FXL 050.010v

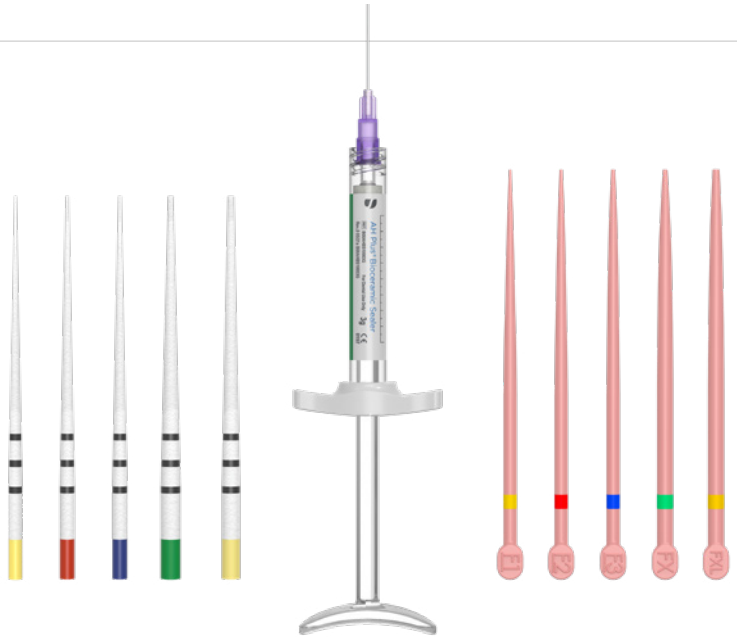
- Lubricants such as NaOCl, EDTA, ProLube, Glyde™ shall be used.
- The use of radiographs in combination with an apex locator and a tool for adjusting the silicone stopper to the correct working length is the appropriate method of working length determination.
- The ProTaper Ultimate™ instruments can be used with an outward brushing motion in all canals, especially those that exhibit an irregular cross-section, or with a light inward pecking motion to progressively advance toward the working length.
- Always cradle the handpiece in the webbing between the thumb and index finger. Avoid pushing; let the files passively progress and follow the Slidepath.

Motor settings: 400 rpm / 4-5.2 Ncm

* SmartLite® Pro EndoActivator® coming soon

Step-by-step Guide **ProTaper Ultimate™ Sequence Obturation and Accessories:**

Obturation



Select dedicated ProTaper Ultimate™ Absorbent Points to dry the root canals, AH Plus® Bioceramic Sealer to seal the canals and dedicated ProTaper Ultimate™ Conform Fit® Gutta-Percha Point corresponding to color code and size of the last instrument used during canal preparation.

Accessories

Dedicated manual versions available for all sizes

SX 020.003v
Orifice Opener

ProTaper Ultimate™ Step-by-Step procedure

1. Review different horizontally angulated radiographs to diagnostically **determine the width, length, and curvature of any given root and its canal(s)**.
2. Prepare an access that enables the **easy identification of each canal orifice**.
3. The auxiliary shaping file, SX, may be used when there is **restrictive space**, to pre-enlarge the body of a canal, or to relocate the coronal-most aspect of a canal away from an external root concavity.
4. In the presence of a lubricant, **select the Slider and PASSIVELY follow the canal**, in one or more passes, to its terminus. Determine working length (WL) using an **electronic apex locator in combination with a radiographic image**, then confirm patency.
5. If the Slider doesn't easily reach the canal terminus, **select a small-sized manual Stainless Steel (SST) hand file**. In the presence of lubricant catheterize the canal, establish working length, confirm patency, and verify the Slidepath. Now, repeat step #4 above.
6. Insert gently the **irrigation needle at the canal orifice**, start irrigating at the **coronal entry**. Bring the needle down into the canal while **irrigating abundantly until the coronal 2/3 of the canal is reached**. Irrigate in the canal with a continuous 2-3 mm back and forth movement. Irrigate with 1 to 2 ml of solution after each pass of instruments.
7. In the presence of NaOCl, **select the Shaper and advance along the Slidepath**, in one or more passes, until the WL is reached.
8. Upon removing the Shaper, **irrigate** as previously advocated in step #6, **EndoActivate to break up debris** and move it into solution, **then re-irrigate** to liberate this debris.
9. Reconfirm WL, especially in curved canals.
10. Select the **FINISHER F1 (020.007v) and passively follow the canal to the WL**, in one or more passes. Remove and inspect its apical flutes. **When loaded with dentinal debris, the preparation is finished**.
11. If the **FINISHER F1 is loose at length and its apical flutes are not loaded with debris**, select the FINISHER F2 (025.008v) and use it in the same manner as described step #10 above.
12. If the **FINISHER F2 is loose at length and its apical flutes are not loaded with debris**, select the FINISHER F3 (030.009v) and use it in the same manner as described step #10 above.
13. Upon removing any given file, **clean and inspect its cutting flutes, irrigate** as previously advocated in step #6, **recapitulate** with either a size 10 file or EndoActivator to break up debris, then re-irrigate.
14. Inspect the file's cutting flutes upon removal for the presence of unwinding, straightening or stretching. If deformation is noted, discard and use a new ProTaper Ultimate™ file.
15. The preparation is finished when the **apical extent of any Finisher is loaded with debris**, and the corresponding Gutta-Percha Point fits at the WL.
16. Once the preparation is finished, proceed with **3-D disinfection protocols with EndoActivator®**.
17. Select dedicated **ProTaper Ultimate™ Absorbent points** (corresponding to color code and size of the last instrument used during canal preparation) to dry the root canals.
18. Insert the **AH Plus® Bioceramic Sealer 24-gauge tip** no further than the **middle third of the root canal**. Inject the sealer until it is visible at the root canal orifice. Maintain the tip immersed in the sealer during injection to minimize the inclusion of voids.
19. Insert a dedicated **ProTaper Ultimate™ Conform Fit® Gutta-Percha Point** (corresponding to color code and size of the last instrument used during canal preparation) into the root canal and **push it to the apical stop**. Avoid excessive pressure to minimize or prevent extrusion beyond the apical foramen.
20. Cut and remove the coronal portion of the master cone at the root canal orifice. Compact the coronal portion of the cone with an appropriately sized and fitted plugger. Verify with radiographs.

Use the auxiliary Finishers in larger and straighter canals only, such as maxillary central incisors, some palatal or distal canals of molars, or when there is a pathologic or iatrogenic defect

1. Follow **steps #1 to #6** above.
2. Select either a mechanically driven or manual auxiliary file, **FINISHER FX (035.012v)**, when working length is established and patency is confirmed. Passively follow the canal to the WL, in one or more passes. Remove and inspect its apical flutes. When loaded with dentinal debris, the preparation is finished.
3. If the **FINISHER FX is loose at length and its apical flutes are not loaded with debris**, select either a mechanically-driven or manual auxiliary FINISHER FXL (050.010v) and use this file in the same manner described above for FINISHER FX.
4. The preparation is finished when the **apical extent of any auxiliary Finisher is loaded with debris**, and the corresponding Gutta-Percha Point fits at the WL.
5. Follow steps #16 to #20 above.

Dentsply Sirona
Research

FactFile

ProTaper Ultimate™
(Part 1 - File System)

ProTaper Ultimate™ is a root canal treatment solution combining:
- the latest generation of ProTaper NiTi files designed to create a deep shape (increased apical taper),
- an enhanced disinfection concept and
- a dedicated obturation system supplemented by the new AH Plus® Bioceramic Sealer.

This Fact File is part 1 of a series of Fact Files describing the scientific background of **ProTaper Ultimate™** and focusses on the **ProTaper Ultimate™** file system.

ProTaper Ultimate™ file system and the deep shape concept

Successful endodontic therapy requires shaping, cleaning and obturation of the root canal [1]. The necessary mechanical preparation of the canal generates debris and a smear layer [2], that can compromise the seal of the root canal filling. The removal of the debris and the smear layer by irrigation is less predictable in the apical part than in the coronal part of the canal [3] and can be significantly influenced by the shape of the apical canal [2]. With ProTaper,
Dentsply Sirona introduced the unique concept of deep shape (increased apical taper) to the market. Consequently, the deep shape philosophy also became an inherent part of the new ProTaper Ultimate™ file system and is obtained by the combination of specially designed files (Figure 1).

The ProTaper Ultimate™ rotary file system consists of a Slider, a Shaper and Finishers (F1, F2, F3, FX, FXL). The Slider is used to create a reproducible pathway to the apical/canal terminus and paves the way for the Shaper. The Shaper's enhanced cutting efficiency and hauling of debris in the coronal two-thirds provides an easy and safe access to the apical third for the Finishers. The Finishers finally create the ProTaper Ultimate™ deep shape. All files work at the same recommended motor speed of 400 rpm, and at the same torque range of 4 – 5.2 Ncm.
A dedicated Hand-Use version is available for all ProTaper Ultimate™ files with the same technical features as the rotary ones.

Dentsply Sirona

Research

FactFile

ProTaper Ultimate™

(Part 1 - File System)

Slider
016.002v

Shaper
020.004v

Finisher F1
020.007v

Finisher F2
025.008v

Finisher F3
030.009v

Fig. 1 Slider, Shaper and Finisher File (F1/F2/F3) depending on canal anatomy. The assortment is completed by one Orifice opener (SX) and two auxillary Finishers (FX, FXL), numbers below the instruments provide the size and the taper.

To maintain the original ProTaper philosophy of deep shape, the Finisher files have an apical preparation size with a taper of at least 7% (F1: 7%, F2: 8%, F3: 9%). The F2 Finisher file, for example, creates a 19% higher apical volume compared to comparable ISO files [4]. Studies show that the ProTaper deep shape leads to optimized hydraulics of the disinfection fluid [4] and better evacuation of the debris, preparing the canal for a better fill with better seal and less apical extrusion, while preserving the upper canal portion thanks to the multiple taper design.

In a user study with 21 dentists, who treated 210 canals with the ProTaper Ultimate™ file sequence, 95% stated that they achieved a sufficient “deep shape” for a sufficient disinfection and 85% of the participants agreed that ProTaper Ultimate™ showed a sufficient debris evacuation [7].

Dentsply Sirona

Research

FactFile

ProTaper Ultimate™

(Part 1 - File System)

ProTaper Ultimate™ file system - mechanical data

Based on a series of new patent-protected instrument geometry features and the application of different heat treatments, ProTaper Ultimate™ shows higher flexibility, higher unwinding resistance and higher cyclic fatigue resistance compared to ProTaper Gold® and other comparable files on the market [5, 6]. In comparison to ProTaper Gold®, ProTaper Ultimate™ F1 showed 13% higher flexibility and 75% higher cyclic fatigue resistance and ProTaper Ultimate™ F2 showed 30% higher flexibility and 30% higher cyclic fatigue resistance [5].

When forcing different instruments into "S"-shaped canals, ProTaper Ultimate™ was able to treat a significantly higher number of root canals before showing signs of unwinding (Figure 2); and showed the fastest canal preparation compared to other files already on the market (Figure 3).

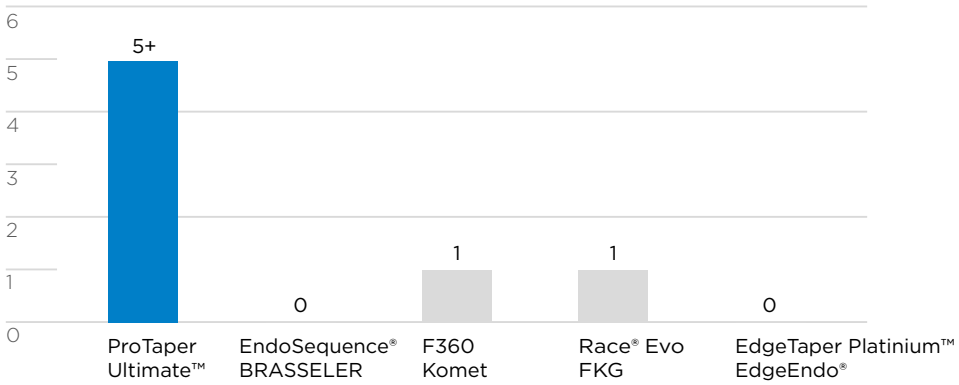


Fig. 2 Number of "S"- shaped canals (picture on the right) treated before unwinding could be detected by visual inspection. ProTaper Ultimate™ shows higher unwinding resistance compared to all competitor files, n=5 per group [6]. Brasseler EndoSequence®, Komet F360, FKG Race® Evo, EdgeEndo® EdgeTaper Platinium™ are not registered trademarks of Dentsply Sirona Inc.

Dentsply Sirona
Research

FactFile

ProTaper Ultimate™
(Part 1 - File System)

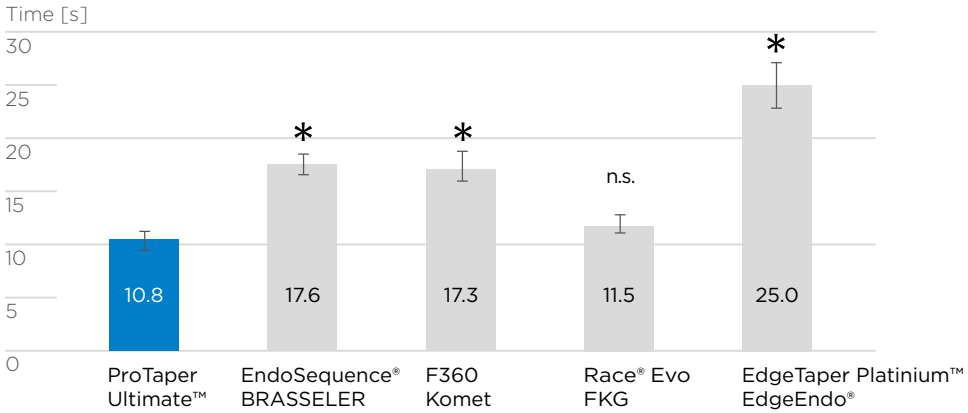


Fig. 3 Time required to prepare a "S"-shaped canal to an apex size of 0.25 mm (n=5 per group) [5]. Brasseler EndoSequence®, Komet F360, FKG Race® Evo, EdgeEndo® EdgeTaper Platinium™ are not registered trademarks of Dentsply Sirona Inc. * $p < 0.05$; n.s. not significant.

Fatigue strength of ProTaper Ultimate™ files was also tested using a tempered stainless-steel set-up simulating a canal with a 90° angle and a radius of curvature of 3 mm. They all exhibit a high fatigue resistance, with life expectancies from 30 % to 550 % higher than other comparable files on the market (Figure 4) [5].

Dentsply Sirona

Research

FactFile

ProTaper Ultimate™

(Part 1 - File System)

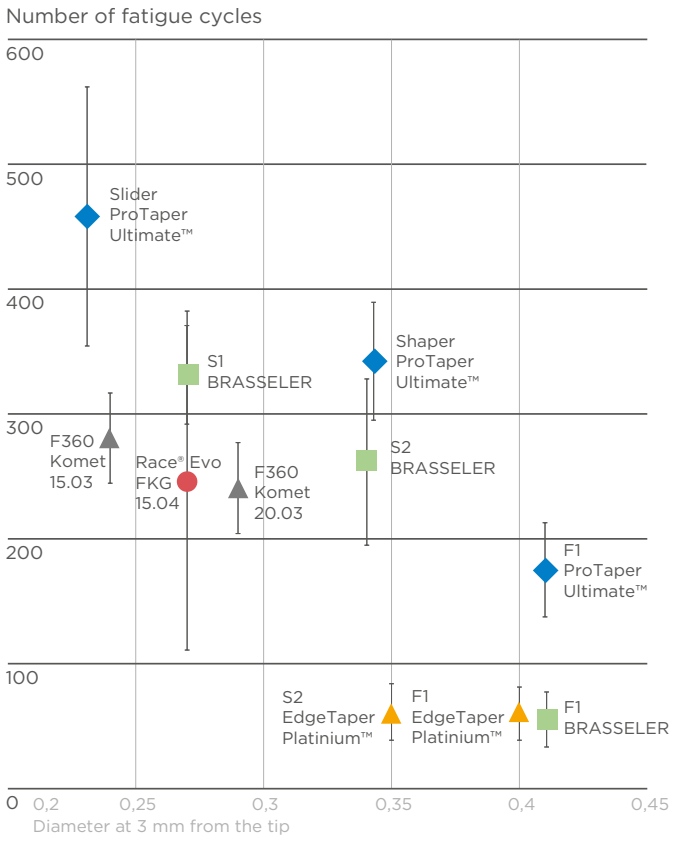


Fig. 4 Fatigue resistance of ProTaper Ultimate™ files and competitor files in a 90° angle (3 mm radius of curvature) (left) and image of the fatigue testing set-up (right). Brasseler EndoSequence®, Komet F360, FKG Race® Evo, EdgeEndo® EdgeTaper Platinium™ are not registered trademarks of Dentsply Sirona Inc.

Dentsply Sirona
Research

FactFile

ProTaper Ultimate™
(Part 1 - File System)

ProTaper Ultimate™ file system - design features

A specific parallelogram cross section geometry with variable acute angles at different lengths of the instrument was applied on all files (Figure 5). This allowed to specifically adjust the cutting efficiency of each part of the file depending on the expected workload in certain areas during operation. Additionally, this positively influences the flexibility and unwinding resistance of the files.

By using specific alternating off-set machining manufacturing process, the files possess a geometry in which the center of mass of the instrument is not aligned with the center of rotation. This reduces the stress level during cutting and increases the available space for debris removal.

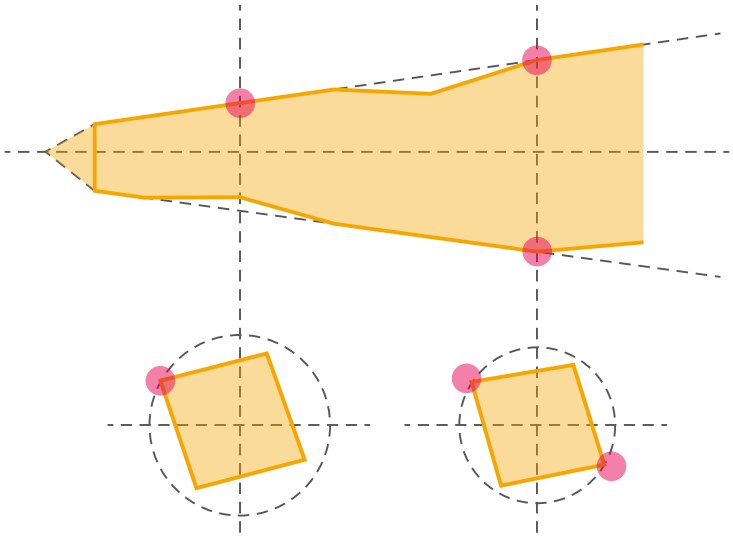


Fig. 5 Parallelogram cross section of ProTaper Ultimate™ files. Variable acute angles are applied at different lengths of the file. The off-centered geometry in certain parts of the file was achieved by alternated off-set machining.

Dentsply Sirona

Research

FactFile

ProTaper Ultimate™

(Part 1 - File System)

The Slider is made of NiTi which received a pre-thermal treatment during wire production (M-Wire® technology). This allows a certain rigidity of the file to secure the pathway of the canal and to remove restrictive dentin and other calcifications without the systematic need of a K-File. In a user study with 21 dentists, who treated 210 canals, 95% stated that the ProTaper Ultimate™ Slider provides a smooth reproducible pathway to the apical terminus, without the need of a K-file in 63 % of the cases [7]. The Shaper and Finishers received a post-grinding heat-treatment to account for a proper negotiation of the canal curvature without transportation and without unwinding issues. The Shaper and the Finishers F1-F3 received a so called “Gold heat-treatment” and the auxiliary Finishers FX and FXL received a so called “Blue heat-treatment”. In the same user evaluation as mentioned above, 85% to 90% of the dentists agreed that ProTaper Ultimate™ has a sufficient flexibility and unwinding resistance [7].

In conclusion, the ProTaper Ultimate™ file system showed higher fatigue strength in canals with a 90° angle, and a higher performance with the fastest treatment time and highest unwinding resistance, compared to ProTaper Gold® and other files on the market.

References:

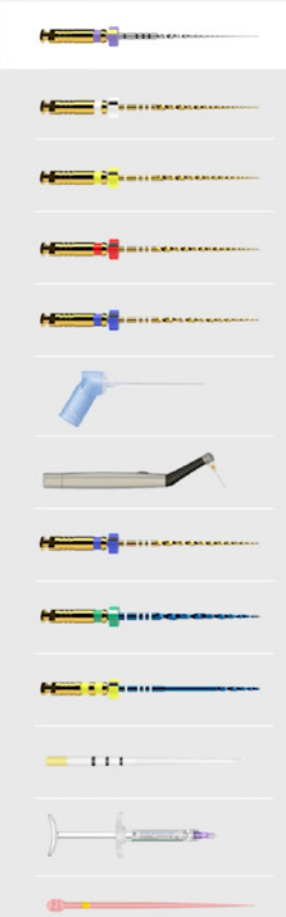
1. Löst C. Quality guidelines for endodontic treatment: consensus report of the European society of Endodontology. International Endodontic Journal. 2006;39(12):921-930.
2. Haapasalo M, Endal U, Zandi H, Coil JM. Eradication of endodontic infection by instrumentation and irrigation solutions. Endodontic Topics. 2005;10(1):77-102.
3. Haapasalo M, Shen Y, Wang Z, Gao Y. Irrigation in endodontics. British Dental Journal. 2014;216(6):299-303.
4. F. Bronnec, S. Bouillaguet, P. Machtou. Ex vivo assessment of irrigant penetration and renewal during the final irrigation regimen. International Endodontic Journal, 43, 663–672, 2010.
5. Data on file: test lab: 21/039
6. Data on file: test lab: 21/031
7. Data on file: User evaluation 1000-TF_6_TR_000915

Deep Shape Shaping

ProTaper Ultimate™
Endodontic Files

016.002v **Slider**

Shaping



ProTaper Ultimate™

Dentsply Sirona

ProTaper Ultimate™

SHAPING

STANDARD

Slider 016.002v

Shaper 020.004v

F1 020.007v

F2 025.008v

F3 030.009v

LARGER AND STRAIGHTER CANALS ONLY

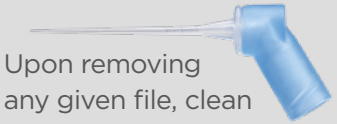
Slider 016.002v

FX 035.012v

FXL 050.010v

Motor settings: 400 rpm / 4-5.2 Ncm

CLEANING



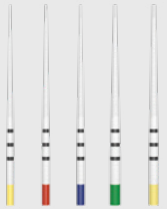
Upon removing any given file, clean and irrigate with the Irrigation Needle

Use SmartLite® Pro EndoActivator® to remove debris

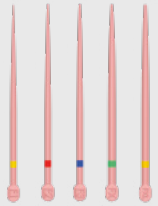
Coming soon

OBTURATION

Absorbent Points



AH Plus® Bioceramic Sealer



Conform Fit® Gutta-Percha Points

ACCESSORIES

Dedicated manual version

SX Orifice Opener