

ProTaper® Universal Nickel Titanium Files

by Julian Webber



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Julian Webber is the Director of the Harley Street Centre for Endodontics, a state of the art facility dedicated to endodontic excellence. He is widely recognised as an expert on the use of nickel titanium in root canal preparation as well as re-treatment procedures. He is a faculty member of the Pacific Endodontic Research Foundation in San Diego, California where he has perfected and taught all aspects of endodontics under the microscope

ProTaper® rotary nickel titanium were first introduced by DENTSPLY Maillefer in 2000. These very easy to use instruments revolutionised root canal preparation with their innovative multiple taper design features, combining safety and efficiency.

In 2003, in an effort to widen the popularity of these instruments to general practitioners and endodontists alike, a hand version was introduced. The hand instruments answered the concerns of torsional and fatigue breakage of the rotary version as well as providing an economical saving as no motor was required.

In 2006, DENTSPLY Maillefer launched the ProTaper Universal System with modified design features from the original ProTaper, expanded rotary and hand preparation files, matching paper points, gutta percha points and ThermoFil® style obturators for canal filling. A true system-based approach to endodontics.

In addition, the requirements for root canal re-treatment have been met with the addition of 3 dedicated files for the removal of failing gutta percha and non resin based paste root fillings.

The design, modifications and additions are as follows:

Rotary and Hand ProTaper Universal

1. Shaping Files

- Shaper 1 (S1) prepares the coronal portion of the canal. The instrument performs its own Crown Down approach establishing a large glide path due to the multiple tapers it exhibits along the cutting portion. This provides passive penetration for the next instrument in the series.



- Shaper 2 (S2) prepares the middle portion of the canal. This instrument refines the shape in the body of the canal to accommodate the safe placement of the first finisher.



- Sx provides increased coronal flare and is a substitute for traditional Gates Glidden. It is 19mm long and has 9 compacted tapers from D0 – D9.



Shaping instruments S1 and S2 are now available in 21mm, 25mm and 31mm versions.

2. Finishing Files

ProTaper Universal Finishing files now have less aggressive, rounded tips to avoid apical ledging and transportation. Also, in an effort to increase flexibility the cross-section has been reduced. The coronal taper

of the ProTaper Universal finishing file has been further reduced to improve tactile feel apically and minimise the contact area of the instrument to the apical last 4mm only.

- F1 finishes the apical preparation with a tip diameter of 0.20mm and a taper of 7%



- F2 finishes the apical preparation with a tip diameter of 0.25mm and a taper of 8%



- F3 finishes the apical preparation with a tip diameter of 0.30mm and a taper of 9%



- F4 is a new file and finishes the apical preparation in larger canals with a tip diameter of 0.40mm and a taper of 6%



- F5 is a new file and finishes the apical preparation in larger canals with a tip diameter of 0.50mm and a taper of 5%



All files are available in 21mm, 25mm and 31mm.

All Hand ProTaper have softer silicone handles for improved tactile feedback and comfort.

ProTaper Universal Paper and Gutta Percha Points

1. Paper points matching the final finishing files are now available to dry the canal. They are available as colour-coded F1, F2, F3, F4 and F5 they are all highly absorbent.



2. Gutta points matching the final finishing files and shape of the prepared canal are available to fill the canal singularly or as a tapered point for warm gutta percha techniques. They are available as colour-coded F1, F2, F3, F4 and F5

Gutta percha should be used in conjunction with an approved sealer for improved obturation. An ideal sealer is AH Plus® available from DENTSPLY Maillefer. It is particularly suitable for warm techniques.



ProTaper Universal Gutta Percha Obturators

1. Matching Thermanal style obturators are available in colour-coded sizes F1 to F5. They are coated in a low viscosity alpha phase gutta percha.

2. These obturators are heated in a Thermanal® oven and sealed into the canal with AH Plus® sealer.



ProTaper Universal Re-treatment Files

1. D1 is the shortest file and first used to remove gutta percha in the coronal portion of the canal. It has a sharp tip (ISO 30) for initial penetration, a taper of 9% to match most coronal taper. They should be used with a dedicated motor such as the X-Smart® rotating at between 600-800 r.p.m.



2. D2 is the next in the sequence. It is longer than D1, has a rounded tip and so is less aggressive with less chance of canal transportation. It shows a reduced taper of 8% to match mid root taper, a tip size of ISO 25. It too is rotated at 600-800 r.p.m.



3. D3 is the longest file in the series to remove apical gutta percha. It has a taper of 6% to match apical taper, a tip size of ISO 20 and also has a rounded tip to prevent canal transportation. It is rotated at 600-800 r.p.m.



ProTaper Universal Re-treatment files can be used in conjunction with a new solvent DMS IV® to aid softening of gutta percha and non resin based pastes.

ProTaper Rotary and Hand Instrumentation Protocol

1. Initial negotiation up to 2/3 canal length by hand using ISO standard files 10 -15 or Senseus Profinder 10, 13, 17 using a viscous chelator such as DENTSPLY Maillefer Glyde® (page 8). This establishes the all important "Glide Path".

2. Take S1 to 2/3 canal length.

3. Take SX to the same point (optional). Gates Glidden can also be used to increase coronal flare.

4. Confirm canal patency and working length up to ISO 15 hand. Use an electronic apex locator (page 21) to the "00" reading.

5. Take S1 and S2 to working length.

6. Gauge foramen diameter with ISO hand files.

7. Take Finishing file 1 (F1) to working length.

8. If required take F2, F3, F4 and F5 to working length after apical gauging.

Rotary Files are used with a dedicated motor such as the X-Smart® (page 21) at 300 r.p.m and the manufacturers recommended torque settings.

The hand files are used in a reciprocal action, clockwise to counter-clockwise through 180 degrees. All files are available in lengths 21mm, 25mm and 31mm.

The following radiographs demonstrate the results obtained using ProTaper Universal rotary or hand files.

Conclusions

The exciting innovations and additions to the ProTaper line ensure that quality conventional and re-treatment endodontics is now within the scope of all clinicians.

ProTaper Universal Rotary treatment



Fig 1a: Caries and endodontic infection

Fig 1b: Crown and caries removed. 3 canals shaped with ProTaper Rotary.

Fig 1c: 1 year recall. Excellent healing

ProTaper Universal Hand treatment



Fig 2a: Showing long curved roots with infection

Fig 2b: Root treatment complete using solely Hand ProTaper Universal

Fig 2c: Six months recall. Excellent healing