



Research Paper

## XP Endo File System – A Review

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### ABSTRACT

Clinical research has still focus on three-dimensional (3D) cleaning, shaping, and obturation of the oval root canal by improving irrigation, creating new alloys for instruments, and creating new sealers. This article only deals the MaxWire® technology instruments XP Endo® Shaper, Finisher, and XP Endo® Retreatment file and analyzes how they are effective in 3D cleaning and shaping, in biofilm removal, triple antibiotic paste removal, and also for debris and smear layer removal.

**KEYWORDS:** MaxWire®, XP Endo® file

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### I. INTRODUCTION

The need for an excellent 3D canal cleaning and minimal invasive treatments has led to the development of XP-endo Shaper. It is introduced by FKG Swiss endo. It is a single file for complete shaping. The MaxWire and Booster Tip techniques combined together for the excellent features of XP-endo Shaper. The ISO diameter changes from 15 to 30 during cleaning and shaping procedures of root canal. The primary purpose of any endodontic treatment is to shape the root canal with its original anatomy and to eliminate microorganisms such as in the case of infected root canals and remaining debris and smear layer which harbor microorganisms and their by-products. Bacteria remaining in the root dentine or in the periradicular tissues should be eliminated in order to improve the prognosis, and this should be achieved without damaging the tissues. Despite different instrumental methods, it has been shown that only 30%–40% area of root canal surfaces are clean and the remaining area are untouched.[1,15] It mostly happens due to smear layer which obstructs the penetration of intracanal disinfectants[4] and sealers into the dentinal tubules, which may lead to failure of sealing the canals.[2] This smear layer forms on the dentinal walls[7,8] during the shaping of root canals. Several irrigation solutions have been introduced to decrease the residual debris, necrotic tissues, bacteria, and the smear layer, which are formed by mechanical instrumentation in the root canal system[4,9] such as sodium hypochlorite, deproteinizing agents, ethylenediaminetetraacetic acid, calcium-chelating agents, conventional syringe irrigation method, and endoactivator system. All these methods are found insufficient for complete cleaning of the complex anatomy of the root canal system such as isthmus, fins, and lateral and accessory canals.[10,15] Hence, this article discusses the newer generation file (XP Endo®) from FKG, Dentaire SA, La ChauxdeFonds, Switzerland, which is expanding in nature, due to MaxWire technology.(Fig 1) XP Endo Shaper® (XPES) and Finisher files are more effective in debris and smear layer removal.[11] They facilitate irrigation, and are effective in biofilm removal from the main canal as well as from the deep, narrow apical groove.[12] In all rotary instruments, the most worrying issue is the risk of fracture to which they are subjected. XP Endo Shaper® (XPES) and XP-Endo-Finisher™ (XPEF) files is continuous rotation file. Both of them are able to perform at variations in temperature and to take on a predetermined shape inside the root canal, at body temperature and it also have high flexibility.[13,14]

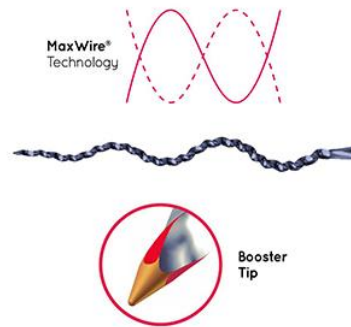


FIGURE 1

**Characteristic features of XP-endo Shaper:** It has an ISO No 30 and is intended for single use only. The optimal speed ranges from 800-1000 rpm. It is available in 21 mm, 25 mm and 31 mm. It has a minimum taper of 4 %. It is available in 3 files and 4 files sequences.

**XP Endo Shaper**

XPES file was introduced by FKG in 2016 for 3D canal shaping. This instrument is also manufactured in MaxWire alloy; it has a 4% taper and an ISO #30 apex.(Fig 2)The anatomy of the instrument is unusual, classic conical instrument that impresses its shape in canal, but it has a waves throughout its body which, during expansive rotation instrument impact the canal surface in its best way (Adaptive Core Technology). The tip of XPES also has a booster tip. It has six cutting blades for optimum file guidance in the canal; the minimum diameter of the tip is #0.15 with the maximum diameter of #0.30. If used at body temperature, the instrument returns to shape outlined for austenite which it is subjected (800 rpm) and its excellent flexibility makes it possible to cover taper up to 8% and canal diameter up to #0.90. The taper is 1%. This file has M phase below 35°C and change to austenitic at above 35°C along with taper of 0.02–0.08 and tip size is #30–#90. It works with a minimum torque of 1 Nw and hence, the risk of creating a dentin crack is minimized.[15]



FIGURE 2

**XP-endo Shaper sequences**

It consist of 4 and 3 file sequences. The first system known as XP-endo Shaper Plus sequence consist of K File (10 and 15), XP-endo Shaper and XP-endo Finisher. It is used for comprehensive treatment, from glide path to canal cleaning, as well as excellent shaping respectively. The 3 file system consist of K File (10 & 15) and XP-endo Shaper. It is used for glide path, and shaping respectively. Dentists use varieties of NiTi files. XP-endo Shaper(XP), Protaper Gold (PTG), Self-adjusting file (SAF) are extensively used for cleaning and shaping of root canals.(Fig 3) Due to excessive instrumentation during chemomechanical preparation, microcracks occurs on the dentin. Based on the usage of the above-mentioned files, it does not create microcracks. Vertical root fracture occurs in many root canal treated teeth. It may lead to loss of tooth structure.(2, 3) Over instrumentation also results in the formation of craze lines. Due to the continuous masticatory forces, it results in the vertical root fracture (2, 4). Presently announced files known as the XP-endoShaper (XP)(FKGDentaire,LaChaux-de-Fonds,Switzerland) has a rotary NiTi snake shaped instrument. The file has an initial taper of .01 in its M phase when it is cooled. The taper of the file varies to 0.04, when it is exposed to 35°C. If the file is used separately, it has a minimum canal preparation of 30/.04. The pressure that is applied on

the dentin is extremely less by XP. This feature helps in the significant reduction of microcracks. It is the best file system which can be used in complex canals due to its high flexibility. Cyclic fatigue is relatively lesser in this file system (5). XP has a unique feature of 3-dimensional cleaning and shaping. It helps in the complete chemomechanical preparation in the complex canals. It is made up of NiTi MaxWire (Martensite-Austenite). The unique feature of this alloy is that it provides excellent flexibility. (5) The defects in dentin triggered by the NiTi file systems which ranges between (4%-80%) (3). when the percentage of taper increases, it results in the higher incidence of dentinal defects. It occurs due to the stress on the canal walls. None of the literature has mentioned about the crack formation in dentin due to the usage of XP. The design of XP results in increased flexibility during high rotational speed (i.e., 800 rpm). (6) The excellent flexibility of XP results in prevention of microcracks in dentin due to the heat treated NiTi instruments. This feature differentiates XP from the traditional NiTi file systems.



FIGURE 3

### XP Endo Finisher

XPEF file was introduced by FKG in 2015. It is suggested to be used at 800 rpm and 1.0 Newton Torque with irrigating solution after root canal preparation to size #25 or longer. The instrument's diameter is ISO #0.25 and its taper is equal to 0. (Fig 4) Bao et al. in 2017 [12] concluded that XPEF file helps remove biofilm from the main canal as well as from the deep, narrow apical groove. Keskin et al. evaluated the efficacy of XPEF file in removing calcium hydroxide from simulated internal resorption cavity in 2017.[15] Many studies compared the XPEF file-cleansing capabilities to Passive Ultrasonic Irrigation, Vibringe syringe (Vibringe B. V. Corp, Amsterdam, Netherlands), and Photon-Initiated Photoacoustic Streaming (PIPS), both in the removal of calcium hydroxide and antibiotic dressing pastes and also in the removal of biofilm from the canals. [11,12] It has proven to be most effective almost in all situations. In 2016, Elnaghy et al. conducted a comparative study on the effectiveness of XPEF file. They found that XPEF file is similarly effective in the removal of smear layer and debris when compared to Endo Activator in curved root canal. Azim et al. and Alves et al. in 2016 performed a comparative analysis between XPEF file and the latest generation Ni-Ti instruments on the ability to disrupt biofilm and confirmed that the latter still left a portion of unremoved bacteria in statistically significant values. XP Endo Finisher file (XPEF) can be used along with root canal preparation with standard Ni-Ti files after XPES. Final cleansing maneuvers are done with the XPEF file.[15]

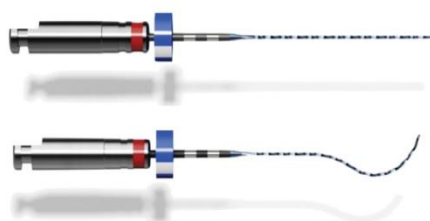


FIGURE 4

### XP Endo Finisher- R

XPEF-R® File was introduced in 2017, FKG completes the range of these instruments with one dedicated to retreatment: the XP-Endo Finisher-RTM (XPEF-R). The XPEF-R has stronger core than XPEF and a diameter of ISO #0.30. The quality of cleaning and removing gutta-percha is superior.[15] In 2019, Taxiarchis G. Kontogiannis et al. concluded that XPEF-R file significantly improves the removal of AH Plus sealer.



FIGURE 5

## II. DISCUSSION

A new expandable, newer generation XPES and Finisher (FKG Dentaire SA, La Chaux-de-Fonds, Switzerland) has been recently introduced. New nickel–titanium (Ni-Ti) forms have been developed by heating the alloy during the process of manufacturing, which results in combination of heat treatment and hardening, and this increases the flexibility of Ni-Ti instruments.[15] It is manufactured for shaping the three-dimensional (3D) instrumentation irregularities of root canals.[16] XPES uses a rotary Ni-Ti snake-shaped instrument. This file has an initial taper of 0.01 in its M phase when it is cool. Upon exposure to body temperature (35°C), the taper changes to 0.04 according to the molecular memory of Austenitic phase. XP achieves a final minimum canal preparation of 30/0.04 when used alone. According to the manufacturer, XP applies minimal stress to dentin walls, thereby minimizing the risk of microcracks in the dentin. XP can adapt easily to canal irregularities and has excellent resistance to cyclic fatigue.[14]

In 2015, FKG manufactured an equally singular file, the XP Endo Finisher® (XPEF), which was developed with the purpose of refining the canal in order to increase the effect of irrigants and improve smear layer removal from the walls. The instrument is made up of an alloy patented by FKG called MaxWire (Martensite-Austenite Electropolish -FleX, FKG Dentaire). According to the manufacturer, the file is straight in M phase when cooled, and it changes into A phase when exposed to body temperature where it will have its unique spoon shape with a length of 10 mm from the tip and a depth of 1.5 mm because of its molecular memory.[14,15]

## III. CONCLUSIONS

Clinical experience and research shows that yet there is no perfect method to accomplish an endodontic treatment and also there is no universal instrument to make it possible to clean the whole canal. However, recent technology using XP-Endo system has certainly allowed us to move forward in order to reduce the risks of failure in endodontic treatment and increase the healing percentage. Further studies are needed to confirm the efficacy of this new file system.

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Nil.

### Conflicts of interest

There are no conflicts of interest.

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