

# MounceFiles: A safe, economical and efficient option for canal preparation

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Fig. 1a

Figs. 1a & b\_The MounceFile SNT Assorted Pack.

Opinions vary as to the best means to achieve three dimensional, cleansing, shaping and obturation of the root canal system. Emerging technology, literature research and proven clinical success all provide clinicians with options, evidence and methods for their clinical techniques. Presently, there is no commercial consensus on the optimal methods for canal preparation, especially when considered across the wide range of clinical cases encountered. The options in the marketplace are myriad—DENSTPLY, Coltène Whaledent, Axis | Sybron, SpecializedEndo, Brasseler, Ultradent.

Taking into account the present state-of-the-art in nickel-titanium science and manufacture, literature evidence and extensive clinical experience, what follows are the author's chosen materials and meth-

ods of shaping root canal systems, i.e., the MounceFile. This article was written both to introduce the MounceFile and suggest that the reader compare his or her present systems and treatment strategies for achieving the goals of canal preparation.

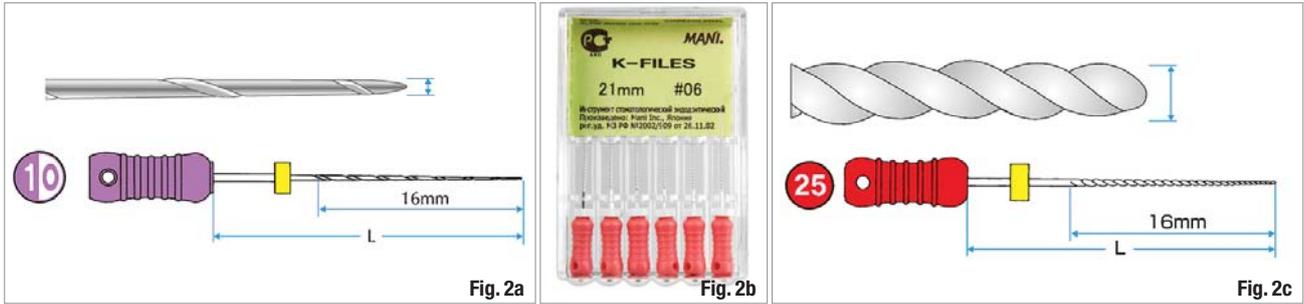
The goals of canal preparation are to:

- \_ Maintain the original position of the canal.
- \_ Maintain the original position and size of the apical foramen.
- \_ Prepare a tapering funnel with narrowing cross-sectional diameters (in essence, to mimic the shape of a tornado).
- \_ Prepare a taper that is proportional to the external dimensions of the root that does not predispose the root to subsequent vertical root fracture.
- \_ Prepare a taper that allows cone fit with tug back and ideal obturation hydraulics during down pack with warm vertical obturation techniques (and warm techniques of all types).
- \_ Prepare a taper that optimizes the necessary volume and space for activation of endodontic irrigants.

Among other valid and clinically proven marketplace choices, MounceFiles represent a literature-based, clinically valid, safe, efficient and economical option for canal preparation.



Fig. 1a



**Fig. 2a** Mani D finders.  
**Fig. 2b** Mani K files.  
**Fig. 2c** Safe-ended Mani hand SEC O K file.

### Universal application

It is a personal bias that not every instrumentation system is applicable to all canal anatomy encountered. Canal anatomy is infinite in its diversity (three-rooted lower molars, etc.), variety (length, curvature, etc.), clinical challenge (resorption, immature apices, etc.) and the environment in which these canals are treated (limited opening, excessive swallowing by patients, etc.). "One size fits all" algorithms worksome or most of the time, but given the above variables, in the wrong clinical situation, otherwise typical clinical actions can lead to iatrogenic events.

MounceFiles come in two forms of nickel titanium, Controlled Memory (CM) and standard nickel titanium (SNT). CM nickel-titanium files result from a proprietary thermomechanical treatment of nickel-titanium whereby once curved, the files remain curved. Clinically, this means that as a CM instrument rotates through a curvature, the file remains curved, a valuable attribute in a complex canal. SNT files are superelastic, meaning they spring back to their original shape after being stressed (used clinically). CM instruments have shown increased resistance to cyclic fatigue and other attributes relative to their superelastic counterparts.<sup>1-5</sup>

MounceFiles are square in cross section, non-landed and of constant taper throughout their cutting flutes. The square cross-section provides added fracture resistance relative to triangular crosssections due to the increased metal mass in this dimension.

The MounceFile Assorted Pack is designed more for the general dentist and the typical endodontic case. Specifically, this pack is ideal for teeth that are 18–23 mm long, have roots of moderate curvature and canals that are located with relative ease and negotiable with hand files. The MounceFile CM Assorted Pack and MounceFile SNT Assorted Pack are configured (from left to right in the box) from larger tapers to smaller: .08/25; .06/25; .04/25; .03/25; .02/25; .03/30 (Fig. 1).

The MounceFile system was developed to give endodontists a virtually unlimited choice of tapers and tip sizes to custom assemble their file configurations and handle virtually any clinical case. If the endodontist (or general dentist handling complex cases) wants to customize his or her selection of MounceFiles, there are 75 combinations of taper and tip size available in both CM and SNT files. Tapers include .01 in addition to the tapers present in the assorted packs. Tip sizes among the tapers range from 20–60, depending on the taper.

The breadth of this product line gives an unlimited set of options for clinicians of any experience level (from dental school graduates to veteran endodontists) to treat virtually any canal (from a straightforward #8 to a more complex 25 mm C shaped #18 with multiplanar curvature and a relatively open apex in proximity to the inferior alveolar nerve).

### Clinical technique

The following directions for use and FAQs have been adapted from PDFs on the [www.MounceEndo.com](http://www.MounceEndo.com) website. These directions reference the MounceFile CM Assorted Pack. The directions for the MounceFile SNT Assorted Pack are identical to those below.

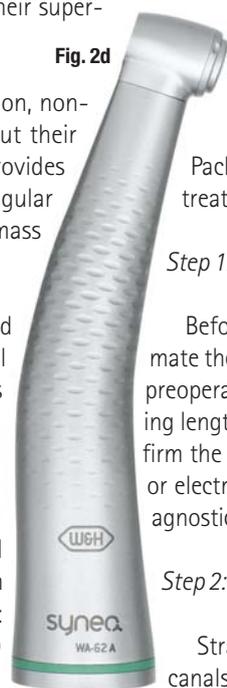
Specifically, the MounceFile CM Assorted Pack is used within the context of the following treatment steps:

#### Step 1: Estimate the true working length

Before making access, the clinician should estimate the true working length (TWL) from the initial preoperative radiographs. This is the estimated working length (EWL). The EWL is used later to help confirm the TWL, which is determined radiographically or electronically (Foramatron-Parkell, Elements Diagnostic Unit-Axis/Sybron, Root ZX II-J Morita).

#### Step 2: Prepare straight-line access

Straight-line access is achieved when all of the canals can be seen in one mirror view and hand



**Fig. 2d** Synea W&H WA-62, a reciprocating hand piece.

**Fig. 3a**\_The MounceFile .08/25 rotary nickel-titanium orifice opener in Controlled Memory (retains its shape once a curve is placed upon it).

and rotary files can be inserted without deflection off the axial walls of the preparation.

*Step 3: Remove the cervical dentinal triangle*

The .08/25 MounceFile CM is inserted 2–3 mm below the orifice and removed with a brushing motion up and away from the furcation (against the canal wall of greatest thickness). After removal of the CDT, the pulp chamber and canal orifice is irrigated copiously.

*Step 4: Shape the coronal third*

After CDT removal, using light pressure, the .08/25 MounceFile CM is gently inserted to the point of first canal curvature. Insertion is gentle and should ideally take about three seconds. The file is not used with a pecking motion. If the file will advance easily and shape the coronal third or advance to the point of first curvature, then it can be taken to this level.

If the .08/25 MounceFile CM file will not easily reach the point of first curvature (or shape the coronal third) after several insertions, do not force the file to reach length. Move to Step No. 5. Irrigate copiously after every insertion of the orifice opener.

*Step 5: Establish and/or confirm apical patency*

Stainless-steel K files are used to establish and/or confirm apical patency (Mani K files, Mani D Finders, Mani Flexile K files). Using the EWL determined from the pre-operative radiographs, pre-curved hand K files (#6, #8, #10; whatever size is appropriate to the canal treated) are inserted successively until the EWL is reached. Now the clinician should verify he or she has reached the apex of the root with an electronic apex locator and/or a radiograph. The EWL and the TWL should be relatively close if not identical.

*Step 6: Prepare a glide path*

Once a hand file reaches the apex and TWL is established, the canal should be enlarged to the diameter of a #20 hand file, i.e., prepare a glide path. One proven method to prepare a glide path is with #6, #8, #10, #15 and #20 hand K files used in succession. A reciprocating handpiece can be immensely helpful in preparing a glide path, especially using a safe-ended hand K file (Mani SEC O K file) (Figs. 2a–d).

**Fig. 3a**



*Step 7: Prepare the canal "crown down"*

The .06/25, .04/25, .03/25, .02/25, .03/30 files are used successively until the desired taper and tip size is achieved. In the majority of clinical cases, a .06 taper is prepared to the apex (i.e., to the TWL). Using the MounceFile CM Assorted Pack, this means the .06/25 instrument will be taken to the TWL before preparation of the master apical diameter.

If any given file in the MounceFile CM Assorted Pack does not advance apically without undue pressure, move to the next smaller file in the sequence (from left to right in the pack, i.e., crown down) and continue to use them in succession (from larger tapers to smaller) until the desired taper is prepared to the apex.

As with the .08/25 MounceFile CM file, the insertion should be gentle, to resistance and take approximately three seconds. Such file engagement should remove approximately 4–6 mm of dentin with each insertion. Do not use a pecking motion or force the files apically. After each insertion, irrigate the canal and recapitulate with a small (#8, for example) hand K file to assure patency (Figs 3a, b).

*Step 8: Prepare the master apical diameter*

Once the final taper is prepared (generally .06 taper), the .03/30 MounceFile CM file is taken to the TWL to prepare the master apical diameter (MAD). If the clinician wishes to prepare a larger MAD, he or she can do so by whatever means is desired.

**\_Important supplementary information**

Use an electric torque control endodontic motor (TCM III-Axis/Sybron).

500 rpm is recommended. Rotational speed can be modified depending on clinician experience and preference from 500–900 rpm.

A gentle and feather touch insertion of the file is recommended. Insertion should seek to minimize engagement of the instrument to 4–6 mm of canal wall per insertion, which generally will take about 3 seconds. Files should be rotating when inserted. Files should be inserted or removed but never left stationary while in use. Do not use a pecking motion or insert the file repeatedly in order to progress apically. If the canal resists apical advancement while using minimal pressure, remove the instrument and chose the next smaller file in the sequence.

After file insertion, the flutes are wiped of debris, the canal irrigated and the canal recapitulated with a small hand K file (Mani K file #8 or #10).

**Fig. 3b**



**Fig. 3b**\_The MounceFile .08/25 rotary nickel-titanium orifice opener in Standard NiTi (SNT) (superelastic, returns to its original shape upon being curved/stressed).

To minimize risk of canal transportation and/or file separation, each file should be taken to the true working length only once for 1-2 seconds, then removed.

Irrigation and recapitulation should be performed after every insertion.

If the file is inserted as per the instructions above, using torque control with the auto reverse function engaged is a matter of clinician preference. Single use is recommended.

Discard files in an appropriate Biohazard Sharps Container.

Straight-line access and removal of the cervical dentinal triangle are recommended.

While a step back approach to instrumentation is feasible and possible in many canal anatomies, the MounceFile CM and SNT instruments are used most efficiently in a "crown down" (CD) sequence, shaping the coronal third first, middle third second and apical third last. Clinically, this means that larger taper and tip-sized instruments are used first followed by smaller.

Rubber stopper colors on the MounceFiles indicate taper size: .01 Purple, .02 White, .03 Black, .04 Red, .06 Yellow, .08 Light Blue.

The .08/25 mm orifice opener in the 21 and 25 mm MounceFile CM and MounceFile SNT Assorted Packs is 21 mm long.

No set of instructions or precautions is comprehensive. Evaluation of clinical risks is essential. Treatment algorithms and clinical strategies must often be revised in the face of anatomical challenges (severe calcification, curvature, open apices, etc.). Clinical judgment and caution are advised.

### \_ FAQs

*\_ What is "Controlled Memory" (CM) and how do these files differ from standard nickel-titanium files?*

Controlled Memory instruments have been subjected to a proprietary thermomechanical treatment that provides significant resistance to cyclic fatigue relative to nickel-titanium (NT) instruments without this treatment. When a CM instrument curves during

AD



Biological & Conservative





**Figs. 4a & b** Clinical cases treated with the MounceFile CM and SNT Assorted pack (.08/25, .06/25, .04/25, .03/25, .02/25, .03/30) utilizing the techniques discussed.

treatment, it retains its shape. CM treatment reduces the effects of NT shape memory, minimizing transportation. Use of CM instruments versus the MounceFile SNT (standard nickel titanium) files is a matter of personal preference with the limitation that SNT instruments are less resistant to cyclic fatigue relative to the CM variety.

*How many times can I use the MounceFile CM and SNT files?*

Single use of the MounceFile CM and SNT instruments is recommended.

*How do I sterilize new packs of files?*

With a steam autoclave, sterilize the instruments at 136 degrees C for 20 minutes.

*Can I use MounceFile CM and SNT files to remove gutta-percha?*

Yes, appropriately sized MounceFile CM and SNT files can be used to remove gutta-percha in retreatment.

*Is torque control recommended?*

If the file is inserted as per the instructions below, using torque control with the auto reverse function engaged is a matter of clinician preference.

*Why is the .03/30 MounceFile CM instrument at the end of the sequence?*

The .03/30 MounceFile CM instrument (at the far right of file box) allows the clinician to prepare the apical diameter to a #30 tip size.

*How do I obturate a canal prepared by the MounceFile CM Assorted Pack?*

Canals can be obturated in whatever manner the clinician chooses. Using vertical compaction and lateral condensation techniques, it is efficient to learn to trim cones. Specifically, a .06/25 cone trimmed 1 mm from its tip is approximately equivalent to a #30 ISO instrument. If the clinician is using carrier-based obturation, he or she can use a size verifier and place the carrier as desired.

*What if I want to prepare a larger apical diameter than a #30 tip size?*

The clinician can use whatever means he or she desires to prepare an apical diameter larger than a #30. In the MounceFile CM file system, the .03-tapered instrument is available (among other tip sizes) in a #40 tip size.

*What is "crown down" instrumentation and what are the advantages of this approach in canal shaping?*

After straight-line access is prepared, the orifice shaped, the canals negotiated to the apical foramen and a glide path prepared, crown down instrumentation means that the coronal third is prepared first, the middle third prepared second and the apical third last. In essence, the clinician is preparing the root from the crown of the tooth to the root apex, so crown down (CD).

The advantages of CD instrumentation outweigh any relative disadvantages. A CD approach removes restrictive dentin, especially in the coronal third, and facilitates its removal by allowing early and copious irrigation prior to enlargement of the middle and apical thirds. Removal of restrictive dentin and its evacuation from the root minimizes the possibility that this debris will be pushed apically. Alternatively, leaving this debris risks canal blockage, an outcome correlated with uncleaned and unfilled canal space and canal transportation.



Are there any contraindications to crown down instrumentation?

There are no absolute contraindications to the CD technique. There are several clinical situations where a CD approach might be less efficient. Specifically, cases of severe curvature, with or without severe calcification, might argue for a step back (SB) approach or a combination CD and SB approach. Such severe cases are not what the MounceFile CM Assorted Pack were designed to treat and these cases generally require a combination of specialized techniques (Figs. 4, 5).

What pre-operative considerations are correlated with endodontic success (among other factors)?

- Optimal visualization (ideally a surgical operating microscope, most certainly loupes, Global Surgical, Zeiss, Orascope).
- Copious irrigation.
- Use of the rubber dam for every case, without exception.
- Use of a bite block where possible.
- Profound anesthesia (STA-Milestone Scientific).
- Pre-operative assessment of case risks (number of roots, curvature, calcification, risk of perforation, open apices, presence of root resorption, etc.)
- Diagnostic radiographs (taken from different angles) and a cone beam where indicated to fully illustrate the anatomy (Planmeca, Sirona).
- Referral when it is in the best interest of the patient.
- Staff training and education (if the staff knows what each step of the treatment process is intended to accomplish, they can provide the needed support more efficiently).
- Having the needed instruments available in the sizes required and having them organized in a fashion that makes them easy to access and store while not in use.

**Detailed informed consent.**

This clinical article has introduced the MounceFiles, a new, literature-based, clinically valid, safe, economical and efficient rotary nickel-titanium option for canal preparation. Emphasis has been placed on blending proven clinical principles with the instruments discussed. Readers are encouraged to compare their present systems and treatment strategies to those presented here. I welcome your feedback.

*Editorial note: A complete list of references is available from the publisher.*

**Figs. 5a & b** Clinical case re-treated with MounceFiles. Pre-operative view (a). Completed case with the MB2 located and treated (b).

<b><u>about the author</u></b>	<b>roots</b>
	<p><b>Rich Mounce, DDS,</b> is in full-time endodontic practice in Rapid City, S.D. He has lectured and written globally in the specialty. He owns MounceEndo, LLC, marketing the rotary nickel-titanium MounceFile in Controlled Memory and Standard NiTi. MounceEndo is an authorized dealer of Mani stainless-steel hand files and burs. MounceEndo also markets W&amp;H reciprocating hand piece attachments. Mounce can be reached at richardmounce@mounceendo.com, www.mounceendo.com and on Twitter at @MounceEndo</p>