Before You Begin

This User Guide as a Foundation
Relative to the many treatment variables inherent in the typical orthodontic case, osteo perforation\(^1\) with Propel is simple, straightforward and quick. The learning curve to proficiency is not a long one.

We strongly encourage doing your first case, or ideally multiple cases, with your Propel Territory Manager present. Beyond that, this guide is designed to be a foundation as you expand your use of Propel. The guide can be used as a step-by-step review of osteo perforation with Propel, or as a quick reference. In short, what you need to successfully complete Propel applications and realize the incredible capabilities of the osteo perforation technique is in this document.

Your Expertise and Experience
Most orthodontic practitioners agree that no two cases are identical. Treatment philosophies, appliances, mechanics, patient anatomy, and patient participation are just a few of the variables on the way to reaching the ideal outcome. Experienced clinicians quickly build on fundamentals, adding their own best practices and adaptations.

Like orthodontics in general, after mastering the fundamentals, Propel users quickly begin to expand or adapt beyond the foundational principles. Propel provides new opportunities and options in orthodontic treatment. So while this user guide provides the foundation, our trained Territory Managers, Clinical Education Programs, and Key Thought Leaders are ready to collaborate with, and assist as you explore beyond the scope of this guide.

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The Excellerator™ Series Drivers

Excellerator®

Excellerator® RT

Excellerator® PT

with ORTHONIA Driver
The Science Behind Osteo Perforation

In orthodontics we know that the rate that bone remodels determines the speed of tooth movement and a patient’s treatment time.¹

“Micro-osteoperforations significantly increased the rate of tooth movement by 2.3-fold; this was accompanied by a significant increase in the levels of inflammatory markers.”²

In the November 2013 issue of the American Journal of Orthodontics & Dentofacial Orthopedics (AJO-DO), New York University’s clinical study concluded “micro-osteoperforation to be an effective and safe procedure to accelerate tooth movement and significantly reduce the duration of orthodontic treatment.”²

¹ Deguchi et al., 2008; Krishnan and Davidovitch, 2005
Osteo Perforation Area/Duration of Effect

Each osteo perforation has a radius of effect and a duration of activity post application.

**Area of Effect of Osteo Perforation**

- Approximately 6 MM
- Up to 10 MM with multiple perforations

**Extended Length of Elevated Cytokine Activity Post Application**

- Most pronounced immediately post osteo perforation
- Progressive decline to the normal level associated with orthodontic force
- Based on the extended duration of activity, approximately 3 month intervals between treatments are recommended
Contraindications

- ASA 3 systemically compromised patients
- Patients requiring chronic NSAID or Steroid Rx
- Patients who are treated with bisphosphonates
- Uncontrolled periodontal disease
- Pregnant women
A Proactive vs. Reactive Approach

We talk about osteo perforation being used Proactively and Reactively

- **Proactive** ➔ general acceleration of the full arch or multiple quadrants, included in initial treatment planning, most often applied near the beginning of the case

- **Reactive** ➔ rate limiting teeth, targeted difficult movements, applied when case progression is not satisfactory to doctor or patient, can be introduced at any point during orthodontic treatment

- Most techniques are the same for Proactive and Reactive approaches

- The symbols below will be used throughout the guide to indicate whether information pertains to Proactive, Reactive or Proactive & Reactive applications

---

**Proactive / Reactive Symbol Guide**

- **Proactive**
  - This symbol denotes guidelines that pertain to a Proactive approach

- **Reactive**
  - This symbol denotes guidelines that pertain to a Reactive approach

- **Proactive & Reactive**
  - This symbol denotes guidelines that are the same for both Proactive and Reactive approaches
Plan Your Case

- Decide whether you are treating Proactively or Reactively
- Identify the areas of the arch/quadrant/specific teeth where movement is desired

### Basic Protocols

<table>
<thead>
<tr>
<th>Protocol</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anterior Protocol</td>
<td>Perforate mesial and distal to centrals and canines</td>
</tr>
<tr>
<td>Distalization Protocol</td>
<td>Perforate mesial and distal to first bicuspid and first molar. Repeat during canine retraction</td>
</tr>
<tr>
<td>Expansion Protocol</td>
<td>Perforate mesial and distal to first bicuspid and first molar</td>
</tr>
<tr>
<td>Localized Protocol</td>
<td>Perforate mesial and distal to targeted tooth or space for rotation, extrusion or intrusion</td>
</tr>
</tbody>
</table>

For more in-depth guidelines on protocols for specific movements, please reference Appendix II in this guide.
Oral Anatomy: Where to Perforate

<table>
<thead>
<tr>
<th>Category</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mesio-Distal</td>
<td>Typically interproximal to targeted teeth</td>
</tr>
<tr>
<td>Bucco-Lingual</td>
<td>Typically buccal approach</td>
</tr>
<tr>
<td></td>
<td>Lingual for palatally impacted teeth</td>
</tr>
<tr>
<td>Crestal-Apical (fig.1)</td>
<td>Stay crestal of apex</td>
</tr>
<tr>
<td></td>
<td>Stay 3mm apical of crest</td>
</tr>
<tr>
<td></td>
<td>As anatomy permits</td>
</tr>
<tr>
<td>Maxillary vs. Mandibular</td>
<td>Indicated for either</td>
</tr>
<tr>
<td>Anatomical Contraindications</td>
<td>Avoid roots, mandibular nerve, frenum, greater palatal artery and maxillary sinuses</td>
</tr>
<tr>
<td>Other</td>
<td>Braces → no perforations mesial or distal to anchorage (including TADs)</td>
</tr>
</tbody>
</table>

Figure 1

[Diagram showing the crest and apex of a tooth]
### Perforation: Number, Pattern & Spacing

**Proactive & Reactive**

<table>
<thead>
<tr>
<th>Number of Osteo Perforations Per Site</th>
<th>1 – Acceptable to stimulate movement (if anatomy prohibits a second perforation)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2 – Recommended (anatomy permitting)</td>
</tr>
<tr>
<td></td>
<td>3 – Ideal (especially for rate limiting teeth; anatomy permitting)</td>
</tr>
</tbody>
</table>

**Recommended Osteo Perforation Patterns**

- Effect is regional so exact pattern is not critical
- Vertical linear is most common (spread evenly along length of root)
- Triangular pattern is also acceptable based on anatomy (most often used in space closures)

**Gingival Spacing of Osteo Perforations**

- Ideally most perforations will be in the keratinized tissue (attached gingiva)
- Perforations in the unattached gingiva (movable mucosa) are acceptable if dictated by the anatomy. Be sure to hold the gingiva taut.
How Deep To Perforate

• It is only necessary to breach the cortical wall. Deep penetration into the alveolar bone is not necessary
• Confirm cortical wall penetration visually and/or tactiley
• Recommended depths below are typical. Depth required may vary based on thickness of the gingiva and alveolar bone (i.e. additional depth to penetrate buccal exostoses)

<table>
<thead>
<tr>
<th>Maxillary</th>
<th>Mandibular</th>
</tr>
</thead>
<tbody>
<tr>
<td>Typically 3 MM is sufficient for entire arch</td>
<td>Typically 3 MM is sufficient mesial of canines</td>
</tr>
<tr>
<td>Molars may require 5 MM based on tissue depth</td>
<td>Typically 5 MM distal of canines</td>
</tr>
<tr>
<td>Palatal perforation may require 7 MM (i.e. thick gingival tissue)</td>
<td>Sometimes 7 MM distal of canines based on anatomy (i.e. extremely thick cortical plate)</td>
</tr>
</tbody>
</table>

When to Stop
• Guide sleeve on closed tips indicates desired depth has been reached
• Tactile sense confirms device has breached the cortical wall
• Patient indicates sensitivity beyond pressure. Cortical wall has been breached
Frequency & Number of Applications

Frequency of Applications

- Allow approximately 3 months between applications
- Apply as needed thereafter at approximately 3 month intervals
- Ideally no perforations within 6 weeks of finish
  - If perforations within 6 weeks of finish are necessary, immediate retention is advised
- Treatment frequency dependent upon case type, bone biology and severity of malocclusion

<table>
<thead>
<tr>
<th>Typical Number of Applications Per Case</th>
<th>Braces</th>
<th>Aligners (Assuming 7-day trays)*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minor anterior correction → 1 application</td>
<td></td>
<td>Less than 20 trays → 1 application</td>
</tr>
<tr>
<td>Typical case → 2 applications</td>
<td></td>
<td>20-40 trays → 2 applications</td>
</tr>
</tbody>
</table>

*assuming an aligner system with 14 day trays
Frequency & Number of Applications

**Frequency of Applications**

- Allow approximately 3 months between applications
- Apply as needed thereafter at approximately 3 month intervals
- Ideally no perforations within 6 weeks of finish
  - If perforations within 6 weeks of finish are necessary, immediate retention is advised
- Treatment frequency dependent upon case type, bone biology and severity of malocclusion

**Typical Number of Applications Per Case**

<table>
<thead>
<tr>
<th>For Braces or Aligners</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>- Dependent upon how targeted teeth respond</td>
<td></td>
</tr>
<tr>
<td>- Typically 1 application is sufficient</td>
<td></td>
</tr>
<tr>
<td>- Apply second as necessary</td>
<td></td>
</tr>
</tbody>
</table>
Timing & Intervals of Applications

- Initial application may be performed once orthodontic force is applied (i.e. first arch wire/auxiliaries engaged) or upon distribution of first set of aligners
- Many clinicians prefer to delay initial application to allow patients to adjust to their appliances
- With clear plastic aligners, the exchange interval is kept at two weeks until the initial application is performed

**Timing & Intervals of Applications**

<table>
<thead>
<tr>
<th>Braces</th>
<th>Aligners (assuming 7 day trays post-application)</th>
</tr>
</thead>
<tbody>
<tr>
<td>First application → once force is applied</td>
<td>First application</td>
</tr>
</tbody>
</table>
| Second application → approximately 3 months after initial treatment, or based on next stage of treatment plan | • Less than 20 aligners → @ aligner 1 or 2  
• More than 20 aligners → @ aligner 2 or 3  
Second application → approximately 3 months after initial application if needed |
Timing & Intervals of Applications

Reactive

- During treatment if case is not tracking
- During treatment to address known difficult movements
- If necessary, a second application should be applied approximately 3 months after initial application

<table>
<thead>
<tr>
<th>Timing Applications by Modality</th>
<th>Braces</th>
<th>Aligners</th>
</tr>
</thead>
</table>
| When encountering difficult movements | • When encountering difficult movements
• When encountering stubborn teeth or "stuck" teeth | • Upon identification of rate limiting teeth
• When encountering stubborn teeth or "stuck" teeth (i.e. maxillary laterals, or rotation of cylindrical teeth) |
Three Simple Steps

Step 1: Evaluate
- Evaluate x-ray and/or palpate tissue

Step 2: Rinse
- Chlorhexidine rinse twice for one minute each before treatment

Step 3: Treat
- Treatment area can be anesthetized using either a compound topical or local infiltrative anesthetic
- Osteo perforation depths are determined by soft tissue thickness and penetrating the cortical plate

Engaging tip should be pain free. Confirm numbness and reapply anesthesia as needed.

For video tutorials on how to perform osteo perforation with each of the Excellerator Series Drivers, please visit www.propelorthodontics.com.

For more information on recommended anesthetic protocols, please ask your local Territory Manager.
Anesthetic Recommendations For Osteo Perforation

- A mandibular block is not indicated
- Doctor preference between infiltration and compound topical
  - Local infiltration may be necessary with some patients and is recommended for palatal perforations
  - Not all topical anesthetics are equally effective and most are technique-sensitive
- Follow pharmacy instructions strictly with topical anesthetic
- Ensure the patient is numb during the entire treatment. Re-apply anesthetic if the patient experiences discomfort (vs. pressure which is normal)

For video tutorials on how to apply anesthesia (infiltrative or topical), please visit www.propelorthodontics.com.

For more information on anesthetic recommendations, please ask your local Territory Manager.
Post-Application Instructions

• Post-application instructions are the same for cases utilizing local or topical anesthetic

• Patient may experience some tenderness around treatment site for 24 – 48 hours; this sensitivity is similar to that of an orthodontic adjustment

• Non-Steroidal Anti-Inflammatory Drugs (NSAIDs) should be avoided as they inhibit orthodontic movement

• Any discomfort should be treated with an Acetaminophen such as Tylenol
Osteo Perforation Aligner Protocol

Doctor Experience Level and Suggested Aligner Exchange Interval

- New User: 7 day intervals
- Experienced User: 3 or 5 day intervals
- Advanced User: 3 day intervals

<table>
<thead>
<tr>
<th>Intervals</th>
<th>Suggested Aligner Exchange Details</th>
</tr>
</thead>
</table>
| 7 Day        | Provide 7 aligners after initial perforation  
               | 7 week follow up visits  
               | Second application at approximately 14 aligners after initial perforation |
| 5 Day        | Provide 10 aligners after initial perforation  
               | 6 week follow up visits  
               | Second application at approximately 18 aligners after initial perforation |
| 3 Day        | Provide 10 aligners after initial perforation  
               | 4 week follow up visits  
               | Second application at approximately 30 aligners after initial perforation |
Osteo Perforation Braces Protocol

- Osteo perforation works with all bracket systems
- Treatment mechanics will remain the same
- Initial application should occur once orthodontic force is applied (i.e. first arch wire/auxiliaries engaged)
- Arch wires may be changed more frequently due to the arch wire and bracket interface being fully expressed more quickly
- Osteo perforation may allow reduction of visit intervals by up to 50%
  - Initially, keep normal appointment intervals
  - Adjust intervals based on assessment of case progression
- Second application may be applied approximately 3 months after initial application
Osteo Perforation Braces Protocol

- Osteo perforation application can be performed at any point during braces treatment.
- Typical reactive applications are performed when:
  - Case includes challenging movements (i.e. closing large spaces)
  - Case progression is not satisfactory to doctor or patient
- Osteo perforation may allow reduction of visit intervals by up to 50%:
  - Initially, keep normal appointment intervals
  - Adjust intervals based on assessment of case progression
- Second application may be applied approximately 3 months after initial application
Typical Variations of Protocols

Proactive
- Only teeth being moved (even for full mouth cases)
- Rate-limiting teeth only (i.e. as identified by digital set-up)
- Second application on rate-limiting teeth/challenging movements only

Reactive
- None identified (reactive approach is by nature ad-hoc)
Appendix I: Driver Instructions
Excellerator How To

Using the Excellerator

1. Set depth (3, 5 or 7 MM) by turning the depth limiter on the driver.
2. Confirm tip is 90 degrees to point of contact to facilitate quick engagement.
3. Apply gentle pressure then rotate driver clockwise.
4. LED light will illuminate when desired depth is reached.
5. Rotate counter-clockwise until tip clears tissue.
6. Complete the desired number of osteo perforations for the application.
7. Dispose of entire device in sharps container after each application.

For video tutorial on how to perform osteo perforations with the Excellerator, please visit [www.propelorthodontics.com](http://www.propelorthodontics.com) and view the “Using Propel’s Excellerator”
Excellerator RT How To

Using the Excellerator RT

1. Remove tip from sterilized packaging.

2. Insert the tip by pressing the Release Button on the driver. Then slide the keyed end of the tip into driver then release the button to lock in tip. Remove safety cap.

3. Confirm tip is 90 degrees to point of contact to facilitate quick engagement.

4. Rotate clockwise while applying gentle pressure.

5. Continue to turn until the desired depth is reached. Line marks on sleeve indicate depth at 3 MM, 5 MM, and 7 MM.

6. Rotate counter-clockwise to remove.

7. Complete the desired number of osteo perforations for the application.

8. Replace safety cap and depress release button to remove tip.

9. Dispose of the tip in the sharps container after each application.

For video tutorial on how to perform osteo perforations with the Excellerator RT, please visit www.propelorthodontics.com and view the “Using Propel’s Excellerator RT”
Excellerator PT How To

Using the Excellerator PT

1. Ensure Power Driver is fully charged (leave in Smart Charger).

2. Secure tip in contra-angle head. Insert blue side of tip into contra-angle face. Manually rotate tip until it fully seats flush and close the latch.

3. **Press and hold** POWER button to turn Power Driver on.

4. Select RPM (recommended setting is HIGH).

5. Select torque (recommended starting setting is 15N/cm). Increase torque setting as required to reach the desired perforation depth.

2 Modes

General: Press START/STOP button briefly to start rotation. Press START/STOP button again to stop rotation.

Temporary: **Press and hold** START/STOP button for at least 3 seconds. Power Driver will stop immediately when button is released.

To assemble the Power Driver, please reference the accompanying manufacturer’s manual available on [www.propelorthodotics.com](http://www.propelorthodotics.com)

For video tutorial on how to perform osteo perforations with the Excellerator PT, please visit [www.propelorthodontics.com](http://www.propelorthodontics.com) and view the “Using Propel’s Excellerator PT”.

[Image of Excellerator PT]

- Contra-angle
- Collar
- Start/Stop
- Rev/Fwd
- RPM
- Torque
- Power
Excellerator PT How To

Using the Excellerator PT (Continued)

6. Position contra-angle by depressing black collar for best access to control buttons.

7. Confirm tip is 90 degrees to point of contact to facilitate quick engagement.

8. Depress START/STOP button in either temporary or general mode.

9. Stop when desired depth is achieved.

10. Reverse direction by pressing Rev/Fwd button. REV indicator will be displayed on the screen.

11. Depress START/STOP button until tip disengages from tissue.

12. Complete the desired number of osteo perforations for the application.

13. Open latch and remove tip.

14. Dispose of the tip in the sharps container after each application.

To assemble the Power Driver, please reference the accompanying manufacturer’s manual available on www.propelorthodontics.com

For video tutorial on how to perform osteo perforations with the Excellerator PT, please visit www.propelorthodontics.com and view the “Using Propel’s Excellerator PT”. 
Appendix II: Perforation Planning For Specific Movements

The following pages provide guidelines to consider when perforation planning for some of the most common malocclusions encountered in daily practice. These guidelines are demonstrated with illustrations using yellow markers as suggested sites for perforations and should serve as recommendations only. Your professional expertise remains the determining factor when treating each individual patient’s case.

<table>
<thead>
<tr>
<th>Basic Protocols</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anterior Protocol</td>
</tr>
<tr>
<td>Distalization Protocol</td>
</tr>
<tr>
<td>Expansion Protocol</td>
</tr>
<tr>
<td>Localized Protocol</td>
</tr>
</tbody>
</table>
Congenitally Missing Teeth

Malocclusion/Desired Movement: Congenitally Missing Teeth

| Perforation Planning | Perforate the anterior segments in order to assist in mass protraction |

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Crowding

Malocclusion/Desired Movement: Crowding

| Treatment Planning | Perforate sites mesial and distal of crowded teeth |

[Image of teeth with perforation sites indicated]
**Distalization**

### Malocclusion/Desired Movement: Distalization

| Perforation Planning | Perforate distal to the teeth in Class II occlusion |

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Impaction/Extrusion

<table>
<thead>
<tr>
<th>Malocclusion/Desired Movement: Impaction/Extrusion</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Perforation Planning</strong></td>
</tr>
<tr>
<td>Begin with perforations on the posterior segment to distalize, then perforate in the area of impaction to assist eruption</td>
</tr>
</tbody>
</table>
Intrusion/Deep Bite

**Malocclusion/Desired Movement: Intrusion**

**Perforation Planning:** Perforate the extruded teeth mesial and distal to assist mass intrusion.

**Malocclusion/Desired Movement: Deep Bite**

**Perforation Planning:** Perforate the arch that is out of the occlusal plane to assist extrusion in the posterior and/or intrusion in the anterior.
Mesialization/Protraction

Malocclusion/Desired Movement: Mesialization/Protraction

Perforation Planning

Perforate in edentulous area and distal to the edentulous area

Braces Tip:

Protracting Teeth in Posterior Region: in some cases, uneven force levels on both the lingual and buccal side may cause slight rotation and binding of the arch wire. There are two alternatives to limit or avoid this occurrence:

- Place buttons & elastics on the lingual side to even out distribution of forces
- Perforate on the buccal & lingual side
Midline Discrepancy

Malocclusion/Desired Movement: Midline Discrepancy

Perforation Planning

Perforate every other tooth on the affected arch to assist shift
Molar Uprighting

Malocclusion/Desired Movement: Molar Uprighting

Perforation Planning Perforate in edentulous space
# Open Bite

## Malocclusion/Desired Movement: Open Bite

<table>
<thead>
<tr>
<th>Perforation Planning</th>
<th>Perforate maxillary arch to assist posterior and/or anterior extrusion</th>
</tr>
</thead>
</table>

![Diagram of teeth with perforations to assist in extrusion](image_url)
Pre-Prosthetic

Malocclusion/Desired Movement: Pre-Prosthetic/Implant Therapy

<table>
<thead>
<tr>
<th>Perforation Planning</th>
</tr>
</thead>
<tbody>
<tr>
<td>To create space for an implant, perforate mesial and distal to the tooth being moved to make space</td>
</tr>
</tbody>
</table>
# Rotation

<table>
<thead>
<tr>
<th>Malocclusion/Desired Movement: Rotation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Perforation Planning</strong></td>
</tr>
<tr>
<td>Perforate sites mesial and distal to rotated teeth</td>
</tr>
</tbody>
</table>
### Malocclusion/Desired Movement: Space Closure

| Perforation Planning | Perforate sites mesial and distal to the areas where movement is desired |

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**Space Closure**
Picture perfect selfies delivered ahead of schedule