This Guide was published on August 8, 2003. As additional Tips & Techniques become available, this Guide will be updated first on the Online Clinical Education Center. An electronic and most current version of this Guide can be viewed or downloaded from the Online Clinical Education Center (www.invisalign.com). Please check the website or with your Sales or Customer Support Representative to make sure you have the most recently updated version.
This Guide is intended to help the Invisalign practitioner successfully monitor Invisalign treatments and address issues that may arise between receipt of Aligners from Align to the completion of treatment.

Special attention has been given to possible root causes of issues that may be encountered, solutions to these issues, and measures that can be taken to prevent the issue from re-occurring in the future.

**Invisalign is a technique.** Invisalign is more than a set of Aligners; it is the Aligners plus other auxiliaries used to achieve desired results. Just as with fixed appliances, a clinician should carefully monitor, adjust and plan for use of auxiliaries for successful treatment outcomes with Invisalign.

**The solutions in this Guide are considerations collected from your peers.** These have not all been tested in clinical trials, but rather are tips and techniques from Invisalign-experienced colleagues. Some tips have been used on many cases and some on only a few. We have tried to list these in the order that clinicians recommend them and feel they work successfully. It is at your discretion to use them where appropriate to get the results you want with Invisalign.

We hope you find this Guide useful. Please do not hesitate to contact us with additional Tips & Techniques (tips may be submitted through the Online Clinical Education Center at www.invisaligncec.com) that will continue to expand the body of clinical knowledge around Invisalign.

With best regards,
Align Technology, Inc.
Key considerations for using Invisalign effectively

This Guide will help you quickly address issues that you may encounter during Invisalign treatment.

When monitoring treatments, from time to time your patient’s teeth may not track to plan. In these instances, it is good to generally keep in mind that this occurs for two fundamental reasons.

1. INSUFFICIENT SPACE—Do the teeth have enough room to move? Often teeth get tied up due to lack of space, particularly due to contact binding. This may be due to insufficient interproximal reduction (IPR), other force systems within the Aligners, or treatment plans that have not been thought through sequentially, stage by stage.

2. INSUFFICIENT FORCE (Aligner contact with tooth or attachment)—Are the necessary forces present to ensure movement? Insufficient force may be due to the prescribed treatment plan or ClinCheck in which certain movements were not included, lack of attachment engagement, insufficient time for the movement to express, or inherent difficulty overcoming selected movements:
   a. An unengaged attachment will not provide sufficient force. Not having an attachment engaged is like having a wire not fully engaged in the slot of a fixed appliance.
   b. Time to express—Teeth may “lag” behind the Aligner due to differences in bone biology from patient to patient, material stress relaxation, or lack of patient compliance. Simply extending Align wear-time may allow the movement to be expressed more completely. Mowing ahead too fast in an Aligner is like changing a wire in fixed that has not fully expressed itself.
   c. Challenging movements—Like fixed appliances, some movements with Invisalign are more predictable than others. Less predictable movements, such as absolute extrusions, rotation of round teeth and large translations, may require auxiliary appliances (buttons and elastics, sectionals, etc.)

Careful monitoring of treatment will help catch issues before they become a problem. To prevent issues from occurring, we have found that thoughtful and successful Invisalign clinicians perform the following at every patient appointment:

1. Have patients arrive with the previous stage Aligner and the current Aligner, so you can evaluate any fit concerns that may arise.

2. At each appointment, review 4 things:
   a. That the current Aligner is a good fit.
   b. IPR instructions (track the amount of IPR performed according to the patient chart).
   c. The condition and engagement of attachments. Teach the patient what to look for in attachment fit.
   d. Evaluate for tight contacts with unwaxed floss and relieve with finishing strips if present.

3. Check actual results versus ClinCheck every 4-8 stages. Some doctors find it useful to print the patient’s ClinCheck and place these in the patient’s chart. Use this as a guide to track actual versus modeled progress regularly.
2. BE DETAILED WHEN TREATMENT PLANNING

a. The more specific you are with your instructions, the better your Align technicians will be able to provide an initial setup that meets your expectations.

b. Begin with the end in mind. Depending on the type of case or movements planned, you may need to plan ahead for the use of auxiliaries.

c. Recognize the default ClinCheck setup standards and know how to overcome them.

You may override this setup by checking The “ClinCheck Objectives” box (Box 13, see below) on the Prescription & Diagnosis form. If you check “Perform less predictable movements to achieve a more ‘ideal’ ClinCheck,” you will override the standard setup. When you check this box, less predictable movements will be included in your treatment plan. While your desired goals might be achieved with Invisalign alone, they more than likely will require auxiliary work that you and your patient should expect.

4. Use ClinCheck as a tool to educate your patient. Explain what is occurring and have the patient help monitor treatment (flossing to check for contacts and using a pencil to outline the attachments to ensure attachment engagement) [see p. 31].

5. Plan to Detail—the adjuncts, tips and chairside tools found throughout this Guide will help with final detailing and should cut down on the need for Refinement and Mid-Course Correction. Refinement and Mid-Course Correction may be used as secondary methods of achieving desired results. Neither option should be viewed as a failure and in fact may be needed in a portion of treatments, depending on the complexity of the case. [For definitions of terms used throughout this Guide, see the Glossary, pp. 40–41.]

6. After finishing treatment, learn from your results. Review your first ten ClinChecks against the actual results to help you plan treatment more effectively on future cases. There is a learning curve with Invisalign.

**Finally, always keep in mind that the 4 keys to ensuring consistent, quality treatment outcomes require that doctors:**

1. **SUBMIT HIGH-QUALITY RECORDS (particularly PVS impressions and photos)**

The #1 reason for poor Aligner fit is an incomplete or distorted impression.

a. Poor dental data ultimately leads to poor-fitting Aligners which lead to sub-optimal outcomes.

b. If your office needs help with impression or photo-taking or has had impressions sent back to you from Align, please contact your Sales Representative or read the guides1 on the Online Clinical Education Center.

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3. REVIEW CLINCHECK CAREFULLY
   a. ClinCheck is a virtual representation of a doctor’s intended treatment plan.
   b. Align Technology is a lab with technicians who interpret the directions on your treatment plan. The more specific your comments and modifications, the closer you will get to your desired setup.
   c. Tips for comments: Be tooth/teeth specific; Specify size (mm) and direction of movement; Avoid non-specific instructions such as “align,” “more,” “a little,” “a lot.” Example: Instead of “improve anterior esthetics,” improve communication by writing: “Add 5 degrees of mesial in rotation to the upper left central and 10 degrees mesial crown tip to the upper left canine.”

4. MONITOR CAREFULLY AND PLAN TO DETAIL
   a. Invisalign is a technique. Monitoring and detailing are critical to achieving consistent, quality treatment outcomes, whether you use Invisalign alone or with auxiliaries.
      “I view my role as getting the teeth to fit into each Aligner.”
      —Ray McLendon, DDS, Houston TX
   b. Keep this Guide handy to help address issues as they arise, and follow the keys outlined above to reduce the likelihood of their occurring in the first place.

How to use this Guide

Each page in this Guide is designed to assist you in identifying root causes and solutions for most of the issues you might encounter during the course of Invisalign treatment. In addition, references to in-depth instructional materials are provided in any instance where they are available, as well as notes that should help you prevent the recurrence of these issues.

Begin on the Contents page (page v), where all the issues addressed in this book are listed in order of frequency of occurrence. After identifying the general issue that best fits your situation, locate the page upon which your specific issue is presented.

The following format is used throughout the book to address the various issues:

<table>
<thead>
<tr>
<th>General issue</th>
<th>Specific issue, listed in order of frequency of occurrence</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Potential root causes, listed in order of probability</td>
</tr>
<tr>
<td></td>
<td>Possible solutions, listed in order of likelihood of effectiveness</td>
</tr>
<tr>
<td></td>
<td>Related photos of issues or techniques</td>
</tr>
<tr>
<td></td>
<td>Helpful references, listed to correspond with order of solutions</td>
</tr>
<tr>
<td></td>
<td>Prevention notes to help avoid the recurrence of each root cause</td>
</tr>
</tbody>
</table>

PLEASE NOTE: The Invisalign Online Clinical Education Center is abbreviated throughout this Guide as “Online CEC”. It is located at www.invisaligncec.com.
1. Managing Aligner fit and seating

Ground fit issues (Aligners are not seating well, >1 mm) ........................................... 3
Aligner popping up when forced down, or anterior/posterior rocking .................................. 8
Severe undercut .................................................................................................................... 11
The Aligners don’t fit at all .................................................................................................... 12
The Aligners are too tight or can’t be removed (too retained) ............................................ 13
The Aligners are not retentive enough ................................................................................ 14
Short Aligners ................................................................................................................. 15
Long Aligners .................................................................................................................... 16

2. Handling tooth-specific movements

Rotations of anterior tooth not occurring ........................................................................... 17
Rotations of posterior tooth (especially premolars) not occurring .................................... 19
Residual crowding ............................................................................................................... 21
Residual space at the end of treatment ................................................................................ 22
Anterior teeth not level ......................................................................................................... 24
Incomplete extrusion ........................................................................................................... 25
Incomplete expansion near end of treatment ....................................................................... 26
Black triangle apices ............................................................................................................ 27
Incomplete tip at end of treatment ....................................................................................... 28
Incomplete torque ............................................................................................................... 29
Unintended intrusion is occurring of tooth that I’m trying to extrude/rotate/expand ........... 30
Unintended tipping/dumping during large spaces closure .................................................... 31
Closure of extraction spaces ............................................................................................... 32
Distalization/Mesialization not occurring ......................................................................... 33
Expansion not occurring .................................................................................................... 34
Inhibition not occurring ..................................................................................................... 35
Intrusion not occurring ....................................................................................................... 36
Anterior or lateral extrusion (used) occurring ..................................................................... 37

3. Ensuring Attachments fit and stay bonded

Attachments are not fitting into the Aligner attachment space ........................................ 37
Attachments come detached ............................................................................................. 38

4. Addressing Patient concerns

Patient has negative reaction to Aligner (rare) ................................................................. 39
TMD symptoms occurring (jaw hurts or locks—rare) ......................................................... 40

5. Handling lost or broken Aligners

Lost or broken Aligner ........................................................................................................ 41

6. Maintaining Aligner Aesthetics

Staining or discoloration ..................................................................................................... 42
Holes or bubbles ................................................................................................................. 43
Attachments on anterior teeth are not aesthetic ............................................................... 44

7. Retainer questions

Is the last Aligner a retainer? ............................................................................................. 45
Can I order an Invisalign retainer? .................................................................................... 45
Do I have to use an Invisalign retainer? ............................................................................. 45
## Managing Aligner fit and seating

### General fit issues (Aligners are not seating well, >1 mm)

If Aligner discrepancy is <1 mm, this is natural deflection that should occur so the Aligner can move the tooth. Continue treatment, continuing to monitor Aligner fit.

### Root Causes

<table>
<thead>
<tr>
<th>Root Causes</th>
<th>Solutions</th>
<th>References</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attachments may have excessive flash</td>
<td>BEGINNING TX ONLY: Remove excess flash and/or remove and rebond attachments with template fully seated.</td>
<td>Guide to Placing Attachments (Tips &amp; Techniques on CEC)</td>
</tr>
<tr>
<td>Distorted initial impression</td>
<td>BEGINNING TX ONLY: Must retake impressions and re-start treatment</td>
<td>PVS Impression Guides (Tips &amp; Techniques on CEC), PVS Troubleshooting Guide (Online CEC)</td>
</tr>
<tr>
<td>Tooth movements may vary among patients due to differences in bone biology and tooth morphology.</td>
<td>Extend weartime of Aligner; go back one stage</td>
<td>Use the Patient Compliance Agreement</td>
</tr>
<tr>
<td>Non-compliance - patient not wearing Aligners long enough for tooth to move</td>
<td>Extend weartime of Aligner; go back one stage</td>
<td></td>
</tr>
</tbody>
</table>

### Prevention Notes:

1. Make sure attachment template is properly seated prior to bonding attachments. Try Aligner #1 to check fit, then bond attachments.
2. Improve quality of initial records. If third molars are present, decide whether to include in treatment or not (virtually extract or not).
3. Instruct Staff to thoroughly review patient compliance (>22 hrs a day); if you feel a patient is not compliant, extend weartime of each Aligner stage. Emphasize to your patients never to dispose of their Aligners and instruct them that the Aligners should be fitting well at the end of the 2-week period.

### Section continued on following page...
# Managing Aligner fit and seating

General fit issues (Aligners are not seating well, >1 mm)

## Root Causes

<table>
<thead>
<tr>
<th>Root Cause</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not enough space due to inadequate IPR</td>
<td>IPR according to patient’s reproximation chart</td>
</tr>
<tr>
<td>With extraction cases, site may need adequate time to heal to obtain best fit (due to inflamed tissue)</td>
<td>Allow site to heal longer (make sure patient wears interim retainer)</td>
</tr>
<tr>
<td>Position of teeth affects Aligner path of insertion/removal (example: Class II Div II)</td>
<td>Seat Aligner starting with area of greatest crowding/undercut</td>
</tr>
<tr>
<td>Severe Undercuts</td>
<td>(See Severe Undercuts section, page 5)</td>
</tr>
<tr>
<td>Lack of extrusion, or unintended intrusion of one tooth</td>
<td>(See Incomplete Extrusions, page 19, or Unintended Intrusion, page 24)</td>
</tr>
</tbody>
</table>

Section continued from previous page.
1 Managing Aligner fit and seating

Aligner popping up when forced down, or anterior/posterior rocking

**ROOT CAUSES**

- Potential tissue impingement; inflamed gingiva distal to the 2nd molars (typical in teens); inflamed incisal papilla

**SOLUTIONS**

- Relieve Aligner impingement by trimming Aligner. Use Trimming bur to adjust Aligners.

**REFERENCE**

- IPR Guides (Tips & Techniques on Online CEC); IPR Video; IPR in Clinical Update, Fall 2002

**PREVENTION NOTES:**

- **1.4** Assess gingiva in ClinCheck vs. actual gingiva position. If a discrepancy exists, request modifications in ClinCheck.
- **1.5** For Pre-PVS IPR or extraction cases, retain teeth between PVS impression and initial Aligner delivery with Vacuform retainers. See Guide to Extractions and IPR information (Online CEC).
- **1.6** Improve quality of initial records.

- **PREVENTION NOTES:**

  - **1.4** Assess gingiva in ClinCheck vs. actual gingiva position. If a discrepancy exists, request modifications in ClinCheck.
  - **1.5** For Pre-PVS IPR or extraction cases, retain teeth between PVS impression and initial Aligner delivery with Vacuform retainers. See Guide to Extractions and IPR information (Online CEC).
  - **1.6** Improve quality of initial records.
# Managing Aligner fit and seating

**Aligner popping up when forced down, or anterior/posterior rocking**

## ROOT CAUSES

<table>
<thead>
<tr>
<th>Prevention Note 1.7</th>
<th>Solutions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Change in patient’s dental anatomy from new restorations.</td>
<td>Relief Aligner pressure points by trimming Aligner with trimming bur (see fig. A).</td>
</tr>
<tr>
<td>Gingiva is simulated in ClinCheck and may be higher in posterior region than actual anatomy.</td>
<td>Mid-Course Correction with new impressions (fee charged).</td>
</tr>
</tbody>
</table>

**BEGINNING TX ONLY:**

- Call Align Customer Support. Solution may require photos or additional clarifications.

## Prevention Notes:

1. **Prevention Note 1.7**

   Assess gingiva in ClinCheck vs. actual gingiva position. If a discrepancy exists, request modifications in ClinCheck.

2. **Prevention Note 1.8**

   Make sure all dental work is completed prior to beginning Invisalign treatment. Be sure dentist is aware of the consequences of any change to the dental anatomy mid-treatment.

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Section continued from previous page.
1 Managing Aligner fit and seating

Severe undercut

<table>
<thead>
<tr>
<th>ROOT CAUSES</th>
<th>SOLUTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Severely tipped teeth</td>
<td>Trim away Aligner in undercut region with trimming bur so the Aligner will seat. May require doing this with subsequent Aligners until tooth position improves and Aligner can fully seat.</td>
</tr>
</tbody>
</table>

Other Root Causes:
- Bridges/Pontics
- Severe Recession
- Flared Teeth
- Periodontically compromised teeth

Trim Aligner with trimming bur; try seating Aligner from different angle

PREVENTION NOTES:

1.9 For severe undercuts, request to have Aligners trimmed at the CEJ in your treatment planning instructions to avoid having to trim every Aligner.
Managing Aligner fit and seating

The Aligners don’t fit at all.

### ROOT CAUSES

<table>
<thead>
<tr>
<th>GENRE</th>
<th>SOLUTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>BEGINNING TX ONLY: Check to make sure patient was given correct Aligner see Tip #1.10</td>
<td>BEGINNING TX ONLY: Try next Aligner first (read imprint on Aligner); otherwise, call Customer Support for additional troubleshooting; may require new impressions and Mid-Course Correction</td>
</tr>
</tbody>
</table>

#### Prevention Notes:

1.10 Make sure you are taking quality initial records, particularly photos and impressions.

1.11 For Pre-PVS extractions or IPR cases, retain with vacuform retainers after taking impressions while waiting for Aligners to arrive. See Guide on Extractions and IPR information (Online CEC.)

1.12 Make sure patient gets all dental work done prior to PVS impressions.

### REFERENCES

Guide to extractions (Tips & Techniques on Online CEC); IPR (Tips & Techniques on Online CEC); IPR Video; Case Studies; Crowding 1, 2 & 3 on Online CEC.

### SOLUTIONS

- **Teeth drifted due to lack of interim retention between Pre-PVS IPR/Extraction and initial Aligner delivery**

  - **Prevention Note 1.10**

  - **Prevention Note 1.11**

  - **Prevention Note 1.12**

- **Patient’s dental anatomy changed—e.g., restorations, crowns, fillings**

  - **Prevention Note 1.11**

  - **Prevention Note 1.12**

- **Patient may not have received or be wearing the correct sequence of Aligners**

  - **Prevention Note 1.12**

  - **Verify that patient was given the correct Aligners**
# Managing Aligner fit and seating

Aligners are too tight or can’t be removed (too retentive)

## ROOT CAUSES vs SOLUTIONS

<table>
<thead>
<tr>
<th>ROOT CAUSES</th>
<th>SOLUTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Too many attachments</td>
<td>Consider not bonding all attachments at first Aligner delivery. Section attachment template into tooth-specific templates, or use the current Aligner as a template (NOTE: current Aligner may be rigid/retentive) and apply attachments at subsequent appointment.</td>
</tr>
<tr>
<td>Severe Undercuts</td>
<td>Consider having patient rinse mouth first with warm water before removing Aligner. (See Undercut section, page 5)</td>
</tr>
<tr>
<td>Severe crowding</td>
<td>Consider having patient rinse mouth first with warm water before removing Aligner. Some doctors suggest patient use a guitar pick to aid in removal of the Aligner.</td>
</tr>
<tr>
<td></td>
<td>Some doctors suggest patient use a guitar pick to aid in removal of the Aligner.</td>
</tr>
</tbody>
</table>

### PREVENTION NOTES:

13 Prevent the number of attachments during ClinCheck review (guideline: try to stay away from more than four attachments per arch). Consider placing attachments at stage 2. Teeth may be more mobile and Aligner will be easier to remove when attachments are placed at this time. See Attachment protocol (Tips & Techniques on Online CEC).
# Managing Aligner fit and seating

The Aligners are not retentive enough

## ROOT CAUSES

- Retention potentially due to short clinical crowns, common with teens

## SOLUTIONS

- Use Detail Pliers for retention see fig. 4
- Ensure that patient’s periodontium is meticulously clean prior to taking initial PVS impressions

## REFERENCES

- Detail Pliers (Tips & Techniques on Online CEC)

### PREVENTION NOTES:

1.14 Add extra attachments for retention when modifying ClinCheck or plan to use Detail Pliers.
1 Managing Aligner fit and seating

Short Aligners

Definition: If the Aligner trim >1 mm from FGM (free gingival margin) in more than 2 consecutive teeth...

ROOT CAUSES

BEGINNING TX ONLY:

SOLUTIONS

BEGINNING TX ONLY:

Short Aligners caused by tooth-specific movements not occurring (When tooth does not track with the Aligner the Aligner may appear short in that area)

Call Align Customer Support; Ask for Aligners with repositioned gingival line—do not resubmit impressions—and ask for warranty replacement Aligners. Submitting photos are helpful to Align to correct the problem

Suboptimal initial impressions that did not capture full clinical crowns

Prevention Note 1.15

SUBOPTIMAL IMPRESSIONS

BEGINNING TX ONLY:

Have Aligners remade by retaking impressions and send back to Align along with new photos and original Aligners that did not fit

SUBOPTIMAL PHOTOS

BEGINNING TX ONLY:

Have Aligners remade by retaking impressions and send back to Align along with new photos and original Aligners that did not fit

Suboptimal photos were submitted that didn’t allow technician to compare clinical position of gingiva with the virtual gingiva

MIDDLE TX ONLY:

Continuous treatment unless movements effected, in which case Mid-Course Correction may be warranted

Aligners were trimmed too short during manufacturing (rare)

MIDDLE TX ONLY:

[See Tooth-Specific Movement sections (pp. 17–30) in this Guide]

During Middle of Treatment:

Improvement in gingival health may cause gingiva to shrink down during treatment which may look like Aligners are short

Prevention Note 1.16

Prevention Note 1.17

REFERENCES

PVS impression taking technique (Tips & Techniques on Online CEC). Photo guide (Tips & Techniques on Online CEC)

PREVENTION NOTES:

1.15 Make sure you are taking quality initial records, particularly photos and impressions.

1.16 Check position of virtual gingiva in ClinCheck to ensure accuracy.

1.17 Consider chlorhexidine gluconate rinse for one week prior to Invisalign PVS impressions to reduce any effects of gingivitis.
## Managing Aligner fit and seating

### Long Aligners

<table>
<thead>
<tr>
<th><strong>ROOT CAUSES</strong></th>
<th><strong>SOLUTIONS</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Suboptimal initial impression. Technician had to guess location of gingival line during Aligner manufacture.</td>
<td><strong>BEGINNING TX ONLY:</strong> If all Aligners affected, send Aligners back to Align with photos of problem areas to have Aligners remade (warranty Aligner).</td>
</tr>
</tbody>
</table>

**Trim Aligner with Invisalign EZ-Trim trimming bur.**

**Trim and polish Aligners see Fig. A, B.**

**EZ-Trim polishing wheel.**
2 Handling tooth-specific movements

ROOT CAUSES

Not enough time for movement to be expressed
Prevention Note 2.0

Lack of overjet; teeth have no place to move without interference from the opposing arch
Prevention Note 2.1

Not enough space for teeth to move due to lack of IPR
Prevention Note 2.0

SOLUTIONS

Extend wear time of Aligner stage; ensure contacts are not binding on teeth that are trying to rotate
Use Invisalign Detail Pliers to assist with minor movements

During Case Refinement ask for Overcorrection (see Align’s Overcorrection policy, p. 12)

REFERENCES

IPR Guides (Tips & Techniques on Online CEC); IPR Video; IPR in Clinical Update, Fall 2002

PREVENTION NOTES:

2.0 Always monitor contacts with unwaxed floss during treatment whether IPR was prescribed or not. If contacts are tight, loosen contacts with a fine diamond strip; verify treatment progress with corresponding ClinCheck stage; if anticipating > 3 mm of IPR then consider doing IPR prior to PVS Impressions (esp. if IPR is in the posterior area); check reproxi-mation form during treatment and keep track of amount of IPR during treatment.

2.1 In Treatment Plan and ClinCheck review, pro-cline uppers; consider IPR on lowers to make space for retraction of anteriors.

3.2 Consider adding attachments during ClinCheck to assist with rotations [See Attachment Protocol on Online CEC to see options you may request, including size, shape, location of attachment]. NOTE: If you change/ add an attachment during treatment, you should section the attachment template into a tooth-specific template, or use the current Aligner as a template. If you use the current Aligner as a template, note that the Aligners will be 1 stage off in relation to the attachments.
2 Handling tooth-specific movements

Rotations of anterior teeth not occurring

<table>
<thead>
<tr>
<th>ROOT CAUSES</th>
<th>SOLUTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>If the tooth did not extrude, the Aligner may have failed to “grab” the tooth, leaving less surface contact area to rotate the tooth (common with upper lateral incisors)</td>
<td>Rotate teeth as a separate step from extrusion</td>
</tr>
<tr>
<td>Attachments are not engaged</td>
<td>Ensure there are no interproximal space constraints and reference the Attachments section, pp. 31-32</td>
</tr>
<tr>
<td>The surface contact of the Aligner against the tooth is small (i.e., peg lateral)</td>
<td>Extend wear time of Aligner stage</td>
</tr>
</tbody>
</table>

Section continued from previous page.

Align Technology, Inc. Note on Overcorrection:
Align recommends overcorrection for all case refinement orders at or near the end of treatment. Align does not recommend building overcorrection into Prescription & Diagnosis Forms at the start of treatment. At the beginning of treatment, it’s nearly impossible to predict the direction and magnitude of overcorrection that may be required at the end of treatment. In fact, a clinical study indicated that the incidence of Refinement does not decrease with the incorporation of overcorrection at the beginning of treatment. If anything, overcorrection may delay the onset of treatment because of confusion from the appearance of ClinCheck, and may also extend overall treatment time because of its unpredictable outcome. Overcorrection makes more sense near the end of treatment when the specific movements need ed are clearly identified. The clinician can then communicate through case refinement which teeth to overcorrect, how much, and in which direction. With the Invisalign Detail Pliers, minor movements may even be corrected without resorting to case refinement.

Requests for overcorrection at the outset of treatment will still be honored if the instructions are specific. The initial prescription form must specify which teeth need overcorrection, what magnitude (degrees or mm), and in which direction. This should ensure greater predictability with treatment outcome, improve the overall appearance of ClinCheck set-ups, and avoid delays in order processing. ClinCheck versions 1.7 and above have a “View Overcorrection” checkbox which enables clinicians to view the overcorrection stages so that the last stage shows the optimal set-up, rather than the overcorrected position.
**2 Handling tooth-specific movements**

Rotations of posterior teeth (especially premolars/bicusps) not occurring

### ROOT CAUSES

- Not enough time for movement to be expressed due to variation in bone biology or tooth morphology

### SOLUTIONS

- Extend weartime of Aligner stage; and ensure contacts are not binding on teeth that are to rotate

### REFERENCES

- IPR Guides (Tips & Techniques on Online CEC); IPR Video; IPR in Clinical Update, Fall 2001

### PREVENTION NOTES:

2.3 Monitor contacts with unwaxed floss during treatment whether IPR prescribed or not—if contacts are tight, lightly loosen contacts with a fine diamond strip; verify treatment progress with corresponding ClinCheck stage; if anticipating >3 mm of IPR then consider doing IPR prior to PVS Impressions (especially if IPR is in the posterior area); check reproximation form during treatment and keep records of amount of IPR during treatment.

2.4 Rotate tooth prior to beginning treatment with other appliances, such as sectionals. When reviewing ClinCheck, make sure that the tooth has room to rotate, either through space or planned IPR (space on each side of tooth). Consider adding buccal/lingual attachments or other attachments during ClinCheck to aid with rotations, but be careful about over-enthusiastic Attachments if there are too many buccal/lingual attachments [See Attachment Protocol on Online CEC] (see fig. C).

2.5 Consider adding attachments during ClinCheck to assist with rotations [See Attachment Protocol on Online CEC to see options you may request, including size, shape, location of attachment]. NOTE: If you change/add an attachment during treatment, you should section the attachment template into a tooth-specific template, or use the current Aligner as a template. If you use the current Aligner as a template, note that the Aligners will be 1 stage off in relation to the attachments.

**Section continued on following page...**
## Handling tooth-specific movements

Rotations of posterior teeth (especially premolars/bicuspids) not occurring

<table>
<thead>
<tr>
<th>ROOT CAUSES</th>
<th>SOLUTIONS</th>
<th>REFERENCES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attachments are not engaged</td>
<td>Ensure there are no interproximal space constraints and reference the Attachments section (pp. 31–32) of this Guide</td>
<td>Attachments Protocol (Tips &amp; Techniques to be on Online CEC)</td>
</tr>
<tr>
<td>The surface contact of the Aligner against the tooth is small (i.e., peg lateral)</td>
<td>Extend wear time of Aligner stage</td>
<td>During Case Refinement ask for Overcorrection (Be specific about tooth and magnitude of Overcorrection: see Align’s Overcorrection policy, p. 12)</td>
</tr>
</tbody>
</table>

Prevention Note 2.5 [see page 18]

Section continued from previous page.
2 Handling tooth-specific movements

Residual crowding

ROOT CAUSES

- Aligner lag, or not enough time for movement to be expressed due to variation in bone biology or tooth morphology
- Lack of overjet; Lower crowding cannot be resolved because lower teeth are contacting upper teeth (interarch interference)
- Inadequate IPR during treatment
- Contact binding (interproximal interference)

SOLUTIONS

- Extend wear time of Aligners or backtrack an Aligner before moving forward. Ensure contacts are not binding on teeth that are to rotate
- Move interference out of the way with Case Refinement Aligners
- Complete the amount of IPR prescribed and extend wear time of Aligner or backtrack an Aligner
- Ensure no contact binding with finishing diamond strips. Extend wear time of Aligners

REFERENCES

- Detail Pliers (Tips & Techniques on Online CEC)
- IPR Guides (Tips & Techniques on Online CEC; IPR Video; IPR in Clinical Update, Fall 2001; Detail Pliers (Tips & Techniques on Online CEC)

PREVENTION NOTES:

2.6 Closely track amount of IPR and monitor teeth.

2.7 Consider Pre-PVS IPR (make sure to retain teeth between taking PVS impressions and initial Aligner delivery).
## 2 Handling tooth-specific movements

### Residual spaces at the end of treatment

<table>
<thead>
<tr>
<th>ROOT CAUSES</th>
<th>SOLUTIONS</th>
<th>REFERENCES</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Aligner lag, or not enough time for movement to be expressed due to variation in bone biology or tooth morphology</strong></td>
<td>Extend wear time of Aligners.</td>
<td><strong>PREVENTION NOTES:</strong></td>
</tr>
<tr>
<td><strong>Case Refinement</strong> (build in overcorrection—virtual C-Chain) Be specific about tooth and magnitude of Overcorrection. (See Align’s Overcorrection policy, p. 12.) see fig. A, B, C</td>
<td>Case Refinement (build in overcorrection—virtual C-Chain) Be specific about tooth and magnitude of Overcorrection. (See Align’s Overcorrection policy, p. 12.) see fig. A, B, C</td>
<td><strong>2.8 Using highest detail setting in ClinCheck, review setup for spaces</strong></td>
</tr>
<tr>
<td><strong>Detail Pliers to retract no more than 0.5 mm per tooth</strong></td>
<td><strong>Hawley retainer</strong> (relieve lingual acrylic)</td>
<td><strong>IPR Guides (Tips &amp; Techniques on Online CEC), IPR Video:</strong></td>
</tr>
<tr>
<td><strong>Positioner</strong></td>
<td><strong>Positioner</strong></td>
<td>IPR in Clinical Update, Fall 2001</td>
</tr>
</tbody>
</table>

**Excessive IPR**

| **Case Refinement** (build in overcorrection—virtual C-Chain) Be specific about tooth and magnitude of Overcorrection. (See Align’s Overcorrection policy, p. 12.) see fig. A, B, C | **Detail Pliers to retract no more than 0.5 mm per tooth** | **Hawley retainer** (relieve lingual acrylic) |
| **Positioner** | **Positioner** | **Detail Pliers (Tips & Techniques on Online CEC)** |

**Prevention Note 2.8**

**Case Refinement** (build in overcorrection—virtual C-Chain) Be specific about tooth and magnitude of Overcorrection. (See Align’s Overcorrection policy, p. 12.) see fig. A, B, C

**IPR Guides (Tips & Techniques on Online CEC), IPR Video:** IPR in Clinical Update, Fall 2001

**No space to retract the teeth due to lack of overjet/ Tooth size discrepancy**

**Leave space for restoration**

**IPR opposite arch to close the spaces with Case Refinement**

**Order Refinement** Aligners to overcorrect intrusion to allow overjet for retraction

**Positioner**

**Hawley retainer** (relieve lingual acrylic)

**Positioner**

**Detail Pliers** (relieve lingual acrylic)

**Positioner**

**Detail Pliers (Tips & Techniques on Online CEC)**

**PREVENTION NOTES:**

2.8 Using highest detail setting in ClinCheck, review setup for spaces
## 2 Handling tooth-specific movements

### Residual spaces at the end of treatment

**ROOT CAUSES**

<table>
<thead>
<tr>
<th>Root Cause</th>
<th>Solutions</th>
</tr>
</thead>
<tbody>
<tr>
<td>No space to retract teeth due to deep bite</td>
<td>Intrude upper or lower incisors to open bite than close spaces (Mid-Course Correction)</td>
</tr>
<tr>
<td>Subgingival IPR ledge makes contacts appear open</td>
<td>Remove ledge with IPR, close space with any of the above solutions listed under “Aligner lag” (p. 18)</td>
</tr>
<tr>
<td>Space may have been present in ClinCheck</td>
<td>Close space with any of the solutions listed in the “Aligner lag” row of the previous page</td>
</tr>
</tbody>
</table>

**Prevention Note 2.8** see page 21

---

Smooth parallel lines without subgingival ledge is the goal (Womack)

---

Section continued from previous page.
2 Handling tooth-specific movements

Anterior teeth not level

ROOT CAUSES

Extrusion not occurring: See sections on Extrusions (p. 24) and Intrusions (p. 33)

Prevention Note 2.9

SOLUTIONS

Aesthetic leveling based on clinician’s judgement (build up a tooth or aesthetically level it) see fig. A, B, C

Case Refinement or Mid-Course Correction to request leveling

Tooth crowns are different lengths

Reshape or build up to even teeth see fig. C

PREVENTION NOTES:

2.9 Where possible intrude teeth rather than extrude teeth when leveling (extrusion is a less predictable movement).
# Handling tooth-specific movements

## Incomplete extrusions

### ROOT CAUSES

- **Absolute extrusion was programmed (less predictable than relative extrusion).**
- **Insufficient undercut for Aligner to grab tooth.**
- **Attachments not engaging or attachment ineffective.**
- **Insufficient coverage area of the isolated tooth (short Aligner around tooth).**
- **Lack of space (interproximal interference).**

### SOLUTIONS

- **Auxiliary Treatment:** Button—interarch or intra-arch elastic—and make sure there is no contact binding (see fig. C).
- **Auxiliary Treatment:** Button—interarch or intra-arch elastic—and make sure there is no contact binding (see fig. A).
- **Auxiliary Treatment:** Button—interarch or intra-arch elastic—and make sure there is no contact binding (see fig. A).
- **Auxiliary Treatment:** Button—interarch or intra-arch elastic—and make sure there is no contact binding (see fig. A).

### REFERENCES

- **Extrusions (Tips & Techniques on Online CEC); Buttons; Button Kit**

### PREVENTION NOTES:

#### 2.10

- Program more predictable movements in ClinCheck (intrusion and relative extrusion); if doing less predictable movements, program them at the end of treatment (i.e., absolute extrusion); attachments are placed for 2–2 anterior intrusions but not automatically placed for extrusions of posterior teeth—request if desired (see Attachment Protocol on Online CEC).

#### 2.11

- Attachments for anterior extrusions are automatically placed for extrusions > 1 mm. Posterior extrusion > 1 mm must be requested by doctor.

---

**Invisalign Clinical Monitoring Guide**

Align Technology, Inc.
2 Handling tooth-specific movements

Posterior openbite occurring near end of treatment

**ROOT CAUSES**

- Anterior interference/insufficient leveling (see fig. A)
- Transient posterior interference/intrusion
- Bowing of arch due to insufficient IPR (Unwanted intrusion) (See “Unintended Intrusion” section, p. 24)
- Posterior buccal tipping instead of bodily expansion

**SOLUTIONS**

- Case Refinement to relieve anterior interference by additional leveling (intrusion of upper and/or lower incisors)
- Cut out premolar/molar region of Aligners; allows for settling in posterior (Watch for rotation relapse of posterior teeth if they are not covered) (see fig. C)
- Provide buccal root torque via fixed appliances

**REFERENCES**

- Auxiliary Treatment: Buttons - extrusion (interarch) - to extrude and close the posterior openbite

**PREVENTION NOTES:**

2.12 Expansion via buccal segment uprighting is more likely to be successful than bodily expansion of the entire segment.
## Handling tooth-specific movements

### Black triangles appear

<table>
<thead>
<tr>
<th>ROOT CAUSES</th>
<th>SOLUTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Due to shape of teeth, position of teeth, or lack of papilla once teeth are aligned</td>
<td>Perform IPR and move contact point gingivally and then close the space with Case Refinement or Detail Pliers</td>
</tr>
<tr>
<td>Unwanted tip between two teeth causing contact point to be occlusal</td>
<td>Consider additional IPR to move contact gingivally</td>
</tr>
<tr>
<td></td>
<td>Upright the teeth with sectionals/fixed appliances or Case Refinement with attachments</td>
</tr>
<tr>
<td></td>
<td>Restorative dentistry</td>
</tr>
</tbody>
</table>

**PREVENTION NOTES:**

2.13 Review ClinCheck carefully for black triangles, although note that ClinCheck is not always 100% indicative of eventual treatment outcomes and simulated gingiva in ClinCheck may not always accurately represent the patient's gingiva. Review patient's initial condition to assess for potential black triangles at the end of treatment.
2 Handling tooth-specific movements

Incomplete tip at end of treatment

## Root Causes

- Aligners switched too fast to allow for root translation before advancing to the next stage
- Insufficient undercut area for Aligner to grab the tooth

## Solutions

- Extend wear time of each Aligner
- Add attachments in Case Refinement as close to center of rotation of tooth as possible to upright the teeth
- Use Detail Pliers near mesial/distal line angles to enhance desired pressure

## References

Alignment Protocol (Tips & Techniques on Online CEC)

## Prevention Notes:

2.14 Request rectangular Attachments. Extend wear time. Ensure amount of tip you want is expressed in ClinCheck.
2 Handling tooth-specific movements

Incomplete torque

**ROOT CAUSES**

- Insufficient undercut area for Aligner to grab the tooth

**SOLUTIONS**

- Add attachments in Case Refinement

**REFERENCES**

- Attachment Protocol (Tips & Techniques on Online CEC)

**PREVENTION NOTES:**

2.15 Request attachments in ClinCheck for additional undercut.

2.16 Expansion via buccal segment uprighting is more likely to be successful than bodily expansion of the entire segment.
Handling tooth-specific movements

Unintended intrusion is occurring of tooth that I’m trying to extrude/rotate/expand

PREVENTION NOTES:

2.18 Make sure sufficient interproximal space is present during rotations and extrusions; Stage less predictable movements towards the end of treatment.

ROOT CAUSES

SOLUTIONS

Inadequate IPR, causing Aligner to squeeze tooth apically

Monitor contact; if tight, lightly loosen contact with fine diamond strip; use auxiliary treatment to get tooth back on track

Buttons/elastics

Sectional fixed appliances

REFERENCES

IPR Guides (Tips & Techniques on Online CEC); IPR Video; IPR in Clinical Update, Fall 2001

Invisalign Clinical Monitoring Guide 30
## Handling tooth-specific movements

### Unwanted tipping/dumping during large span space closure of extraction spaces

<table>
<thead>
<tr>
<th>ROOT CAUSES</th>
<th>SOLUTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Space too large (e.g., bicuspid extraction)—less predictable movement of Aligners</td>
<td>Extend weartime of Aligner to allow tooth movements to fully express</td>
</tr>
<tr>
<td></td>
<td>Consider combining with restorative dentistry and not trying to close all spaces orthodontically</td>
</tr>
<tr>
<td></td>
<td>Mid-Course Correction if off-track. Submit new PVS impression to Align.</td>
</tr>
<tr>
<td></td>
<td>Consider other appliances: Sectionals, Power arms</td>
</tr>
<tr>
<td></td>
<td>Consider virtual gable bend programmed in ClinCheck</td>
</tr>
<tr>
<td></td>
<td>Combination Treatment: Aligners plus sectionals or fixed appliances</td>
</tr>
</tbody>
</table>

### PREVENTION NOTES:

2.19 Choose extraction cases where the roots are positioned in your favor; request rectangular attachments on teeth adjacent to the extraction site and plan to extend the weartime of the Aligners per stage; combination treatment—use Aligners until unwanted crown dumping/tipping occurs then switch to sectionals or fixed appliances. Place vertical rectangular attachments to help prevent unwanted tipping.
## Handling tooth-specific movements

### Distalization/Mesialization not occurring

<table>
<thead>
<tr>
<th>ROOT CAUSES</th>
<th>SOLUTIONS</th>
<th>REFERENCES</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Aligners can be less predictable distalizing teeth depending on bone biology and tooth morphology (&gt;2 mm less predictable)</td>
<td>- Backup anchorage with elastics. NOTE: Aligner may become less retentive with prolonged elastic wear, so add pressure points with Detail Pliers for retention.</td>
<td>- Interarch Guide (Tips &amp; Techniques on Online CEC)</td>
</tr>
</tbody>
</table>

### Prevention Notes:

**Prevention Note 2.20**

2.20 If you anticipate using elastics during treatment, the Aligner may become less retentive so add attachments for retention in your ClinCheck; do distalization/mesialization before Invisalign treatment with a fixed or removable distalization appliance; hold with retention prior to Aligners arriving.
2 Handling tooth-specific movements

Expansion not occurring

ROOT CAUSES  SOLUTIONS  REFERENCES

Excessive expansion by bodily movements rather than buccal uprighting

Mid-Course Correction; Fixed Appliances

Prevention Notes 2.21 and 2.22

Excessive skeletal component to the expansion for a dental movement appliance

Consider treating in combination with Aligners and fixed appliances/surgery

Prevention Note 2.23

PREVENTION NOTES:

2.21 In Treatment Planning/ClinCheck, expansion via buccal uprighting is more predictable than bodily movement.

2.22 Consider expanding posterior segment (4–7) as one unit first vs. individual teeth.

2.23 Consider combination pre-treatment with expanders (see Online CEC article Hickory WR. Combination Treatment to Meet Market Demands. Pre-Invisalign Combination Treatment Part 1: Intrusion. Praxis, excellence in orthodontic management. June/July 2002; 11–13) or surgical expansion. Consider modifying treatment goals if skeletal component to expansion and the patient is unwilling to correct through surgery.
2 Handling tooth-specific movements

Intrusion not occurring

**ROOT CAUSES**

- Attachments may have come off or may have become worn down

**SOLUTIONS**

- Rebond attachment using sectional template or current Aligner. (see Attachments section, pp. 31-32.)

**REFERENCES**

- Guide to Placing Attachments (Tips & Techniques on Online CEC)

**PREVENTION NOTES:**

2.24 When reviewing ClinCheck, check intrusive movement—is it isolated or in combination with tipping or torquing movement. Try to isolate intrusion. Separate movements in ClinCheck. If a lot of intrusion is being done, consider intruding 2–2 first, then intruding the cuspids rather than all at once. Place attachment adjacent to the tooth needing to be intruded in ClinCheck.

2.25 Intrusion of upright teeth is more biomechanically advantageous than intrusion of flared teeth.
## 2 Handling tooth-specific movements

### Extraction site space not closing

<table>
<thead>
<tr>
<th>ROOT CAUSES</th>
<th>SOLUTIONS</th>
<th>REFERENCES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pontic material preventing adjacent teeth from moving</td>
<td>Make sure to leave space mesial/distal on each side on pontic (suggested rule of thumb: toothpick size space on each side)</td>
<td>Align Pontic Kit; Guide to Extractions (on Online CEC)</td>
</tr>
</tbody>
</table>
2 Handling tooth-specific movements

Anterior or lateral openbite (rare) occurring

<table>
<thead>
<tr>
<th>ROOT CAUSES</th>
<th>SOLUTIONS</th>
<th>REFERENCES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Terminal molar (i.e., 2nd or 3rd molar) supereruption due to non-occlusal coverage of terminal molar (doctor would have to cut Aligner at terminal molar with no coverage on that tooth for this to occur or missed capturing the molar in the initial PVS impression)</td>
<td>Occlusal equilibration</td>
<td>IPR Guides (Tips &amp; Techniques on Online CEC), IPR Video, IPR in Clinical Update, Fall 2001</td>
</tr>
<tr>
<td>Distal uprighting of tipped molar without pre-treatment equilibrating</td>
<td>Equilibrate during or after treatment</td>
<td></td>
</tr>
</tbody>
</table>

**Prevention Notes:**

2.26 If trimming Aligners at terminal molar, ensure at least mesial half of tooth is covered to prevent supereruption.

2.27 Make sure terminal molar (2nd or 3rd molar) are included in the impression. Decide what will be done with third molars before ClinCheck (i.e., virtually extract 3rd molars or include in Aligner coverage).
## 3 Ensuring Attachments fit and stay bonded

### Attachments are not fitting into the Aligner attachment space

<table>
<thead>
<tr>
<th>ROOT CAUSES</th>
<th>SOLUTIONS</th>
<th>REFERENCES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tooth movement not occurring due to bone biology, Aligner lag, or excessive speed of movements</td>
<td>Back up an Aligner to try to reengage attachment into pocket; if they don't reengage, see the solutions to the right...</td>
<td>Guide to Placing attachments (Tips &amp; Techniques on Online CEC)</td>
</tr>
<tr>
<td>Remove attachment and use sectioned attachment template to rebond attachments; or use current Aligner as an attachment template, but be aware that you will be one stage off</td>
<td>Remove attachment and continue treatment without attachments if possible; if attachment pocket in Aligner affects patient aesthetics erase it with the Eraser pliers (NOTE: this may distort the Aligner) see Fig. D, E</td>
<td></td>
</tr>
<tr>
<td>If attachments are necessary to achieve original treatment goals, then use Mid-Course Correction for new Aligners</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### PREVENTION NOTES:

- **3.0** Make sure attachment is fully covered by Aligner —during ClinCheck modification, request attachment is placed at least 2 mm away from the gingival ledge of the Aligner.

- **3.1** Educate the patient to mark the attachment with a pencil or wax pencil and to check to make sure the attachments are engaged. (See Fig. B, C)

---

**Prevention Note 3.0**

Gingiva is simulated in gingiva —if Aligner is trimmed short then attachment will not be fully covered and therefore not fully engaged (See Short Aligners section, p. 9)
# Ensuring Attachments fit and stay bonded

## Attachments come debonded

### Root Causes

<table>
<thead>
<tr>
<th>Cause</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contaminated bond surfaces</td>
<td>Replace under better isolation</td>
</tr>
<tr>
<td>Attachment broken from use</td>
<td>Section attachment template and reuse it on current tooth as bond attachment, refer to section 3.2</td>
</tr>
<tr>
<td>Attachments worn down from wear</td>
<td>Remove and replace attachment with higher-fill composite</td>
</tr>
<tr>
<td>Occlusal interference, causing patient to shear off attachment</td>
<td>Adjust attachment with trimming bur to relieve</td>
</tr>
<tr>
<td>Attachments don’t bond well to restorations</td>
<td>Section attachment template and reuse it on current tooth to bond attachment</td>
</tr>
</tbody>
</table>

### Prevention Notes:

1. **Prevention Note 3.2**
   - Bonding to porcelain or gold may be difficult. Check ClinCheck to see if teeth with crowns or veneers have attachments and plan accordingly. Treatment goals may require alteration if attachments are not bonded to crowns.

2. **Prevention Note 3.3**
   - Don’t smooth off edges of rectangular attachments.
   - Attachment repositioning can be requested during ClinCheck modification.

3. **Prevention Note 3.5**
   - Attachments worn down from wear. Remove and replace attachment with higher-fill composite.

4. **Prevention Note 3.4**
   - Attachments don’t bond well to restorations. Section attachment template and reuse it on current tooth to bond attachment.

### References

Guide to Placing Attachments (Tips & Techniques on Online CEC)

Align Technology, Inc. Note on Attachments:
Not all types of attachments are placed automatically by default (please reference the Attachment Protocol document) because we are still researching the data that will help determine if and when certain attachments are indispensable for certain movements to occur, or to prevent unwanted results from developing. Until further data is available, outside the current default attachments, the decision whether attachments are necessary, what type and where to put them, is up to the treating clinician. Align will make suggestions if it is requested from us, but please be aware that further clinical data is still required on this issue. Align and several universities are currently researching this area of the treatment.

(See Attachment Protocol on Online CEC)
## 4 Addressing patient concerns

Patient has negative reaction to Aligner (rare)

<table>
<thead>
<tr>
<th>ROOT CAUSES</th>
<th>SOLUTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensitivity to Aligner material</td>
<td>Call Align Customer Support to report problem.</td>
</tr>
<tr>
<td>Prevention Note 4.0</td>
<td></td>
</tr>
</tbody>
</table>

**Prevention Notes:**

4.0 Check if patient has history of allergy to plastics. Rule out latex allergy, especially when delivering Aligners using latex gloves.
# Addressing patient concerns

## TMD symptoms occurring (jaw hurts or locks—rare)

<table>
<thead>
<tr>
<th>ROOT CAUSES</th>
<th>SOLUTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Material thickness; jaw clenching while sleeping</td>
<td>Trim occlusal/distal-most portion of Aligner</td>
</tr>
<tr>
<td>Prevention Note 4.1</td>
<td>Don’t wear Aligners while asleep; extend wear time to 3 weeks to compensate for lost time</td>
</tr>
<tr>
<td>Anterior tooth interference</td>
<td>(See Posterior Openbite section, p. 20)</td>
</tr>
<tr>
<td>Prevention Note 4.0</td>
<td></td>
</tr>
<tr>
<td>Supereruption of terminal molar</td>
<td>(See Anterior or Lateral Openbite section, p. 30)</td>
</tr>
<tr>
<td>Prevention Note 4.0</td>
<td></td>
</tr>
<tr>
<td>Underlying/masked symptoms manifesting as a result of splint effect from Aligners</td>
<td>Stop treatment. Re-diagnose or treat one arch at a time. Discontinue elastic use, if any</td>
</tr>
</tbody>
</table>

### PREVENTION NOTES:

4.1 Diagnose for underlying TMD symptoms or history of TMJ problems prior to starting treatment. If in doubt, consider making a vacuform retainer as a starter appliance before committing to Invisalign treatment.
5 Handling lost or broken Aligners

Lost or broken Aligner

<table>
<thead>
<tr>
<th>ROOT CAUSES</th>
<th>SOLUTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>If &lt;7 days into current stage</td>
<td>Try moving to next Aligner stage; Retain with Previous Stage; Reorder lost stage (if broken, a warranty Aligner will be available at no charge if broken Aligner is returned to Align).</td>
</tr>
<tr>
<td>If &gt;7 days into current stage</td>
<td>Try to move to next stage.</td>
</tr>
</tbody>
</table>

PREVENTION NOTES:

5.0 Have patients keep previous (old) Aligners for retention and backtracking.
## 6 Maintaining Aligner aesthetics

### Staining or discoloration

<table>
<thead>
<tr>
<th>ROOT CAUSES</th>
<th>SOLUTIONS</th>
<th>REFERENCES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient drinking tea, coffee, soda, wine, smoking with Aligners on.</td>
<td>Instruct Patient to remove Aligners when drinking/smoking/eating; Instruct Patient on cleaning; use the Invisalign Cleaning System.</td>
<td>Invisalign Instructions for Use in Patient Starter Kit; Cleaning Kit.</td>
</tr>
<tr>
<td>Prevention Note 6.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Patient biology: some patients' teeth may stain at different rates.</td>
<td>Instruct Patient to remove Aligners when drinking/smoking/eating; Instruct Patient on cleaning; use the Invisalign Cleaning System.</td>
<td></td>
</tr>
</tbody>
</table>

**PREVENTION NOTES:**

6.0 Have Staff instruct patient at outset of treatment on cleaning care and use of the Invisalign Cleaning System and crystals.
6 Maintaining Aligner aesthetics

Holes or bubbles

<table>
<thead>
<tr>
<th>ROOT CAUSES</th>
<th>SOLUTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Potential issue in manufacturing, packaging, or damage during shipment (rare)</td>
<td>Call Align Customer Support for warranty replacement Aligner(s)</td>
</tr>
</tbody>
</table>
## 6 Maintaining Aligner aesthetics

### Attachments on anterior teeth are not aesthetic

#### ROOT CAUSES

<table>
<thead>
<tr>
<th>Attachments on anterior teeth</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Prevention Note 6.1</strong></td>
</tr>
</tbody>
</table>

#### SOLUTIONS

| Remove attachments and do a Mid-Course Correction for new Aligners without attachment spaces (fee involved) |
| Use Eraser Pliers to "erase" attachments until needed; may distort Aligner (see Fig. A, B) |

### References

- Attachments Protocol, Guide to Placing Attachments (Tips & Techniques on Online CEC)

### PREVENTION NOTES:

**6.1** Save requests for less aesthetic attachments until Case Refinement or consider placing attachment on the lingual surface.
# Retainer questions

Frequently asked questions and answers

<table>
<thead>
<tr>
<th>QUESTIONS</th>
<th>ANSWERS</th>
<th>REFERENCES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Is the last Aligner a retainer?</td>
<td>No. The Aligner material is not durable for long-term retention. Invisalign retainers are made from more durable material</td>
<td></td>
</tr>
<tr>
<td>Can I order an Invisalign Retainer?</td>
<td>If you are satisfied with the final position of the teeth, match the teeth to stage of ClinCheck (initial or case refinement ClinCheck) and order retainer from Align for that particular stage. Use the Retainer Order form.</td>
<td></td>
</tr>
<tr>
<td>Do I have to use an Invisalign Retainer?</td>
<td>No. You can use any retainer—fixed or removable. Retention is left up to the doctor and patient preferences</td>
<td>Retainer Information sheet on Online CEC</td>
</tr>
</tbody>
</table>

**NOTES:**

7.0 Align does not accept study models or additional impressions to make retainers (Retainers only created from initial or case refinement ClinCheck).

7.1 Retention should be planned and discussed with the patient prior to the beginning of treatment.
**Glossary**

This glossary is intended to be used as a tool for the dental professional as they learn about the Invisalign® treatment modality. It is not designed to be an all-inclusive orthodontic glossary, but to serve as a reference to commonly used Invisalign terms.

Terms denoted with a (*) refer to either an Invisalign specific term, or a definition that differs slightly from the accepted orthodontic definition.

**Absolute Extrusion** True vertical movement along the long axis of the tooth.

**Anchorage** Resistance to displacement. The Invisalign system allows for intra-arch anchorage by isolating selected teeth to be moved.

**Angle’s Classification** A classification system based on the relationship of the permanent maxillary first molar and occlusion cusps to the lower permanent teeth.

**Angulation** Mesial-distal movement of a tooth around the center of rotation.

**Ankylosis** Abnormal immobility, union or fusion. May occur between two bones at their articulation (i.e., TMJ) or between teeth and the alveolar bone. Dental ankylosis prevents both eruption and orthodontic movement.

**Anterior open bite** No vertical overlap exists between maxillary and mandibular anterior teeth.

**A-P Discrepancy** Anterior Posterior Discrepancy. Also known as Sagittal Discrepancy. An evaluation of the anterior-posterior position of the jaws, and/or teeth made from a profile view.

**Arch length deficiency** Difference between the available and required space within an arch to align the teeth.

**Attachments** Composite forms bonded onto facial or lingual surfaces of teeth using a forming template to help achieve certain types of tooth movement with the Invisalign System.

**Bilateral** Denoting both sides.

**Biomechanics** Application of physical principles such as force, resistance as it relates to biological systems.

**Bite O (Bite Zero)** The stage at which the models are virtually articulated. Extensive measurements are taken of plaster casts to insure the occlusion as you see depicted in the ClinCheck file on the computer, match the patients actual occlusal condition.

**Body Translation** The movement of a tooth where the crown and root of the tooth move the same distance in the same direction at the same time.

**Bolton Analysis** A method to evaluate tooth-size discrepancies (mesio-distal crown width) between the upper and lower arches.

**Case Refinement** The term used by Align Technology to describe when additional Aligners-beyond the last stage are required to move the same distance in the same direction at the same time.

**Centric** The definition used by Align Technology: CO is the position of the teeth when the teeth are in Occlusion (CO) their maximum intercuspual position, i.e. the fit of the arch.

**Cephalometrics** The scientific measurement of the bones of the cranium and face, utilizing a fixed reproducible position for lateral radiographic exposure of the skull and facial bones. Used for the evaluation of facial growth and development, including soft tissue profile.

**Class I** The mesiobuccal cusp of the upper first molar lies in the buccal groove of the lower first molar. The upper canine lies distal to the lower canine.

**Class II** The mesiobuccal cusp of the upper first molar lies medial to the buccal groove of the lower first molar. The upper canine lies mesial to the lower canine.

**Class II Division 1** Class II with increased overjet.

**Class II Division 2** Class II with retroclined upper central incisors.

**Class III** The mesiobuccal cusp of the upper first molar lies distal to the buccal groove of the lower first molar. The upper canine lies distal to the contact point between the lower canine and first premolar.

**ClinCheck®** A computerized movie depicting the patient’s teeth from beginning to final position is sent to you via the Internet and is easily viewed using Align Technology’s exclusive ClinCheck software. This program allows you to visually review the projected movement as well as the final setup in three dimensions. Depending on the treatment option you select, ClinCheck may also give you the opportunity to request modifications in the treatment plan until you are satisfied with the movement staging and the final outcome.

**Couple** Two parallel forces of equal magnitude acting in opposite directions and separated by a distance. Couples result in pure rotational movement about the center of resistance regardless of where the couple is applied on the object.

**CR/CO Discrepancy** When the CR bite position and the CO bite position are not coincident.

**CR/CO Shift** A deflection of the mandible in an anterior, posterior and/or lateral direction to centric occlusion, as a result of a premature contact occurring when the mandible is in centric relation.

**Crossbite** An abnormal relationship of one or more teeth to one or more teeth of the opposing arch, in the buccolingual or labio-lingual direction. May be Anterior, Buccal, Lingual, Palatal, Posterior, Functional.

**Buccal Crossbite** A crossbite due to buccal displacement of the affected tooth or group of teeth from their ideal position relative to their antagonists.

**Deep Bite** Excessive overbite.

**Distalization** The movement of teeth in the distal direction.

**Edge to edge occlusion** An occlusion in which the anterior or posterior teeth of both jaws meet along their incisal or buccal cusp edges. Often associated with a Class III occlusal relationship.
**Glossary (cont’d)**

**Expansion** Widening of the dental arches.

**Extrusion** A translational type of tooth movement parallel to the long axis of the tooth in the direction of the occlusal plane.

**Finishing** see case refinement

**Force** The actions of one body against another - push or pull, it has both magnitude and direction.

**Headfilm** A common term for cephalometric radiograph. In orthodontics lateral and frontal head films are common.

**Inclination** The buccal lingual movement of a tooth around the center of rotation.

*Interproximal Interference* Excessive “virtual” interproximal contacts between adjacent teeth. Clinically can result in stalled or lack of movement of teeth. May require additional interproximal reproximation.

**Intrusion** A translational type of tooth movement parallel to the long axis of the tooth in an apical direction.

**IPR (Interproximal reduction)** Interproximal reduction of enamel. Also known as reproximation, slenderizing, stripping, Air-Rotor Stripping (ARS), or recontouring. Lateral Relating to the one side or the other.

**Limited Treatment** Orthodontic treatment with a limited treatment objective, not involving the entire dentition. Typically addressing the patient’s chief concerns or objectives.

**Makolecclusion** Any deviation from the normal or ideal occlusion.

*Mid-Course Correction* The resubmission of a case when the clinical results have deviated from the approved course of treatment to the point that the teeth no longer fully adapt to the Aligner. A mid-course correction is also required if the patient undergoes significant dental work such that the Aligners no longer fit. New PVS impressions and instructions regarding treatment are required. The patient should be instructed to wear the latest, best fitting Aligner to hold progress until the new Aligners arrive.

**Moment** A force that does not pass through the center of resistance will not produce solely linear movement and will result in some rotational movement. This rotational movement is called a moment of the force.

*Occlusal Interference* Excessive “virtual” contacts between upper and lower teeth. Often referred to clinically as premature or excessive contacts. May require occlusal equilibration.

**Open Bite** Form of malocclusion that may be inherited, developmental, or acquired.

**Overbite** Vertical overlap. The distance between the upper and lower incisal edges when the patient is in maximum intercuspation.

**Overcorrection** Tooth movement beyond the ideal, final position to compensate for potential dental relapse.

**Overjet** The horizontal distance between upper and lower incisal edges along the occlusal plane.

**Palmer Notation Numbering System** The standard numbering system used by Orthodontists in the United States. The mouth is divided into four quadrants. Numbers 1 through 8 identify each tooth within the quadrant, with x designating centrals moving distally with third molars being “85”. When charting, the numbers sit inside an L-shaped symbol to identify the quadrant they belong to - as you look into the patient’s mouth. Primary teeth (an) follow the same format but are represented with letters “A” through “E” in each quadrant.

**Posterior Open Bite** No vertical contact is exhibited between maxillary and mandibular posterior teeth.

**Proclination** Inclination of the crown forward.

**Protraction** Anterior (mesial) movement of teeth, usually referring to bodily movement.

**Protrusion** The state of being anteriorly positioned.

**PVS (aka VPS)** Polyvinylsiloxane impression material.

**Relapse** A partial or full return of malocclusion following orthodontic treatment.

**Relative Extrusion** Used to describe the appearance of vertical correction by crown inclination (torque).

**Repromaximation** see IPR

**Retention** Holding of corrected occlusion after orthodontic treatment.

**Retention** Posterior (lateral) or distal movement, usually referring to the bodily movement.

**Retroclination** Lingual inclination or tipping of crown backward.

**Rotation** Spinning a tooth around the vertical axis.

**Tapping** see Angulation

**TREAT** Stands for “Virtual Invisalign Practice.” This is the name of the program that allows doctors to manage their Invisalign practices online. Within VIP you can: view all aspects of your patient’s cases, including ClinCheck; order marketing materials; start a new patient using online treatment planning forms; review Invisalign “how-to” tutorials; and more.

**Universal Numbering System** Permanent teeth are numbered 1 to 32, starting with the upper right third molar, working around to the upper left third molar, then dropping down to the lower left third molar and working around to the lower right third molar. The 20 primary teeth are lettered, using capital letters A through T, following the same methodology as for the permanent teeth, starting with the upper right second primary molar and ending with the lower right second molar

**VIP** see Virtual Invisalign Practice

**Transverse Discrepancy** see Crossbite

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References

Tips from Your Colleagues on Getting the Results You Want with Invisalign®

Align has compiled a range of creative tips from your peers on a variety of clinical topics. These tips may not have been tested in clinical trials, but rather are personal techniques from Invisalign-experienced colleagues. Some tips have been used on many cases and some on only a few. It is at your discretion to use them where appropriate to best to get the results you want with Invisalign.

To see full downloadable and printable copies of the in-depth Tips & Techniques guides referenced in this document, please go to the Invisalign Clinical Education Center at: www.invisaligncec.com

Acrobat Reader is required to view these documents. (Software available as a free download from Adobe.com)
Index

2nd and 3rd molars. See molars absolute extrusions, completeness of extrusions 19 Aligner fit and seating 1–10 Aligner popping up or anterior posterior rocking 3–4 correctness of fit 6 general fit issues 1–2 long Aligners 10 retention 8 short Aligners 9 tightness and retentiveness 7 undercuts 5 Aligner lag and residual crowding 15 residual spaces at end of treatment 16 time to express ii Aligner material, sensitivity to 33 Aligner path of insertion/removal 2 Aligners aesthetics of 36–38 predictability of movements 25 removing with guitar pick 7 retention of 7, 8, 26 shortness of and shrinking of gingiva 9 switching 22 underlying/masked symptoms manifesting as splint effect from 34 using current Aligner as an attachment 8, 11, 13, 32 allergy history 33 archway on adjacent teeth, intrusion not occurring 28 anterior interference, TMD symptoms 34 anterior opening, tooth-specific movements 30 anterior rocking, Aligner fit and seating 3–4 anterior teeth attachments 38 levelness and tooth-specific movements 18 rotations of and IPR 11 rotations of and upper lateral incisors 12 anterior tooth interference, posterior openbite 20 appointments with patients ii–iv arch, bowing of and posterior openbite 20 attachment pockets, using eraser pliers to ease 31 attachment template, ensuring seating and bonding 1 attachments aesthetics of 38 Align note on 32 anterior teeth 38 assisting with rotation 13 bonding 32 coming off 8 completeness of extrusions 19 engagement of ii, 12 excessive flash ii lit iii intrusion not occurring 28 number of 7 reducing number of 7 rotations 12, 14 sectioning templates 7, 11, 13, 28 using current Aligner as 8, 11, 13, 31, 32 worn 28, 32 bicuspid rotations of 13–14 tipping or dumping 25 black triangles, tooth-specific movements 21 bodily movements, expansion not occurring 27 bond surfaces, contaminated 32 bonding attachment template 1 attachments 32 removing of attachments 7 bone biology attachments 31 rotations of posterior teeth 13 time to express teeth ii variations in and residual crowding 15 brackets/sectional wires 13, 19, 22 bridges, undercuts 5 broken Aligners 35 broken attachments 32 bubbles as Aligners 37 buccal-lingual attachments 13 buccal segment, expansion via 23 buccal segment uprighting, expansion via and posterior openbite 20 bur, trimming 3, 4, 5, 10 buttons challenging movements ii inadequate undercuts 13 incomplete extrusions 19 transient posterior interference/intrusion ii c-chain, virtual 16 case refinement orders for overcorrection 12 relieving anterior interference 20 chlorhexidine gluconate rinse, gingivitis 9 cleaning system 36 ClinCheck as a charting, education tool ii checking for black triangles 21 checking intrusive movements 28 decisions on third molars 32 default setup standards ii number of attachments 7 objectives (box 13) iii spaces in 17 specificity of instructions for iv clinical crowns. See crowns closures, space 25 compliance, patient ii, 1 contact binding, and residual crowding 15 contact points, occlusal 21 contacts rotations of anterior teeth 11, 12 rotations of posterior teeth 13, 14 contaminated bond surfaces 32 coverage area of isolated teeth, completeness of extrusions 19 crowding residual 15 tightness and removing Aligners 7 crowns Aligner fit 6 bonding attachments to 32 retention of Aligners 8 without undercuts 3 debonding. See bonding deepbite, residual spaces at end of treatment 17 default ClinCheck setup standards iii dental anatomy, changes in 4, 6 detail pliers distalizing/mesializing not occurring 26 incomplete extrusions 19 overcorrection ii residual crowding 15 residual spaces at end of treatment 16 retention 8 detailing importance of iv planning for iii diamond strips, IPR 11 dimples, applying adjacent to an attachment 19 discolored of Aligners 36 distal space, pontic material 29 distal uprighting, anterior or lateral openbite 30 distalizing, and tooth-specific movements 26 distortions of impressions 1 dumping, and tooth-specific movements 25 eating or drinking with Aligners 36 elastics challenging movements ii distalizing/mesializing not occurring 26 inadequate undercuts 13 incomplete extrusions 19 unintended intrusions 24 engagement, of attachments ii eraser pliers 8, 31, 38
Index (cont’d)

aligner.

tips, tooth-specific movements 22

Alinert fit and seating 4

attachment.

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Table of contents

Aligner popping up 3

bi-cuspids 28

healing time 2

lower incisors 23

root position 25

extrusions

interproximal space during rotations and extrusions 24

tooth-specific movements 19

extractions

anterior teeth 18
existence of 2

interproximal space during rotations and extrusions 24

Aligner fit 6

fit of Aligners. See Aligner fit and seating

fixed appliances ii

flared teeth

undercuts 5

versus upright teeth 28

date, and Aligner fit 1

force, sufficiency of ii

gable bend, virtual 25

gingiv

assessing 3

attachments 31

height in relation to posterior region 4

improvements and potential impact 9

simulating in ClinCheck 21

gingiva line, suboptimal impressions leading to long Aligners 10

glossary 40-41

gloves, and latex allergy 33

guitar picks, removing Aligners 7

Hawley retainers 16, 20

healing time, extractions 2

history

of allergies 33

of TMJ 34

holes in Aligners 37

impingement, tissue 3

impressions

distortions of 1

long Aligners 10

short Aligners 9

tip of molar 10

impingement, tissue 3

interferences, transient posterior 20

interim retention, sufficiency of and teeth drifting 3

interproximal interference, completeness of extrusions 24

interproximal reduction. See IPR

interproximal space during rotations and extrusions 24

intrusions

Aligner fit and seating 4

not occurring 28

transient posterior 20

unintended 24

versus extrusions 18

Invisalign

about ii

Aligner aesthetics 36-38

attachment fit and bonding 31-32

considerations for using ii-iv

fit and seating 1-10

lost or broken Aligners 35

patient concerns 33-34

retainers 39

tooth-specific movements 11-30

IPR (interproximal reduction)

Aligner fit and seating 2, 6

representation form 3

residual crowding 15

residual spaces at end of treatment 16

rotations of anterior teeth 11

rotations of posterior teeth 13

unintended intrusions 24

jaw-related symptoms 34

lateral incisor, upper 12

lateral openbite, tooth-specific movements 30

lateral opposition, tooth-specific movements 30

lateral, anterior teeth not rotating 12

latex, allergy to 33

leveling, sufficiency of and posterior openbite 20

long Aligners, Aligner fit and seating 30

low incisors, extraction 23

marking attachments, patients 31

mesial space, pontic material 29

mesializing, and tooth-specific movements 26

mid-course corrections ii, iii

molar, posterior openbite 20

molars

anterior or lateral openbite 30

including third molars in treatment decision 1

influenced gingivae 3

supereruptions 30, 34

monitoring

contacts 11, 13, 19, 28

importance of iv

treatment ii-iii

See also ClinCheck

morphology, tooth 13

mouth rinse with warm water, removing Aligners 7

movements

absence of causing short Aligners 9

predictability of ii, 25

See also tooth-specific movements

non-compliance, patient 1

non-occlusal coverage of terminal molar, anterior or lateral openbite 30

occlusal contact points 21

occlusal interference, attachment bonding 32

openbite, tooth-specific movements 20, 30

overcorrection, for case refinement orders 12

overjet

and residual crowding 15

rotations of anterior teeth 11

pain, jaw 34

papilla

black triangles 21

inflamed incisal 3

patient concerns

sensitivity to Aligner material 33

TMJ symptoms 33

patients

appointments with ii-iv

compliance ii, 1

keeping previous Aligners 35

marking attachments 31

periodically compromised teeth, undercuts 5

placement of attachments 32

planning, for detailing iii

plastics, allergy to 33

polishing wheel 30
Index (cont’d)

Keywords:
- pontic material
- extraction site space not closing 29
- mesiodistal space 29
- pontics, undercuts 5
- porcelain, bonding attachments to 32
- position of teeth, Aligner path of insertion/removal 2
- posterior openbite, tooth-specific movements 20
- posterior region, gingiva height in relation to 4
- posterior rocking, Aligner fit and seating 3–4
- posterior teeth, rotations of 13–14
- Pre-PVS extraction, Aligner fit 6
- Pre-PVS IPR cases 3
- predictability of distalizing and mesializing 26
- of movements ii, 25
- programming and 19
- posterior openbite, tooth-specific movements 20
- premolar region, posterior openbite 20
- premolars, rotations of 13–14
- programming predictable movements 19
- PVS impression quality of 3
- terminal molars 30
- recession, undercuts 5
- records, importance of quality iii, 1
- reducing number of attachments 7
- removal path, Aligner 2
- removing Aligners 7
- residual crowding, and tooth-specific movements 15
- residual spaces, and tooth-specific movements 16–17
- restorations, and Aligner fit 4, 6
- retainers
- frequently asked questions 39
- Hawley retainers 16, 20
- vacuum retainers 3, 6, 34
- retention
- Aligner fit and seating 8
- during extractionPre-PVS IPR 3
- rocking, anterior/posterior 3–4
- root position, extraction cases 25
- rotations
- of anterior teeth 11–12
- interproximal space during 24
- of posterior teeth 13–14
- seating of Aligner. See Aligner fit and seating
- of second molars. See molars
- sectioning templates 7, 11, 13, 28
- sensitivity to Aligner material 33
- short Aligners,Aligner fit and seating 9
- skeletal components
- expansion not occurring 27
- incomplete torque 23
- sleeping, jaw clenching 34
- smoking with Aligners 36
- space
- adequacy of IPR 2
- IPR and rotations of anterior teeth 11
- residual 16–17
- for teeth ii
- span of space closures, and tipping or dumping 25
- splint effect, from Aligners 34
- staining of Aligners 36
- subgingival IPR ledge, residual spaces at end of treatment 12
- supereruptions, molars 30, 34
- surgery, with skeletal component to expansion 27
- switching, Aligners 22
- teenagers
- inflamed gingiva due to 2nd molars 3
- retention and clinical crown length 8
- teeth
- shape of and black triangles 21
- tracking of ii
- See also movements; tooth-specific movements
- teeth drifting
- correctness of Aligner fit 6
- sufficiency of interim retention 3
- templates, sectioning 7, 11, 13, 28
- terminal molars. See molars
- third molars. See molars
- time
- to express teeth ii
- healing extractions 2
- See also weartime
- tipped molars, anterior or lateral openbite 30
- tipped teeth, undercuts 5
- tipping, and tooth-specific movements 25
- tips, and tooth-specific movements 22
- tooth crowns lengths, anterior teeth 18
- tooth morphology and residual spaces at end of treatment 17
- tooth-specific movements
- 11–30
- anterior or lateral openbite 30
- anterior teeth not level 18
- black triangles 21
- distalizing/mesializing not occurring 26
- expansion not occurring 27
- extraction site space not closing 29
- incomplete extrusions 19
- incomplete tips 22
- incomplete torque 23
- intrusion not occurring 28
- posterior openbite 20
- residual crowding 15
- residual spaces at end of treatment 16–17
- rotations of anterior teeth 11–12
- rotations of posterior teeth 13–14
- tooth size discrepancy, overjet 16
- tooth-specific movements
- 11–30
- anterior or lateral openbite 30
- anterior teeth not level 18
- black triangles 21
- distalizing/mesializing not occurring 26
- expansion not occurring 27
- extraction site space not closing 29
- incomplete extrusions 19
- incomplete tips 22
- incomplete torque 23
- intrusion not occurring 28
- posterior openbite 20
- residual crowding 15
- residual spaces at end of treatment 16–17
- rotations of anterior teeth 11–12
- rotations of posterior teeth 13–14
- unintended intrusions
- existence of 2
- tooth-specific movements 24
- upright incisors, rotations of anterior teeth 12
- upper lateral incisors, rotations of anterior teeth 12
- veners, bonding attachments to 32
- virtual c-chain 16
- virtual gable bend, tipping/dumping 25
- weartime
- and rotations of anterior teeth 11
- wires
- likened to engaged attachments ii
- See also brackets/sectional wires
- worn attachments 28, 32
Align Technology, Inc. would like to thank the following clinicians who contributed to and reviewed this Guide.

Dr. Zahra Ammari
Dr. Doug Brandt
Dr. Robert Brewka
Dr. David Chenin
Dr. Craig Crawford
Dr. Mitra Derakhshan
Dr. Ken Fischer
Dr. Eric Kuo
Dr. Mark Perelmuter
Dr. Thom Rosenbarger
Dr. Lou Shuman
Dr. Michael Steinberg
Dr. Rene Sterental
Dr. Rob van den Berg
Dr. Damon Wilkerson
Dr. Randol Womack

We hope you find this Guide useful. Please do not hesitate to contact us with additional Tips & Techniques (tips may be submitted through the Online Clinical Education Center at www.invisaligntec.com) that will continue to expand the body of clinical knowledge around Invisalign.