



Clear Aligner Orthodontic Treatment

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Doctor's Manual

**Free Your Smile !**

# Forward

Just ten years after the commercial introduction of the Clear Aligner Treatment (CAT) of malocclusions, the clear aligner treatment has become one of the most popular treatment methods of malocclusions. In many cases, it has become the first choice of treatments, chosen both by the patient and by the dentist. As the leader of the third generation of CAT, we have pursued continuous improvement and innovations in iROK technologies and products. As a result, iROK has become the CLEAR leader in clear aligner treatment with the best clinical results, the widest clinical case selection and the easiest way of use.



With the most advanced technologies, iROK has provided the patients an aesthetic way to straighten their teeth, to obtain health and perfect smiles. Treating malocclusions for the first time becomes an option for many people. For doctors, iROK is an alternative treatment method, a tool to expand service and to create new service.

The development and evolution of the iROK technology have provided us a rare view into the future. We envision the future of orthodontics is digitized orthodontics. The applications of digital technologies in orthodontics will bring fundamental changes to the ways in which orthodontic treatment is planned, designed and communicated; in which the orthodontic treatment is delivered. The iROK clear aligner therapy is only the beginning of a great journey to the future. Along the journey, many more digital technologies and products will be developed to treat malocclusions better and more efficiently.

We will lead and strive in this journey to develop the best products and services to the doctors and patients since we believe that this journey is about helping the ordinary people to obtain the best health and happiness in their lives; and we have seen the possibilities that the digital orthodontics can bring.

We hope all of you to join iROK in this great journey.

Frank Liu  
CEO

**Henghui Technologies, Ltd.**  
**the maker of iROK brand products**





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# iROK Technology Overview

Based on the traditional theories of orthodontics, iROK technology has been developed to provide an aesthetic alternative to the traditional braces. The iROK 3g is the most advanced clear appliance orthodontic therapy in the world. It produces the most precise aligners to fit the teeth, the most accurate teeth movement control and the widest clinical case selection. Most of all, the iROK clear appliance therapy produces the best and most reliable clinical results because of the precision and the integration of traditional functional devices into its clear appliances.

The iROK clear aligner treatment process starts with a patient's PVS impressions and other related case documents. The patient's dental models are first digitized. The digital scanning technologies have advanced significantly in recent years. A variety of scanning methods are available, such as CT scanner, Laser scanner etc. iROK chooses the most accurate Laser scanning technology to digitize the dental models. The Laser scanner which iROK uses has a scanning accuracy of 10 to 20 microns (0.01 – 0.02mm), comparing with typical CT scan accuracy of 0.1 to 0.2mm. This precision also matches the accuracies in the following iROK manufacturing processes. The total manufacturing error of any iROK aligner is well controlled to the following standards:

For the model teeth in the modes:

- shape and geometry error < 0.1% or 0.02mm
- translational position control error < 0.02 mm
- rotational angle control error < 0.2 degree

To summarize, iROK aligners' overall errors are controlled within 0.05mm in positions and 0.2 degree in rotations. These numbers are about 4 to 10 times better than the comparable products in the market.

After a patient's dental models are digitized, the doctor can review the case using special digital orthodontics software program OrthoRx. iROK is the only company in the world to offer the doctor complete control of his/her case. The doctor can use OrthoRx to review the case and design the treatment plan. The doctor can move and rotate any tooth in six degree of freedom. The very friendly user interface of OrthoRx helps doctors to design, experiment and record all concepts and treatment plans for a particular case. After the treatment plan is designed, the doctor only needs to communicate the treatment plan to iROK. Upon receiving the treatment plan, iROK knows exactly how the doctor wants the case to be treated. iROK custom makes a series of aligners based on the treatment plan designed by the doctor.

iROK also provides treatment plan development service. This service is for doctors who relies on iROK's knowledge and expertise; and for doctors who cannot develop the treatment plan due to some other engagement. iROK's treatment plan development is led by experienced orthodontists. It provides timely and reliable treatment planning service for needed doctors.

In both cases, the treatment plan has to be approved and signed off by both the doctor and iROK. After the approval of the treatment plan, iROK uses proprietary CAD/CAM manufacturing process to fabricate the aligners for each patient. The overall errors in each aligner are controlled well within 0.05mm in positions and 0.2 degree in rotations. Each aligner moves the teeth toward the desired directions in the range of 0.25mm to 0.36mm and 0.5-degree to 2-degree. The series of aligners eventually bring the teeth to the prescribed positions and orientations.

Another advantage of the iROK aligner is the uniformity and the thickness of the aligners. iROK has researched and optimized the parameters during the pressure forming process. iROK's unique set of parameters such as temperature, pressure and other settings produces the most uniform aligners in thickness, resulting in thinner aligners with better bio-mechanic properties. Our strict quality control system also guarantees the reliable performance of each aligner.

With all these precise and advance technologies, iROK has made the quantum leap from traditional orthodontic treatment method to digital orthodontics easy. Try it now. You will never look back.

# The iROK Process

A doctor prepares case materials:

- iROK prescription form
- PVS impressions
- Bite registration
- X-ray and panoramic X-Ray photo
- Standard patient photos



The doctor mails the case materials to:

Your distributor (international)  
Or  
Henghui Technology (China)



iROK provides the e-model in 5 business days after receiving the case materials. If the doctor chooses to design the treatment plan himself/herself

iROK digitizes the dental models and provides a recommended treatment plan in 8 business days after receiving the case materials (e-model)



iROK and the doctor both approve the final treatment plan

iROK aligner fabrication



Three work days after the treatment plan is approved, the first 4 sets of aligners are shipped from iROK's manufacturing site to the doctor or its international distributor



Every two month, another 4 sets of aligners are shipped to the doctor



Treatment Completed

### Submitting a case

To submit a case, a doctor completes the iROK prescription form, prepares other required materials, and mails the complete package to your local distributor (international) or to Henghui Technology, Ltd.(in China)

### Digitizing the dental models

This process is performed in iROK's digital laboratory. Precise and advance Laser 3D scanning equipments are used to scan the dental models. After the scanning, sophisticated 3D image processing software and algorithm are used to precisely prepare the dental models. This process usually takes up to five business days.

### Developing the treatment plan

After the dental models are digitized, a doctor can use the OrthoRx software program to design, review and modify a treatment plans. The treatment plan can be done either by the dentist or by iROK's doctors. If a doctor has assigned iROK's doctor to develop the treatment plan, the process usually takes up to 3 business days.

iROK is an open platform in treatment plan development. Some of the doctors who prefer to design their own treatment plan can easily develop his/her own treatment plan using OrthoRx. Statistically, about 80% of doctors assign iROK to develop the treatment plans. The doctor then reviews, modifies and approves the treatment plan. This is also the quickest way to complete the treatment plan development. However, about 20% of our doctors choose to design the treatment plans by themselves. In most cases, those doctors are very experienced orthodontists and have used iROK products extensively.

After the approval of a treatment plan by both the dentist and iROK, iROK starts its manufacturing process. The first phase of aligners will be shipped in 3 business days. The time for a doctor to receive aligners depends on the location of the offices and logistics efficiency. Please contact your local distributor or iROK for time estimate.

### Wearing aligners and following shipment

iROK recommends that each set of aligners be worn for half a month (15 days) before changing to the next stage. Aligners should be worn for at least 20 hours per day. Wearing aligners less than 20 hours a day may result in unpredictable tooth movements causing interruptions to the treatment and following aligners unfit.

iROK highly recommends a doctor to monitor the compliance of the patient to wear aligners during the treatment. The number one reason for clear aligner therapy to fail is the compliance of the patient.

Every two month, iROK delivers 4 more sets aligners to the doctor for the next phase of treatment till the complete of treatment.

### Doctor's support

iROK provides professional doctor's support service. The doctor's support team is led by iROK's orthodontists. It provides timely and professional services to doctors.

Our toll free doctor's support hot-line in China is: **400 – 66 – SMILE (400-66-76453)**

For international support, please contact your local distributor.

### On-line Service

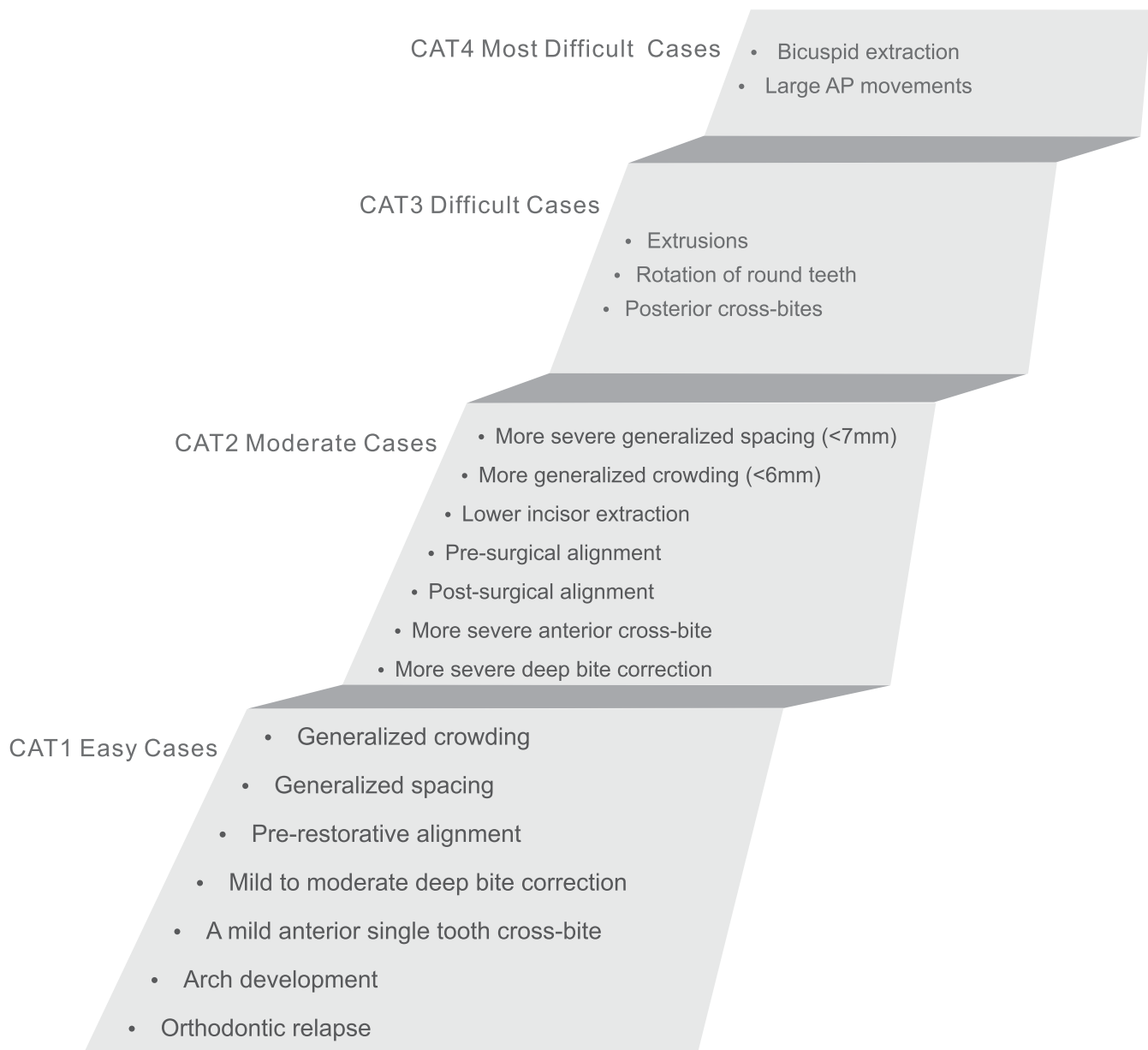
An online iROK service account is created when a doctor's first case is submitted. A doctor can use the online account to

- Submit a new case
- Check status of his/her cases
- Submit questions to iROK's doctor support. iROK's doctor support replies to the doctor within 24 hours.

The online service also provides a doctor instant access to all related documents for all his cases such as photos, X-Ray photos etc.

# iROK Case Selection Guide

Selecting the right case for iROK clear aligner treatment is the most important factor for a successful treatment. iROK recommends a doctor to start from easy cases (CAT 1 or CAT 2). After gaining experience of a couple of CAT 1/2 cases, a doctor then can move on to more difficult cases. When in doubt, iROK's doctor support team is always available to help. In most cases, sending standard clinical case photos and/or plaster dental models to iROK can help a doctor determine whether iROK is applicable quickly.



# Case Submission

After determining the applicability of iROK treatment, a doctor can start preparing the necessary documents and materials for submitting a case..

To provide the highest quality product and service, iROK requires a doctor to provide complete documents and materials listed in the following table.

1. iROK prescription form
2. PVS impressions
3. Bite registration
4. X-ray and panoramic X-Ray photo
5. Standard patient photos

Among the above items, the PVS impressions are the most important materials. Since the success of a clear aligner treatment depends heavily on the quality of the impressions, the impressions must meet the following criteria:

1. Rigid, sturdy impression tray
2. Uniform, homogeneous mix of material
3. Tray is sufficiently filled with impression material and strong bond between impression material and tray.
4. No tray show-through of the impression material
5. No voids or pulls on margin detail
6. Detailed margins with no tears or rough surfaces
7. Good blend between heavy body and light body materials
8. No dragging or rolling of the impressions on the teeth when the impression is taken

Complete and precise impressions produce precise 3D computer dental models and molds that are used to produce the aligners, resulting in good clinical results.

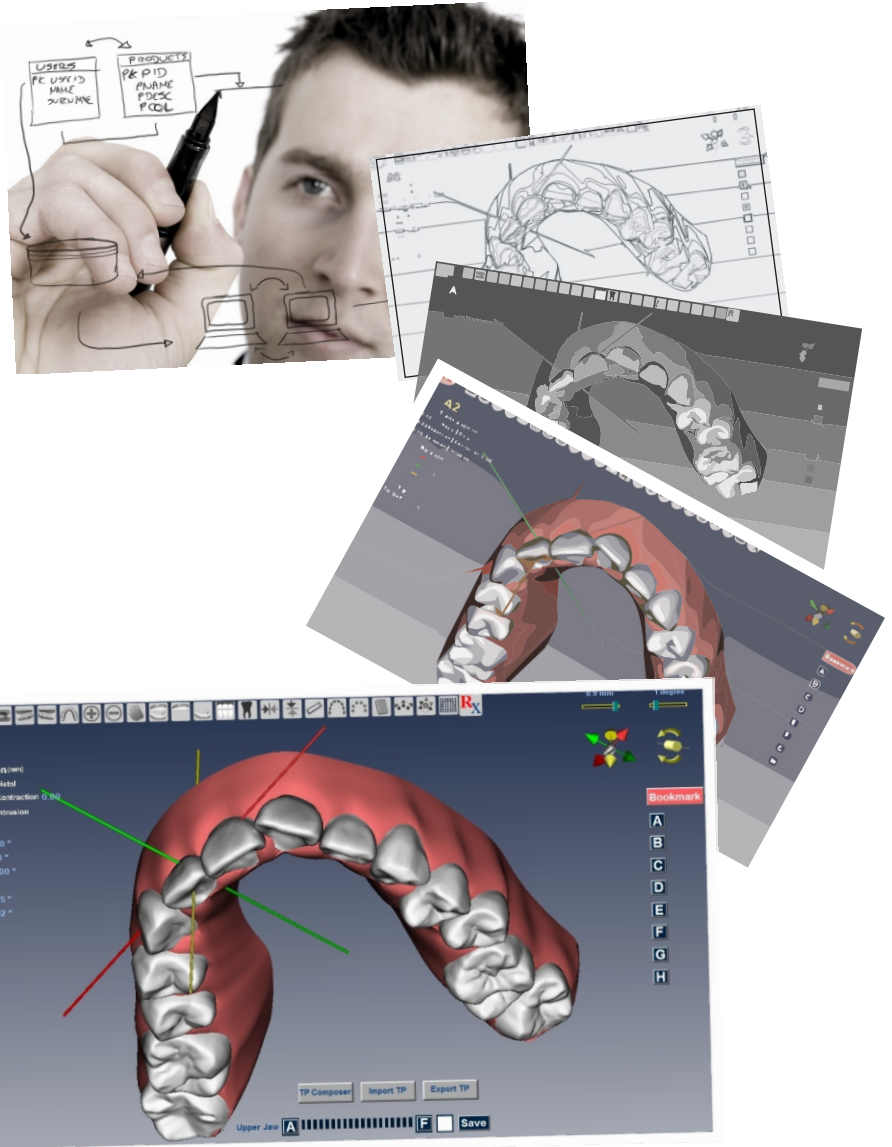


A case can also be submitted online using the doctor's iROK online account. A doctor can fill out the iROK prescription form, upload pictures and X-Ray photos online. After submitting the case online, only the impressions and the bite registration need to be mailed to iROK.

Submitting a case online is the most efficient way to submit a case. It provides iROK all documents needed before the receipt of the impressions. With the online case submission, iROK can fabricate the aligners quicker.



# OrthoRx Software Program

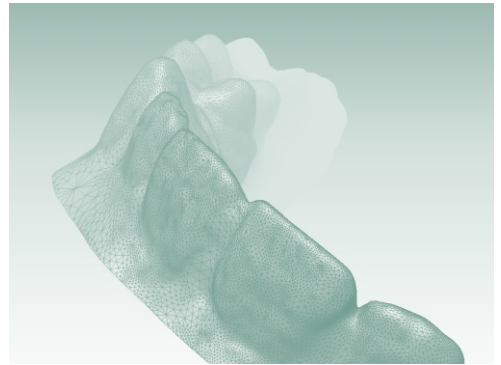


# OrthoRx

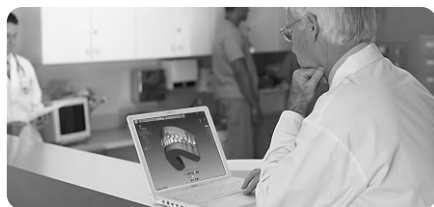
## OrthoRx Software Program - the foundation of modern digital orthodontics

Digital applications in dental care industry started to appear not too long ago. For the past ten years, digital orthodontics has made significant inroad in all aspects of a traditionally manually-operated orthodontics far beyond any expectation.

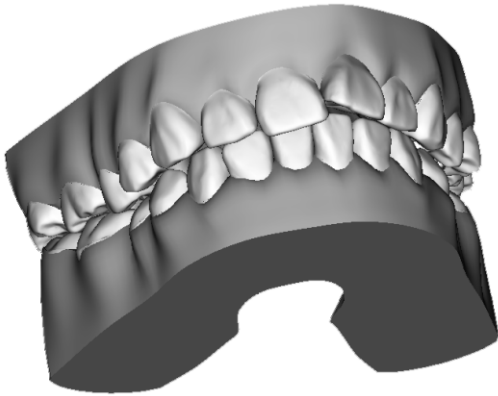
OrthoRx is an advance software toolkit for orthodontists and general dentists to grasp and utilize the powerful digital orthodontic tools in order to provide better, more reliable and more efficient service to patients.



OrthoRx is the foundation of iROK clear aligner orthodontic treatment. It is designed to be a digital tool for doctors to review a case; to design and modify the treatment plan and to execute treatment process. It is also developed to be a communication tool between iROK and its doctors about the doctors' treatment plans. With those two goals set during development, OrthoRx program developers have made a powerful digital orthodontic tool with friendly user interface and ease to learn. Doctors all over the world have performed clinical analysis and treatment planning virtually without going into a dental lab by using OrthoRx program.

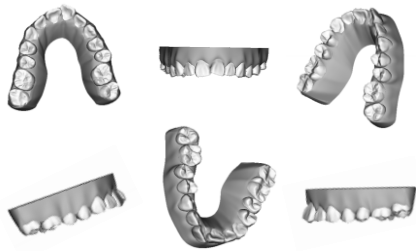


The major functions of OrthoRx associated with the iROK clear aligner treatment are described in the following section. There are many other applications of OrthoRx in orthodontic treatment and other dental care applications. Please contract Henghui Technology, Ltd directly for such applications.



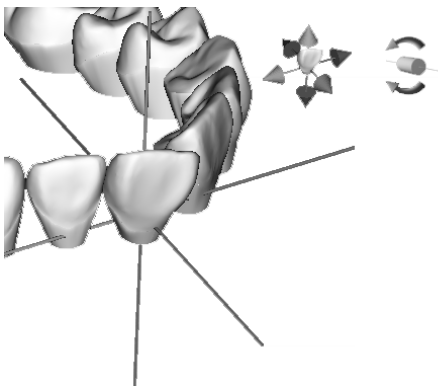
## Create Precise 3D Dental Models

The virtual 3D dental models in OrthoRx program are scanned with precise Laser scanners. The geometry and position errors are controlled within 20 microns (0.02mm). Accurate representation of the patient's teeth is the solid foundation of any good clinical analysis and treatment planning.



## View 3D Dental Models

OrthoRx provides very intuitive viewing tools for a doctor to view the dental models from any angle. It also provides convenient standard views, occlusal view, zoom-in and zoom-out functions. These powerful viewing tools assist a doctor to observe and understand a clinical case better.



## Straighten the Teeth Virtually

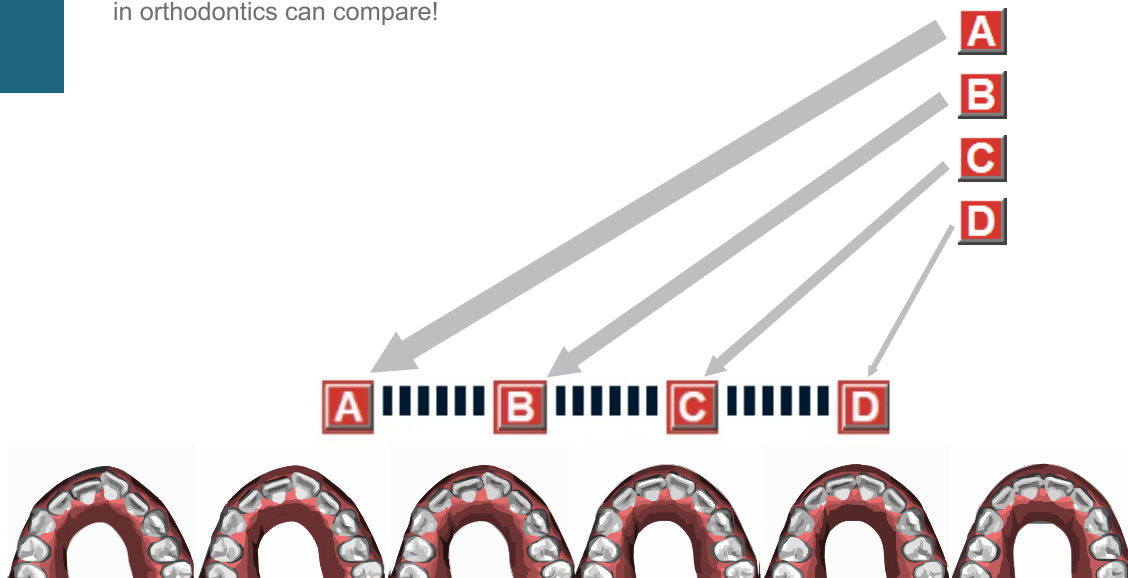
With patented translation and rotation operators, a doctor can move and rotate any tooth virtually in 6-dgree of freedom. After a model tooth is moved and rotated, OrthoRx displays the amount of translations and rotations. OrthoRx also provides critical calculations of the relationship between neighboring teeth, the relationship of the teeth to the occlusal plane and the relationship of the teeth to the Andrew's plane. These parameters provide doctors very good reference in order to develop the right treatment for the patient.

## Design a Treatment Plan

A treatment plan in iROK clear aligner orthodontic treatment contains a multiple states during the treatment process. A simple treatment plan contains an initial state and a target state. A more complex treatment plan may involve several states in phases such as expansion, molar distal movement etc. OrthoRx allows a doctor to have maximum of eight states (phases) in one treatment plan.

In order to assist a doctor to implement complex treatment plans, OrthoRx provides a Book Mark function. A doctor can use Book Mark function to record any state of the teeth. One state can be a concept for the treatment, an intermediate state for the treatment or simply a record of the doctor's current thought to be used in the future. With the Book Mark function, a doctor can experiment different ideas and concepts; develop complex treatment plans easily. After all the considerations and analysis, the doctor emails iROK the treatment plan he chooses to execute. Upon receiving treatment plan, iROK knows exactly how the doctor wants his/her case to be treated and starts fabricating the aligners accordingly.

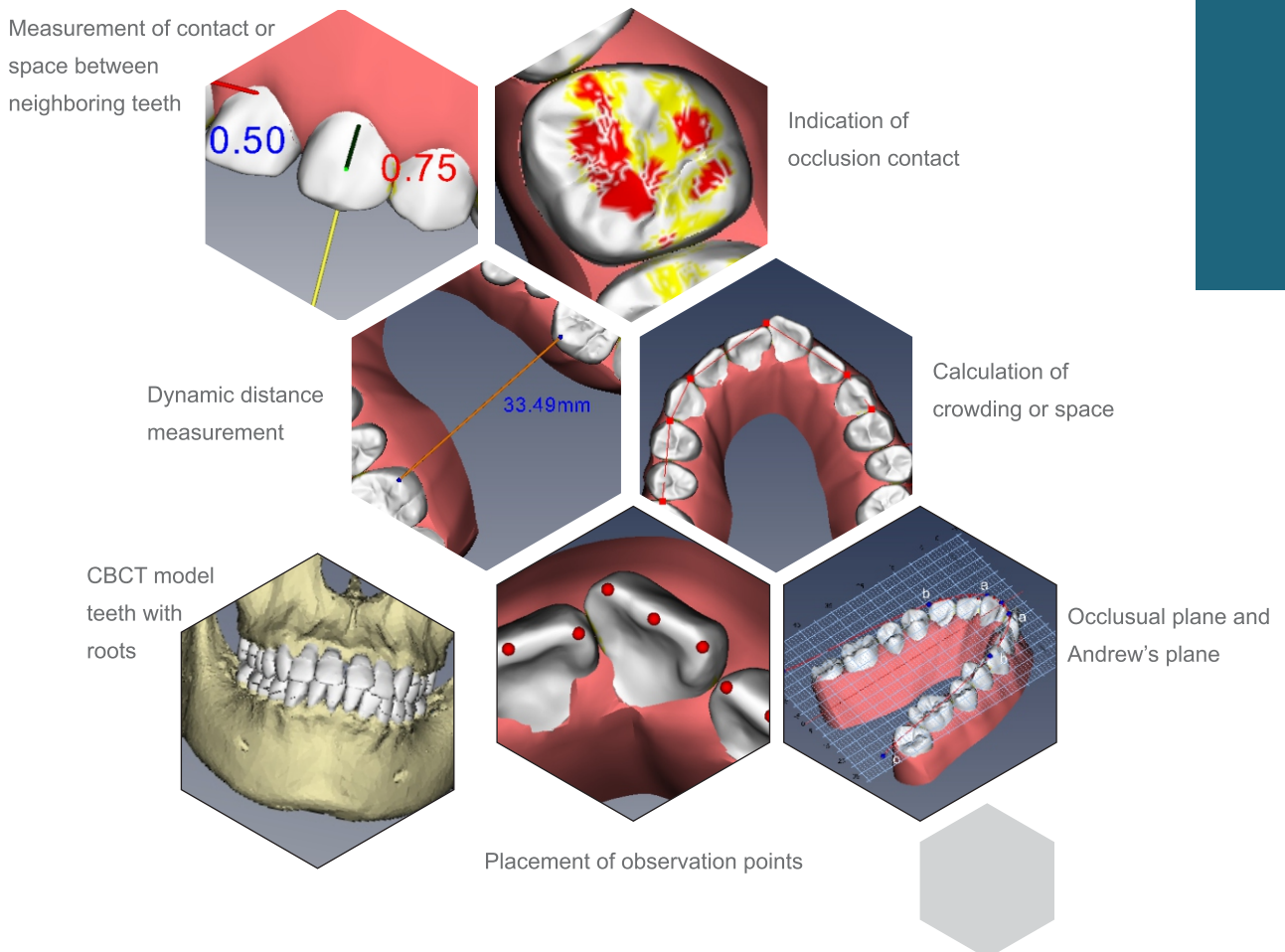
The patented treatment Rx function really makes the thinking and planning process easy for doctors. To create or modify a treatment plan, a doctor just needs to drag states into the right treatment plan path, or to delete a state from the treatment plan path. It is so easy, nothing else in orthodontics can compare!



## Use Measurement and Analysis Tools

OrthoRx provides powerful measurement and analysis tools for doctors. When the patient's digital dental models are created, OrthoRx already has calculated tooth parameters. OrthoRx further provides fundamental parameters such as the crowding measurement and space analysis automatically. For more advanced analysis, OrthoRx provides standard arch shape, Bolton Index calculation, etc.

The various analysis assist tools provided in OrthoRx are demonstrated in the following picture.



## Communicate and Share the Treatment Plan

OrthoRx is developed to design the iROK clear aligner treatment plan and to communicate the treatment plan between iROK and the doctor. The treatment plan is packaged in a very small file and can be easily attached to any email in no time.

With the treatment plan in both the doctor's office and iROK manufacture site, the doctor and ROK are in sync to execute the treatment seamlessly.

## OrthoRx is Open and Growing

OrthoRx program is the leading digital application in orthodontics in China. It is also free! Any doctor can download the program from our website [www.irokaligner.com](http://www.irokaligner.com) and start to provide digital dental care. We have developed OrthoRx for iROK clear aligner treatment process. But the creative applications by doctors who use OrthoRx program have expanded its use way beyond iROK clear aligner treatment, or even beyond orthodontics.

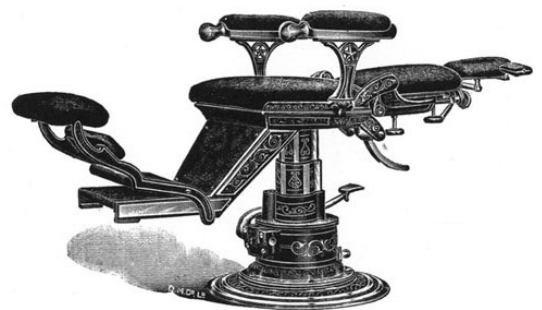
The development of new applications of OrthoRx by our doctors has inspired us. We will keep the OrthoRx platform open to all doctors and developers. We believe that by keeping it open we can create better applications and software programs in digital dental care that will provides better and more efficient health care to the very needing people around the world.



OrthoRx program comes with a detailed user's manual in the software. For details, please download the free software or request an OrthoRx CD from Henghui Technology, Ltd.



# Clinical Cases



Chief Complaints: Maxilla incisors protrusion; Mandibular moderately crowding

Diagnosis:

- Angle's Class I
- Moderate Maxilla crowding, protruding incisors
- Moderate Mandibular crowding

Treatment plan:

- IPR to create space
- Tip maxilla incisors lingually

Treatment time: 7 months

Number of aligners: Upper 14; Lower 14



Before treatment



After treatment





Chief Complaints: Moderate Maxilla and Mandibular crowding

Diagnosis:

- Angle's Class I
- Moderate Maxilla crowding, protruding incisors
- Moderate Mandibular crowding

Treatment plan:

- Extract 41
- Use the space created by extracting 41 to treat Mandibular
- Expand Maxilla

Treatment time: 13 months

Number of aligners: Upper 10; Lower 29



Before treatment



After treatment

Chief Complaints: Spaces in upper and lower arches

Diagnosis:

- Angle's Class I
- About 5mm spaces in the maxilla
- About 3.1mm spaces in mandibular,
- Midline correction is needed.

Treatment plan:

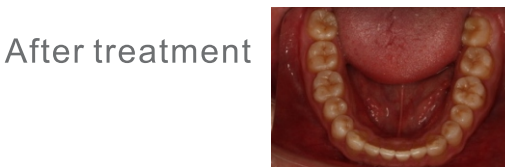
- Maintain the occlusion
- Center the midline; close the spaces
- Improve the bite situation

Treatment time: 7 months

Number of aligners: Upper 14 ; Lower 11



Before treatment



After treatment

Chief Complaints: Crowding in upper and lower arches

Diagnosis:

- Angle's Class III
- Moderate crowding in the maxilla; incisor tilted distally
- Minor crowding in mandibular

Treatment plan:

- Rotate upper incisors about 40 degrees; Use IPR to create spaces in Maxillar
- Use IPR to create spaces in lower arch.

Treatment time: 11 months

Number of aligners: Upper 21 ; Lower 24



Before treatment



After treatment



Chief Complaints: Correct the cross bite and align the teeth in both arches

Diagnosis:

- Angle's Class III
- Narrow upper arch, incisors protrude
- Lower arch midline is 1.2mm off to the right.

Treatment plan:

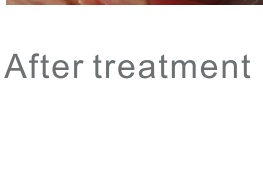
- Expand the upper arch. Correct the 12 cross bite. Rotate 23 about 30 degrees. Align all molars.
- IPR in lower arch. Correct the midline.

Treatment time: 9 months

Number of aligners: Upper 16; Lower 18

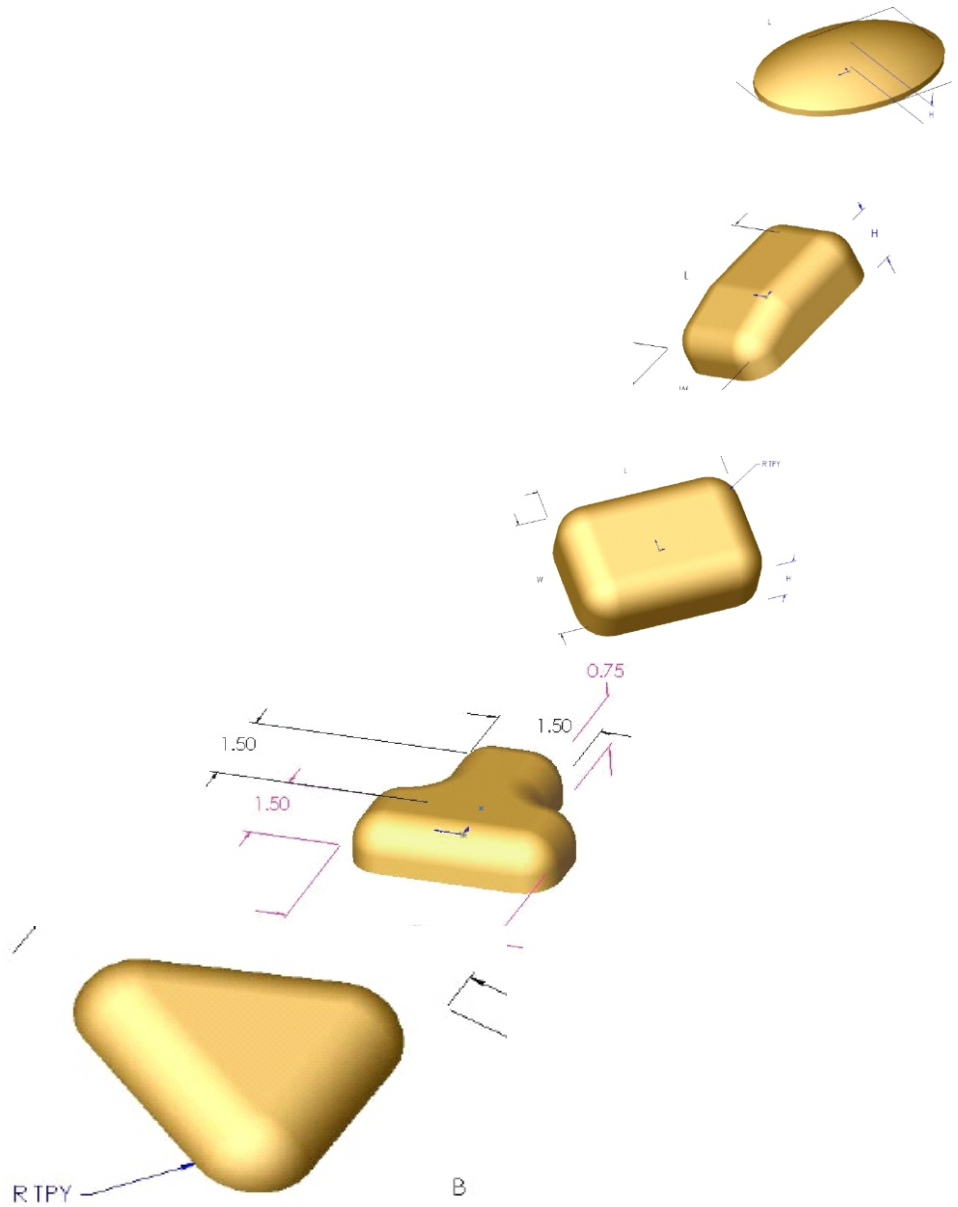


Before treatment



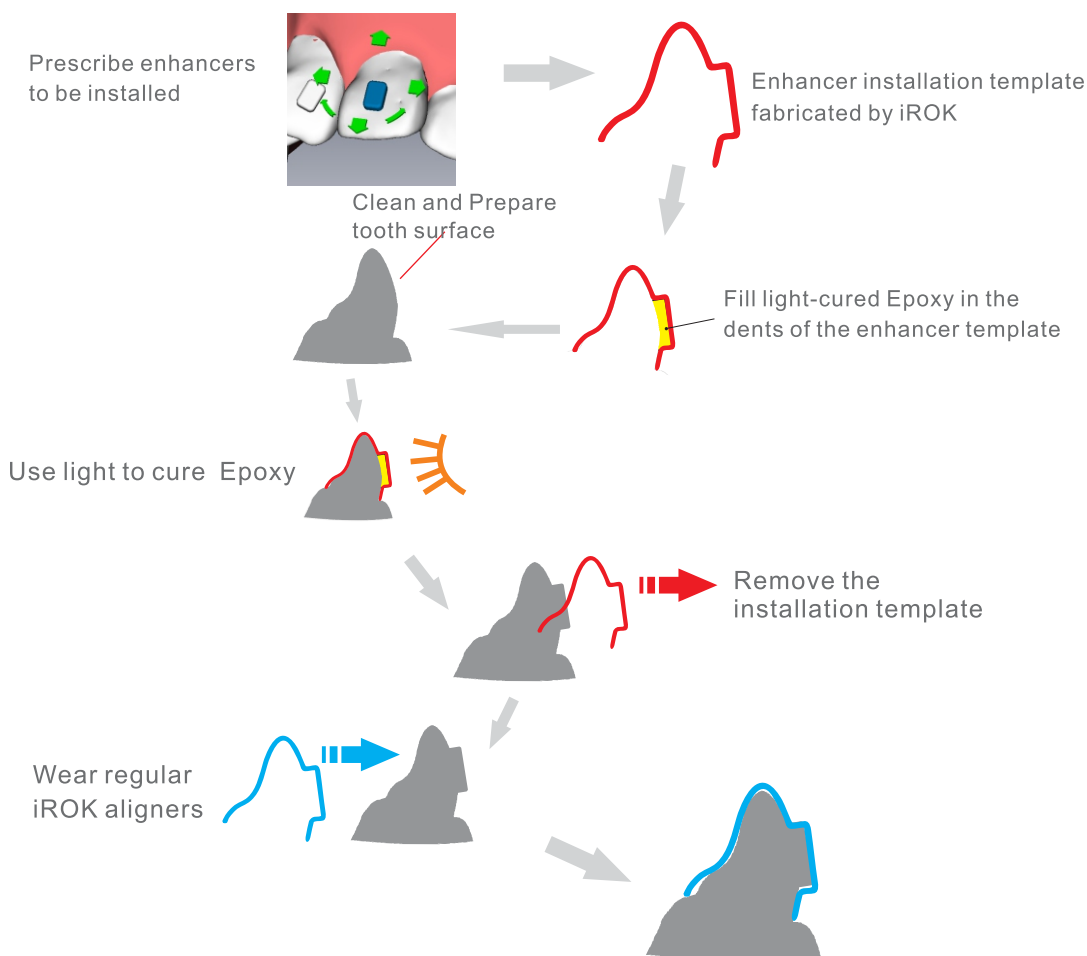
After treatment

# Enhancers



In most cases, the special plastics used in iROK aligners can effectively move the teeth to its designed positions with proper and tight fit onto the teeth. But sometimes the aligner needs anchorage to perform difficult teeth movement. An enhancer or an attachment as sometimes is called, is a small block of light-cured epoxy installed on a tooth using a pre-fabricated enhancer installation template. After the enhancers are installed, the following aligners will have corresponding dents at the locations of enhancers. The enhancers together with the aligner generate desired force and moment to properly move the teeth to its designed positions and angles. At the end of the treatment the enhancers are removed from the teeth.

iROK offers a variety of enhancers with different shapes and sizes. The most commonly used enhancer shapes are rectangular and oval shape. The following pictures demonstrate a typical process of enhancer installation and its usage with aligners.

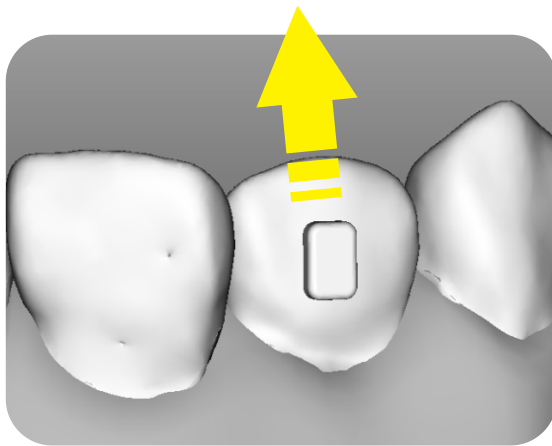


## iROK Guidelines of Enhancers

iROK recommends the use of enhancers in the following five situations. (Other manufacturers need a lot more attachments / enhancers to produce good clinical results. That is mainly due to the inaccuracies in their aligners.)

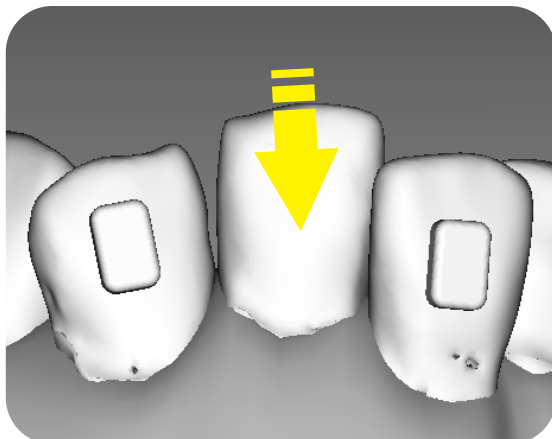
### Extrusion of teeth

Install an enhancer on the tooth to be extruded



### Intrusion of teeth

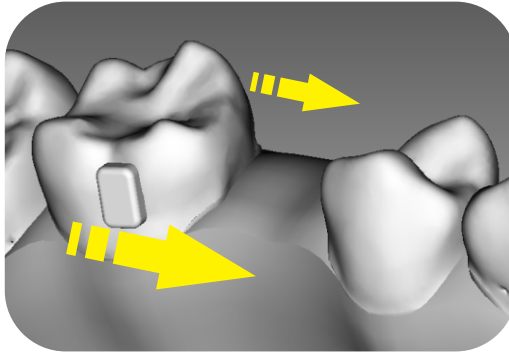
Install enhancers on the neighboring two teeth





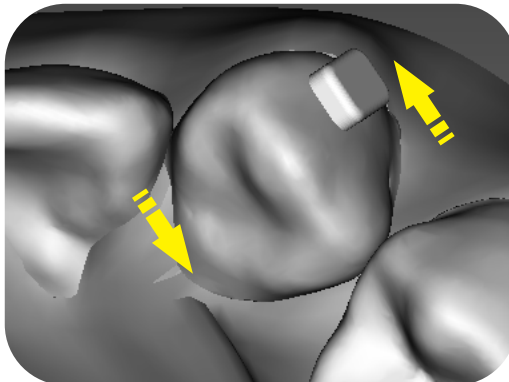
## Translation of a tooth with root control

Install an enhancer on the tooth near gingival



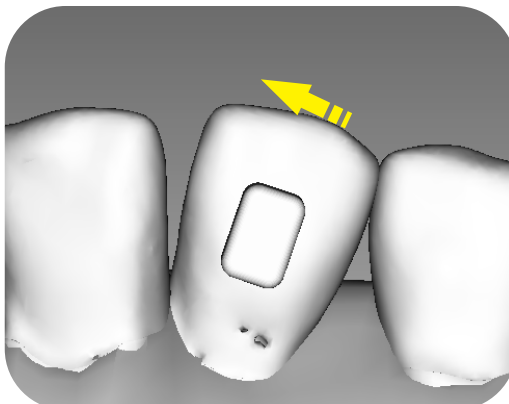
## Rotation of a round shape tooth

Install an enhancer on the tooth near gingival



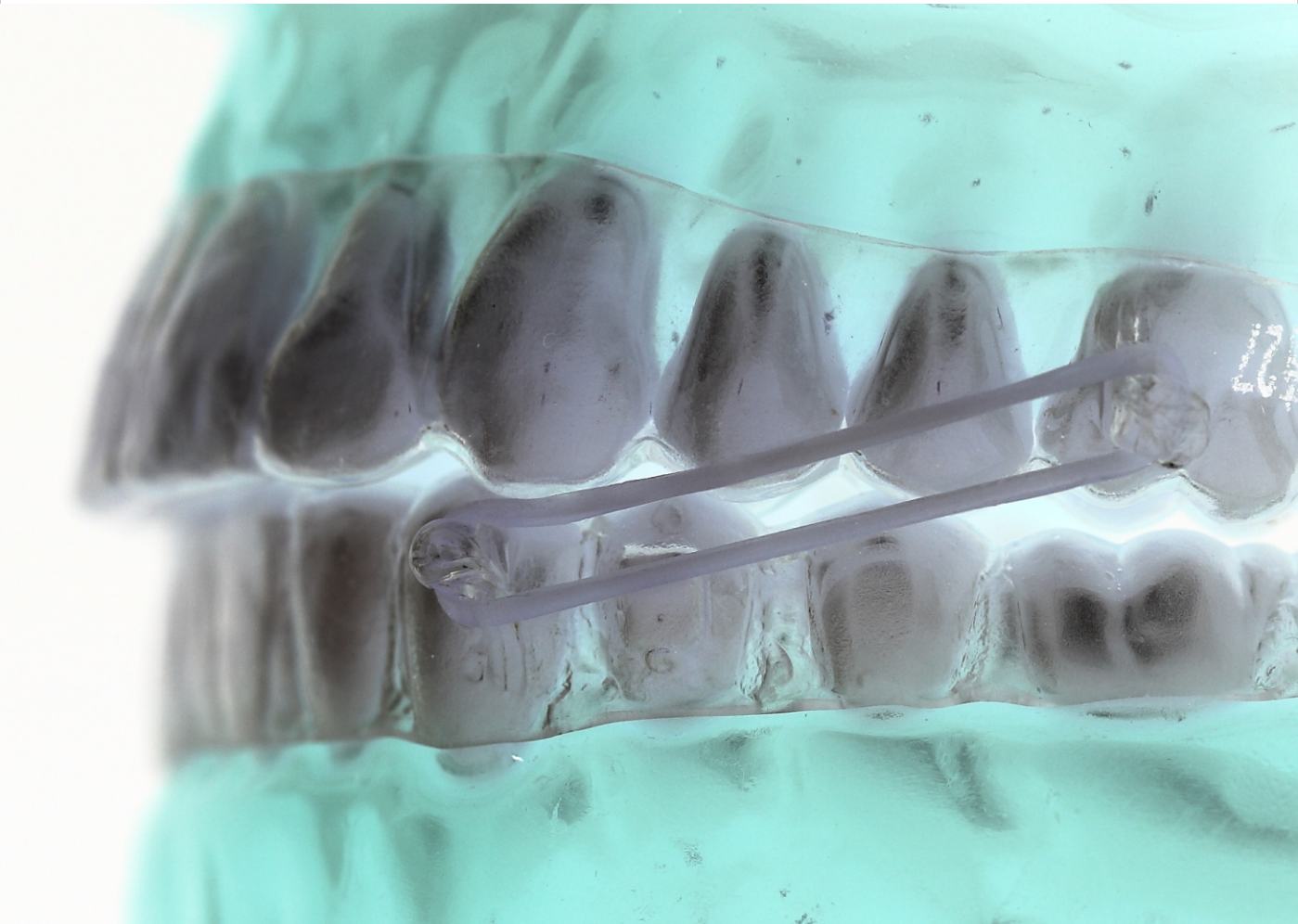
## Root control

Install an enhancer on the tooth near gingival





# Integrated Functional Devices



Clear aligner therapy has grown from almost nothing in late 1990s to a significant orthodontic treatment method in just over ten years. There is little doubt that the clear aligner therapy will continue to grow and expand into other traditional orthodontic treatment. Due to the lack of some mechanical properties comparing to stainless steel, the aligners' applicable range has been limited to 10% to 20% of total orthodontic treatment.

iROK is the pioneer in integrating traditional orthodontic functional devices into its aligners. The purpose is to increase the range of the iROK clear aligner therapy, as well as to achieve better clinical results in shorter time. With integrated functional devices, iROK aligners can be used in many situations involving difficult tooth movements.

In this section, we introduce some of the clinically proved devices. Most of the concepts in this section are patented.

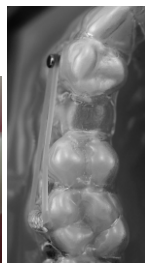


### Aligners with wire enforcement

**Typical applications:** Arch expansion; correction of cross bite;

**Typical implementation:** The doctor prescribes the enforcement wire on aligners. iROK places enforcement wires on the lingual side of the aligner.

### Aligners with root control hook



**Typical applications:** Translation of teeth with root control requirement.

**Typical implementation:**

i. The doctor prescribes aligners with root control hook specifying the location and direction of the hook.

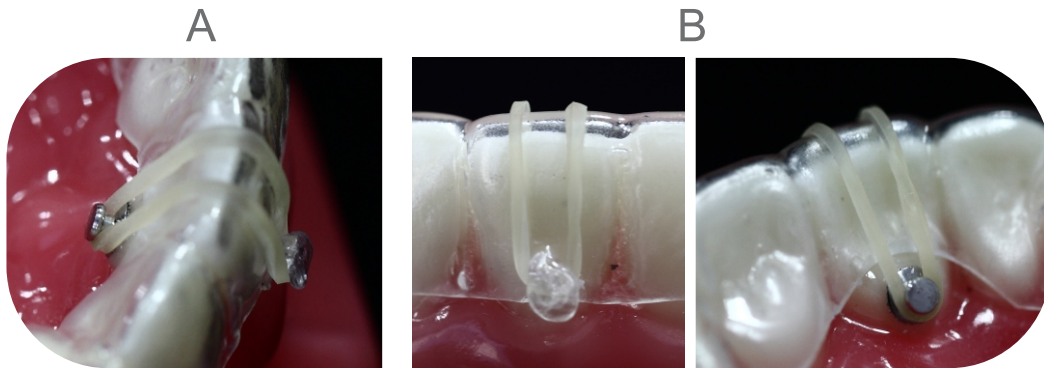
ii. The doctor glues a lingual button on the buccal surface of the tooth to be translated. The lingual button

should be glued near the gingival to be more effective. (The name of the lingual button here is confusing. The button is commonly used on the lingual surface in traditional orthodontic treatment. Therefore, it is called lingual button. iROK uses the button on the buccal surface in this case.)

iii. iROK produces aligners with the root control hooks on the aligner. The aligner also has a smooth cut-out in the button area.

iv. The patient first puts on the aligner, then uses a rubber band to link the hook and the lingual button on the tooth.

## Aligners with tooth extrusion device



**Typical applications:** Difficult tooth extrusion.

(When a tooth needs extrusion, the first choice is to use an enhancer. An enhancer works in most cases. Sometimes, a doctor prefers to have a stronger device. In such cases, iROK provides the following integrated devices of extrusion.)

### A. Typical implementation:

- I. The doctor glues two lingual buttons on both lingual and buccal side of the tooth to be extruded.
- ii. The doctor prescribes aligners to be used to extrude the tooth.
- iii. iROK produces aligners with space in the aligner for the tooth to be extruded and with smooth cut-outs on both lingual and buccal side of the aligner.
- iv. The patient wears the aligner first, then uses a rubber band to link the two buttons. The tooth is lifted by the force from the rubber band.

Another device for extruding a tooth

### B. Typical implementation:

- I. The doctor glues one lingual button on the lingual side of the patient's tooth to be extruded.
- ii. The doctor prescribes iROK aligners with a hook on the buccal side of the aligner, pointing toward the gingival. The aligner has space designed in for the tooth to extrude. The aligner also has a smooth cut-out on the lingual side for the lingual button.
- iii. The patient wears the aligner first, then uses a rubber band to link the lingual button and the hook on the aligner. The tooth is lifted by the force from the rubber band.

## Aligners with tooth intrusion device

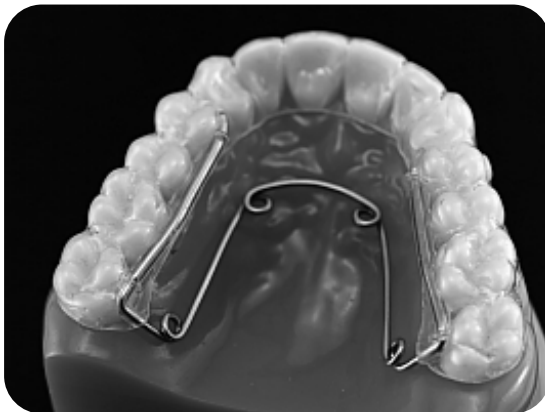


### Typical applications: Difficult tooth intrusion

(When a tooth needs intrusion, the first choice is to use an enhancer. An enhancer works in most cases. Sometimes, a doctor prefers to have a stronger device. In such cases, iROK provides the following integrated devices of intrusion.)

### Typical implementation:

- I. The doctor prescribes iROK aligners with tooth intrusion device. The tooth being intruded should be clearly specified.
- ii. iROK fabricates aligners with tooth intrusion device. The aligners come with hooks on the buccal side of the aligners and wire springs on the lingual side. The aligners also have cut-out slots on top of location of the specific teeth.
- iii. The patient wears the aligner first, then uses a rubber band to link the lingual button and the hook on the aligner. The rubber band should be placed into the slots on top of the aligners. The tooth will be pressed down by the force from the rubber band.



## Aligners with Helix Quad

**Typical applications:** General arch expansion; Narrow arch expansion; Correction of molar cross bite.

### Typical implementation:

- I. The doctor prescribes iROK aligners with Helix Quad. The treatment plan should be clearly communicated to iROK.
- ii. iROK fabricates aligners with Helix Quad spring imbedded.
- iii. The patient wears the aligner with Helix Quad.
- iv. The doctor adjusts the Helix Quad rings periodically, till the treatment goal such as arch expansion is reached
- v. The doctor provides PVS or plaster dental models at the end of this phase. iROK starts sending regular iROK aligners according to the latest positions of the teeth.

## Aligners with Class II hooks

**Typical applications:** Class II correction.

**Typical implementation:**

- i. The doctor prescribes iROK aligners with class II hooks.
- ii. iROK fabricates aligners with hooks on both the upper aligner and the lower aligner. Each aligner has two hooks, one on the right side and one on the left side.
- iii. The patient wears the aligners, then uses two rubber bands to link the upper and lower aligners.



## Aligners with molar movement anchorage

**Typical applications:** difficult movement of molars

**Typical implementation:**

- i. The doctor prescribes iROK aligners with molar movement anchorage.
- ii. iROK fabricates aligners with molar movement anchorage. The device has a sectional wire to group the other teeth together to function as a strong anchor.
- iii. The doctor installs high-profile enhancers on the molars to be moved or rotated.
- iv. The patient wears the aligners.



## Aligners with bite correction guide



**Typical applications:** correction of Class II malocclusion; opening deep bite.

**Typical implementation:**

- I. The doctor prescribes iROK aligner with bite correction guide.
- ii. iROK fabricates aligner with bite correction guide. The device is a single aligner with bite correction guide when the bite is closed.
- iii. The patient wears the aligner.

### ***Precautions:***

All aligners with special functional devices must be approved by the doctor before being applied on any patient. Doctors should consider the simpler or the regular aligner solutions before choosing aligners with functional devices.

When aligners with functional devices are chosen and approved, doctors should pay extra attention to:

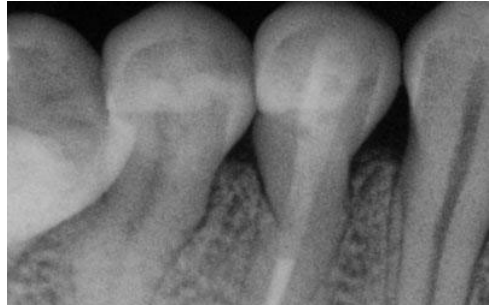
- I. Guide the patient to use the device correctly
- ii. Check the progress and status of the case more often
- iii. Ask the patient to change the rubber band everyday in case of rubber band is applied
- iv. Stop the treatment in case of any side effect or unexpected result

# Inter-proximal Enamel Reduction (IPR)



## IPR, Inter-proximal Enamel Reduction

There are three methods to create space. One of the techniques used to create space in conditions when there is dental crowding, is to remove baby or adult teeth. This is an excellent option when there is a significant amount of crowding.



Another option is the use of expansion of the dental arches. Obviously, there are limits to how wide the dental arches can be expanded and how far the upper and lower front teeth can be tipped forward in order to make room for the teeth. Nevertheless, expansion is a great approach to eliminating moderate amounts of crowding.

A third option to eliminating crowding that is especially beneficial when the degree of crowding is small is the use of interproximal reduction (IPR). This technique is used to reshape the width of specific teeth so as to cause them to fit in the dental arch by removing enamel but without removing the whole tooth.

All three methods are used in iROK clear aligner therapy. The choice depends on the case, the preferences of the patient and the doctor.



## Is IPR safe?

Many wonder if IPR is risky to the health of the teeth or gums. First of all, the amount of enamel being removed is of a very small volume, generally 0.2-0.4 millimeters per intersection of teeth.

Because the enamel removed is at the point where two teeth touch one another, approximately half of that volume is removed from each individual tooth, so that a 0.4 mm reduction removes approximately 0.2 mm from each of the two teeth. Even the smallest of teeth have 1.25 mm of enamel so this is well within safe limits of health to the teeth. In fact, in the volumes we have been discussing here, studies have shown there is not an increased risk of sensitivity to heat, sensitivity to cold, risk of cavities, or risk of gum disease.

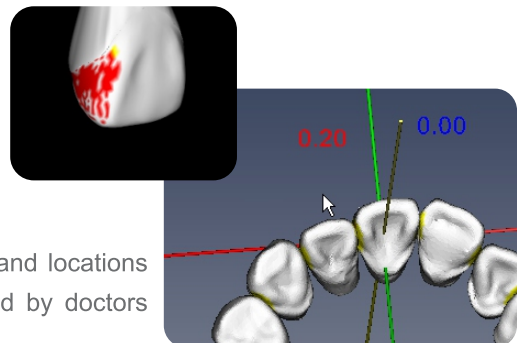
There is one risk about which you should be aware. Because diamond cutting instruments are used against the enamel of your teeth, microscopic scratches will remain in the enamel when the treatment is completed. It is in these places where stain build up can occur, which would require returning to the dental clinic every six months for cleaning appointments. This risk for many people is considered inconsequential.

### Maximum recommended IPR amount (mm)

Maxilla	0.3	0.3	0.3	0.3	0.3	0.5	0.5	0.5	0.5	0.5	0.6	0.6
	Mesial	Distal	Mesial	Distal	Mesial	Distal	Mesial	Distal	Mesial	Distal	Mesial	Distal
	Central Incisors		Lateral Incisors		Canine		First Pre-molar		Second Pre-molar		First Molar	
Mandibular	Mesial	Distal	Mesial	Distal	Mesial	Distal	Mesial	Distal	Mesial	Distal	Mesial	Distal
	0.2	0.2	0.2	0.2	0.2	0.3	0.5	0.5	0.5	0.5	0.6	0.6

## Determination of the exact IPR amount and IPR locations

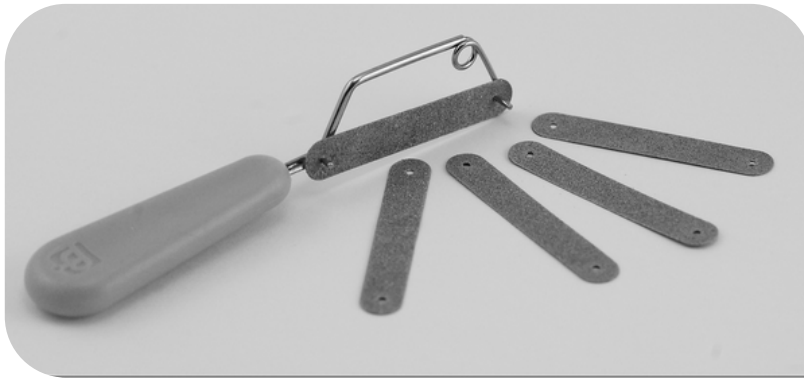
When IPR is needed, iROK recommends to use the 3D digital dental model in OrthoRx to determine the IPR amount and IPR locations. The 3D digital images are precise presentation of the patient's teeth. After a treatment plan is developed, OrthoRx provides exact IPR amount. A doctor can design the IPR amount and locations based on that. An IPR form is commonly used by doctors clinically to perform the IPR on patient's teeth.



## Recommended IPR tools

IPR can be done with sand strips manually or by diamond disc for low speed power tool. The advantage of manual operation is the ease of control. But the manual IPR takes a long time to complete. Using diamond disc can be very quick, but the profile of the tooth can be difficult to control. In most cases, a combination of the diamond disc for rough IPR and manual sand strip for fine adjustment and polishing are used.

Sand strips and stripping tools



Diamond discs



IPR gauges



In case of overlapping teeth, the teeth first must be separated by traditional rubber rings. After enough room is created, IPR can be performed.



The IPR amount is measured by IPR gauge. The iROK IPR gauge comes with 0.1mm, 0.2mm, 0.3mm thick gauges. The combination of the gauges generates the following measurements: 0.1, 0.2, 0.3, 0.4, 0.5 and 0.6mm.



### *Post IPR Process*

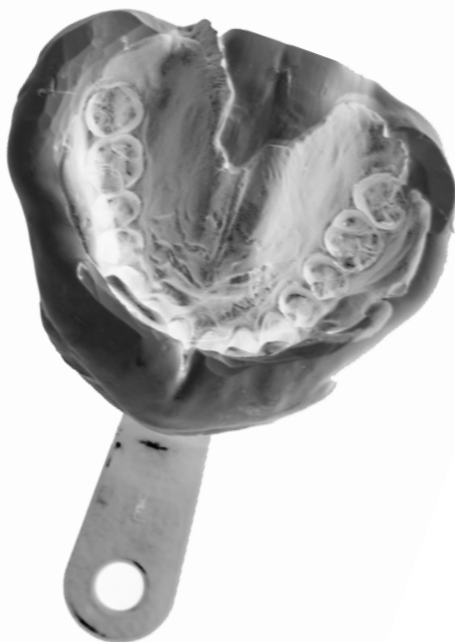
After IPR, the shape of the tooth is usually modified using the high speed grinding bit. The purpose of the modification is to make the tooth look natural and beautiful.

Polishing the tooth surface is also needed after IPR since IPR causes rough surface on the tooth. It is in these micro places where stain build up can occur. Therefore, after IPR is done, the tooth should be polished using fine sand trip and soft polishing disc.

It is also recommended to treat the IPR area with gels containing Fluoride. The patient is also recommended to use tooth paste with Fluoride to further protect the IPR area.



# PVS Impressions



Introduced in the 1970s, Polyvinyl Siloxane (PVS) impression materials are addition-reaction silicone elastomers that have gained a large share of the impression material market and have become the most widely used impression materials in restorative dentistry.

iROK requires PVS impressions on rigid plastics impression trays for all iROK cases because PVS impressions provide the best accuracy and shape stability among all the impression materials (PVS impression materials have the smallest dimensional change with a contraction range between 0.05% and 0.1%). The accuracy and the shape stability of the impressions are the most critical factors to achieve the best clinical results.

Two basic types of PVS impression materials are commonly available in the market. The traditional type is a two-step PVS impression material that has a heavy and a light body material; the other one is gaining popularity recently since it is a one-step material. Both types of PVS materials can work with iROK process.



One of the recommended PVS impression material is 3M ESPE Imprint.



The ESPE Imprint is a two-step PVS impression material. It has heavy body material in two containers.

- mixing time: 30 seconds
- Formation time: 60 seconds
- Curing time: 5 minutes



The ESPE Imprint light body material is packaged into two tubes and is mixed with a special hand tool.

- mixing time: 30 seconds
- Formation time: 60 seconds
- Curing time: 5 minutes

### *Recommended impression tray*



High quality, rigid plastics dental impression tray.

For specific brand dental impression tray which iROK recommends, please contact your local distributor.

### *NOT recommended impression tray*



Flexible plastics impression tray with metal mesh imbedded.

Reasons for rejection: flexible and easy to change shape.



Aluminum impression tray

Reasons for rejection: flexible and easy to change shape.



Stainless steel impression tray

High cost to doctor. (iROK does not return the impression trays to doctor after receipt of the case material.)



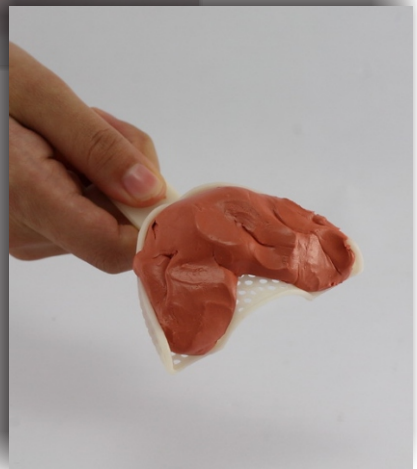
## The process of taking PVS impressions

### Preparing the heavy body impression

Take equal part of heavy body impression material PART A and PART B.

Mix thoroughly with hands

Fill the impression tray with the mixed material



### Note:

Do not take impressions in room temperature above 25°C.

Do not use the palm, use the fingers to mix the material.

High room temperature or the higher temperature in palms can cause the impression material harden sooner than specified.



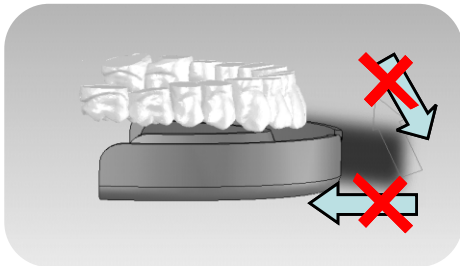
## Taking the heavy body impression



Place the impression tray into the patient's mouth.

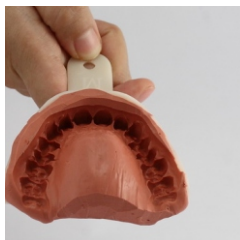
Position the tray right below the arch.

Press the impression tray vertically onto the teeth.



Do not push the tray from front into the position.

Do not have the patient bite down from a non-vertical direction.



After the impression tray is removed from the patient's mouth and cleaned, carefully trim the excessive heavy body materials above the gingival line.

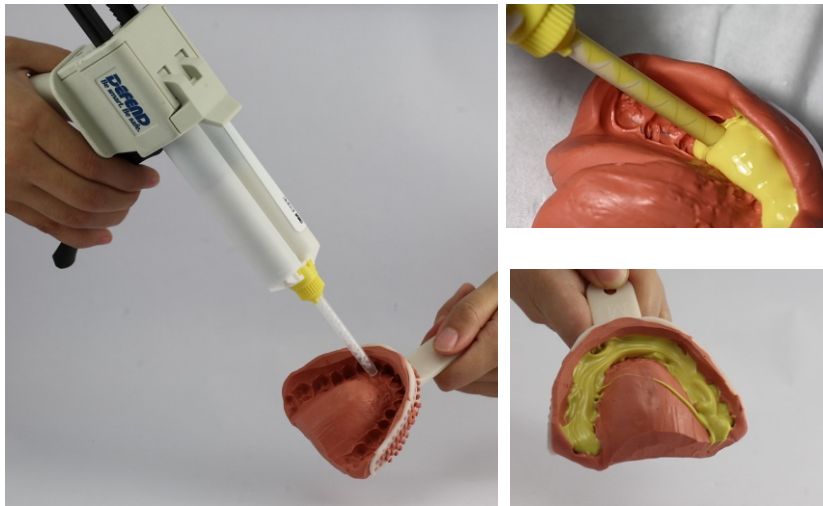
Now the impression tray is ready for the light body impression.

Proper control of the working time is very important. iROK recommend that when taking impression, leave a small portion of the mixed impression material in your hand. Observe the sturdiness of the impression material in your hand. When the material in your hand is curing, the impression in the patient's mouth is ready to be removed.

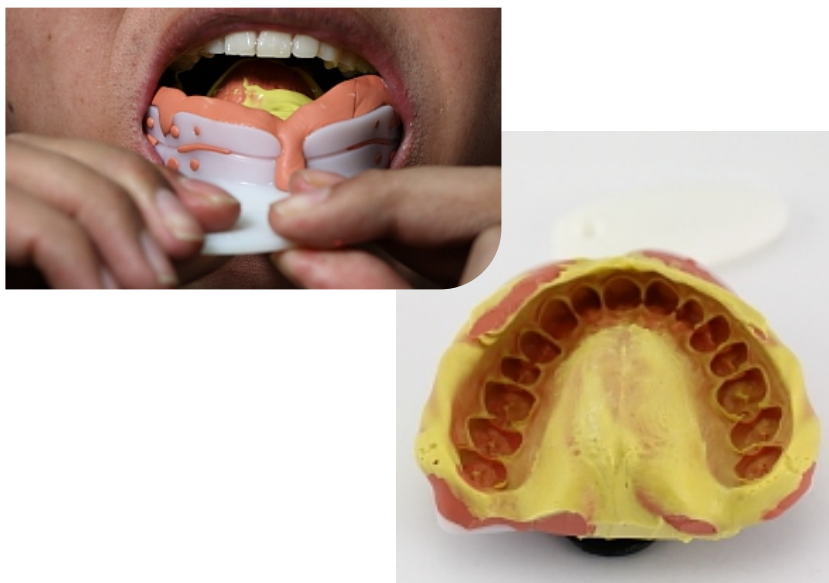
**Caution:** Leaving impression tray with mixed impression material on patient's teeth for too long can cause serious problem. The impression material can become very hard and impression tray stuck on patient's teeth.

### Light body impression

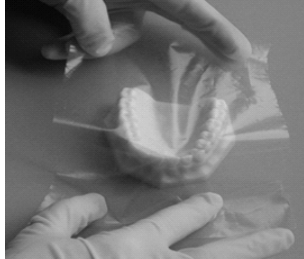
Use a dispenser to fill teeth in the heavy body impression. Avoid air bubbles in the light body impression material.



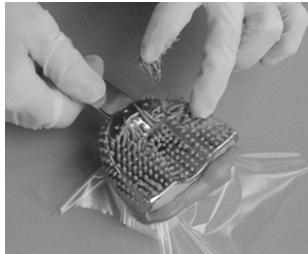
Place the impression tray into patient's mouth, right below the teeth.  
Press the impression tray vertically onto the patient's teeth.



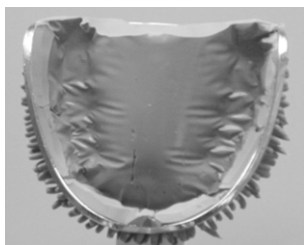
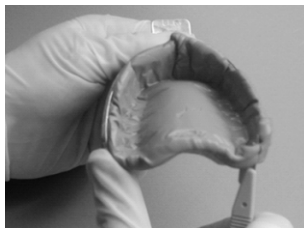
If a plaster model is already taken from the patient, a PVS impression can be produced from the plaster model.



Place a thin food-wrap (very thin plastics sheet) on the plaster dental model.



Press the tray with heavy body impression material into the plaster model.



Let the impression material cure.

## Guidelines for good impressions and trouble shooting

Making an accurate and detailed impression is the most important step in successful treating malocclusion using iROK aligners.

### **A good impression should have the following:**

1. Rigid, sturdy impression tray
2. Uniform, homogeneous mix of material
3. Sufficiently filled tray with impression material and strong bond between impression material and tray
4. No tray show-through of the impression material
5. No voids or pulls on margin detail
6. Detailed margins with no tears or rough surfaces
7. Good blend between heavy body and light body materials
8. No dragging or rolling of the impressions on the teeth when the impression is taken

# Key Partners

iROK has sponsored and collaborated with the following universities in developing the iROK technologies and the future digital technologies in dental care.

- The Stomatological Hospital of Beijing University, Beijing, China
- The Stomatological Hospital of the Ninth People's Hospital, Shanghai Jiaotong University, Shanghai, China
- The Stomatological Hospital of the Fourth Military Medical University, Xi'An, China
- The Huaxi Stomatological Hospital, SiChuan University, Chengdu, China
- The Provincial Stomatological Hospital of Guangdong Province, Guangzhou, China
- The Provincial Stomatological Hospital of Jiangsu Province, Nanjing, China
- The Stomatological Hospital of Jiaotong University, Xi'An, China

# About the Company

iROK clear aligner therapy technology is created by Henghui Technology, Ltd., located in the city of Xi'An, China. Henghui was established in 2004 to develop new digital applications for dental care.

Since establishment, Henghui has worked with many orthodontists, dentists and technologists in the U.S. and in China to invent and to innovate. With clear visions and advance technologies, Henghui has created two generations of clear aligner therapy technologies with the assistance and guidance of doctors. The second generation of the clear aligner therapy technology was used by doctors in the U.S. and Europe extensively, bringing perfect smiles to patients and providing doctors a superior aesthetic method to treat malocclusions.

With sharp focus and experience of creating the second generation clear aligner therapy, Henghui invented the third generation technology in clear aligner therapy. The iROK 3g is the most advanced clear aligner therapy technology in the world with best clinical results, widest case selection and easiest operations in clinics. The iROK clear aligner therapy is widely available in China. The iROK products are also available in selected countries and regions internationally.

As we pursue innovation in the iROK clear aligner treatment method, we started to cover a larger field of application, the digital orthodontics with our technologies. We believe that the future of orthodontics is digital. Our digital orthodontics software program OrthoRx has morphed from a clear aligner therapy treatment plan development platform to a foundation for the four pillars of future orthodontics: Digital Brackets and Braces, Clear Aligner Treatment, Functional Devices and Digital communications and trainings.

Henghui will continue to focus at developing digital applications in orthodontics and other dental care areas. More new technologies and applications will be introduced by Henghui in the future. Our technologies have been created by multi-discipline talents including doctors and engineers, and will remain that way in the future. We are open to all kinds of collaborations with orthodontists, dentists and doctors. We believe that the future technologies will come from doctors and for the doctors. We hope you join us to create the next digital technologies and applications in dental care.

Together, we define the future of digital orthodontics.





**Henghui Technologies, Ltd.**

**[www.irokaligner.com](http://www.irokaligner.com)**

**400-66-76453 (China)**