

# DIONavi. Surgical Manual\_E Ver.5

Product Introduction: DIONavi.

Surgical Process



## Surgical Manual Ver.5

This DIONavi. Surgical Manual serves as an instruction manual for using DIONavi. surgical guide system intended for clinical practitioners that covers treatment planning, implant planning, and DIONavi. product ordering.

### DIONavi. Introduction

### DIONavi. Process

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#### 3. Order Process

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### Surgical Process

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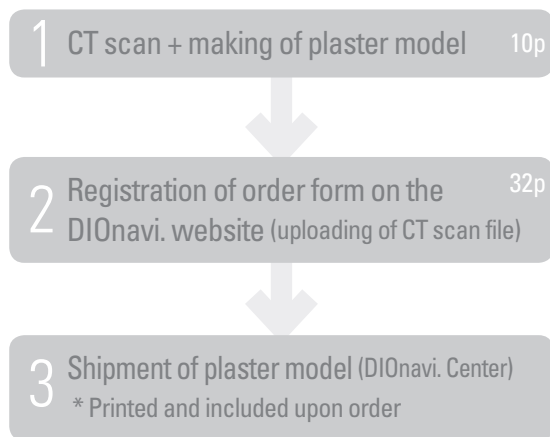




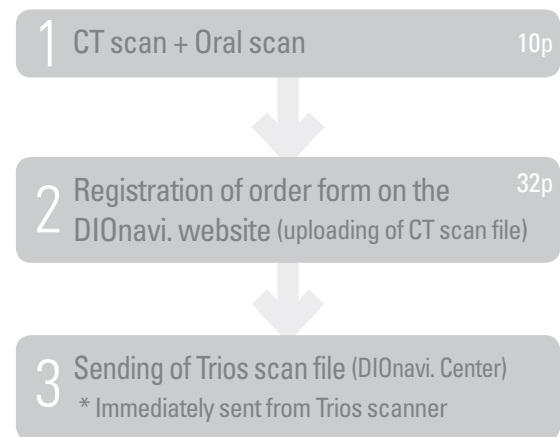
# One-Step Protocol

You can perform implant surgery with a DIONavi. surgical guide printed by a 3D printer within a week once you send CT scan data along with intra-oral scan data to DIONavi. Center.

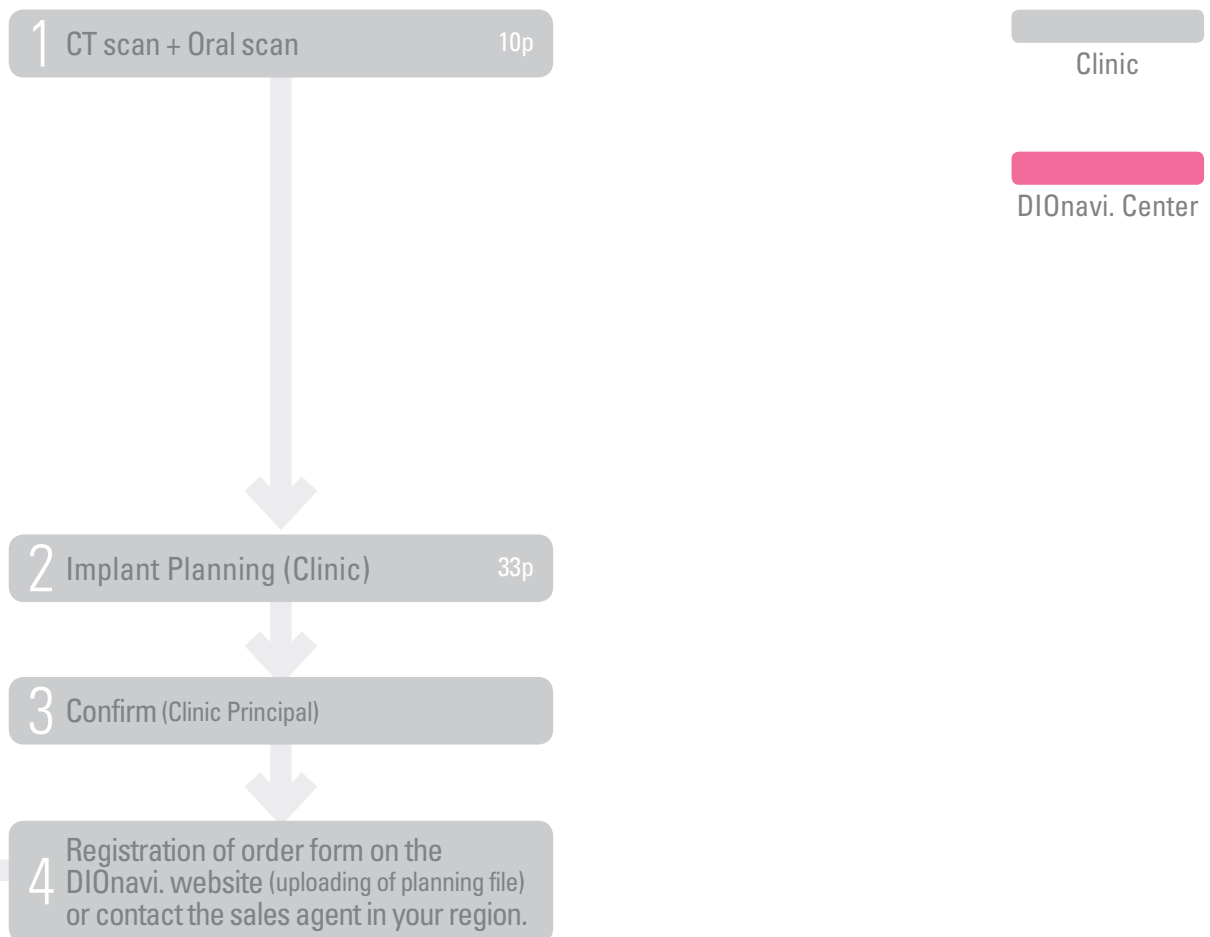
## 1. If planning is done by DIO - plaster model



## 2. If planning is done by DIO - Trios oral scan



### 3. If planning is done at the clinic - oral scan



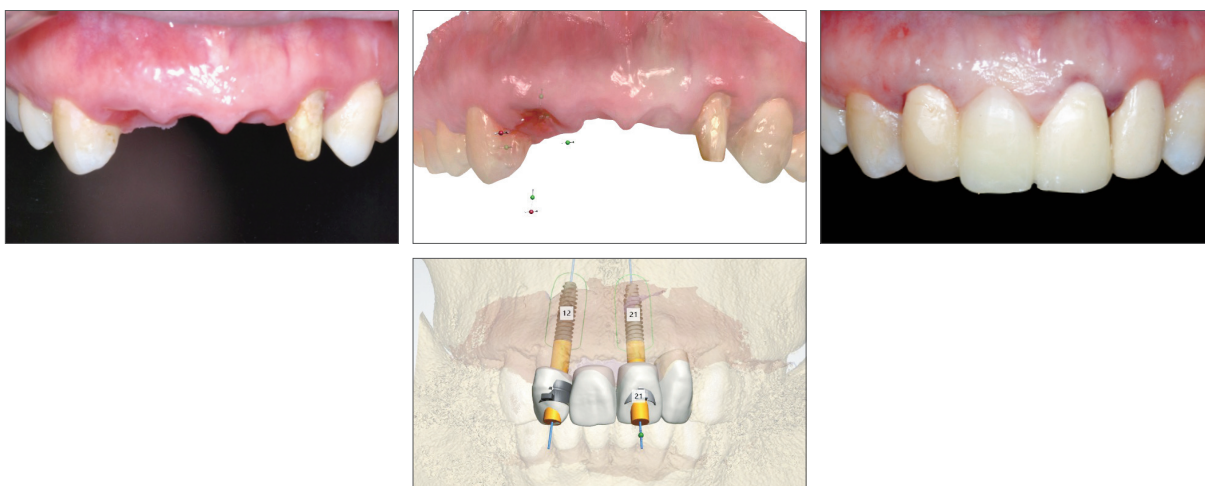
### | Manufacturing period |

CT + plaster model / Request for confirmation of Planning after the receipt of oral scan data	When only making surgical guide	Surgical Guide + Customized Abutment + Temporary Crown
2 days required	3 days required	4 days required
After confirmation >>		

The manufacturing period excludes weekends (Saturday, Sunday) and holidays, and it assumes that the order was received or confirmed prior to 4 PM. Orders taken after 4 PM will require one additional day.

# DIONavi. System

The entire implant placement protocol of DIONavi. is carried out 100% using digital data, which allows for implant treatment without requiring inconveniences like analog impression taking. In addition, the operator can perform accurate placement based on accurate digital data analysis. Both the operator and patient can be satisfied with this implant placement.



## Best accuracy and stability

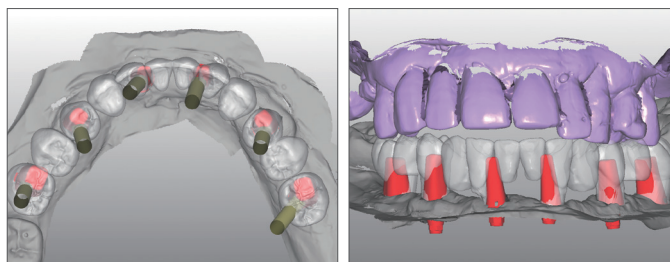
DIONavi. has increased accuracy of implant placement through top-down implant planning that accounts for occlusion and stress distribution. The surgical guide with considerations of anatomical structure can help perform safe implant placement.

### | DIONavi. placement



Desirable prognosis is shown after placement because load is effectively distributed by designing the crown in accurate position first and then positioning the fixture underneath the crown.

### | General implant placement



Since it is difficult to align center of the implant and crown, load cannot be distributed effectively, leading to failure of implant placement such as fracture of prosthesis.

DIONavi.

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Process

# 1 Preparation before order

## 1) Checking of CT

Precision of the guide can be reduced depending on type and management of CT used at the dental clinic.  
We recommend making the guide after inspecting conditions of CT at the dental clinic.

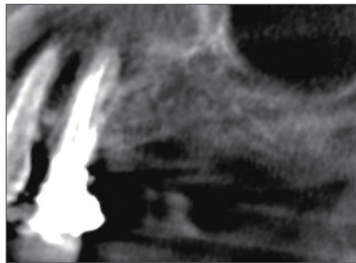
### ① CT resolution

If CT at the dental clinic has poor resolution, it may not be able to show bones, gum and nerves properly.  
Poor resolution needs to be corrected in advance.

#### | Normal CT

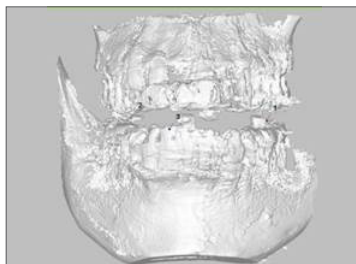
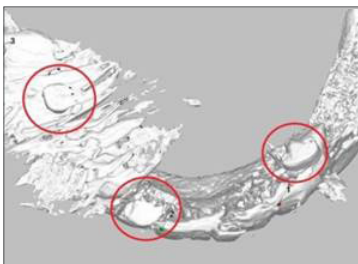


#### | Gum and bones cannot be distinguished well.



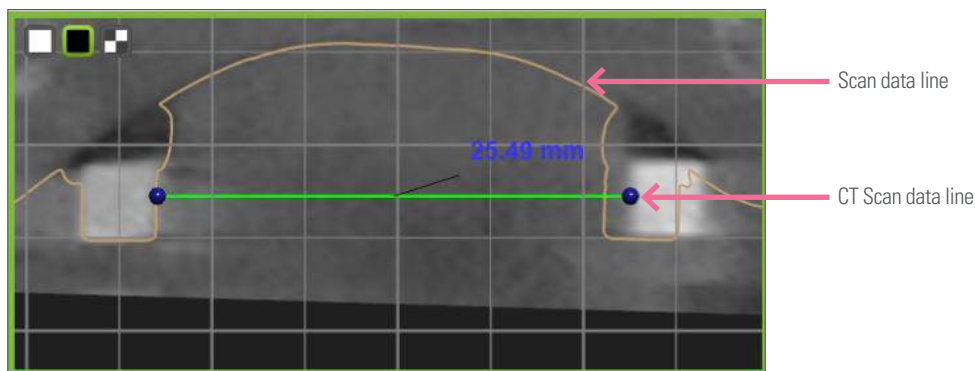
### ② Distortion of CT image

It is necessary to check whether the shape of reference tooth or marker is appropriate during image merging. If shape of the tooth or marker is distorted, it needs to be corrected in advance.



### ③ Horizontal error of CT

Horizontal error of CT may cause failure of merging or incorrect direction of placement.  
Horizontal error must be checked using a CT jig, correcting error of 0.5mm or larger.



※ Horizontal discrepancy of about 1mm is created compared to CT scan data

#### ④ How to check CT error

Error can be checked by shooting the CT jig with CT.



CT Jig



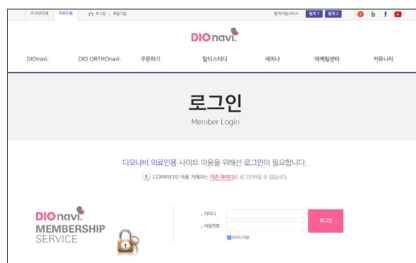
Shooting of the CT jig using CT

Sending of CT image to DIONavi. Center through a salesperson at the dental clinic

## 2) Registration on DIONavi. online order website

Please join membership on the DIONavi. website or switch MyDIO membership.

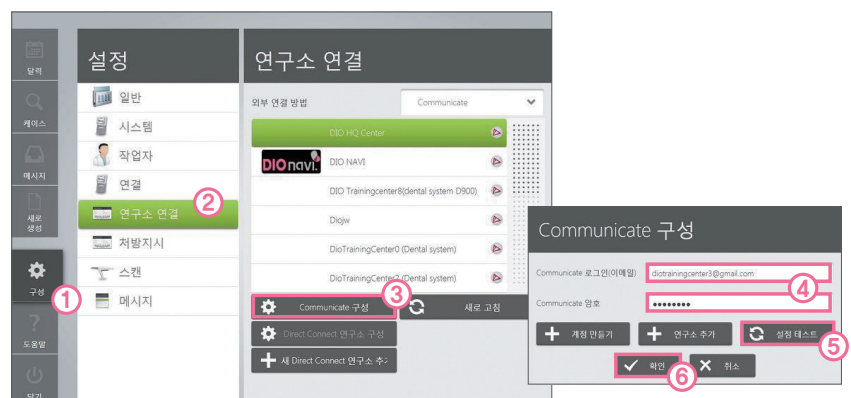
[www.dionavi.co.kr](http://www.dionavi.co.kr)



※ Order process is different in each country. Please contact the sales agent in your region.

## 3) Trios account registration

- ① Configure
- ② Connect to Lab center
- ③ Configure communicate
- ④ Enter account ID / password
- ⑤ Click Test Setting
- ⑥ Click OK



※ Remote setting service (Call Center +82 1599 3875) is available.



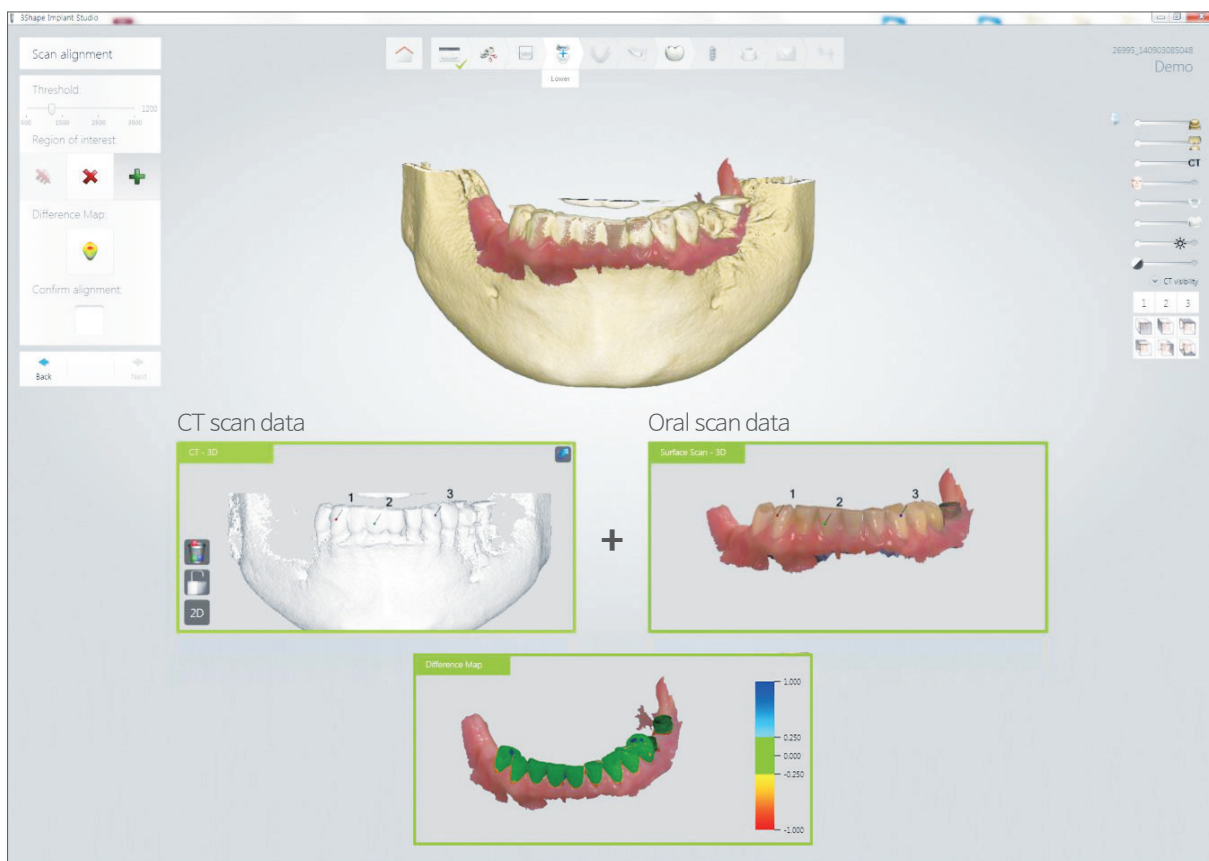
## 2 Scan Process

### 1) Necessity of CT and oral scan

Anatomical information of teeth and bones can be taken from CT scan data, but the gingiva cannot be seen well. Anatomical information of teeth and gingiva can be taken from oral scan data, but information of bones cannot be acquired.

Since making of the surgical guide requires information of teeth, gingiva **and bones**, we merge CT scan data and oral scan data.

\*Merging criterion: Tooth information (common information of CT scan and oral scan)





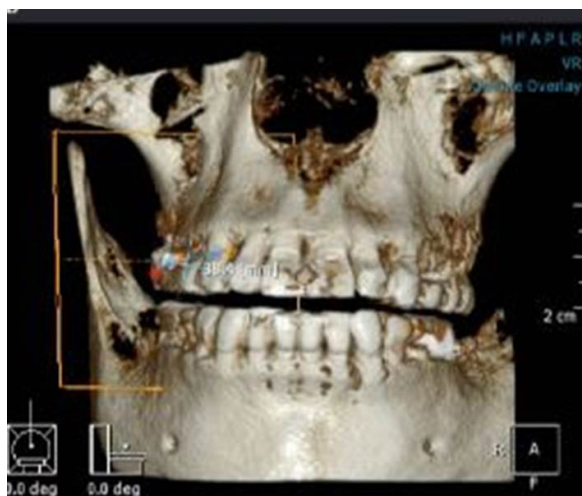
## 2) Classification of cases according to scan method

Depending on oral conditions of the patient, you can select a case among  
Normal Case / Metal Artifact Case / Partial Edentulous Case / Edentulous Case.

		Normal Case	Metal Artifact Case	Partial Edentulous Case	Edentulous Case
Indication		If there are many remaining teeth and no metallic prosthesis	If there is metallic prosthesis on the work side	If unilateral molar is missing	If there is no remaining tooth
If you have Trios	CT + oral scan	Basic method	Marker (or Resin)	Marker (or Resin)	Use of denture and marker
	Reference page	11p	12p	14p	16p
If you do not have Trios	CT + plaster model	Basic method	Marker (or Resin)	Manufacture of splint	Manufacture of splint
	Reference page	12p	13p	15p	17p

### Normal Case

① If the dental clinic has Trios



CTscan



Oral scan

Maxillary scan / Mandibular scan / Bite scan

② If plaster model is made



CT scan

+



Plaster model

Maxillary and mandibular plaster models,  
Bite scan

\* Scanning done at DIONavi. Center

## Metal Artifact Case

① If the dental clinic has Trios



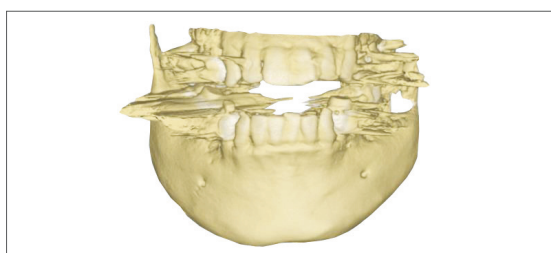
Scanning of maxillary and mandibular merging

...



Deletion of **marker position** from scan data

...



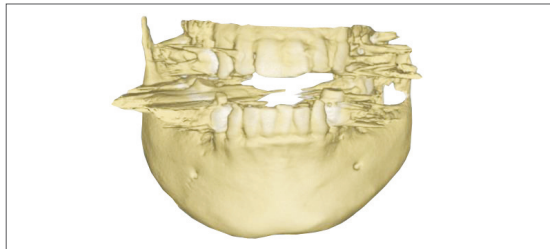
CT scan with **marker attached**

...



Additional scanning after marker attachment

② If plaster model is made



CT scan with marker attached  
(Open Bite)



Making of plaster model by taking impression of the  
work side with marker



Making of plaster model by taking impression of the work side  
after removal of marker



Making of plaster model after taking impression  
of the opposing teeth



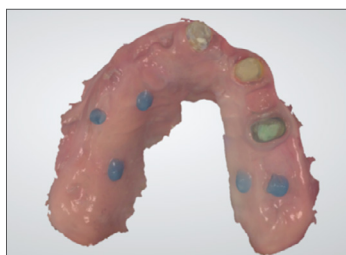
Bite taking

**Caution**

Plaster model of the work site with marker, plaster model of the work side without marker, plaster model of the opposing teeth, and bite index are necessary.

## Partial Edentulous Case

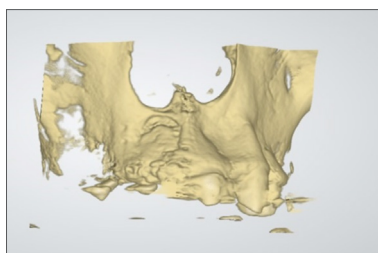
① If the dental clinic has Trios



Marker (or resin) on the arch of the working site



Scanning of the opposing teeth

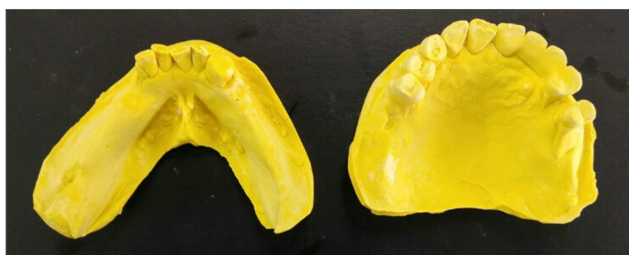


Addition of CT scan after marker attachment



Additional scanning after marker attachment

② If plaster model is made



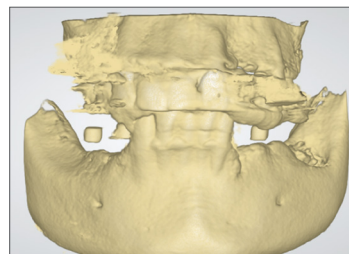
Make maxillary and mandibular plaster models and ship to DIONavi. Center.  
(Bite index unnecessary)



DIONavi. Center. makes the splint and ship to the dental clinic.



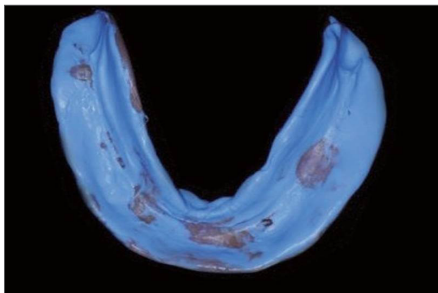
Check the bite using the splint considering VD



Settlement of the splint on the mouth  
for CT scan (close bite)

## Edentulous Case

① If the dental clinic has Trios and denture



Reline of the inside of the denture with impression material



Attachment of the markers on the outside of the denture



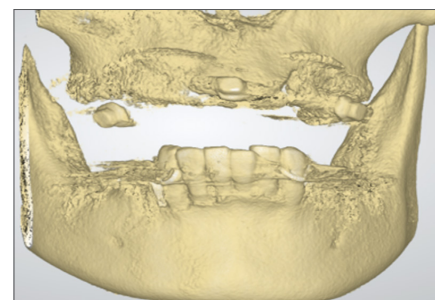
Settlement of the denture with the marker attached in the mouth



Scanning of the inside of the denture, marker and teeth



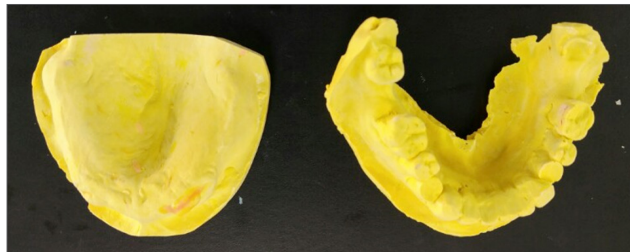
Scanning of the bite after settlement of the denture



CT scan after settlement of the denture



② If plaster model is made



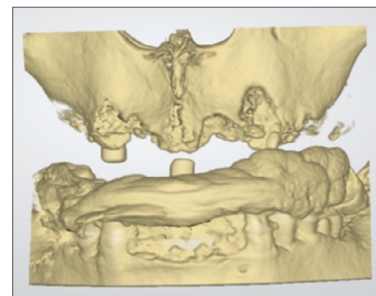
Making of maxillary and mandibular plaster models and shipment to DIONavi. Center



Making of the splint at DIONavi. Center and shipment to the dental clinic



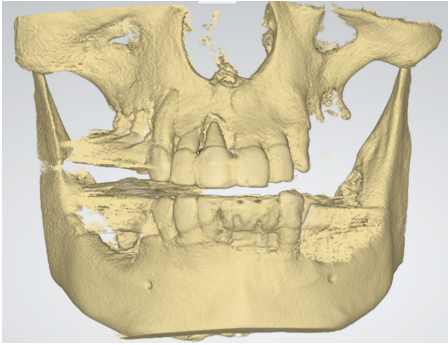
Check the bite using the splint considering VD



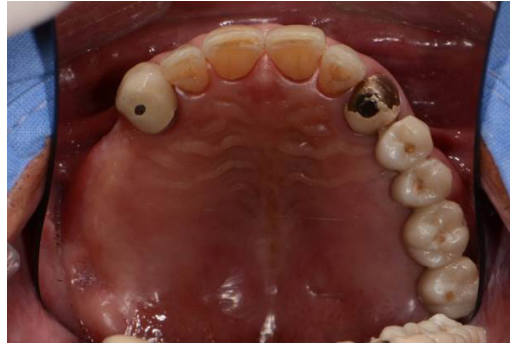
Settlement of the splint on the mouth for CT scan

### 3) How to use and attach the marker

#### ① If marker attachment is necessary



If there is a metallic prosthesis in the patient's mouth, an artifact appears on CT and causes difficulty of merging CT and oral scan.



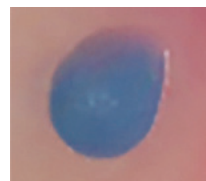
If unilateral molar is missing in the patient's mouth, it is difficult to merge at the implant position.

#### ② Types of marker

Marker materials are largely divided into two types.



Marker



Flow resin (radiopaque)  
(CHARMFIL BLUE resin recommended)

**Tip** The marker can be attached and detached easily by using histoacryl (adhesive).



- **Manufacturer** : BBRAUN
- **Product name** : Histoacryl
- **Components and appearance**  
 Components\_ Main component : N-BUTYL 2-CVANDACRYLIC ACID  
 Others : Protein, etc.
- **Appearance**\_ Transparent liquid
- **Storage and type**  
 Storage method: Room temperature of 30C°  
 or below or refrigeration (5C°) recommended  
 Expiration: 2 years
- **Precautions**
  - ① Avoid wounded site and only use on the oral mucosa.
  - ② Be careful not to have direct contact with instruments, clothes, fingers, etc.
- **Packaging unit and price**
  - ① Packaging unit: 5PCS / BOX
  - ② Price: 220,000 Korean won / BOX (including VAT)
  - ③ Order code: 1050060



### ③ Marker position

#### Metal Artifact Case

By default, the marker is attached on the arch for which the surgical guide is to be made.

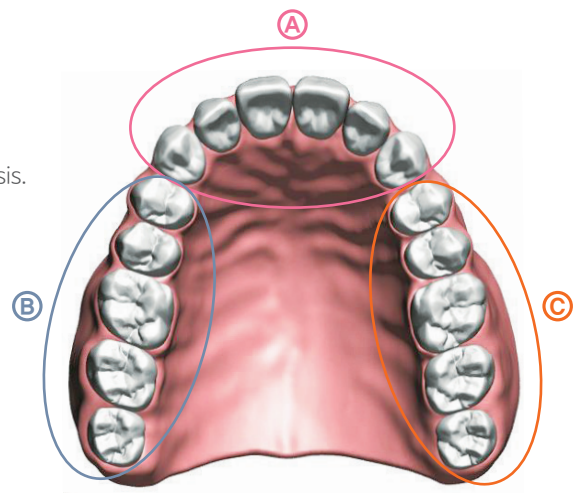
##### | Marker attachment method

6 anterior teeth / left molar / right molar, divided into A-B-C

Divided into areas, attach to area A if there is a metallic prosthesis.

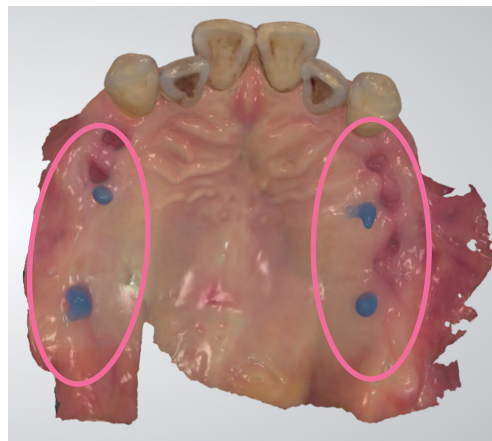
Attach to area B if there is a metallic prosthesis.

Attach to area C if there is a metallic prosthesis.



#### Partial Edentulous Case

Attach the marker or resin to the gum with missing molar.



#### ④ Method of attachment for each case

##### Metal Artifact Case

If there is a metallic prosthesis, the marker can be attached in one of the following three ways.

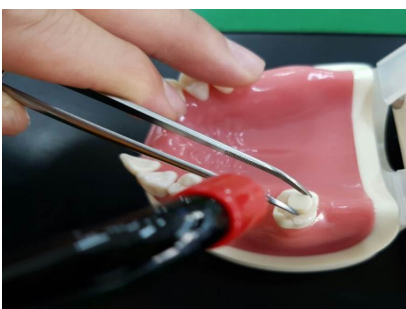
##### ► Method of attaching the marker using flow resin

- ① Pour the flow resin so as to widely spread out between the marker and occlusal surface.
- ② Hold the marker using pincette and position it on the occlusal surface of the tooth to be attached.
- ③ Cure for about 5~10 seconds using curing light.



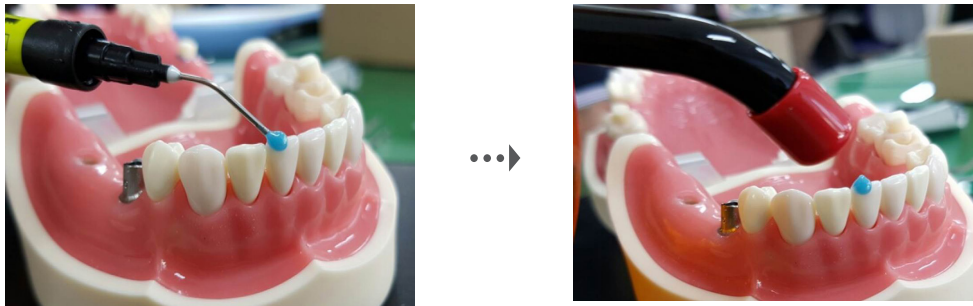
##### ► Method of attaching the marker using histoacryl

- ① Pour the flow resin so as to widely spread out between the marker and occlusal surface.
- ② Hold the marker using pincette and position it on the occlusal surface of the tooth to be attached.
- ③ Cure for about 5~10 seconds using curing light.
- ④ Apply histoacryl around the resin. (For 20 seconds)



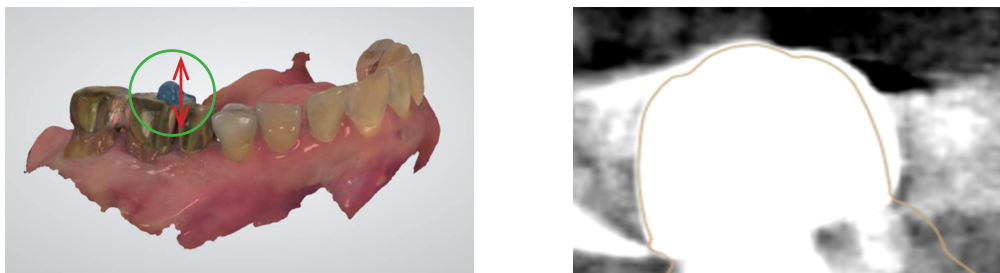
► Method of attaching the flow resin to the occlusal surface

- ① Stack the flow resin in the desired position to a height of 2mm or above.
- ② Cure for about 5~10 seconds using curing light.



**Caution**

Required height of the resin is 2mm or above.  
If height of the resin is below 2mm, it may not be shown on CT.



### Partial Edentulous Case

The marker can be attached to Partial Edentulous Case by selecting one of the two methods below.

#### ► Method of attaching the marker using histoacryl

- ① Pour the flow resin onto the gum.
- ② Hold the marker using pincette and position it on the gum.
- ③ Cure for about 5~10 seconds using curing light.
- ④ Apply histoacryl around the resin. (For 20 seconds)



#### ► Method of attaching the flow resin using histoacryl

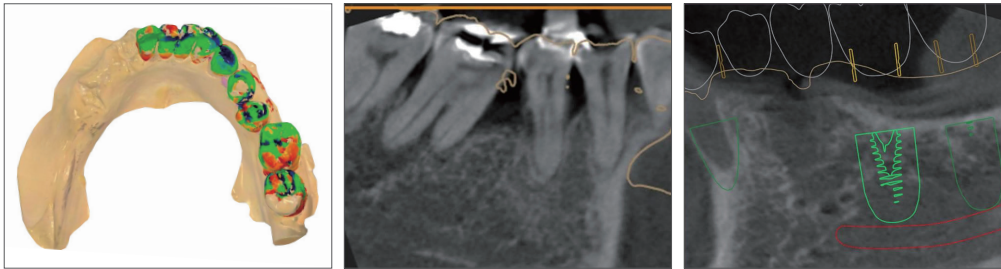
- ① Pour the flow resin onto the gum.
- ② Cure for about 5~10 seconds using curing light.
- ③ Apply histoacryl around the resin. (For 20 seconds)



### Splint Case

Free-End Case where the molar is missing can be merged up to the part where tooth exists.

It cannot be merged in the part where implant is to be placed.



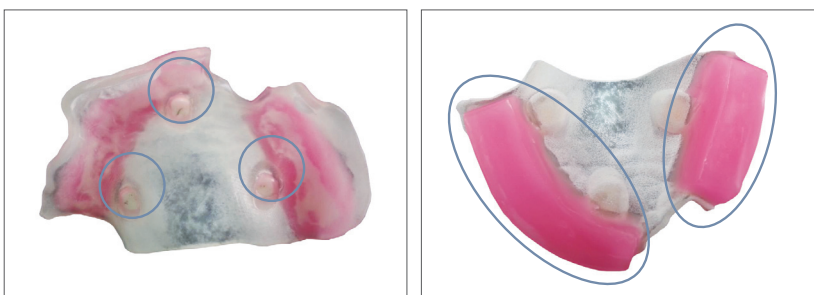
### Caution

The marker can be attached to the palate in case of maxilla, but attachment of the marker to the gum is not recommended due to difficulty.



### TIP

We make a splint similar to wax rim used to make denture at dental clinics.



Markers are inserted in 3 places.

There is a part to take occlusion.



## | Precautions for CT scan

### Caution

VD must be checked first to prevent movement of the splint during CT scan.  
Make sure to check whether it has been properly sit in the mouth.



Sending of the splint to the clinic



VD check in the patient's mouth



CT scan with the splin



CT scan



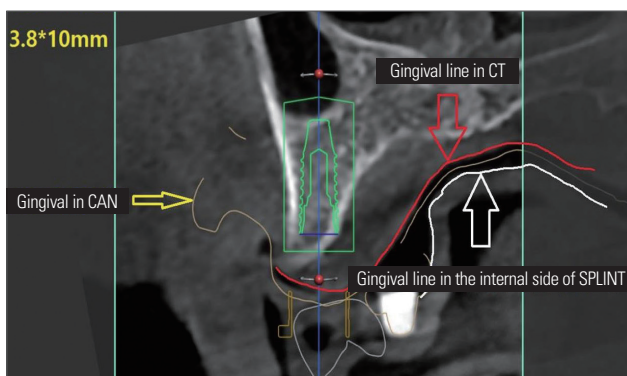
Uploading of CT file onto the order form on the DIONavi.



**TIP** The same method of bite taking conducted for fabricating denture can be used.



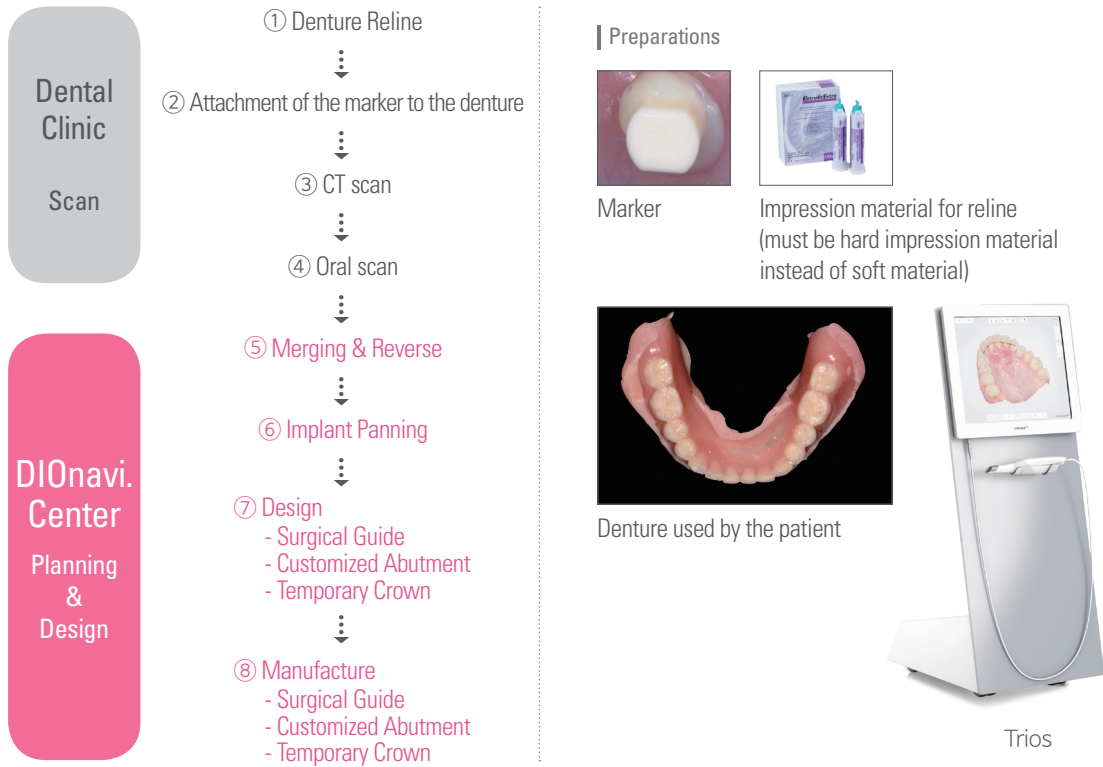
**TIP** Edentulous CT scan (actual case)



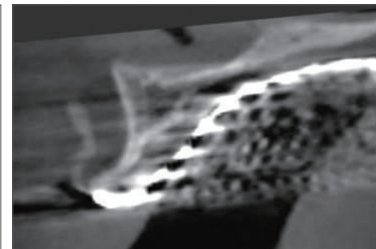
**Caution** If the splint is not accurately attached to the mouth, the chance of error increases and the guide cannot be made.

## Edentulous Case

► If the dental clinic has Trios and denture



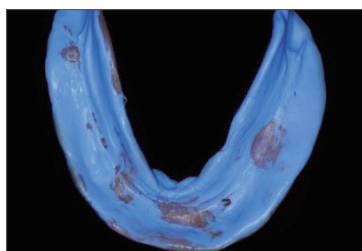
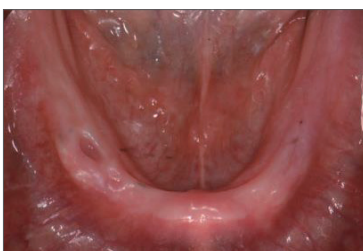
## | Inappropriate case using denture



Partial denture and full denture with metallic structure cannot be used because bones become invisible due to artifact caused by metallic structure.

### Ⓐ Denture Reline

Since the inner surface of the existing denture does not fit the gum well, it must be relined precisely. We recommend using silicon impression material as relining material.



⑥ Attachment of the marker to the denture

Attachment of the marker to the denture using the flow resin.

Five markers are positioned, one on both sides of #1 and #7 buccal & lingual.



Position of the marker should be on the marginal area if possible.

⑦ CT scan with the denture attached to the mouth

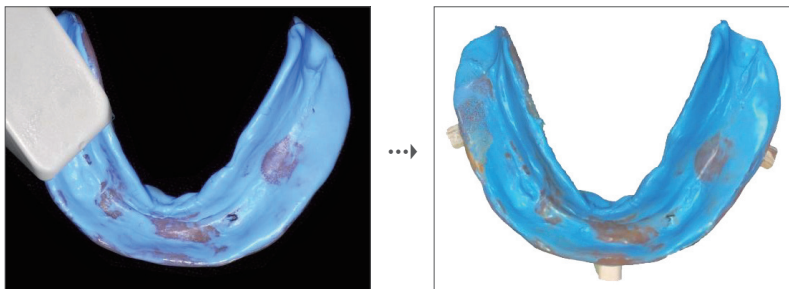


**Caution**

Fix the denture onto the mouth.  
Make sure to shoot in close bite.  
Open bite can cause movement of the denture.

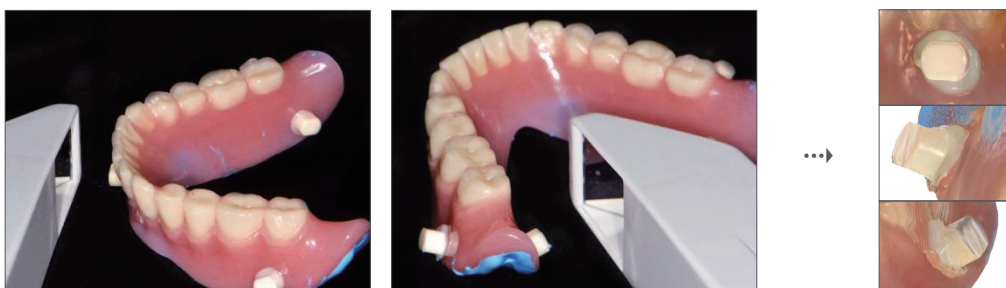
⑧ Denture scan

(a) Scan the inner surface of the denture that has been relined precisely.



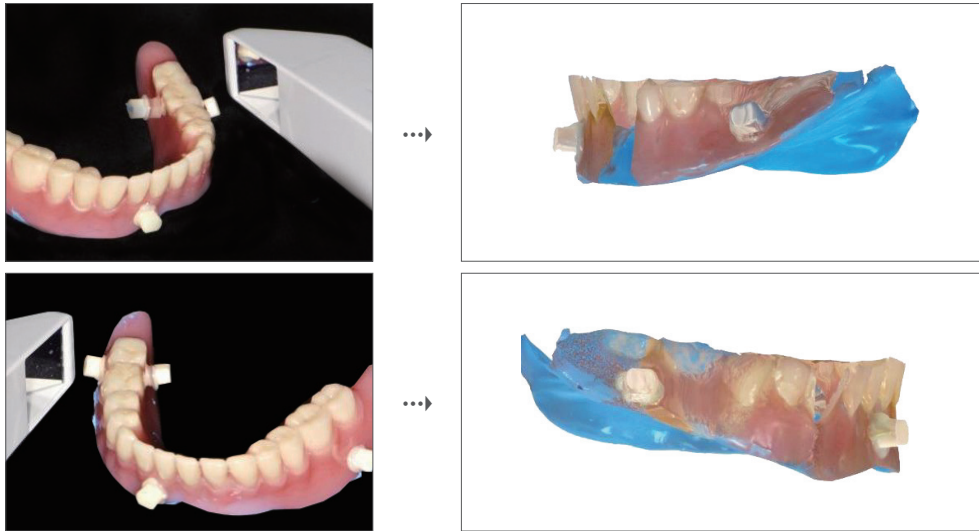
Perform precise scanning **with the denture fixed in place**.

(b) Surface of all markers attached to the outer surface of the denture must be scanned precisely.





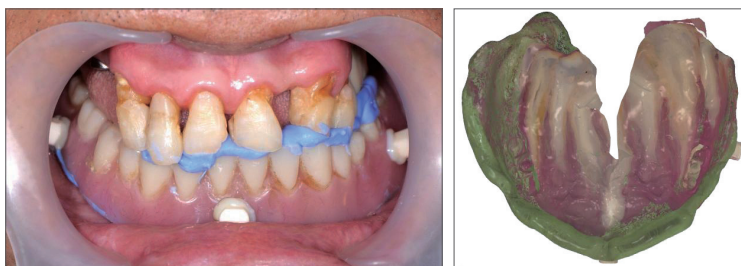
- (c) Buccal side of 4#, 5#, 6# and 7# teeth on left and right sides of the denture must be scanned.  
(Necessary for bite alignment with the opposing teeth)



- (d) Scan image  
Scan the denture, opposing teeth and occlusion.



- (e) Bite scan  
When scanning occlusion, make sure to scan left and right occlusions after attaching the denture to the mouth.



**Caution**

If the inner surface of the denture is not scanned, information of the gum cannot be acquired and the guide cannot be made.

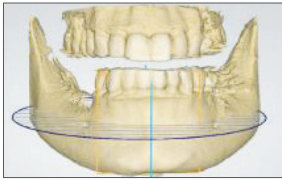
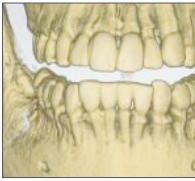

#### 4) Precautions for scanning

##### ① CT scan

##### Normal Case

##### ► Precautions for CT scan

② Check F.O.V size of CT at the dental clinic in advance. Cases can be limited according to F.O.V size.

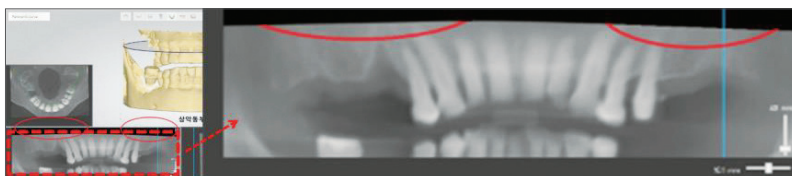
	10 X 8.5cm	8 X 8cm	8 X 5cm
Scan Image			
Indication	Can be done on full arch	Can be done on unilateral last molar ~ premolar on the opposite side (1~8 unit)	Can be done on unilateral last molar ~ anterior tooth (1~8 unit)
Note	-	Two surgical guides are made if the case becomes longer.	



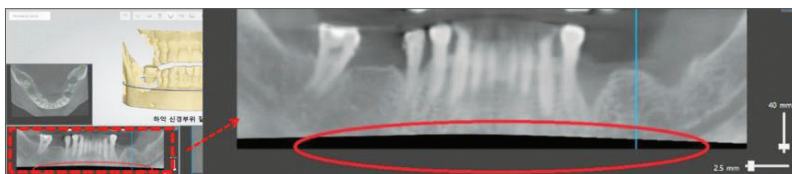
※ If F.O.V of CT is small, matching is difficult and making of the guide is limited.

##### ③ Anatomical structure must be normal.

(Common: Anterior teeth / maxilla: Sinus / mandible: Nervus alveolaris inferior)



Structure of the maxillary sinus does not appear on CT image. Panorama of the maxilla



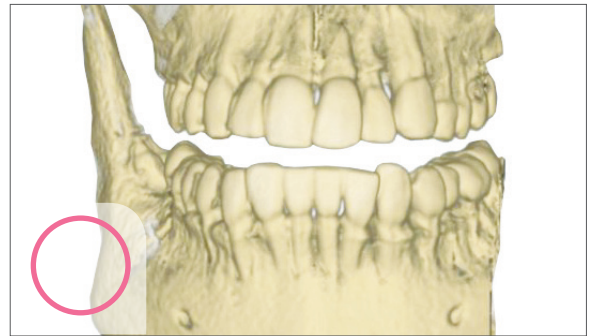
Neural structure of the mandible does not appear on CT image. Panorama of the mandible



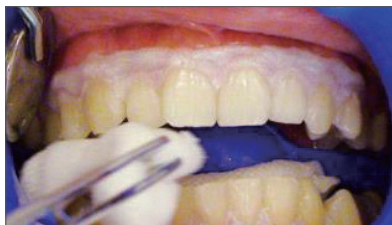
© CT scanning must be done in open bite.



| Close Bite



| Open Bite



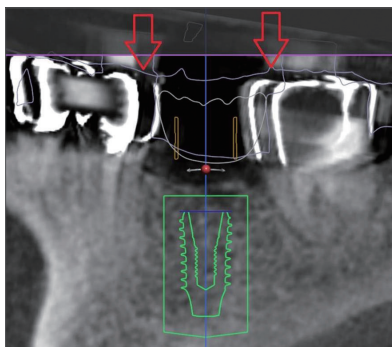
**Caution**

If CT scanning is done in close bite, information of teeth can be inaccurate.

**TIP**

Open bite can be made easily by letting the patient bite a gauze.

④ If the patient moves during CT scan, CT image can be shaken.



**Caution**

Matching cannot be done if CT images overlap, and implant cannot be positioned accurately.

## ② Oral scan

The maxilla / mandible / occlusion must be scanned because implant planning is done by top-down method.



### Precautions for arch scan

Both the gum and teeth must be shown for implant planning and manufacture of the surgical guide.



### Precautions for Bite scan

Bite is necessary for crown and customized abutment design.  
Make sure to check and send bite matching in the scan.



### Precautions for sending

Trim unnecessary parts other than the gum and teeth such as cheeks and tongue during post-processing before sending.  
※ Unnecessary parts can adversely affect making of the guide.

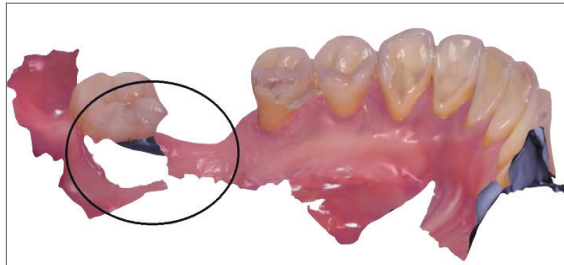
## | Examples of oral scan error

If oral scan error occurs, making of the guide can be limited or the guide may not fit in the mouth.



Distortion during scanning

**Caution** The guide may not fit in the mouth.



Non-scanned area during scanning

**Caution** The guide cannot be made.



Bite scan alignment error

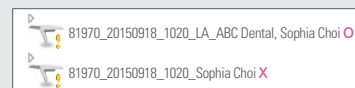
**Caution**  
The guide cannot be made accurately since position of implant is determined after arranging the crown by top-down method.

Select DIONavi. as the lab center account for Trios.



File name must be **Clinic Name-Patient Name**.

**Caution** Work can be omitted if the file name is unclear.





### ③ Impression taking and making of a model

#### | Important points for plaster models

The maxillar model, mandibular model and matching index are necessary.



Plaster model (maxillar)



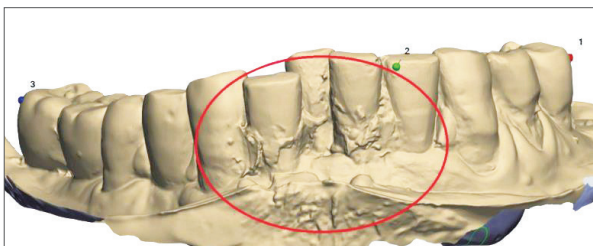
Plaster model (mandibular)



Matching index

#### | Examples of plaster model error

If the plaster model becomes inaccurate due to deformation of impression, it is difficult to make the guide.



##### Caution

If there is an error during impression taking, the guide cannot be sit in the mouth.



##### Caution

The guide cannot be made if impression of proposed implant site is not taken.

#### | Shipment of plaster model



##### Caution

Surround the plaster model with packaging bubble wraps to prevent damage.

Send the three models above, including the DIONavi. order form, to the DIONavi. Center plaster scan manager of DIO.

## 3 Order Process

Order process is varied by the country.

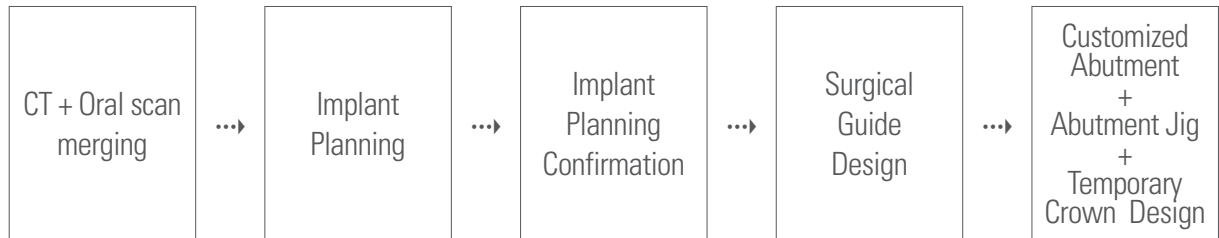
Please contact the sales agent in your region.

**DIO navi.** Center



# 4 DIOnavi. Surgical Guide Design

Design process using 3-Shape Implant Studio



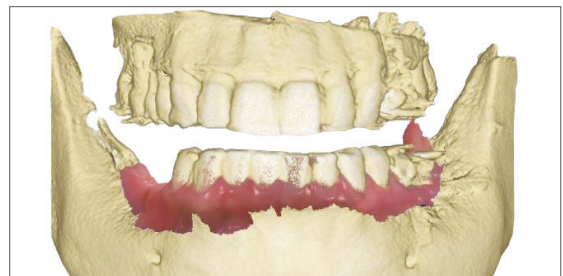
## 1) Merging



Merging with 3points on the same teeth No. of both data.

### Caution

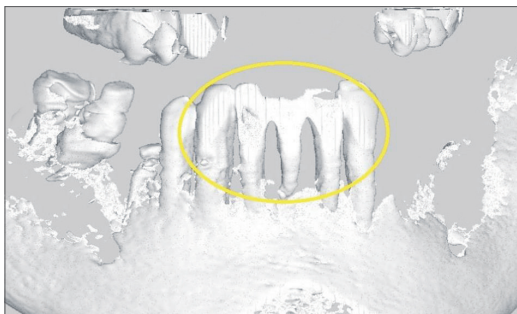
Condition in the mouth must be the same during CT scan, oral scan and impression taking.



### Caution

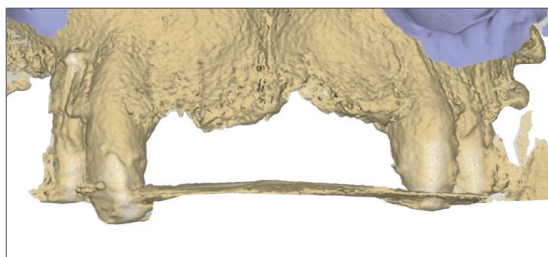
Take a CT with open bite as the teeth are not show properly in the closed bite.

### | If anterior teeth are cut off on CT



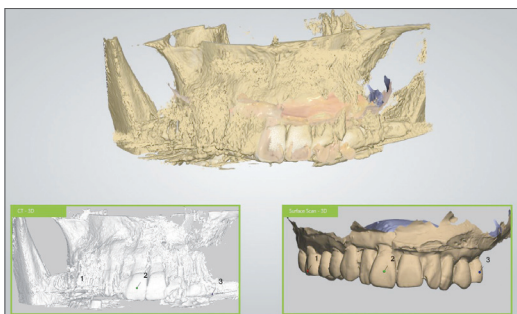
After taking CT, check whether CT scan range is appropriate.

### | If there is a temporary crown

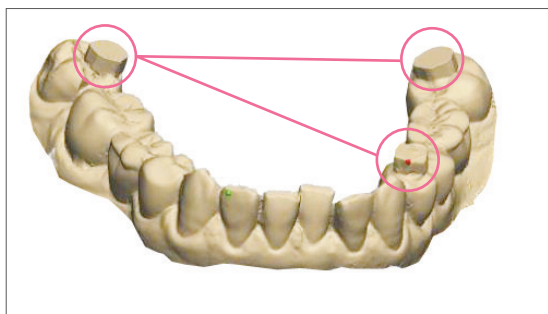


If there is a temporary crown in the mouth, remove the temporary crown or attach a marker to the occlusal surface before CT scan.

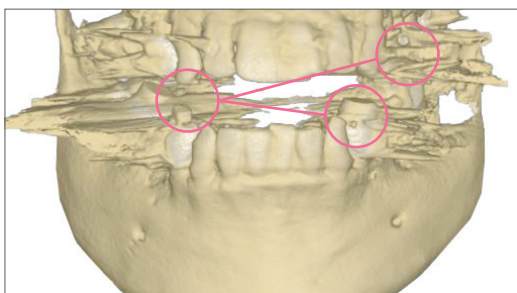
### | If artifact phenomenon occurs from CT due to metallic prosthesis



If there is a metallic prosthesis in the mouth, artifact is created on CT and the distortion is spread horizontally.



Attach the marker to 3 points on the occlusal surface before CT scan.



#### **Caution**

The surgical guide must be attached on top of the occlusal surface of the arch to be made. Position of the marker must be the same between CT and scan data.

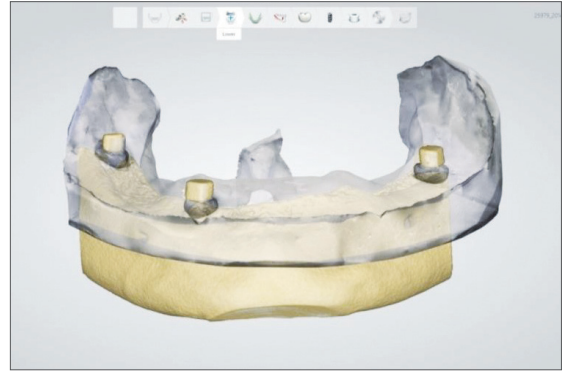


## 2) Implant Planning

### ① Edentulous Case

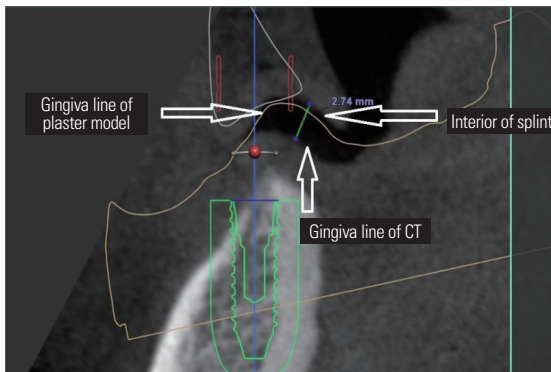


...



Making of the splint

※ Precautions for the splint: Refer to P23-24.



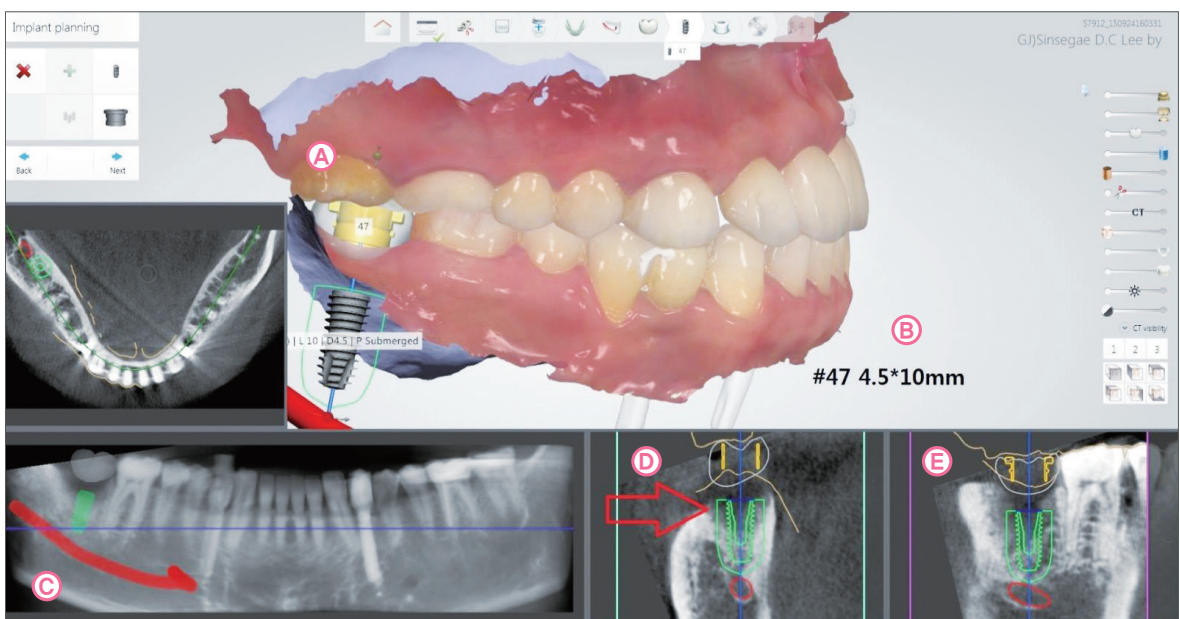
#### Caution

Make sure to check the inner surface and proper attachment through CT scan for denture or splint.

#### TIP

There must be no gap between the gum and inner surface of the splint on CT.

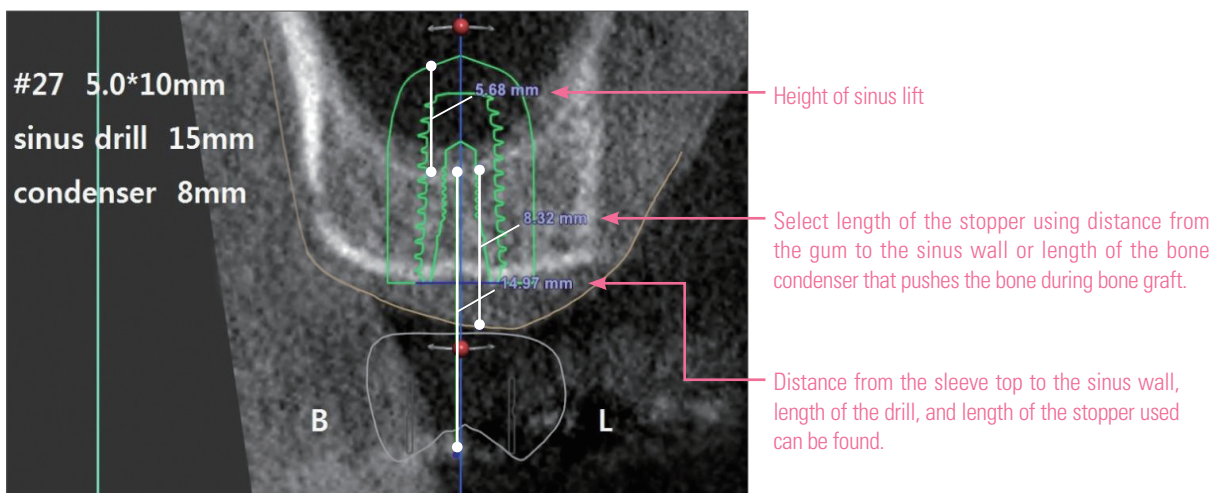
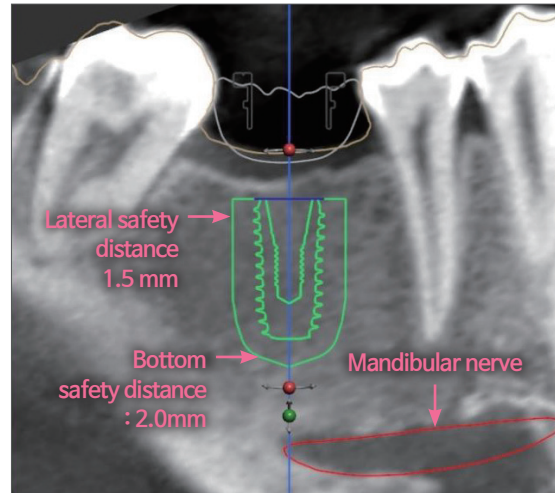
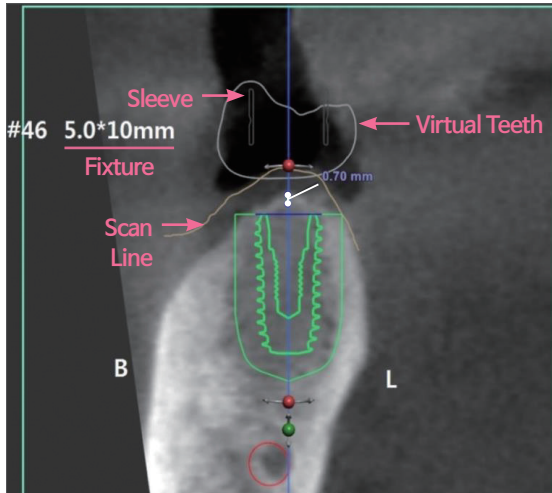
### ② Normal Case



Ⓐ Scan-View: Check relation of the prosthesis.  
Ⓑ Relevant Information of the Implant Fixture

Ⓒ Panoramic View  
Ⓓ Buccal-Lingual View

Ⓔ Mesial-Distal View



Surrounding anatomical information and implant position can be checked.  
Determine bone quality based on white balance of the bone.

### 3) Implant Planning Confirmation

Implant planning confirmation process is different in each country.  
Please contact the sales agent in your region.

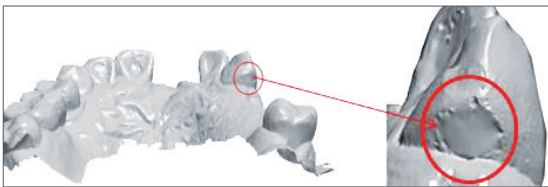
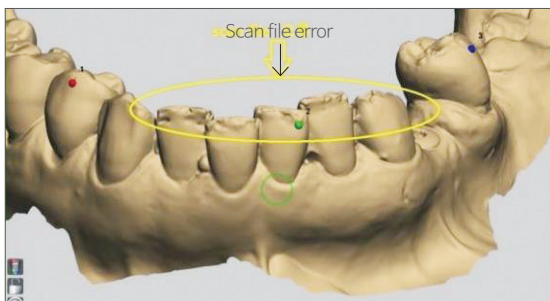
#### 4) Surgical Guide Design



The surgical guide is designed based on scan data.

##### Caution

Scan data must be accurate to make a surgical guide that perfectly fits in the mouth.



The guide cannot be attached if there is an error in the plaster model or oral scan.



▶ LowerJawScan	2015-09-30 오후...	DCM 3D Model F...	8,575KB
▶ UpperJawScanWithImplantInfo	2015-09-30 오후...	DCM 3D Model F...	9,745KB

Once the design of the guide is completed after planning, a file with coordinates of the implant is created. Dental clinic, or cooperating laboratory asks design of Customized Abutment + Abutment Jig, the scan file with relevant coordinates will be sent.

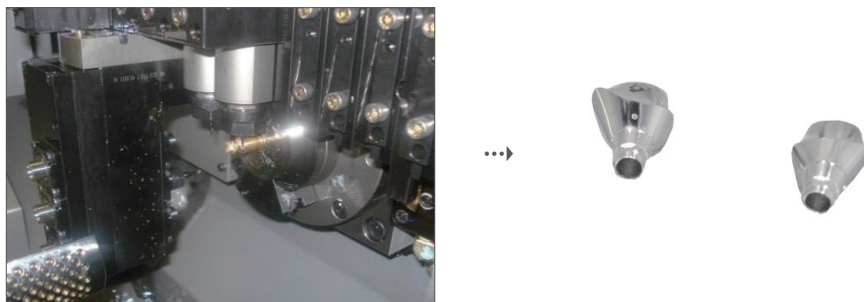


## 5) Manufacture

- ① A precise surgical guide is fabricated by using 3D printer.



- ② Customized abutments are precisely manufactured with CNC machine.



To customize and precisely make all products, it takes 3 days after confirmation to make the surgical guide and 4 days to make the surgical guide, a customized abutment and a temporary crown.

- ③ The temporary crown is precisely processed by a partner laboratory of DIO using a milling machine.



Check details of planning and reply via e-mail in an area where DIONavi. site service is not provided. Making of the case is started after receiving e-mail confirmation from DIO.

## 6) Matters to be confirmed after receiving DIONavi. product

Offset **9.0mm**

DIONavi. Surgical Protocol

Check offset of the sleeve and select the drilling step according to bone quality of the patient.

Case 4 #36, #46

**UF(II) 5010**  
 UFII Fixture Ø5.0 x 10mm

**Drilling**  
Torque  
Abutment Profile  
Fixture

(Repeated injection of saline in each drilling step is recommended)  
55 Ncm (Maximum Torque)  
1,000 rpm (Saline)  
30 rpm Below

**DIONavi.**  
Ver.5\_201706.01.

**TIP**  
Attach the report to the operation room and use it as reference during operation.



Check the surgical guide, and check for the exact fit of the customized abutment and abutment jig.

Implant information			
Implant position (FDI)	36	37	
Manufacturer	DIO	DIO	
Type	UF(II) 5010	UF(II) 5008	
Order number	UF(II) 5010	UF(II) 5008	
Length, mm	10	8.5	
Diameter (Ø), mm	5	5	
Color	Green	Green	
Sleeve information			
Name	DIO GS 53	DIO GS 53	
Type	Fully guided	Fully guided	
Order number	GS 53	GS 53	
Offset, (mm)	9	10.5	
Drill information			
Minimum drill length	19	19	

Surgical report.pdf (1.8MB)  
 Drilling protocol.pdf (204KB)

Content shown  
in the surgical report mail

Offset **9.0mm**

DIONavi. Surgical Protocol

Check offset of the sleeve and select the drilling step according to bone quality of the patient.

Case 4 #36, #46

**UF(II) 5010**  
 UFII Fixture Ø5.0 x 10mm

**Drilling**  
Torque  
Abutment Profile  
Fixture

(Repeated injection of saline in each drilling step is recommended)  
55 Ncm (Maximum Torque)  
1,000 rpm (Saline)  
30 rpm Below

**DIONavi.**  
Ver.5\_201706.01.

Check offset value in  
drilling protocol



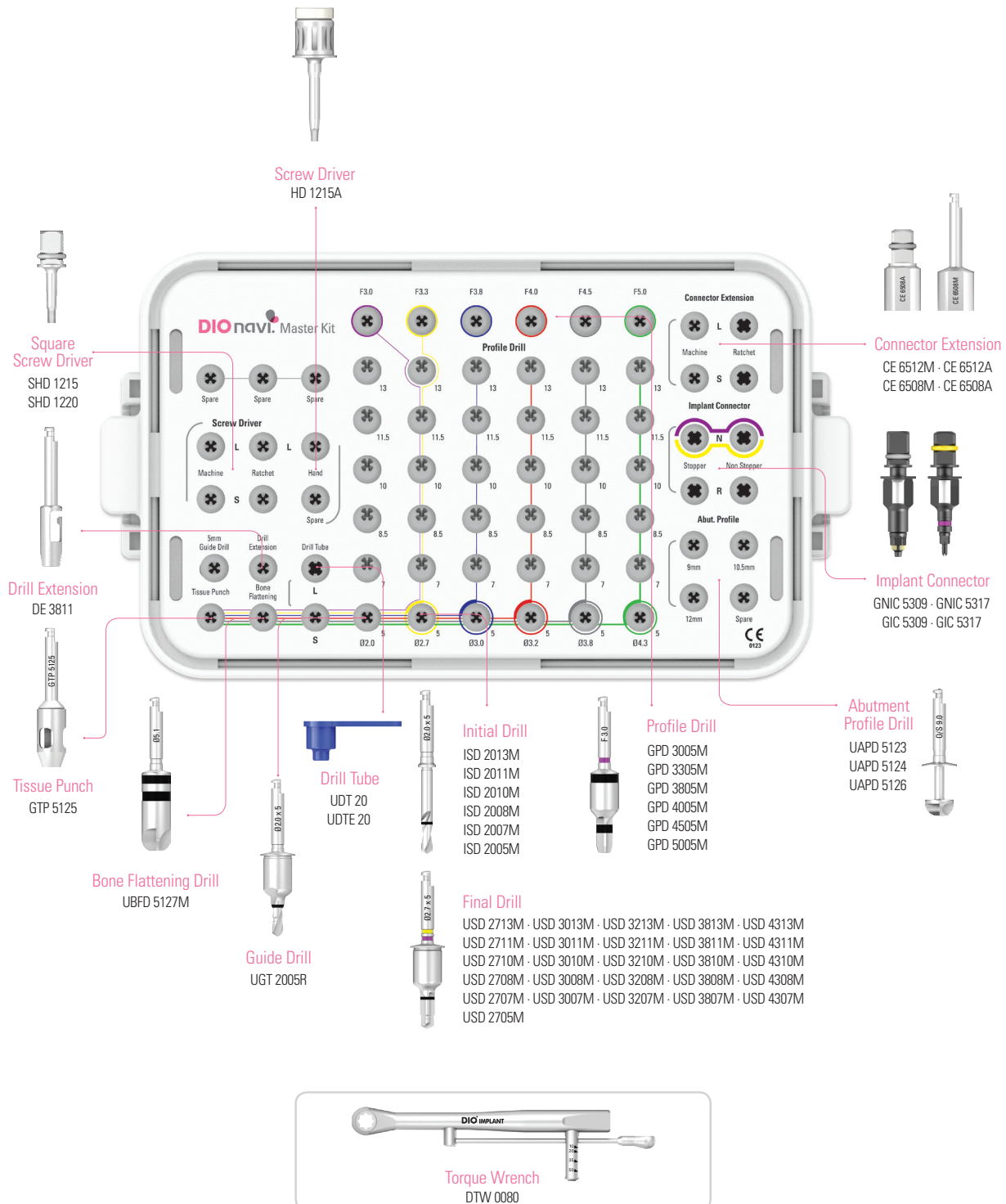


# Surgical Process

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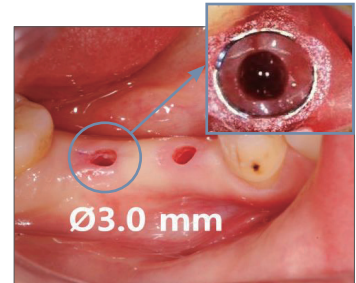
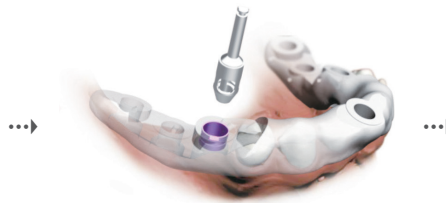
# 1 DIONavi. Master Kit

General operation process + DIONavi. Master Kit  
Guide Sleeve [ GS 53 ]



## 1) Tissue Punch

Incise the gingiva in the position of implant and remove the gum tissue.



### Benefits of a small-diameter tissue punch

- ① Postsurgical hemostatic effect due to the contact between mucosa and abutment surface
- ② Faster healing of the wound
- ③ Healing with smaller scars

#### TIP

Since residues after operation can result in rust, they must be managed cleanly. They can be removed easily using explore or steam.

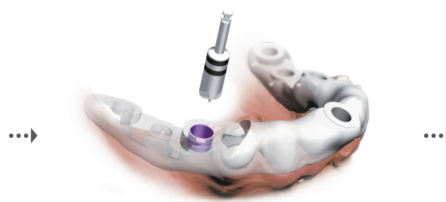
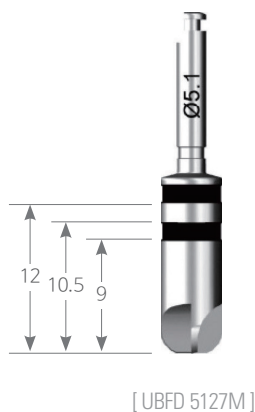
## 2) Bone Flattening Drill

The bone flattening drill flattens the surface of the alveolar bone.

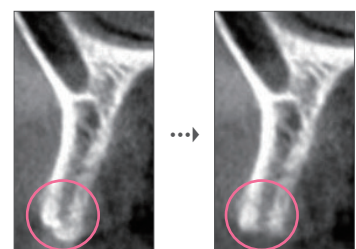
(If the bone surface is not flat, the drill can slip and be drilled in an unwanted position.)

Use the tissue punch and remove soft tissues remaining in the alveolar crest.

If the cortical layer is thick, use 800 RPM while irrigating.



Bone Flattening Drill

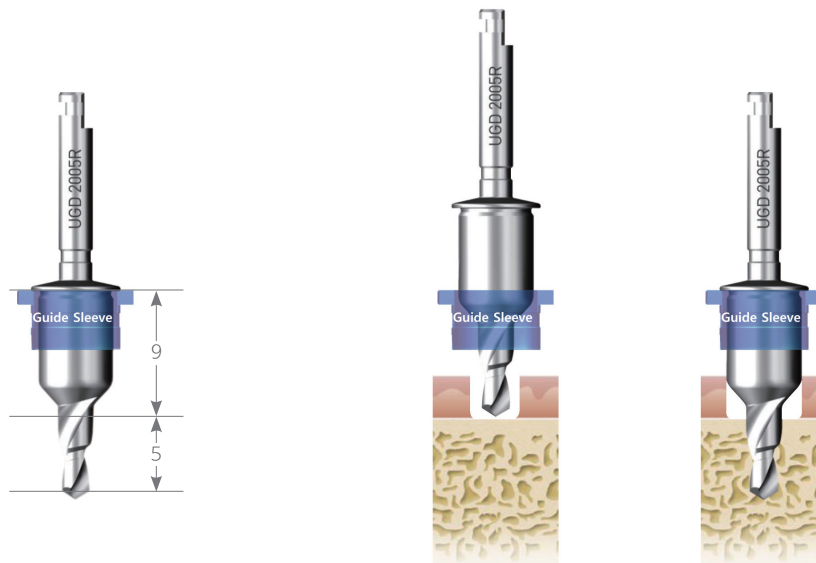


Before use

After use

## 1) Ø2.0x5mm Guide Drill

Use the Ø2.0x5mm Guide Drill for a case of limited mouth opening(※Optional)  
If opening is small, it can be used without a drill tube.



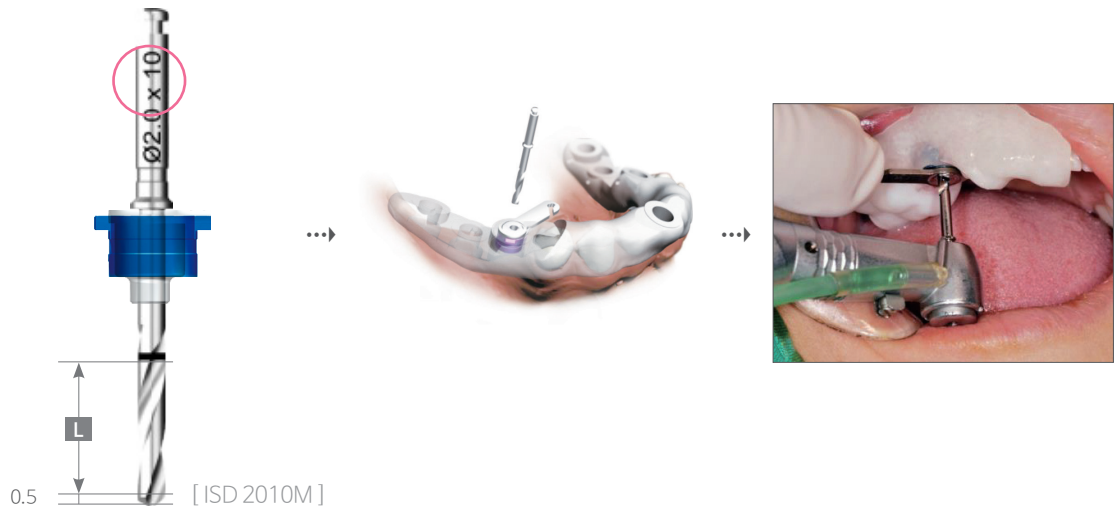
[ UGD 2005R ]

Drilling is done stably after fixing the drill  
onto inner surface of the guide sleeve.

## 2) Ø2.0 Initial Drill

Secure accurate position and direction of the initial drilling hole.  
After drilling 5mm, select and use a drill appropriate for fixture size.

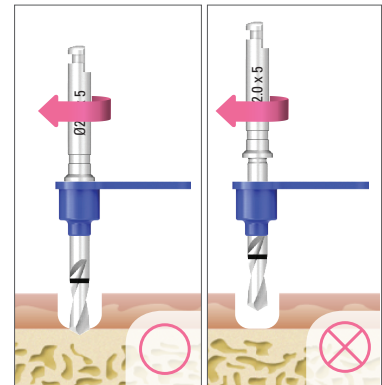
- ※ Maintain accurate position and direction of the drill using a drill tube.
- ※ Drilling at 50 RPM without irrigation.



**L** Length=5/7/8.5/10/11.5/13/15mm ※Sold separately

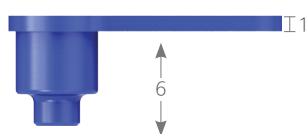
### Caution

Drilling starts after the drill passes the drill tube and stably settles down on the bone.  
The drill can get jammed in the drill tube if it enters while rotating.

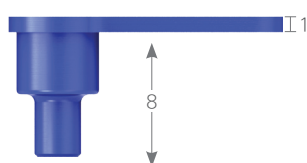


## Ø2.0 Drill Tube

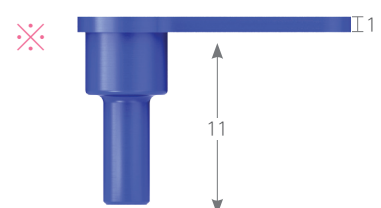
Select and use according to sleeve offset and drill length. Drilling can be more stable if fixing area is larger.



Standard Size [ UDT 20 ]



Extension Size [ UDTE 20 ]



Extension Size [ UDTL 20 ] ※Sold separately

## ✂ Irrigation after drilling

### ① Correct method of irrigation during flapless guide surgery

- ▶ We recommend performing surgery with irrigation.

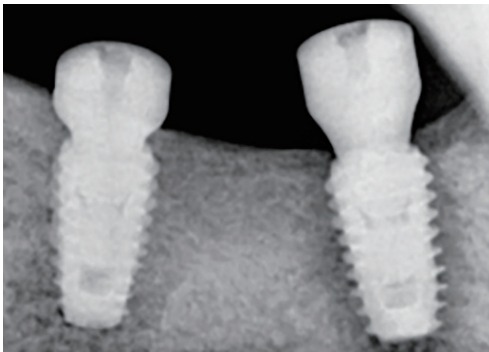


When irrigating external water during flapless guide surgery, it is difficult to irrigate into bones because of the mucous and guide.

Therefore, during flapless guide surgery, it is necessary to minimize heat generation through low-speed drilling and irrigate after removing the drill and positioning the irrigation needle on the bone cavity.

### ② Correct method of irrigation during low-speed drilling

- ▶ It is recommended to repeat cleaning and suction of the drilling hole in each drilling step.



Bone Heating

No water is sprayed during low-speed drilling at 50 RPM or below. For prevention of bone heating and complete removal of particles in the bone cavity, it is recommended to repeat cleaning and suction of the drilling hole to the bone cavity in each drilling step.

#### **TIP**

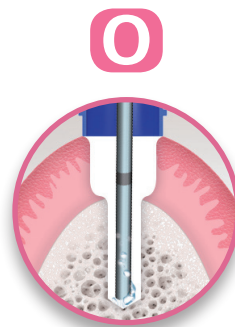
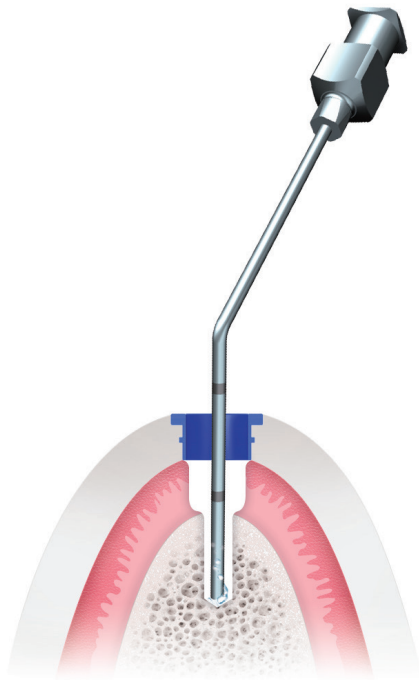
##### **Drilling 10-second rule!**

If low-speed drilling is done in a case with high bone density, increased drilling time involves risk of bone heating. Drilling time should not exceed 10 seconds. If drilling time is too long, perform drilling for less than 10 seconds and remove the drill. Resume drilling after irrigation into the bone cavity.

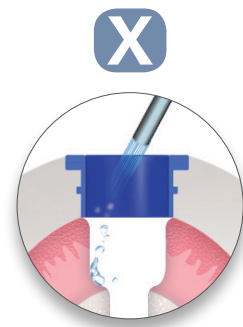


### ③ Method of using metal needle

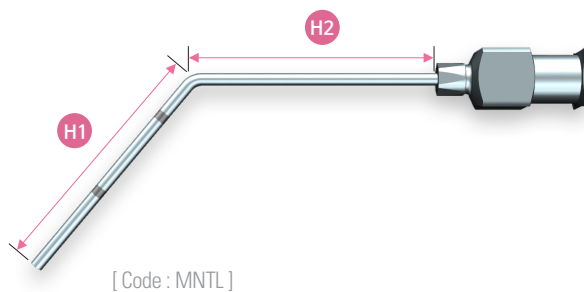
The irrigation needle needs to be positioned as deep as the bone cavity to prevent bone heating and completely remove particles in the bone cavity.



The needle is positioned as deep as the bone cavity for irrigation.



The needle is not deep enough to irrigate into the bone.



#### TIP

Spec. : 18G OD : 1/2"

Code	H1	H2
MNTE	30	50
MNTL	25	25

Recommended syringe spec : 30~50cc  
(refrigerated for storage before operation)

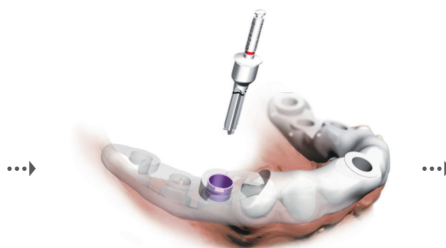
### 3) Final Drill

The drill body and guide sleeve are fixed by touching one another without a drill tube. Select a drill appropriate for fixture size.

※ Drilling at 50 RPM without irrigation.

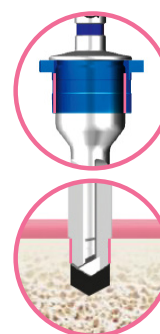


**L** Length=7/8.5/10/11.5/13/15mm  
※Sold separately



#### Caution

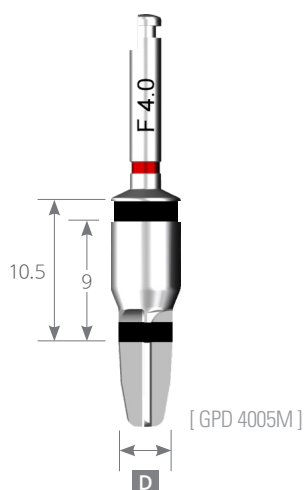
The drill body and sleeve settle down on the drilling hole for double contact. Slipping can only be prevented by starting with a short drill.



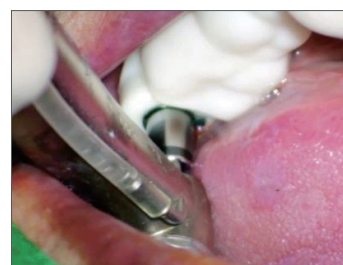
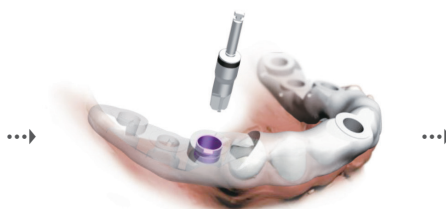
### 4) Profile Drill

Excessive torque is prevented when inserting the fixture by expanding the cortical bone in the D1 or D2 mandible. Also, this helps flattening of bone and stable drill entry.

※ Drilling at 50 RPM without irrigation.

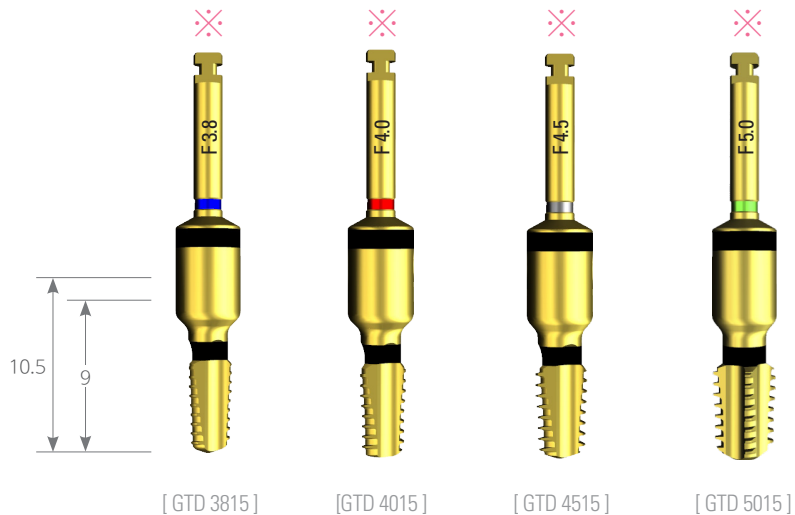


**D** Diameter=Ø3.0/Ø3.3/Ø3.8/Ø4.0/Ø4.5/Ø5.0mm



### 5) Tap Drill

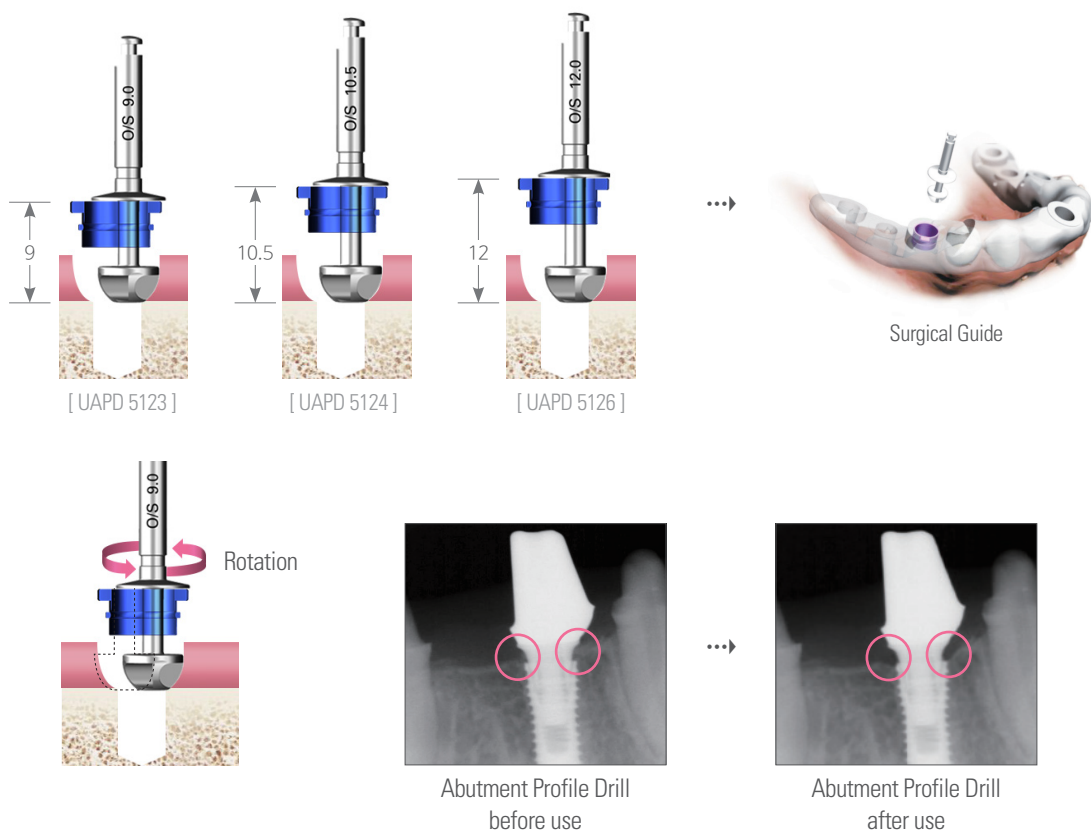
Excessive torque is prevented when inserting the fixture. ※Sold separately



## 6) Abutment Profile Drill

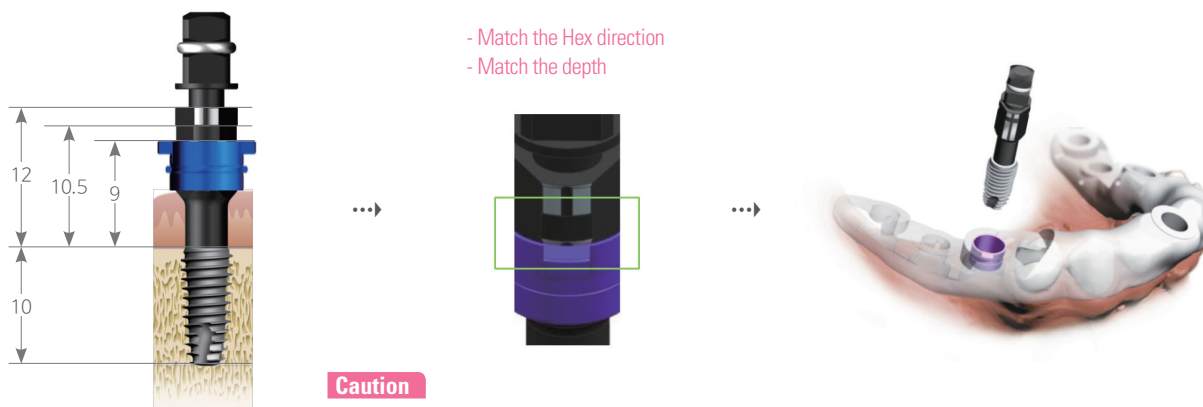
The alveolar bone, which interferes connection of the abutment or H-scanbody, is removed. The drill is rotated along inner surface of the sleeve to form the abutment profile.

※ If the cortical layer is thick, increase RPM while irrigating. (1,000 RPM)



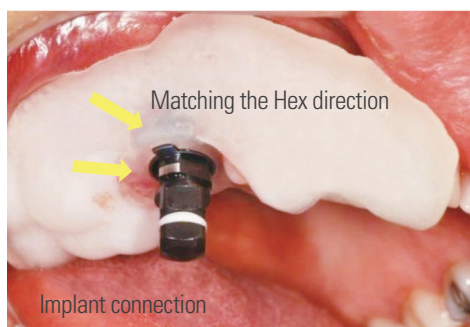
## 7) Implant Connector

The fixture is stably pulled to the guide sleeve for insertion.  
Sleeve offset is matched with depth of the implant connector.



### Caution

When connecting the customized abutment, both depth and direction of the implant connector and sleeve must be matched.



### TIP

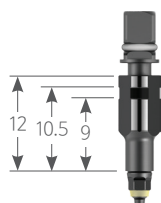
If the implant connector is jammed in the sleeve, put the crown remover into the groove and remove the connector using the principle of the lever.

## K UF II Regular

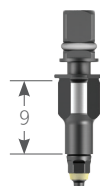


2.5 Hex

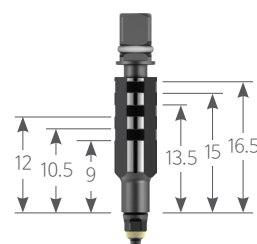
Type



Stopper  
[ GIC 5309 ]



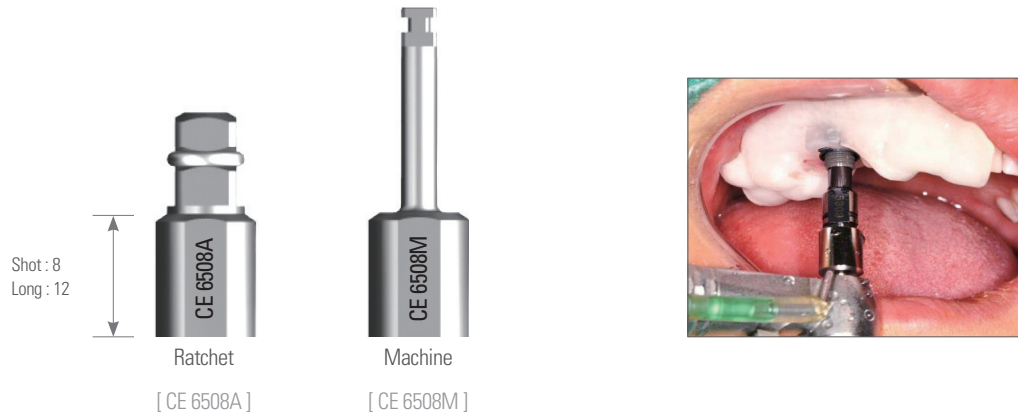
Non-Stopper  
[ GIC 5309ST ]



Multi  
[ GIC 5317 ]

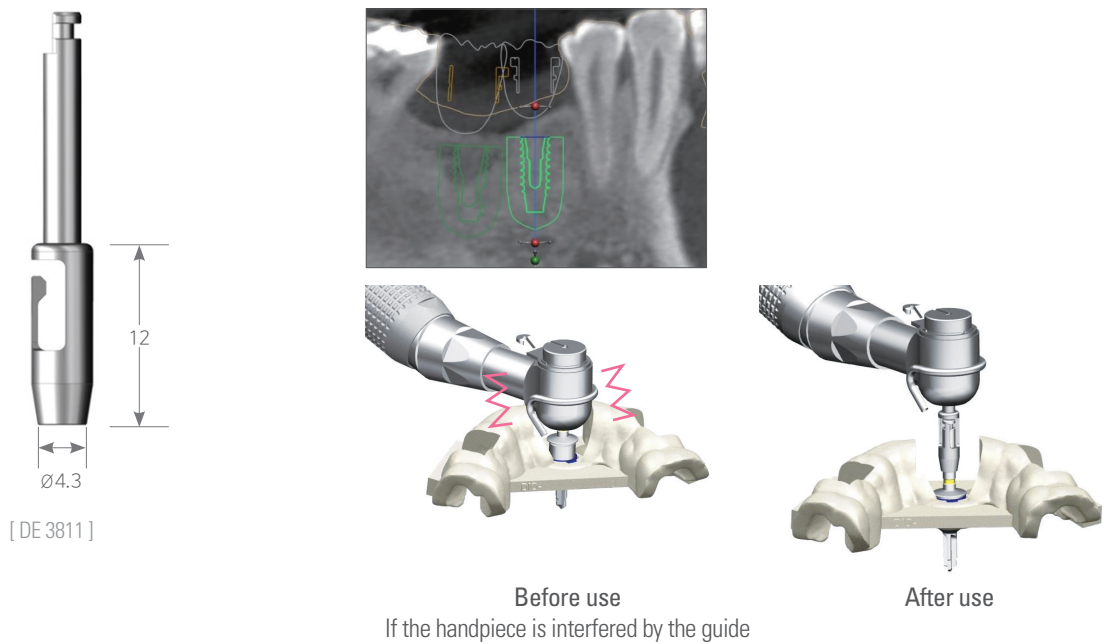
## 8) Connector Extension

Extend the implant connector and insert the fixture using the ratchet and handpiece.



## 9) Drill Extension

Extend the drill to perform drilling with the handpiece.



**TIP** This can be useful if the fixture is inserted into the lower part of bone level because of bone loss or the handpiece is caught by the guide due to interference of adjacent teeth.

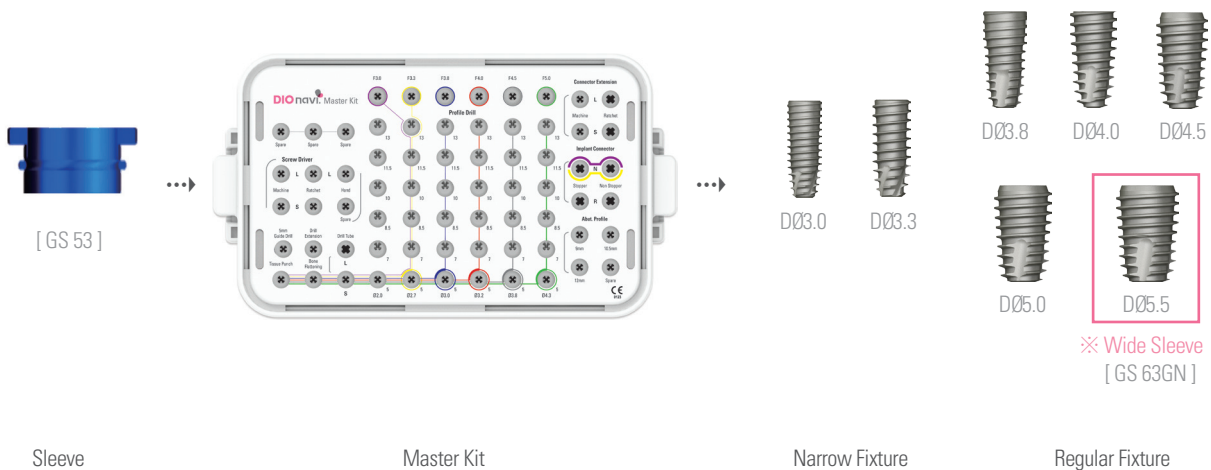
## 10) Torque Wrench

This is used during insertion of the fixture using the implant connector.

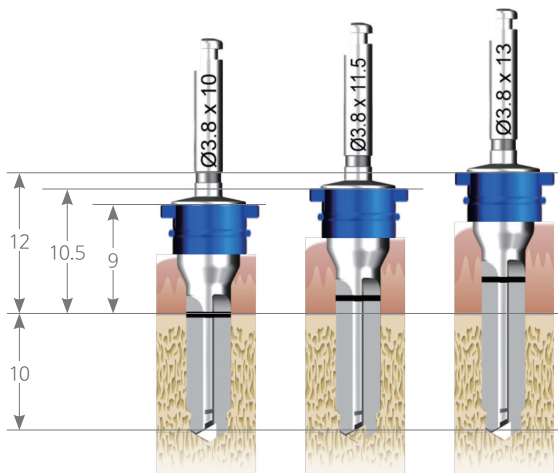


## Understanding of offset

### 1) Selection of product according to sleeve

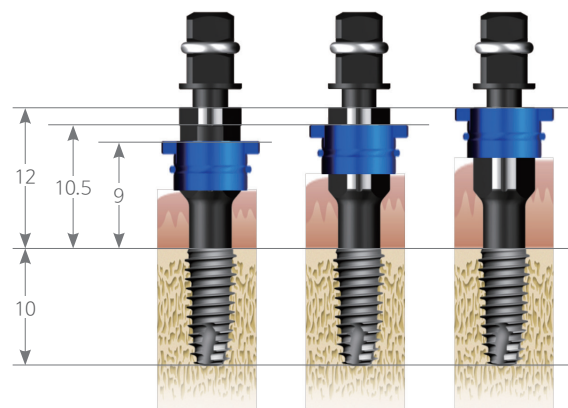


### 2) Use of sleeve offset and product



Method of selecting drill according to sleeve offset  
(For 10mm drill)

- \_ Select 10mm drill in case of 9mm offset
- \_ Select 11.5mm drill in case of 10.5mm offset(Increased by 1.5mm)
- \_ Select 12mm drill in case of 13mm offset(Increased by 3mm)



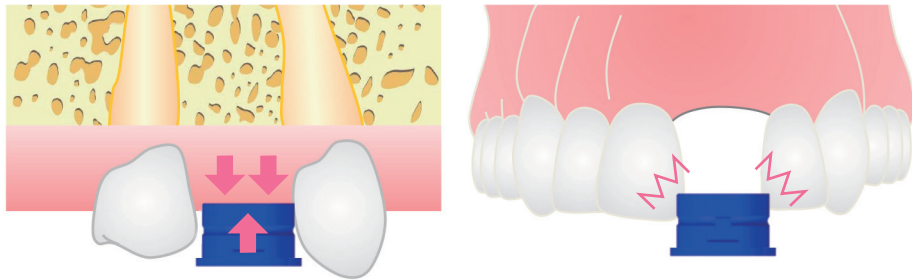
Reference height of the implant connector according  
to sleeve offset (for 10mm fixture)

- \_ To the first mark in case of 9mm offset
  - \_ To the second mark in case of 10.5mm offset (increased by 1.5mm)
  - \_ To the third mark in case of 12mm offset (increased by 3mm)
- ※ Interval between marks: 1.5mm

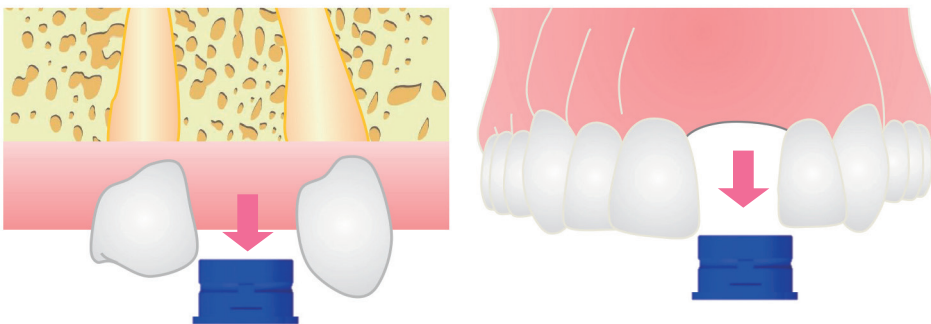
**Caution** When connecting the customized abutment, both depth and direction of the implant connector and sleeve must be matched.



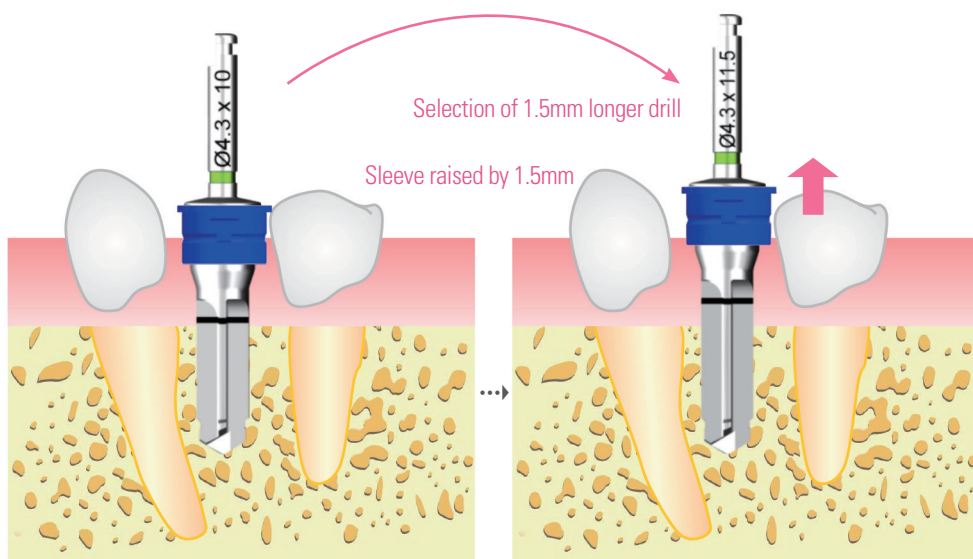
### 3) Sleeve offset application



If the gum is thick that the guide is pushed up during connection or there is interference during entry into the sleeve due to narrow space with adjacent teeth, offset the guide sleeve by 3 steps (9/10.5/12mm).



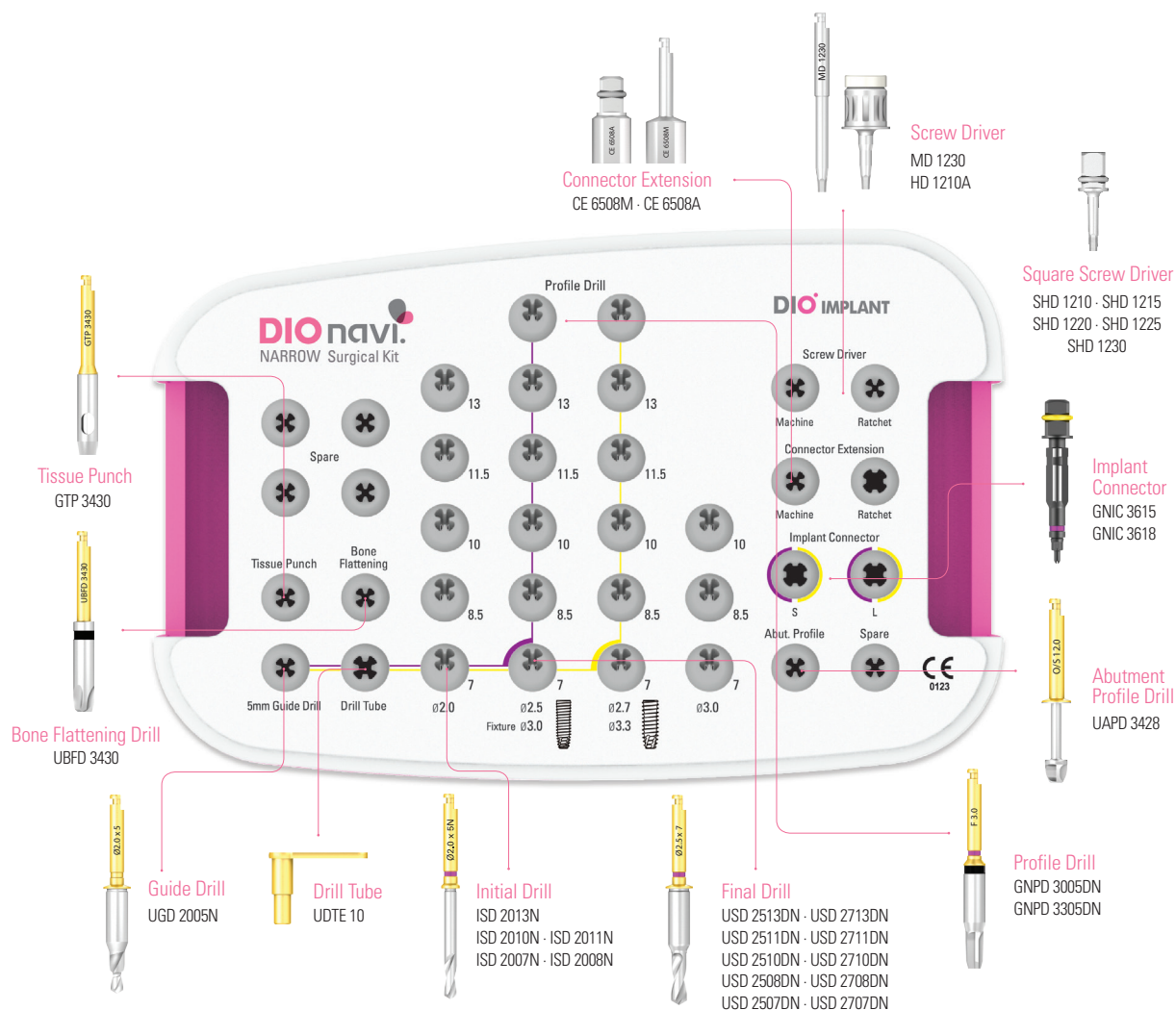
Sleeve lifted by 1.5mm, 3mm



Selection of 11.5mm drill when sleeve offset is 10.5mm during placement of 10mm implant

## 2 DIOnavi. Narrow Kit

Use of narrow-only sleeve + DIOnavi. Narrow Kit  
[ GSL 36 ] [ GS 36 ]



## 1) Use of narrow-only sleeve

When more precise drilling is necessary because of narrow width of tooth like the anterior tooth or narrow bone width

A narrow-only sleeve (GSL 36 / GS 36) with smaller diameter than standard size sleeve (GS 53) is used.

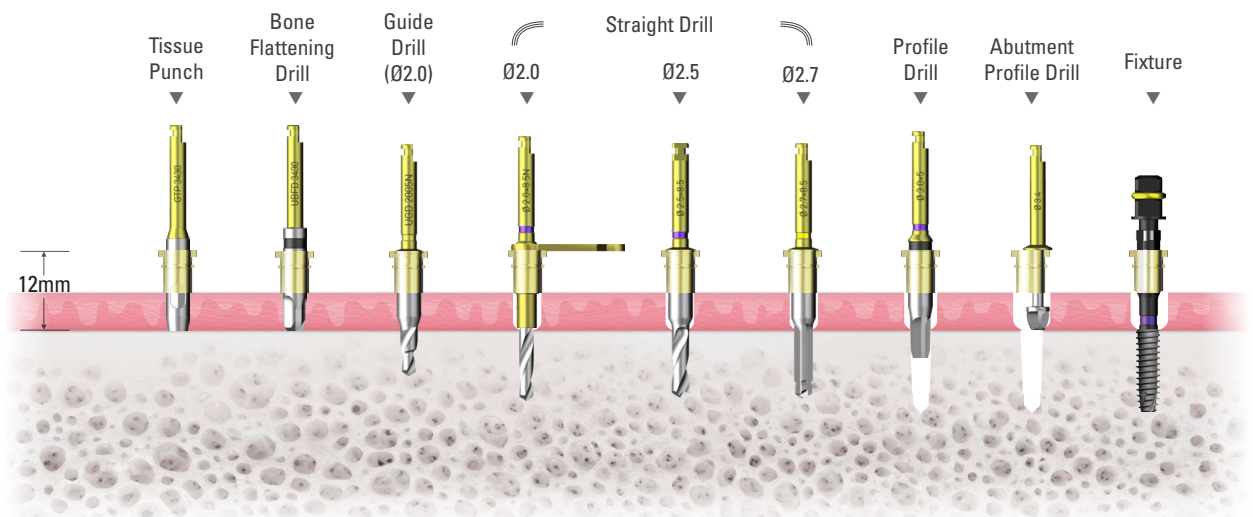
A narrow kit exclusive for DIONavi. is used.



### Caution

The narrow-only sleeve only has 12mm offset, and drill length does not change according to offset. Depth of the implant connector is the same as well.

## | Surgical Protocol



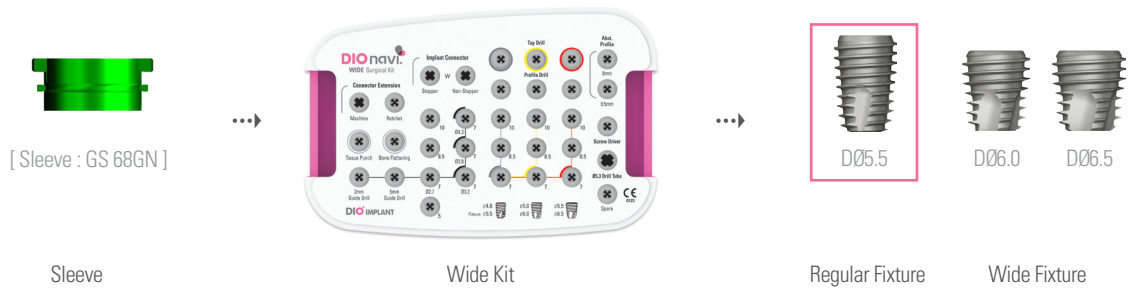
	Bone Density	Tissue Punch	Bone Flattening Drill	Guide Drill	Initial Drill (Ø2.0)	Straight Drill		Profile Drill	Abutment Profile Drill
Ø3.0	Soft	▶	▶	▶	▶	◁			▷
	Medium	▶	▶	▶	▶	▶			▷
	Hard	▶	▶	▶	▶	▶		▶	▷
Ø3.3	Soft	▶	▶	▶	▶		▷		▷
	Medium	▶	▶	▶	▶		▶		▷
	Hard	▶	▶	▶	▶		▶	▶	▷



## 1) Use of wide-only sleeve

When inserting the wide fixture into a molar with small opening, the guide is made using a wide-only sleeve. A wide-only kit is used.

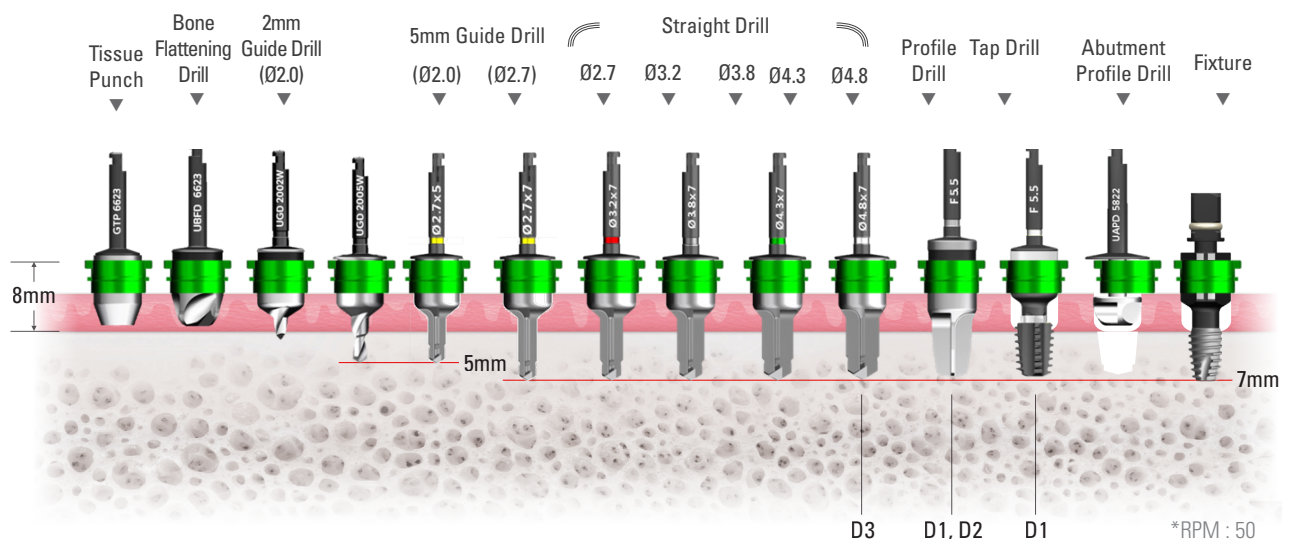
**Caution** Offset steps are 8 and 9.5mm.



## 2) Sleeve Offset



## | Surgical Protocol





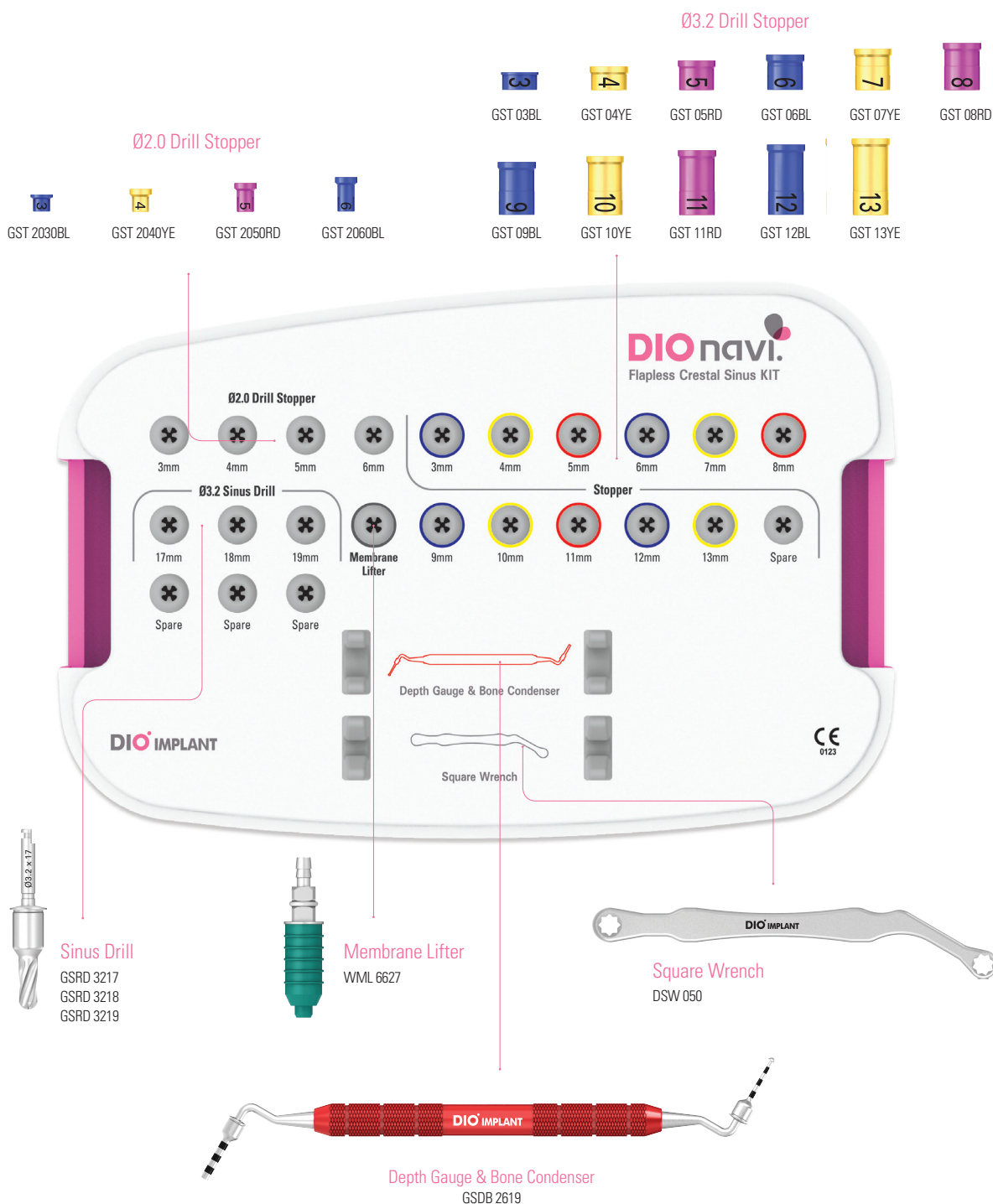
# 4 DIONavi. Flapless Crestal Sinus Kit

Crestal sinus using the DIONavi.guide



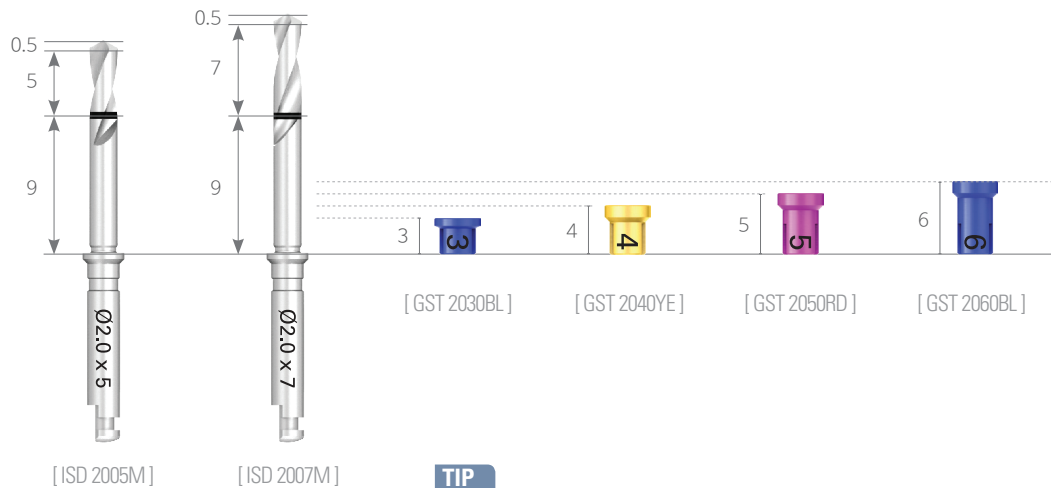
Main : DIONavi. Flapless Crestal Sinus Kit

Sub : DIONavi. Master Kit



## 1) Drill stopper for Ø2.0 drill

Engage the stoppers with the Ø2.0 initial drills and perform drilling to desired depth.

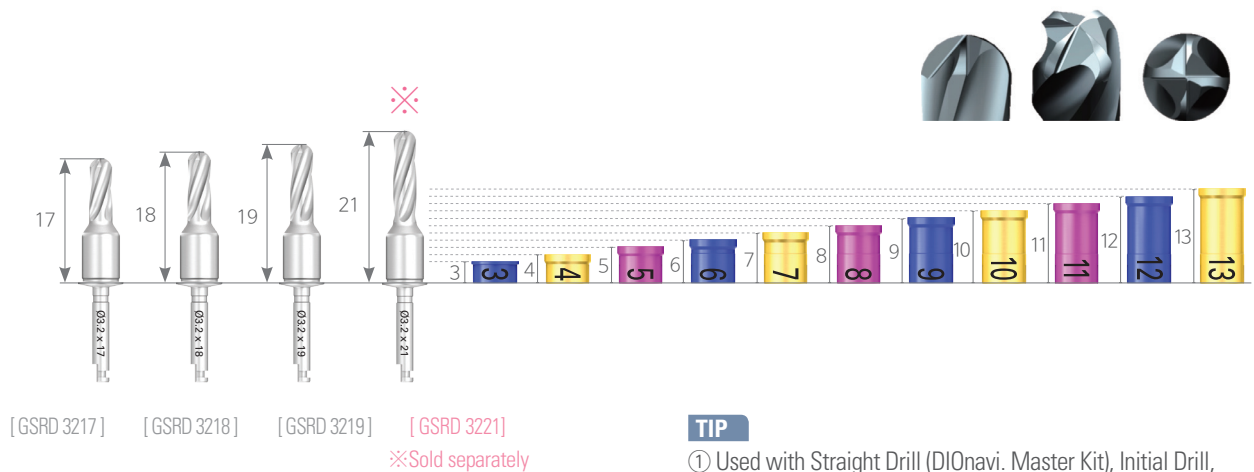


- ① Range is 3~6mm with 1mm interval.
- ② Anodizing and laser marking are done according to length.

## 2) Sinus drill (crestal) & stopper

Front blade with round shape approaches the sinus without damaging the membrane.

※ No irrigation, low-speed drilling (50 RPM)



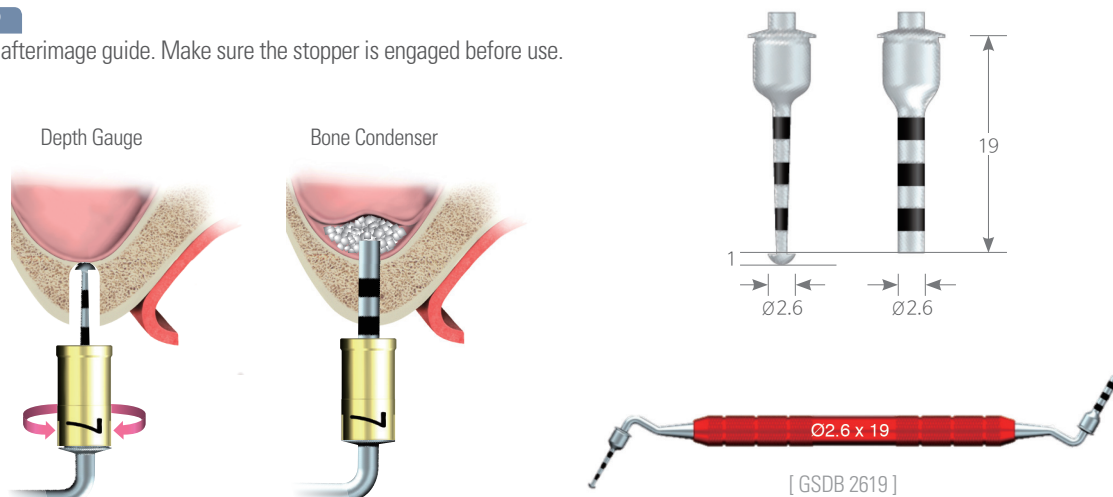
- ① Used with Straight Drill (DIOnavi. Master Kit), Initial Drill, Sinus Drill, Depth Gauge & Bone Condenser.
- ② Range is 3~13mm with 1mm interval for a total of 11 lengths
- ③ Height of the stopper refers to length.

### 3) Depth Gauge & Bone Condenser

Check thickness of residual bone and perforation of the membrane, and push the bone into the perforated sinus.

**TIP**

Use afterimage guide. Make sure the stopper is engaged before use.



### 4) Membrane Lifter

Append the method of hydraulic pressure technic using saline 0.8cc is slowly injected in general per a sinus.

**TIP**

- ① Do not use for the patient with sinus inflammation
- ② If morphology of the sinus floor is complex (septum, etc.), It is prohibited.
- ③ Use saline or the patient's own blood.
- ④ Use after removing the guide.

**Caution**

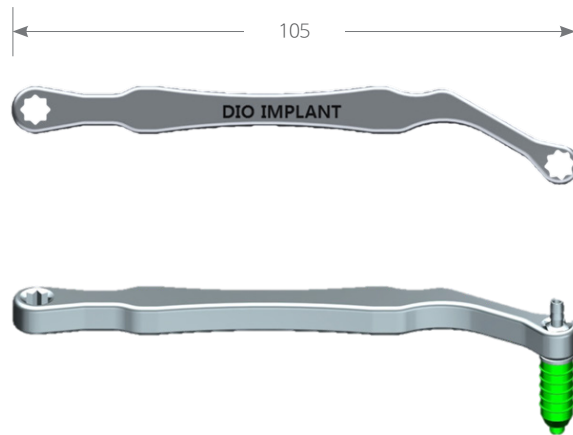
Use after autoclaving before the surgery.  
Use the Membrane Lifter one time only since multiple uses can cause cross infection.



[ WML 6627 ]

## 5) Square Wrench

Settle and fix the membrane lifter on the drilling hole.



## 6) Syringe & Tube

### Syringe

It must be a needleless syringe of 5mL / cc capacity with clear 0.2mL / cc marks.

- ※ Disposable sterile medical device
- ※ Sold separately

### Membrane Lifter

### Tube

[ MLT 40300 ]

This is a semi-transparent silicon tube with outer diameter of Ø4.0 / inner diameter of Ø2.0 and length of 300mm.

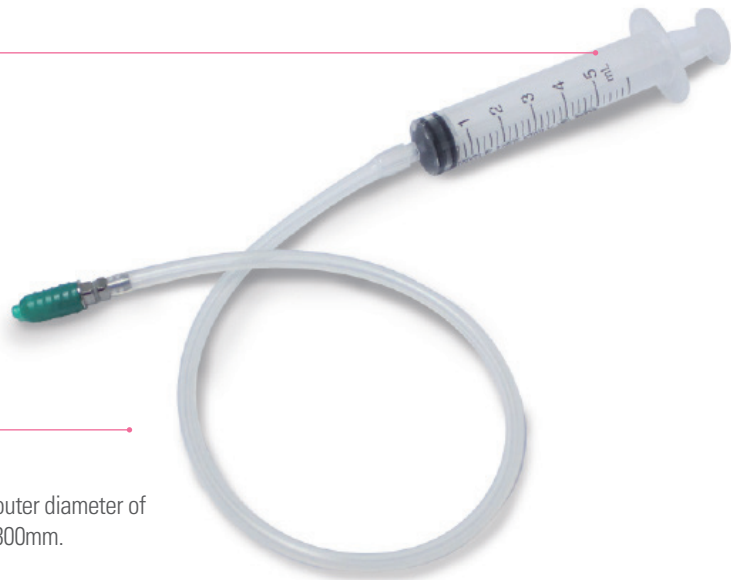
- ※ Sold separately

### TIP

- Primary packaging with sterile paper and secondary packaging with User Manual included
- Secondary package opened by the customer
- Used after performing autoclave on primary package (sterile paper)

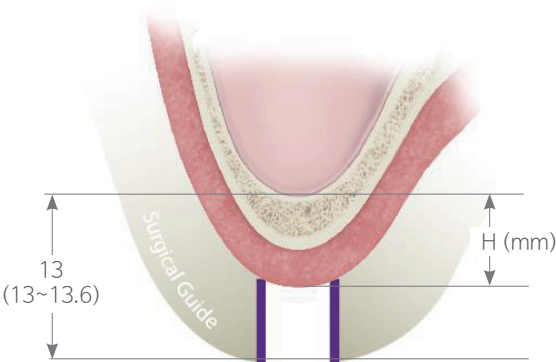
### Caution

Use the devices one time only since multiple uses can cause cross infection.



7) Drilling Protocol

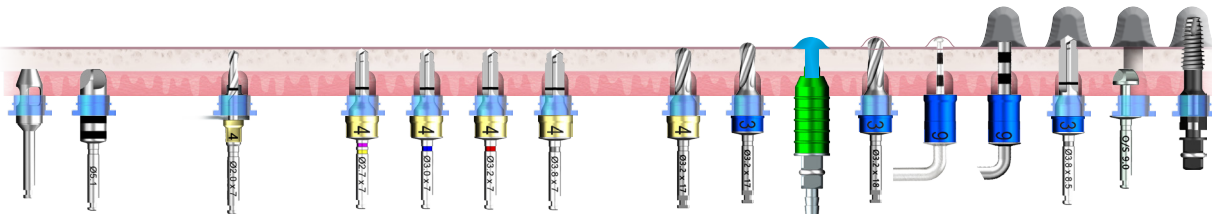
ex) Protocol : 4.5x10\_Offset 9



Drilling : 100 RPM  
Torque: 55 Ncm (Maximum Torque)

※ Opened while exerting an external force of 10 RPM or below (minimum RPM)

Tissue Punch	* Bone Flattening	Approach to the Membrane			Opening		Lifting	Opening	Penetration / Bone graft	Bone graft	Final Drilling	Abut. Profile Saline	* Fixture
		12.5mm			13mm	14mm	0.8cc	15mm	15mm	15mm	50 RPM	1000 RPM	30 RPM



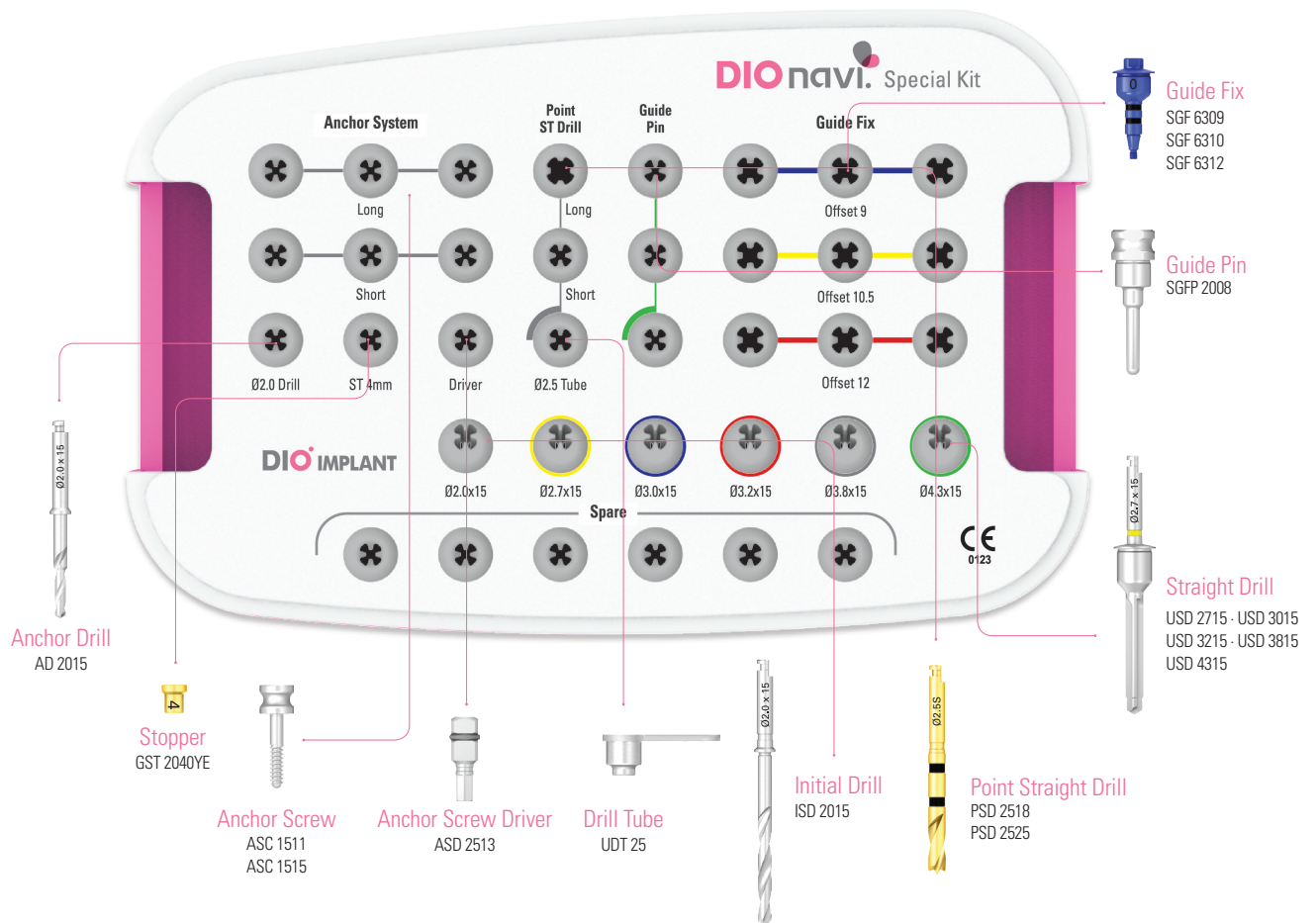
Stopper	4mm	4mm	4mm	4mm	4mm	4mm	3mm		3mm	9mm	3mm		
Drill Length	7mm	7mm	7mm	7mm	7mm	17mm	17mm	After guide removed	18mm	19mm - H	8.5mm		
Ref	Ø2.0 Initial	Ø2.7	Ø3.0	Ø3.2	Ø3.8	※ Sinus Drill			※ Sinus Drill	Condenser	Final Drill		

## 5 DIOnavi. Special Kit

Process of fixing the DIOnavi. guide  
if edentulous or missing range is broad



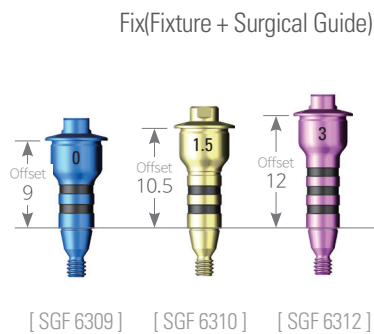
Main : DIOnavi. Special Kit  
Sub : DIOnavi. Master Kit





## 1) Surgical Guide Fix & Fix pin

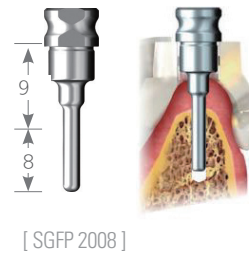
Connect to the drilling hole or pre-inserted fixture and fix the surgical guide in place.



### Caution

Make sure the fix is connected to the fixture according to the sleeve offset.

Fix Pin(Ø2.0 Drill Hole + Surgical Guide)



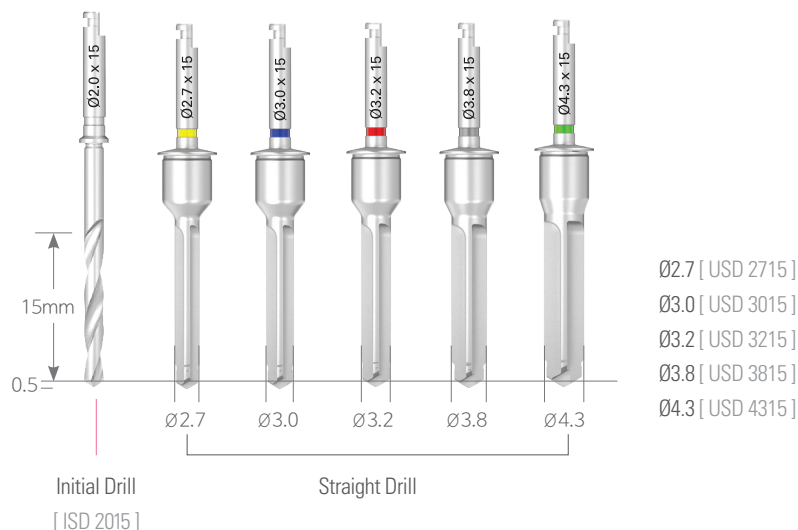
### TIP

We recommend using a Bone flattening drill to reduce interference of the gum. Use Ø2.0 x 8.5mm drilling.

## 2) Initial Drill & Straight Drill

Form an accurate initial hole with 5mm drilling, and try to make stable depth and direction during subsequent drilling.

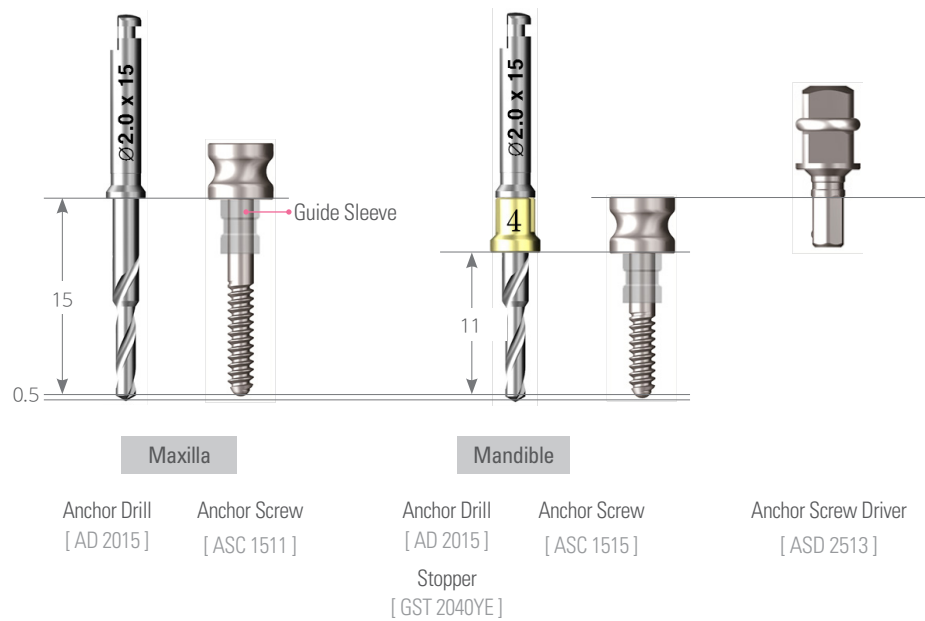
※ Drilling at 50 RPM without irrigation.



### 3) Anchor Drill & Anchor Screw

Drilling into anchor sleeves and tighten an anchor screw.

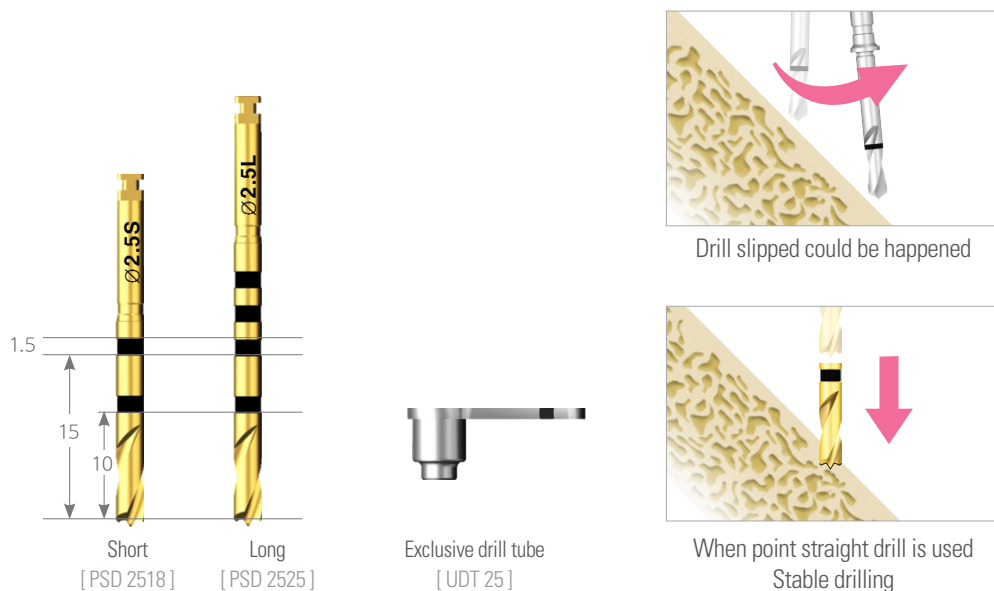
**TIP** In case of the mandible, a 4mm stopper and exclusive anchor screw must be used.



### 4) Ø2.5 Point Straight Drill

This is a specialized drill to prevent slipping in a slanted bone and form the guide hole in accurate position.

**Caution** Drilling at 800~1,000 with irrigation.





TIP

Matters  
to be confirmed  
before the surgery

The diagram illustrates the components of the DIONAVI Master Kit and their corresponding assembly locations on a dental implant model. The components are organized into several groups:

- Connector Extension:** Includes L (Left) and R (Right) Machine, Ratchet, and S (Stopper) and N (Non Stopper) variants. The N variant is highlighted with a yellow circle.
- Implant Connector:** Includes L (Left) and R (Right) variants. The R variant is highlighted with a yellow circle.
- Abut Profile:** Includes 5mm, 10mm, and 15mm profiles. The 10mm profile is highlighted with a yellow circle.
- Screw Driver:** Includes L (Left) and R (Right) Machine, Ratchet, and S (Stopper) and N (Non Stopper) variants. The N variant is highlighted with a yellow circle.
- Drill Extension:** Includes L (Left) and R (Right) variants. The R variant is highlighted with a yellow circle.
- Drill Take:** Includes L (Left) and R (Right) variants. The R variant is highlighted with a yellow circle.
- Spine:** Includes L (Left) and R (Right) variants. The R variant is highlighted with a yellow circle.
- Tissue Punch:** Includes L (Left) and R (Right) variants. The R variant is highlighted with a yellow circle.

The implant model shows the following dimensions and locations:

- Dimensions:** 13, 11.5, 10, 8.5, 7, 5, 02.0, 02.7, 03.0, 03.2, 03.6, 04.3.
- Locations:** F3.0, F3.3, F3.8, F4.0, F4.5, F5.0.

The DIONAVI Master Kit logo is visible in the top left corner.

The diagram illustrates the components of the DIONAVI NARROW Surgical Kit and their assembly sequence. The components are arranged in a grid, with their names and corresponding part numbers listed to the right of each icon.

**Kit Components:**

- Profile Drill:** 13, 11.5, 10, 8.5, 7, 6.5, 5, 4, 3, 2, 1
- Spurs:** 13, 11.5, 10, 8.5, 7, 6.5, 5, 4, 3, 2, 1
- Tissue Punch:** 13, 11.5, 10, 8.5, 7, 6.5, 5, 4, 3, 2, 1
- Base Flattener:** 13, 11.5, 10, 8.5, 7, 6.5, 5, 4, 3, 2, 1
- Stem Guide Drill:** 13, 11.5, 10, 8.5, 7, 6.5, 5, 4, 3, 2, 1
- Drill Hole:** 13, 11.5, 10, 8.5, 7, 6.5, 5, 4, 3, 2, 1
- Screen Driver:** 13, 11.5, 10, 8.5, 7, 6.5, 5, 4, 3, 2, 1
- Machine:** 13, 11.5, 10, 8.5, 7, 6.5, 5, 4, 3, 2, 1
- Connector Extension:** 13, 11.5, 10, 8.5, 7, 6.5, 5, 4, 3, 2, 1
- Implant Connector:** 13, 11.5, 10, 8.5, 7, 6.5, 5, 4, 3, 2, 1
- Alus Profile:** 13, 11.5, 10, 8.5, 7, 6.5, 5, 4, 3, 2, 1
- Screw:** 13, 11.5, 10, 8.5, 7, 6.5, 5, 4, 3, 2, 1

The assembly sequence is indicated by numbers 1 through 13, showing the progression from the initial drilling to the final implant placement.

The diagram illustrates the components of the DIO navi. WIDE Surgical Kit and their application sequence on a skull model. The components are arranged in a grid, with their application order indicated by numbers 1 through 15. The sequence starts with the Implant Connector (1), followed by the Connector Extension (2), then the Machine (3) and Ratchet (4). The Top Drill (5) is used for the Top Profile (6), and the Pulla Drill (7) is used for the Pulla Profile (8). The Screw Driver (9) is used for the Screw (10), and the B.S. Drill Tube (11) is used for the B.S. Drill Tube (12). The final step is the Screw (13). The diagram also shows the application of the Machine (14) and Ratchet (15) to the Machine (16) and Ratchet (17).

The diagram illustrates the components of the DIO navi. Implant Kit. At the top right, the logo 'DIO navi.' is shown with a small icon of a person wearing a head-mounted display, followed by the text 'Flipless Cranial Gius KIT'. Below this, the components are organized into sections:

- Ø12 Drill Stopper:** A row of four grey circles with 'X' marks, labeled '3mm', '4mm', '5mm', and '6mm'.
- Ø12 Gius Drill:** A row of four grey circles with 'X' marks, labeled '13mm', '18mm', '19mm', and '20mm'.
- Markers:** A row of four circles. The first three are grey with 'X' marks and labeled '3mm', '4mm', and '5mm'. The fourth is a grey circle with a black 'X' mark, labeled 'Spare'.
- Shaper:** A row of eight circles. The first four are grey with 'X' marks and labeled '3mm', '4mm', '5mm', and '6mm'. The next four are yellow with black 'X' marks and labeled '7mm', '8mm', '9mm', and '10mm'.
- Depth Gauge & Bone Contourer:** A diagram showing a red double-headed arrow between two vertical grey rectangular blocks, labeled 'Depth Gauge & Bone Contourer'.
- Square Wrench:** A diagram showing a grey rectangular block with a horizontal line through its center, labeled 'Square Wrench'.
- Spare:** A single grey circle with a black 'X' mark, labeled 'Spare'.

At the bottom left, the text 'DIO IMPLANT' is displayed. At the bottom right, the 'CE' mark is shown.

The diagram illustrates the components and connections of the DIONAVI Special Kit. It is organized into four main columns: Anchor System, Post ST End, Guide Pin, and Guide Fix.

- Anchor System:** Contains two rows of three circular components each. The top row is labeled "Long" and the bottom row is labeled "Short". Below these are labels: "D25 Drill", "ST Area", "Dinner", "D25 Tube", "D25 In/5", "D25 In/3", "D25 In/5", "D25 In/3", and "D4 In/5".
- Post ST End:** Contains two circular components labeled "Long" and "Short".
- Guide Pin:** Contains one circular component.
- Guide Fix:** Contains two rows of two circular components each. The top row is labeled "Offset 9" and the bottom row is labeled "Offset 18.5". Below these are labels: "Offset 12", "D25 In/5", "D25 In/3", "D25 In/5", and "D4 In/5".

Connections are shown as follows:

- A blue line connects the "Long" component in the Anchor System to the "Long" component in the Post ST End.
- A green line connects the "Short" component in the Anchor System to the "Short" component in the Post ST End.
- A green line connects the "Long" component in the Post ST End to the "Guide Pin" component.
- A blue line connects the "Long" component in the Guide Fix to the "Guide Pin" component.
- A yellow line connects the "Short" component in the Guide Fix to the "Guide Pin" component.
- A red line connects the "Long" component in the Guide Fix to the "Guide Pin" component.
- A green line connects the "Short" component in the Guide Fix to the "Guide Pin" component.

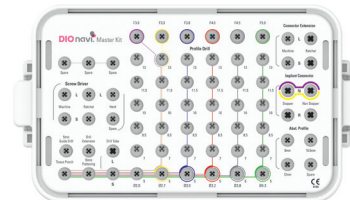
The diagram also includes the text "DIONAVI Special Kit" at the top right, "DIO IMPLANT" at the bottom left, and a "CE" mark at the bottom right.

## DIOnavi. Special Kit

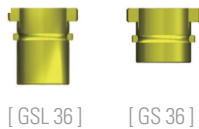
## 2) Kit preparations for each case

### Sleeve Size Case Regular | Wide | Narrow

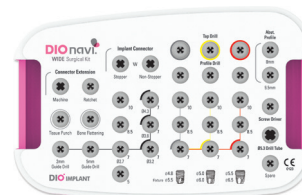
Regular  
DIONavi. Master Kit



Narrow  
DIONavi. Narrow Kit

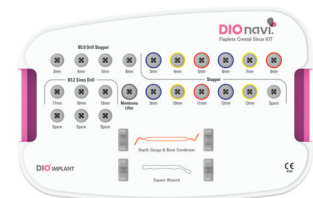
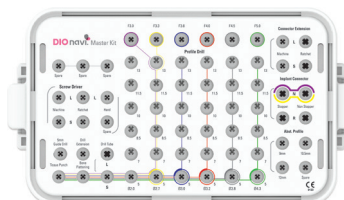


Wide  
DIONavi. Wide Kit

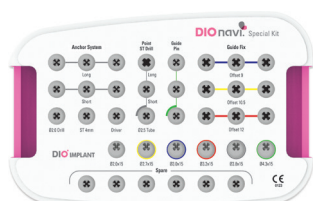
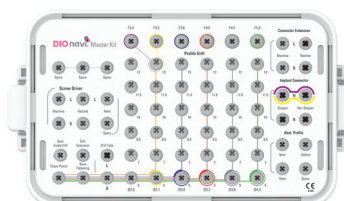


### Surgical Case Sinus | Edentulous

Sinus Case  
DIONavi. Master Kit &  
DIONavi. Flapless Crestal Sinus Kit

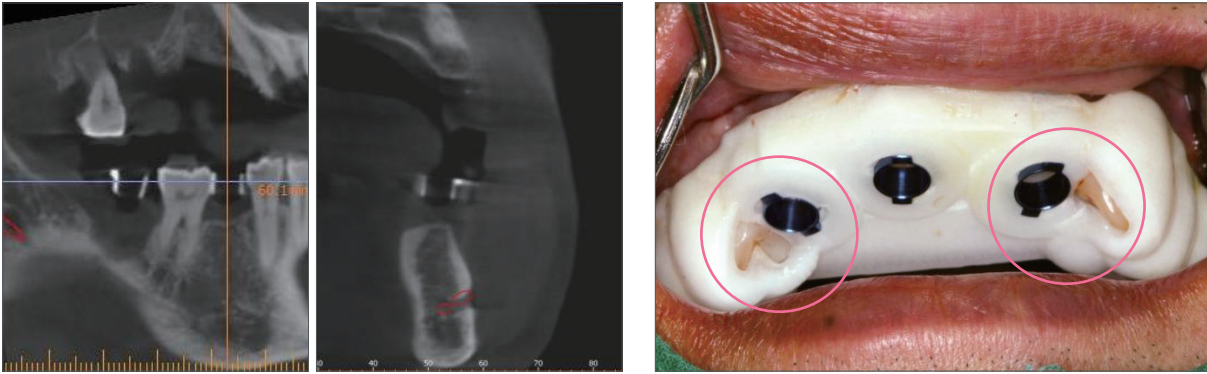


Edentulous  
DIONavi. Master Kit & DIONavi.  
Special Kit





## 2 Prior to surgery checking the guide



Before starting the surgery, take CT with the surgical guide attached to the patient's mouth and check direction of the guide sleeve.

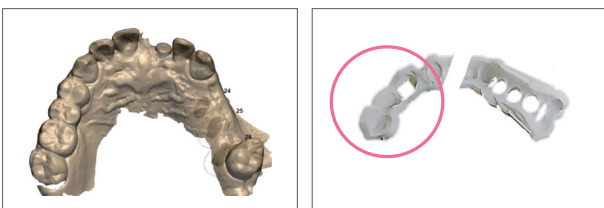
**TIP** Check proper binding of the guide to the tooth through the guide window.

### | If the guide does not fit well

If the guide is interfered.



**TIP** Place a check-bite inside the guide. Adjust the marked part and then place the guide.



**TIP** Since distortion can occasionally occur in the arch part of the anterior teeth or if a metallic prosthesis exists during Trios scan, cut the part irrelevant to the operation before connecting.

### Cases of loose surgical guide



**TIP** Apply a self-curing resin into loose part of the guide. Repeatedly take it out and insert it before connecting.

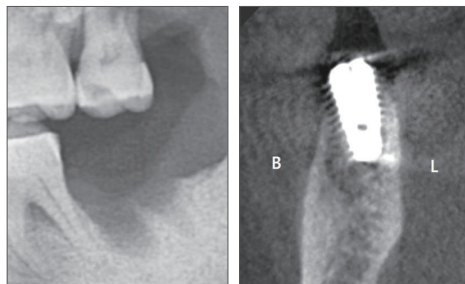
TIP

Method of using  
the surgical tool for  
each surgery type

# 1 Immediate case after tooth extraction

Tooth extraction on the day of the operation + DIONavi. Master Kit

The drill can slip from unhealed extraction socket immediately after tooth extraction.

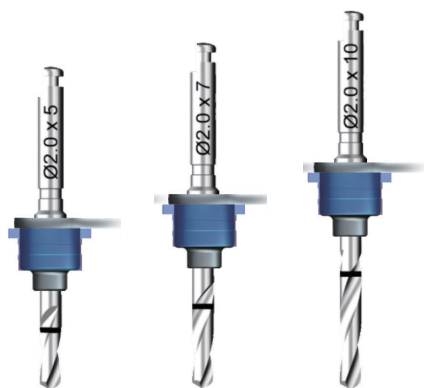


## | Solution 1

[ ISD 2005M ]

[ ISD 2007M ]

[ ISD 2010M ]

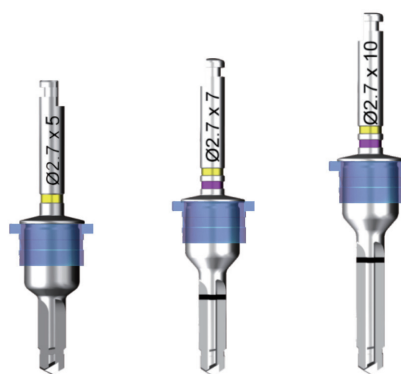


The Ø2.0 initial drill connected to the drill tube allows for stable drilling with stable fixing force. Error range can be minimized by sequentially increasing length of the drill, starting with a short drill.

[ USD 2705 ]

[ USD 2707 ]

[ USD 2710 ]



Select a short drill of Ø2.7 to secure fixing force of the guide sleeve.

## | Solution 2

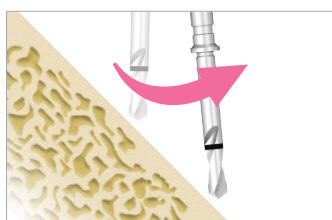
The Ø2.5 point straight drill in Special Kit is an exclusive drill designed to prevent slipping.



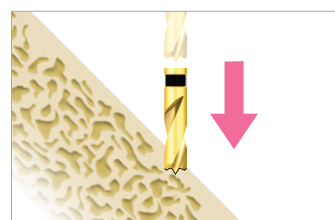
Short



Long



Drill slipping could be happened

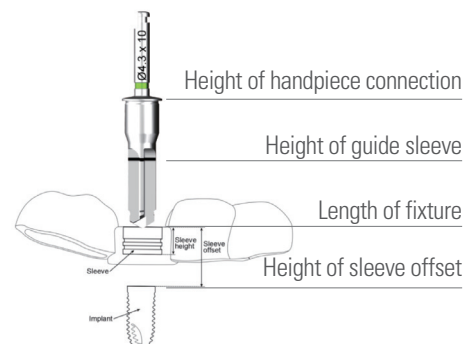


Stable drilling when point straight drill is used

## 2 Case with small opening

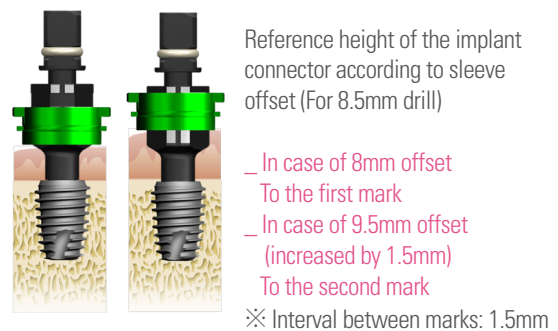
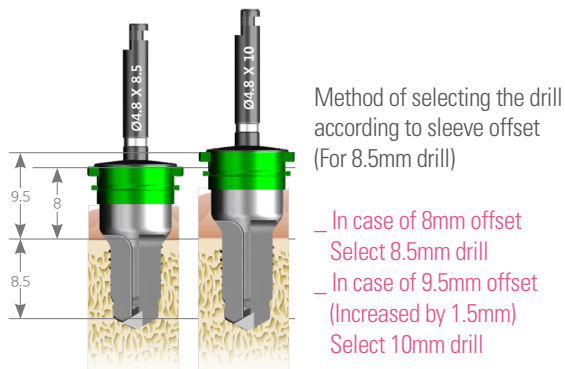
When performing operation on the molar of a patient with small opening  
(primarily on 2nd molar) + DIOnavi. Master Kit

Opening is about 20mm higher during DIOnavi. operation compared to other operations, causing difficulty of drill entry into the molar.



### | Solution 1

Use a wide sleeve and Wide-only Kit.

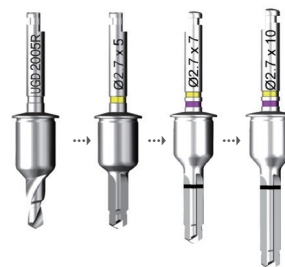


### | Solution 2



The burden of height can be reduced by carrying the Ø2.0X5mm drill inserted into the drill tube from the outside of the patient's mouth to the guide hole.

### | Solution 3

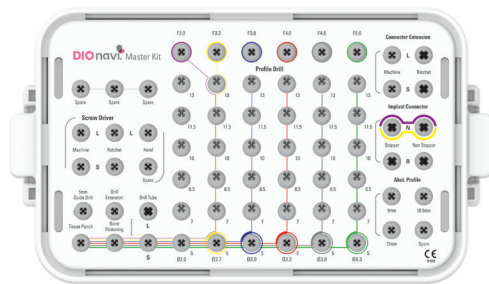


Start with a short drill and sequentially increase length to 5, 7 and 10mm without using a drill tube.

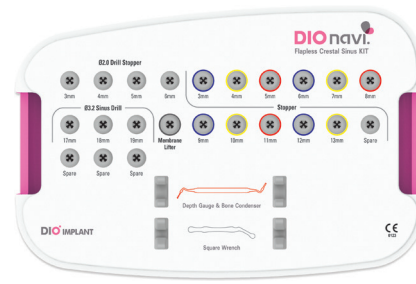
## 3 Sinus Case

### 1) Preparation of DIONavi. Surgical Kit

When performing sinus case operation using a guide,  
DIONavi. Master Kit and DIONavi. Flapless Crestal Sinus Kit must be prepared in advance.

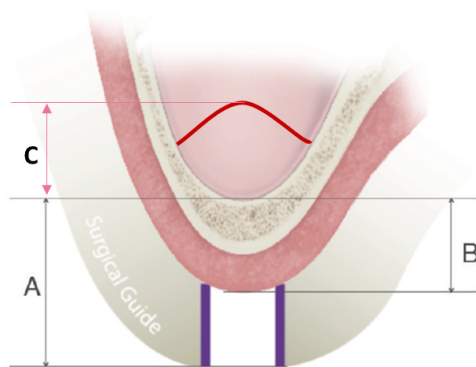


DIONavi. Master Kit



DIONavi. Flapless Crestal Sinus Kit

### | Figures to be checked before the surgery

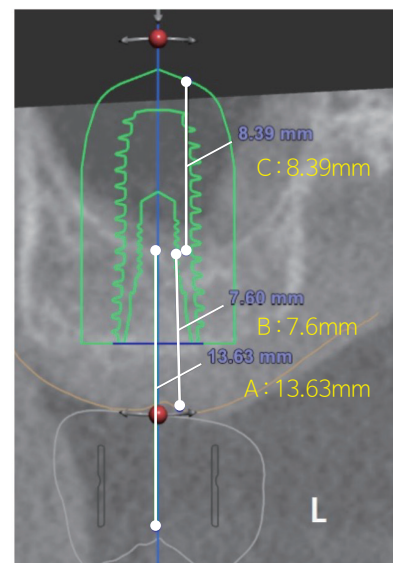


A : Length from the top of the surgical guide sleeve to the maxillary sinus floor

B : Length from the maxillary sinus floor to the tissue

※ When using the bone condenser and depth gauge,  
depth can be checked using scale mark.

C : Height of the lifted maxillary sinus and grafted bone



## 2) Use of tool during sinus case surgery

### ① Initial Drill & Straight Drill

After using the tissue punch and bone flattening drill in DIONavi. Master Kit,  
Connect a stopper to the initial drill and straight drill to perform sequential drilling.

#### (1) Initial Drill – Formation of placement hole (osteotomy site)

Use the Ø2.0 initial drill to form the drilling hole.

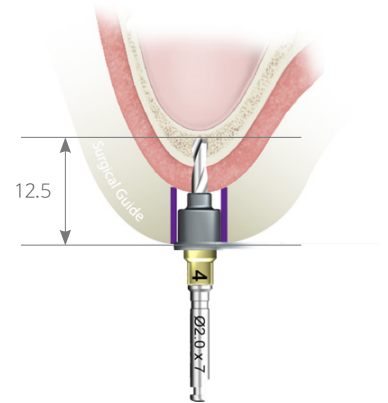
Drilling depth is based on height of the lower bone of the maxillary sinus floor  
measured on CT.

Drilling is done to 0.5~1mm depth directly below the maxillary sinus floor.

※ Drill tube: Used to secure fixing force for more accurate position and direction.

##### Caution

- ① Make sure to use the stopper to adjust depth.
- ② No irrigation, low-speed drilling (100 RPM, 55Ncm)
- ③ Use of Ø2.0 initial drill in DIONavi. Master Kit

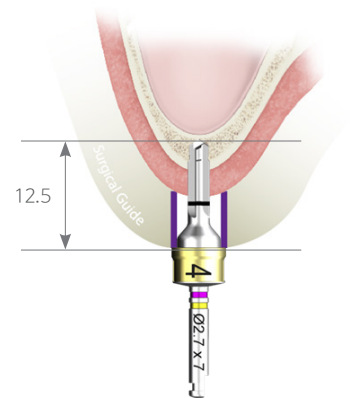


#### (2) Straight Drill – Expansion of the drilling hole and approach of the floor

Sequentially use the straight drill to expand the drilling hole.

##### Caution

- ① Make sure to use the stopper to adjust depth.
- ② No irrigation, low-speed drilling (100 RPM, 55Ncm)
- ③ Use of final drill in DIONavi. Master Kit



### ② Perforation of the lower bone of the maxillary sinus floor using the sinus drill

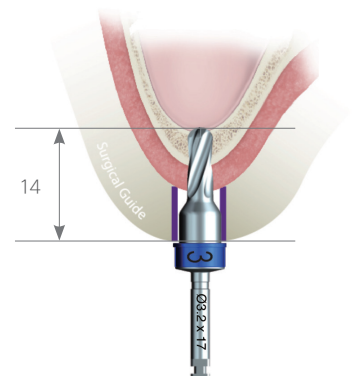
Drilling is done 1mm deeper than the previous drilling step.

##### Caution

Make sure to use the stopper to adjust depth. / No irrigation, low-speed drilling (50 RPM)

**TIP** Method of adjusting depth when using the sinus drill

- ① Length can be adjusted by the stopper.
- ② Drill length can be changed by fixing the stopper in place.
- ③ Types of sinus drill: 17mm, 18mm, 19mm, 21mm (option)

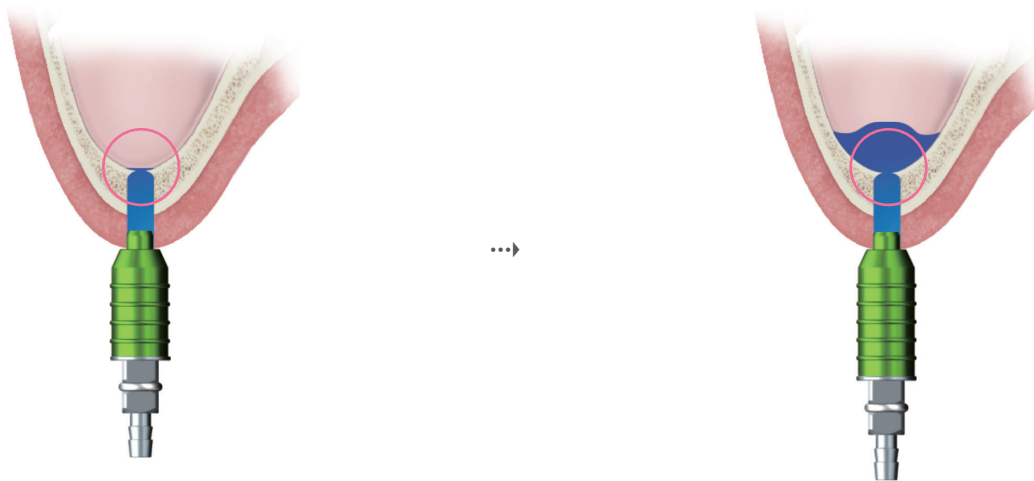




### ③ Water Membrane Lifter - Lifting of the sinus membrane

After removing the guide, use the water membrane lifter to inject saline solution into the drilling hole.

- Inject about 0.4cc for lifting of the membrane.
- Start calculating injection dose when injection pressure can be felt.



#### | Pressured part

Inject about 0.4cc before pressure is applied.  
Inject about 0.4cc more to lift the membrane.

※ Volume injected before pressure is applied differs according to height and expansion of the bone.

#### | Opening of the floor (A) of the maxillary sinus

Pressure can be felt during injection of saline solution. As the membrane is lifted, pressure drops and saline solution will be injected.

#### | No opening of the floor (A) of the maxillary sinus

After pressure is felt during injection of saline solution, no more pressure can be exerted or the nozzle is pushed out.

→ Retry after drilling the sinus drill 1mm deeper.

#### | Checking of perforation of the maxillary sinus membrane

Perform aspiration of saline solution while keeping the nozzle on the hole. If aspiration volume is the same as volume of saline solution injected, it suggests that the membrane is good.

※ Blood comes out together.

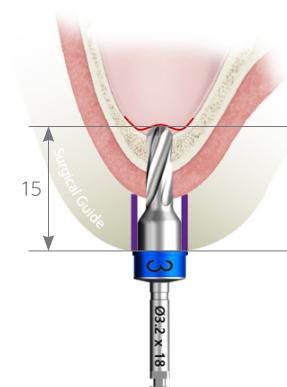
### ④ Sinus Drill - penetration of the floor of the maxillary sinus

After lifting the maxillary sinus membrane, drill the sinus drill 1mm deeper to completely open the floor of the maxillary sinus.

Opening of the floor of the maxillary sinus can be checked using the bone condenser.

#### Caution

- ① Make sure to use the stopper to adjust depth.
- ② No irrigation, low-speed drilling (50 RPM, 55Ncm)
- ③ The stopper connected to the bone condenser
- ④ The bone graft material may not be injected  
If the membrane is not open

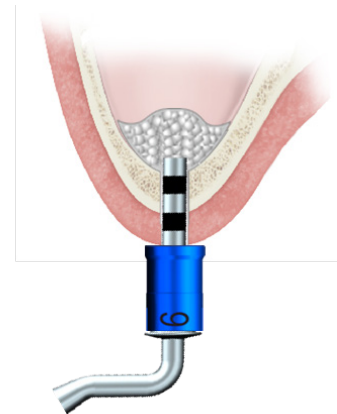


### ⑤ Bone Condenser - Injection of the bone graft material

Remove the surgical guide and inject the bone graft material through the drilling hole into the maxillary sinus using the bone condenser.

- Sponge-type bone graft material is recommended for DIONavi.
- Space can be maintained as the bone graft material lifts the membrane in the maxillary sinus.
- In the case of immediate implant placement after bone graft, implant helps maintain space in the maxillary sinus along with the bone graft material, facilitating bone.

**Caution** Make sure to use the stopper to adjust depth.



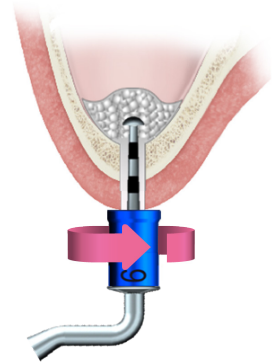
### | Volume of the bone graft material

Lifting height of the sinus membrane	1mm	2mm	3mm	4mm	5mm	6mm	7mm	8mm	9mm	10mm
Implant placement	0.1cc	0.2cc	0.3cc	0.4cc	0.5cc	0.6cc	0.7cc	0.8cc	0.9cc	1.0cc
No implant placement	0.3cc	0.6cc	0.9cc	1.2cc	1.5cc	1.8cc	2.1cc	2.4cc	2.7cc	3.0cc

### ⑥ Depth Gauge - Distribution of the bone graft material (option)

After removing the surgical guide, insert the depth gauge into the maxillary sinus and rotate it so as to evenly distribute the bone graft material.

**Caution** Make sure to use the stopper to adjust depth.

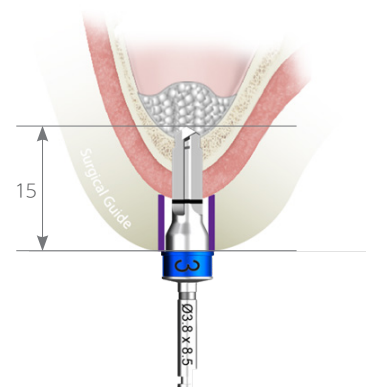


### ⑦ Final Drilling

After attaching the surgical guide, perform drilling 2mm deeper than the sinus drill.

**Caution**

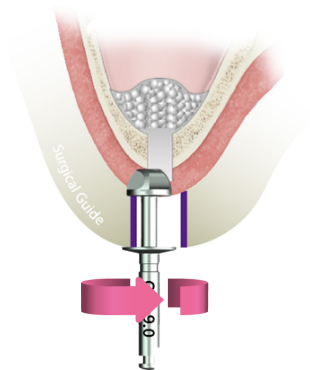
- ① Make sure to use the stopper to adjust depth.
- ② No irrigation, low-speed drilling (100 RPM, 55Ncm)
- ③ We recommend using a drill of one or two steps lower if the bone is weak.



### ⑧ Abutment Profile Drill

This drill removes the alveolar bone, which interferes connection of the abutment or H-scanbody. Rotate the drill along inner surface of the sleeve to form the abutment profile.

※ If the cortical layer is thick, increase RPM while irrigating. (1,000 RPM)



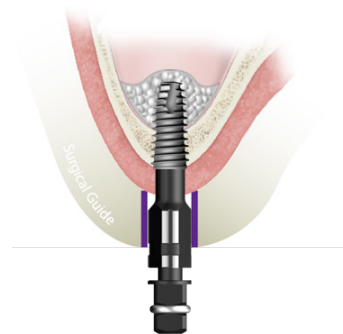
### ⑨ Implant Connector - Insertion of the fixture

Implant is placed using the surgical guide so that implant in the maxillary sinus pushes the bone graft material away for distribution.

**TIP** Insertion of the fixture according to residual bone

- Desirable initial fixing force can be secured if residual bone is 4mm or larger. Implant can be placed immediately and the temporary crown can be restored.
- If residual bone is 3mm or smaller and initial fixing of implant cannot be secured, only bone graft is done on the maxillary sinus and implant is not placed at the same time.

**Caution** Implant placement with no irrigation and at low speed (30 RPM, 55Ncm)



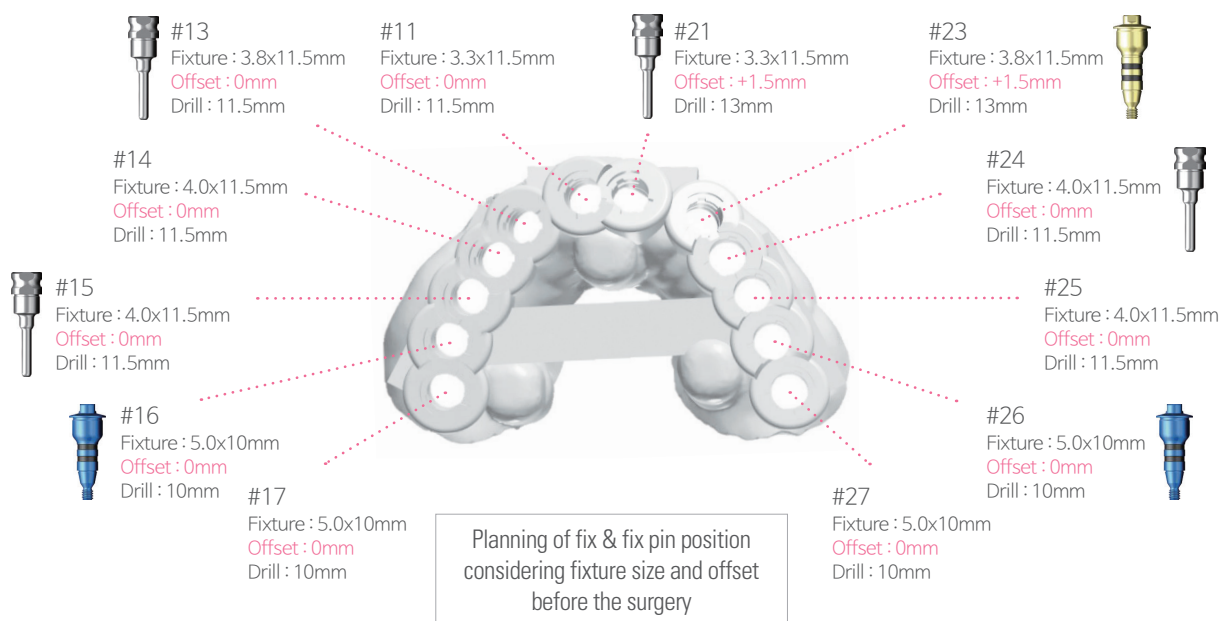
## 4 Edentulous Case

Process of fixing in an edentulous patient + DIOnavi. Special Kit



### 1) Edentulous fixing guide fix & fix pin

Fixing can be secured in the position of implant placement without having to form a separate hole.



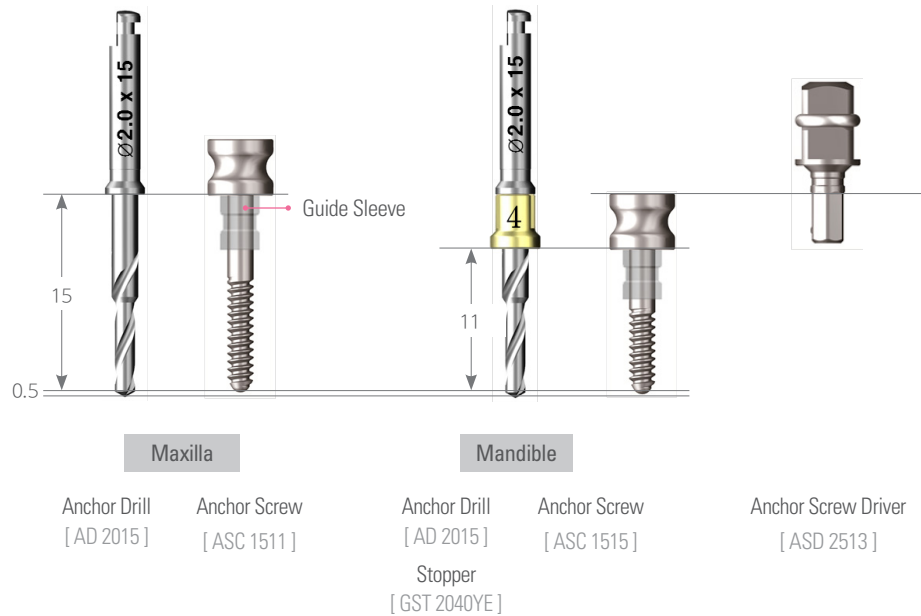
### | Example of fixing in an edentulous patient



**Caution** We recommend fixing the fix pin onto a part with desirable bone thickness.

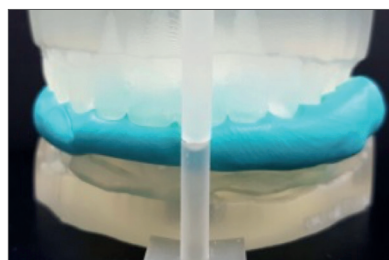
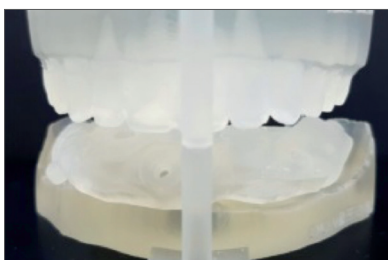
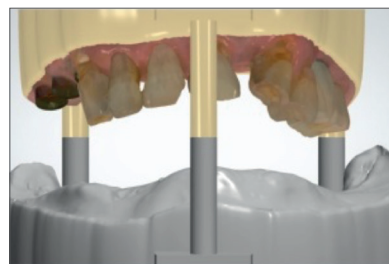
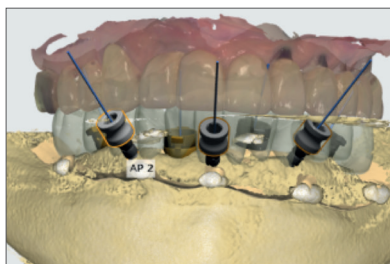
## 2) Anchor System

Fix on the side of the guide.



**TIP** In case of the mandible, make sure to use a 4mm stopper and exclusive anchor screw.

## | Anchor Process



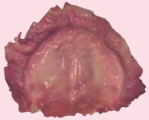



### 3) Edentulous scan - Scan Retractor

This increases accuracy of edentulous oral scan and shortens scanning time by removing disruptive factors.

#### | Method of use

- ① Clearly recognize the maxillary opening.
- ② Control movement of tongue / cheeks (mandible).
- ③ Set the reference point for oral scan.

	Maxilla	Mandible
<b>Scan Retractor before use</b>	 <p>Difficulty of identifying boundaries of attached gingiva and alveolar mucosa</p>	 <p>Failure of oral scan due to movement of tongue</p>
<b>Scan Retractor after use</b>	 <p>Clear recognition of the maxillary opening</p>	 <p>Can control movement of tongue</p>

#### | Shape and specifications

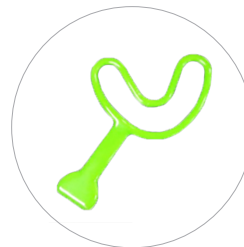
For maxilla Set (5 Piece)

For mandible Set (5 Piece)



For maxilla

[ Code : SCANR 01S ]



For mandible

[ Code : SCANR 02S ]



1 Set

(5 pieces / single use)

#### | Example of use (mandible)



Select an appropriate scan retractor based on the arch and bend it to fit the mouth.

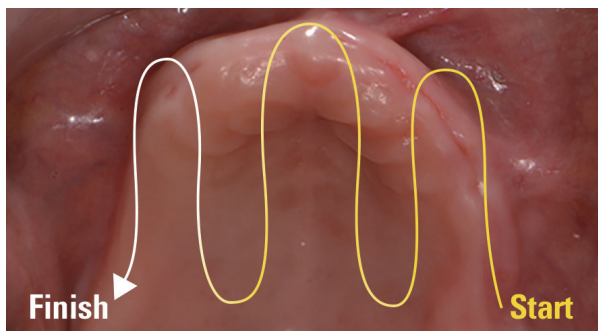


## | Method of use

- ① Wet the area where the retractor is to be used to prevent dryness.
- ② Insert a finger into the mouth while wearing a surgical glove.  
Lift a corner of the mouth from the tooth and start inserting one end of the retractor into the mouth.
- ③ Check with fingers to make sure that lips and cheeks are not pressed by the retractor.
- ④ During oral scan, grab the handle of the retractor to prevent its movement in the mouth.
- ⑤ After using, carefully remove the retractor from the patient's mouth so that dry lips of the patient are not damaged.

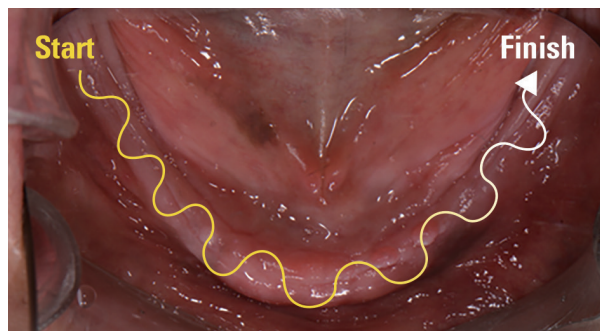


## | Order of scanning



### Maxilla

Left molar of the maxilla → anterior teeth → palate of left molar → from center of palate to anterior teeth → from anterior teeth to right palate → from anterior teeth to right molar

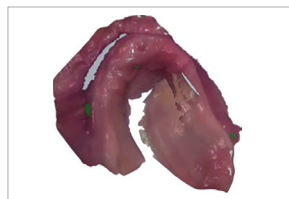
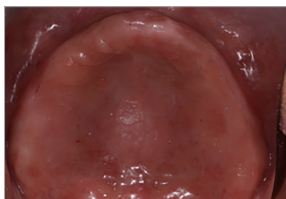


### Mandible

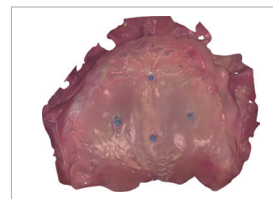
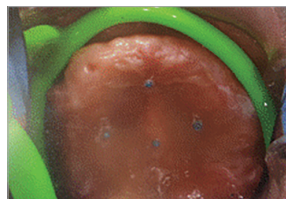
Right molar of the mandible → anterior teeth → left molar of the mandible (moving in zigzag between buccal side-lingual side / labial side-lingual side)

## | Preparations for use

- ① Scanning can be difficult if the patient's palate is overly flat.



...



Glue flow resin to palatal soft tissue and then scan

- ② The retractor should not move. Be careful about excessive expansion or suppression of soft tissues.
- ③ The patient must breathe through the nose and not move while scanning.



