The key component of the CAS-KIT is the CAS-Drill. The unique design of the CAS-Drill enhances convenience and safety of maxillary sinus surgery by; safely lifting the membrane while drilling, precision cutting, flexible cutting speed from low to high speed (800rpm), formation of conical shaped bone chip, generation of bone particles, smooth & stable insertion, easy path correction and septum surgery.

- Safely and rapidly lifts the sinus membrane while drilling
- Unique Stopper system that prevents over drilling into the sinus cavity
- Hydraulic Lift System that easily & safely lifts the membrane
- Bone Carrier System for transferring and filling bone material
- Bone Spreading System for spreading & compacting bone material
- Simple and intuitive surgical system
- The ability to combine Osteotome in surgery
**CAS-Drill SPECIFICATIONS & PERFORMANCE**

- The CAS-Drill is designed to safely and rapidly lift the maxillary sinus membrane from a crestal approach. The CAS-Drill can be used for either general-straight or tapered fixtures. It is optimized for insertion torque, initial fixation strength, and tactile feedback when using Hiossen’s HG III & OSSTEM’s GS / TS III Fixtures.

**The CAS-Drill:**
- Theatraumatic design of the drill tip allows the user to perform sinus surgery even if the sinus floor is flat, incline, or septum.
- Its design forms conical bone and bone chips.
- The CAS-Drill tip has an inverse conical shape. This shape will form a conical bone chip when drilling, which assists with safely lifting the membrane. In addition, bone particles generated when drilling discharge upwards, producing a Membrane Auto-Lift function.
- Membrane can safely be lifted.

**The CAS-Drill can:**
- Drilling can be done at various speeds, from low to high speed (800rpm), allowing flexibility during surgery.
- The drill is designed with four blades which reduce deflecting off of the bone, and the straight sides dampen vibrations.
- Extraction of bone particles (at low speed of ~50rpm).
- Generally, the CAS-Drill can be used up to 50 times.

The number of uses may vary depending on the type of bone.
**Components**

1) **2.0 Twist Drill**
- The drill tip is 0.6mm and is 13mm long.
- Recommended drill speed: 1000~1500 RPM (Water Infusion + Pumping)
- 1mm spaced markers with wide bands at 4~5, 9~10
- Unique Stopper system
- It is recommended to stop drilling when there is about 2mm of bone left, please calculate this beforehand when using CT images as a guide.

2) **CAS-Drill**
- Comes in six (6) diameters: ∅2.8 / ∅3.1 / ∅3.3 / ∅3.6 / ∅3.8 / ∅4.1
- Allows a 13mm Fixture to be implanted
- Drilling is dependent upon the fixture diameter and the how far the fixture protrudes into the maxillary cavity.
- Drilling speed ranges from low speed to high speed (800rpm)
  - Experienced: 800rpm; Beginner: 400 to 600rpm is recommended (Water Infusion + Pumping)
- Unique Stopper system

3) **Stopper System**
- A total of eleven (11) stoppers; labeled 2 to 12mm
- Labels indicate the remaining length of the drill (from drill tip to stopper top)
- Each stopper is anodized and color coded. Labels are laser etched.

4) **Depth Gauge**
- Measures the thickness of the remaining bone
- The atraumatic tip can be used to confirm membrane lifting
- Can be used with the Stopper system
- Caution: Do not use the Depth Gauge to lift membrane beyond 1mm.

5) **Hydraulic Lifter**
- The Hydraulic Lifter uses normal saline to raise the membrane
- Infuse 1cc with a syringe
- Required volume of saline
  - To expand 3mm of the membrane, generally 0.2 to 0.3cc of saline is injected. Inject saline very SLOWLY.
- Contraindication
  - Not recommended for patients with inflammation of the maxillary Sinus (Sinusitis)
  - Not recommended for patients with complex morphology of the sinus floor (including the septum)

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**An example of a CAS-Drill dependence on the Hiossen’s HG III & OISTEM’s GS / TS III Fixture diameter and protrusion height**

- Fixture protrusion height (mm)

<table>
<thead>
<tr>
<th>Fixture protrusion</th>
<th>HG III, GS / TS III F = 4.0</th>
<th>HG III, GS / TS III F = 5.0</th>
</tr>
</thead>
<tbody>
<tr>
<td>HG III, GS / TS III F = 4.5</td>
<td>9-12</td>
<td>10-13</td>
</tr>
<tr>
<td>HG III, GS / TS III F = 5.0</td>
<td>9-12</td>
<td>10-13</td>
</tr>
</tbody>
</table>

**CAS-Drill**

<table>
<thead>
<tr>
<th>Code</th>
<th>SNDR2813T</th>
<th>SNDR3113T</th>
<th>SNDR3313T</th>
<th>SNDR3613T</th>
<th>SNDR3813T</th>
<th>SNDR4113T</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAS-Kit</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
6) Bone Carrier
- Transplanting bone material to the grafting site
- Has dual diameters: ∅ 3.5 and ∅ 3.9

Bone graft material and filler (for reference)

<table>
<thead>
<tr>
<th>Henry Y and Lee DY, 2005</th>
<th>Lift height</th>
<th>Volume of bone matrix</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>3mm</td>
<td>0.36cc</td>
</tr>
<tr>
<td></td>
<td>4mm</td>
<td>0.5cc</td>
</tr>
<tr>
<td></td>
<td>5mm</td>
<td>0.7cc</td>
</tr>
<tr>
<td></td>
<td>6mm</td>
<td>0.9cc</td>
</tr>
</tbody>
</table>

7) Bone Condenser
- Assists compacting bone grafting material
- Has dual diameters: ∅ 2.3 and ∅ 3.3
- Can be used with the Stopper system
- Wide banded markers at 4-5 and 9-10mm
- Can also be used to confirm membrane lifting after using the CAS-Drill

8) Bone Spreader
- Evenly spreads bone material after transplanting bone material to the site.
- After injecting 0.2 to 0.3cc use the spreader and add additional material
- Use at lower speeds: ~30rpm is recommended
- Comes in two diameters: ∅ 2.0/∅ 3.0
- Can be used with the Stopper feature
- The total length (head tip to stopper hilt) is 2.5mm longer other CAS-KIT tools

Caution: When equipping this tool remember that the length is 2.5mm longer.

9) Hydraulic Lifter Tube
- Used with a syringe
- Reusable; sterilize in an autoclave.
Clinical Indications & Case Study

1) #26, #27 Septum Case (F/36)

- #26 Septum Case
  - The membrane is lifted 4~5mm and the remaining bone is about 5mm
  - #26 GSII φ 4.0 x 10mm
  - #27 GSII φ 4.5 x 10mm
  - were implanted

- # 2.0 Twist Drill
  - Using a 3.0mm Stopper with the 2.0 Twist Drill, we are able to drill 3mm into the bone, confidently leaving 2mm of bone.

- # 2.8 → # 3.1 CAS-Drill (800rpm)
  - A 5mm Stopper is used for the final drilling and lifting of the membrane.

- Membrane safely lifted
  - A conical bone chip is formed and pushes up the membrane, with the assistance of bone particles formed during drilling.

*Data source from: Professor Kim Gyeong-won from Chungbuk National Univ. Hospital

Clinical Indications & Case Study

1) #26, #27 Septum Case

- Depth Gauge
  - Confirm membrane lifting and measuring the bone thickness

- Membrane Lift
  - The membrane is lifted by slowly injecting 0.30cc of saline solution using a 1cc syringe

- Bone Carrier
  - Osteoss Bone Powder 0.25cc is transplanted
  - A mix of Cortical 50%: Cancellous 50%

- Bone Condenser
  - Vertical compacting of the bone grafting material

- Bone Spreader
  - Evenly spread the bone grafting material at 10rpm of rotational speed
Clinical Indications & Case Study

1) #26, #27 Septum Case

- Fixture implantation
  #26 GSII \( \varnothing 4.0 \times 10 \text{mm} \) implanted using 20 to 30Ncm

- Fixture implantation
  #27 GSII \( \varnothing 4.5 \times 10 \text{mm} \) implanted using 20 to 30Ncm

- Results
  #26, #27 Missing, a case with 6mm of bone remaining

Even though there was a Septum at #26, fixture implantation was successfully completed using the CAS-KIT to safely lift the membrane and establishing a secure implant site.

2) #26 Missing Case

- USII \( \varnothing 4.0 \times 11.5 \text{mm} \) implant planning
  - Initiated using a \( \varnothing 2.0 \) Twist Drill
  - CAS-Drill at 800rpm
  - Membrane lifted with 0.25cc of saline solution
  - Bone Condenser: 4-5mm lifting
  - Bone Spreader at 10rpm
  - Initial fixation force 36Ncm

*Data source from: Dr. So, Gwang-seup; Mirae Dental Clinic

3) #25 Hydraulic Lift Case

- TSIII \( \varnothing 4.5 \times 10 \text{mm} \) implant planning
  - Initiated using a \( \varnothing 2.0 \) Twist Drill
  - CAS-Drill at 800rpm
  - Membrane lifted with 0.30cc of saline solution
  - Bone Condenser: 4mm lifting
  - Bone Spreader at 30rpm

*Data source from: Dr. Jung, Gi-don; Bright Smile Dental Clinic
**Surgical Procedure**

- The CAS-Drill design is optimized for Hiossen’s HG III & OSSTEM’s GS / TS III Fixtures. Use the matrix below to prepare for surgery. There are a few things that need to be taken into consideration; the diameter of the fixture, the height of the fixture apex protruding into the sinus floor, and the necessary force for a stable fixture. In the case of a general straight type fixture, use a CAS-Drill that is 1mm smaller in diameter than that of the fixture.

- Prepare tools for surgery by soaking them in a “saline solution” or in “distilled water.”

- After surgery: All tools should be soaked in an “alcohol solution.”

- Tools should be cleaned thoroughly with distilled or tap water to wash away any remaining blood and foreign material.

- Completely dry all tools using a dry cloth or warm air.

- Dried tools should be stored in the KIT case.
  - Please refer to the color coding when placing the tools back in the case.

- After placing all the tools back into the kit, dry the entire kit in an Autoclave (132°C for 15 minutes) and then store the kit at room temperature.

<table>
<thead>
<tr>
<th>Fixture selection</th>
<th>CAS-Drill</th>
<th>Hydraulic Lift &amp; Bone Condensing</th>
<th>CAS-Drill</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diameter (∅)</td>
<td>Twist Drill</td>
<td>F &lt; 45</td>
<td>F = 45</td>
</tr>
<tr>
<td>1-3 mm</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>1-6 mm</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>1-8 mm</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>1-10 mm</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
</tbody>
</table>

**CAS-KIT Care & Maintenance**

- Prepare tools for surgery by soaking them in a “saline solution” or in “distilled water.”

- After surgery: All tools should be soaked in an “alcohol solution.”
  - Avoid using Hydrogen Peroxide.
  - Hydrogen Peroxide will discolor laser markings and anodized surfaces.

- Tools should be cleaned thoroughly with distilled or tap water to wash away any remaining blood and foreign material.

- Completely dry all tools using a dry cloth or warm air.

- Dried tools should be stored in the KIT case.
  (Please refer to the color coding when placing the tools back in the case)

- After placing all the tools back into the kit, dry the entire kit in an Autoclave (132°C for 15 minutes) and then store the kit at room temperature.

**NOTES:**
- It is recommended to re-sterilize the surgical KIT right before surgery.
- (132°C; for 15 minutes)
- Immediately after surgery, all the tools should be cleaned and stored.
- The CAS-KIT has a one year warranty on all parts & case.
- The recommended usage of the drills is 50 times.