DIEM™
Immediate Occlusal Loading™
Guidelines
Mandibular Fully Edentulous
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## How To Use The Icon Key:

The icons represent the connection types of the implant system, and both internal and external connection types are represented in this manual. In the fully illustrated protocols, each icon is present by each step. When a dark blue icon and a light blue icon are present together, the dark blue indicates which system is illustrated. When both icons are dark blue, then both systems are illustrated together.

### Icon Key:

- OSSEOTITE® Certain™ Internal Connection Implant System:

- OSSEOTITE External Hex Connection Implant System:

- OSSEOTITE Certain Internal and OSSEOTITE External Hex Connection Implant System:
Introduction

These guidelines were designed to serve as a reference for the dental practitioner to utilize 3i implants and surgical instruments in Immediate Occlusal Loading™ of the fully edentulous mandible.

Initially, occlusal loading of dental implants was governed by a strict protocol. Immediate Occlusal Loading of dental implants in the 1960s sometimes resulted in fibrous encapsulation of the implants, implant mobility and loss of implants. There are significant differences between Immediate Occlusal Loading of dental implants and the immediate restoration of dental implants without occlusal function. Immediate Occlusal Loading requires multiple implants rigidly splinted by a fixed prosthesis. Immediate restoration of dental implants can be accomplished with single implants, but the restorations are contoured to have no occlusal contact in centric occlusion, lateral working or balancing movements.

Authors have reported favorable results on the immediate loading of dental implants. In 1997, Tarnow et al. reported 98 percent cumulative survival rates (CSR) 1 to 6 years post-implant treatment. In 2000, Cooper et al. reported 98 percent CSR 18 months post-implant treatment. Testori et al. (2003) reported one failure, due to infection, in a study involving 92 OSSEOTITE® Implants that were immediately loaded with fixed prostheses in edentulous mandibles. Testori et al. reported a CSR for OSSEOTITE Implants of 98.9 percent, which was achieved for up to 48 months of follow-up. The prosthetic CSR for the same period was 100 percent.

DIEM™, the latin word for day, was chosen by 3i as the name for our initiative to incorporate immediate loading procedures into your practice. Evidence-based research will drive the development of clinician-driven guidelines for each type of immediate loading procedure. This initiative by 3i is divided into 4 phases:
1. Immediate occlusal loading of the fully edentulous mandible.
2. Immediate non-occlusal loading of the maxillary anterior single tooth. Immediate non-occlusal loading of the partially edentulous maxilla and mandible.
3. Immediate Occlusal Loading of the partially edentulous mandible/maxilla.
4. Immediate occlusal loading of the fully edentulous maxilla.

The following DIEM™ Guidelines for the fully edentulous mandible have been developed for clinicians by consensus from a peer-leading group of implant surgeons and restorative dentists. These provide clinicians interested in treating patients with Immediate Occlusal Loading (IOL™), using 3i OSSEOTITE Implants and IOL Components, with guidelines relative to patient selection, diagnostic work-ups, surgical parameters and restorative techniques. The guidelines illustrate the use of OSSEOTITE Implants and a new line of IOL Abutments and IOL Cylinders that were designed for this treatment concept. The guidelines have been specifically developed to emphasize simplicity and flexibility in multiple clinical situations. Patients may be edentulous or dentulous on the day of surgery. If they are edentulous, implants can be placed crestally or subcrestally. If the patient presents a hopeless mandibular dentition, the teeth may be extracted and an alveolectomy may be performed in order to obtain optimal surgical sites for implant placement. In addition, it is the responsibility of the implant clinician to determine the benefits and limitations of a particular treatment protocol for each patient.

DIEM Guidelines are intended to serve as a road map to immediate loading. Once the doctor has become comfortable performing immediate load procedures, he may take a variety of personally selected detours to enhance his technique.

There are two main objectives to Phase 1 of the DIEM Guidelines:
1. To create a full-arch, fixed, implant-supported provisional restoration for the immediate occlusal loading of an edentulous mandible.
2. To create a full-arch, fixed, implant-supported provisional restoration for the Immediate Occlusal Loading of a partially edentulous mandible, which is to be rendered fully edentulous as part of the IOL procedure.

A determination needs to be made prior to performing an immediate loading procedure: (1) Are the surgical and prosthetic procedures to be rendered in the same office, or (2) Is the patient moving from the surgical office to the prosthetic office?

If the patient is to move between offices, coordination of appointments is critical.
Treatment Planning Considerations

PRETREATMENT DIAGNOSTICS:
(Surgeon, Restorative Dentist And Laboratory Technician)
- Medical work-up
- Clinical and radiographic evaluation
  (1) Periapical X-rays
  (2) Panoramic X-rays
  (3) CT Scans
- Preprosthetic evaluation, articulated casts with record of vertical dimension
- Verified wax try-in(s) set to 1st molar occlusion if implants will only be placed between the mental foramina (if a provisional denture is made)
- Measure gingival thickness; this will facilitate IOL™ abutment selection

TREATMENT INDICATIONS:
- Adequate bone quality equal to or greater than Type III
- Bone height equal to or greater than 12mm to allow for a minimum 10mm implant
- Bone width equal to or greater than 6mm to allow for a minimum 4mm diameter implant
- Adequate curvature of the arch and space between mental foramina, to permit proper anterior/posterior spread measurement, will allow functional cantilevers to 1st molar occlusion

TREATMENT CONTRAINDICATIONS:
- Health complications
- Parafunctional habits
- Poor bone quality - Type IV (not able to achieve primary stability)
- Limited curvature of the arch and space between mental foramina (will not allow good anterior/posterior spread measurement to achieve functional cantilevers to 1st molar occlusion)
- Bone height less than 12mm
- Bone width less than 6mm

A/P SPREAD DEFINED:
- The A/P, or anterior/posterior, spread measurement is a formula used to calculate the maximum indicated cantilever length off the posterior-most implant on a fixed restoration. It is calculated by measuring the distance between two parallel lines, one drawn across the distal of the posterior-most implants and one drawn through the center of the anterior-most implant, and multiplying the result by 1.5.7

Distal of Posterior-Most Implants
Center of the Anterior-Most Implant

A/P x 1.5 = Cantilever
IOL™ Product Chart

IOL ABUTMENTS*: For 4.1mm Platform 3i Implants

Description:
- Two-piece non-hexed (external hex)
- One-piece non-hexed (Certain)
- Titanium alloy

Diameter:
- 4.1mm platform
- 4.5mm abutment collar diameter

Collar Heights:
- 2.0mm
- 3.0mm
- 4.0mm
- 5.5mm
- 7.0mm

Instrumentation:
- PAD00 or PAD24 Abutment Driver
- RASA3 Abutment Driver Tip

Abutment Screw Recommended Torque:
- 20Ncm

IOL TITANIUM TEMPORARY CYLINDER:

Description:
- Titanium alloy
- Knurled surface to aid in mechanical locking of acrylic to cylinder
- Notch at bottom of cylinder retains the rubber dam and inhibits dam movement
- Height may be adjusted with a carbide cross-cut bur
- Secured with a Hex Gold-Tite™ Retaining Screw (GSH30)

Height:
- 10mm

Instrumentation:
- PHD02N or PHD03N Large Hex Driver
- RASH3N or RASH8N Large Hex Driver Tip

Retaining Screw Recommended Torque:
- 10Ncm

* IOL Abutments are used for both provisional and final restoration.
IOL™ Product Chart

IOL DISTAL EXTENSION:
Description:
• Titanium alloy
• Placed on the two posterior-most temporary cylinders
• Provides up to 8mm of distal support for provisional denture cantilevers
• Length may be adjusted when necessary, with carbide cross-cut bur
• Retained in place with acrylic resin

IOL HEALING CAP:
Description:
• One-piece
• Titanium alloy
• Height 4.3mm

IOL GOLD CYLINDERS:*
Description:
• Used for definitive framework
• Gold/palladium alloy
• Secured with a Hex Gold-Tite™ Retaining Screw (GSH30)

*Indicates prosthetic components to be used for definitive restoration.
**IOL™ IMPRESSION COPINGS:**

**Pick-Up Impression Coping***

**Description:**
- Two-piece (coping and guide pin)
- Stainless steel

**Transfer Impression Coping***

**Description:**
- One-piece
- Stainless steel

**IOL ANALOG:**

**Description:**
- Replicates IOL Abutment
- Stainless steel

**IOL POLISHING PROTECTOR:**

**Description:**
- Placed on the interface of cylinders during polishing to protect integrity of interface
- Stainless Steel
- Secured with a Hex Gold-Tite™ Retaining Screw (GSH30) or Abutment Waxing Screw (WSK15)

*Threads must be shortened 0.5mm for use with 2mm IOL abutments.*
1. PREOPERATIVE

A. Surgeon
Order 4mm diameter OSSEOTITE® Certain™ or OSSEOTITE Implants in lengths of 10mm or greater, determined during treatment planning.

B. Surgeon Or Restorative Dentist
- Order IOL™ Abutment Components.
- Other required materials:
  - Light-to-medium rubber dam and punch
  - Impression adhesive
  - Impression bite putty
  - Heavy body impression putty
  - Equipment to polish acrylic
  - Syringe for acrylic resin
  - Dappen dishes
  - Small paint brushes
  - Cross-cut carbide bur for titanium
  - Acrylic resin (hard autopolymerizing or light cure)
  - Acrylic bur
  - Articulating paper
- Instruments needed:
  - Abutment Driver (PAD00 or PAD02)
  - Abutment Driver Tip (RASA3)
  - Large Hex Driver (PHD02N or PHD03N)
  - Large Hex Driver Tip (RASH3N or RASH8N)
  - Torque Device
  - Surgical Kit

C. Restorative Dentist And Laboratory
- Fabricate a surgical guide stent by duplicating the patient’s existing denture in clear acrylic resin.
  OR
- Using an immediate or provisional denture, fabricate surgical guide stent in clear acrylic resin from the wax try-in.
  OR
- The immediate or provisional denture may be used as the surgical guide stent.
D. Prepare Surgical Guide Stent

- Drill guide holes in the clear guide stent or provisional denture from 1st premolar to 1st premolar where 5-6 implants will be positioned between the mental foramina to achieve a good anterior/posterior (A/P) spread and provide cross-arch stabilization.
- Open the lingual side of the surgical guide stent, using an acrylic bur.
- Placement beyond the mental foramina is acceptable if there is adequate bone.

E. Prepare Immediate Or Provisional Denture

- Process the immediate or provisional denture in acrylic resin from the wax try-in. Make the denture a little thicker buccolingually than usual for the prosthesis. This will provide additional strength to the prosthesis.
- Relieve the denture approximately 8mm beyond the posterior-most implant locations and to the proper depth if distal extensions are used.

2. SURGERY AND IMPLANT PLACEMENT

A. Try-in Of Denture And Surgical Stent

- If the patient is partially edentulous, cut all remaining teeth off at gingival crest.
- Verify that the opposing occlusion is stable. If necessary, add denture adhesive.
- Place adhesive bilaterally in free-end saddle areas of denture and surgical guide stent.
- Add thin layers of bite registration material to free-end saddle areas of denture and have patient bite to place. This will ensure a stable and reproducible seat for the denture.
- Place adhesive bilaterally on occlusal surfaces of posterior teeth on the denture.
- Place bite registration material on posterior occlusal surfaces on the denture. Return denture to position and have patient occlude in maximum intercuspsation. This will produce a stable and reproducible occlusal position.
- Repeat the above process for the surgical stent.

Clinical Tip: Some surgeons prefer to have the bite registration for the stent recorded in protrusive to improve access for implant site preparation and implant placement.
- Remove denture(s).
B. Ridge Preparation

- Make a midcrestal incision extending along the ridge and continue beyond the mental foramina, where a releasing incision is made buccal to lingual. If the patient is partially edentulous, extend the incision into the sulcus around the remaining roots.
- Visually locate the mental foramina and alveolar nerve bundles and separate flap 5–10mm beyond this landmark.
- On the alveolar ridge, with a round bur, mark the locations of the inferior alveolar nerve as it exits the mental foramina for landmarks.
- If the patient is partially edentulous, extract the residual tooth roots at this time.
- Reduce uneven bone contours to create a level plane.

C. Surgical Placement Of OSSEOTITE® Certain™ Or OSSEOTITE Implants

- Position the guide stent in the mouth by seating it on the retromolar pads and placing the buccal and lingual flanges in the vestibules as positioning guides.
- Place anterior-most implant first, followed by the two posterior-most implants. Next, split the difference between the anterior and posterior implants and place the final implants.
- Place implants using the OSSEOTITE Drilling Sequence for crestal or subcrestal placement to achieve adequate primary stability for immediate loading.

**NOTE:**
When placing External Hex Implants, do not remove the implant mounts at this time.

**NOTE:** Please refer to the 3i Surgical Manual (CATSM) for the complete surgical protocol. Implant Innovations, Inc. as the manufacturer of these medical devices does not practice medicine and does not recommend these devices or surgical techniques for any particular patient.

D. Immediate Load Determination

- Place the IIPDTS or IIPDTL placement driver (for Certain) or a MDR10 hand-piece connector (for external hex) in a torque device.
- Apply forward torque of 20Ncm to each implant to check stability.
- If the implant does not move and is stable in the bone, the implant may be immediately loaded.
- If the implant moves and does not feel stable in the bone, the implant should not be immediately loaded. A single- or two-stage surgical technique may be used on a nonloaded implant.
- Immediate Occlusal Loading™ ideally includes all implants in the arch. However, if at least four implants are determined to be stable, the provisional prosthesis may be attached to and supported by these while the others are not loaded.
E. **For External Connection Implants**

- Remove all mounts from the external hex implants.

F. **Select And Place IOL™ Abutments**

- Select an IOL Abutment height for each implant so that the interface will be 1-2mm above the level of the gingiva. The abutment platforms should be as level as possible.
- Place an IOL Abutment on each implant using the Abutment Driver.
- Torque the abutment screws to 20Ncm using the Abutment Driver Tip and a torque device.

G. **Suture Gingiva**

- Suture the gingival tissue closed around the IOL Abutments using resorbable suture.
- If the patient is to be sent to the restorative dentist, place the IOL Healing Caps on the abutments using the large hex driver.
3. RESTORATIVE
   A. Surgeon Or Restorative Dentist
      Provisional Restoration
      • Cut a piece of rubber dam to follow the anterior arch curve.
      • Cut holes at the implant locations using a rubber dam punch so that it fits over the abutments.
      • Adapt the rubber dam to the ridge where acrylic will be added into the denture. This will separate the surgical and prosthetic fields.
      • Fill the anterior portion of the denture with heavy bodied impression putty.
      • Articulate the lower denture with the opposing using the bite registration and have the patient close onto the IOL™ Abutments. Allow the putty to set.
      • Remove the denture(s) and drill holes in the provisional denture at the abutment locations. Drill each hole to the approximate diameter of the temporary cylinders.

   B. Place IOL Temporary Cylinders
      • Place the IOL Temporary Cylinders on the abutments and attach using hand tightened hex Gold-Tite™ retaining screws.
      • Reposition the rubber dam into the grooves of the IOL Temporary Cylinders (see insert).

   C. Place IOL Distal Extensions
      • If you are using the distal extensions, slide the distal extension support bars over the two posterior-most temporary cylinders and position these so that they will support the distally extended posterior teeth (see insert).
      • Apply a small amount of acrylic resin around the distal extensions to hold these in proper position.
D. 🔄 Adjust The Denture
- Try in the provisional denture over the temporary cylinders and distal extensions.
- Relieve the acrylic resin at the cylinder and distal extension locations as needed, so the denture passively seats on the edentulous ridge and retromolar pads.

E. 🔄 Verify Occlusion
- Evaluate the occlusion to verify that there is no interference with the cylinders and the denture is fully seated. If one or more cylinders interferes, reduce its height only enough to clear the opposing occlusion at this time. Do not prepare the cylinder flush with the denture at this time unless the occlusion requires it.
- Place access hole filler (cotton, wax, etc.) inside the cylinders to prevent acrylic resin from entering the access openings.

F. 🔄 Lute Denture To Temporary Cylinders
- Mix hard autopolymerizing acrylic resin and place it in a syringe.
- Place the acrylic resin inside the denture relief area and into the retention groove around the temporary cylinder on the anterior-most implant.
- Have the patient close into the established vertical using the bite registration to verify the denture is in the correct position. Maintain centric occlusion while the acrylic resin is setting.
- Allow the acrylic resin to set, per the manufacturer’s instructions.
- Remove the access hole filler from the luted cylinder and remove the hex screw.
- Continue with luting all other cylinders into the denture.
G. Remove Denture From Mouth And Reduce Cylinders
- Remove all access hole filler from the temporary cylinders.
- Unscrew the retaining screws and remove the denture from the abutments.
- Remove the rubber dam from the mouth.
- Using a carbide cross-cut bur, adjust the heights of the cylinders to conform with the lingual surface of the denture.

H. Modify Denture Into Fixed Provisional Restoration
- Place polishing protectors onto the cylinder interfaces.
- Add acrylic resin to any areas with voids.
- Verify the stability of the cylinders.
- Using an acrylic bur, remove all flanges, the acrylic resin on ridge contact areas and all excess acrylic from the bottom of the denture between the cylinders and posterior of the first molars.
- Remove the polishing protectors.

I. Adjust Occlusion
- Place the provisional restoration on the IOL™ Abutments and attach using retaining screws, until finger tight.
- Adjust the occlusion using articulating paper, into group function to ensure even distribution of support, minimizing lateral forces.
- Mark any areas where acrylic may be contacting the tissue.
- Remove the provisional restoration.
J. Polish The Fixed Provisional Restoration
- Place polishing protectors onto the cylinder interfaces.
- Relieve any marked areas.
- Polish the entire provisional denture so that the surfaces are smooth.
- Remove the polishing protectors.

K. Seat The Fixed Provisional Restoration
- Place the provisional denture back onto the IOL™ Abutments and attach using the Hex Gold-Tite™ Retaining Screws.
- Torque the screws to 10Ncm using the large hex driver tip and a torque device.

L. Complete Fixed Provisional Restoration
- Place a protective material over the screw heads, seal the access holes with acrylic resin and polish.
- The provisional denture should not be removed or loosened during the following six weeks.
- Instruct the patient on hygiene care of the provisional restoration.
- Place the patient on a soft diet for two weeks.
- Patient should be seen after two weeks for follow-up.
This manual will instruct practitioners in the use of 3i® implant systems. The success of any dental implant system depends upon proper use of the components and instrumentation. This manual is not intended for use as a substitute for professional training and experience.


M. Final Impression For Definitive Restoration

- The final impression of the definitive restoration may be made 4-6 weeks after the surgical appointment.
- Refer to the 3i® Restorative Manual for instructions on fabrication of the definitive restoration.