

Want To Grow Your Practice?  
DIEM<sup>®2</sup> Can Help!



# INTRODUCING **DIEM<sup>®2</sup>**

Solutions For Immediate Full Arch Rehabilitation *In One Day\**

Treatment Solution Provides Both Surgical And Prosthetic Treatment Of The Full Arch *In One Day\**

Comprehensive Solutions Designed To Help Grow Your Practice



Step-by-Step Instruction Designed To Serve As A Roadmap For Treatment

Education Courses Designed For Complete Technique Training

**DIEM<sup>®2</sup>** Provides Clinicians One Solution At A Time

- Differentiate Your Practice By Offering Patient Treatment *In One Day\**
- Surgical And Restorative Components Developed For Immediate Loading Protocols
- Guidelines Allow For Simple Adoption Of Treatment Into The Practice
- Didactic And Over-The-Shoulder Training



\*Not all patients are candidates for immediate load procedures.

# Treatment Planning Considerations

## Pre-Treatment Diagnostics

### Surgeon, Restorative Dentist and Laboratory Technician:

- Review medical history/medical consultation as needed
- Clinical and radiographic evaluations

## Clinical Evaluation

### Extraoral factors:

- Skeletal/dental malocclusion
- Temporomandibular joint health/disease
- Mandibular range of motion

### Intraoral factors:

- Condition of the remaining teeth
- Soft tissue contours, type and thickness
- Condition of the alveolar bone

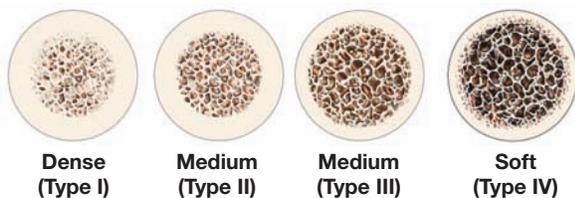
### Prosthetic factors:

- Pre-prosthetic determination of the vertical dimension of occlusion, lip support, incisal display at rest, speaking, smiling, lip mobility and resulting transition zone
- Interarch distance
- Condition of pre-existing dentures; need and design considerations for provisional restorations

### Radiographs options:

- CT scans
- Periapical radiographs
- Panoramic radiographs

## Treatment Indications For Immediate Implant Prostheses



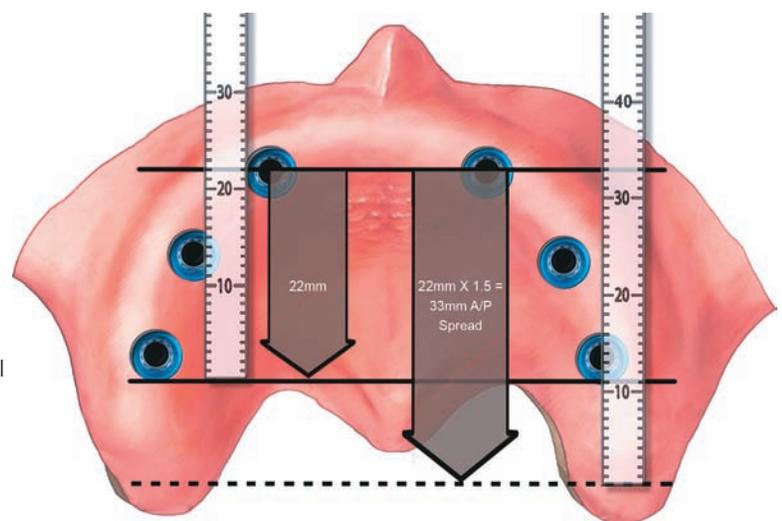
- Adequate bone quality equal to or greater than Type III
- Adequate bone volume for implant placement
- Adequate restorative volume that provides space for implant restorative components and prostheses
- Adequate A/P spread (curvature of the arch) for optimal positioning of implants and to decrease the extent of cantilevers.

## Patients With The Following Are Not Considered To Be Optimal Candidates For Immediate Occlusal Loading:

- Systemic diseases:
  - Bleeding disorder
  - Uncontrolled metabolic disease (Diabetes)
  - Uncontrolled cardiovascular disease
  - Uncontrolled hypertension
  - Compromised immune system (autoimmune diseases, HIV)
- Parafunctional habits
- Poor bone quality - Type IV (implants unable to achieve primary stability)
- Lack of bone quantity
- Limited arch curvature (poor A/P spread)

## A/P Spread Defined

The A/P, or anterior/posterior spread is a formula used to calculate the maximum cantilever length distal to the most posterior implants for fixed restorations. It is calculated by measuring the distance between two parallel lines; one drawn across the distal most posterior implants and one drawn through the center of the most anterior implant. A line perpendicular to these lines is drawn; this number is multiplied by 1.5.<sup>28</sup> This length represents the maximum lengths for cantilevered segments within the framework/prosthesis. The number should be decreased for immediate all-acrylic resin restorations.



# Introduction

In the 1960s, loading dental implants with functional occlusal forces immediately after implant placement frequently resulted in fibrous encapsulation of implants in alveolar bone. This led to relative degrees of implant mobility and ultimately loss of implants with the potential loss of the prostheses.<sup>1</sup> Brånemark *et al.*<sup>2</sup> initially described the placement and restoration of endosseous, machined (turned), commercially pure (cp) titanium implants with surgical and prosthetic protocols that included unloaded healing periods of approximately four months for mandibular implants and six months for maxillary implants.<sup>3</sup> Throughout the last three decades, the use of dental implants has grown significantly in clinical use throughout the world and, under certain specific clinical circumstances, Immediate Occlusal Loading (IOL<sup>®</sup>) of endosseous implants was found to be as efficacious as the results clinicians obtained with previously reported unloaded healing protocols.<sup>4-11</sup>

Two of the primary benefits of IOL<sup>®</sup> Protocols include reduction in the number of surgical procedures and the amount of time required for insertion of immediate, fixed, provisional prostheses. This is especially true for patients with debilitated dentitions who no longer have to go through prolonged healing periods, which include wearing complete dentures. In order for clinicians and patients to select an IOL<sup>®</sup> Protocol, the protocols must provide at least similar implant survival rates as compared to the Cumulative Survival Rates (CSRs) associated with unloaded healing protocols.

Years of evidence-based research drove the development of clinical guidelines for each type of immediate loading procedure: Immediate Occlusal Loading in the edentulous mandible and Immediate Occlusal Loading in the edentulous maxillae.

## Immediate Occlusal Loading In The Edentulous Mandible

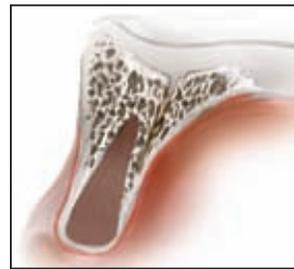


Authors have reported favorable results for immediate occlusal loading in the edentulous jaws. In 1997, Tarnow *et al.* reported 98% Cumulative Survival Rates (CSR; six mandibular, four maxillary jaws) one to six years post implant placement.<sup>6</sup> In 2000, Cooper *et al.* reported 98% CSR 18 months post

implant placement.<sup>7</sup> In 2003, Testori *et al.* reported one failure, due to infection, in a study involving 92 OSSEOTITE<sup>®</sup> Implants that were immediately loaded with fixed prostheses in edentulous mandibles. Testori *et al.* reported a 98.9% CSR for OSSEOTITE<sup>®</sup> Implants up to 48 months post implant placement. The prosthetic CSR for these patients during the same period was 100 percent.<sup>10</sup>

More recently in 2009, Pieri *et al.* reported a 98.6% CSR in which 144 implants in 23 patients were restored with full arch restorations immediately post implant placement. Pieri *et al.* suggested immediate loading dental implants placed immediately after multiple extractions is a viable treatment option for edentulous arches when implants were stable at the time of placement and rigidly splinted with screw-retained titanium-resin prostheses.<sup>12</sup>

## Immediate Occlusal Loading In The Edentulous Maxillae



Edentulous maxillary jaws are, in general, remarkably different from edentulous mandibles at macroscopic and microscopic levels. This is especially true when comparing the anterior, inter-foraminal portions of

edentulous mandibles to anterior maxillary segments; maxillary bone is much more trabecular and, therefore, less dense.<sup>13,14</sup> Therefore, in some cases, it is much more difficult to achieve high levels of implant stability at implant placement (primary stability) for maxillary implants. Primary implant stability is considered to be one of the most important factors for achieving successful osseointegration of dental implants.<sup>14,15</sup> In soft bone, undersizing implant osteotomies at the time of surgery, and selecting implants with differing shapes, lengths and diameters may help to overcome some of these anatomic limitations and allow implants to be placed with high primary stability.<sup>16,17</sup> Implant insertion torques of at least 40Ncm have been suggested as the minimum value acceptable for immediate occlusal loading,<sup>17</sup> although there is some debate on this subject, specifically as it pertains to multiple, splinted implants versus single, un-splinted implants.<sup>18,19</sup>

## Introduction (Cont'd)

In the last several years, a number of reports have addressed the treatment of edentulous maxillary jaws with implant-supported prostheses **utilizing both straight and tilted implant placement protocols using four or more implants.**<sup>20-26</sup> In a literature review of maxillary immediate occlusal loading studies in 2006, Del Fabbro *et al.*<sup>19</sup> found a wide variety of studies in terms of the numbers of implants placed by clinicians, for maxillary immediate occlusal loading protocols, as well as differing surgical and prosthetic protocols. These studies reported that the mean number of maxillary implants placed for immediate occlusal loading was eight.<sup>18</sup>

In 2009, Romanos and Nentwig reported the results of a prospective clinical trial regarding immediate occlusal loading for maxillary implants.<sup>27</sup> Ninety implants were placed (six in each maxillary arch) in 15 patients. Immediately after surgery, the implants were loaded with provisional acrylic resin prostheses (immediate occlusal loading). The provisional prostheses remained in function for six to eight weeks; a soft/liquid diet was recommended for this time period. Definitive fixed restorations were fabricated and delivered approximately six to eight months post implant placement. Romanos and Nentwig reported three implant failures after a mean loading period of 42.4 ( $\pm 19.15$ ) months (CSR 96.7%). Romanos and Nentwig concluded that immediate loading, splinted, maxillary implants can be used successfully when implant primary stability, cross-arch stabilization and soft diets for the initial stages of healing have been prescribed and followed.

**BIOMET 3i**<sup>™</sup> previously offered a solution for Immediate Occlusal Loading in the mandible with its original DIEM<sup>®</sup> Guidelines introduced in 2004. Now, this solution has been expanded with **NEW DIEM<sup>®2</sup>**, a solution for rehabilitation in **both arches**, utilizing innovative products to deliver full arch fixed provisional prostheses in as little as one day.\*

### Advantages of DIEM<sup>®2</sup> - For Patients And Clinicians

#### For Patients:

- Eliminates dentures for patients with hopeless dentition
- Eliminates loose fitting or painful dentures
- Enables patients to return home on the day of surgery with prostheses that look aesthetically pleasing and function normally\*
- Reduces the number of procedures and follow-up visits
- Allows for fixed interim prostheses for increased patient satisfaction

#### For Clinicians:

- Decreases surgical morbidity
- Reduces the need for bone augmentation
- Offers an additional innovative procedure for the dental practice
- Allows for implant dentistry access to a large edentulous or partially edentulous patient population
- Is designed to increase implant treatment acceptance due to a single day procedure
- Increases practice productivity and efficiency by reducing chairside visits for each case

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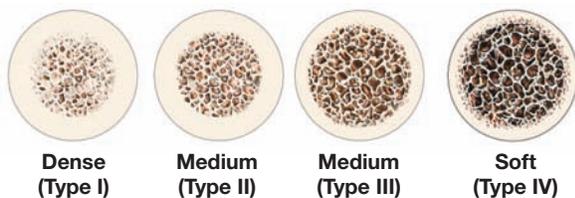
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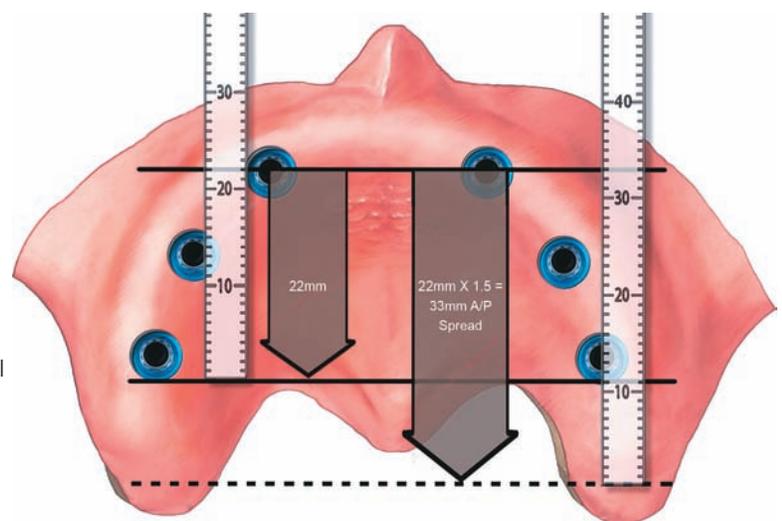
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# Low Profile Abutment Selection

<b>Low Profile Abutments</b>	
<p><b>Material:</b> Titanium Alloy</p>	<p><b>Indications:</b></p> <ul style="list-style-type: none"> <li>• Single and multiple-unit screw-retained restorations</li> <li>• Adequate interarch distance to accept a hybrid restoration</li> <li>• Minimum tissue height of 1mm</li> <li>• Angle correction up to 30°</li> <li>• External hex connection 3.4mm(D)</li> </ul> <p>Low Profile Abutments are limited to use in anterior segments</p>



### Low Profile One-Piece Abutments

Designed for use with multiple-unit restorations. These do not have anti-rotation features at the

base of the restorative platform and do not engage the hex of the implant. Non-hexed restorative components are used with these abutments.



### Low Profile Angled Abutments

Designed for use with single and multiple-unit restorations; are available in 17 and 30 degree

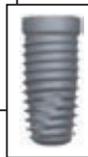
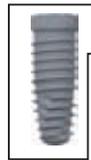
angles. These abutments have hexed configurations at the base of the restorative platforms for anti-rotation and to engage the hex of the implant. Hexed and non-hexed restorative components can be used with these abutments.

### Abutment Selection

Abutment selection should be discussed by the implant team as part of the treatment planning process. With the advent of CT scans and three dimensional treatment planning, definitive abutment selection can be accomplished prior to surgery. In the event that implants are not placed vertically, the use of angled abutments may be required.

In order to accomplish accurate abutment selection, clinicians need to be aware of the following six characteristics:<sup>29</sup>

1. Implant/abutment connection
2. Diameter of the implant restorative platform
3. Emergence profile of the healing abutment
4. Peri-implant soft tissue depths
5. Implant angulation
6. Interarch distance



### Surgical Materials Required

- **BIOMET 3i**™ Tapered Implants in lengths of 10mm or greater, determined during treatment planning
- Surgical kit

### Restorative Materials Required

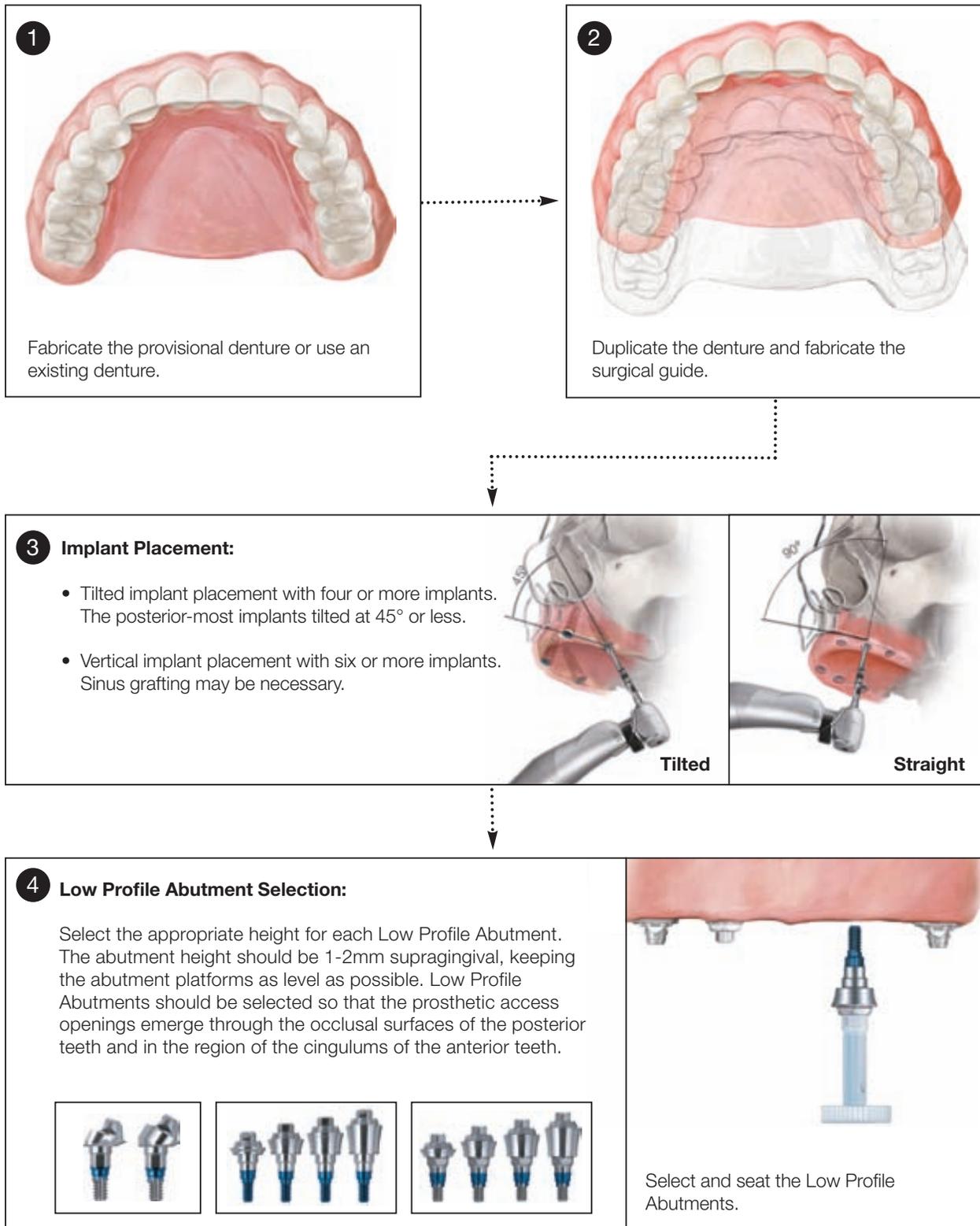
- Low Profile Abutments
- Low Profile Components:
  - Low Profile Polishing Protectors
  - Gold-Tite® or Titanium Retaining Screws
  - Waxing Screws
  - Non-Hexed Temporary Cylinders

### Other Materials Required

- Light/medium rubber dam and punch
- Impression material adhesive
- Vinyl Polysiloxane (VPS) occlusal registration material (quick set)
- Heavy body VPS impression material
- Equipment for polishing acrylic resin
- Syringe for acrylic resin
- Dappen dishes
- Small paint brushes
- Cross-cut carbide bur for titanium cylinders
- Acrylic resin (auto-polymerizing or light cure)
- Acrylic trimming burs
- 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)
  - Low Torque Indicating Ratchet Wrench (L-TIRW)

# DIEM<sup>®</sup>2 Surgical Flow Chart



## **DIEM<sup>®2</sup> Guidelines**

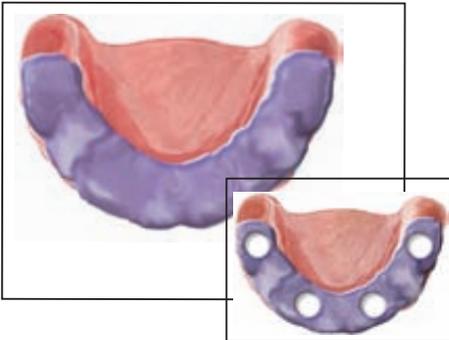
### **Prosthetic Procedure For Denture Conversion**



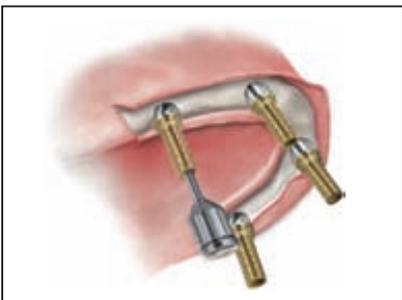
1. Fill the anterior portion of the provisional prosthesis with heavy body VPS impression material or quick set occlusal registration material.



2. Seat the prosthesis into the mouth. Use the palatal portion of the maxillary prosthesis to accurately and completely seat the prosthesis. Make sure the dental midline is consistent with the facial midline. If an occlusal registration was previously made clinically or in the laboratory, it can be used to accurately position the prosthesis on the mandibular dentition. Have the patient close into centric occlusion. Let the VPS impression material set in the intaglio surface of the prosthesis.



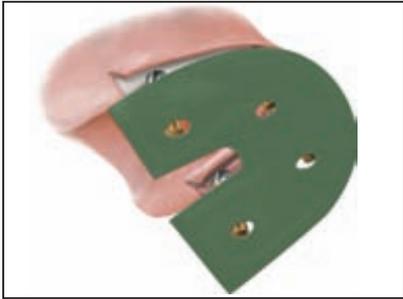
3. Remove the provisional prosthesis. The locations of the abutments have been recorded in the impression. Drill holes into the prosthesis at the abutment locations identified in the impression. Drill each hole slightly larger than the diameters of the Low Profile Abutments.



4. Place the temporary cylinders onto the Low Profile Abutments. Make sure that all of the cylinders are completely seated onto the abutments.

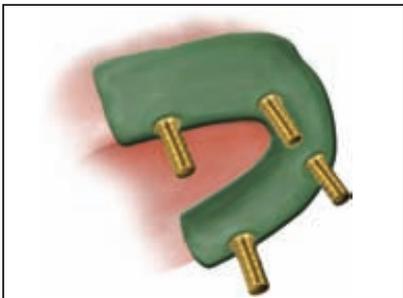
# **DIEM<sup>®2</sup> Guidelines**

## **Prosthetic Procedure For Denture Conversion**



### **PREPARATION OF THE PROVISIONAL RESTORATION**

5. Cut a piece of rubber dam to follow the curvature of the maxillary arch. Cut holes at the implant locations using a rubber dam punch so that the rubber dam fits securely over the Low Profile Temporary Cylinders. The apical portions of these cylinders have been machined with concavities to retain the rubber dam.



6. Make sure that the rubber dam covers the surgical sites so that the acrylic resin will not come into contact with the incision or sutures. This will separate the surgical and prosthetic fields.



### **ADJUST THE PROVISIONAL PROSTHESIS**

7. Try in the provisional prosthesis (after it has been adjusted) over the Low Profile Temporary Cylinders. Relieve the acrylic resin at the cylinder locations as needed. This ensures that the provisional prosthesis seats completely. The provisional prosthesis should not contact any of the restorative components.



### **VERIFY OCCLUSION**

8. Evaluate the occlusion to verify that there is no interference from any of the cylinders when the denture is fully seated. If one or more cylinders interferes with seating, reduce its height only enough to clear the opposing occlusion at this time. This must be done extraorally. Do not prepare the cylinder flush with the occlusal surface of the denture unless the occlusion requires it.

Place access opening filler (cotton, wax, etc.) inside the cylinders to prevent acrylic resin from entering the access openings during the pick-up procedure.

## **DIEM<sup>®2</sup> Guidelines**

### **Prosthetic Procedure For Denture Conversion**



#### **LUTE DENTURE TO TEMPORARY CYLINDERS**

- 9a.** Inject autopolymerizing acrylic resin around the base of the temporary cylinders.
- 9b.** Load a monojet syringe with a thin mix of autopolymerizing acrylic resin. Inject resin into the intaglio surface of the denture. Seat the provisional prosthesis.
- 9c.** Have the patient close into centric occlusion. Make sure that the provisional prosthesis is positioned properly – midline, occlusion and vertical dimension. Let the acrylic resin completely polymerize.



#### **REMOVE PROVISIONAL PROSTHESIS FROM MOUTH AND REDUCE CYLINDERS**

- 10a.** Remove all access opening fillers from the temporary cylinders. Unscrew the waxing screws and remove the provisional prosthesis from the Low Profile Abutments. Remove the rubber dam. Adjust the heights of the cylinders to conform with the palatal and occlusal surfaces of the denture.



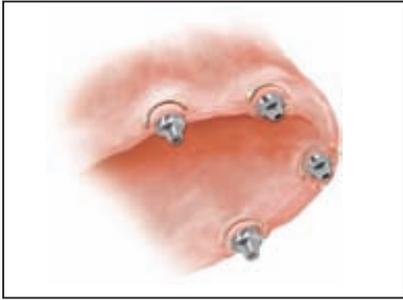
- 10b.** Place Low Profile Abutment Polishing Protectors into the temporary cylinders inside the provisional prosthesis. Fill any voids around the cylinders with autopolymerizing acrylic resin. Allow the resin to polymerize. Remove flanges, excess resin; minimize the length of the cantilevers.



- 10c.** Finish and polish the provisional prosthesis.

# **DIEM<sup>®2</sup> Guidelines**

## **Prosthetic Procedure For Denture Conversion**



- 10d.** Remove the polishing protectors. While the prosthesis is being finished, suture the flaps to achieve primary closure.



### **SEAT THE FIXED PROVISIONAL PROSTHESIS**

- 11.** Place the provisional prosthesis onto the Low Profile Abutments and attach it using the Low Profile Retaining Screws. Torque the Low Profile Retaining screws to 10Ncm using the Large Hex Driver Tip and the Low Torque Indicating Ratchet Wrench.

Adjust the occlusion using articulating paper allowing multiple contacts in centric occlusion. Right and left working movements should be designed in group function.

**Clinical Tip:** For mandibular prostheses, place the Low Profile Retaining Screws into the screw access openings of the prosthesis, then place the provisional prosthesis onto the abutments. This minimizes the risk of aspiration by dropping a retaining screw intraorally. For maxillary prostheses, place the provisional prosthesis onto the abutments and then place the retaining screws one by one onto the abutments.



### **COMPLETE FIXED PROVISIONAL PROSTHESIS**

- 12.** Block out the screw heads with cotton or another suitable material. Restore the access openings with composite resin and polish. Re-evaluate and adjust the occlusion as necessary.

The provisional prosthesis should not be removed or loosened for at least eight weeks. Give the patient appropriate post-operative instructions. Schedule the next follow-up appointment.



### **DEFINITIVE PROSTHESIS**

- 13.** Clinicians should wait at least eight weeks prior to making definitive impressions. Refer to the **BONET 3i** Restorative Manual (CATRM) for fabrication of the definitive prosthesis.

# DIEM<sup>®2</sup>

## Certain<sup>®</sup> Ordering Information

### Low Profile Abutments



#### 3.4mm Seating Surface

	One Piece (Non-Hexed)	Two Piece (Hexed)	17° (Hexed)	30° (Hexed)
1mm	ILPC341U	ILPC341	-	-
2mm	ILPC342U	ILPC342	ILPAC3217	-
3mm	ILPC343U	ILPC343	-	ILPAC3330
4mm	ILPC344U	ILPC344	ILPAC3417	-
5mm	-	-	-	ILPAC3530

#### 4.1mm Seating Surface

Collar Height	One Piece (Non-Hexed)	Two Piece (Hexed)	17° (Hexed)	30° (Hexed)
1mm	ILPC441U	ILPC441	-	-
2mm	ILPC442U	ILPC442	ILPAC4217	-
3mm	ILPC443U	ILPC443	-	ILPAC4330
4mm	ILPC444U	ILPC444	ILPAC4417	-
5mm	-	-	-	ILPAC4530

#### 5.0mm Seating Surface

Collar Height	One Piece (Non-Hexed)	Two Piece (Hexed)	17° (Hexed)	30° (Hexed)
1mm	ILPC541U	ILPC541	-	-
2mm	ILPC542U	ILPC542	ILPAC5217	-
	ILPC543U	ILPC543	-	ILPAC5330
	ILPC544U	ILPC544	ILPAC5417	-
5mm	-	-	-	ILPAC5530

### Abutment Compatibility

Component	Hexed Abutment	Non-Hexed Abutment
Hexed	Yes	No
Non-Hexed	Yes	Yes

### Low Profile Screws

Description	Item No.
Gold-Tite <sup>®</sup> Retaining Screw	LPCGSH
Titanium Retaining Screw	LPCTSH
Waxing Screw	LPCWS

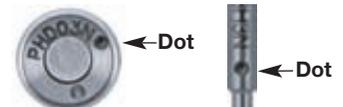
### Low Profile Laboratory Tools

Description	Item No.
Lapping Tool	LPCAMI
Polishing Protector	LPCPP

### Large Hex Driver And Driver Tip

Description	Item No.
Large Hexed Driver	PHD02N, PHD03N*
Large Hexed Driver Tip	RASH3N, RASH8N*

\*Now, narrower to fit with external hexed angled Low Profile Abutments. The new driver and driver tips can be identified by a laser marked dot after the catalog number as pictured below.



### Low Profile Impression Copings And Analog

Description	Item No.
Pick Up Impression Coping (Non-Hexed)	LPCPIC2
Twist Lock <sup>™</sup> Impression Coping (Non-Hexed)	LPCTIC2
QuickBridge <sup>®</sup> Impression Coping	LPCTIC
Laboratory Analog	LPCLA

### Low Profile Provisional Restoration Components

Description	Item No.
Temporary Cylinder (Non-Hexed)	LPCTC2
Healing Cap	LPCHC
PreFormance <sup>®</sup> Temp. Cylinder (Non-Hexed)	LPCPTC2
QuickBridge <sup>®</sup>	LPCQB
QuickBridge <sup>®</sup> Replacement Cap	LPCQBCAP
Distal Extension	LPCDE

### Low Profile Final Restoration Components

Description	Item No.
Gold Cylinder (Non-Hexed)	LPCGC2
Castable Cylinder (Non-Hexed)	LPCCC2
Laser Welded Cylinder	LPCTUCA

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