Herbert T. Shillingburg, Jr, DDS
David Ross Boyd Professor Emeritus
Department of Fixed Prosthodontics
University of Oklahoma College of Dentistry
Oklahoma City, Oklahoma

with

David A. Sather, DDS
Edwin L. Wilson, Jr, DDS, MEd
Joseph R. Cain, DDS, MS
Donald L. Mitchell, DDS, MS
Luis J. Blanco, DMD, MS
James C. Kessler, DDS

Illustrations by
Suzan E. Stone
Cover design based on a photograph of Monument Valley on the Navajo Reservation in northern Arizona taken at sunrise by Dr Herbert T. Shillingburg, Jr.
Dedication vii
Authors viii
Preface ix
Acknowledgments x

1 An Introduction to Fixed Prosthodontics 1
2 Fundamentals of Occlusion 13
3 Articulators 27
4 Interocclusal Records 35
5 Articulation of Casts 45
6 Treatment Planning for Single-Tooth Restorations 71
7 Treatment Planning for the Replacement of Missing Teeth 81
8 Fixed Partial Denture and Implant Configurations 99
9 Principles of Tooth Preparations 131
10 Preparations for Full Coverage Crowns 149
11 Preparations for Partial Coverage Crowns 165
12 Preparations for Intracoronal Restorations 193
13 Preparations for Severely Debilitated Teeth 203
14 Preparations for Periodontally Weakened Teeth 229
15 Provisional Restorations 241
16 Fluid Control and Soft Tissue Management 269
<table>
<thead>
<tr>
<th>Chapter</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>17</td>
<td>Impressions</td>
<td>291</td>
</tr>
<tr>
<td>18</td>
<td>Working Casts and Dies</td>
<td>325</td>
</tr>
<tr>
<td>19</td>
<td>Wax Patterns</td>
<td>343</td>
</tr>
<tr>
<td>20</td>
<td>Investing and Casting</td>
<td>363</td>
</tr>
<tr>
<td>21</td>
<td>Cementation and Bonding</td>
<td>383</td>
</tr>
<tr>
<td>22</td>
<td>Esthetic Considerations</td>
<td>413</td>
</tr>
<tr>
<td>23</td>
<td>All-Ceramic Restorations</td>
<td>425</td>
</tr>
<tr>
<td>24</td>
<td>Metal-Ceramic Restorations</td>
<td>447</td>
</tr>
<tr>
<td>25</td>
<td>Pontics and Edentulous Ridges</td>
<td>471</td>
</tr>
<tr>
<td>26</td>
<td>Solder Joints and Other Connectors</td>
<td>493</td>
</tr>
<tr>
<td>27</td>
<td>Restoration of Osseointegrated Dental Implants</td>
<td>517</td>
</tr>
<tr>
<td>28</td>
<td>Single-Tooth Implant Restoration</td>
<td>531</td>
</tr>
<tr>
<td>29</td>
<td>Multiple-Tooth Implant Restoration</td>
<td>543</td>
</tr>
</tbody>
</table>

Index 555
This book is dedicated to the loving memory of Constance Murphy Shillingburg. We met at the University of New Mexico at the beginning of her freshman year in 1956. We were married 4 years later, 1 week after she graduated. During my first 2 years in dental school, I made 13 trips, totaling over 22,000 miles, from Los Angeles to Albuquerque. She shared all of the triumphs and disappointments of my last 2 years in dental school. It was not my career; it was our career. She supported me in all that I did. She didn’t question my leaving practice to start a career in academics or our moving from California to Oklahoma. We had three daughters along the way. Although she had three open-heart surgeries in her teens because of rheumatic fever and then two cancer surgeries later in life, she was the most optimistic person I ever met.

She accompanied me on 29 trips outside the United States. At first she came along because she loved to travel, and I didn’t enjoy the trips nearly as much without her. However, I very quickly learned that my hosts and audiences were enchanted by her. They enjoyed her as much or more than they did me, and she used what she learned on those trips in her teaching. She died 3 weeks after we celebrated our 48th wedding anniversary. There is a song on the most recent Glen Campbell album, Ghost on the Canvas, that sums it up perfectly: “There’s no me…without you.”
Authors

Luis J. Blanco, DMD, MS
Professor and Chair
Department of Fixed Prosthodontics
University of Oklahoma College of Dentistry
Oklahoma City, Oklahoma

Joseph R. Cain, DDS, MS
Professor Emeritus
Department of Removable Prosthodontics
University of Oklahoma College of Dentistry
Oklahoma City, Oklahoma

James C. Kessler, DDS
Director of Education
L. D. Pankey Institute
Key Biscayne, Florida

Donald L. Mitchell, DDS, MS
Professor Emeritus
Department of Oral Implantology
University of Oklahoma College of Dentistry
Oklahoma City, Oklahoma

David A. Sather, DDS
Associate Professor
Department of Fixed Prosthodontics
University of Oklahoma College of Dentistry
Oklahoma City, Oklahoma

Herbert T. Shillingburg, Jr, DDS
David Ross Boyd Professor Emeritus
Department of Fixed Prosthodontics
University of Oklahoma College of Dentistry
Oklahoma City, Oklahoma

Edwin L. Wilson, Jr, DDS, MEd
Professor Emeritus
Department of Occlusion
University of Oklahoma College of Dentistry
Oklahoma City, Oklahoma
Preface

Fixed prosthodontics is the art and science of restoring damaged teeth with cast metal, metal-ceramic, or all-ceramic restorations and of replacing missing teeth with fixed prostheses using metal-ceramic artificial teeth (pontics) or metal-ceramic crowns over implants. Successfully treating a patient by means of fixed prosthodontics requires a thoughtful combination of many aspects of dental treatment: patient education and the prevention of further dental disease, sound diagnosis, periodontal therapy, operative skills, occlusal considerations, and, sometimes, placement of removable complete or partial prostheses and endodontic treatment.

Restorations in this field of dentistry can be the finest service rendered for dental patients or the worst disservice perpetrated upon them. The path taken depends upon one’s knowledge of sound biologic and mechanical principles, the growth of manipulative skills to implement the treatment plan, and the development of a critical eye and judgement for assessing detail.

As in all fields of the healing arts, there has been tremendous change in this area of dentistry in recent years. Improved materials, instruments, and techniques have made it possible for today’s operator with average skills to provide a service whose quality is on a par with that provided only by the most gifted dentist of years gone by. This is possible, however, only if the dentist has a thorough background in the principles of restorative dentistry and an intimate knowledge of the techniques required.

This book was designed to serve as an introduction to the area of restorative dentistry dealing with fixed partial dentures and cast metal, metal-ceramic, and all-ceramic restorations. It should provide the background knowledge needed by the novice as well as serve as a refresher for the practitioner or graduate student.

To provide the needed background for formulating rational judgments in the clinical environment, there are chapters dealing with the fundamentals of treatment planning, occlusion, and tooth preparation. In addition, sections of other chapters are devoted to the fundamentals of the respective subjects. Specific techniques and instruments are discussed because dentists and dental technicians must deal with them in their daily work.

Alternative techniques are given when there are multiple techniques widely used in the profession. Frequently, however, only one technique is presented. Cognizance is given to the fact that there is usually more than one acceptable way of accomplishing a particular task. However, in the limited time available in the undergraduate dental curriculum, there is usually time for the mastery of only one basic technique for accomplishing each of the various types of treatment.

An attempt has been made to provide a sound working background in the various facets of fixed prosthodontic therapy. Current information has been added to cover the increased use of new cements, new packaging and dispensing equipment for the use of impression materials, and changes in the management of soft tissues for impression making. New articulators, facebows, and concepts of occlusion needed attention, along with precise ways of making removable dies. The usage of periodontally weakened teeth requires different designs for preparations of teeth with exposed root morphology or molars that have lost a root.

Different ways of handling edentulous ridges with defects have given the dentist better control of the functional and cosmetic outcome. No longer are metal or ceramics needed to somehow mask the loss of bone and soft tissue. The biggest change in the replacement of missing teeth, of course, is the widespread use of endosseous implants, which make it possible to replace teeth without damaging adjacent sound teeth.

The increased emphasis on cosmetic restorations has necessitated expanding the chapters on those types of restorations. The design of resin-bonded fixed partial dentures has been moved to the chapters on partial coverage restorations. There are some uses for that type of restoration, but the indications are far more limited than they were thought to be a few years ago.


—Herbert T. Shillingburg, Jr, DDS
Acknowledgments

No book is the work of just its authors. It is difficult to say which ideas are our own and which are an amalgam of those with whom we have associated. Two fine restorative dentists had an important influence on this book: Dr Robert Dewhirst and Dr Donald Fisher have been mentors, colleagues, and, most importantly, friends. Their philosophies have been our guide for the last 40 years. Dr Manville G. Duncanson, Jr, Professor Emeritus of Dental Materials, and Dr Dean Johnson, Professor Emeritus of Removable Prosthodontics, both of the University of Oklahoma, were forthcoming through the years with their suggestions, criticism, and shared knowledge. Thanks are also due to Mr James Robinson of Whip-Mix Corporation for his help with materials and instruments in the chapters that deal with laboratory procedures. Appreciation is expressed to Dr Mike Fling for his input regarding tooth preparations for laminate veneers. Thank you to Mr Lee Holmstead, Brasseler USA, for his assistance with the illustrations of the diamonds and carbide burs.

Illustrations have been done by several people through the years: Mr Robert Shackelford, Ms Laurel Kallenberger, Ms Jane Cripps, and Ms Judy Amico of the Graphics and Media Department of the University of Oklahoma Health Sciences Center. Artwork was also contributed by Drs Richard Jacobi and Herbert T. Shillingburg. This book would not have come to fruition without the illustrations provided by Ms Suzan Stone and the computer program, Topaz Simplify, suggested by Mr Alvin Flier, a friend from 40 years ago in Simi, California. A special thank you to the Rev John W. Price of Houston, Texas, for restoring my sense of mission in June 2008.

Thanks to you all.
Treatment Planning for the Replacement of Missing Teeth

The need to replace missing teeth is obvious to the patient when the edentulous space is in the anterior segment of the mouth, but it is equally important in the posterior region. It is tempting to think of the dental arch as a static entity, but that is certainly not the case. It is in a state of dynamic equilibrium, with the teeth supporting each other (Fig 7-1). When a tooth is lost, the structural integrity of the dental arch is disrupted, and there is a subsequent realignment of teeth as a new state of equilibrium is achieved. Teeth adjacent to or opposing the edentulous space frequently move into it (Fig 7-2). Adjacent teeth, especially those distal to the space, may drift bodily, although a tilting movement is a far more common occurrence.

If an opposing tooth intrudes severely into the edentulous space, it is not enough just to replace the missing tooth (Fig 7-3). To restore the mouth to complete function, free of interferences, it is often necessary to restore the tooth opposing the edentulous space (Fig 7-4). In severe cases, this may necessitate the devitalization of the supererupted opposing tooth to permit enough shortening to correct the plane of occlusion; in extreme cases, extraction of the opposing tooth may be required.

Selection of the Type of Prosthesis

Missing teeth may be replaced by one of three prosthesis types: a removable partial denture, a tooth-supported fixed partial denture, or an implant-supported fixed partial denture (Table 7-1). Several factors must be weighed when choosing the type of prosthesis to be used in any given situation. Biomechanical, periodontal, esthetic, and financial factors, as well as the patient’s wishes, are some of the more important ones. It is not uncommon to combine two types in the same arch, such as a removable partial denture and a tooth-supported fixed partial denture. Combining teeth and implants in the support of the same fixed partial denture, however, is not recommended.

In treatment planning, there is one principle that should be kept in mind: treatment simplification. There are many times when certain treatments are technically possible but too complex. It is important to narrow the possibilities and present a recommendation that will serve the patient’s needs and still be reasonable to accomplish. At such times, the restorative dentist, or prosthodontist, is the one who should manage the sequencing and referral to other specialists. He or she will be finishing the treatment and should act as the quarterback. The restorative dentist must communicate and be open to suggestions but should not allow someone else to dictate the restorative phase of the treatment, which may result in carrying out a treatment plan that seems unfeasible. As the clinician who is providing the restoration, the restorative dentist is the one the patient will return to if it fails; therefore, he or she must be comfortable with the planned treatment.

The following are guidelines, not laws, and they are not absolute. However, when a preponderance of these items is used in the consideration of the planning for one arch or one mouth, a compelling reason exists for the selection of the type of prosthesis described.

Removable partial denture

A removable partial denture is generally indicated for edentulous spaces greater than two posterior teeth, anterior spaces greater than four incisors, or spaces that include a canine and two other contiguous teeth (ie, central incisor, lateral incisor, and canine; lateral incisor, canine, and first premolar; or the canine and both premolars).

An edentulous space with no distal abutment will usually require a removable partial denture. There are exceptions in which a cantilever fixed partial denture can be used, but this solution should be approached cautiously. See the section on cantilevers later in the chapter for a more detailed description of this type of restoration. Multiple edentulous spaces, each of which may be restorable with a fixed partial denture, nonetheless may call for the use of a removable partial denture because of the expense and technical complexity. Bilateral
**Fixed Partial Denture and Implant Configurations**

**Missing: Maxillary canine**

**Implant:** $4.5 \times 15$ mm

**Considerations:** A dental implant is the restoration of choice.

**Restoration:** MCR over a custom abutment (UCLA, Atlantis, or preparable abutment)

---

**Missing: Mandibular canine**

**Implant:** $4.5 \times 15$ mm

**Considerations:** A dental implant is the restoration of choice.

**Restoration:** MCR over a custom abutment (UCLA, Atlantis, or preparable abutment)

---

**Missing: Mandibular canine**

**Abutments:** Central incisor, lateral incisor, and first premolar

**Considerations:** An implant-supported MCR is the restoration of choice in the mandible as well. Use group function to restore the occlusion. If there has been extensive bone loss around the lateral incisor, or if it is tilted to produce a line of draw discrepancy, remove the lateral incisor and use both central incisors as abutments if a fixed partial denture is used. Fortunately, the need to replace this tooth is not common.

**Retainers:** MCRs

**Pontic:** Ovate MCR

**Abutment-pontic root ratio:** 1.9

---

**Missing: Mandibular canine**

**Implant:** $4.5 \times 15$ mm

**Considerations:** A dental implant is the restoration of choice.

**Restoration:** MCR over a custom abutment (UCLA, Atlantis, or preparable abutment)
Simple Fixed Partial Dentures (Two Teeth)

**Missing:** Maxillary central incisor and lateral incisor  
**Abutments:** Central incisor and canine  
**Considerations:** If the central incisor and canine are unblemished and unusually large, pin-modified partial coverage crowns could be used. Patient acceptance and dentist skill are strong considerations. 
**Retainers:** MCRs  
**Pontics:** Modified ridge lap MCR  
**Abutment-pontic root ratio:** 1.2

**Missing:** Maxillary central incisor and lateral incisor  
**Implants:** 4.0 × 12 mm (central incisor), 3.5 × 12 mm (lateral incisor)  
**Considerations:** A large nasopalatine foramen (incisive canal) may interfere with implant placement. If loss of the lateral incisor has caused loss of the facial plate of bone, the resulting facial concavity will place the implant too far to the lingual. This may necessitate bone grafting to eliminate the facial concavity. Splinting the dental implant restoration will reduce rotational forces on the abutment screws, lessening the possibility of screw loosening. Splinting the dental implants will increase restoration strength and stress distribution.  
**Restorations:** MCRs over custom abutments (UCLA, Atlantis, or preparable abutments)

**Missing:** Mandibular central incisors  
**Abutments:** Lateral incisors  
**Considerations:** If there has been any bone loss around the lateral incisors, or if they are malpositioned, remove them. Use MCR retainers on the canines for a tooth-borne fixed partial denture.  
**Retainers:** Resin-bonded retainers if the abutments are unblemished  
**Pontics:** Ovate MCRs or one-piece pontics with a modified ridge lap of pink porcelain  
**Abutment-pontic root ratio:** 1.1
Principle of Substitution

When it is necessary to compensate for mutilated or missing cusps, inadequate length, and in extreme cases even a missing clinical crown, the principle of substitution is employed. For those teeth with moderate to severe damage that test a dentist’s ingenuity, a preparation may be modified by squaring the walls of defects left by caries and old restorations and by adding features to enhance retention and resistance. Boxes may be substituted where grooves might ordinarily be used. Grooves may be used to augment retention and resistance where axial walls have been shortened. Pins may be employed where much of the supragingival tooth structure has been destroyed. More than one of these auxiliary features may be employed where damage is severe.

Two rules should be observed to avoid excessive tooth destruction while creating retention in an already weakened tooth:

1. The central “core” (the pulp and the 1.0-mm-thick surrounding layer of dentin) must not be invaded in vital teeth. No retentive features should extend farther into the tooth than 1.5 mm at the cervical line or from the central fossa (Fig 13-5). If caries removal results in a deeper cavity, any part lying within the vital core should be filled with glass-ionomer cement. Any preparation feature added for mechanical retention is kept peripheral to the vital core.

2. No wall of dentin should be reduced to a thickness less than its height for the sake of retention. This may preclude the use of a full veneer crown, or, if one must be used, it might first require the placement of a core or foundation restoration.
**Box forms**

Small to moderate interproximal caries lesions or prior restorations can be incorporated into a preparation as a box form. This substitute for grooves serves the dual purpose of caries removal and retention form\(^3\)–\(^5\) (Fig 13-6). Because large quantities of tooth structure must be removed for it, the box is not usually used on an intact surface.

Opposing upright surfaces of tooth structure adjacent to a damaged area can be used to create a box form if at least half the circumference (180 degrees) remains in the area outside the lingual walls of the boxes. The walls of the box, and not the line angles, will resist displacement.\(^6\) If the mesial and distal surfaces are extensively involved, another means must be used to compensate for the diminished lingual tooth structure (Fig 13-7). This situation may require a crown placed over a pin-retained amalgam core.

**Grooves**

Grooves placed in vertical walls of bulk tooth structure must be well formed, at least 1.0 mm wide and deep, and as long as possible to improve retention and resistance. Multiple grooves are as effective as box forms in providing resistance,\(^7\) and they can be placed in axial walls without excessive destruction of tooth structure. They may also be added to the angles of oversized box forms to augment the resistance provided by the box walls. This is particularly helpful when the facial and lingual walls of a box are a considerable distance apart. However, too many grooves in a crown preparation can adversely affect the seating of a full veneer crown.\(^8\)
not touch any rests or clasps on that tooth. Resin is added to the outside of the crown, and while the resin is still soft, the crown is seated on the tooth. To form the rest seat and guide planes on the crown, the partial denture is lubricated with petrolatum and seated over the provisional crown. The partial denture should be pumped up and down several times to ensure that it is not locked into any undercuts. The crown is removed from the tooth, any rough areas are smoothed, and the crown is polished.

The restoration should be cemented with a temporary cement of moderate strength. After the zinc oxide–eugenol cement has been mixed to a thick, creamy consistency, an amount of petrolatum equal to 5% to 10% of the cement volume is incorporated to slightly reduce the strength of the cement (Fig 15-22). This will facilitate removal of the provisional restoration at a subsequent appointment. If the preparation is short or otherwise lacking in retention, the petrolatum should not be added.

It is not necessary to keep zinc oxide–eugenol cement dry while it is setting. In fact, moisture will accelerate the hardening. Coating the outside of the restoration with a thin film of petrolatum prior to cementation will aid in the removal of excess cement. After the cement has hardened, all excess must be removed from the gingival crevice. Use an explorer in accessible areas and knotted dental floss interproximally (Fig 15-23).

Template-fabricated provisional fixed partial denture

When a fixed partial denture is to be made for a patient, the provisional restoration should also be in the form of a fixed partial denture rather than individual crowns. In the anterior region it will provide a better esthetic result, and in the posterior region a provisional fixed partial denture will better stabilize the teeth and will afford the patient the opportunity to become accustomed to having a tooth in the edentulous space again.

Template armamentarium

- Diagnostic cast
- Mor-Tight putty (TP Orthodontics)
- No. 7 wax spatula
- Denture tooth
- Crown form
- Vacuum forming machine
- Coping material or temporary splint material
- Quadrant impression trays
- Silly Putty (Crayola)
- Wire frame
- Bunsen burner
- Scissors
- Laboratory knife with no. 25 blade
- Heavy-duty laboratory knife
- Large camel-hair knife
- Cement spatula
- Dappen dish
- Separating medium
- Monomer and polymer
- Medicine dropper
- Heavy rubber band
- Straight handpiece
- Acrylic burs
- Abrasive disks and Moore mandrel

Template technique

To make a template, place a metal crown form or a denture tooth in the edentulous space on the diagnostic cast (Fig 15-24). All of the embrasures should be filled with putty (Mor-Tight) to eliminate undercuts during adaptation of the resin template.

To facilitate removal of the template, a thin strand of putty can be placed around the periphery of the cast and on the lingual surface of the cast, apical to the teeth (Fig 15-25). A large acrylic bur is used to cut a hole through the middle of the cast (midpalatal or midlingual). A 5 × 5-inch sheet of 0.020-inch-thick resin (clear temporary splint vacuum forming material, Buffalo Dental) is placed in the frame of the vacuum forming machine (Sta-Vac II, Buffalo Dental) (Fig 15-26). The heating element of the machine is turned on and swung into position over the plastic sheet.
As the resin sheet is heated to the proper temperature, it will droop or sag about 1.0 inch in the frame. If a coping material is used, it will lose its cloudy appearance and become completely clear (Fig 15-27). The cast should be in position in the center of the perforated stage of the vacuum forming machine. Then the vacuum is turned on.

The handles on the frame that holds the heated coping material are grasped while the frame is forcefully lowered over the perforated stage (Fig 15-28). The heating element is turned off and swung to the side. After approximately 30 seconds, the vacuum is turned off, and the resin sheet is released from the holding frame. After the resin sheet is removed from the frame, a laboratory knife with a sharp no. 25 blade is used to cut through the resin over the Mor-Tight strand (Fig 15-29).

If a vacuum forming machine is not available, it is still possible to fabricate a template for a provisional restoration. A quadrant impression tray is filled with Silly Putty, a soft sili-
The preliminary alginate impression (Fig 28-6a) is removed from the patient's mouth, revealing the negative of the closed tray impression coping and the natural dentition. The closed tray impression coping of each manufacturer has a unique shape that allows it to be accurately reinserted into the preliminary alginate impression. A laboratory implant analog is a replica of the top of the dental implant.

After the preliminary alginate impression is made, the closed tray impression coping is removed from the dental implant, and the healing abutment is replaced. The closed tray impression coping is then secured to the laboratory implant analog with the attachment screw (Fig 28-6b). The combined impression coping, attachment screw, and laboratory implant analog are reinserted into the preliminary alginate impression in preparation for diagnostic cast fabrication (Fig 28-6c). The cast is poured by initially placing dental stone around the exposed laboratory implant analog (Fig 28-7) and then filling the remaining impression with dental stone.

The closed tray impression coping will remain attached to the laboratory implant analog when the preliminary alginate
Impression Taking and Cast Fabrication

The impression tray is separated from the cast (Fig 28-8a). The closed tray impression coping is removed from the cast by unscrewing the attachment screw. This will reveal the top of the laboratory implant analog, which is a replica of the patient’s dental implant with the internal hex (Fig 28-8b). The detailed shape of a closed tray impression coping, while well recorded within impression material, can present a challenge when reseating the impression coping in the impression for cast fabrication.

**Final impression and master cast fabrication**

The open tray impression coping (Fig 28-9a) has an even more detailed shape and a longer attachment screw than the closed tray impression coping. As stated earlier, an open tray impression technique will produce a more accurate cast than a closed tray impression technique because the impression coping remains within the impression material when the impression tray is removed from the mouth. Therefore, the open tray impression technique is recommended for taking a final impression and fabricating a master cast.

The open tray is fabricated on the diagnostic cast with the open tray impression coping attached to the laboratory implant analog with the attachment screw (Figs 28-9b and 28-9c). The diagnostic cast is blocked out around the dentition with two sheets of pink baseplate wax (approximately 2 mm thick), leaving the top two-thirds of the attachment screw exposed. Four vertical stops are cut through the occlusal surface of the block-out wax. The stops should be well spaced to provide impression tray stability during the
Index

Page numbers followed by “f” indicate figures; those followed by “t” indicate tables

A
Abrasive
  definition of, 384
  forms of, 384–385
  Knoop hardness numbers, 384t
Abutments
  contraindications, 85
  criteria for
    crown-root ratio, 85–86
    overview, 85
    periodontal ligament area, 86–88, 88f
    root configuration, 86
    root surface areas, 86f, 86–88
    definition of, 1
  diagnostic casts of, 9
  endodontically treated teeth, 217
  pier, 91f, 91–92
  secondary, criteria for selecting, 90
  tilted molar, 94–95
  tooth-supported fixed partial dentures
    conventional, 84
    resin-bonded, 84
Acid etching, 179, 426
Addition silicone. See Polyvinyl siloxane.
Adjustments, for gold restorations
  contours, 395
  esthetics, 395
  margin finishing, 390–392
  marginal adaptation, 390, 391f
  occlusal
    nonworking movement, 394, 394f
    overcorrection, 392, 393f
    protrusive interferences, 394, 394f
    working movement, 394, 394f
  proximal contacts, 389f, 389–390
  seating completeness, 390
Agar. See Reversible hydrocolloid.
Air brush, 396f
Alginate impressions
  multiple-tooth implant, 544–546, 545f–546f
  overimpression-fabricated custom provisional restorations
    armamentarium, 243
    cementation process
      armamentarium, 247
procedure, 247–248, 247f–248f
  technique, 243–247, 243f–247f
  tooth preparation, 243–247
  single-tooth implant, 533–535, 533f–535f
All-ceramic crowns
  attributes, 77t
  cementation
    armamentarium, 408
    cements
      removal of excess, 410
      selection of, 409
    shade, 409–410
    finishing of rough surfaces, 409, 444
    proximal contacts, 409, 443
    stone smoothing, 444
    technique, 409f, 409–410
  contraindications for, 161
  description of, 76
  evolution of, 425
  fabrication of, 429–434, 430f–434f
  fracture susceptibility of, 161
  illustration of, 76f
  indications, 149
  longevity of, 78, 79t
  occlusal reduction, 138, 138f
  tooth preparations
    armamentarium, 161
    depth-orientation grooves, 161, 161f
    incisal reduction, 161, 161f
    labial reduction, 161–162, 161f–162f
    lingual reduction, 162, 162f
    overview, 162f
    radial shoulder, 162, 162f, 429
    shoulders, 161
All-ceramic restorations
  bonded
    advantages of, 426
    feldspathic porcelain restorations, 426
    highly filled glass-ceramic restorations, 427–428
    cementation of, 443–444
    crowns. See All-ceramic crowns.
    finishing of, 443–444
    high-strength core restorations
      alumina-reinforced substructures, 428–429
      zirconia-reinforced substructures, 429
    overview of, 425–426
Allergies, 3–4
All-metal crown
characteristics of, 77t
longevity of, 79t
All-metal hygienic pontic, fabrication
casting, 486, 486f
die trimming, 482, 482f–483f
excess wax removal, 482, 484f
investing, 486, 486f
plaster matrix, 484, 485f
wax coping, 482–483
Alloys
ADA classification, 364
base metal. See Base metal alloys.
casting of. See Casting.
factors that affect choice of, 364–365
gold
base metal alloys and, differences, 363
investing of, 365
types II and III, casting of
armamentarium, 371
burnout, 371
cleaning the cast, 373–374, 374f
common defects, 375f
pickling, 374, 374f
procedure, 371–373, 372f–373f
gold-palladium
casting
armamentarium, 379
procedure, 379, 379f
for metal-ceramic restorations, 448–449
soldering
burnout, 512
casting, 512
indexing, 509–510
investing, 510–511
preparatory procedures, 509
noble. See Noble alloys.
recommended uses, 364–365
Alumina-reinforced materials, 428–429
Alveolar bone loss, 232
Amalgam
cores for, 208
indications for, 71–72, 193
longevity of, 78, 79t
plaque control, 71
for prefabricated dowels, 217
restorations
complex
attributes, 77t
description of, 73, 75
illustration of, 74f
longevity of, 78, 79t
simple
attributes, 77t
description of, 72–73
illustration of, 74f
longevity of, 78, 79t
strength of, 217
Angle of convergence, 132
Angle of divergence, 132
Anterior guidance, 17f
Denar facebow and articulator, 61–62, 62f
Hanau facebow and articulator
custom settings, 68, 68f
mechanical, 69, 69f
Whip Mix facebow and articulator, 55–56, 55f–56f
Anterior teeth
dowel cores, for endodontically treated teeth
illustration of, 215f–216f
length determinations, 215f
rationale for, 214–217
retentive properties, 215
guidance of mandible, 55–56, 61–62, 68, 69
metal-ceramic crowns. See Metal-ceramic crowns,
anterior teeth.
three-quarter crown, tooth preparations for. See Three-quarter crowns, anterior teeth.
vertical overlap of, 23f
Ante’s Law, 87, 526
Anticoagulants, 520
Anticoagulation, 4
Antirotational devices, for die in working casts
Pindex system, 333–340
straight dowel pin, 330–333, 331f–333f
Antisialagogues, 271
Appearance zone
definition of, 413, 474
incisors
incisal lines, 416
interproximal contacts, 416
midline, 413
pontics, 474
smile line, 413
Arcon articulators
advantages of, 30–31
description of, 30
Articulators
arcon, 30–31
border movements duplicated by, 27
condylar movements, 33f, 33–34
definition of, 27
Denar, 57
fully adjustable, 28–29
Hanau, 63–69
nonadjustable, 27, 28f
nonarcon, 30–31
principles of, 27, 28f
semiadjustable, 27
tooth–transverse horizontal axis relationship, 31f, 31–32
Whip Mix, 45
Aspiration of restorations, 407
Autopolymerizing acrylic resin, 300–302, 301f–302f
Axial contours
full veneer crown, 347f
wax patterns
bulges, 346, 347f
emergence profile, 346, 347f
faciolingual, 345–346, 345f–346f
proximal, 345
Axis, hinge
arbitrary location of, 32
articulator hinge axis and, effect of dissimilarities, 27, 28f–29f
trial and error method to determine, 31

B
Base, 207–208, 209f
Base metal alloys
advantages, 364
beryllium content, 364
fluoride use, 493
gold alloys and, differences, 363
melting temperatures, 364
for metal-ceramic restorations, 448–449
nickel-chromium, 364
soldering, 512
Base metal restorations
adjustments, 397
finishing, preliminary
armamentarium, 397
procedure, 397
polishing, 397
try-in, 397
Bennett angle, 16, 16f
Beryllium
carcinogenic properties of, 364, 449
description of, 364
Bevels
contraindications for, 140–141, 140f–141f
facial, 169f
functional cusp
description of, 138, 139f
for full veneer crown, 150
metal-ceramic crown, 158, 159f
three-quarter partial coverage crowns, 166, 166f
indications for, 140
mesio-occlusodistal onlays, 197–200, 198f–200f
proximo-occlusal inlays, 195f, 195–196
three-quarter crown, 171, 173f
Bilateral balanced occlusion, 20, 361
Binangle chisel, 156, 156f–157f
Biologic width, 212
Bis-acryl composite
characteristics of, 242t
overimpression-fabricated crowns
description of, 256
procedure for creating, 256–259, 256f–259f
Bisphosphonate-related osteonecrosis of the jaws, 6
Bite fork, 46f, 49f, 58
Black triangles, 478
Blow holes, soldering repair of, 503
Bonded ceramic restorations
advantages of, 426
feldspathic porcelain restorations, 426
highly filled glass-ceramic restorations, 427–428
Bonding, 434
Border movements, 27
Box form
for damaged teeth, 205, 205f
substitution of, 136
Bridge. See Fixed partial denture.
Brightness. See Value.
Bruxism, occlusion and, 19
Bur(s), 146t, 174f–175f, 194f. See also specific procedure, armamentarium.
Burnout
definition of, 363
gold alloys, types II and III, 371
high-temperature, 366
low-temperature, 365
C
CAD/CAM system, 320, 427, 457
Canines
in appearance zone, 415
fixed partial dentures for
configurations, one tooth, 107–108
description of, 95, 95f
resin-bonded, 183f
incisal lines, 416f
mandible, 117, 124–125
maxillary, 115f, 124
root surface area of, 526t
Cantilever fixed partial dentures, 95–96, 96f–97f
Caries
resin-bonded fixed partial denture and, 182
restoration of, glass ionomer use, 72, 73f
Casting
alloys, 363–365
definition of, 363
dowel-core patterns, 376
gold alloys, types II and III
armamentarium, 371
burnout, 371
procedure, 371–373, 372f–373f
gold-palladium alloys
armamentarium, 379
procedure, 379, 379f
inlay patterns, 376
investing for, 368–371, 369f–371f
voids, soldering repair of
armamentarium, 503
contraindications, 503
indications for, 503
Casting rings, for gypsum-bonded investments, 368
Casting temperature, 376
Casts, working
mounting of
Denar facebow and articulator
mandibular, 59–60
maxillary, 59, 59f
Hanau facebow and articulator
mandibular, 65–66, 66f
maxillary, 65, 65f
Whip Mix facebow and articulator
mandibular, 52–53
maxillary, 50–52
with removable die
advantages over separate die, 330
antirotational devices, 330, 330f
methods of orienting die in cast
Pindex system, 333–340, 334f–340f
requirements, 330
straight dowel pin, 330–333, 331f–333f
requirements for, 325
with separate die
armamentarium, 325
description of, 325
die preparation, 327–329, 327f–329f
difficulties associated with, 325
finish lines, 327–328, 329f
hardening agents, 328
impression pouring, 325–326, 326f
Cellulose liners, for casting rings, 368
Cement(s)
  bonding mechanisms
    micromechanical bonding, 398, 399f
    molecular adhesion, 398
    nonadhesive luting, 398, 399f
glass ionomer. See Glass-ionomer cement.
polycarboxylate. See Polycarboxylate cement.
resin. See Resin cements.
selection of, 398–401
zinc phosphate. See Zinc phosphate.
Cement film, 141f
Cementation
  all-ceramic restorations
    armamentarium, 408
cements
    removal of excess, 410
    selection of, 409
    shade, 409–410
    finishing of rough surfaces, 409
    proximal contacts, 409
    technique, 409f, 409–410
ceramic crowns, 444–445
description of, 401
dowel cores, 407–408, 408f
fixed partial dentures, 410
gold inlays, 407
metal-ceramic crowns, 410
with polycarboxylate cement, 407
with resin cements, 402–404, 403f
with resin-modified glass-ionomer cement, 401–402
vent holes for cement escape, 402f
with zinc phosphate cement
cement preparation, 404–405, 405f
mandibular isolation, 404, 404f
pulp protection, 404
removal of excess cement, 406
restoration seating, 405–406, 406f
vital tooth considerations, 404
Cemented restorations
  external surface
    finishing of, 383
    plaque accumulation on, 383, 383f
    indications for, 71–72
  internal surface, 383
    plaque control, 71
  provisional
    armamentarium, 247
    procedure, 247–248
Central incisors
  fixed partial dentures for
    complex
      more than two teeth, 117–118
      two teeth, 113–114
    pier abutments, 120–122, 129
    simple
      one tooth, 100–101
      two teeth, 109–110
  root surface area of, 526t
Centric occlusal interference, 17, 18f
Centric relation, 13
Centric relation record
  armamentarium, 35
description of, 35
technique
  anterior programming device, 37, 37f
  baseplate wax adaptation to maxillary teeth, 37–38
  bimanual manipulation, 35–36, 36f
  manipulation of mandible, 36f, 36–37
  patient positioning, 36–37
  registration base use, 37–38, 38f–39f
Ceramic liners, for casting rings, 368
Ceramic restorations. See also All-ceramic restorations.
etching of, 426
inlays
  attributes, 77t
description of, 75
illustration of, 74f
longevity of, 78, 79t
veneer crowns
  all. See All-ceramic crowns.
  attributes, 77t
cementation, 444–445
description of, 76
illustration of, 76f
longevity of, 78, 79t
Chamfers. See also Finish line(s).
advantages of, 144t
description of, 141
disadvantages of, 144t
full veneer crown, 150
heavy, 141
illustration of, 142f
resin-bonded fixed partial denture, 182
Chemical bonding, 448
Chroma, 419
Classic shoulder finish line, 142, 143f, 144t
Clenching, occlusion and, 19
Colloid solutions. See Hydrocolloid.
Color, for shade selection of ceramic restorations
  characteristics of, 419
daily functions’ effect on, 419
factors that affect, 418
light sources’ effect on
  artificial, 418f, 418–419
  natural, 418, 418f
Color blindness, 418
Composite resin restorations
attributes, 77t
criteria for, 71–72
inlays, 72, 74f
longevity of, 78, 79t
Condensation silicones
armamentarium, 311
characteristics of, 292t
disadvantages, 310–311
impression making, 311–312, 311f–312f
putty/reline, 311
reaction of, 310
viscosity, 293, 293f
wettability, 291
Condyles
guidance
on Denar facebow, 60–61, 61f
effect on posterior teeth, 21–22, 21f–22f
on Hanau facebow, 66–67, 67f–68f
on Whip Mix facebow, 50f, 53f–54f, 53–55
inclination of, on arcon and nonarcon articulators, 30, 30f
movements of
articulator reproduction of, 27, 33f, 33–34
pantographic recordings, 33f, 33–34
positioning of, 13
Cone beam computed tomography, 520–521, 521f
Connectors
definition of, 1
nonrigid
cross-pin and wing, 515, 515f
dovetail, 513–514, 513f–514f
for pier abutments, 91–92, 92f, 513–514
split pontic, 514
for tilted molar abutments, 94, 94f
rigid, contraindications for, 91–92
soldering. See Soldering.
Contacts, proximal
adjustments for, 389f, 389–390
all-ceramic restorations, 409, 443
metal-ceramic restorations, 450–451
soldering
armamentarium, 502, 502f
indications for, 502
Coping
for fabrication of wax patterns, 343–344, 344f
metal-ceramic restorations
alloy used, melting range of, 448
description of, 447
extent of veneered area, 451–453, 452f–453f
facial margins, 454
metal collar, 454
occlusal contacts, 450–451, 451f
overview, 449
porcelain support, 450, 450f
porcelain veneer, 449–450
proximal contacts, 450–451
thickness of metal, 450
Core
composite resin, 208
pin-retained, 207f, 208
Cross-pin and wing, 515, 515f
Crown-root ratio, for abutment teeth, 85–86
Crowns
all-ceramic. See All-ceramic crowns.
cement retention of, 524, 525f
definition of, 1
derodontic access preparation, 215
full coverage. See Full coverage crown.
lengthening of, for gingival exposure, 287–288
longevity of, 78, 79t
metal-ceramic, 75, 151–152, 158–160
partial coverage. See Partial coverage crowns.
placement, 206f, 206–207
preformed anatomical metal
armamentarium, 264
procedure, 263–267, 264f–267f
provisional, for endodontically treated tooth, 263, 263f
removal force resistance by, 72f
retention and resistance, 131, 131f
tapering of, 132–133
three-quarter, 171–178
Crucible, 371
C-terminal cross-linking telopeptide, 520
Curve of Spee, 354
Curve of Wilson, 355
Cusp(s)
mandibular teeth, 349t
maxillary teeth, 349t
Cusp-fossa
curve of Spee, 354
curve of Wilson, 355
cusp placement and occlusal contacts, 354f
definition of, 354
description of, 348t
illustration of, 348f
wax patterns of, 355–358, 355f–358f
Cusp–marginal ridge
cusp placement and occlusal contacts, 350f
description of, 348–349
wax patterns of
mandibular teeth, 352, 353f
maxillary teeth, 350–352, 351f–352f
Custom provisional restorations
overimpression-fabricated. See Overimpression-fabricated custom provisional restorations.
shell-fabricated
armamentarium, 254
description of, 254
procedure, 254–255, 255f
template-fabricated
armamentarium, 248
fabrication process, 248–252, 248f–252f
visible light–cured
armamentarium, 252
fabrication process, 252–254
Custom resin trays
adhesives, 298–299
armamentarium, 299
autopolymerizing acrylic resin, 300–302, 301f–302f
composition of, 299
faciolingual section of, 298f
preparation, 299–302
stock trays and, comparison, 298
uses of, 298
for VLC, 299f–300f, 299–300
Cutback areas, 462, 463f–464f
Cuttle, 384

D
Dam, rubber, 269, 272
Damaged teeth
destruction areas, 203, 204f
orthodontic adjuncts
extrusion, 212f, 212–214, 214f
regaining interproximal space, 210
preparations for
bases, 207–208
cores, 208
retention and space
methods to avoid excessive destruction, 203–204
substitutive methods for creating
box forms, 205, 205f
overview, 204
pins, 206–207
vital teeth, modifications for, 208–210, 209f
Deep chamfer finish line, 141–142, 143f, 144t
Dental implants. See Implants.
Depth-orientation grooves
all-ceramic crowns, 161, 161f
full veneer crown, 149–150
metal-ceramic crowns, 154, 155f
Devitrification, 467
Diagnostic casts, 9, 522, 522f
Diagnostic work-up
casts, 9
elements of, 1–2
full-mouth radiographs, 9
history taking, 2–6
intraoral examination, 8f, 8–9
Die, for working casts
removable
advantages over separate die, 330
antirotational devices, 330, 330f
methods of orienting die in cast
Pindex system, 333–340, 334f–340f
straight dowel pin, 330–333, 331f–333f
requirements, 330
separate
armamentarium, 325
description of, 325
die preparation, 327–329, 327f–329f
difficulties associated with, 325
finish lines, 327–328, 329f
hardening agents, 328
impression pouring, 325–326, 326f
Die milling, 428
Digital impressions, 320–322, 321f
Disinfection, of impressions, 319–320
Disocclusion, 21
Distofacial root, of maxillary molar, 234, 234f
Double-bite impression, 305
Dovetail connector, 513–514, 513f–514f
Dowel cores
aspiration during try-in, 407–408
cemented vs threaded, 218
classification of, 218
for damaged teeth, 215f–217f
diameter of, 223f
devitalized teeth
illustration of, 215f–216f
length determinations, 215f
rationale for, 214–217
recessive properties, 215
illustration of, 215f–217f
insertion procedure, 220, 220f–221f
length determinations, 215f
for posterior teeth, 215–216
prefabricated, with amalgam or resin core, 217–218
rationale for, 214–217
retenitive properties, 215
tooth preparation for
armamentarium, 218
custom cast
armamentarium, 222
canal preparation, 222–223
finishing and cementation, 224–225, 225f
instrumentation, 222t
resin pattern fabrication, 223–224, 224f
Peeso reamer use, 218–219, 218f–219f
pin placement, 220, 220f
prefabricated with amalgam or composite resin core
armamentarium, 218
diameter recommendations, 219, 219f
Peeso reamer use, 218–219, 218f–219f
pin placement, 220, 220f
technique, 218–220
for pulpless teeth, 215f
wax patterns, 376
Dowel inlays, 222
Dowel pins
armamentarium, 331
location, 330
procedure, 331–333
Dry mouth, 5–6
Dual-arch impressions
advantages of, 302
armamentarium for, 302
technique for, 303–306, 303f–306f
variations of, 302
Edentulous ridge
classification of, 477, 477f
deformities, 477, 477f
pontic modification, 478–479, 478f–479f
surgical correction
Class II and III defects, 480, 481f
donor tissue, 480
incisions, 479–480, 480f
Edentulous spaces
  fixed partial denture, 84–85, 99–100
  removable partial denture, 81–82, 84
Electrochemical etching, 179
Electrosurgery
  armamentarium, 284
  contraindications, 284
  crown lengthening, 287–288
  current types, 282, 282f
  edentulous cuff removal, 287, 287f
  gingival sulcus enlargement, 286
  grounding, 283, 283f
  recommended uses, 281, 281f
  technique, 284–285, 285f–286f
  tissue damage from, 281
Emergence profile, 346, 347f
Endodontically treated teeth
  abutment use, 217
  anterior teeth, 215
  dowel cores. See Dowel cores, endodontically treated teeth.
    technique, 218–220
Endosseous implants, 517, 518f–519f, 519
Epinephrine
  cardiovascular disease contraindications, 4
  in gingival retraction cord, 273, 273t
Esthetic zone, 474
Esthetics
  absolute, 417
  appearance zone
    definition of, 413
    incisors
      incisal lines, 416
      interproximal contacts, 416
    midline, 413
    smile line, 413
    conversational, 417
    ideal, 416–417, 417f
Etching
  acid, 179, 426
  electrochemical, 179
Examination, intraoral, 8f, 8–9
Expansion methods, for shrinkage during investing
  hygroscopic, 365
  setting, 365
  thermal, 365–366
  wax pattern, 365
Extracoronal restorations, 75–76
Extrusion, for damaged teeth, 212f, 214f
  arch wire, 213, 213f
  biologic width, 212
  determination of amount needed, 213f
  endodontic treatment, 212–214
  ferrule effect, 212
  pin placement, 213, 213f
  surgical crown lengthening vs, 212f
F
  Facebows
    articulator use, 31–32
    caliper-style, 32, 32f
  Denar
    anterior guidance settings, 61–62, 62f
    armamentarium, 57
    cast mountings, 59–60
    components of, 57f
    condylar guidance settings, 60–61, 61f
    description of, 57
    facebow record, 57–58, 60f–61f
    description of, 31
  Hanau
    anterior guidance
      custom settings, 68, 68f
      mechanical, 69, 69f
    armamentarium, 63
    cast mountings, 65–66
    components of, 63f
    condylar guidance, 66–67, 67f
    facebow record, 63–65, 64f
    hinge axis points, arbitrary, 32
    transverse horizontal axis recordings, 31
  Whip Mix
    anterior guidance, 55–56, 55f–56f
    armamentarium, 45
    cast mountings, 50–53
    components of, 45f
    condylar guidance, 50f, 53f–54f, 53–55
    facebow records, 45–46, 45–48, 46f
  Facial bevel, 169f
  Facial roots, of maxillary molar, 237
  Faciolingual axial contours, 345–346, 345f–346f
  Facio-occlusal finish line, 144, 145f
  Feldspathic porcelain restorations, 426
  Ferrule effect, 212
  Fineness, 493
  Finish line(s)
    advantages of, 144t
    bevels, 141
    chamfer, 141, 142f, 144t
    classic shoulder, 142, 143f, 144t
    configurations for marginal integrity, 141–145
    deep chamfer, 141–142, 143f, 144t
    disadvantages of, 144t
    facio-occlusal, 144, 145f
    knife edge, 144, 144f, 144t
    placement of
      near alveolar crest, 145
      subgingival, 145
      supragingival, 145
      radial shoulder, 142–143, 143f, 144t
      shoulder with a bevel, 143f, 143–144
  Finish line exposure
    chemicomechanical, 273–278
    criteria for, 273
    decongestants, 275
    electrosurgery. See Electrosurgery.
    lasers for, 288f, 288–289
    mechanical, 272, 272f
    retraction cord
      armamentarium, 275
      chemical types, 274t
      epinephrine, 273
Index

placement of, 275–278, 275f–279f
rotary curettage, 280, 280f
rubber dam, 272

Finishing
base metal restorations, preliminary, 397
gold restorations
postcementation, 396
preliminary
armamentarium, 385
procedure, 385–387, 386f–387f
margins, for wax patterns, 358–360, 359f–360f

Fixed partial dentures
abutment teeth
crown-root ratio, 85–86
ideal types, 84
arch curvature, 90, 90f
biomechanical considerations, 89–90, 89f–90f
canine-replacement, 95, 95f
cantilever, 95–96, 96f
casting of, single-piece, 494
cementation, 410
configurations
complex
more than two teeth, 117–120
one tooth, 107–108	
two teeth, 113–117
simple
one tooth, 100–107
two teeth, 109–113
connectors, 91–94, 94, 513–515
definition of, 1
deflection of, 89f, 89–90
faciolingual movement, 91, 91f
illustration of, 3f
implant-supported, 84–85
metal-ceramic
coping wax pattern, 487–490, 488f–490f
incisal configuration, 486
metal coping, 486
rigidity, 486–487
soldering
indications for, 504
methods, 504, 504f
postveneer, 509–512, 509f–512f
preveneer, 505–508, 505f–508f
requisites for, 493
single-piece casting, 494
tooth-supported
conventional, 84
resin-bonded, 84
wax patterns, 378
Fluid control methods
antisialagogues, 271
high-volume vacuum, 269–270, 270f
rubber dam, 269
saliva ejector, 270
Svedopter, 270–271, 270f–271f
vacuum attachments, 269f
Freedom of displacement, 133–134, 134f

Full coverage crown
axial contours, 347f
definition of, 1
esthetics, 71
illustration of, 2f
indications for, 149
partial coverage crown and, comparison, 149, 165
prevalence of, 149
retention of, 71–72
tooth preparation for
armamentarium, 149
axial reduction, 150, 150f
chamfer, 150
depth-orientation grooves, 149–150
finishing lines, 150
functional cusp bevel, 150
occlusal reduction, 149, 150f
overview, 149, 151f
seating groove, 151
venting of, 401

Functional cusp bevel
description of, 138, 139f
for full coverage crown, 150
for metal-ceramic crown, 158
for MOD onlay, 198
for partial coverage crown, 166

Functionally generated path technique
advantages, 361
definition of, 360
functional core, 360

Furcation
definition of, 230
flutes, 230
preparation finish lines, 229f, 229–230, 231f
root resections affected by, 232

Fusion temperature, 376
metal-ceramic alloys
indications for, 504
methods, 504, 504f
postveneer, 509–512, 509f–512f
preveneer, 505–508, 505f–508f
methods of, 504, 504f
preveneer, 504
proximal contacts, 502–503
repair of casting voids, 503
requisites for, 493

resin-bonded. See Resin-bonded fixed partial dentures.
soldering
breaking of joint, 503–504
distortions, 496
gold alloy
distortions, 496
indexing, 494
investing, 497–499, 497f–499f
procedure, 500–501, 500f–501f
single-piece casting, 494

562
G
Gingiva, finish line exposure of. See Finish line exposure.
Gingival collar, 230f
Gingival sulcus, 281, 286
Glass-ionomer cement
- attributes of, 77t
- bacteriostatic properties, 400
- composition of, 400
- disadvantages, 400–401
- factors that affect, 401
- hybrid, 401
- indications for, 72, 73f
- longevity of, 78, 79t
- properties, 400–401
- pulp protection for damaged teeth, 207
- resin-modified, 401–402
Glass-ceramic restorations, highly filled, 427–428
Glenoid fossae, 13
Glycosylated hemoglobin, 5, 5t
Gold alloys
- casting of, 371–373
- casting defects, 375f
- cleaning the castings, 373–374, 374f
- pickling the castings, 374, 374f
- investing of, 365
- properties of, 363
Gold restorations
- adjustments
- contours, 395
- esthetics, 395
- margin finishing, 390–392
- marginal adaptation, 390, 391f
- occlusal, 392–394
- proximal contacts, 389f, 389–390
- seating completeness, 390
- cementation, 401–407
- finishing
- postcementation, 396
- precementation polishing, 395, 395f–396f
- preliminary, 385–387, 386f–387f
- try-in
- anesthesia use, 387
- armamentarium, 387
- precautionary procedures, 388, 388f
- provisional crown
- patient hypersensitivity, 387
- removal, 388
Golden rectangle, 415, 415f
Gold-palladium alloys
- casting, 379, 379f
- for metal-ceramic restorations, 448–449
- soldering
- burnout, 512
- indexing, 509–510
- investing, 510–511
- preparatory procedures, 509
Grooves
- depth-orientation
- all-ceramic crowns, 161, 161f
- full coverage crown, 149–150
metal-ceramic crowns, 154, 155f
retentive, 136
Group function, 20
H
Hemisection, 232, 237–238, 238f
Hepatitis B, 9–10
Highly filled glass-ceramic restorations, 427–428
Hinge axis
- accuracy of, 32t
- arbitrary location of, 32
- and articulator hinge axis, effect of dissimilarities, 27, 28f–29f
- trial and error method to determine, 31
History, patient, 3–6
Horizontal symmetry, 413
Hue, 419
Hybrid ionomer cements, 401
Hydrocolloids, reversible, 294–298
- irreversible hydrocolloids and
- concomitant use, 294
- disadvantages of, 294–295
- origins of, 294
- storage of impressions, 294
- wettability, 291
Hygienic pontic, all-metal
- casting, 486, 486f
- die trimming, 482, 482f–483f
- excess wax removal, 482, 484f
- investing, 486, 486f
- plaster matrix, 484, 485f
- wax coping, 482–483
Hygroscopic expansion, 365
I
Implants
Brånemark, 519
- crown retention, 524
- diameter of, 526–527
- endosseous, 517, 518f–519f, 519
- history of, 517–519
- ideal positioning of, 524, 524f
- inclination of, 525, 525f
- length of, 526–527
- number of, 526–527
- occlusal considerations, 527
- in partially edentulous patients, 517, 517f
- placement of, 525f–526f, 525–527
- restoration retention over, 524–525
- single-tooth. See Single-tooth implant.
- size of, 527t
- subperiosteal, 517, 518f
- surgical splint for, 526, 526f
- treatment planning of
- anatomical structures, 523, 523f
- cone beam computed tomography, 520, 521f
- diagnostic casts, 522, 522f
- health history, 520
- imaging, 520–521
- oral examination, 520
Implant-supported fixed partial denture
   characteristics of, 83t
   description of, 84
   retainers, 84
   span length, 83t, 84

Impressions
   alginate. See Alginate impressions.
   condensation silicones. See Condensation silicones.
   criteria, 291
   definition of, 291
digital, 320–322, 321f
disinfection of, 319–320
dual-arch. See Dual-arch impressions.
factors in selecting
   cost, 293
   viscosity, 293, 293f
   wettability, 291
hydrophilic vs hydrophobic, 291
pin-retained restorations, 318–319, 319f
polyether. See Polyether.
polysulfide. See Polysulfide.
polyvinyl siloxane. See Polyvinyl siloxane.
shear rate, 293
single-tooth implant
   alginate, 533–535, 533f–535f
closed tray, 532–533, 533f
final, 535–539, 535f–539f
open tray, 532–533, 533f

Incisal curve, 413
Incisal reduction
   all-ceramic crowns, 161, 161f
   laminate veneer, 436, 436f
   metal-ceramic crowns, 154, 155f
three-quarter crown, 171, 172f
Incisive canal, 523
Incisors
   central, fixed partial dentures for
      complex
         more than two teeth, 117–118
         two teeth, 113–114
      pier abutments, 120–122, 129
      simple
         one tooth, 100–101
         two teeth, 109–110
   esthetic length of, 413, 414f
   incisal edges, 416
   mandibular, 126
   maxillary, 115f, 125
preparation of, for resin-bonded fixed partial denture,
   183f
   root surface area of, 526t

Index, soldering
   armamentarium, 495, 495f–496f
   function of, 494
   gap width, 496
   procedure, 495–496
Infectious disease
   patient history taking for, 3
   protective measures, 9–10, 10f

Inlays
   cementation, 407
   ceramic
      cementation, 444–445
      description of, 75
   definition of, 1
dowel-inlay, 222
   illustration of, 2f
   indications, 193
   metal. See Metal inlays.
   proximo-occlusal
      armamentarium, 194
      bevel, 195f, 195–196
      flares, 194–195, 195f
      gingivoaxial groove, 194, 195f
      marginal ridge, 194
      occlusal outline, 194
      overview, 196f
      proximal box, 194
   wax patterns, 343

Interferences, occlusal, 17–18, 18f
Interocclusal records, 42f
   articulator use of, 30
   centric relation. See Centric relation record.
   definition of, 30
   maximal intercuspation, 40–41
Interproximal space
   loss from tooth migration, 211f
   methods to regain, 210

Intracoronal restorations
   amalgam, 71–79, 208, 217
   composite resin
      attributes, 77t
      criteria for, 71–72
   inlays, 72, 74f
   glass ionomer, 72, 207, 400–401
   inlays. See Inlays.
   retention and resistance, 131, 131f
   stress concentrations, 193

Investing
   for casting
      base metal alloys, 380
      crowns, gold alloy, 371–373, 372f–373f
      dowel-cores, 376
   expansion methods, 365–366, 376
   fixed partial denture, gold alloy, 497–499, 497f–499f
   general procedure, 368–371, 369f–371f
   gold-palladium alloys, 379, 379f
   inlays, gold, 376
   definition of, 363
   for soldering
      metal-ceramic alloys, 506–508, 510–511
      type III gold, 497–499, 497f–499f

Investments, casting
   gypsum-bonded, 366–376
   phosphate-bonded, 377f
   requirements of, 365
Irreversible hydrocolloid, 291, 294
J
Joining, 493
Joints, solder. See Soldering.

K
Keyway, 223, 223f, 513
Knife edge finish line, 144, 144f, 144t
Knoop hardness numbers, 384t

L
Laminate veneer
  composite resin, 434
  definition of, 1
  porcelain. See Porcelain laminate veneer.
  working casts, 437–438
Laminating, 435
Lasers, for finish line exposure, 288f, 288–289
Lateral incisors
  fixed partial dentures for
    complex, 113–116
    pier abutments, 120–123, 126–127, 129
    simple
      one tooth, 101–102
      two teeth, 109
    root surface area of, 526t
Lateral interocclusal record, 42–43
Lateral translation, 24f
Leucite-reinforced material, 427
Light
  artificial, 418f, 418–419
  natural, 418, 418f
Lingual index, 154f
Lingual reduction
  all-ceramic crowns, 162, 162f
  metal-ceramic crowns, 154
  resin-bonded fixed partial dentures, 185f
  three-quarter crown, 171, 172f
Lithium disilicate-reinforced material, 427
Lost salt technique, 179

M
Mandible
  movement
    Bennett angle, 16, 16f
    determinants
      anterior guidance, 22–24
      condylar guidance, 21–22, 21f–22f
    description of, 17
    molar disocclusion, 21
    posterior. See Temporomandibular joint.
    effect of anterior teeth, 17
    excursion, 15–16, 16f
    protrusive, 15, 16f
    types of, 15, 15f
    positioning of
dysfunctional, 14f
  healthy, 14f
    methods to guide, 13
    terminal hinge axis theory, 15
Mandibular canal, 523, 523f
Mandibular teeth
  cusp placement, 349t
  cusp–marginal ridge, 352, 353f
  hemisection, 237–238, 238f
  incisors
    esthetic length of, 413, 414f
    preparation for resin-bonded fixed partial denture, 183f
    root surface areas, 87f
Margins
  beveling vs not beveling, 140–141, 140f–141f
  finishing
    for gold restorations, 390–392
    for wax patterns, 358–360, 359f–360f
Maryland bridge, 179
Master cast
  multiple-tooth implant, 552, 552f
  single-tooth implant, 539, 539f–540f
Maxillary sinuses, 523
Maxillary teeth
  cusp placement, 349t
  incisors
    esthetic length of, 413, 414f
    incisal edges, 416
    preparation for resin-bonded fixed partial denture, 183f
    root resections of
distofacial root, 234
    mesiofacial root, 235, 235f
  root surface areas, 87f
  wax patterns of cusp–marginal ridge, 350–352, 351f–352f
Maximal intercuspation record, 40–41, 41f
MCR. See Metal-ceramic restorations.
Mesiofacial root, of maxillary molar, 235, 235f
Mesio-occlusodistal onlays
  attributes, 77t
  description of, 75
  illustration of, 74f
  indications for, 197
  longevity of, 78, 79t
  mandibular molar preparations for, 200f
  maxillary teeth preparations for, 197–200
  stress concentrations, 197, 197f
Metal inlays
  attributes of, 77t
  Class 1, 196, 196f
  Class 3, 196, 196f
  Class 5, 196f, 196–197
  description of, 75
  illustration of, 74f
  longevity of, 79t
  tooth preparations for, 196–197
Metal-ceramic crowns
  anterior teeth
    armamentarium, 152
    axial reduction, 154, 155f
    depth-orientation grooves, 154, 155f
    finish lines, 154, 156
    incisal reduction, 154, 155f
    labial reduction, 154, 155f
    lingual reduction, 154
occlusal reduction, 152, 152f
overview, 157f
proximal reduction, 154
putty molds, 152, 153f
radial shoulder, 154, 156, 156f
shoulders, 154, 156
technique, 152–157, 153f–157f
attributes, 77t
cementation, 410
description of, 75, 151–152
illustration of, 76f
indications, 149
longevity of, 78, 79t
path of insertion, 137f
on periodontally weakened teeth, 229
plaque accumulation, 383, 383f
posterior teeth
axial reduction, 159f–160f
depth-orientation grooves, 159f
facial reduction, 159f
functional cusp bevel, 159f
gingival bevel, 160
indications, 158
occlusal reduction, 158, 159f
preparation for
armamentarium, 158
axial reduction, 159
depth-orientation grooves, 158
facial reduction, 158
functional cusp bevel, 158
gingival bevel, 160f
occlusal reduction, 138, 138f
overview, 160f
radial shoulder, 160
selective use of, 158
thickness requirements, 152
Metal-ceramic restorations
all-ceramic restorations and, comparison, 447
alloy types, 448–449, 449t
bonding mechanisms, 448
CAD/CAM application to, 457
cementation, 467–468
chairside correction of, 468
composition of, 447
coping design
extent of veneered area, 451–453, 452f–453f
facial margins, 454
metal collar, 454
occlusal contacts, 450–451, 451f
overview, 449
porcelain support, 450, 450f
porcelain veneer, 449–450
proximal contacts, 450–451
thickness of metal, 450
crowns. See Metal-ceramic crowns.
finishing, 467–468
fixed partial dentures
coping wax pattern, 487–490, 488f–490f
incisal configuration, 486
metal coping, 486
requirements, 486
rigidity, 486–487
soldering, 504, 504f
layers of, 447f
maxillary molar, 234f
metal coping, 447
 pontics, 471, 471f, 476
porcelain addition
all-porcelain margin fabrication, 459–462, 459f–462f
dentin and enamel porcelain, 462–467, 463f–467f
opaque application, 458, 459f
soldering of, 504, 504f
surface treatment, 467
wax pattern
alloy surface treatment, 457, 457f
all-wax technique, 455–457
heat treatment, 458
single coping, 454–458, 455f–458f
Metamerism, 419
Micromechanical bonding, of cements
description of, 398
illustration of, 399f
Missing teeth, treatment options for
case presentation, 85
considerations, 81, 85
removable partial denture, 81–82, 83t, 85
MOD onlay, 75, 197–200
Molars
first, 119
fixed partial dentures
cantilever, 96
configurations for
one tooth, 105–107
pier abutments, 128–129
two teeth, 111–113
resin-bonded, preparations for, 184f
reverse three-quarter crown, 170, 170f
root surface area of, 526t
Molecular adhesion, of cements, 398
Multiple-tooth implant
healing of, 543
 impressions
alginate, 544–546, 545f–546f
closed tray, 544
final, 546–551, 546f–551f
open tray, 544
master cast articulation, 552, 552f
placement of, 543, 543f, 553, 553f
study cast for, 544–545, 545f–546f
wax-up, 553, 553f
Mutually protected occlusion, 20, 361
N
Nasal cavity, 523
Nickel-chromium alloys, 364
Noble alloys
ADA classification system, 363
gold content, 363
heat treatment, 458
melting temperature, 448
types of, 363
Nonadhesive luting, 398
Nonarcon articulators, 30
Nonrigid connectors. See Connectors, nonrigid.
Nonworking interference, 18f, 394

O
Oclusion
bilateral balanced, 20
diagnostic casts, 9
disharmony of, 19f
evaluation of, 6–8
implant considerations, 527
interferences, 17–18
mandibular movement. See Mandible, movement.
mutually protected, 20
normal vs pathologic, 19
unilateral balanced, 20
wax patterns
cusp-fossa
cusp placement and occlusal contacts, 354f
definition of, 354
description of, 349t
illustration of, 348f
origins, 355
procedure, 355–358, 355f–358f
cusp–marginal ridge
cusp placement and occlusal contacts, 350f
description of, 348–349
for mandibular teeth, 352, 353f
for maxillary teeth, 350–352, 351f–352f
Onlay
definition of, 1
illustration of, 3f
mesio-occlusodistal. See Mesio-occlusodistal onlays.
Organo-tin silicones, 310–312
Osseointegration, 519
Osteonecrosis, 6
Overimpression-fabricated custom provisional restorations
alginate
armamentarium, 243
cementation process
armamentarium, 247
procedure, 247–248, 247f–248f
technique, 243–247, 243f–247f
tooth preparation, 243–247
bis-acryl composite crown, 256–259, 256f–259f
Oxidation cycle, 458, 458f

P
Palatal root, of maxillary molar, 236–237, 236f–237f
Palladium alloys
gold
casting, 379, 379f
for metal-ceramic restorations, 448–449
soldering, 509–512, 509f–512f
silver, 363
Pantograph
air-activated, 33f
condylar movement recordings, 33f, 33–34
description of, 33
fully adjustable articulator use with, 34
Partial coverage crowns
advantages of, 165
characteristics of, 77t
definition of, 1
full coverage crown and, comparison, 149, 165
illustration of, 2f
indications, 165
lingual grooves, 165, 165f
longevity of, 79t
retention of, 165
seven-eighths crown, 170, 170f
diagnosis of, 18f, 394
three-quarter, tooth preparations for
anterior teeth
overview, 173f
path of insertion, 171
tooth preparation, 171–173
pin-modified, 174–178
posterior teeth, 166–170
Partial dentures
fixed. See Fixed partial dentures.
removable, 81–82, 84, 247–248
Path of insertion, 136, 137f
Periodontal ligament area, 86–88, 88f
Periodontically weakened teeth
finish line modifications
furcation flutes, 230, 231f
location, 229f, 229–230
nonresection methods, 239t
root resection. See Root resection.
Periodontium, finishing line effects on, 145
Phosphate-bonded investments
alloy types, 376
armamentarium, 376
casting
base metal alloys, 380
gold-palladium alloys, 379, 379f
expansion methods, 376
indications for, 376
investing procedure, 376–379, 378f
sprue former, 376–377
Pickling, 374, 374f
Pier abutments
description of, 91–92
fixed partial denture configurations, 120–129
illustration of, 91f
nonrigid connectors, 91–92, 92f
Pin(s)
for damaged teeth, 206–207
dowel
armamentarium, 331
location, 330
procedure, 331–333
in restorations, impressions for, 318–319, 319f
retentive, 174f
uses of, 206
Pinhole
drilling of, 206–207
placement areas, 206f
substitution of, 136
Index

Pindex system
- base to cast, process for adding, 337–339
- components, 334f
- description of, 333
- pinholes, 335–336
- pouring of impression, 333
- technique, 334f–340f

Pin-modified three-quarter crown
- indications for, 174
- retention, 174
- tooth preparation for
  - armamentarium, 176
  - axial reduction, 176, 176f
  - bevel, 178
  - cutting holes, 174–175
  - flares, 177
  - grooves, 176–177, 177f
  - offset, 177, 178f
  - overview, 178f

Pitting, 493
Plasma glucose, 5, 5t
Polishing materials
- abrasives, 384–385
- description of, 384

Poly carbonate crown, anterior, 260–263
Poly carboxylate cements
- cementation, 407, 407f
- compressive strength, 400
- indications, 400
- pulp protection for damaged teeth, 207

Polyether
- armamentarium, 318
- characteristics of, 292t
- description of, 318
- effect of disinfectant solutions, 319–320
- impression making, 318
- wettability, 291

Poly ethyl methacrylate, 242t
Polymerization, 242
Polymerization shrinkage, 72
Poly methyl methacrylate, 241–242, 242t

Polysulfide
- armamentarium, 307
- characteristics of, 292t
  - in custom resin trays, 299
  - effect of disinfectant solutions, 319–320
  - hydrophobic nature, 307
  - impression making, 307–310, 308f–310f
  - packaging of, 307
  - viscosity, 293f

Poly vinyl siloxane
- armamentarium, 315
- bonding strength of, 298–299
- characteristics of, 292t
- description of, 312–313
- effect of disinfectant solutions, 319–320
- formulations, 313–315
- hydrophobic nature, 313
- impression making, 315–317, 316f–317f
- overimpression-fabricated crowns, 256–259, 256f–259f

porcelain
- addition of, to metal-ceramic restorations
  - all-porcelain margin fabrication, 459–462, 459f–462f
  - dentin and enamel porcelain, 462–467, 463f–467f
  - opaque application, 458, 459f
- contouring of, 468
- glazed, 435

Porcelain jacket crown, 425, 425f. See also All-ceramic crowns.

Porcelain laminate veneer
- description of, 434
- developmental stages of, 434–435
- dies
  - fabrication of, 437–438, 438f
  - gingival retraction, 437
  - illustration of, 3f
  - impression, 437
  - refractory, 438f–441f, 438–441
  - removable, 437–438
- indications, 435
- porcelain application
  - color, 441
  - procedure for, 441–443, 442f–443f
  - shade selection, 441
- preformed, 434
- provisional restorations, 445
Index

removable, 437–438
silane coupling agent, 435
tooth preparation
axial outline, 436, 436f
axial reduction, 436, 436f
depth-reduction grooves, 436f
facial reduction, 435, 435f–436f
finish line, 435, 437
finishing, 437, 437f
incisal finish line, 437
incisal reduction, 436, 436f
proximal refinement, 437
tissue management, 437
tooth reduction, 435
working casts, 437–438

Porcelain release agent, 460
Porcelain-fused-to-metal restoration. See Metal-ceramic crowns.

Posterior teeth
contact with mandible, 20
fixed partial dentures for, 99
metal-ceramic crowns. See Metal-ceramic crowns, posterior teeth.
three-quarter crowns. See Three-quarter crowns, posterior teeth.

Precious metals. See Noble alloys.

Prefabricated provisional restorations
anterior polycarbonate crown
armamentarium, 260
overview of, 260
procedure, 260–263, 260f–263f
preformed anatomical metal crown
armamentarium, 264
procedure, 263–267, 264f–267f

Premolars
dowel cores, 222
fixed partial dentures
configurations for
one tooth, 103–105
pier abutments, 122–129
two teeth, 110–112
resin-bonded, preparations for, 184f
mandibular first, 120
maxillary first, 119–120
maxillary second, 119
root surface area of, 526t

Preparations, tooth. See Tooth preparations.

Protrusive incisal path, 22
Protrusive incisal path inclination, 22
Protrusive occlusal interference
adjustments, for gold restorations, 394, 394f
definition of, 18
illustration of, 18f

Provisional restorations
classifications
direct vs indirect, 241–242
prefabricated vs custom, 241
criteria for, 241
custom. See Custom provisional restorations.
definition of, 241

endodontically treated teeth, 263, 263f
prefabricated, techniques for
anterior polycarbonate crown, 260–263, 260f–263f
preformed anatomical metal crown, 263–267, 264f–267f
removal of, 388
resins, 242, 242t. See also specific resin.

Proximal contacts
adjustments for, 389f, 389–390
all-ceramic restorations, 409
metal-ceramic restorations, 450–451
soldering, 502–503

Proximo-occlusal inlays
armamentarium, 194
bevel, 195f, 195–196
flares, 194–195, 195f
gingivoaxial groove, 194, 195f
marginal ridge, 194
occlusal outline, 194
overview, 196f
proximal box, 194

Pulpless tooth. See Endodontically treated teeth.

Q
Quick Mount facebow, 45–48

R
Radial shoulder, 142–143, 143f, 154, 156, 160, 429
Radiating symmetry, 415
Radiographs, full-mouth, 9

Reduction. See specific reduction.

Removable die, for working casts
antirotational devices, 330, 330f
orientation methods for
Pindex system, 333–340, 334f–340f
straight dowel pin, 330–333, 331f–333f
requirements, 330
separate die vs, 330

Removable partial dentures
abutment teeth requirements, 81–82
characteristics of, 83t
indications for, 81
provisional crown placement under, 247–248

Resin cements
autopolymerizing, 398
cementation, 402–404, 403f
composite
dentinal bonding agent use with, 402–404
description of, 398
problems associated with, 402
restorations
criteria for, 71–72
inlays, 72
longevity of, 79t
problems associated with, 398–400
restorations
inlays, 74f
longevity of, 78

Resin-bonded fixed partial dentures
advantages, 180
cements, 180
contraindications, 182
delivery
armamentarium, 186
sequence
abutment teeth, 186, 187f
air abrading, 186, 187f
bonding, 187–188
excess removal, 188
Oxyguard II, 188, 188f
primer, 187
pumice cleaning, 186
disadvantages, 180
framework configurations, 184f
longevity uncertainties, 180, 181t
Maryland bridge, 179
Rochette bridge, 179
tooth preparation
armamentarium, 184
axial reduction, 182, 186f
countersinks, 185f
elements of, 183f–184f
finish lines, 182
grooves, 183, 183f–184f, 186f
lingual reduction, 185f
occlusal reduction, 182, 185f
proximal reduction, 185f
rests, 184f
sequence, 185–186
vertical stops, 182
Virginia bridge, 179–180
Resin-modified glass-ionomer cement, 401–402
Resistance, 131–137
Restorations
all-ceramic. See All-ceramic restorations.
base metal
adjustments, 397
finishing, preliminary, 397
polishing, 397
try-in, 397
considerations for, 71–72
gold
adjustments
contours, 395
esthetics, 395
margin finishing, 390–392
marginal adaptation, 390, 391f
occlusal
nonworking movement, 394, 394f
overcorrection, 392, 393f
protrusive interferences, 394, 394f
working movement, 394, 394f
proximal contacts, 389f, 389–390
seating completeness, 390
finishing
postcementation, 396
preliminary, 385–387
precementation polishing, 395, 395f–396f
try-in
anesthesia use, 387
armamentarium, 387
precautionary procedures, 388, 388f–389f
provisional crown
patient hypersensitivity, 387
removal, 388
marginal integrity
beveling vs not beveling, 140f–141f, 140–141
finishing line configurations, 141–145
metal-ceramic. See Metal-ceramic restorations.
provisional. See Provisional restorations.
retention and resistance of
extracoronal, 131, 131f
factors that affect
freedom of displacement, 133–134, 134f
internal feature substitution, 136, 136f
occlusogingival length, 135, 135f
path of insertion, 136, 137f
intracoronal, 131, 131f
overview, 131
small teeth vs large teeth, 133, 133f
shade selection. See Shade selection.
structural durability, factors that affect
axial reduction, 138, 139f
functional cusp bevel, 138, 139f
occlusal reduction, 138
tooth preparation for. See Tooth preparation.
tooth structure preservation, 131
Retainers
definition of, 1
implant-supported fixed partial denture, 84
Retentive pins, 174f
Retraction cord
armamentarium, 275
chemical types, 274t
epinephrine, 273, 275–278
placement of, 275–278, 275f–279f
Reverse occlusion, 20
Reversible hydrocolloid
agar content, 294
armamentarium, 296
characteristics of, 292t
conditioner for, 294, 295f
cooling of, 294
impression making, 294, 296f–297f, 296–298
irreversible, 294
origins of, 294
storage of impressions, 294
wettability, 291
Ridges
cusp–marginal
cusp placement and occlusal contacts, 350f
description of, 348–349
wax patterns of
mandibular teeth, 352, 353f
maxillary teeth, 350–352, 351f–352f
edentulous
classification of, 477, 477f
deformities, 477, 477f
pontic modification, 478–479, 478f–479f
surgical correction
Class II and III defects, 480, 481f
donor tissue, 480
incisions, 479–480, 480f
Rochette bridge, 179
Root
configuration of, 86
crown-root ratio, 85–86
Root amputation, 232
Root canal. See Endodontically treated teeth.
Root caries. See Caries.
Root resection
capacity of resected roots, 232
contraindications, 232
description of, 232
effect of narrow furcations, 232
failure rates, 239
indications, 232
success rates, 239, 239t
technique, 232–233, 233f
tooth preparation and crown configurations
mandibular hemisection, 237–238, 238f
maxillary distofacial root, 234
maxillary facial roots, 237
maxillary mesiofacial root, 235, 235f
maxillary palatal root, 236, 236f, 237, 237f
skyfurcation, 239, 239f
Rotary curettage, 280, 280f
Rouge, 384
Rubber base. See Polyether; Polysulfide.
Rubber dam, 269, 272
Rubber points, 385
Rubber wheels, 385
S
Saliva ejector, 270
Separating disks, 384
Seven-eighths crown, 170, 170f
Shade selection
color
characteristics of, 419
daily functions’ effect on, 419
light sources’ effect on artificial, 418f, 418–419
factors that affect, 418
natural, 418, 418f
glass-ceramic restorations, 427
metal-ceramic restorations, 467
sequence for
illustration of, 420f–423f
patient positioning, 421
recording of findings, 423
removal of distractions, 420
shade guide, 420
shade tabs, 421–423
translucency, 419
Shade tabs, 421–423
Shear thinning, 293
Shell-fabricated provisional restorations, 254–255, 255f
Shoulder
all-ceramic crowns, 161–162, 162f
mesio-occlusodistal onlays, 198f
metal-ceramic crowns, 154, 156, 156f
Shrinkage, during investing
description of, 365
expansion methods
hygroscopic, 365
setting, 365
thermal, 365–366
wax pattern, 365
Shrink-spot porosity, 367, 375f
Silane coupling porosity, 367
Silicon carbide, 384
Silicone
Condensation. See Condensation silicones.
polyvinyl siloxane. See Polyvinyl siloxane.
Silicone putty index, 253f
Silver-palladium alloys, 363
Single-tooth implant
cast fabrication, 532, 535–539
description of, 531
facial view of, 531f
gingival tissue evaluation, 532
healing of, 531, 532f
impression techniques
alginate, 533–535, 533f–535f
closed tray, 532–533, 533f
final, 535–539, 535f–539f
open tray, 532–533, 533f
master cast articulation, 539, 539f–540f
placement of, 531, 542, 542f
wax-up for, 540, 541f–542f
Single-tooth restorations
attributes of, 77t
extracoronal. See Crowns.
intracoronal
amalgam
complex, 73, 75
simple, 72–73
composite resin. See Composite resin restorations.
glass ionomer, 72, 207, 400–401
inlays. See Inlays.
mesio-occlusodistal onlays. See Mesio-occlusodistal.
longevity of, 78
treatment planning, considerations for, 71–72
Skyfurcation, 239, 239f
Smile line
effect of mouth on, 414f
illustration of, 413f
Solder
breaking of, 503–504
characteristics of, 493
gold, 493
noble metal content, 493
Soldering
definition of, 493
difficulty associated with, 494
fixed partial denture
gold alloy
distortions, 496
indexing, 494
investing, 497–499, 497f–499f
single-piece casting, 494
soldering, 500–501, 500f–501f
metal-ceramic alloys
indications for, 504
methods, 504, 504f
postveneer
burnout, 512
casting, 512
indexing, 509–510
investing, 510–511
preparatory procedures, 509
preveneer
burnout, 506–508
indexing, 506
investing, 506–508
margin finishing, 508
postveneer and, comparison, 505
procedure, 505–508, 505f–508f
methods of, 504, 504f
preveneer, 504
proximal contacts, 502–503
repair of casting voids, 503
requisites for, 493
Sprue former
for all-metal hygienic pontics, 486
description of, 366
in gypsum-bonded investments, 366–368, 368f
illustration of, 367f
in phosphate-bonded investments, 376–377
Stones, abrasive
green, 385
pink, 385
shapes of, 385f
white, 385
Stress concentrations, in intracoronal restorations, 197
Structural durability, of restorations
axial reduction, 138, 139f
functional cusp bevel, 138, 139f
occlusal reduction, 138
Subgingival margins, 145
Subperiosteal implants, 517, 518f
Subpragingsial margins, 145
Surgical crown lengthening, 212f
Svedopter, 270–271, 270f–271f
Symmetry, of face, 413
T
Taper
definition of, 132
optimum degree of, 132, 133t
retention and, relationship between, 132f
Teeth. See also Mandibular teeth; Maxillary teeth; specific teeth.
abutment use. See Abutments.
alignment of, 82f
damaged. See Damaged teeth.
endodontically treated. See Endodontically treated teeth.
mandibular movement affected by, 17
missing. See Missing teeth.
Telescope crown, 94, 94f
Templates, for provisional restorations
fixed partial denture, 248–252, 248f–252f
visible light–cured, 252–254
Temporomandibular joint
anatomy of, 13, 14f
evaluation of, 6–8
mandibular movement and, 27
Terminal hinge axis theory, 15
Three-quarter crowns
anterior teeth
armamentarium, 171
axial reduction, 171–172, 172f
bevels, 171, 173f
flares, 172–173, 173f
grooves, 172f, 172–173
incisal reduction, 171, 172f
lingual reduction, 171, 172f
offset, 173, 173f
overview, 173f
path of insertion, 171
for mandibular molar, 170, 170f
pin-modified
indications for, 174
retention, 174
tooth preparation for
armamentarium, 176
axial reduction, 176, 176f
bevel, 178
cutting holes, 174–175, 177f–178f
flares, 177
grooves, 176–177, 177f
offset, 177, 178f
overview, 178f
posterior teeth
armamentarium, 166
axial reduction, 166–167, 167f
finishing lines, 167, 167f
flares, 168–169, 169f
functional cusp bevel, 166, 166f
grooves, 167–168, 167f–168f
occlusal reduction, 166, 166f
offsets, 169
overview, 169f
reverse, 170, 170f
Tilted molar
abutments
corrective methods, 93–94
description of, 93–94
fixed partial dentures, 93–94
split pontics, 514
proximal half crown, 170f, 170–171
uprighting of, 93, 93f
Titanium alloy, 364
TMJ. See Temporomandibular joint.
Tooth conditions, 203t
Tooth preparations
all-ceramic crowns. See All-ceramic crowns, tooth preparations.
damaged teeth. See Damaged teeth, preparations for.
full coverage crown. See Full coverage crown, tooth preparation for.
instrumentation, 145–147, 146t
laminate veneers, porcelain
depth-reduction grooves, 436f
facial reduction, 435, 435f–436f
finish line, 435
finishing, 437
incisal reduction, 436, 436f
marginal integrity
beveling vs not beveling, 140–141, 140f–141f
finish line configurations, 141–145
mesio-occlusodistal onlays
for mandibular molars, 200f
for maxillary teeth
armamentarium, 197
bevel, 198–199, 198f–200f
finish lines, 198, 199f
flares, 198, 199f
isthmus, 198
occlusal reduction, 197–198, 198f
overview, 200f
proximal box, 198
shoulder, 198f
metal-ceramic crowns. See Metal-ceramic crowns.
periodontium preservation, 145
retention and resistance
extracoronal, 131, 131f
factors that affect
freedom of displacement, 133–134, 134f
internal feature substitution, 136, 136f
occlusogingival length, 135, 135f
path of insertion, 136, 137f
intracoronal, 131, 131f
overview, 131
taper, 132–133
small teeth vs large teeth, 135f
structural durability, factors that affect
axial reduction, 138, 139f
functional cusp bevel, 138, 139f
occlusal reduction, 138
tooth structure preservation, 131, 208–210
Tissue structure preservation, 131, 208–210
Transformation toughening, 429
Transosseous mandibular bone plate, 517, 518f
Tripoli, 384
Try-in
base metal restorations, 397
gold alloy restorations
anesthesia use, 387
armamentarium, 387
precautionary procedures, 388, 388f–389f
provisional crown
patient hypersensitivity, 387
removal, 388

V
Vac-U-Spat investor, 369–371
Value, 419
Van der Waals forces, 448
Veneer crowns. See Full coverage crown; Partial coverage crowns.
Veneer restorations. See Laminate veneer.
Ventr holes, 401
Virginia bridge, 179–180
Visible light–cured provisional restorations, template-fabricated, 252–254
Visible light–cured urethane dimethacrylate, 242t
Vital teeth
abutment use of, 85
damaged, modifications for restorative procedures, 208–210, 209f
Voids, casting
armamentarium, 503
contraindications, 503
indications for, 503

W
Wax interocclusal records. See Interocclusal records.
Wax patterns
axial contours
bulges, 346, 347f
emergence profile, 346, 347f
faciolingual, 345–346, 345f–346f
proximal, 345
fabrication
armamentarium, 343
coping, 343–344, 344f
methods of, 343
margin finishing
common problems, 358
occlusal grooves, 360
occlusal scheme
classification of, 349f
cusp–fossa
curve of Spee, 354
curve of Wilson, 355
cusp placement and occlusal contacts, 354f
definition of, 354
description of, 349f
illustration of, 348f
origins, 355
procedure, 355f–358f, 355–358
cusp–marginal ridge
cusp placement and occlusal contacts, 350f
description of, 348–349
for mandibular teeth, 352, 353f
for maxillary teeth, 350–352, 351f–352f
single coping, 454–458, 455f–458f
wax types, 343
Wax wafers, 45, 46f
Wet field technique, 296–297
Working casts
mounting of
Denar facebow and articulator, 59–60

U
Undercuts
box form to eliminate, 208
visual examination for, 136, 137f
Unilateral balanced occlusion, 20, 361

Index
Hanau facebow and articulator, 65–66
Whip Mix facebow and articulator, 50–53
with removable die
advantages over separate die, 330
antirotational devices, 330, 330f
methods of orienting die in cast
Pindex system. See Pindex system.
straight dowel pin, 330–333, 331f–333f
requirements, 330
requirements for, 325
with separate die
armamentarium, 325
description of, 325
die preparation, 327–329, 327f–329f
difficulties associated with, 325
finish lines, 327–328, 329f
hardening agents, 328
impression pouring, 325–326, 326f
Working occlusal interference
adjustments, for gold restorations, 394, 394f
description of, 17, 18f

X
Xerostomia, 5–6

Z
Zinc oxide–eugenol cement
indications, 400
performance of, 400
provisional crowns, 248, 248f
Zinc phosphate
cementation
cement preparation, 404–405, 405f
mandibular isolation, 404, 404f
pulp protection, 404
removal of excess cement, 406
restoration seating, 405–406, 406f
vital tooth considerations, 404
compressive strength, 400
indications, 400
Zirconia-reinforced materials, 429