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Recent advances in color matching have been driven by the market demand for high-quality esthetic restorations. Improved shade guides, availability of shade-taking devices, and research in the area of human color vision have improved the potential of clinicians to achieve excellent color-matched restorations. A thorough understanding of appearance attributes of natural teeth is required along with these new tools to maximize shade-matching results.

Designing Tooth Preparations for Optimal Success **359**
Charles J. Goodacre

The form of prepared teeth and the amount of tooth structure removed are important contributors to the mechanical, biologic, and esthetic success of the overlying crown or fixed partial denture. Therefore, it is important to develop clinical guidelines that can be used to optimize success in fixed prosthodontics.

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Theoretical and clinical studies of resistance form are reviewed, supporting the basic prosthodontic principle that resistance form is an essential element in preparation design. Concepts of the "on-off" nature of resistance form, its application in guidelines for minimally acceptable preparation taper, and the controversy over whether there is a relationship with clinical success or failure are discussed. It is more challenging to obtain resistive molar preparations than resistive anterior preparations, and uneven preparation margins can make parallel 0° taper preparations lack resistance form. The usefulness of grooves, especially in molar preparations

with uneven margins, is illustrated. The Lewis and Zuckerman techniques for evaluating resistive areas of a preparation are shown to be consistent with each other but not with the Weed method.

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Steven M. Morgano, Antonio H.C. Rodrigues, and Carlos Eduardo Sabrosa

Endodontically treated teeth have lost substantial tooth structure as a result of previous restorations, dental caries, and the access preparation for the endodontic therapy. The topic of restoring these teeth is complex and controversial, and their long-term prognosis is directly connected to the quality of the final restoration. This article describes contemporary knowledge of the biomechanical principles related to the restoration of pulpless teeth and provides a critical review of currently available materials and methods.

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Terry E. Donovan and Winston W.L. Chee

The contemporary dentist has a wide variety of options to use in the restoration of extensively damaged or previously restored teeth. Metal-ceramic and all-ceramic crowns are frequently used to restore esthetics and function. One of the essentials for success with either option is proper tooth preparation, which includes proper selection and preparation of the cervical margin of the preparation.

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Terry E. Donovan and Winston W.L. Chee

Gingival displacement is an important procedure with fabricating indirect restorations. Gingival displacement is relatively simple and effective when dealing with healthy gingival tissues and when margins are properly placed a short distance into the sulcus. Several techniques have proven to be relatively predictable, safe, and efficacious. No scientific evidence has established the superiority of one technique over the others, so the choice of technique depends on the presenting clinical situation and operator preference.

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Terry E. Donovan and Winston W.L. Chee

The contemporary restorative dentist has a host of impression materials available for making impressions in fixed prosthodontics, implant dentistry, and operative dentistry. With proper material selection and manipulation, accurate impressions can be obtained for fabrication of tooth- and implant-supported restorations. This

article outlines the ideal properties of impression materials and explains the importance of critical manipulative variables. Available impression materials are analyzed relative to these variables, and several "specialized" impression techniques are described. Special attention is paid to polyvinyl siloxane impression materials because they have become the most widely used impression material in restorative dentistry.

Jaw Relation Records for Fixed Prosthodontics **471**
Rachel S. Squier

This article discusses and reviews general principles of jaw relation records, including the purpose of a jaw relation record and the concept of a tripod of vertical support with adequate horizontal stability to allow opposing dental casts to be mounted accurately on an articulator. The use of the maximum intercuspal position for the vast majority of patients is favored when the goal of restorative treatment is to maintain a patient's pretreatment intercuspation and vertical dimension of occlusion. In addition, articulator choice, purpose of a facebow, and materials for jaw relation records are discussed. Common errors in making impressions, pouring impressions, mounting casts, and making interocclusal records are elucidated, providing the practitioner important information with which to avoid inaccuracies that may lead to additional time spent making intraoral occlusal adjustments at the insertion of fixed restorations.

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David G. Gratton and Steven A. Aquilino

Interim restorations are a critical component of fixed prosthodontic treatment, biologically and biomechanically. Interim restoration serves an important diagnostic role as a functional and esthetic try-in and as a blueprint for the design of the definitive prosthesis. When selecting materials for any interim restoration, clinicians must consider physical properties, handling properties, patient acceptance, and material cost. Although no single material meets all the requirements and material classification alone of a given product is not a predictor of clinical performance, bis-acryl materials are typically best suited to single-unit restorations, and poly (methylmethacrylate) interim materials are generally ideal for multi-unit, complex, long-term, interim fixed prostheses. As with most dental procedures, the technique used for fabrication has a greater effect on the final result than the specific material chosen.

Casting Alloys **499**
John C. Wataha and Regina L. Messer

Although the role of dental casting alloys has changed in recent years with the development of improved all-ceramic materials and resin-based composites, alloys will likely continue to be critical

assets in the treatment of missing and severely damaged teeth. Alloys have physical, chemical, and biologic properties that exceed other classes of materials. The selection of the appropriate dental casting alloy is paramount to the long-term success of dental prostheses, and the selection process has become complex with the development of many new alloys. However, this selection process is manageable if the practitioner focuses on the appropriate physical and biologic properties, such as tensile strength, modulus of elasticity, corrosion, and biocompatibility, and avoids dwelling on the less important properties of alloy color and short-term cost. The appropriate selection of an alloy helps to ensure a longer-lasting restoration and better oral health for the patient.

Dental Ceramics: Current Thinking and Trends **513**
J. Robert Kelly

Dental ceramics are presented within a simplifying framework allowing for understanding of their composition and development. The meaning of strength and details of the fracture process are explored, and recommendations are given regarding making structural comparisons among ceramics. Assessment of clinical survival data is dealt with, and literature is reviewed on the clinical behavior of metal-ceramic and all-ceramic systems. Practical aspects are presented regarding the choice and use of dental ceramics.

Contemporary All-Ceramic Fixed Partial Dentures: A Review **531**
Ariel J. Raigrodski

High-strength all-ceramic systems for fixed partial dentures (FPDs) have become available for replacing missing teeth. New core materials have been developed and have evolved in the last decade, with yttrium tetragonal zirconia polycrystals (Y-TZP)-based materials being the most contemporary. With the emphasis on the use of computer-assisted design/computer assisted-manufacturing technology, various production techniques have been developed for enhancing the fabrication of consistent and predictable restorations in terms of strength, marginal fit, and esthetics. Although initial results are limited, results reported in scientific abstracts of ongoing clinical studies assessing the long-term success of three-unit all-ceramic FPDs and anecdotal evidence published in peer-reviewed articles on the use of Y-TZP-based restorative systems are encouraging. This article reviews the evolution and development of materials and technologies for all-ceramic FPDs.

Fiber-Reinforced Composite Prostheses **545**
Martin A. Freilich and Jonathan C. Meiers

Metal-free prosthetic dentistry continues to gain interest. Although the metal alloys contribute great strength and stiffness to restorations and prostheses, they do so at a considerable esthetic liability.

Two somewhat divergent metal-free approaches to fixed tooth replacement continue to be developed for a variety of clinical applications. These are all-ceramic and all-polymeric systems. The polymeric prostheses are the subject of this article.

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