Tech-Specs

Technical Specifications *From the Manufacturer* of Captek

CAPTEK™
A New Era in Porcelain-Fused-to Metal Esthetics

In today's world of restorative dentistry, the dentist and technician have many wonderful materials at their disposal for any given restorative case. The decision to choose one material over another is based on many things, including the required esthetic results, quality, strength, cost, and very importantly, the familiarity and confidence that the dentist and/or the technician has in the material or technology.

Porcelain-Fused-to-Metal

In spite of a wide variety of available technologies and materials, porcelain-fused-to-metal (PFM) is and will remain the primary restoration choice for a long time to come. The available alloys for PFM have actually changed very little in the last decade or more, and all fall within one of the five basic alloy groups:

1. Gold/Platinum
2. Gold/Platinum/Palladium
3. Gold/Palladium
4. Silver/Palladium
5. Palladium/Copper (2% gold type)

Figure 1—Captek™ is a revolutionary new material that combines the very best in esthetics with the very latest developments in strength, temperature stability, and color.

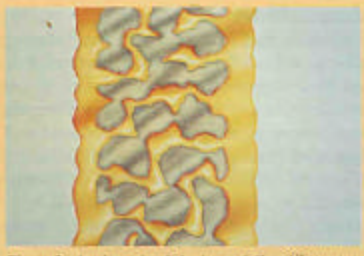


Figure 2—A schematic of the internal Captek™ structure shows a matrix of 97% gold reinforced with small particles of a very high fusing and high strength platinum/palladium/gold alloy.

Figure 3—Captek™ enjoys many advantages over other traditional PFM crowns, such as color, biocompatibility, stresses, oxidation, and grain size. Plus, it can be used for a myriad of restorations.

A Dilemma

It is a well-established fact that a rich gold color is the ideal background for porcelain. Unfortunately, no alloy has ever been able to achieve both a high gold color and sufficient strength for use on singles and bridges. The reason is simple: Palladium and/or platinum are needed for strength and high temperature stability but rob gold almost entirely of its color leaving a gray background. Reducing the amount of these metals to maintain color deprives the alloy of strength and stability. It's a dilemma that has perplexed metallurgists since the advent of PFM and still has no solution using "alloy" technology. Add to this the fact that alloys oxidize, further "darkening" the background, and it's no wonder that we have sought out more esthetic alternatives to PFM. Unfortunately, current alternatives have their own drawbacks, such as technical sensitivity (especially chair side), strength, their own esthetic problems, etc.

Case 1

Five-unit anterior Capiek™ bridge. Important observations are: three-point margins with maintenance of color and translucency down to margins (Figures 4A and 4B); dark margins on original cast-metal crowns (Figure 4C); excellent marginal esthetics of Capiek™ bridge with nice recovery of tissue health (Figure 4D).

Figure 4A

Figure 4B

Figure 4C

Figure 4D

Captek™

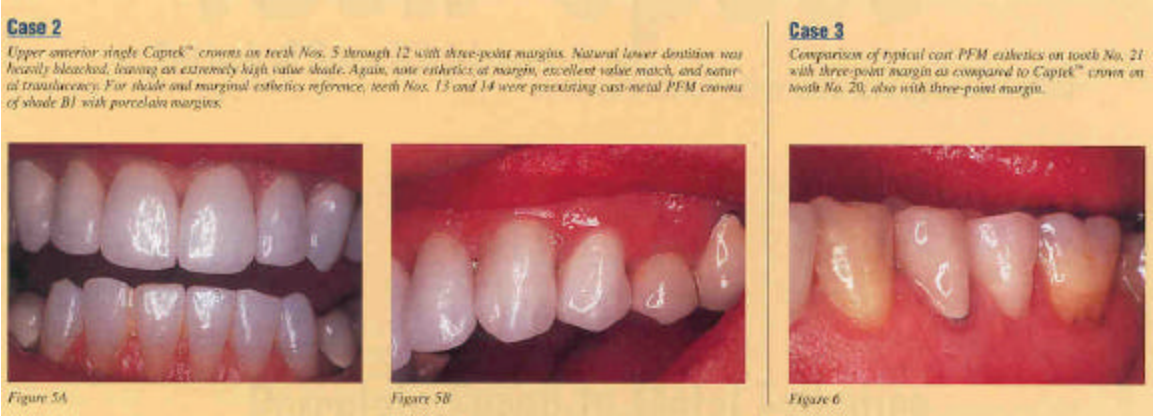
The limitations of alloys led the developers of Captek™ to search for an alternative way to combine metals without alloying. The process would need to yield both the necessary physical properties and color for superior technical and esthetic results.

Captek™ is an acronym for “Capillary Casting Technology”. This revolutionary material is completely new and has for the first time thrust the PFM restoration into the class of truly high esthetic restorations (figure 1). This status has, until now, been enjoyed exclusively by nonmetal-containing restorations, such as all ceramic and composite resin.

Composite Metal

Captek™ is not an alloy! This also implies that it is not a foil or a sintered material. It is best described as a composite metal. If you consider a composite resin to be basically a sea (or matrix) of 97% gold reinforced with small particles of a very high fusing and high strength platinum /palladium/gold alloy (approximately 30% of each) (figure 2).
It is important to note that in any composite system, the resulting material combines the properties of each component individually. In the case of composite resin, the plastic, curable properties of soft resin are combined with the high compressive strength, resistance of glass. This forms a third material that is not only plastic and curable, but also high in compressive strength, abrasion resistance, and fracture resistance.

In Captek™, the material resulting from the combination of the gold matrix and the palladium group filler particles possesses the color, biocompatibility, burnish ability, and nobility of basically pure gold while having the high temperature stability, strength, and toughness of a high platinum/palladium alloy. Unlike various 24k gold-plated or cast-ceramic metals, Captek™ actually hardens and strengthens as it is fired during porcelain application.



Advantages

Captek™ has many advantages over anything that has ever been available (figure 3).

It has physical and esthetic properties that create advantages far beyond what is possible with traditional PFM crowns.∇**Rich gold color.** The inner and outer surfaces present pure 97% gold color, which provides the ideal background for very natural and vital porcelain esthetics without tissue "shadowing" caused by the gray color inside traditional cast ceramic alloys.
∇**Biocompatibility**. Captek™ has exceptional biocompatibility, corrosion resistance, and resistance to bacterial colonization. Research at Tubingen University in Germany has shown Captek™ to have higher nobility (lower reactivity) than pure gold. Similarly, in vivo studies recently completed by J.Max Goodson,♣Itzhak Shoher,♦and Stephan Imber♥ have shown bacterial counts (especially gram-negative rods) in the sulcus around Captek™ crowns with small exposed collars to be up to 1,000% lower than around natural dentition. The study also showed that porcelain in the sulcus (all ceramic crowns, porcelain margins, and three point margins) accumulated up to 800% higher counts than around the Captek™ restorations! ∇**No internal, external, or interfacial stresses.** No stresses form between Captek™ and porcelain during firing and cooling. This makes Captek™ compatible with an extremely wide range of porcelains (basically all low-and high fusing porcelains on the market today) and is responsible for extremely high bond strengths with the porcelain, thereby enhancing vitality and translucency.∇**Totally nonoxidizing.** Oxides can contaminate furnaces, create odd color reactions with porcelain, are always dark and can create a "weak link" at the bonding surface if they are too thick. More importantly, when present in the furnace, they accumulate on the surface of the porcelain and actually make it more plaque retentive. Contrary to popular belief, it has been proven that oxides are not necessary for strong porcelain bonding-control of stresses is the key to bonding.∇**Extremely small grain size of 15 mm to 20 mm.** This allows the margins to be finished to a very fine edge without loss of integrity. Because there is no oxide and no gray metal to mask out, the opaque requires only 0.05 mm to cover! This compares with an average of 0.3mm on cast metal. All this together allows three-point margins to be created that are virtually indistinguishable from porcelain margins!

Preparations and Uses

Captek™ requires no special preparation and can be used on any traditional preparation with featheredge, chamfers, or bevels, to deep shoulders with porcelain margins. Reduction requirements are the same for Captek™ as for any traditional PFM preparation. It is not appropriate to incorporate a more "conservative" preparation for Captek™.

Ideally, because of Captek's™ impressive bacterial inhibition properties, a chamfer bevel or shoulder bevel with a subsequently prescribed small metal collar should be used in all nonesthetic areas (generally from mid-proximal). There is a tremendous loss of tissue health if 360-degree porcelain or three-point margins are used where they are not necessary for esthetics! Captek™ can be used for all single anterior or posterior restorations, as well as for bridges with any configuration of up to two consecutive pontics. It can be built up to form bands, metal linguals, or occlusal islands, and, in other words, can accomplish practically anything that can be done with traditional lost wax-casting techniques.