

Crown Materials Compared — Porcelain, Zirconia, Gold & PFM

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Description:

Compare dental crown materials — porcelain, zirconia, gold and PFM. Learn about aesthetics, strength, longevity and which suits your tooth at CSSC Melbourne.

Details:

Collins Street Specialist Centre: Crown Materials Compared — Porcelain, Zirconia, Gold & PFM

Choosing a crown material is rarely straightforward. The material your prosthodontist recommends will shape how your restoration looks, feels and holds up over years of daily use — and with several genuinely good options available today, understanding the differences between them makes for a much more productive clinical conversation.

Collins Street Specialist Centre is a specialist dental practice in central Melbourne, where our prosthodontists work through exactly these decisions with patients every day. What follows is a practical overview of the most commonly used crown materials: what they offer, where they fall short and which situations each one handles best.

What is a dental crown?

A dental crown (sometimes called a cap) is a restoration that encases the entire visible portion of a tooth above the gum line, restoring its shape, dimensions, structural integrity and appearance. Crowns are indicated when a tooth is:

- Severely decayed and too extensively damaged to be restored with a filling
- Cracked or fractured
- Structurally compromised following root canal treatment
- Heavily worn from attrition or erosion
- Cosmetically unsatisfactory in its current state
- Required to support a dental bridge
- Placed on top of a dental implant as the final prosthetic component

Each crown is custom-fabricated in a specialist dental laboratory to match your bite and, where clinically appropriate, the colour and shape of your natural teeth. It is then permanently cemented or adhesively bonded onto the prepared tooth or implant abutment.

All-ceramic (porcelain) crowns

What they are All-ceramic crowns contain no metal. The most clinically common types are:

- **Feldspathic porcelain** — the traditional option, with outstanding aesthetic properties but comparatively lower fracture strength. Used mainly for veneers and as a layering material over stronger ceramic cores.
- **Lithium disilicate** — a pressed or CAD/CAM-milled glass-ceramic that balances aesthetics and mechanical strength well. One of the most widely used all-ceramic materials in contemporary restorative and prosthodontic practice.
- **Leucite-reinforced ceramics** — broadly comparable to lithium disilicate in application, though generally with slightly lower flexural strength values.

Aesthetics All-ceramic crowns produce the best aesthetic result of any crown material currently available. Their translucency closely replicates how light interacts with natural tooth enamel — which matters most for front teeth where appearance is the primary concern.

Because there is no metal beneath the ceramic, all-ceramic crowns avoid the grey or dark marginal line that can appear with metal-based restorations, particularly as gum tissue recedes over time.

Strength Lithium disilicate crowns have a flexural strength of approximately 360–400 MPa — sufficient for most clinical applications, including many premolar restorations. They are not as strong as zirconia or metal-based alternatives, which limits their use on posterior teeth in patients with heavy bite forces or parafunctional habits such as bruxism.

Longevity Clinical evidence shows excellent survival rates for lithium disilicate crowns — around 95% at ten years in appropriately selected cases. Long-term outcomes depend on patient factors (parafunction, bite forces, oral hygiene) as well as the technical skill of both the clinician and the dental laboratory.

Best suited for - Front teeth (incisors and canines) where aesthetic excellence is the priority - Premolars in patients without heavy occlusal loading - Patients for whom natural appearance is the foremost concern - Teeth with adequate remaining coronal structure

Zirconia crowns

What they are Zirconia (zirconium dioxide, ZrO_2) is a crystalline ceramic that has changed crown dentistry considerably over the past two decades. It comes in several formulations:

- **Full-contour monolithic zirconia** — the entire crown is milled from a solid zirconia block. Contemporary formulations look substantially better than the early generations of this material. - **High-translucency zirconia** — newer compositions that trade a modest reduction in strength for meaningfully improved optical properties, approaching the aesthetic qualities of lithium disilicate. - **Zirconia core with porcelain layering** — a high-strength zirconia substructure veneered with aesthetic porcelain, combining structural advantages with superior optical qualities. The main clinical consideration is the risk of porcelain delamination or chipping over time.

Aesthetics Early zirconia crowns were criticised for their opaque, somewhat artificial appearance. Modern high-translucency zirconia has addressed this considerably, and contemporary monolithic zirconia restorations achieve highly satisfactory aesthetic results — particularly for posterior teeth and, increasingly, for anterior applications as well.

For the most demanding aesthetic cases, a zirconia core with layered porcelain can produce outstanding outcomes, provided the risk of porcelain fracture is discussed with the patient beforehand.

Strength Zirconia is the strongest ceramic used in clinical dentistry. Flexural strength values range from approximately 900–1,200 MPa for standard formulations — several times greater than lithium disilicate.

This makes zirconia highly resistant to fracture under heavy occlusal loading. It can also be fabricated in thinner sections than many alternatives, which can allow for more conservative tooth preparation.

Longevity Zirconia crowns show excellent clinical longevity, with survival rates comparable to or exceeding those of traditional metal-based restorations. Fracture resistance is outstanding; the porcelain veneering on layered designs remains susceptible to chipping, which is why monolithic designs have become the more common choice in many practices.

Best suited for - Posterior teeth (premolars and molars) where structural demands are greatest - Patients with bruxism or heavy bite forces - Implant-supported crowns, where the material's strength suits implant loading characteristics - Fixed dental prostheses (bridges) spanning multiple teeth - Clinical situations requiring conservative tooth preparation - Patients wanting a metal-free restoration

with maximum strength

Gold crowns

What they are Gold crowns are fabricated from a gold alloy — typically comprising gold, platinum, palladium and small quantities of additional metals. They represent one of the most long-standing and clinically validated restorative materials in dentistry.

Despite a decline in popularity driven mainly by aesthetics, gold remains an exceptional restorative material that many experienced prosthodontists continue to hold in high regard.

Aesthetics Gold crowns are, self-evidently, gold in colour — which makes them a poor aesthetic choice for visible front teeth. For posterior teeth, particularly second molars and teeth not visible during normal social interaction or smiling, the aesthetic compromise may be entirely acceptable given gold's outstanding functional and longevity profile.

Some patients choose gold crowns as a deliberate stylistic preference. For most patients today, however, the metallic appearance is the main reason gold is less frequently selected.

Strength and wear properties Gold's mechanical characteristics are genuinely distinct from other crown materials:

- **Hardness comparable to natural enamel** — gold wears at a rate similar to the natural teeth opposing it, meaning it exerts minimal destructive forces on the opposing dentition. Harder ceramic materials can accelerate wear on opposing natural tooth enamel over time.
- **Malleability** — gold can be burnished at the margins to achieve a very precise fit at the crown-tooth interface, which reduces the risk of secondary decay at the margins.
- **Ductility** — gold flexes slightly under load rather than fracturing, making gold crowns virtually impervious to cracking or chipping — a real advantage over ceramic alternatives.
- **Corrosion resistance** — gold alloys are highly biocompatible and resist corrosion well within the oral environment.

Longevity Gold crowns are arguably the most durable restorative option available. Both clinical research and decades of documented experience show longevity well in excess of 20 years, with many gold crowns remaining functional after 30 years or more. Precise marginal fit, fracture resistance and excellent biocompatibility underpin this track record.

Best suited for - Second molars and other non-visible posterior teeth - Patients with heavy bite forces or bruxism, where gold's ductility makes it highly resistant to mechanical failure - Patients for whom longevity matters more than aesthetics - Teeth with minimal remaining coronal structure, as gold can be cast in very thin sections - Patients where preserving opposing natural enamel is a clinical priority

Porcelain-fused-to-metal (PFM) crowns

What they are PFM crowns have been a cornerstone of restorative and prosthodontic dentistry for over five decades. They consist of a cast metal substructure — typically a noble or base metal alloy — veneered with layers of dental porcelain fired at high temperatures to form a durable bond with the metal.

Aesthetics PFM crowns provide clinically acceptable aesthetics — the porcelain exterior can be shade-matched to adjacent natural teeth. There are, however, some aesthetic limitations patients should understand:

- **The marginal dark line** — as gum tissue recedes over time, a grey or dark line at the crown margin can become visible where the metal substructure is exposed. This is the most common aesthetic concern with PFM restorations.
- **Reduced translucency** — the metal substructure blocks light transmission through the crown, producing a somewhat less natural optical quality compared to all-ceramic alternatives. Skilled laboratory technicians can reduce this effect, though it remains an

inherent limitation of the design. - ****Metal show-through**** — under certain lighting conditions, the metal substructure can give a slightly grey undertone to the overlying porcelain.

Some PFM designs incorporate a porcelain margin extending to the gum line to eliminate the visible metal margin, though this may introduce some compromise in marginal integrity.

Strength PFM crowns offer excellent overall strength. The metal substructure provides solid support, while the overlying porcelain delivers the aesthetic surface. The combined structure is strong enough for virtually any position in the dental arch.

The main mechanical vulnerability is at the porcelain-to-metal interface — the ceramic veneer can chip or fracture away from the metal substructure, exposing the underlying metal. Published literature reports porcelain chipping rates of approximately 5–10% over ten years.

Longevity PFM crowns have a long and well-documented clinical history, with survival rates of approximately 90–95% at ten years. Many restorations last considerably longer. When PFM crowns do fail, it is most commonly due to porcelain fracture, secondary decay at the margins or loss of retention — not failure of the metal substructure itself.

Best suited for - Any tooth position, both anterior and posterior - Long-span fixed dental prostheses, where the metal substructure handles flexural forces across the span - Patients seeking a clinically proven, cost-effective restorative option - Select complex prosthodontic cases where a metal substructure provides the precision and rigidity required

Declining use in contemporary practice PFM crowns remain a clinically reliable option, but their use has declined substantially as all-ceramic and zirconia materials have advanced. Many practices and dental laboratories now use zirconia as the default material for posterior crowns, and lithium disilicate or high-translucency zirconia for anterior restorations.

Material selection: a summary

Factor	All-Ceramic	Zirconia	Gold	PFM	-----	-----	-----	-----	-----	Aesthetics																																		
Excellent	Very good–excellent	Poor (metallic)	Good	Strength	Moderate–good	Excellent	Excellent	Excellent	Fracture resistance	Moderate	Excellent	Outstanding	Good (porcelain can chip)	Wear on opposing teeth	Low–moderate	Moderate	Low (similar to enamel)	Moderate	Longevity	Very good	Excellent	Outstanding	Very good	Biocompatibility	Excellent	Excellent	Excellent	Good–excellent	Metal-free	Yes	Yes	No	No	Tooth preparation	Moderate	Minimal–moderate	Minimal	Moderate	Cost	Moderate–high	Moderate–high	Moderate–high	Moderate–high	Moderate

Factors your prosthodontist considers

When recommending a crown material, your prosthodontist evaluates multiple clinical and patient-specific factors:

****Tooth position**** — front teeth prioritise aesthetic excellence, so all-ceramic and high-translucency zirconia are the materials of choice in most cases. Posterior teeth place greater demands on structural strength, making zirconia, gold and PFM more appropriate options.

****Bite forces and parafunctional habits**** — patients with bruxism or pronounced occlusal forces need the most mechanically strong materials — zirconia or gold. All-ceramic restorations carry an elevated risk of fracture under excessive or repetitive loading in these patients.

****Opposing dentition**** — the material opposing the crown matters. Gold is the most conservative option in terms of wear on opposing natural teeth; harder ceramics can accelerate enamel wear on opposing surfaces over time.

****Remaining tooth structure**** — different materials require varying degrees of tooth preparation. Where minimal coronal structure remains, materials that can be fabricated in thinner sections — zirconia or gold — may offer a distinct advantage.

****Adjacent restorations and teeth**** — the crown should integrate with neighbouring teeth. Where adjacent teeth carry existing restorations, material selection may be influenced by the need for a consistent appearance across the dental arch.

****Patient priorities and preferences**** — your individual priorities, whether aesthetic outcome, long-term durability, avoiding metal or cost, are meaningful clinical considerations. Your prosthodontist will explain the relevant trade-offs and help you reach a well-informed decision.

****Implant-supported versus tooth-supported crowns**** — crowns placed on dental implants experience different biomechanical forces than those placed on natural teeth. Natural teeth have a periodontal ligament that provides some shock absorption; implants do not. This distinction can meaningfully influence material selection in implant prosthodontics.

The value of specialist expertise

There is rarely a single universally correct answer in crown material selection, but there are demonstrably better and less appropriate choices for each individual clinical situation. Prosthodontists bring specialist knowledge in dental materials science, oral biomechanics and aesthetic dentistry that supports well-reasoned, patient-specific recommendations.

At Collins Street Specialist Centre, our prosthodontists work with leading dental laboratories to deliver restorations that meet high standards of marginal fit, occlusal function and aesthetic integration — regardless of the material selected. Every material recommendation is grounded in current clinical evidence and tailored to the individual patient's clinical presentation.

If you are considering treatment with a registered specialist, the Australian Health Practitioner Regulation Agency (AHPRA) maintains a publicly accessible register at [www.ahpra.gov.au](<https://www.ahpra.gov.au>) where you can verify the specialist registration of any treating clinician.

Book a consultation

If you need a dental crown, or are considering replacing an existing restoration, a consultation with a prosthodontist at Collins Street Specialist Centre will give you a thorough assessment of which material suits your tooth, your bite and your clinical goals.

****Call Collins Street Specialist Centre on (03) 9654 5705**** to arrange your appointment. We are located in Melbourne's Manchester Unity Building at 220 Collins Street, and we are here to help you make the most informed decision for your long-term oral health.