

Taking Control of Crown Aesthetics with Polychromatic Shade™

Dr. Marc Wilk



A crown should look like a tooth.

That is the goal, and for most of the history of restorative dentistry, achieving it has required a trade-off.



A full-contour monolithic zirconia crown offers exceptional strength, durability and a competitive price point, but has historically struggled to replicate the optical complexity of natural dentition. It is designed as a single solid piece with no porcelain overlay hence it lacks a natural translucency and characterization even when properly shaded and polished or glazed. The flat, uniform appearance of standard zirconia is clinically acceptable in the posterior, where aesthetics are secondary to function. But in the anterior smile zone, where every subtle variation in translucency, chroma and shade depth is visible under any light, a crown that looks like a crown is not good enough.

The alternative options, such as layered porcelain, feldspathic or lithium disilicate restorations crafted by a skilled ceramist, can produce lifelike results, but at a price that reflects the human technician time and expertise required. Digital dentistry has lowered costs and increased predictable outcomes across nearly every restorative category, yet in the anterior region, zirconia has remained an aesthetic compromise, unable to replicate the optical complexity that more expensive material options have long delivered, until now.

Polychromatic Shade™, a new restorative manufacturing technology from Dandy, resolves the compromises we had to make in the past. Through a patented staining process, it builds color dimensionally into a monolithic zirconia crown, replicating the natural gradients, incisal

translucency, and optical depth that master ceramists have historically achieved by hand. The result is a restoration that does not merely offer strength and durability. We can now deliver those qualities with lifelike tooth aesthetics at a fraction of the cost.

I think of it the way an acquaintance of mine once described his own work: He created the Pantone Matching System after growing frustrated that no two printers could reproduce the same color consistently, and his solution was a standardized system that removed the variability entirely. Polychromatic Shade™ technology does the same thing for crown shade, from a single anterior unit that needs to blend seamlessly with adjacent natural teeth, to a full-arch smile transformation, where consistency across every restoration is as critical as the accuracy of any one crown. The technology standardizes and automates the nuanced characterization of translucency, optical depth, chroma, and the natural gradient of color from incisal edge to gingival margin that has always required significant human labor, delivering a predictable, lifelike result regardless of the complexity or scale of the case.

Every crown, one consistent result.

WATCH HOW DR. WILK DID IT.



[VIEW CLINICAL CASE FILM](#)

Case Description

The case that follows is a 16-unit full smile transformation for a long-standing patient whose upper veneers had reached the end of their clinical life, aesthetically and functionally, after more than 30 years of use, and whose opposing mandibular teeth had deteriorated significantly in the interim. It illustrates how a fully digital three-appointment workflow, from initial scans, preliminary digital wax-up and custom temporization to delivery of the final restorations, produced a highly predictable outcome in a fraction of the chair time a comparable analog case would have required. And at the center of the aesthetic result, Polychromatic Shade™ technology delivered anterior crown restorations that blended seamlessly across the patient's smile in a way that would previously have required a master ceramist and a much greater laboratory fee.



Patient Presentation

Ian and I have known each other for approximately 35 years. When he first came to see me he wanted to improve his smile. The treatment plan included upper veneers to widen his smile, close diastemas, correct rotations and improve the color. He wore those veneers for more than three decades without ever replacing them. He is now close to 60 years old and in generally excellent overall health. He takes care of himself with daily regimens of fitness and nutrition and has an active social life. For a man who loves to engage with people, the main issue for him was his increasing self-consciousness. As he framed it for me, "I don't feel comfortable smiling any more."

His dental history over those decades had grown extensive: fillings, root canals, crowns, and more recently, an implant following an extraction. All of the upper veneers had deteriorated, leading to gingival recession and marginal exposure, discolorations and stains, and incisal chips. Several of the upper teeth had developed interproximal decay on the lingual aspect over time, which I had managed chairside with composite restorations to extend the functional life of the veneers. At this point, due to the aesthetic and structural compromise, the life cycle of those restorations had exceeded their normal span by many years.

The mandibular arch presented a separate set of problems. There was significant crowding, rotation, recession and discoloration from years of coffee, tea and other staining agents. Whitening could not have adequately resolved the discoloration and darkening. Orthodontic treatment was not a realistic option. Even if Ian had decided he would allow fixed orthodontic appliances in order to restore the position and alignment of the mandibular teeth, porcelain restorations would have been indicated due to the depth of stain and incisal wear and fractures. What was happening on the lower arch was simply the normal deterioration of

teeth that had been progressing without the benefit of prior restorative intervention. Ian's teeth are quite visible at rest and when animated, speaking and smiling. In combination with the issues that had formed with his maxillary veneers, this ultimately led him to commit to a full smile makeover, particularly after seeing what was possible with the aid of the digital tools available through Dandy, whose scanner and lab are central to how I practice restorative dentistry.

From a clinical standpoint, the decision to treat with full-coverage crowns was straightforward given the old veneers and previous palatal decay and fillings of the upper teeth. At 60 years old, with the dental history Ian has, full crowns are the optimal choice both aesthetically and functionally. There is also a periodontal benefit that is often overlooked in these conversations: Highly polished zirconia crown surfaces are far more compatible with tissue health than the rough root surfaces and compromised veneer margins Ian had been managing for years. My expectation is that his periodontal health will measurably improve as a result of these restorations.



Retracted intraoral view shows the initial condition of the patient's dentition: eight maxillary veneers worn for over three decades, with staining and recession at the margins, as well as significant crowding, rotation and discoloration affecting the mandibular anterior teeth.



Right lateral view shows visible tooth understructure above the gingival margins of teeth #5-12, where decades of recession had exposed the demarcation between the original veneers and the natural tooth structure, with interproximal decay and composite restorations present on the lingual aspect of several teeth.



Left lateral intraoral view illustrates the extent of gingival recession and rotation affecting the mandibular incisors, along with severe discoloration that bleaching alone could not resolve, underscoring why full-coverage crowns represented the most clinically sound restorative approach.

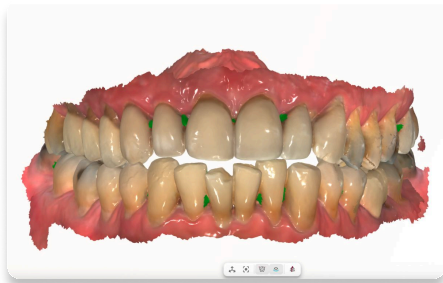
Initial Consultation and Design of the Digital Wax-Up

The case really started not at a formal treatment planning appointment but during a routine cleaning visit. We had been discussing Ian's teeth for a while, and during that appointment I said to him, "While you're here, give me five minutes and let me scan you so I can show you what's possible." I submitted to Dandy the intraoral scans, which would ultimately begin a streamlined and predictable restorative process.

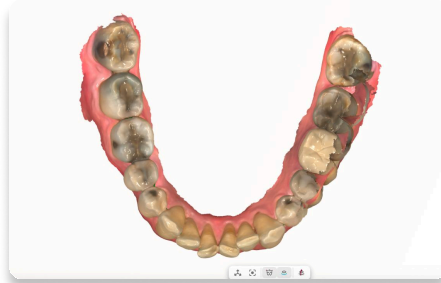
From these preoperative scans, the Dandy lab team created a digital wax-up that would help get Ian's case acceptance and serve as the basis for matrices to produce custom temporaries. The treatment plan consisted of 16 crowns: eight maxillary and eight mandibular, covering teeth #5-12 and #21-28. I had an online meeting with the lab technician for a live design review of the digital wax-up, refining and customizing every contour of the proposed 16-unit restoration until it met my clinical expectations exactly.

To share the design with Ian, I took selective screen captures and recorded a short video of rotating the digital wax-up, using the 360° digital preview to show him the contours and anatomy of his new crowns and how they would renew his smile. I emailed it to him and we had a virtual consultation after. A well-framed walkthrough supported by clear visualization of what's possible gets the patient to where they need to be, which is confident and enthusiastic enough to proceed.

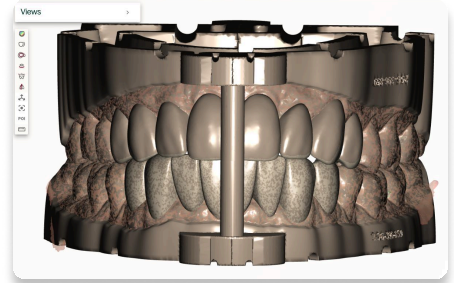
With Polychromatic Shade™ technology, that same level of digital precision now extends beyond crown anatomy to the aesthetics of the restoration itself, giving clinicians control over color transitions, translucency, and optical depth in the final crowns with the same accuracy and predictability that digital workflows have long delivered for contour and fit and in the past could only be achieved with in-house laboratory master ceramicists.



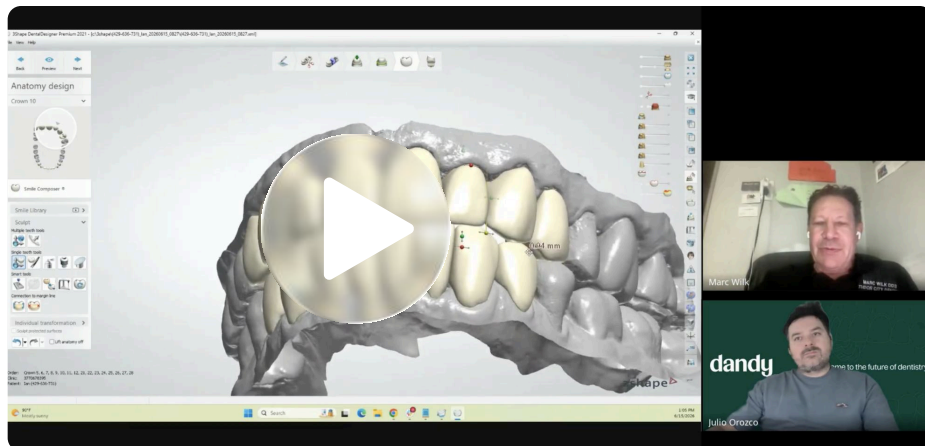
Preoperative intraoral scans were captured and submitted to the lab for the design of a digital wax-up that served as the initial clinical proposal for the new crowns and as the basis for the custom temporary matrices from which the provisional restorations would be fabricated chairside.



The preoperative scan of the lower arch documented the crowding and rotation of the mandibular anterior teeth, conditions that, combined with the extent of discoloration and recession present, made full-coverage crowns the most predictable and periodontally sound restorative approach.



The lab created a digital wax-up representing the proposed 16-unit restoration, which served as the basis for the temporary matrices used to fabricate chairside provisionals following clinician approval.



A live collaborative video review between the dentist and the lab technician allowed every contour, contact and anatomical detail of the proposed restoration to be refined in real time, with adjustments made iteratively until the design fully satisfied the functional and aesthetic requirements of the case. This workflow replicates the engagement many of the most famous cosmetic dentists and prosthodontists have with their in-house ceramists.

Summary

Items

Physical Waxup 5, 6, 7, 8, 9, 10, 11, 12, 21, 22, 23, 24, 25, 26, 27, 28

Material N/A

Waxup Teeth Selection 28, 27, 26, 25, 24, 23, 22, 21, 6, 5, 7, 8, 9, 10, 11, 12

Smile Style Youthful

Diastema No Diastema

Matrix

Material N/A

Design Preview

You approved this design
We'll get to work fabricating your order right away

Design Preview

Press the button below to load a 3D model of the design preview

Display Design Preview

After making some refinements, the final digital wax-up was approved, and the requested physical wax-up and temporary matrices were fabricated and sent to the practice for the next appointment.

Tooth Preparation, Scanning and Temporization



I allowed for three hours for the preparation appointment for all 16 crowns. We completed the treatment in a little over two hours due to the temporization predictability with Dandy's matrix workflow.

I started with the lower arch, working across all eight teeth in sequence rather than completing one tooth at a time. Using a gross reduction bur, I reduced the occlusal, buccal and lingual surfaces across the arch, then broke interproximal contacts. The upper preparations were completed with shoulder margins. The lower teeth, being smaller, received chamfer margins. Once the preparations were complete, I applied retraction paste to achieve hemostasis and clear margin visibility for scanning without cord packing, which I avoid in anterior cases to protect tissue architecture.

With both arches prepared, I seated the clear temporary matrices that had been fabricated from the approved digital wax-up. Because the matrices were translucent, they served as a real-time verification tool for the quality of my preparations. Unlike an impression-based custom temporary from the lab, the matrices enabled me to visualize exactly how the preparations aligned with the intended final crown contours and architecture. I could see where I was, make any refinements needed, and proceed with confidence. I then scanned the 16 tooth preps and submitted the scans through the Dandy Chairside portal integrated with the Dandy Vision scanner.

Next, I fabricated the upper custom temporaries by loading dual-cure composite into the matrix, seating it, having Ian bite, and curing the material after filling in any voids. The lower arch followed the same sequence. Because the bite had already been established in the preliminary digital design, there was no occlusal correction needed. In an analog workflow, getting the bite aligned correctly to remove occlusal interferences on a full-arch case like this is one of the most time-consuming and unpredictable parts of the appointment. Here, the bite was essentially perfect from the start.

Ian's reaction to the temporaries was immediate as he was now looking into his future: The temporary digital design will be our template for the final restorations. He was amazed. For a patient who had been managing a deteriorating and compromised smile for years and had been thinking about this treatment for almost as long, seeing the temporaries in place was genuinely transformative and gave him the vision and confidence to know his final restorations would be close to replicating this alignment, contour and aesthetics.



A 3D-printed physical wax-up was requested alongside the digital design to provide a tangible, three-dimensional chairside reference during tooth preparation and temporization.



The temporary matrices produced from the approved digital wax-up translated the clinician-approved crown designs into physical form, serving as the molds from which custom provisional crowns were fabricated chairside.



The mandibular tooth preparations were completed first, with chamfer margins selected to accommodate the smaller tooth dimensions of the lower anterior teeth.



The veneers were removed and the maxillary teeth were prepared with shoulder margins. The translucent temporary matrices were then seated over the preparations of each arch, helping to visualize the relationship between the preparations and the crown designs and confirm that adequate and accurate reduction had been achieved.



Each temporary matrix was used to fabricate provisional crowns chairside by loading dual-cure composite into the matrix, seating it over the preparations, and allowing the material to set before removing and finishing each crown.



The seated custom temporary crowns transferred the approved digital wax-up designs directly into the patient's mouth, effectively serving as a clinical try-in of the definitive restorations. The temporaries required no chairside alterations, confirming the crown designs were ready for final fabrication.

Crown Fabrication with Polychromatic Shade™ Technology

We used shade A2 composite for the temporaries, which was noticeably whiter than Ian's existing dentition but conservative enough to give him a calibrated reference point before locking in the final shade. I asked him to wear them for a few days and then report back. He came back and said he wanted to go one shade lighter. My guidance to him was that going to A1 from A2, combined with the natural incisal-to-body translucency of the Polychromatic Shade™ technology built into the final restorations, would produce a result that not only appeared lighter but more realistic. The translucency prevents the lighter shade from reading as flat or artificial. He agreed with this approach, and A1 was confirmed for the final zirconia restorations.

The crowns were milled from high-strength monolithic zirconia with 1,250 MPa, an exceptionally strong restorative material considering the premium aesthetics this technology delivers. The lab milled the crowns using the exact same designs approved with the digital wax-up, as the fit, shape and occlusion of the temporary crowns were perfect and did not require any chairside alterations. The crowns were stained and finished using the Polychromatic Shade™ manufacturing process, and I want to say something directly about what this technology delivers, because I think it represents a genuine clinical milestone.

Achieving the nuanced interplay of shade depth, chroma and incisal translucency that makes an anterior crown look realistic has historically required an extraordinarily skilled ceramist working by hand. The result was beautiful when done well. It was also incredibly expensive, non-standardized and subject to variation. Five different technicians producing the same crown from the same prescription and patient photos would produce five different restorations, with the variations in appearance ranging from subtle to pronounced.

Polychromatic Shade™ technology standardizes and automates the characterization of crowns through a patented digital staining process, building color dimensionally into the restoration. The result does not vary from technician to technician. It does not depend on who is at the bench that day. Every crown produced reflects the precise aesthetic parameters of the digital design, from incisal translucency to the natural gradient of hue, chroma, and value as the restoration transitions toward the gingival margin.

I actually placed the very first crown produced with Polychromatic Shade technology, a lateral incisor that had to match adjacent crowns and veneers, before the product was officially released for clinical use. I seated it, and it was perfect. The crown blended in so perfectly, against a complex mix of adjacent restorations, that I simply could not believe the result. That experience told me everything I needed to know about what this technology is capable of.

For a 16-unit anterior case like Ian's, where consistency across the full arch is as important as the accuracy of any individual crown, that level of high aesthetics is not a convenience, it is a clinical necessity.



The final crown designs replicated the contours, contacts and anatomy of the approved temporary crowns exactly. Because the temporaries had required no chairside adjustments, a Digital Design Preview for the final crowns was not requested, as the approved wax-up designs were carried forward to fabrication without modification.



The digital design for each crown precisely mapped the hue, chroma, value, and incisal translucency of the restoration, establishing the aesthetic blueprint that would be applied to the milled zirconia crowns during fabrication.



At Dandy's manufacturing facility in Provo, Utah, Polychromatic Shade™ technology brings the precision of digitally controlled staining to zirconia crown fabrication, applying each crown's approved aesthetic design with exacting accuracy at scale.



The final crowns were milled from high-strength, 1,250 MPa monolithic zirconia and finished using Polychromatic Shade™ technology, a patented digital staining process that applied the approved crown color, tone and translucency with a high level of precision and consistency, eliminating the cost and variability associated with manual ceramist characterization.

Delivery of Final Crowns

The crowns arrived from the lab as precise replicas of the approved temporaries, which meant the delivery appointment was straightforward. Upon unboxing, each crown exhibited the consistent incisal translucency and natural gradient from incisal edge to gingival margin that Polychromatic Shade™ technology is designed to deliver. The vitality across all 16 units was remarkably consistent, and closely mirrored that of natural teeth.

When Ian returned, he was already thrilled with his temporary smile, so the transition to the finals was seamless. After removing the provisionals, each crown was tried in and exhibited a precise fit. No chairside alterations were required.

I cemented all 16 crowns into place in a fraction of the time a case of this scale would typically demand. The digital wax-up, live design review, and validation via the “test drive” with the custom temporaries had resolved every question about contour, anatomy, and aesthetics before a single unit was milled. What remained at the delivery appointment was simply confirming what the workflow had already established. Predictable and exceptionally consistent clinical outcomes are invaluable in restorative dentistry. That is what Dandy delivered.

Ian's reaction to the final restorations was everything I expected it to be. There are moments in this practice that are genuinely rewarding, and delivering a smile transformation of this magnitude to a patient who has been living with a compromised smile for years is one of them. You are not just improving their teeth. You are enhancing their quality of life. When a patient hugs you at the end of an appointment, there is nothing more professionally satisfying than that. For Ian, the change was not just cosmetic. A confident smile is a professional asset and a personal one, and he now has that in a way he has not for a long time.



The final crowns were tried in, confirmed to exhibit a precise fit with no adjustment required, and cemented into place. The restorations replicated the contours and anatomy of the approved temporaries exactly, with the Polychromatic Shade™ staining process delivering lifelike incisal translucency, smooth hue-to-chroma gradients, and optical depth that closely replicated the vitality of natural dentition.



Ian's smile following delivery of the final restorations said more than words can describe. For the first time in several decades, his smile reflected the confidence and vitality that a precisely designed, lifelike result can provide.



Intraoral view shows the warmth and natural aesthetics of the completed smile transformation, which is an outcome made possible by the combination of digital wax-up design, 360° preview and approval, clinical validation through the temporary crowns, and the consistent, precisely controlled crown aesthetics delivered by Polychromatic Shade™ technology.

Patient Before and After



Dandy's Technology

The digital workflow and lab partnership that supported this case were the foundation it was built on. The preliminary digital wax-up and live design review refined every contour to precise clinical specifications before a single tooth was touched, and gave Ian the visual reference he needed to commit to treatment. The custom temporary matrices translated the approved designs directly to the chair and clinically validated the crown designs during provisionalization. And Polychromatic Shade™ technology delivered what no digital workflow tool alone can: crowns with the translucency, optical depth, and natural color gradients that make them indistinguishable from natural dentition, at a price point that extends that level of aesthetic outcome across the full range of cases.

Conclusion & Best Practices

This case reinforced something I have come to believe more firmly with every large anterior case I complete: The most transformative thing digital dentistry has given us is not speed or efficiency, though both matter. It is predictability. The ability to design, validate, and refine every element of a restoration before the patient sits in the chair for treatment has fundamentally changed what is possible in a single practice, on a single day. Polychromatic Shade™ technology extends that predictability to the one variable that has always resisted it: crown aesthetics. When the translucency, optical depth, and color characterization of the final restoration are as digitally controlled as its contours and occlusion, the outcome is no longer a function of who fabricated it or how skilled they were that day. It is a function of the design. Ian's smile is the evidence.

Every crown, one consistent result.

WATCH HOW DR. WILK DID IT.

▶ [VIEW CLINICAL CASE FILM](#)



ABOUT THE AUTHOR

Dr. Mark Wilk

Dr. Marc Wilk earned his DDS from Columbia University School of Dental and Oral Surgery and completed a general practice residency at St. Luke's/Roosevelt Hospital Center. He has practiced general dentistry at Tudor City Dental in New York City since 1988. Nearly four decades into practice, he's known for pressure-testing new dental technology chairside long before it becomes standard, from early digital impressions to today's AI-assisted scanning and design tools

Dr. Wilk is an advisor to Dandy and sits on advisory boards for several other dental technology companies, including Vyne Dental, Pearl, Adravisision, Weave and Videia, giving him a clinician's-eye view of intraoral scanning, digital workflows and AI innovation across the industry. He was among the first practicing dentists to put Dandy's Vision scanner through its paces, and has lectured extensively on how faster, more precise scanning has cut appointment times in his practice.