

# Systems in a not so Perfect World



by David M Reeve

Manager of The London Implant Laboratory

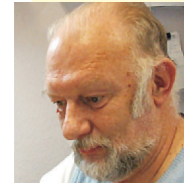
Every manufacturer needs to create a brand identity and publicise their products. These days “end user marketing” is often used, where companies target the end user or final purchaser (our clients, and increasingly, patients) in order to put pressure on the target primary user (the dental technician) to purchase a specific “trade name” system, service or product. There is nothing wrong with this, particularly as we are now seeing some very good products on the market. The problems begin when so many companies produce systems that do very similar things to their competitors (me-too products).

As Laboratory Manager of The London Implant Laboratory, I am often asked by dental surgeons to explain the features, benefits and differences in strength and function of different systems. They also want guidance on where to use a particular product, which restoration type is appropriate and why. It is clear from the contacts we have with dental technicians – through our sister company, Lab-2-Lab – that they are similarly unsure about the best choice for their needs, despite being more aware of the range of technical products and systems available.



Titanium implant structure

## David M Reeve



David began his training in a small laboratory in Harley Street, London, in 1964, where he specialised in crown and bridge work. Since then he has spent many years working in the Harley Street area and subsequently had his own laboratory in London for 20 years. His main experiences were in Implantology and Crown & Bridge work. Closing his laboratory to join Ivoclar Vivadent as a Product Consultant in Dental Ceramics. He has lectured on and demonstrated Dental Ceramics, Pressable Ceramics and Prosthetic Systems and became known for his technical knowledge of Dental Ceramics. More recently he has become Laboratory Manager to The London Implant Laboratory and enjoying the many new challenges in this, his latest position.

I certainly wouldn't be without a ceramic pressing system: it is every bit as important to our laboratory's daily function as metal ceramics. The question is which one. I have tried several and each one, to date, has its restrictions and inherent problems. I hope this article makes the decision easier from an unbiased viewpoint, and shows why a press ceramic system is so necessary.

With regard to other systems, i.e. CAD/CAM and milling, my personal view is that these are initially very expensive to purchase and set up, and the number of systems on the market is mind-boggling. If you are considering purchasing a system of this type, it is always worth doing your maths first, factoring in the number of expected units per annum, profit margin and returns. It may not be cost effective, or even affordable, for the majority of laboratories to keep pace with the rapid changes in the market by purchasing these systems.

A better strategy may be to leave all that to one of the outsourcing laboratories, which provide a very good service to keep the technology moving, help their customers stay up to date, and offer qualified help and advice.

For example, at Lab-2-Lab we can produce anything your clients may require from single substrates, bridge substructures and implant abutments in various materials, such as Alumina and Zirconia (Titanium or Zirconia in the case of implant abutments). If I still had my own laboratory, I would be quite happy subcontracting substrates and structures that I could add my personal touch to, so that my clients could still recognise the definitive work as mine. As someone once said, "You don't need to buy a whole cow when you only want a pint of milk!"

Since being involved in CAD/CAM techniques I have been amazed at the levels of fit and accuracy, none more so than in implant bridge structures, where passive fits are achieved that would be impossible in conventional casting techniques without considerable work. The next stage will, of course, be the production of these structures in Zirconia, combining great aesthetics with high flexural strength and phenomenal fit.

However, I digress and I really wish to describe why a pressable ceramic system has become essential for our laboratory... saving time, helping our business grow, and definitely making my working life easier, especially with difficult cases.

## A Brief History

When the first pressable ceramic system was about to be released on the UK dental market, I was asked, "How many systems would I consider could be sold here?" I considered that a maximum of five in the first year could be sold, as it was a specialised system. This system worked extremely well, but was laborious and time consuming, but produced some of the most aesthetic results I had seen in dental ceramics.

That particular system has, subsequently undergone many changes, in part forced on it by subsequent competitor products. Rather like the Japanese 4 x 4 manufacturers influence on Land Rovers. This, in most cases, is beneficial for the customer, unless changes are placed in the market without considerable test and trial. I had, until recently, used this system, with the occasional deviation to two other systems. The decision to change was taken due to the anomalies of the original, but revised product. I returned to the original system once it appeared to be more 'sorted', even though it was a little slow to produce the desired results. It was, therefore, with an open mind that I asked to try, yet another Pressable Ceramic System. As is common

in busy labs, it took several weeks to try out the new material and to venture a few production units.

## The Matchmaker PRESS System

The system I elected to try was the Matchmaker PRESS System from Schottlander. I requested a full system on trial and was extremely pleased to find considerable technical and aesthetic advice from the company's staff. No salesmen, pushing me for an early purchase, just good honest support. This was very refreshing and made me wish to investigate the system further.



This system is not suitable for making bridges, which I never considered to be an option in pressable ceramics for every day use, mostly due to the very large connectors necessary that could compromise aesthetics. There are other systems that cover this area of restoration better, with a stronger result. Although, it is possible to press the ceramic material to precious alloy; this and pressing to Zirconia, I hope to cover in a future article.

The full system comes with a variety of translucent and opacous, shade matched and non shade matched pressing pellets. The first impression was of a system that had been thought through extremely carefully by someone who really understood the needs and complications of our job. Unfortunately, it would be impossible to describe the full system here, and I considered it more important to show how well the system works, on a daily basis, in practice and how it saves considerable working time.

However, it is necessary to mention that the layered, low fusing layering porcelain, can be used in metal ceramic restorations, also. An extremely useful advantage when combination work is considered. That alone solves so many problems in shade parity attainment.1

## Time Saving

This is where the Matchmaker PRESS System really comes into its own! Just reading the instructions for the investment showed that I could save half an hour on just the investment setting time alone over my current system.

What is more, the plungers could be placed in a hot furnace; this was an amazing saving in time as in a busy laboratory the problems of 'shoe horn' furnace time with metal workers and cooling the furnace poses considerable delays. I know that both ingots and plungers of my previous system could be pre-heated in a porcelain furnace, however timing needed to be watched carefully and other members of staff objected to me running around from ceramic room to casting room with hot items.

All ingots come pre-sintered; this may not immediately appear an advantage to most, unless the alternatives of non-sintered ingots have been tried. One of the other systems I tried in the past had this system of ingots and the experiences of contamination from non-residual wax led to blue or grey restorations, even after considerable burnout times. The other problem that can occur with non-sintered ingots often becomes apparent when more than one ingot is used. There often appeared, in the labial face, a circular line of air bubbles and a shade difference where one plasticised ceramic met another. This proved extremely difficult to remove or disguise, hence time wasting was considerable, not so with pre-sintered ingots.

Burnout times were similar to the existing system, so no extra saving in time here, but then again, that wouldn't be possible as wax must be fully vaporised and investment rings must be uniformly heated to temperature.

Due to the lower pressing temperature, pressing and investment cooling times were considerably shorter. This wasn't immediately evident in time-saving until it was found that I had saved over an hour on five pressings.

The refractory material was very smooth, giving clean crisp pressings every time. Devesting was also quicker, due to the softer nature of the material. It was once the restorations were devested that a very real saving in both time and stress was noticed. The pressings fitted the dies perfectly, needing no adjustment whatsoever with fits exactly as the wax patterns.

The fine grain structure allowed for very fine trimming of external surfaces, with diamonds and Meisinger green stones, without the slightest hint of chipping. This proved invaluable, especially, for porcelain inlays.

The system does allow for pressing pre-reduced contours, although I tend to wax full contour to ensure pressing ceramic





flows from thicker to thinner areas. The pressed restoration in Matchmaker PRESS is so easily ground that reductions are very quickly made to allow space for layered and effect powders.

Further savings in time came at the layering stages: it was found that a wash layer was not necessary! That's one firing saved. Another firing saved in the layering, all internal effects, internal stains and layered materials could be built and fired at the same time. This had saved two, sometimes three extra firings.

A common problem that I found with previous systems was that the layered ceramic sometimes 'tore' leaving open fissures in the incisal edge requiring extra firings. In all the restorations I've made with Matchmaker PRESS, a minimum of 100 now, I haven't once experienced this problem, or the slightest hint of delamination.

Since my original thoughts, over sixteen years ago, that pressable ceramics was limited in its use, I have totally revised my opinion. I now consider it to be a totally essential part of our business and would suggest the same for any other laboratory. Certainly, it does not do everything, no system can, but I hope it is evident from the following cases that pressable ceramics are essential as an aid in difficult and certain cases. Its aesthetics, in my opinion, are second to none and once bonded to the underlying tooth, should produce a long lasting and successful restoration.

For those of you wishing to try the Matchmaker PRESS System, it can be a very inexpensive system to get into. I was able to use my previous pressing furnace and ring formers and Schottlander offer a range of different kit sizes, ranging from all you need to produce a single shade, right up to full kit. This is another example of how this system has been so carefully thought out.

### It's not a perfect world!

I maintain that 'Dentistry is not a perfect world.' Quite a sweeping statement, especially, after nearly forty five years of striving to perfect my work. Unfortunately, it's true and the many restrictions put on what we do by factors that we have no power over, such as physical and natural laws and other factors that are forced on us by the restrictions of a particular case or others' expectations lead us down a path of compromise. I still find that I may be dissatisfied with a case that I was pleased with, the night before or, more fortunately, visa-versa. That's a human trait and another

factor to consider when we try achieve the elusive perfection. I think what I am really saying is that we work in a subjective environment and we can only do the best we can in those given circumstances at that time and with the knowledge currently available. Sometimes a fully tested and tried system can help considerably in achieving a more than acceptable result and may even get us out of trouble.

Having said all that, why should I consider that a pressed ceramic system is an essential part of a laboratory? The first point I'd like to make is that since The London Implant laboratory has been offering this service there has been a very healthy growth in financial turnover by having this extra string to our bow. It produces extremely aesthetic and accurate restorations and has also made the working day less fraught with anxiety for particularly awkward cases, some of which I wish to describe below.

In this article I would like to describe a few situations that I was presented with and how the restrictions of 'normal' everyday cases directed me into a situation of overcoming obstacles, rather than just enjoying playing with porcelain in attempt to achieve perfection. Although, as you will see, I still enjoyed my work and I managed to achieve a reasonably, satisfying result with less compromise than I originally expected, aided by modern techniques and materials.

### CASE 1

The request from the client was for me to fabricate 2 veneers on the two centrals with just a basic A2 shade. Shade parity was essential even though one preparation was only half the length of the other and the other had an undesirable, 'darkish' background colour. Not an ideal situation, in fact quite a problematic and reasonably common one.



**A pair of central restorations**

I assumed that this was an 'accident' case and it was for a young patient with little incisal translucency. These indicators would, strangely enough assist my decision on fabrication style and, actually aid, not hinder the desired result. I therefore, had something positive working for me.

I haven't shown you a picture of the prepared teeth, in order that I can leave it for you to decide which natural tooth is the short one and which is the discoloured one. I've used a strong blue background, for this picture, which should help your choice, due to the transmission of blue through yellow translucency. Also, this 'solid' model was modified in colour on the preparation for the veneer with the darker underlying tooth colour, to assist my working, colour evaluations. Please look carefully for the clues.

*\*Answers at the end of this article.*

My conventional choice of material, for veneers, would have been for a 'feldspathic' porcelain on platinum foils. This allows for greater control of fit, marginal accuracy and thickness and quality of the fired porcelain, and hence, is my preference over refractory veneer techniques. Unfortunately, this was not an option for this case as shade parity could not be fully evaluated until platinum foils were removed, leaving it much too late for modification, without completely remaking the restorations. Due to the colour influence of the grey foil through half of one veneer and completely through the other it would have been impossible to evaluate the shade parity and the masking effect of the ceramic over the discoloured tooth and the influence of this undesirable background colour on this veneer and it's comparison with the other.

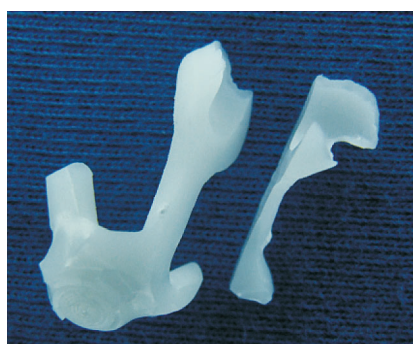
An alternative material option available to me was a CAD/CAM produced veneer substrate and in this case, could have been more than a possibility. It would have been possible to extend the substrate on the reduced preparation to match the length of the substrate on the other, A pair of central restorations 3

enabling a possibility for shade parity. My personal feeling is that CAD/CAM techniques and results are amazing with the technology improving at an alarming rate; however, I consider this technique may not be the best system for producing veneers. This is purely a personal feeling, and I base it on marginal integrity being reasonably difficult in a 'knife edge' situation to achieve. I also, personally dislike a reasonably opaque layer of Chroma Liner exactly at half depth of finished veneer



that is generally not a thick restoration. I do believe there are more aesthetic answers to veneer fabrication. Although, as a substrate for crowns and bridges, CAD/CAM techniques produce very aesthetic, strong, accurate and practical solutions to everyday situations. I come back to my original statement "It's not a perfect world" ie. No system will provide all the answers to all cases, it's not possible.

I therefore decided that my best option was for a 'Pressable Ceramic'. Not a situation I fully relished as the system I was currently using had a number of restrictions and required quite a considerable amount of time to fabricate, and time was not a commodity I had much of. It also required a 'cold' burnout furnace, also not available to me, without prior consultation with my work colleagues. I also had, had some failures with this system, ie. cracking of the ceramic, through the button, sprues and restorations.



This was caused by a coefficient of thermal contraction difference between ceramic and aluminium oxide plunger, during the cooling process. (Not a perfect world) Although, this problem, had been resolved, subsequently, by the use of disposable plungers, from a different manufacturer.

It was this particular case that became my first two restorations with Matchmaker PRESS. All the above mentioned advantages over my existing system became very apparent. After discussion with Maurice King, the Schottlander Ceramist, whose technical advice has proved invaluable, it was decided that Translucent Ingots A2 would be sufficient to mask out the undesirable background colour and would provide an aesthetic result. The effect of the dark areas could be assessed by colour modification of the die. It will be noted that this is not visible in the picture of the finished restorations, although it, certainly exists.

## Hints and Tips for the Use of Disposable Plungers

Cold Matchmaker PRESS ingots and disposable plungers are placed in the hot investment, only immediately prior to pressing and are not preheated in the burnout furnace.



Plungers and sprue former

Note that Alox plungers and sprue former are a different configuration at the plunger end from the disposable plunger. The disposable plunger is milled flat, with no rounding of the corners.

Considerably different from the sprue former, in particular. This produces a slightly bigger button, as the plunger cannot penetrate the full depth of the recess. The recommended maximum weights of wax pattern and sprue, for one and two ingots, are not to be taken too literally. It would be advised to err on the side of caution and not take the weight too close to the maximum as a short pressing mat result.

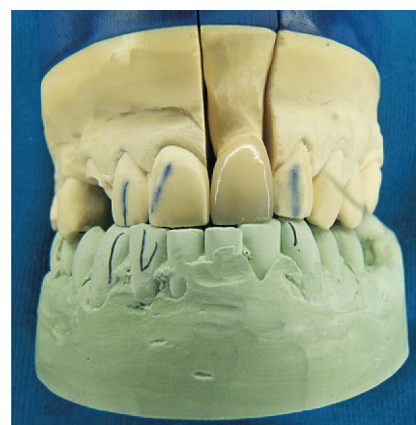
The disposable plungers are made from a refractory material and, hence, there is no conflict of coefficient of thermal contraction between plunger and pressed ceramic. No cracking of ceramic results.

## CASE 2

A very simple case? A single central! We all know the problems of single centrals and the difficulties of shade match attainment, add to that a prominent preparation and the thought of a large drink and an early bed is a definite viable alternative.

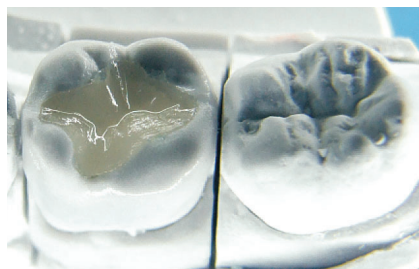
This case would, certainly not have been suitable for metal ceramics, with all the problems of specula reflection of an opaque layer close to the labial surface.

An aesthetic result, without an extremely prominent restoration was now possible and the patient and practitioner were delighted with the result.





## CASE 3



Porcelain inlay example

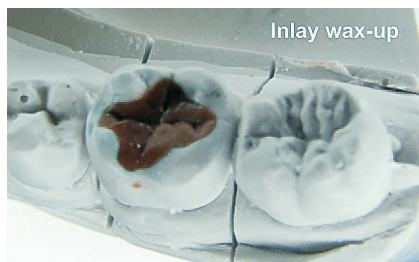
### Porcelain inlays.

Of course it is possible to make porcelain inlays, using refractory techniques. It is possible; I've done it, but never wish to do it again. It is a very time consuming process and once the restorations are removed from the refractory are almost impossible to adjust. The use of feldspatic porcelains is problematic in this situation, due to their larger grain structure than leucite and apatite ceramic materials used in pressable ceramics. The resultant restoration is, therefore, more prone to chipping at the margin.

### The Requirements of Ceramic Inlay

1. Ceramic inlays must be aesthetic and have sufficient translucency to collect the colour of the surrounding tooth substance.
2. Marginal integrity is essential. A prominent margin is considerably abrasive on the antagonising tooth and a short or chipped
- 4 margin is source of leakage or bacteria accumulation.
3. The ceramic should be close grained and highly glazed to reduce abrasive factors against the antagonistic tooth.
4. The internal box cavity fit should be accurate, as the luting resins tend to be a thin viscosity and their, subsequent, contraction may result in post operative pain, as tooth walls are pulled inwards.

There are, of course further requirements for inlays, but these essentials do need to be considered.

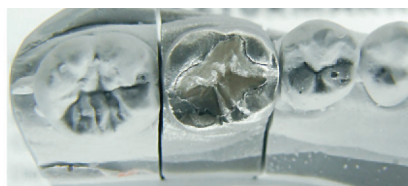


Inlay wax-up

To be able to wax-up inlays, evaluate their accuracy of fit, prior to fabrication is a big leap forward in inlay production. Especially when confidence in a system, such as Matchmaker PRESS, of producing exact reproduction of wax pattern can now be very high. This system has proved time and time again restorations that fit straight from devesting, without modification. I now thoroughly enjoy porcelain inlays, even on complex cavity preparation designs.

### Hints and Tips for Ceramic Inlays

I have found that the use of a silver powder, aesthetic, evaluation material is extremely useful to evaluate marginal integrity and transitional contour from restoration to tooth (an essential requirement for longevity of antagonist).



Silver on inlay

A small change in mixing ratios of the refractory materials is sometimes required.

50-50% mixes are recommended, although I've found 40% liquid to 60% distilled water works better for internal, closed, wall inlays



Finished inlays

## CASE 4



Model veneers

### Restoring Annotated Teeth to Evenness

A common request for cosmetic change is to even up anterior arches with veneers. Whilst I fully understand the need to remove as little good, tooth material in cosmetic restoration, it does pose technical and aesthetic problems.

Complicated paths of insertion and inter tooth contacts, shade parity between thick and thin restorations and thick, unsightly incisal edges (particularly in lower anteriors), next to more normal dimensions, all, may, compromise the results. Patient's expectations could certainly be reduced by diagnostic wax-ups, and this is considerably easier to reproduce in pressable ceramic than build and fire techniques.

The first problem, with this particular case, started with the impressions. In an ideal world, the impression should have been retaken, unfortunately, the practitioner said this was not an option. He presented me with two impressions for me to work on, so that I could transfer restorations from one to another, using the best of each. Whereas, the average of two bad impressions is one bad impression. It's best not to describe the subsequent discussions around this, we've all had unfortunate situations like this and it is not for this article to describe the moralities and responsibilities of this type of decision. Suffice to say, this is the problem I was posed with and there is no such thing as a perfect world.





This made the decision for type of restoration material easy. Build and fire techniques on platinum foil was not possible. The transfer of these from one model to the other would pose considerable problem. Build and fire techniques on refractory model, again was impossible due to the need to work between the two investment models and maintaining the same labial position on all restorations would be technically problematic. Also, the way that the teeth were interlaced, margins covered by the adjacent tooth or teeth would pose considerable problems and one lost margin would mean a difficult remake. I trust the following photographs explain the difficulties.



**Prep model from incisal edge**

Waxing the restorations, not only allowed for path of insertion, margin positions and contacts evaluation, but also allowed the possibility to transfer from one model to another.



**Primary wax-up**

There was also, considerable problem in separating the dies and I employed my own technique of sawing up from the bottom of the model. It may be noted that a fracture point is created by brutalising the lingual, interproximal areas and drilling small holes through the model, just beneath the margins, to create natural fracture points. Had this case been on just one impression, with pressable ceramics, it would have been possible to wax all veneers on a solid model, separate the individual patterns and transfer them to separate dies to redefine the margins.



**Model prepared prior to sawing through**

I considered this case very carefully, and to this day, I am certain that pressable ceramic was the only option, reiterating my point that pressable ceramic is an essential system in every lab. To my great relief, the Matchmaker PRESS System performed extremely well. The fit of each veneer was perfect, directly from investing and, although, I reduced more of the dentine, for enamel and effects, than I would normally risk, there was no distortion of substrates or compromise of marginal integrity.

The final result was, I admit, a compromise, as many cases often are and as I expected from the onset. However, Patient and Clinician were both pleased with the result as expectations were not inflated and, maybe, that is a satisfactory result.

Although it's not a perfect world, we can still produce acceptable results and there are systems out there that can really make a difference and help us, in our often difficult working environment.



### **In Conclusion**

Having fabricated in excess of 100 units in a short space of time, I am more than impressed in the Matchmaker PRESS System and the help and support I've received from Schottlander and Maurice King, in particular. I know I've made considerable time savings, overcome obstacles and increased my employer's turnover through this system. What more could be asked of any system or of a Manufacturing and Supply Company? For further information of the services available at The London Implant Laboratory or Lab-2-Lab, please contact us on telephone 020 8902 7768 - our trained staff are here to help.

*\*Answers: Full length and discoloured preparation is patient's upper right 1 and the half length, normal colour preparation is the patient's upper left 1.*

## **match** *Maker* **PRESS** Pressable Ceramic System

Matchmaker PRESS is designed for "all-ceramic" crowns as well as inlays, onlays and veneers. Its special leucite and glass matrix imparts strength in excess of the requirements of EN ISO 6872 together with optical properties which blend seamlessly with the natural tooth.

*..... perfect shades first time every time*

To learn more about Matchmaker PRESS  
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