Peterson Area Dental Laboratory Information Letter

10th Dental Squadron/USAFA, Colorado 5 September 2000

Pontic Design for Fixed Partial Dentures

Pontics are fixed partial denture components that replace missing teeth and restore appearance, function, and phonetics. Oftentimes, the edentulous areas where a fixed partial denture is to be placed may be overlooked during the treatment-planning phase. In these cases, the design of the pontic may not be considered until the master cast is prepared, and the case is sent to the dental laboratory.

Proper diagnostic evaluation for a fixed partial denture includes careful analysis of the critical dimensions of the edentulous areas. The examination should include the buccal-lingual ridge dimension, the mesiodistal edentulous length, and the occlusogingival height. If the pontic space has been reduced due to migration of adjacent teeth, orthodontic movement or modification of the abutment teeth should be planned. A careful diagnostic wax-up will help determine the best course of treatment. Disregard for the available space may result in an undersized pontic that will likely trap food debris and be an esthetic failure.

Residual ridge contour and texture must also be considered. An ideal ridge will be broad and smooth with no signs of inflammation. Hyperplastic tissue should receive periodontal treatment and/or be surgically removed if required.

Patients with severe residual bone resorption following tooth loss can present a significant esthetic challenge. In these cases, surgical ridge augmentation should be considered prior to tooth preparation. If left untreated, large defects in the edentulous ridge often require large, over-contoured pontics to fill the space. Access for proper oral hygiene is usually compromised in these situations.

Form and shape of the gingival surface must be evaluated in order to design a pontic that will meet biologic, mechanical, and esthetic considerations.

Biologic Considerations: The biologic principles of pontic design relate to the maintenance and preservation of the residual ridge, abutments, opposing teeth, and the supporting tissues. Specific factors of influence include good oral hygiene, ideal pontic-ridge contact, and occlusal harmony.

Oral Hygiene: Tissue inflammation of the edentulous ridge can be caused by the release of toxins from microbial plaque. Patients must be taught to perform efficient oral hygiene techniques, with particular emphasis on cleansing the gingival surface of the pontic. The shape of the pontic tissue-surface will influence the success of the restoration. Ideally, all contours should be rounded and convex.

Resistance to plaque accumulation also depends on the smoothness of the material used. Many clinicians prefer glazed porcelain against the edentulous ridge.

However, although glazed porcelain looks very smooth, microscopically its surface can be seen to contain voids and may actually be rougher than polished gold.

Metal ceramic fixed partial denture #12-14 with modified ridge lap pontic #13. When esthetics is important, the pontic should appear to be "growing" out of the gingival tissue.

Nevertheless, highly glazed porcelain is relatively easy to clean, making plaque removal easier than from other materials. Well-polished gold is also resistant to initial plaque accumulation. However, it has been shown that even highly polished surfaces will accumulate plaque if oral hygiene measures are ignored. Because of their porous nature, and the difficulty in obtaining a highly

polished surface, resins should not be used on pontics near the tissue.

Pontic-Ridge Contact: When esthetics is a concern (such as the maxillary arch and mandibular anteriors), the pontic should contact the gingival tissue on the labial or buccal aspect of the ridge to give the appearance of emerging from the tissue. To create this illusion, the tissue surface of the pontic must passively contact the ridge along the facio-cervical line-angle. The design best suited for esthetics with the facial surface shaped to simulate normal tooth structure but with a convex lingual surface is known as a **modified ridge lap pontic.** With this design the pontic tissue surface must be convex in all directions.

In posterior regions (i.e., mandibular molar and premolar areas) where esthetics is not the primary concern, focus should center on occlusion, function and hygiene. A **bullet-shaped pontic** is probably easiest for the patient to clean. It is made as convex as possible with only one point of contact at the center of the residual ridge. This design is recommended for the replacement of mandibular posterior teeth where esthetics is less of a concern.

Normally, where tissue contact occurs, the gingival surface of a pontic is inaccessible for cleaning with a toothbrush. If a pontic has a depression or concavity in its gingival surface, plaque will accumulate there because floss cannot clean this area and tissue inflammation will result. A pontic with a concave fitting surface that overlaps the residual ridge buccally and lingually is called a **saddle or ridge lap pontic** and should be avoided because the gingival surface cannot be easily cleaned.

A pontic that does not contact the tissue is known as a **hygienic or sanitary pontic.** The hygienic pontic is used primarily in nonappearance areas. It restores occlusal function and stabilizes adjacent and opposing teeth. Because there is no requirement for esthetics, it is usually made entirely of gold and is kept away from the ridge for ease of cleaning. The occlusogingival thickness is no less than 3 mm and should have minimal distance of 3 mm from the edentulous ridge.

The hygienic pontic is frequently made in an all-convex configuration, faciolingually and mesiodistally. An alternative design has been suggested in which the pontic is made in the form of an archway mesiodistally, and is known as a **Perel pontic**.

The **ovate pontic** is a bullet or convex-shaped pontic that is placed into a gingival depression made in the edentulous ridge site. Primarily indicated for the anterior region, the ovate pontic depression may result from a recent extraction or from tissue contouring at the edentulous site using electrosurgery instruments. The tissue grows around the gingival 1 mm of the pontic, giving the appearance of a natural tooth/tissue interface.

Occlusal Harmony: A stable occlusion is best achieved by maintaining proper buccolingual pontic proportions. Narrowing the pontic occlusal table will not reduce forces that occur during chewing or para-functional activity. In fact, narrowing the occlusal table may actually impede a stable relationship due to resulting inadequate occlusal contacts, difficulties in plaque control, or failure to provide proper cheek support.

Mechanical Considerations: The prognosis of the fixed partial denture may be compromised without giving attention to mechanical principles. Improper choice of materials, poor framework design, poor tooth preparation, or poor occlusion can lead to fracture of the prosthesis or displacement of the retainers.

Long span posterior fixed partial dentures are particularly susceptible to mechanical problems. Flexing of the metal due to occlusal forces increases with the cube of the span length. That means a single pontic will deflect a small amount (x) when subjected to a certain force. Two pontics will deflect 2^3 times as much (8x) to the same force, whereas three pontics will deflect 3^3 times as much (27x). In these long span instances, a strong all-metal pontic may be required rather than a weaker metal ceramic pontic.

Esthetic Considerations: An esthetically successful pontic will replicate the form, contours, gingival margin, incisal edge, gingival and incisal embrasures, and color of adjacent teeth.

Pontics should represent the missing tooth in terms of occlusogingival height and mesiodistal width. The features of the contralateral tooth should be duplicated as precisely as possible in the pontic. If space discrepancies exist, the pontic space can be restored esthetically by matching the location of the line angles and adjusting the interproximal areas.

For more information on available pontic systems and their design, please feel free to give us a call!

Dental Laboratory Technology: Q&A in Fixed Prosthodontics

By SMSgt (Sel) Francisco Pizana, Jr.
ADL NCOIC

Staff Sergeant Don Scott from Scott AFB, IL submitted the following question:

SMSgt (Sel) Pizana:

What is the ideal clinical tooth preparation for a porcelain butt margin that will result in a most lifelike porcelain fused to metal crown from my laboratory?

Dear SSgt Scott:

A metal-ceramic restoration is where a veneer of porcelain is bonded to an underlying metal substructure. This type of restoration enables the dentist to provide the patient the esthetic and biological advantages of porcelain, plus the fit, strength, and durability of the ceramic alloy. Also, porcelain is impervious to mouth fluids, color-stable, and is resistant to abrasion.

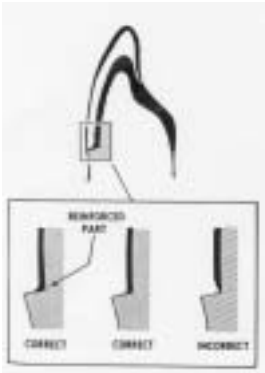
In order to provide the patient with a lifelike restoration, the dentist is obligated to reduce the facial

surface of the tooth at least 1.5 mm. The ideal preparation for a collar-less crown is a 90-degree shoulder preparation on the facial that extends from one proximal surface to the other. All porcelain junctions must not be feathered at the porcelain-to-metal junction. If so, the porcelain would be more likely to chip during functional movements or flake off during seating! Also, all junctions between porcelain and metal on the external surface of a restoration should be as close to a 90-degree angle as possible. **(See Figure 1.)**

The combined thickness of metal and porcelain on the facial surface of metal-ceramic crowns should be at least 1.2 to 1.5 mm thick to meet minimum strength and shade requirements. You must have at least 0.3 mm metal thickness in the porcelain bearing areas to keep the substructure from flexing under stress, thus fracturing the applied porcelain.

The opaque layer needs to be 0.1 to 0.2 mm thick to perform its masking function. The dentin and enamel porcelain should be 0.8 mm thick or thicker (if space permits) to reproduce the shade labeled on the bottle. More porcelain may be needed in the incisal portion because of the added translucency in this area. Ideally, metal-ceramic restorations should be made so that porcelain can be uniformly applied in thickness that do not exceed 1.5 mm on the facial and 2.0 mm on the incisal. **(See Figure 2.)** A thin uniform thickness of porcelain supported by rigid substructure offers the most strength. This is truly a team effort between the dentist and the dental laboratory technician! I hope the question, and especially the answer will be beneficial to all dental laboratory technicians. Keep those questions coming! Sincerely, F. P. Jr.

If you have any immediate questions or concerns, please feel free to contact me at DSN 834-1600 or via e-mail: francisco.pizana@peterson.af.mil



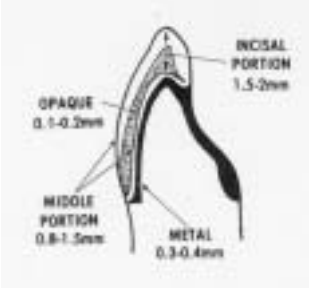


Figure 1 Figure 2

Reference: AF Pamphlet 162-6, Vol. 3, pages 108 & 133

Noble Alloys…and Princely Prices

The noble metals include gold, platinum, palladium, rhodium, ruthenium, iridium, and osmium. Noble metals are chemically inactive and resist corrosion and tarnish. Of the seven noble alloys, gold, palladium and platinum are currently of major importance in dental casting alloys.

GOLD! Chemical element Au, gold is a dense, lustrous, yellow precious metal of Group Ib, Period 6, of the periodic table. Gold has several qualities that have made it exceptionally valuable throughout history. It is attractive in color and brightness, durable to the point of virtual indestructibility, highly malleable, and usually found in nature in a comparatively pure form. The history of gold is unequaled by that of any other metal because of its value in the minds of men from earliest times.

Gold is one of the heaviest of all metals. It is a good conductor of heat and electricity. It is also soft and the most malleable and ductile of metals; a troy ounce (31.1 g) can be beaten out to 187 square feet (about 17 sq m) in extremely thin sheets called gold leaf.

Because gold is visually pleasing and workable and does not tarnish or corrode, it was one of the first metals to attract human attention. Examples of elaborate gold workmanship, many in nearly perfect condition, survive from ancient Egyptian, Minoan, Assyrian, and Etruscan artisans, and gold has continued to be a highly favored material out of which to craft jewelry, dental restorations, and other decorative objects.

Owing to its unique qualities, gold has been the one material that is universally accepted in exchange for goods and services. In the form of coins or bullion, gold has occasionally played a major role as a high-denomination currency, although silver has generally been the standard medium of payments in the world's trading systems. Gold began to serve as backing for the 19th century, and from the 1870s until World War I, the gold standard was the basis for the world's currencies. Although gold's official role in the international monetary system had come to an end by the 1970s, the metal remains a highly regarded reserve asset, and approximately 45 percent of all the world's gold is held by governments and central banks for this purpose. Gold is still accepted by all nations as a medium of international payment.

Gold has been the standard for fabricating cast dental restorations since the late 19th Century because it is a noble alloy, it is easily cast, it is malleable, and it wears favorably against natural dentition. In the early 1980's, gold prices rocketed to over $700 an ounce, partly as an inflationary hedge and in response to high oil prices. Eventually gold prices have stabilized near $275 per ounce (see Table).

Alloy	Price 23Oct 80	Price 6 Jan 97	Price 20 May 99	Price 3 Aug 00
Gold	$711.00	$358.50	$274.20	$271.90
Palladium	$201.32	$117.80	$327.00	$720.00
Platinum	$671.36	$362.75	$356.00	$570.00

Malleable platinum is obtainable only upon purification to essentially pure metal, and was first produced by the French physicist P.F. Chabaneau in 1789; it was fabricated into a chalice that was presented to Pope Pius VI. The discovery of palladium was claimed in 1802 by the English chemist William Wollaston, who named it for the asteroid Pallas.

Since pure annealed platinum is extremely soft, it is susceptible to scratching and marring. In order to improve hardness, it is alloyed with a variety of other elements. Platinum jewelry is very popular in Japan, where it is called hakkin, or "white gold." Alloys for jewelry castings include 90% platinum-10% palladium, which is readily worked and brazed. Adding ruthenium to platinum-palladium alloys increases their hardness while maintaining their oxidation resistance.

Platinum is used in the semiconductor as well as dental industry because of its corrosion resistance and stability at high temperature. Platinum-rhodium alloys are employed in the production of thermocouples that are capable of measuring temperatures as high as 1,800^{o} C (3,270^{o} F). Palladium is used in both the pure and alloyed states for a variety of electrical applications (accounting for 50% of consumption) and for dental alloys (30% of consumption).

The following alloys are used at the ADL:

	Jensen Type II	Firmilay Type III	Jelenko #7 Type IV	Olympia	Jelenko "O"
Au %	77	74.5	68.75	51.5	87.32
Pd %	1	3.5	3.35	38.4	5.94
Pt %			2.9		4.49
Ag %	13	11	12.4		1
In %			0.25	8.5	0.3
Cu %	8.5	10.495	12.34		
Zn %		0.5			
Ir %		.005	0.01		.05
Ru %				0.1	
Ga				1.5	
Sn					0.4
Fe					0.5

Although noble alloy prices are known to fluctuate, the Air Force has a contract for direct purchase from the Defense Supply Depot for some gold alloys. Please be sure to order items from the Depot using the national stock number (NSN).

You will find this less expensive than purchasing gold directly from the manufacturer…even at the government price!

If there is no NSN, call the company directly for Government Pricing. For Jelenko products, the Government Sales Representative is Ms. Rosa Santana and is the only one authorized to offer 50% government discount on Jelenko products. She can be reached at 1-800-431-1785 ext 242 or n.santana@jelenkois.com. For example, the ADL pays $14.40 a strip for 585 solder, and $14.30 a strip for 650 solder when purchased directly from Jelenko.

Some useful NSN numbers for gold alloys include:

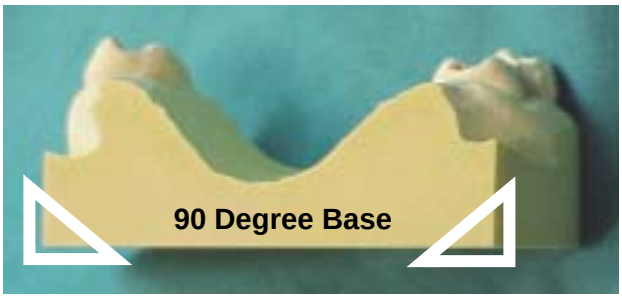
Firmilay Type III: NSN 6520-00-145-0176
Jelenko #7 Type IV: NSN 6520-00-145-0349
Olympia: NSN 6520-01-154-1733
Jelenko Olympia Pre-solder: NSN 6520-01-188-5347

Trimming Casts Can Be Fun and Easy!

By MSgt Robert Berkeley
NCOIC Removable Partial Dentures

We have received many master casts that are either trimmed improperly or not at all. The major problem areas are casts that are trimmed at a taper and casts that are overly bulky. We prefer casts that are trimmed at a 0° taper. This allows for more efficient duplication process. Master casts that are overly bulky sometimes don't fit in the duplication flasks and require further trimming. A major area of concern is thickness in the heal areas which sometimes make casts too tall to fit in our flasks. The sides must be trimmed as close as possible for the same reasons above. Please reference the picture below.

If you have questions, you can reach me at the following address: robert.berkeley@peterson.af.mil



Proper trimming of RPD master cast

Chief's Comments

By CMSgt Michael Bonner, Manager, ADL

With the end of summer upon us, we here at the ADL hope you all took some time out of your busy schedules to take a well-needed break. We are gearing up to continue to provide you the best support possible from our staff. Just a couple of things you can do to help us better help you:

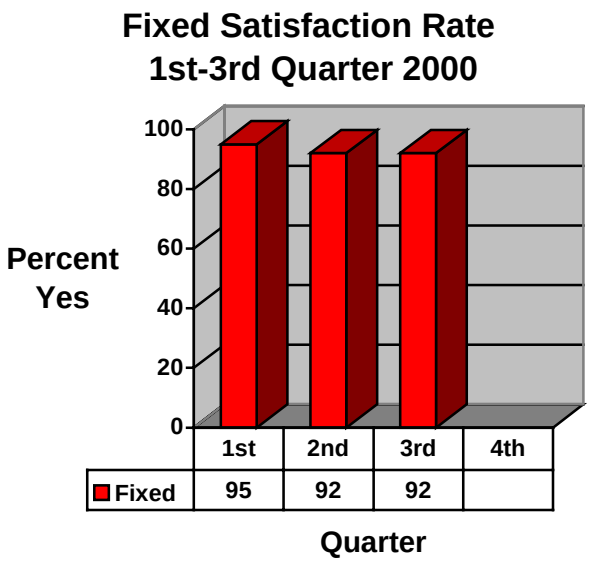
1. For our overseas customers, please provide us with your facility's physical address. We are currently utilizing FedEx as our primary shipper, and they do not deliver to APO/FPO addresses. If we do not have your physical address, we must ship via United States Postal Service (USPS). Since the USPS only serves the United States, your cases are transferred to the Military Postal System (MPS) once they

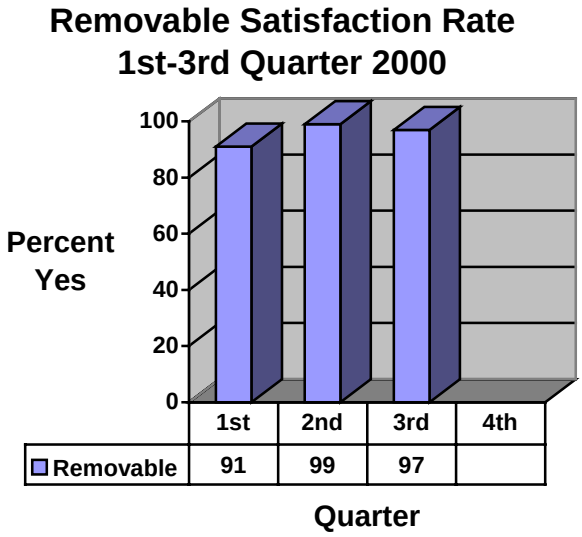
reach the stateside port, and most of us know how cumbersome the MPS system can be at times. With a physical address we can return your cases much sooner. For our stateside customers, please ensure we have a Dental address and not your orderly room. FedEx will deliver directly to whatever address you provide.

2. We have put together an e-mail group of base laboratory NCOICs. If your lab NCOIC is not receiving e-mail from us, please provide us with an address. This includes our Army and Navy customers.
3. When you review our Quality Control information, you will notice that our response rate for fixed cases was 48%, and for removable only 25%. We sincerely want to know how we are serving you, so I encourage you to please return the forms, good or bad.
4. Our manning level continues to be below normal. We are in need of about 12 technicians. As I mentioned previously, the Peterson ADL is a beautiful facility and The City of Colorado Springs is a wonderful place to live, whether you are single or have a family. For more information on an assignment here, just give us a call, or you can fax your special duty application directly to us, (DSN 834-1605) and we will forward it to HQ USAFA/DPAA. The requirements and other details can be accessed by going to:

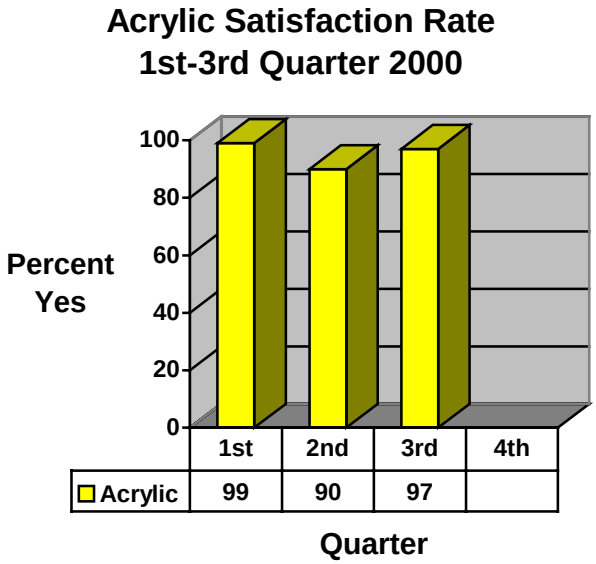
http://afas.afpc.randolph.af.mil/amsweb/master.cfm

ADL Report Card: Customer Satisfaction Rate…Were You Satisfied With the Quality?





Fixed QC Response Rate: 1134 of 2350 cases or 48%



Removable QC Response Rate: 155 of 632 cases or 25%

Acrylic QC Response Rate: 166 of 476 cases or 35%

Beryllium Exposure in the Dental Laboratory: A Nickel for Your Thoughts?

Many of our popular nickel-chromium base metal alloys used at the ADL for metal-ceramic restorations (Rexillium V, Jeneric/Pentron: 73.0% Ni, 14.0% Cr, 9.0% Mo, 1.8% Be) and removable partial dentures (Ticonium, CMP Industries: 70% Ni, 15% Cr, 5% Mo, >.05% Be) contain beryllium. This particular element is added to these alloys in small amounts to reduce the

fusion temperature, improve the casting characteristics, refine the grain structure, and possibly participate in the bonding of porcelain.

Beryllium is highly toxic in its free state. Exposure to beryllium may result in acute and chronic forms of beryllium disease. Workers with acute disease states can experience physiologic responses ranging from contact dermatitis to severe chemical pneumonitis, which can be fatal. The chronic disease is characterized by symptoms persisting longer than 1 year and may include coughing, chest pain, and general weakness due to pulmonary dysfunction. Inhalation of the dusts and fumes of beryllium and its compounds is the main route of exposure. It has been shown that under certain working conditions, such as in the absence of adequate local exhaust ventilation, beryllium in base metal alloys can present a dental occupational health problem. Therefore, in laboratory and clinical situations in which grinding or melting of beryllium-containing alloys is performed, adequate local exhaust ventilation safeguards should be employed, since all forms of beryllium are toxic, and the body cannot excrete beryllium.

SSgt Michael Rinnels, skilled technician in the ADL removable partial denture framework section, displays proper wear of personal protective clothing and equipment when grinding on alloys containing beryllium.

OSHA specifies that exposure to beryllium dust in air be limited to a concentration of 2 micrograms/m^3 of air from an 8-hour time-weighted coverage. The allowable ceiling concentration is 5 micrograms/m^3, not to be exceeded for a 15-minute period. Additionally, the American Conference of Governmental Industrial Hygienists recently announced that it intends to slash its recommended exposure limits by 90%, from 2 micrograms/m^3 of air to 0.2 micrograms/m^3 averaged over an 8-hour work shift.

High levels of beryllium have been measured during finishing and polishing when a local exhaust system was not used. When an exhaust system was used, the concentration of beryllium in the breathing zone was reduced to levels considered safe. In the Air Force, the Bioenvironmental Engineers are required to perform periodic (usually annual but is determined locally) Industrial Hygiene Surveys that include air sample evaluation and evacuation hood inspection. Recommendations are made to correct problems or deficiencies. All dental squadrons are required to have these surveys available.

In many base metal alloys, nickel is found along with beryllium. Nickel and its compounds have been implicated as potential carcinogens and as a sensitizing agent. Since the nickel content of base metal alloys can exceed 80%, precautions should also be employed to prevent the aspiration of nickel-containing dust produced during dental grinding procedures.

Because of the risks involved with grinding and melting both beryllium and nickel, as well as most any alloy, it is imperative that good ventilation and exhaust facilities be employed. Additionally, when handling these materials, the guidelines offered by the OSHA website should be followed.
http://www.osha-slc.gov/dts/hib/hib_data/hib19990902.html

The topics include:
1. Engineering controls
2. Work practices to reduce beryllium exposure
3. Hygiene and personal protective clothing
4. Respiratory protection
6. Training
7. Health screening methods for beryllium sensitization and chronic beryllium disease

The risks presented with beryllium materials are significant. However, research has shown that airborne levels and the associated risks of beryllium can be controlled with proper work practices, respiratory protection, handling techniques and training as outlined above. Please let me know if you have any further questions!

Empress 2 New Product Line for Peterson ADL: A "Glass-Act"

Looking for a new and improved, stronger, more esthetic restorative material? We may have just the answer for you! The ADL recently introduced Empress 2 (Ivoclar North America) into our available product line. The second generation of the "revolutionary system in esthetic dentistry," Empress 2 now offers the ability to fabricate all-ceramic bridges. The new lithium disilicate framework ceramic and the apatite layering ceramic (fluorapatite glass ceramic with apatite crystals)

permit the fabrication of all-ceramic restorations that reportedly demonstrate properties similar to those of natural teeth.

Empress 2, as with original Empress, offers two methods of fabrication. The new layering technique of Empress 2 first fabricates a cutback framework made of litium disilicate, and then places a ceramic veneer overtop using the apatite ceramic. Indications for the layering technique include: three-unit fixed partial dentures with one pontic and the second premolar as the most distal abutment; and single crowns in the entire dental arch.

The second fabrication method is the staining technique. This technique uses a slightly shaded ingot of leucite glass-ceramic, which has been clinically used for over 10 years. Ingots are also available in 4 degrees of opacity while the dentin stains are in paste form and are baked on to the fully contoured surface. The staining technique is used for **i**nlays, onlays, and veneers.

Preparations:

1. Single crowns: The preparation significantly influences the stability and thus the durability, esthetics, and fit of the restoration. Therefore, the margins must be carefully designed with a pronounced chamfer or shoulder (rounded inner edges). Avoid sharp transitions, inner angles, or feather edge margins. Margins should be a deep chamfer or rounded shoulder: minimum 1.0 mm reduction. Incisal third of the preparation requires minimum 1.5 mm reduction. Occlusal and/or incisal requires minimum 2.0 mm reduction.

2. Inlays: Fissure width: minimum 1.5 mm reduction. Width of the isthmus: minimum 1.5 mm reduction. Proximal boxes should be slightly flared; line angles > 90°. Functional contacts need to be observed.

3. Onlays: Same procedures as for inlay. 2.0 mm of occlusal clearance is required for the cusp areas.

4. Veneers: Preparation margins located in the cervical enamel should demonstrate an inclination of 10-30°. A palatal chamfer is not required; various preparation designs are possible.

Shade Guides

Either the Vita (Vident) or Chromascop (Ivoclar) shade guides can be used. The dentin shade of the prepared tooth is determined by means of the Ivoclar Die Material shade guide. This shade subsequently serves as the ideal basis for the final restoration.

Cementation

The ADL will return your Empress 2 restoration with the internal (intaglio) surface etched. Adhesive cements such as Variolink II (Ivoclar) or Enforce (Dentsply) should be used clinically. If there are clinical reasons that argue against adhesive cementation, crowns and fixed partial dentures fabricated using the Empress 2 layering technique may also be seated with conventional glass ionomer cements or ProTec CEM (Vivadent). Hybrid ionomer cements with higher degrees of expansion than ProTec CEM must not be used. Restorations fabricated according to the Empress 1 or 2 staining technique or the old Empress layering technique must be seated using the adhesive resin technique.

For further information regarding the new Empress 2 material, please call or write MSgt Pete Santaularia (All-Ceramic Production Manager) at:
peter.santaularia@peterson.af.mil

A Systematic Approach to Smile Design

What are the principles of treatment planning an esthetic case to ensure a successful outcome? Gerard Chiche, DMD, Professor and chair of the Department of Fixed Prosthodontics at Louisiana State University School of Dentistry and co-author of Esthetics of Anterior Fixed Restorations (Quintessence) may have some answers for us all. In a recent Dental Products Report (August, 2000) interview, he advocates evaluating the patient's smile and breaking it down into six basic elements. While many secondary elements also comprise the smile, Dr. Chiche states there are six primary building blocks to systematically evaluate during the initial analysis process and diagnostic phase. The procedure is as follows:

1. Look at the smile line. Does it follow the lower lip? Is the plane parallel to the inter-pupillary line?
2. Look at the profile of the incisors, do they protrude too far or can they be built out further?
3. Check the length of the teeth. Do they relate to the upper lip normally? Do they need to be made shorter or longer?
4. Analyze the proportions of the central incisors. Are they balanced in shape? Are they too narrow or too wide?
5. Analyze the proportions of the smile from central to lateral to canine. Is more than one restoration needed to balance the proportion of each tooth?
6. Analyze gingival levels. Is gingival recontouring, crown lengthening, or graft procedure indicated?

Dr. Chiche states that this six-step analysis almost always complements what the patient desires. The analysis allows you to simply determine exactly what needs to be done and provides all the options available for best improving a patient's appearance. This in turn allows the ADL to provide the most esthetic restoration(s) possible. And that makes us all look good!

ADL Hosts Sheppard AFB Tri-Service Dental Laboratory Training Staff: A "Dental Investment"

"There's always room for improvement!" That was the motto of a unique working group formed when staff members of the tri-service dental laboratory training program within the Inter-service Training Organization (ITO) at Sheppard AFB, TX, recently visited the Peterson ADL in Colorado Springs. The ITO team first toured the ADL facility and then discussed with key members of the ADL many of the ways area and base dental laboratories could increase product quality and production. Central to the discussion was the on-going requirement for skilled dental laboratory technicians and how the ITO "schoolhouse" could continue to meet or exceed those needs.

Mr. John Ness, CDT, President and CEO of Productivity Training Corporation (PTC) served as guest speaker and presented proven PTC management and teaching tools used in the civilian dental laboratory sector. Strategies for possible integration into the schoolhouse curriculum were also discussed. Many other perspectives were presented, with both the ADL and ITO dental teaching staff receiving a good understanding of each others capabilities and needs. Future meetings are planned to discuss issues concerning Army and Navy ADLs.

The Peterson ADL would like to thank the ITO staff for visiting our facility and continually striving to improve the quality and skills of their newest dental laboratory technicians. Their dedication to teaching is a true "dental investment" that ensures we have the skilled technicians to deliver you that quality dental restoration!

L to R: MSgt Alan Kietzer, USAF; TSgt Greg Edwards, USAF (Peterson ADL); MSgt Darlene Stonecipher, USAF; DTC Scott Smith, USN; Mr. John Ness, CDT (President and CEO, Productivity Training Corporation); Col Regan Salamander, USAF (Peterson ADL), Lt Col Phil Sandefur, USAF; SSG Moises Soto, USA, MSgt (Sel) Mike Cumbie, USAF, (Peterson ADL). Photo by Col Doug Evans.

15 Keys to Employee Protection: Infection Control

OSHA (Occupational Safety and Health Administration) mandates using "universal precautions" when the potential exists for contact with any infectious person or item. As we all know, that potential for contact is very great in the dental laboratory setting. An effective infection control protocol established between the dental treatment room (DTR) and the laboratory is the first line of defense for protecting staffs as well as patients from the threat of exposure to an infectious disease.

The second line of defense involves the adoption of the "universal precautions" concept, which assumes that every case you receive is a potential health hazard. This principle, in combination with the following 15 key standards for an effective infection control program in your lab, will help you protect yourself and employees.

1. Practice personal cleanliness: Technicians should wash their hands with an anti-microbial soap before and after gloving, before and after using the restroom, before and after lunch and breaks, and before leaving the lab to go home at the end of the day.

2. Determine area at risk: Evaluate the lab set-up to determine the areas in the lab at risk for infectious contamination, including the receiving area, the cast department, denture repair, and possibly an isolated area or room set aside for patient shade-taking.

3. Establish a designated lunch/break area: Technicians should not eat, drink or use any consumable product in risk areas.

4. Wear personal protective equipment (PPE): Technicians working in risk areas must use proper personal protective equipment: disposable latex gloves or reusable vinyl gloves, safety eyewear or goggles, fluid-resistant gowns, and a surgical mask if required. To prevent cross-contamination, personal protective equipment must not be worn outside the risk area.

5. Protect receiving area equipment: Cover computer keyboards, phones and other equipment in the receiving area with a barrier material that allows them to be disinfected.

6. Rinse, Rinse, Rinse: Cases arriving from the DTR should initially be rinsed in running water. If the case was previously disinfected in the DTR, rinsing removes pooled disinfectant that may hinder an accurate stone pour. If the case has not been properly disinfected, rinsing removes blood and debris from the impression. Manufacturers of most disinfectants state on the label that the disinfectant is effective only on clean surfaces.

7. Use disinfectants properly. If you are not 100% certain that the case has been previously disinfected, you will need to disinfect the case yourself. To ensure the proper performance of any disinfectant, make sure the formulation is appropriate for the case being disinfected; the dilution is per manufacturer's instructions; and the contact time is in accordance with the manufacturer's instructions. Use the Tuberculosis kill contact time as the standard for length of disinfecting contact.

8. Discard contaminated packaging: If the case received from the DTR or lab did not arrive in a plastic container or bag, the packing material (foam inserts) and shipping box must be disinfected (to prevent bio-waste) and discarded.

9. Disinfect surfaces, countertops, and floors: Work surfaces, countertops, and floors in risk areas must be disinfected at least daily using an appropriate disinfectant and a spray-wipe-spray technique. If a risk area is also used for non-risk procedures, then cleaning and disinfecting must be performed immediately upon completion of the risk procedure.

10. Disinfect and/or discard PPE: Visibly soiled gowns should be discarded; otherwise, disinfect if possible, wash and reuse. Latex gloves and fluid-resistant surgical gloves should be discarded; vinyl gloves and plastic face shields can be appropriately disinfected and reused.

11. Disinfect new exposed surfaces: Trimming back over-extended borders on impressions, separating imbedded appliances from impression material, and grinding and polishing old dentures and partials exposes new contaminated surfaces that must be disinfected. Employees engaged in these procedures should wear PPE.

12. Establish separate denture repair areas: If possible, maintain two separate areas for pumicing and polishing of dentures and partials – one area for repairs, relines and adjustments, another for new work. For new denture work, wheels, brushes and pumice can be used from case to case. For used prostheses, pumice is discarded after each case; wheels and brushes are changed with each case, then bagged and sterilized before reuse.

13. Disinfect prior to shipping: Prior to shipping, cases should be disinfected, rinsed, and placed in plastic bags or containers. Though not an OSHA regulation, it is a courtesy that demonstrates professionalism and mutual concern for the patient and personnel within the laboratory.

14. Provide employee training: Employees (including shipping and receiving personnel) working in an at-risk area must be provided infection control training on an annual basis.

15. Protocol enforcement: Once an infection control program has been established, each safety measure must be enforced. The infection control program should be integrated into other management polices (dental operating instructions) and disciplinary steps put into place to handle employees who disregard the protocols.

New Shipping Boxes Put a Lid on Broken Casts

Perhaps you've noticed that the Peterson ADL has recently been returning your cases in new four-slot shipping boxes. These larger boxes were purchased in response to your constructive feedback saying that the old two-slot boxes were too small and often overpacked, resulting in returned items sometimes being damaged. Because most cases are submitted with a master cast, opposing cast, impression and solid cast, we tested a four-slot box and found it works well for the average case.

The four-slot box, lid and foam inserts are sold as a complete set for $2.75 each. If you damage or contaminate the four-slot foam inserts, two foam inserts from the old two-slot boxes placed side-by-side will work as well.

Four-slot shipping boxes can be purchased from:
Tharco
13400 East 39th Ave
P.O. Box 39103
Denver, CO 80239-0103
1-800-525-1831

Part #Z68591 A B C

A = Lid

B = Box

C = Foam

Restorations Fit to a Solid Cast: The Solid Facts

Fitting a fixed restoration to a solid cast has many advantages. Because the solid cast has not been cut, sectioned or pindexed for dies, an accurate intra-occlusal relationship exists. Traditional pindexing often causes dies to wiggle and move when the crown or fixed partial denture is seated to the dies. This pin movement in the laboratory often results in tight interproximal contacts in the mouth. Using a solid cast, the technician can accurately adjust interproximal contacts in the laboratory, allowing the dentist to save valuable clinic time and minimize frustration. With virtually no chance

of die movement and/or saw blade damage to adjacent cast teeth, restorations that are fit to solid casts require little or no adjustment when tried in the patient (one exception is when the provisional restoration did not have sufficient interproximal contact and the tooth moved…a clinical fault).

The solid cast also maintains intact gingival contours and allows the dental technician to visualize restoration emergence profile near the cervical region. Additionally, the solid cast permits development of ideal pontic contours on ridge areas verses pindexed casts where stone may be removed during the die trimming procedure.

Finally, the solid cast allows verification of fixed partial denture fit. Again, pindexed casts may result in mobile dies, and the fit may not be an accurate representation of the patient. When a fixed partial denture doesn't fit properly, the solid cast offers an accurate, undisturbed source to obtain a solder relationship.

The Peterson ADL will fit your fixed restorations to a solid cast that is sent in with the case. As a policy change, we will no longer routinely pour a solid cast for us to fit the restoration. We have found that our pouring additional solid casts can introduce several errors and inaccuracies. First is that there are significant setting expansion differences between Modern Material's Die-Keen (0.18-0.2% expansion) which we use, and those of other die stones that are sent to us, i.e., Whip Mix's Silky-Rock (.09% expansion), Hard Rock (.28% expansion) and Modern Material's Die Stone (.07% expansion). Because the expansions can differ by factors of two or almost three, restorations fabricated on one type of stone will likely not fit accurately on another type stone.

Additionally, research has shown that a cast poured in one of the most dimensionally stable materials (addition silicones) is most accurate when poured between 24 hours and 1 week after the impression is made. Due to time required for doctors to trim dies, mount casts, and ship the case, it is not uncommon for the ADL to receive cases weeks and even months after the impression is first made. The impression at this time may be inaccurate.

Due to these reasons, if you would like us to fit the restoration to a solid cast, please provide a solid cast that has been re-poured immediately after the master cast has been poured, and in the same stone type as the master cast and dies. We appreciate your cooperation!

Peterson ADL Workshop Update: We're Looking for a Few Good Presentations!

The next Workshop is planned for 13-15 Feb 2001! Please mark your calendars and budget now! We are also beginning our search for lecture and laboratory hands-on presentations. The POCs for this event are SMSgt (Sel) Francisco Pizana and MSgt Robert Berkeley. Please contact them at DSN 834-1621 for further information on how you can participate in your next ADL Workshop. Further details and registration materials will be posted on the ADL Web Page. We plan on having another superb venue of lecture presentations, hands-on courses, and commercial exhibits. We look forward to seeing you here in '01!

Current Case Turnaround Time as of 5 September 00

1. Acrylic Section – 18-20 duty days
2. RPD Frames– 12-14 duty days
3. Fixed Section – 12-14 duty days

Please call for Rush cases and other special needs. For the most current turnaround times, please visit our ADL web page at: http://www.usafa.af.mil/sg/adl/default.htm For planning purposes, please note these are "in-house" turnaround ranges, and do not reflect case transit time. As mentioned earlier, we have contracted with Federal Express for overnight return delivery to you. Similar guaranteed shipping from your facility will allow you to accurately project scheduling dates for your patient.

As always, we appreciate your business!

Certified Dental Technician Examination at ADL Workshop

A Certified Dental Technician (CDT) National Board Practical Examination will be offered at the Peterson ADL on 17 February 2001, following the ADL Workshop.

The practical portion is a 5-hour, in-laboratory examination testing technician abilities in procedures commonly associated with practice in a selected specialty. For details of the examination, contact the NADL home office through e-mail at nadl@nadl.org or through the NADL web site http://www.nadl.org

If you are interested in challenging the CDT practical examination, please contact Col Doug Evans or SSgt Robert Gutierrez at:
robert.gutierrez@peterson.af.mil

We need 20 candidates in order to host an examination. So please get in touch with us if you are interested!

Federal-Express Service Continues as a Huge Success!

Based on the tremendous response from the field, the ADL Federal-Express shipping contract appears to be a huge success. The Peterson ADL contracted the mailing of all our outgoing cases through Federal-Express this past February 00. Our contract is for

Priority Overnight delivery from our facility to yours. How can you help us keep this service working smoothly? We must have a current **street address** before we can ship to your facility. Your cases and their status are posted on the ADL Web Page. With FedEx overnight service, you can expect to see your case arriving by 1530 hours on the second business day, so you can schedule your patients accordingly.

ADL Hail and Farewells!

Arrivals:

MSgt Judy Bailly arrived from Travis AFB, CA
MSgt Luis Pacheco arrived from Fairchild AFB, WA
MSgt Nancy Kujak arrived from Bolling AFB, MD
TSgt Eugene Fisher arrived from the Recruiting Service, Hazleton City, PA
TSgt Mitchell Griffin arrived from Scott AFB, IL
SSgt Teres Cooksey arrived from Sheppard AFB, TX
SSgt Michael Domingo arrived from Sheppard AFB, TX
SSgt Brad Hanenkratt arrived from Andrews, AFB, MD
SSgt Derek Lucas arrived from Wright-Patterson AFB, OH
SrA Jason Buckley arrived from McClellan AFB, CA
SrA Daniel Battin arrived from Sheppard AFB, TX
Amn Jennifer Erickson arrived from Sheppard AFB, TX
Amn Erica Johnson arrived from Sheppard AFB, TX

Departures:

Col Regan Salamander - He served as the Peterson ADL Director and Military Consultant to the AF Surgeon General for over 2 years. He is the new Clinical Flight Commander at the USAF Academy.
TSgt Frank Dawkins - Medically retired
TSgt Loretta Archibeque - PCS'd to Kirtland AFB, NM
TSgt Tim Heidger - Retired in Colorado Springs
SSgt Michael Collisi - PCS'd to Lajes Field, Azores
SSgt James McAtee - Separated
SSgt Mark Smith - Separated
SSgt Amy Wagner - Separated
SrA Ann Morris - Separated
SrA John Donaldson - Separated
SrA Wade Sawaya - Separated
SrA Rex Wilson - Separated
GS-9 Terrell Pauli - PCS'd to Sembach, Germany
GS-9 Ronald Hill - PCS'd to Sembach, Germany

Projected Departures:

MSgt Charles O'Hara will retire in September 2000
TSgt Michael Cumbie will PCS to Kadena AB, Japan, March 01
TSgt Elisha Cumbie will PCS to Kadena AB, Japan, March 01
SSgt Robert Balbi will PCS to Andrews AFB, MD via Officer Training School
SSgt Stacey Grice will PCS to Ramstein, Germany in December 2000
SSgt Terry Freeman will PCS to Spanghdalen, Germany in December 2000
SSgt Rupert Young will PCS to Osan AB, Korea in January 2001
SrA Matt Burns will separate in November
Sra Rodney Oxendine will separate in November

ADL Web Page

Please visit our ADL Web Page! We are currently posting submission standards, product lines, and turnaround times. A special feature is the display of case status reports. Each week we update our web page report detailing when we received your cases, what stage of fabrication they are in (wax-up, casting, finishing, etc.) and when they were shipped. The intent is to keep you informed on the progress of your cases and aid in the scheduling of your patients in anticipation of the prosthesis arrival. You can also find copies of the ADL Newsletter and information about upcoming Workshops on the web page!

Peterson ADL Web Page:
http://www.usafa.af.mil/sg/adl/default.htm

Other ADL Web Page Sites:

- Ft. Gordon (US Army), GA, ADL: http://www.dencom.army.mil/adl/index1.html
- Kadena AB, Okinawa, Japan ADL: http://www.kadena.af.mil/kadena/18wg/18mg/adl/adlhomepage.html
- San Diego (US Navy), CA, ADL: http://ndcsd.med.navy.mil/adl01.htm
- Sembach AB, Germany ADL: https://wwwmil.usafe.af.mil/bases/ramstein/86ds/adl

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//*Signed*//

DOUGLAS B. EVANS, Col, USAF, DC

Area Dental Laboratory Director/Flight Commander