

TiconiumTM

premium 100

TECHNIQUE MANUAL

TICONIUM COMPANY
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Albany, New York
USA



Ticonium Technique Manual

With pictures and clear, concise instructions, you will find this Technique Manual easy to understand. Please keep it in a handy place for quick reference. For best results, follow these instructions carefully. Thank you for your support of Ticonium Company.

DUPLICATION	2-8
MODEL PREPARATION.....	9-10
SPRUNG	11-16
METAL MIZER & INGOT ALLOY	17-19
PAINTING & FLASKING.....	20-23
BURNOUT.....	24
CASTING	25-26
FINISHING	27-30
REPAIR	31-34
TECHNIQUE AT A GLANCE.....	35
PROCEDURES & PRECAUTIONS.....	35
INDEX.....	36

DUPLICATION

Ticonium duplicating material normally does not require dilution, however, you should be familiar with the strength of the duplicating material. The duplicating material cannot be too stiff, this will decrease the setting expansion of the investment when poured into the duplicating material.

After removing the master model from the colloid, you should check the strength of the walls of the duplicating material. If they are more rigid than usual, distilled water should be added to the material and remelted. (see figure 1)

Figure 1:

DIONIZER WATER DISTILLER #61750

Ticonium Dionizer

Cartridges produce water equivalent to single distilled water, removing all ionized particles except free carbon dioxide and silica. They deliver water that is ideal for duplicators, mixing investments and many other uses within the laboratory. Resin color change shows when to replace cartridges. Comes complete with cartridge, mounting bracket and accessories.



Because of weather conditions and shipping distances, it is possible that the same material will present different characteristics. The quantity of distilled water added to the material will vary for each specific situation. It could be rated from 100 cc's per each four pounds of material to 300 cc's per each four pounds. We believe this information is important due to the shrinkage of Ticonium alloy after casting, which on an average represents 1.7%, and will be compensated for by oversizing the

refractory model.

The Ticonium Technique provides three methods to achieve this:

1. Hygroscopic Expansion – is directly related to the percentage of water existing in the duplicating material. The hygroscopic expansion should be approximately 0.3%.

2. Setting Expansion – is achieved when the Ticonium Investment is mixed according to ratios indicated later in this chapter, and vibrated into the duplicating material. During the setting of the investment in contact with the duplicating material, the setting expansion should be approximately 0.4%. It is easy to understand that if the duplicating material is too strong the investment cannot expand properly.

3. Thermal Expansion – the average thermal expansion is 1% and is achieved when the flasks are placed in the oven and burned out at 1350° F (732° C).

AUTO-DUPPLICATOR INSTRUCTIONS

The use of a Ticonium 2 or 3 1/2 gallon Auto-Duplicator will simplify the melting of the duplicating material. Ticonium Auto-Duplicators will perform melting and cooling operations automatically and maintain correct pouring temperature at all times. (see figure 2)



Figure 2: AUTO-DUPPLICATORS
2 Gallon #405811 & 3-1/2 Gallon
#405711 Auto Digitals

Place small chunks of material inside the Auto-Duplicator and follow the detailed information provided in the Auto-Duplicator Operating Instructions

Periodic maintenance of the Auto-Duplicators is necessary. The inside tank should be cleaned once a week. The inside cover and blades of the Auto-Duplicators should also be cleaned and all the stainless steel parts should be sprayed with a silicone lubricant periodically.

PREPARING MASTER MODEL FOR DUPLICATION

After designing, surveying (see figure 3) and blocking-out of the undercut areas, relieve tissue undercuts with TICENE or WAX. (see figure 4)

Remove TICENE from model after duplication and store for reuse. Choose the sprue cone to be used with each master model. The sprue cones are **7 mm** high.

Correct placement on the lower cases should be **7 mm** from the lower part of the lingual bar.



Figure 3: SURVEYING



Figure 4: RELIEF of unnecessary undercuts and sprue placement

For upper cases the sprue cone should be placed approximately **4 mm** from palatal bars or from horseshoes. It is also important that with uppers the criteria of placing the sprue cone *perpendicular* to the occlusal plane be followed.

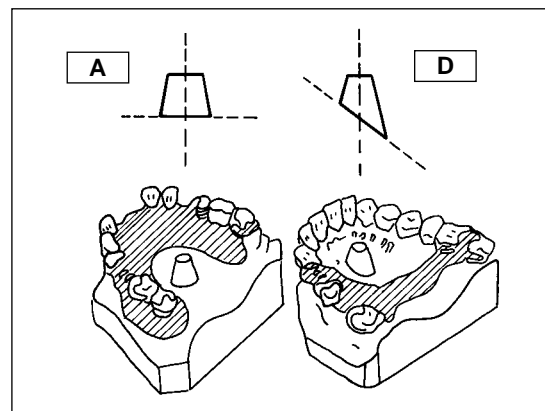


Figure 5: MOUNTING of "A" & "D" Sprue Cones

An easy way to place the cone in the correct position is as follows:

1. Place the cone in a *lying down position* so that the edge of the sprue cone touches the design of the lingual bar.
2. Tilt back to vertical position and seal. Always be sure that the cone is placed *perpendicular* to the occlusal plane.

"A" Sprue Cone (#TD-1475A) is used for flat surfaces. **"D" Sprue Cone (#TD-1475D)** for inclined surfaces – (see figure 5) refer to *Sprue Cones* on page 12. Secure sprue cones to the master model with wax. If the case will not be sprued through the investment model, no sprue cone will be needed at the point.

TWO METHODS OF SOAKING STONE MODELS

1. Soak model approximately 20 minutes in tepid, slurry water. (see figure 6) Slurry water is the liquid resulting from storing large pieces of stone in a bottle of water and using the resulting solution. This solution will not etch the model whereas tap water will. (If large areas of model are relieved with sheet wax, soak model with teeth pointed down.)

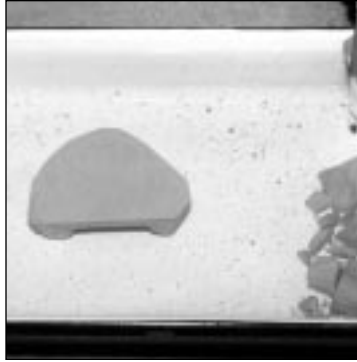


Figure 6: **SOAKING MODEL** to be duplicated in slurry water

Some technicians prefer to use slurry water from model trimmers. The idea is good, although, special precautions must be taken. The slurry water from model trimmers has a milkish appearance and a large content of powdered stone. Prior to using this slurry water the container should be left aside for a couple of days to allow the sediment to settle. Then, the liquid should be filtered and transferred to a new container. *If this procedure is not followed, a residue of stone will deposit on the master model, including areas at the tips of the clasps, and rest preparations, changing the configuration of the master model, which will result in a **poor fitting casting**.*

2. Another method of soaking the model is to stand the model in about 1/4" of water and let the model soak by capillary action. This is the *preferred method*, but will take slightly longer.

After the model has been soaked, blow off excess water and duplicate.

There are three parts to the duplicating flask: (see figure 7)

1. The base
2. The body
3. Pouring spout

Two flask sizes are provided. Use the one which provides at least 1/2" clearance between the edge of the cast and the rim of the base. Place TICENE Blocking Clay (#14) in the rim of the base.



Figure 7 : **DUPLICATING FLASK**

This serves two important purposes:

1. It forms a seal between the base and body so that there will be no leakage of duplicating material during the duplication process.
2. It will also act as an insulator when the cooling process is begun.

Secure master cast to base of flask with TICENE. Place flask body on the base and seat firmly. Position a ball of TICENE behind each venthole on the shoulder of body. Place pouring spout into flask body.



Figure 8: **POURING**

Center duplicating flask under pouring spout. (see figure 8) Open valve until the duplicating material flows in a stream about the diameter of a lead pencil. When the duplicating material reaches the level of the 2 ventholes, place the TICENE over the vents and

continue filling the flask until at least 2/3 of the pouring spout is full.

Place the flask in circulating tap water. (see Figure 8) The temperature of the running water used for chilling is directly related to the temperature of the room in which the chilling is being done. If the temperature of the water is lower than the temperature of the room, a desirable pattern of cooling will result. Regulate depth of water so it covers only the base of the flask. The water should not be below 55°F (13° C).

30 minutes is required to chill small duplicating flasks.

45 minutes is required to chill large duplicating flasks.

After proper cooling time has elapsed, you will note a dimple in the colloid in the pouring spout. This indicates that colloid has been pulled toward the chilling base, assuring you that the duplicating material is fixed firmly against the surface of the model inside the flask.



Figure 9: **CHILLING DUPLICATING FLASK**

Remove the pouring spout by twisting it *slightly*. Cut off excess duplicating material projecting from the body of the flask. Remove the base by prying with a knife between the base and body of the flask.

Insert two knives in depression made by the dabs of TICENE. The model is removed with a quick snap. Pry up, using the walls of the body of the flask as a fulcrum. (see figure 10)



Figure 10: **REMOVING MASTER MODEL**

NOTE: DO NOT lift one side of model before the other.

If sprue cone remains in duplicating material, it can now be removed. (see figure 11)



Figure 11: **IMPRESSION with sprue cone**

Use Ticonium INVESTIC™ for refractory or investment models.

WARNING: INVESTIC™ is harmful when inhaled repeatedly over a long period of time. Care should be taken to avoid breathing dust caused by use of this product. This product contains a blend of silica and plaster. Symptoms may not appear until permanent lung injury (silicosis) has occurred. Immediate clean-up of spills is highly recommended.

EFFECT OF WATER

Most communities are chlorinating and/or fluoridating the water supply. It is becoming more and more essential to use *distilled water* for mixing investment and duplicating material. Laboratories have noticed a pronounced difference in the behavior both of the investment and duplicating material during different seasons. Hence, the recommendation is that only **distilled water** be used in mixing *both* investment and duplicating material.

The recommended proportion is **29 cc of distilled water to 100 grams of Ticonium investment.** (Always use room temperature water. Hot or cold water will accelerate or retard setting time of investment.)

Use 28 cc of water to 100 grams of investment for large horseshoe or full bases.

DUPLICATION

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NOTE: Use an accurate scale and syringe for measuring. (see figure 12)

The Dionizer Distiller (#61750) will eliminate variables in water such as chlorination, fluorination and deposits of mineral salts in hard water. (see figure 1 on page 2)

Figure 12:
CAREFULLY WEIGH
investment
and measure
water for accuracy



Mechanical spatulation of a mix used for models is highly desirable. The expansion obtained with the investment when it has been mechanically spatulated can be controlled much more closely than is possible with hand spatulation. The investment has been compounded to provide a *combined setting and hygroscopic expansion of 0.7%* when mechanically spatulated for 30 seconds at a water/powder ratio of 29 cc to 100 grams and then poured into Ticonium duplicating material.

If the water/powder ratio is dropped to 26 cc to 100 grams, the combined setting and hygroscopic expansion can be forced upward to **1.1%**. Thus a very wide control range has been built into the investment.

Excessive spatulation will tend to *break down* the crystalline structure of the investment whereas insufficient spatulation will cause a *weak model*.

If spatulation is by hand, 60 seconds is needed.

Before vibrating the investment into the duplicating material, *blow out any "free water" left in the impression*, after the master model is removed from the colloid.

NOTE: The above recommendation is important to avoid a powdery investment model.

Vibrate directly into the mold. Place a little investment in the teeth and along the ridges and vibrate to displace all trapped air. Then add enough to fill the mold. **DO NOT make it flow around the mold** as this may cause inaccuracies where salts are removed from the duplicating material by the flow of investment.

Vibrate a small amount of investment around the sprue cone to form a seal. Now remaining vibration can be accomplished without holding sprue cone. (see figure 13)



Figure 13: VIBRATION

NOTE: By vibrating investment around the steel sprue cone, the sprue hole produced is smooth and dense.

After pouring the refractory model the duplicating flask should be placed in a location which it will *not be subjected to continued vibration* while other cases are being poured.

Effect of Vibration

If the impressions are placed on the bench alongside the vibrator as additional refractory models are poured, the continued effect of vibration will bring moisture to the interface between the colloid and the model. This water layer will result in a powdery surface on the model.

DO NOT ALLOW TICONIUM INVESTMENT TO EXTEND TO THE BODY OF THE FLASK AS THIS WILL RESTRICT THE AMOUNT OF SETTING-EXPANSION OBTAINED.

Allow investment model to set **60 minutes, minimum**, before separating from colloid.

SPECIAL NOTES

Occasionally it is a good idea to check your operating procedures. Many minor deviations can occur. These deviations add up and can cause real difficulty.

The following is a list of the problems which may occur and the errors that cause them.

1. STORAGE OF INVESTIC™:

Investment material will pick up moisture if exposed to humid air. Therefore, it should be kept in a tightly closed container and in a cool, dry place.

Investic is doubly protected in a water resistant carton and a polyethylene bag. To prevent prolonged exposure after the package is opened, the material is packaged in 25 pound containers.

To get the maximum protection, we recommend that after you have removed investment from the polyethylene bag you squeeze the bag down snugly against the surface of the investment, thus squeezing out any air (see figure 14) and preventing prolonged contact between the investment and air.



Figure 14:
SQUEEZE AIR
out of investment bag to prevent contamination



The 25 pound pack is a convenient unit to use right at the bench and many labs now use it instead of the wall mounted plaster bin. However, if you are still working with the plaster bin, check its location. In many instances the bin is located alongside a boil-out tank where steam is given off and allowed to come in continual contact with the investment. **This will cause difficulty.**

2. PROPER HANDLING OF INVESTIC™:

Attention must be given not only to the investment, but also to the materials used in conjunction with it.

3. TESTING: Ticonium INVESTIC™

can absorb moisture from the air which will affect accuracy. Investments may be checked as follows:

When a new package of investment is opened, mix 30 cc of distilled water with 100 grams of investment for 30 seconds, mechanically, or one minute by hand. Then check the time from the start of spatulation until the surface of the investment appears to be dry. To check the batch later, repeat this operation to see if the time corresponds. If moisture has been absorbed, the setting time will have increased.

4. SLOW SETTING: Slow setting

investment can cause difficulty. Slow setting is usually caused by severe hydration of the investment. To avoid trouble, keep the investment in a tightly sealed container.

DUPLICATION

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RAPID SETTING CAN RESULT IF HYDRATED INVESTMENT IS MIXED WITH NORMAL INVESTMENT.

The most common ways this may occur are:

- A. Old investment clinging to the blades of a mechanical spatulator.
- B. Investment trapped in worn areas of a plaster bowl.
- C. Investment which has caked on the weighing scoop.

Duplicating material which has been used during the day should be:

- A. Rinsed off in cool tap water.
(Preferably giving final rinse in distilled water.)
- B. Cut into small pieces.
- C. Returned to a cool air tight container and covered with a damp towel.

Usually the moisture that remains on the surface of the colloid during rinsing is sufficient to replace lost water in the duplicating process. However, it may be necessary to add additional water to maintain proper consistency.

NOTE: Never store duplicating material by **immersing in water**. This will cause the duplicating material to *absorb water* and rapidly lose accuracy and strength.

Also, **never store the colloid near a heat source**, such as sunny windows or boil-out tanks as this may result in *water loss*.

Following these simple rules, Ticonium Duplicating Material can be used effectively and with the greatest degree of accuracy for approximately 200 duplications or two to four weeks of normal use.

INVESTMENT MODEL PREPARATION

IMPORTANT

Always allow the investment to set in the duplicating material for a **1 hour minimum**. Premature separation of the refractory model is a potential cause for loose, powdery investment deposits.

Look for a change in investment setting time, particularly during the summer months (when humidity is high), as hydration of the investment may occur. Originally the hydration will cause a speed up in the setting time, but this will later reverse, and result in a retarding action. If the normal setting time of the investment, which is about **8 to 9 minutes initial setting**, starts to *increase*, the refractory model may not be completely set and hard in the normal one hour.

TECHNICAL INFORMATION

Remove duplicating material from duplicating flask and break duplicating material away from investment model. (see figure 15)



Figure 15:
SEPARATE
investment model
from colloid

As soon as model is removed from mold, outline with a pencil approximately 1/4" from extremities of proposed pattern and trim with knife or wet model trimmer. (see figure 16)

Keep fingers off of abutment teeth, regardless of how model is trimmed.

Figure 16:
WET GRIND
investment model
to outline



Immediately after trimming, the refractory model should be *carefully* rinsed under running water to rinse off any slurry adhering to it.

Dry model in the Ticonium Model Drying Oven (#40551) for approximately one hour at **190°-200° F (88°-93° C)**. (see figure 17)

Be sure to check the temperature of the Model Drying Oven to prevent the temperature from going *above* 190°-200° F (88°-93° C).



Figure 17:
MODEL DRYING
OVEN #40551 with
a large drying area



Over-drying the model will result in the breakdown of the investment. It is best not to exceed a temperature of 200° F (93° C).

It is important not to obstruct the vents on the top of the unit, except the center one where the thermometer should be placed.

Melt beeswax in a pan or thermostatically-controlled pot.

Only refined beeswax should be used.

Check temperature of the wax occasionally until 280°-300° F (138°-149° C) is reached. If a thermometer is not available, you should dip just as the beeswax begins to *smoke*.

Figure 18:
BEESWAX HEATER
#62133



Thermostatically-controlled pots, such as **Ticonium's Beeswax Heater (#62133)**, are available to prevent over-heating of the wax. (see figure 18) These units are recommended to maintain proper control of beeswax temperature.

NOTE: Temperature of the beeswax is approximately **100° F (38° C)** above the temperature of the investment model.

MODEL PREPARATION

Ticonium Premium 100

When the beeswax has reached the proper temperature, immerse the dehydrated model. After a few seconds, a foaming action will be observed. The model should remain immersed for 15 seconds after foaming starts. It should then be removed and placed on a piece of absorbent paper so excess beeswax will drain off. (see figure 19) After a few seconds, move it to another position on the absorbent paper so that a pool is not allowed to collect at the base of the model and solidify. Allow model to cool and then begin waxing.

Figure 19:
MODEL DIPPED
in beeswax and
set to dry



Excessive heat during drying or immersing the refractory model in the beeswax for too long will alter the subsequent thermal expansion of the investment.

SPECIAL CARE IS NEEDED IN THIS STEP!

Contaminated Beeswax

After extensive use, the beeswax can pick up an appreciable amount of investment residue. Unless the beeswax is *cleaned periodically*, this residue may attach itself to the surface of the model during the beeswax operation.

**PURE TICONIUM
BEESWAX #65**



SPECIAL NOTE

If you encounter difficulties with soft or powdery investment surfaces, follow the special notes described in the Duplication Chapter.

In order to use refractory models with these symptoms, leave the case on the bench over-night prior to drying and beeswax dipping. This overnight setting will allow the investment to improve in surface hardness.

The next day, place the refractory models in the Model Drying Oven and dry at **190°-200° F (88°-93° C)** for 45 minutes. This drying process is fifteen minutes less than the normal recommended procedure because a large percentage of the water has already evaporated during the overnight setting and the model will be much easier to dry.

Next, dip in beeswax per normal recommendations in this manual.

Some advantages of beeswax dip over spraying are:

1. Eliminates soaking investment model prior to applying the painting layer of investment.
2. Assures a smooth, dense surface on which to wax.
3. The action of the beeswax during dipping drives out any excess moisture in the model. Transfer the design from the master cast to the investment model with a wax crayon pencil. Use of a graphite pencil may cause pits in the final casting.

WAXING

One of the most important considerations in being an effective waxer is: **ALWAYS USE WAX OF KNOWN GAUGE OR THICKNESS.**

Clean wax is essential. Wax containing debris will certainly result in pits in the finished case.

Use preform plastic patterns to aid you further in waxing uniformity. This will give your finished case *maximum strength and minimum bulk.*

**TYPICAL
TICONIUM
WAX-UP**



The following gauges are suggested for either sheet wax or plastic stipple sheet:

1. Full upper palates – 26 gauge.
2. Narrow upper horseshoes – 24 gauge.
3. Broad upper horseshoes – 24 gauge.
4. Lower lingual plates – 24 or 26 gauge.
5. Saddle relief – 24 gauge.
6. Lingual bar relief – 28 to 30 gauge.

NOTE: Stippled TI-FORM patterns are suggested for simulating tissue detail.

SPRUING

SPRUE PIN CLEANLINESS

If the sprue pins are not kept perfectly *clean*, the remaining investment will *harden to the surface* and can become *bonded* to the new investment. This will then loosely attach to the surface of the mold. If sodium citrate solution is used to soften the old investment and keep the pins clean, it is essential that they be thoroughly washed and rinsed before use. Since the sodium citrate solution is a drastic retarder, it will prevent the investment coming in contact with the pin, coated with sodium citrate, from setting.

First it is necessary to establish some basic facts on spruing.

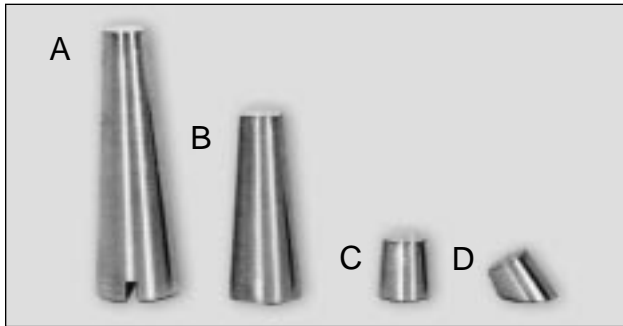
1. All metals *shrink* during solidification. We cannot eliminate this shrinkage. We can, however, compensate for the shrinkage of Ticonium.

2. Never feed a thick section through a thin section – **ALWAYS SPRUE TO THE BULKY SECTION OF YOUR PATTERN.**

The ideal casting is one that gets progressively *smaller* in volume from the point of attachment of the sprue to the extremities of the casting. (see figure 20) It is impossible, however, to maintain this ideal situation since all dental castings vary.

Figure 20:
**TYPICAL SINGLE
SPRUING** from
bulky to smaller
volume areas





TICONIUM SPRUE CONES #TD-1475 A,B,C,D

Made of stainless steel and brass, these cones save time and help facilitate duplication & burnout.

3. The main sprue acts as a reservoir for the casting. It is the bulkiest section of the casting and, therefore, the metal remains molten longer than in lighter sections. The sprue supplies molten metal to offset the shrinkage that takes place while the casting is solidifying.

4. The area where the sprue lead is attached is always the *least dimensionally accurate* section of the casting. This is due to the shrink-age pattern of the metal.

TECHNICAL INFORMATION

There are two basic types of sprues, *single* and *multiple*. **ALMOST ALL TICONIUM CASTINGS CAN BE MADE FROM A "SINGLE" SPRUE.**

There are, however, some exceptions:

1. When heavy pontics or backings are used, you should attach an *additional sprue* near the bulky area, arched so that the highest point of the sprue is above the top of the pontic or backing.

2. Where the metal must flow through a thin section to reach a heavy section, an *additional sprue lead* should be used.

For instance, two sprues should be used when the following conditions are present:

Lower Cases

A. When the lingual bar has attachments such as uprights supporting crib clasps or steel facings (see figure 21), two sprues should be used. The attachment of the sprues to the lingual bar should not be made directly in line with the upright or bulky areas. Always attach the sprue leads before or after the bulky area.

NOTE: Shrinkage will occur during the cooling down of the metal after casting. To allow even shrinkage the sprue leads should be near the *bulky zones*.

3. When spruing lower lingual bars, always attach the main sprue lead to the *bottom* of the bar.



Figure 21:
TYPICAL TICONIUM SPRUING TECHNIQUES

Upper Cases

A. Two sprues should also be used with large castings, for instance, a palatal bar with extensions to the anterior region. In this case one sprue should be pointed towards the posterior palatal bar and another to the anterior. (see figure 21)

B. Large palatal bars with prominent torus – the use of two sprues is also advisable. The sprue leads should be placed one on *each side* of the torus. This will give a better flow of

the metal and at the same time provide better draining of the wax during the burnout.

C. Palatal bars with extensions to the anterior having Kennedy bars, steel facings, with bulky zones – two sprues in a V shape should also be used. These two sprues will allow better wax elimination during burnout, easy flow of the molten metal and a more uniform shrinkage during cooling down.

When spruing cases, sprues should be *thinned* and *slightly rounded* to eliminate sharp corners. Metal will then enter under pressure, assuring a good casting.

THE OVERJET PRINCIPLE

The overjet principle of spruing differs from other methods as the sprue lead is attached 3/16" below the tip of the main sprue. (see figure 22)

Using the overjet principle, the initial thrust of molten metal is directed against the *tip of the main sprue reservoir*. The turbulence that is created by this velocity is confined to this area rather than at the entrance of the pattern mold cavity.



Figure 22:
OVERJET PRINCIPLE

Some advantages of the overjet principle are:

1. The tip of the main sprue will help collect any loose particles of investment that may be carried in by the initial thrust of molten metal, thereby *minimizing pits*.
2. It checks the *scuffing effect* that molten metal would normally have on the investment.
3. The feed is *kept open for a longer time* supplying molten metal.

4. You will obtain a *denser casting*.

Attach the lead out to the bottom edge of the lingual bar so that the metal will be entering in an *upward* path. **Never bring the lead directly into the center of the bar.**

A. Always use **palatal bar sections** for upper partials. **6 or 8 gauge round wax** for lower partials.

Allow wax leads to project slightly over the main sprue hole. (see figure 23)

Make sure that you seal all sides of the joint where the sprue is attached to the pattern. Merely sealing the top wax surface will leave the under surface open where investment can run in and project into the path of the incoming metal.



Figure 23:
ATTACHING OF WAX LEADS
on upper and lower partials

In spruing through the investment model, use stainless steel sprue cone "C". (see figure 24) Heat sprue cone over a Bunsen burner and insert through the investment model (wax lead will now seal to sprue cone).

However, additional hard wax should be added at this attachment point to assure better flow of molten metal and prevent molten metal from breaking off a sharp angle of investment as it enters the mold cavity. This should be done on both surfaces of the model.

Figure 24:
"C" SPRUE
CONE INSERTED



Seal main sprue to investment model with **hard wax** to prevent a ledge of investment forming on the edge of the sprue hole (*use a minimum amount of wax*).

The sealing operation is very important and should be carefully checked before investing.

If the sprue leads and the main sprue are not *totally sealed*, the investment, during pour on will run into the small openings, leaving a ledge of investment protruding into the sprue channels. (*see figure 25*) Consequently, when the casting is made, metal will strike directly on the thin ledges of the investment and break-off little investment particles, carrying them into the casting. A tiny particle of the investment completely embedded in the liquid metal will literally explode. The plaster of paris binder, actually decomposes at the temperature of the molten metal, and gives off sulphur trioxide, which vigorously attacks the Ticonium alloy.

Figure 25:
SEALED MAIN
SPRUE
*Note overjet
principle*



Because the bulk of the mold can absorb heat reasonably well, the decomposition does not occur when the metal rides over the surface of the mold. However, if a tiny particle breaks off and becomes completely surrounded by the liquid metal, it will definitely disintegrate.

If you are encountering some difficulty with pits in castings, it is possible that onrushing molten metal has carried particles of investment into the usable part of the casting.

To prevent this:

1. Be *careful* when removing metal sprue cone.
2. Heat metal sprue cone *prior to removal* so that wax will not pull particles of investment off at the seal junction.
3. *Do not surface mold with a wet model trimmer* as this will cause a slurry of investment to lodge in main sprue reservoir.
4. Be sure to *clean all investment particles* off of the sprue pins.



Figure 26:
**SPRUING FULL BASES &
FULL PALATAL PARTIALS**
Note restricted throat

Special **wax sprues** are used for *full bases* and partials with *full palatal coverage*. Attachment can be made from the *anterior* or *posterior*. Usually the posterior offers the bulkiest section for attachment due to the beading or postdam. This heavy section will help feed the rest of the casting as does the finishing lines of the pattern. (see figure 26)

WAX SPRUE MOLD FOR FULL DENTURES

Wax sprues can be made quickly and accurately in the laboratory with Ticonium's Full Denture Sprue Mold. (see figure 27)

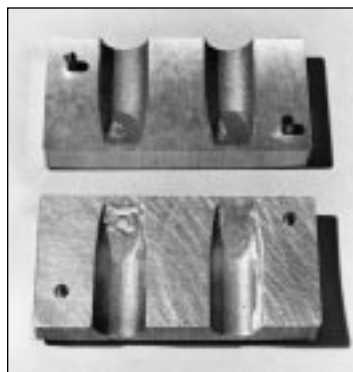


Figure 27:
**TICONIUM WAX
SPRUE MOLD
#65053 for
full dentures**

SPRUING FOR FULL DENTURES AND PALATAL COVERAGE

1. The wax sprue mold pictured earlier, (#65053) is recommended for *full bases* and partials with *full palatal coverage*.

This wedge shaped sprue helps to bring the flow of metal to the desired thickness of the area to be cast. As the body section of the sprue fills, the tapered area helps to create extra pressure at the tip, therefore making possible the casting of thinner areas.

2. Attachment can be made from *anterior* or *posterior*. On cases where solid retention is used, a narrow strip of wax is connected from the tip of the sprue to the lingual finishing line. Also, a small amount of wax is flared out on each side of the sprue junction. (see figure 28)



Figure 28:
**SPRUE WITH
SOLID RETENTION**

The #8 round gauge wax attached to the top of the sprue and the bottom of the refractory model is used to prevent the sprue from breaking off when investing the case. (see figure 26)

NOTE: CARE OF SPRUE MOLD
#65053 – Apply Silicone spray (#61531)
to sprue molds weekly.

SPRUNG

Ticonium Premium 100

3. Usually the posterior offers the bulkiest section for attachment due to the beading of the postdam. This heavy section will help feed the rest of the casting as does the finishing line.

Knowing that metal tends to follow the path of least resistance (*which in this instance would be the postdam*) we recommend on large uppers to flow wax reinforcement on the refractory model before applying the stipple sheet (#822-T, 824-T, or 826-T).

4. The wax pattern should always face the seam of the Flask Former (#32863-P6, 3-1/4" 450 gm; #32863-P3, 3-1/2" 700 gm; #35178-P1, 3-5/8" 700 gm; 54238, 3-3/4" 900 gm) whether sprued anteriorly or posteriorly. (see figure 29)



Figure 29:
WAX PATTERN
facing toward
seam of
flask former

On large castings, we recommend using copper mesh (#61562) along the inside wall of the flask before investing. The copper mesh reinforces the investment and prevents the mold from breaking when large ingots of metal are used.

FULL DENTURES AND PALATAL COVERAGE.

Remember . . .

Investic water : Powder ratio

28 cc to 100 gm for refractory model

30 cc to 100 gm for painting and outer investing.

A "single sprue" will produce a denser casting due to the shrinkage occurring in only "one direction" while cooling.

5. Only regular finishing is required with these full cast uppers and lowers.

**SINGLE
SPRUE
CASTING**



METAL MISER

The Ticonium Metal Miser (see figure 30) is a circular calculator containing all the necessary framework information that makes it possible to add values from each part as the case is being estimated. Instead of writing down the value, the wheel is rotated and, after the final unit has been checked out, the total can be read directly from the wheel.

Figure 30: TICONIUM METAL MISER
Saves time and money by enabling you to select the correct ingot for each case, quickly and easily, without any guesswork



INGOT ALLOY

Ticonium Premium 100

CASE PARTS		WEIGHT (DWT)		
		Average	Heavy, Large, Long	Light, Small, Short
CLASPS	Backaction, Akers, Ring & Rest and Connecting Truss (Per Clasp)	1.2	1.5	1.0
	Clasp Arm	.4	.6	.3
	Roach (Per Roach Arm)	.7	.8	.6
	Embrasure Hooks (Each)	.2	.6	.1
REST	Rest & Connecting Truss	.3	.4	.2
	Rest	.1	.3	
	Lingual Bar with Finishing Line	3.4	3.9	3.0
	Lingual Bar without Finishing Line	3.2	3.8	2.9
	Palatal Bar (12-20 mm)	5.0	6.0	4.0
	Palatal Bar (Average 6 mm)	3.5	5.0	3.0
BARS	Circular Bar (Narrow)	4.7	5.0	4.5
	Circular Bar (Plate in Anterior)	6.3	6.8	5.5
	Palatal Bar Extension to Anterior (One side Only)	1.8	2.2	1.4
	Palatal Bar Extension to Anterior (Both sides)	2.7	3.1	2.4
	Kennedy Bar (Per Tooth Passed)	.1	.2	
RETENTION	Skeleton Retention (Posterior – Per Tooth Passed)	.4	.5	.3
	Skeleton Retention (Anterior – Per Tooth Passed)	.3	.4	.2
	Solid Saddle Retention (Per Tooth Passed)	.5	.6	.4
	Anterior Tube Teeth (Per Tooth)	.5	.7	.3
	Posterior Tube Teeth (Per Tooth)	1.0	1.5	.8
	Metal Saddles (Per Tooth Passed)	2.0	2.5	1.8
HORSESHOE & FULL PALATE	Horseshoe (Narrow)	4.4	5.0	4.0
	Horseshoe (Average 24 Gauge)	5.6	6.0	5.3
FULL PALATE	Full Palate (26 Gauge)	7.5	7.8	7.0
	Lingual Plate (Per Tooth Passed)	.3	.4	.1
BACKINGS & DUMMIES	Per Backing or Veneer	1.0	1.5	.6
	Per Bicuspid Dummy	3.5	4.0	3.0
	Per Molar Dummy	4.0	4.5	3.5
METAL CUSPIDS	Bicuspids for Overlays	.6	.8	.4
	Molars for Overlays	.8	1.0	.6
ADDITIONAL SPRUE LEADS	10 Gauge	.6	.9	.4
	8 Gauge	.8	1.1	.5

INGOT ALLOY

Premium 100 Alloy is a quality, low-heat alloy used in the fabrication of partial denture frame-works. This alloy is supplied in two diameters: 7/16", *small* and 5/8", *large*.

Premium 100 "Hard" Alloy is 12% harder than "Regular" Premium 100 and is available in a 1/2", *medium* diameter.

TICONIUM INGOT SIZES & WEIGHTS

The following is an up-to-date chart indicating the size ingots available and their weights.

Please adhere to this chart when ordering Ticonium Alloys.

PREMIUM 100 ALLOY

Diameter	Length	Approximate DWT
7/16"	3/8"	4.8
7/16"	1/2"	6.4
7/16"	5/8"	8.0
5/8"	3/8"	9.8
5/8"	7/16"	11.4
5/8"	1/2"	13.0
5/8"	9/16"	14.6
5/8"	5/8"	16.2
5/8"	3/4"	19.4

PREMIUM 100 "HARD" ALLOY

Diameter	Length	Approximate DWT
1/2"	3/8"	6.0
1/2"	3/4"	12.0

SPECIAL NOTES

1. Select the ingot closest to the amount of DWT calculated. When in doubt, select a *heavier* weight.

2. For cases that estimate 3/8S or 1/2S, re-estimate the case using the *heavy* column for all parts. On cases that are estimated 5/8S, use *heavy* column for clasps.

- 3. Short Lingual Bar – *Cuspid to Cuspid*
Average Lingual Bar – *1st Bicuspid to 1st Bicuspid*
Large Lingual Bar – *2nd Bicuspid to 2nd Bicuspid*

4. Figure all molar clasps in the heavy column unless waxed *light*, then figure them in the average column.

5. Ingot size includes weight of sprue and one main lead. If additional sprue leads are needed, check table for correct weight.

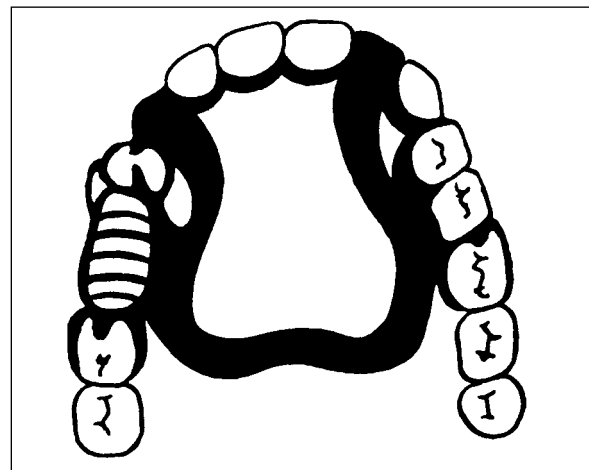
6. In figuring the weight of your case components, three columns have been provided:

- 1) Average
- 2) Heavy, Large, Long
- 3) Light, Small, Short

Select the proper weight for each component by using the chart on the opposite page.

Here's how you would figure the case illustrated below:

2 Molar Clasps (1 Heavy & 1 Average)	2.7
1 Roach Arm	.7
1 Rest & Connecting Truss	.3
1 Clasp Arm	.3
Rest	.1
4 Kennedy Clasps	.8
2 Steele's Facings	2.0
2 Extension from Palatal Bar to Anterior Section (Both Sides)	2.7
Retention for 2 teeth	.8
2 Tube Teeth	2.0
Palatal Bar	3.5
Total DWT	15.9



PAINTING & FLASKING

Mark ingot selection on a paper towel with a magic marker, wet the towel and adapt it over a glass plate.

This method or a similar method should be used for the following reasons:

1. The case will not be confused with other work on the investinging bench.
2. It can be easily moved on the investment bench.
3. Wet paper will act as a seal when case is flaked and will not extract water from the investment mix.



**TI-SOL WETTING AGENT
#1600-A**

Use **Ti-Sol Wetting Agent (#1600-A)** to break surface tension on the wax. Ti-Sol is supplied in concentrated form. Proper dilution is 10 cc to 1 pint of water. Prior to painting, dip waxed model in Ti-Sol.

Remove and blow off any Ti-Sol puddled on the model.

SPECIAL NOTE

Some materials used as wetting agents have a retarding effect on the setting of the investment, leaving a soft investment surface against the pattern. When this occurs, fining is apt to result, a rough, pitted surface can also be expected. Ti-Sol has been thoroughly tested and has proven best. Even when a satisfactory wetting agent is used, it can cause difficulty if too much is applied. *Be sure to blow any excessive wetting agent before starting the painting operation.* When the painting layer is applied, vibrate the investment over the pattern so that it flushes the wetting agent away, instead of incorporating it into the painting mix.

The correct water to investment ratio for painting and full flasking for Ticonium investment is as follows:

Example	Water	Powder
Painting and Outer Investing	30 cc	100 gm

Use room temperature distilled water for mixing investment painting layer.

Always measure investment and distilled water "accurately" for consistent results.

Each case will require *50 grams* for the painting layer. Mechanically spatulate mix for about 30 seconds, or 1 minute by hand. Small electro-mechanical vibrators are **not adequate**.

Cover the entire wax pattern and sprue uniformly, vibrating the investment *ahead of the brush*, being careful not to trap any air bubbles. (see figure 31)



**Figure 31:
VIBRATING
PAINT-ON
INVESTMENT**
"ahead of the brush" with a thin, uniform thickness

Keep the painting layer of investment *thin*, about 1/8". Avoid build-up in palate area of upper or under lower edge of lingual bar on lowers. (see figure 32)

Painting an "even layer" is essential in obtaining uniform expansion of the investment.



Figure 32:
PAINT-ON INVESTMENT
with an "even layer" of approx. 1/8"

A thin layer is also essential to permit the escape of gases produced during burnout. Failure to follow this technique will result in voids or short clasp arms.

The painting layer is a *must* to assure bubble free contact of the investment with the pattern. The use of the painting layer offers definite advantages. Since the painting layer is allowed to set completely before fully flasking, there is actually no bond between the flasking material and the painting layer. This is readily apparent when the case is knocked out of the flask. The outer investment drops away quite readily leaving the painting layer intact over the casting. This feature is definitely advantageous. There is some indication that the minute space between the painting layer and flasking investment permits gas to be forced through the painting layer and diffuse into this space. At any rate, it does seem to provide a marked improvement in the overall permeability of the mold. This is the reason why we recommend keeping the painting layer quite *thin* and *uniform* over the **entire** contour of the pattern.

Another advantage lies in the fact that if any cracks should form in the outer portion of the investment area it terminates when it meets the painting layer.

For this reason, even though a flask does show a crack it would be most unusual for the metal to break through the painting layer and surge on out through the crack. Rest the investment

model (slotted end of sprue down) on a pouring spout from a duplicating flask and return to glass slab. (see figure 34)

CAUTION: DO NOT set painted model where it may be affected by bench vibration.



Figure 33:
PAINTED MODEL BENCH SETTING
away from vibration

If this precaution is *not* followed, the paint on layer will become thinner and thinner having the danger of exposing areas of the wax-up! After the painting layer has reached the final set (about 15 minutes) it is ready to be full-flasked. Mark ingot size selected for the case on the slab. (see figure 33)

The Ticonium Flask Set (#22513) contains a selection of seven sizes of stainless steel flask formers. They are split-type flask formers held together with a clip. (see figure 34)



Figure 34:
TICONIUM FLASK SET #22513
COMPLETE WITH FLASKS & CLIPS

Contains: 1 each 150 gm, 250 gm, 450 gm, 700 gm (medium & large oval) and 3 each 350 gm, 500 gm

Familiarize yourself with the amount of investment required to fill each flask (marked in grams on each flask shown in figure above).

In selecting a flask, maintain a 1/4" to 1/2" clearance from the sides of the flask. (see figure 35)

NOTE: Always use a glass graduate to measure water – **be sure to measure water and weigh powder accurately!**



Figure 35:
**PROPER FLASK
CLEARANCE**

Use the following method for determining water ratio to investment for flasking.

Example:

Size Flask = 350 gram
Correct Water/Powder Ratio = 30 cc/100gm
 $30 \times 3.5 = 105 \text{ cc}$

Correct water/powder ratio would be :

105 cc to 350 grams

Hand spatulate this mix for about **60 seconds.** (see figure 36)
If a mechanical spatulator is used, the blades should be straight so air is not squeezed out of the mix. Mechanical spatulation should *not* exceed **30 seconds.**



Figure 36:
**HAND SPATULATE
for 60 seconds**

Put the flask on the glass slab and, using a minimum of vibration, fill the flask approximately **3/4 full.** (see figure 37)



Figure 37:
**FILL FLASK
3/4 FULL
with investment**

NOTE: Use only enough vibration to settle the investment in the flask. **DO NOT attempt to remove air bubbles.**

Prior to inserting investment model in flask, dip it in water and *blow-off any excess water.* This way, the set painting layer of investment will not extract water from the investment mix. It is most important to know the *position of the case in the flask.*

To determine the position when the overjet is used:

1. A single sprue lead will always be toward the seam.
2. If an auxiliary sprue is used in addition to the main sprue lead, always face the main lead *toward the seam.*
3. If two sprue leads of equal thickness are used, point the *bisect line towards the seam of the flask.* Both of these sprue leads will become equally separated in relation to the seam of the flask.

Using this method:

1. The lighter areas of the pattern will always be *furthest from the seam.*

2. The centrifugal force of the casting machine will aid the flow of metal.

3. Every casting is made in the same relative position.

If a single sprue either from the anterior or posterior is used: (full bases) **the wax pattern will always face the seam.**

Note in figure 38 how the operator teases the case into the flask being careful not to create air voids. Case is centered in the flask as accurately as possible. There should not be more than 1/4" from the bottom of the flask to the painting layer.



Figure 38:
CAREFUL POSITIONING OF CASE IN FLASK

The investment model should displace enough investment so that the flask will now be completely full. However, if more investment is required, it can easily be added.

NOTE: If the flasks are placed on a bench near the vibrator, the continued effect of vibration can move the position of the case in the flask. Set the investment-flasked case well away from any possible further vibration.

The investment will reach final set in about 15 minutes, then:

1. Square the end of the flask by rubbing the mold over screening or equivalent rough surface. (see figure 39)

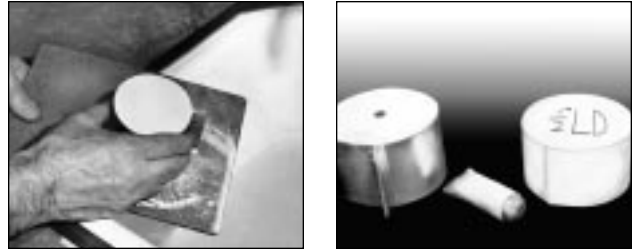


Figure 39:
TRUING SURFACE OF MOLD & MARKING INGOT SIZE

2. When a stainless steel sprue cone is used, it must be removed before the mold is surfaced. Remove the sprue by inserting a screwdriver in slot and twist slightly. Sprue cone should drop out easily.

3. When flask former makes contact with the screening, remove the clip and slide off flask former. (Blow loose particles of investment out of sprue hole with an air blast.)

4. Mark ingot size on the bottom of the mold with jeweler's rouge. (Note cross section of mold in figure 40 showing position of case.)

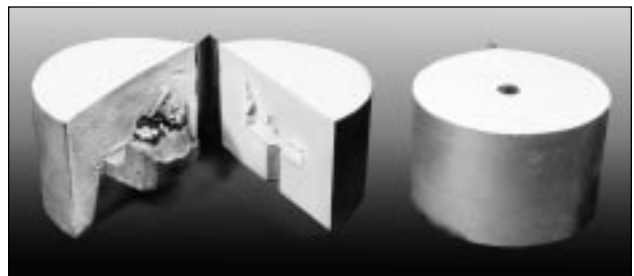


Figure 40:
COMPLETE FLASKING & PROPER POSITIONING

Advantages of the double-investing technique are:

A. Minimizes losing the casting if the mold splits or cracks.

B. Decreases the chance of trapping air bubbles on the wax pattern.

C. Makes possible a more permeable mold.

BURNOUT

ELECTRIC BURNOUT FURNACES

Ticonium offer two highly efficient, digitally controlled, electric **Burnout Furnaces** (see figure 44). One has a 9-case capacity, the other can accommodate 18-cases.

1. Use old porcelain teeth or other ceramic type scrap pieces to elevate the molds off the oven floor and to separate layers.

2. Always face spure hole down so that wax can be more easily eliminated.

3. Molds should not touch oven walls or each other, if they do, hot spots and uneven expansion will occur causing ill fitting frameworks

4. Moisture in the mold is essential so that steam will help produce a more uniform heat saturation during the initial burnout, thereby minimizing cracking. If molds are loaded in the oven several days before actual burnout occurs, it is a good idea to place each mold in a plastic zip-lock bag. This will insure sufficient moisture is still present in the mold for successful burnout.

5. When two layers of molds are loaded into the oven, adequately separate the layers.

6. Stagger the top layer of molds so that wax being eliminated from the sprue holes of the top layer will drain between molds on the bottom layer.

7. To assure good circulation of air, for efficient burnout, check door and top vents to insure they are clean and free from obstructions.



Figure 41:
18 CASE ELECTRIC BURNOUT FURNACE

The Burnout serves two purposes:

1. Burns out the pattern materials (wax & plastic) leaving a cavity in the mold into which the molten metal can be cast.
2. Expands the mold one percent (1%).

BURNOUT TIMES & TEMPERATURES

- 1 to 3 Cases: 1½ to 2 hours at 1350° (732°C)
- 4 to 9 Cases: 2½ to 3 hours at 1350° (732°C)
- 9+ Cases: 3½ to 4 hours at 1350° (732°C)

NOTE: All times are after oven has reached 1350°F (732°C).

**MODULAR 4 &
MODULAR MAX
ELECTRONIC INDUCTION
CASTING MACHINES**

*See Casting Machine Manuals
for Proper Operating Procedures*



**MODULAR 4 INDUCTION
CASTING MACHINE #2001M**
Precise, Versatile, Accurate, Compact

The Modular 4 will consistently cast precious, semi-precious and non-precious alloys in just 60 seconds...all in a compact, versatile floor-standing unit. Metallurgical characteristics are unaltered by induction heating and alloys retain their physical properties. The digital electronic eye provides precise, adjustable control of the melting cycle! Alloy temperature is continuously monitored by the electronic eye and displayed in easy-to-read numbers for constant reference. Operation is so effortless, so consistent, training is minimal.



**MODULAR MAX INDUCTION
CASTING MACHINE #2005M**
Precise, Versatile, Accurate, High-Capacity

The Modular Max electronic induction casting machine is a high-capacity, fully-automatic model that will precisely cast non-precious, semi-precious and precious alloys in *less than 60 seconds!* The digital electronic eye provides precise, adjustable control of the melting cycle! The high skill level required for torch casting is eliminated.

IMPORTANT INFORMATION

**Proportional Blend of Virgin
Ticonium Alloy and Sprue Buttons**

Always use approximately **50% virgin alloy** with **50% revert alloy (sprues)** from previous castings. This is important to maintain the *integrity* of the alloy's properties.

CASTING & SANDBLASTING

After carefully following casting machine processing instructions as outlined in the owner's manual, set the newly cast mold to cool and mark the time it was cast. A mold should be cool enough to be handled in **20 to 30 minutes**.

CAUTION: Never quench molds! This can cause serious warpage of the casting.

Freeing casting from investment:

1. Tap the sides of the mold lightly with a plaster knife. Outer investment should fall away easily, exposing the painting layer of investment and the main sprue button.

2. Grasp the button with pliers and tap the sprue with a hammer. Investment will fall off easily. (see figure 42)



Figure 42:
REMOVING INVESTMENT
from casting
with pliers
and hammer

3. The use of Ticonium's Shell/Sandblaster (#3160A1) shown at the upper right is highly recommended at this time. The sandblaster will thoroughly remove all traces of the investment from the casting as well as any oxide traces. Notice the difference between the *rough* casting and the *sandblasted* casting in figure 43.

Figure 43:
ROUGH vs. SANDBLASTED CASTING



FACTS ABOUT SANDBLASTING

The high pressure air (up to 100 lbs pressure) enters through a small tube with a relatively narrow bore.



SHELL/SANDBLASTER #3160A1

When the air enters in the outer tube, there is a change in velocity and consequently a drop in pressure in the area near the tip. This partial vacuum draws the Zircon Grit (#108) up from the bottom of the sandblaster. Where the stream of mixed air and Zircon Grit emerges in the outer tube, the air expands again with a much more marked extent as they pass through the nozzle into the chamber of the sandblaster. This abrupt

expansion induces a change in velocity which gives a final "kick" to the Zircon Grit. It is the Zircon particles which should act on the case to be sandblasted, not the stream of compressed air.

If a thin horseshoe is held directly under the nozzle of the sandblaster, the stream of air and Zircon will very likely bend it.

THIS IS NOT THE MANNER IN WHICH THE SANDBLASTER SHOULD BE USED.

The case should be held several inches below the nozzle so that only the scattering Zircon Grit particles affect the case.

SUMMARY

Unless the case is held immediately under the nozzle, distortion will not occur. The sand-blaster does a very effective cleaning job and, when properly used, will not distort or warp your Ticonium castings.

The Casting is now ready to be finished.

FINISHING

POLISHER/GRINDER

The **Demco Polisher/Grinder (#E96)** turns at 24,000 rpm and is supplied with an automatic spindle and lighted work area to help minimize finishing time.



**DEMCO
POLISHER/
GRINDER
#E96**

Important rules in finishing are:

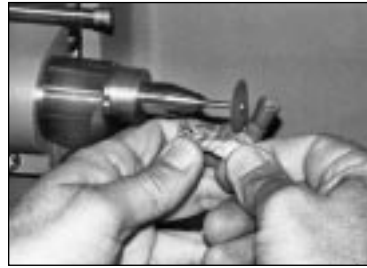
1. Let the *finishing abrasive* and *speed of the lathe* do the cutting.
2. *Avoid heavy pressure.* It will heat the work, warp the casting, crush the abrasive particles slowing cutting and cause the abrasive to clog and glaze. This wastes time and materials.
3. Be certain each finishing operation removes all scratches left by the *preceding* abrasive.

NOTE: This is *most important* in maintaining a *permanent high luster* on the finished casting.

Follow this finishing step procedure:

1. Cut sprue with a large separating disc.

NOTE: A *smaller* separating disc is provided for places that are inaccessible to the large disc. (see figure 44)



**Figure 44:
SPRUE CUTTING
with a small disc
for tight areas**

2. Use a "Heat-Free" wheel 7/8" x 1/8" (22 x 3 mm) wheel to remove bulk where sprue was attached and for all rough grinding. (A thin large abrasive wheel is also provided.) For each *red* mounted point, there is a corresponding *white* mounted point.

3. Use mounted point (#205 or 205W) for shaping the casting. This point can be shaped easily with a truing stone.

NOTE: NEVER STONE Tissue bearing surfaces.

Smaller points of various shapes and finer grit are provided for final shaping of the casting (#201, 202, 203, and 204).

4. Ti-Lectro polish framework as outlined on pages 28 and 29.

5. Rubber wheel framework, removing all scratches left by the preceding abrasive. Use rubber points to get under truss arms, leading edges of clasps, inside of clasps and all other places inaccessible to the rubber wheel.

NOTE: DO NOT use *rubber wheels* or *points* on tissue-bearing surfaces.

**QUALITY
TICONIUM
ABRASIVES**
*insure
consistent
results*



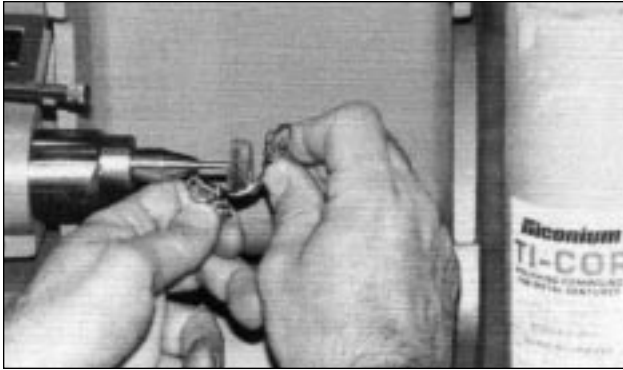


Figure 45:
POLISHING WITH TI-COR
preliminary polishing compound

6. Apply Ti-Cor purple preliminary polishing compound on a felt wheel or point, going over the entire case until it takes a high luster. (see figure 45) For difficult to get at rough surfaces, apply Ti-Cor with a bristle brush. The felt wheel can be softened or "fluffed" by soaking it in boiling water until thoroughly wet and then allowing it to dry. This will make it "hold" the compound a little better.

7. Prepare a heated solution of detergent, and brush remaining particles of Ti-Cor (#314) off casting or clean in an ultrasonic unit.

8. Dry case and apply Ti-Hi (#322) on a felt wheel or point to complete finishing.

9. Low-Speed Polishing: Rubber case smooth on High-Speed Grinder. Brush case on a slow motor (approximately 3400 rpm) using a stiff B-20 type brush.

NOTE: Keep a generous amount of Ti-Cor polish (#314) on brush at all times.

A tightly sewn rag wheel can also be used with our Ti-Cor to smooth cases after rubber wheeling. **DO NOT USE HEAVY PRESSURE ON CASE WHEN USING A RAG WHEEL.** Also, use with caution around clasps.

NOTE: A rag wheel can also be used on a slow motor with our Ti-Hi glazing compound (#322) for final polish.

TI-LECTRO POLISHER

The **Ticonium Ti-Lectro Polisher (#3155A1)** is a true time-saver. Its deplating action eliminates the need for mechanical polishing on the tissue side of cases and provides an excellent working surface for quick final polishing operations. Ti-Lectro polishing yields a reflective, brilliant luster even in hard to reach areas. A built-in timer switch prevents accidental over-polishing.



TI-LECTRO SOLUTION #1700B
is formulated specifically for Ticonium alloys

The Ti-Lectro procedure polishes your casting by electrolytic deplating. Only tissue-bearing cases need Ti-Lectro polishing. Some technicians, however, prefer to Ti-Lectro polish all castings so that retention areas will be equally bright.

Prerequisites for Ti-Lectro polishing are:

1. Casting must be thoroughly *sandblasted* and *rough finished* with wheels and points.

2. Rinsed in water.

NOTE: Small particles of zircon grit will cling in the scratches of the metal and contaminate Ti-Lectro polishing solution unless rinsed off.

3. Dried thoroughly. **Small amounts of water can ruin the solution.**



TICONIUM TI-LECTRO POLISHER #3155A1
eliminates the need for mechanical polishing on the tissue side of cases

To Ti-Lectro polish:

1. Heat the bowl of solution in a pan of water until temperature reaches 120°-140° F (49°-60° C) or use the Ti-Lectro heater. Stir occasionally. Check temperature with thermometer immersed to same depth case will occupy.

CAUTION: For exceptionally large horseshoes and deep vaulted palates, more desirable results are obtained by using lower temperature solution.

2. Remove bowl from pan and attach cathode clip to terminal tab on assembly. Use this rule for establishing the correct amperage:

For each square inch of surface on the case, considering both sides, use "2" amperes.

NOTE: The average case will fall between 6 to 8 amperes.

3. Attach tip of anode clip to the casting and submerge case and tip of clip in Ti-Lectro solution. Casting must not touch cathode assembly and must be completely submersed.

NOTE: Always attach clip to the posterior of palatal cases to avoid pocketing escaping gases.

4. Switch on the controller and regulate to proper amperage.

5. Set the time clock to 6 minutes for average castings – only when solution is preheated to 120°-140° F (49°-60° C).

For large horseshoes and deep vaulted palates, reverse position of case in clip after 1/2 the polishing time has elapsed.

6. After case is Ti-Lectro polished, switch controller off and remove anode assembly. Release case into rinsing bowl containing water.

When you finish Ti-Lectro polishing a case:

A. Rinse clip in water.

B. Lay anode assembly across bowls (clip down).

NOTE: Ti-Lectro solution will corrode anode assembly contacts rapidly and cause needless maintenance.

7. Dry casting and continue finishing step procedure.

The Ti-Lectro polishing solution should be effective up to 200 cases.

If case does not shine:

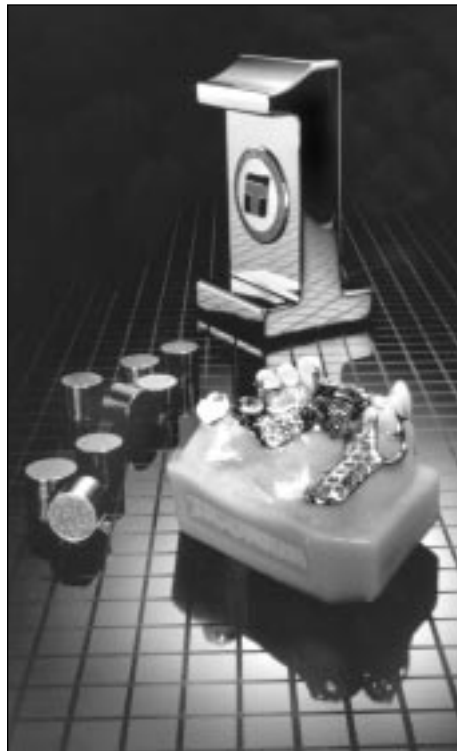
A. Check temperature of solution.

B. Check to see if case was thoroughly sandblasted.

C. Determine if proper amperage was estimated.

D. Examine solution to find if it is contaminated or worn out.

E. Determine if case was Ti-Lectro polished long enough.



TICONIUM PREMIUM 100
THE WORLD'S "FINEST"
LOW-HEAT, FINE-GRAIN
PARTIAL DENTURE ALLOY

TI-LECTRO POLISHING TROUBLE-SHOOTING

Cases "whiten" but don't shine:

1. Solution too *cold*. Did you *stir* it?
2. Solution *contaminated* with grinding and sandblasting dust.
3. In too *short* a time.
4. Amperage too *low*.

Cases "etched":

1. Solution too *hot*. Did you *stir* it?
2. In solution too *long* a time.
3. Amperage too *high*.

Polish is "uneven":

1. Case not *centered* in cathode ring.
2. Case not properly *sandblasted*.
3. Case not *washed* after sandblasting.
4. *Oil contamination* from compressed air or fingers.
5. Teeth on clamp are *worn away*.

Cases are dark "yellow brown":

1. *Water* in polishing solution.

Areas of case are "black":

1. Use solution *cooler*.

NOTE: This happens mostly on cases with *deep recessed* areas.

No "voltage" or "current":

1. Check *fuse* or *circuit breaker*.
2. Check *switch*.

Voltage but "no current":

1. Clip *off* at cathode.
2. Lead wires *reversed*.
3. Badly *corroded* contacts.

Control turned to highest volume, still "not enough current":

1. Badly *corroded* contacts.
2. *Cold* solution or *small* case.
3. *Contaminated* solution.



REPAIR

TECHNICAL INFORMATION

Eighty per cent (80%) of all soldering can be done electrically. For this purpose, Ticonium provides the **Electric Soldering Machine (#3150A1)**. A compact, multiple function unit, Ticonium's Electric Soldering Machine offers a selection of 10 heat ranges suitable for handling light to heavy soldering of both non-precious and precious alloys. Convenient foot switch operation allows both hands to be free during soldering. This soldering machine comes complete with 8 accessories to satisfy most repair requirements.



ELECTRIC SOLDERING MACHINE #3150A1
handles light to heavy soldering of
both non-precious and precious alloys

Electrical soldering is especially useful when soldering next to an *acrylic saddle*. It eliminates removal of the saddle due to rapid localized heating conducted by the electrode.

Use **Ticonium Triple-Thick Solder (#106)** for electric soldering. This solder is 19K, flows at 1675°F (913° C) and is color-matched to Ticonium alloys.

Triple-Thick Solder is used for electric soldering because the additional *bulk* of the solder will *retard melting* momentarily, allowing time for the carbon to conduct heat to the case.

The application of **Krome Flux (#61198)** is an extremely important part of soldering Ticonium. Krome Flux should be applied *liberally* where the solder must flow and in a watery consistency. *(The lid of the flux jar can be used as a temporary container for the diluted flux.)*

ELECTRIC SOLDERING

1. Carefully prepare the area to be soldered. **Solder will not flow on a dirty or oxidized surface, no matter how good the flux you are using.** Lightly *fine-stone* the area to be soldered in order to have a *clean, rough surface* for the solder. *(see figure 46)* Avoid soldering large bulky joints.



Figure 46:
CLEAN & ROUGH
areas to be soldered

2. Seat broken sections on master model in proper relation to each other. Secure them in position with sticky wax. *(see figure 47)*



Figure 47:
SECURE BREAK
IN POSITION
with sticky wax

3. Use soldering investment or plaster to hold case in correct position. (see figure 48) **DO NOT use excessive amounts of investment to secure case – leave as much metal as possible exposed.**

CAUTION: Never use model investment to secure case.



Figure 48:
INVESTED CASE
for soldering

4. When soldering investment dries, *boil-out sticky wax*, cut sufficient solder and secure the model on a soldering stand.

5. Use *diluted flux*. **Ticonium Krome Flux (#61198)** is the correct consistency for “flame” soldering. It should be diluted for use with the electric soldering unit. Transfer a little of the flux from the jar to the inside cover and dilute it with approximately **two times** its volume of water.

6. Always use **Triple Thick Solder (#106)**. Ticonium Standard Solder (#105) is intended for “flame” soldering *only*. Triple Thick Solder is intended for “electric” soldering purposes. The added bulk in the Triple-Thick Solder *delays melting* of the solder until the case is hot enough to let it *flow*.

Remember, with either “flame” or “electric” soldering, the solder cannot flow on or adhere to cold metal!

7. Shape the carbon electrode to fit joint, but **do not remove any more of the copper coating than you have to**. The copper coating helps *carry the current* and confines the heating to the tip of the carbon, where it is most effective.

Due to the variety of attachments supplied with the Ticonium Electric Soldering Machine, it would be impractical to cover all the methods you may use in effecting the soldering joint. Choose the method which you can use most effectively. An example of one of these methods follows:

8. Using a “V” type ground, span the break without interfering with the carbon tip. Flux joint liberally with *diluted mixture*. (see figure 49) Use a sufficient amount of Triple Thick Solder on the joint to complete job.

Make sure the soldering machine is adjusted to the *proper setting* for type of work to be soldered. Also, make sure the ground and carbon are *clean* before making contact.

9. Wet carbon tip in a bowl of water to aid current conduction and touch carbon to solder.



Figure 49:
CARBON GROUND AND SOLDER IN POSITION

10. Press on foot pedal, allowing time for solder to flow freely, then let up on the pedal.

NOTE: DO NOT PUSH SOLDER WITH CARBON TIP. The heat from the carbon will make the solder flow.

CAUTION: Never remove carbon from solder while soldering operation is in progress. This will cause *surface pitting* due to sparking of the carbon as it is removed.

11. Remove soldered case from model and finish in the usual manner.

TORCH SOLDERING GAS – OXYGEN OR PROPANE

“Torch” soldering differs in many respects from “electric” soldering both in *preparation* and *method*. The torch should be used when the solder joint is *long*, unusually *bulky* or when an appreciable *quantity of solder* has to be used to do the job. Use **Ticonium Standard Solder (#105)** for all “torch” soldering.

To prepare for soldering:

1. Roughen ends of sections to be joined with a heatless stone.
2. Adapt platinum foil to the master model so that it extends under *both* sections.
3. Seat the sections on the master model in proper relationship and temporarily secure them with *sticky wax*. Flow *sticky wax* into the joint to be soldered.
4. Secure an old burr over the two sections with a liberal amount of sticky wax. Lay another burr *higher* on the case and secure with sticky wax to lend additional support to the case. (see figure 50)

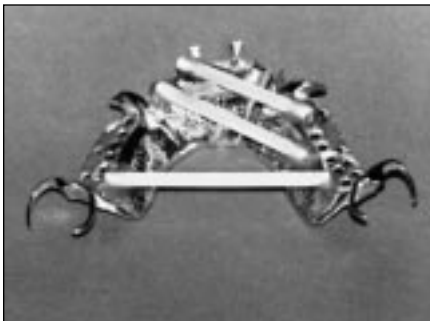


Figure 50:
PROPERLY
SECURED
CASE

CAUTION: Never use wood sticks to secure sections. Water may get on the wood as the case is invested and cause the wood to swell, distorting the sections' relationship.

5. Carefully remove case from master model.

6. Adapt *utility* or *baseplate wax* directly under roughened part of each section. (see figure 51)

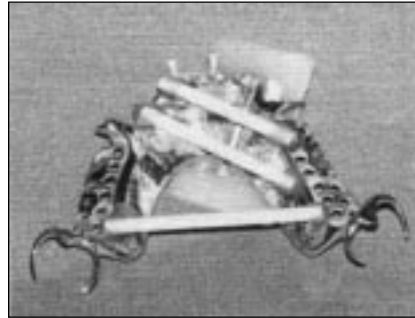


Figure 51:
ADAPTING
UTILITY WAX
under sections

Using this method, heating can be accomplished rapidly and a minimum of investment need be heated. (Note in figure 51 how investment supports platinum foil in position.)

7. Invest case with soldering investment being certain sufficient amount is used to secure case.

NOTE: As in electric soldering, **expose as much of the case as possible** so that heating can be done *rapidly*.



Figure 52:
BOILED-OUT
CASE

8. When investment sets, *boil-out* the wax. (see figure 52)

NOTE: **DO NOT PREHEAT CASE.** Oxides will form over the surface of the metal making soldering impossible.

REPAIR

Ticonium Premium 100

Moisture in the investment can be volatilized by putting the case in a *drying oven*. Temperature of the oven should *not exceed* **200° F (93° C)**.

9. Regulate the flame until the *blue inner cone* is visible. The feather of flame that surrounds this cone is the reducing part of the flame. Use it for soldering.

10. Flux the joint thoroughly drying out flux until it has a powdery appearance.

NOTE: Continue to use the outer part of the flame to *glaze* the flux.

11. Heat the case until it is a *dull red*. Holding the strip of solder with soldering tweezers, dip it into the flux and feed into the joint while keeping the case *hot* with the torch.

CAUTION: Once the soldering operation is begun, **do not remove the flame from the work** as this cooling will cause *oxides* to form rapidly.

The heat from the case should be sufficient to melt the solder. **DO NOT put the flame directly on the melting solder** as this will cause the solder to become *overheated* and will be a source of *pitting*.

12. Finish case in the usual manner.

TICONIUM TECHNIQUE AT A GLANCE

- | | |
|--|--|
| 1. Master Model Soak | 20 Minutes at 80° F
(27° C)
Use Slurry Water for
Longer Periods |
| 2. Hydrocolloid | Pouring Temperature
is 130°-140° F
(55°-60° C) |
| 3. Cooling Time of
Hydrocolloid | 30 Minutes –
Small Flask
45 Minutes –
Large Flask |
| 4. Refractory Investment
(Average Case) | 29 cc Water to 100 gm
Investic |
| 5. Refractory Model
in Hydrocolloid | 1 Full Hour |
| 6. Model Drying
Temperature | 190°-200° F
(88°-93° C) for
1 Hour |
| 7. Beeswax | 280°-300° F
(138°-149° C)
for 15 Seconds
after Foaming |
| 8. Main Wax
Sprue Lead | 7 or 8 Gauge
(3.5 mm) |
| 9. Auxiliary Leads | 10 to 12 Gauge
(2.5 mm) |
| 10. Paint-On Investment | 1/8" (3 mm) Thick |
| 11. Painting-Full
Flasking | 30 cc to 100 gm
Investic |
| 12. Burnout | 1 to 3 Cases:
1 1/2 to 2 Hours
at 1350° F (732° C)
4 to 9 Cases:
2 1/2 to 3 Hours
at 1350° F (732° C)
9+ Cases:
3 1/2 to 4 Hours
at 1350° F (732° C) |

PROCEDURES AND PRECAUTIONS FOR PROCESSING TICONIUM PREMIUM 100 & PREMIUM 100 "HARD" PARTIAL DENTURE ALLOYS AND T-3 NON-PRECIOUS CROWN & BRIDGE ALLOY

1. Adequate local *exhaust ventilation* should be provided for all operations such as grinding, polishing and finishing. *Good industrial hygiene practices* will eliminate any possible hazard from the silicone dust from grinding wheels or from the dust of alloys containing nickel and/or beryllium.
2. Adequate *general ventilation* should be provided to *all* laboratory areas.
3. Sandblasting, grinding, polishing and finishing procedures should be avoided whenever local exhaust ventilation is *not operating* or until it can be installed in the laboratory.
4. Each week, *clean* protective laboratory coats or their *equivalent*
5. Dust removal from clothing and cleaning machinery should be accomplished by power suction methods, *not by air hoses*.
6. Every employee should be appraised of these recommendations.
7. Dental laboratories, like all other industries, *must conform to OSHA regulations*. Obtain a copy of all applicable standards as issued and conduct regular inspections to insure that your laboratory is properly equipped and that *all* OSHA requirements are observed at *all times*.

INDEX

Ticonium Premium 100

A	
Alloy Case Chart.....	18
Alloys.....	18,19
Auto Duplicators.....	2
B	
Beeswax.....	9,10
Beeswax Heater.....	9
Burnout.....	24
C	
Case Chart.....	18
Casting – Casting Machines.....	25-27
Colloid.....	2,3,5,8
D	
Dionizer Water Distiller.....	2,6
Dipping, Model.....	10
Drying Oven.....	9
Duplicating Flask.....	4,5
Duplicating Material.....	2,3,5,8
Duplication.....	2-8
Duplication Spruing.....	3
Duplicators.....	2
E	
Electric Soldering.....	32-34
Electric Soldering Machine.....	31-33
Electro – Polishing.....	27-30
Electro Furnaces, 9 & 18-Case.....	24
F	
Finishing.....	27-30
Flask, Duplicating.....	5
Flasking & Painting.....	20-23
Flask Set.....	21
G	
Grinder – Polisher.....	27
H	
Hydrocolloid.....	2,3,5,8
I	
Induction Casting Machines.....	25
Ingot Alloy.....	18-19
Ingot Alloy Case Chart.....	18
Investic Investment.....	5-7
Investing Solder.....	32,33
Investment, Powder to Water Ratio.....	5,6
M	
Metal Mizer.....	17
Model Dipping.....	10
Model Drying Oven.....	9
Model Duplication.....	2-8
Model Preparation.....	9-10
Modular 4 Casting Machine.....	25
O	
OSHA.....	35
Ovens, Burnout.....	24
Overjet Principle.....	13
P	
Painting & Flasking.....	20-23
Polisher – Grinder.....	27
Premium 100 Alloy.....	16
Procedures & Precautions.....	35
R	
Repair.....	33,34
S	
Sandblasting.....	26
Soaking Stone Models.....	4
Soldering.....	31-33
Soldering Machine.....	31
Solder Investing.....	32-36
Sprue Cones.....	12
Sprue Mold.....	14
Sprues, Wax.....	11,13,14
Spruing.....	11-16
Stipple Sheets.....	11
T	
Technique at a Glance.....	35
Ticomatic Casting Machine.....	25
Ti-Cor Polish.....	28
Ti-Hi Polish.....	28
Ti-Lectro Polisher.....	28,29
Ti-Lectro Polisher Trouble-Shooting.....	30
Ti-Lectro Solution.....	28
Time and Temperature.....	24
Ti-Sol Wetting Agent.....	20
Torch Soldering.....	31-33
Triple-Thick Solder.....	31
V	
Vibration, Investment.....	6,20
W	
Water Distiller.....	5
Waxing.....	11
Wax Sprues.....	15,16
Wetting Agent, Ti-Sol.....	20



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