

## Photoetched Brass Tutorial

By Art Braunschweiger and Bruce Kern

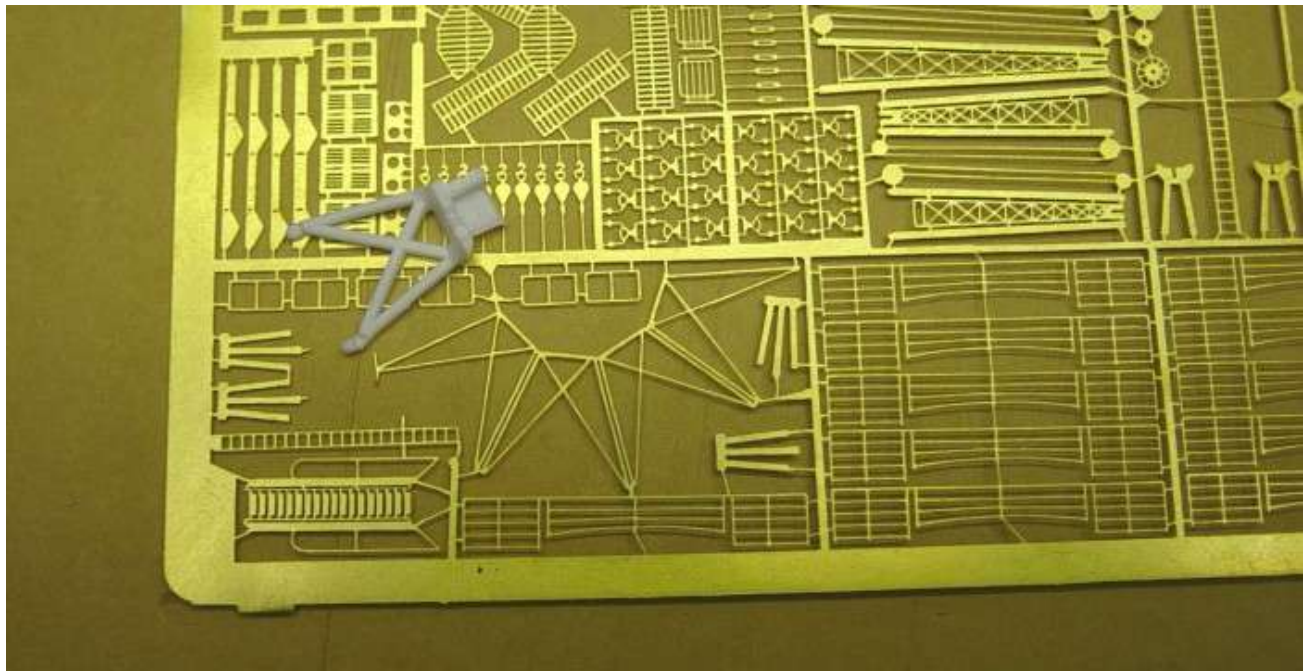
- Part 1:** About photoetched brass
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*Photo of the after 2<sup>nd</sup> Class Boat Deck entrance from Bruce Kern's Titanic model, showing the photoetched windows and ventilator grills used.*

### Part 1: About photoetched brass

In recent years, ship modeling has been revolutionized by the advent of photoetched brass parts. These are small and highly detailed, intended to replace many of the smaller plastic parts from a kit. Because there is a limitation to how finely parts can be cast in styrene plastic, very fine parts such as found on grills, ladders, railings, chairs, and benches can't be reproduced with any detail or scale accuracy. In the image below, compare the difference between the compass tower legs from the Minicraft kit and the ones on the photoetched brass sheet:



Photoetched brass parts are normally produced in a sheet with many other parts, as with the sheet of general *Titanic* fittings from Tom's Modelworks (shown above). The reason photoetched brass parts can be produced with such fine detail is how they're made: the parts are drawn much larger than the size at which they will be

produced, which allows very exacting detail to be reproduced. This high-resolution drawing of all the parts and small lines connecting them is reduced to production size and then transferred to a high-resolution photographic negative of the same size. A sheet of fine brass is coated with a light-reactive chemical, affixed to the negative, and exposed to ultraviolet light. This transfers the parts drawing to the brass, although it's not visible at this point. Immersion in a second chemical protects those areas of brass that will not be removed. A final immersion in acid dissolves away, or etches, all surrounding unwanted material.

Using photoetched brass parts on your model can add about \$50.00 to your model for the simpler sets and up to \$100 for the more advanced sets (typically three or four sheets of parts are involved, at \$10-20.00 per sheet) but can add immeasurably to the appearance.

Cost aside, there are two things to consider before purchasing photoetched brass enhancements. The first is your skill level. While many small photoetched parts aren't too difficult to handle, the larger and more elaborate pieces such as railings (and parts such as the compass tower legs shown in the photo on the previous page) are very delicate and easily bent or ruined. Others, like benches and deck chairs, require bending and assembly. You'll need to learn and develop some new skills to work with these types of parts, and you need to assess your own abilities before investing a lot of money. One suggestion if you're unsure is to start with a sheet of simpler parts (benches, deck chairs and railings are definitely out.) Get a feel for handling them and then work up to more delicate, involved parts.

The second point to consider is how you'll paint them. Parts with a lot of fine, closely-spaced detail - like mesh grills and benches - can't effectively be painted with a brush without ruining their finely-detailed appearance, no matter how skilled you are. Some parts can be carefully painted by hand, but most demand an airbrush to avoid the application of excess paint and to achieve a uniform appearance. Airbrushing skills are easily learned, and you don't need expensive, artist's grade setup, but you will need to invest in about \$200 at a minimum for one of decent quality plus a protective respirator. On the other hand, you can also use an airbrush to paint nearly everything else on your model (and future models), with the superior appearance that will result by doing so.

A brief note as to what's available in photoetched brass: You should be aware that there are several manufacturers, not all parts are available from each one, and different sets from different manufacturers may have a few parts in common. Photoetched brass is also included in two manufacturers' kits. In the 1:350 "Deluxe" Minicraft kit, a sheet of photoetched brass railings is included. In the 1:400 limited edition Academy kit, an extensive array of photoetched brass is included.

On the TRMA site, the photoetched brass available for the 1:350 and 1:400 kits are shown at

[http://titanic-model.com/articles/pe\\_brass\\_sheets\\_350.shtml](http://titanic-model.com/articles/pe_brass_sheets_350.shtml) (1:350 scale) and  
[http://titanic-model.com/articles/pe\\_brass\\_sheets\\_400.shtml](http://titanic-model.com/articles/pe_brass_sheets_400.shtml) (1:400 scale).

All are equally high quality. In some situations the parts from one manufacturer may be more finely detailed to a slight degree from those of another manufacturer, but this difference will be negligible for most modelers. All are very reliable suppliers with experience in *Titanic* modeling, so a product from any of them is assured to be a good choice.

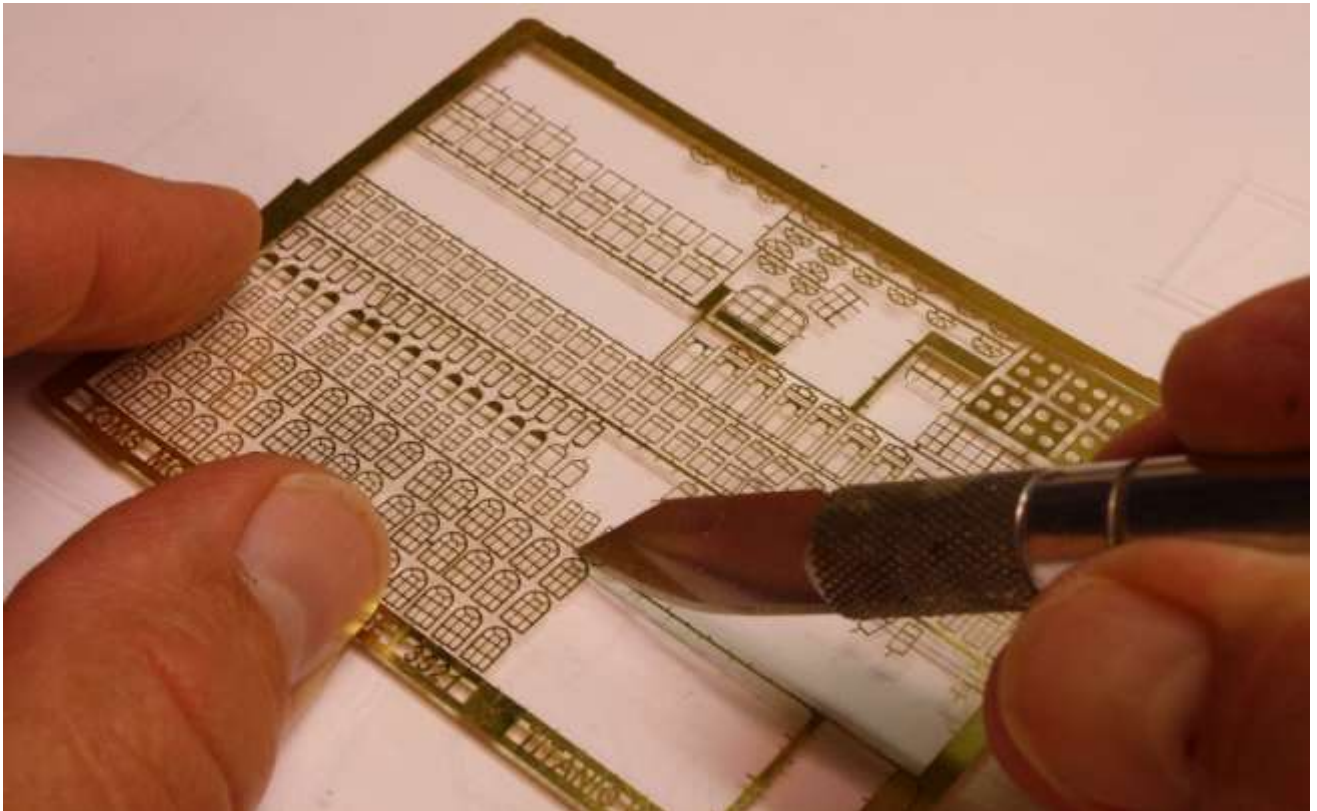


*Photo of the after Well Deck of Art Braunschweiger's partially completed model, starboard side, showing photoetched brass crane jibs, ladders, handrails and benches .*

## Part 2: Working with photoetched brass

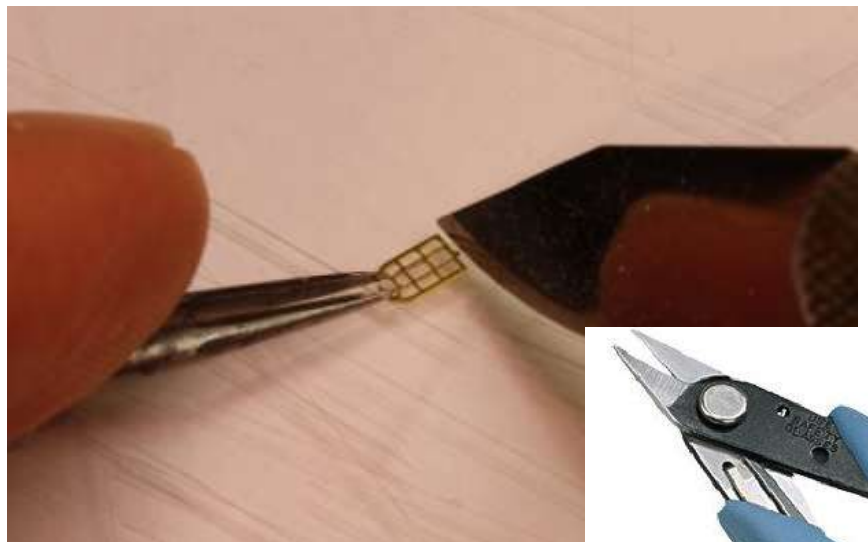
### Removing parts from the sheet:

Use an X-Acto or other hobby knife with a sharp blade to cut through the sprue. (The sprue is the little thread of brass that connects the part to the sheet, or to other parts on the sheet.). A semi-curved blade is recommended because it will cut along whatever point on the blade is brought to bear, not just the tip as with a straight-edged blade (*see photo next page*) Make sure you have a new blade fresh out of the box – the cutting surface near the tip must be extremely sharp. Use a firm downward pressure with your knife to cut the sprue. Your cutting should be done on a hard surface; otherwise you'll bend the piece ever so slightly with the downward pressure from your knife. Lexan (plexiglas) works well for this. Placing a piece of plain white copy paper over the lexan will help preserve the edge on your blade, eliminates glare and makes it much easier to see the small pieces.



### Trimming the sprue from the parts:

Once the part is free of the sheet, you can use a hobby knife to trim the sprue from the part, or – depending on the type of cutting you're doing and the shape of the part – you can also use a pair of photoetch shears (inset). These make the job much easier, and they do a cleaner job. They are also called Xuron shears, and their cutting action works by a slicing cut, not the pinching cut that most small clippers or shears make. Their cut is so precise that the slightest bit of sprue can be trimmed off a piece without any distortion or bending of the piece



whatsoever. They're also particularly useful if not essential if you're going to be cutting larger parts like grills or screens to shape.



A note here about magnifiers: a good optical magnifier is essential for use with photoetched parts. A watchmaker's loupe of 3 to 4x magnification is ideal and has the advantage of being able to be used much closer to the model. An alternative choice is an optical visor if you're uncomfortable with using a watchmaker's loupe. However, one disadvantage of an optical visor is that you cannot get as close to your work area, and the image tends to distort quite a bit around the periphery of your vision. If you want to use a watchmaker's loupe but are new to its use, you can purchase one with a wire headpiece to hold it in place against your eye. Either way, you'll need both hands free during assembly and parts placement so one or the other is essential. Loupes can be purchased online from watchmaker supply houses.

### Handling parts:

A good pair of tweezers of the proper type is essential. Fine-point tweezers of the type pictured below are the best for handling small, delicate brass parts. They are shorter than standard tweezers, which gives you better control; the points are finer, and they have low spring tension. They can be found online at jeweler, dentist and watchmaker supply houses as well as some specialty online hobby suppliers such as [www.micromark.com](http://www.micromark.com). If you intend to use photetched shears as well, you'll also need a pair of flat-pointed tweezers - these are better for holding parts when you're trimming them with a pair of shears, because the flat points clamp the brass in between them without risk of the piece twisting between the points, or the points offsetting under pressure and flicking your piece of brass into the air. For handling the smaller photetched brass windows, a second fine-pointed pair is helpful. Some modelers prefer the cross-locking type for the second pair. Cross-lock tweezers have the advantage of holding a part without having to exert finger tension, and minimizes the chances of accidentally dropping a piece.



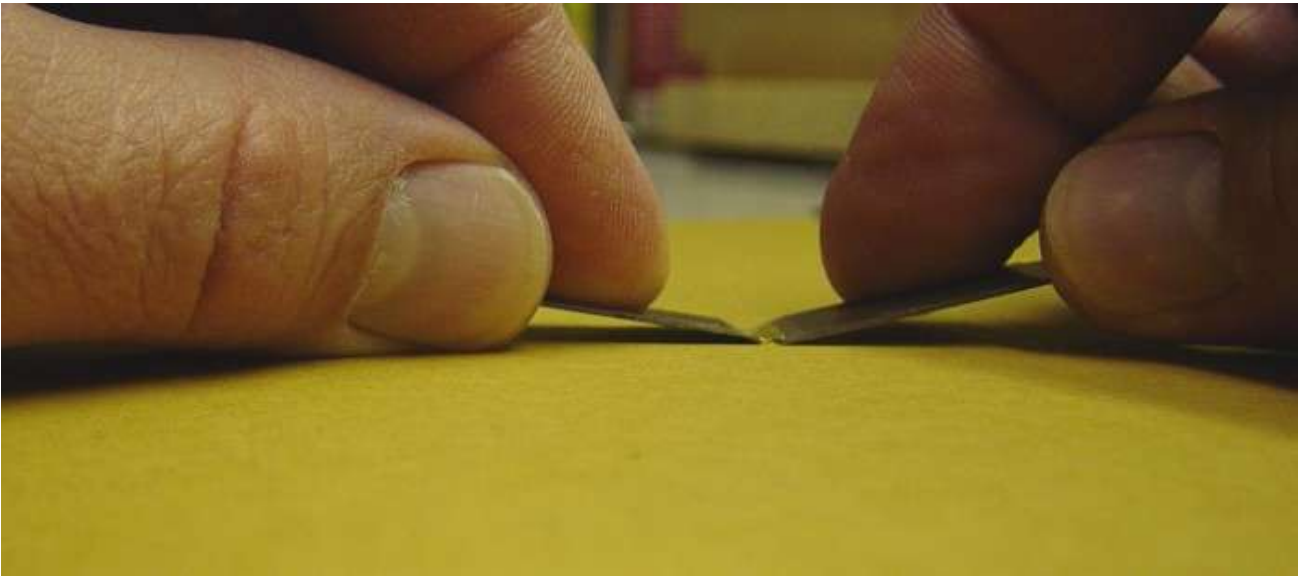
Small parts can sometimes be difficult to pick up from a hard surface with a pair of tweezers. Press down gently with your finger and it will stick to your skin. With the part sitting on your finger, you can easily get under it with a tweezer tip to grasp it in whatever position is required. Another option is to fashion a pick-up stick from a piece of plastic sprue and tape. A piece about five inches long with a corner bend of an inch will work well. Wrap the short end with blue painters tape (sticky side out).

### Flattening distorted parts:

Occasionally it happens that despite careful handling, a part inadvertently gets slightly bent or distorted. When this happens, lie the piece down on a semi-hard surface. Using the flat back end of a set of tweezers (the end furthest from the points), press down firmly. Turn the part over and repeat.

### Bending parts:

Some parts, like benches, require bending. The simplest and least-expensive option, and the one that works the best, is to use two chisel-point hobby knife blades. Lay the photoetched brass part down on a hard or semi-hard surface. Position one blade where you want the bend, and hold the part firmly down against your work surface. Holding the other blade almost flat, gently slide it under the piece as far as the first blade. Lever it upwards and you'll have a clean bend. The photo on the next page shows the top half of a deck bench being held down by the blade on the left, while the bottom half of the bench is bent upwards with the blade underneath.



There are also several tools and bending jigs available. However, the above technique is recommended as being simpler and just as effective, and doesn't involve any added expense. (The two blades are essential for basic work with styrene model parts anyway.)

Some pieces, like the lifeboat davits and benches require a more complex bend. For benches, the initial bend between the bottom slats and back slats is done as above, but then other more adaptive techniques, not covered here, must be used to apply the proper curve to both parts if you wish to have a truly accurate bench in miniature.

Some photoetched parts require an application of cement during assembly or bending, but before painting. This is covered in Part 4 on page 8.

### **Part 3: Painting photoetched brass parts**

Paint all parts before you cement them to the model, not after. If you're using oil-based paints, no cleaning or priming is necessary. Simply apply the desired color "as is", and remember that airbrushing is strongly recommended. Care should be taken to handle all brass parts and sheets by their edges to avoid transferring oil from your skin to the parts prior to final painting.

Note – GMM ocean liner figurines should be painted and detailed prior to removal from the sheet. These are covered under a separate article that can be found at

[http://titanic-model.com/articles/painting\\_figures/detailing\\_gmm\\_figures.htm](http://titanic-model.com/articles/painting_figures/detailing_gmm_figures.htm)

One technique particularly useful for windows is to paint the entire photoetched sheet rather than cutting the windows off first and painting them individually. This allows airbrushing of all the windows while they're "suspended" on the sheet for a clean application of paint. To do this, first make a brass sheet holder by laying it on a piece of corrugated (box) cardboard two inches larger than the sheet and trace the outline onto the cardboard. Cut along this line to form a removable panel in the center of the cardboard. After confirming all cuts are clean through the backside, leave the cutout in place and lay face-up on a flat surface. Center the brass sheet over the panel and use tape at the outer sheet edges to secure. Use just enough tape to hold in place (avoid tape over the actual brass parts). When you're ready to paint, simply remove the panel from the opposite side and hold it by the cardboard edges. Excess spray will pass through the parts and help minimize excessive paint buildup. As a result, you will obtain a clean paint job without having to handle or touch the individual pieces. After painting, the brass sheet can be taken off the cardboard holder for easy cutting.

Some sheets include parts that require different paint colors. For "on the sheet" painting of these parts it is recommended to mask the sheet with paper. These can be held in place by taping to the cardboard holder. Use very small squares of tape on the back side to keep flat against the brass sheet (again try to avoid the parts if possible). ***Do not attempt to tape across any of the parts on the sheet – it is impossible to pull off the***

**tape without bending the parts.** Depending on color sequence (black over grey vs. white over black) the modeler may opt to paint the entire sheet with the primary color first. After those parts have been removed during assembly, the remaining parts can be repainted the correct color.



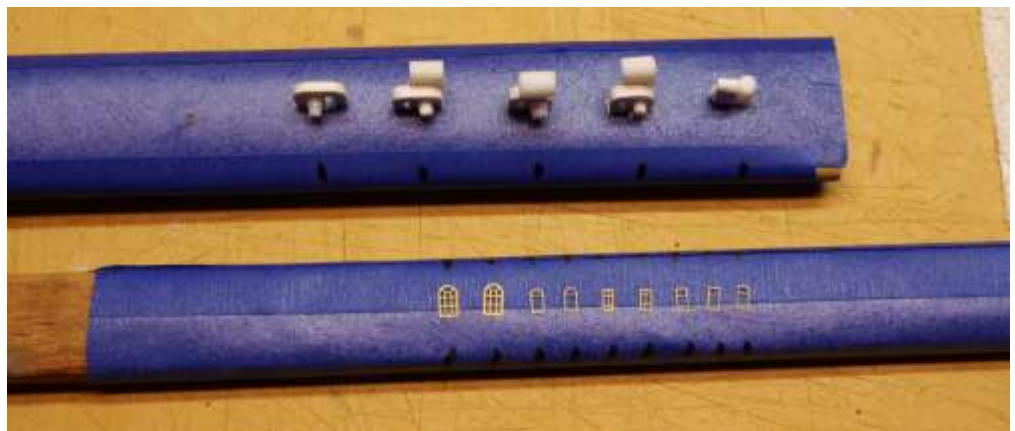
If you have removed individual P/E parts from their sheet for bending and/ or assembly, and/or prefer to paint them individually (off the sheet) you can hold the parts for painting by making yourself a painting stick. First, get a few paint mixing sticks (the kind you get at any paint store). You'll also need **Scotch blue painter's tape** (This is a U.S. product; modelers elsewhere should look for the equivalent product). It comes in several varieties as shown at left. If possible, seek out the **orange-flagged #2080 "Delicate Surface" type** (far left). This is a tape with low adhesion. A second-best alternative, but just as useful, is **the #2090 "Multi-Surface" tape** with medium adhesion. Both are a lot less sticky than regular

masking tape, which should **never** be used with photoetched brass parts. Blue painter's tape or the equivalents are sticky enough hold small delicate pieces in place against the air current from the airbrush, but not so firmly that they can't be easily removed.

When you're ready to paint, pull off a piece of masking tape and lay it on your work surface with the sticky side up. (You might need to hold the ends down with two pairs of tweezers.) Then take two other pieces of masking tape and lay them down above and below the first piece, sticky side down, with each one overlapping the middle strip by a small margin. Lay this lengthwise on your paint mixing stick, wrap the top and bottom around the edges, and you have a paint stick. The sticky section of tape in the center will hold your pieces while you paint - just place them there with tweezers, and apply only the barest amount of gentle downward pressure. For very delicate pieces, you won't need to apply any pressure at all. (Go especially easy if you're not using the low-adhesion "Delicate Surface" type of tape.) Even the smallest, most delicate pieces will stay perfectly in place while you airbrush them. Place them on the tape only when you're ready to paint, as they tend to adhere stronger if they're left there a long time (like overnight).

In the picture at right, note that the position of each piece has on the paint sticks have been marked with a felt-tip pen. This way, should one inadvertently get knocked off, its absence will be noticed.

If you're using a paint stick to paint flat pieces like windows and grills (instead of painting them while they're attached to the sheet), one problem is that the finished piece can end up with ragged edges from the overspray on the blue tape backing surface adhering to the piece itself. The ultra-fine mesh of ventilator grills can also become clogged with paint if there's not air space behind them. This can easily be solved by taping a small-diameter rod to the paint stick before attaching the tape. This allows you to stick the pieces to a narrow raised area of tape instead of having them adhere to the entire piece. An alternative technique, as shown with the lower paint stick in the photo below, is to position the stick/nonstick line of tape along the center of the sheet and lay the pieces down so that only the bottom edge of each window or grill is on the sticky part - the rest of the part should sit over the non-stick part, raised up slightly. In addition to a cleaner application of paint, this avoids the additional problem of inadvertently bending the pieces during removal when their entire surface is stuck to the tape. Again, this does not apply to large pieces like vents that are not delicate in nature - these can simply be stuck completely to the tape, as on the top paint stick in the photo at right.



When airbrushing, less is better. It is not necessary to apply enough paint to completely hide the blue color of the tape. Brass is a fairly neutral color that takes most colors very well, and it shouldn't take more than a few passes with an airbrush to adequately cover them. It is far better to do several light applications, letting the paint set in between each, than to apply one overly-heavy layer. Do a pass or two, wait a minute for it to dry, and do another light application. You can actually gauge when you have applied sufficient paint by how much of the blue color of the tape is visible beneath the pieces you're painting – when the blue is almost but not completely covered by paint, you've applied enough. (Also, when airbrushing, paints must be thinned quite a bit when airbrushing. Paints are never used straight out of the bottle in an airbrush, otherwise you risk clogging your airbrush nozzle and clogging up your finely detailed brass pieces with thick paint. Standard thinning ratios for oil-based paints are 2 parts thinner per 3 parts glossy paint, and 1 part thinner per 3 parts flat paint. As a general guideline, paint should be thinned to the consistency of skim milk before use in an airbrush.

After you've airbrushed your parts, remove them from the tape as soon as the paint becomes dry to touch. This is usually 15 minutes after you paint them. If you wait longer than that, when you remove them from the sheet the paint won't break cleanly and you'll pull some off the tape, giving a somewhat ragged appearance to your pieces. Handle them carefully, as the paint is easily scratched off at this point and still needs to dry another 12 - 24 hours to dry. Flat pieces can be gently lifted from the tape by sliding a knife blade underneath them and gently levered upward. Be careful not to put too much upward pressure while doing this as parts can easily bend or pop off and become lost. If you find yourself having to exert too much pressure to lift the parts up, then you've pressed them onto the tape too firmly. Apply them with a lighter touch next time.



*An Aztek model A470 double-action airbrush kit, retailing for around a hundred US dollars, and a Testors "Blue Ice" air compressor, costing about the same. Both are the personal choice of one of the authors (Art Braunschweiger). Easy to learn and easy to use, an airbrush setup need not be tremendously expensive nor especially complicated.*

## Part 4: Cementing photoetched parts:

### Cement for photoetched parts:

CA (Cyanoacrylate) glue is recommended. However, there are different types, and modelers frequently use the wrong one and then become frustrated over their inability to apply their parts with ease. In the United States, ZAP is the predominant brand, but the guidelines here can apply to CA glue of any manufacture.

ZAP CA glue is available in three types:

- Pink** label - low-viscosity, instant bonding
- Green** label (not shown) - medium viscosity, 10-second positioning time
- Yellow** label (SLO-ZAP) - high viscosity, 20-30 second positioning time.

The pink label CA glue is the most commonly purchased, yet its use can be a mistake for affixing photoetched brass parts to your model. Because it bonds instantly, it allows no positioning time. Even the most skillful modeler can't be assured of placing a tiny brass window in the correct position every time. Instant-bonding CA also tends to glue the tweezers to the piece, and the low-viscosity of the instant-bonding CA allows it to bleed into areas where it's not wanted. Better is the **yellow label** CA (Slo-ZAP): its viscosity makes it much easier to work with, and after dropping the piece down in place it can be shifted slightly with a tweezer tip in the 15-20 seconds before it bonds.

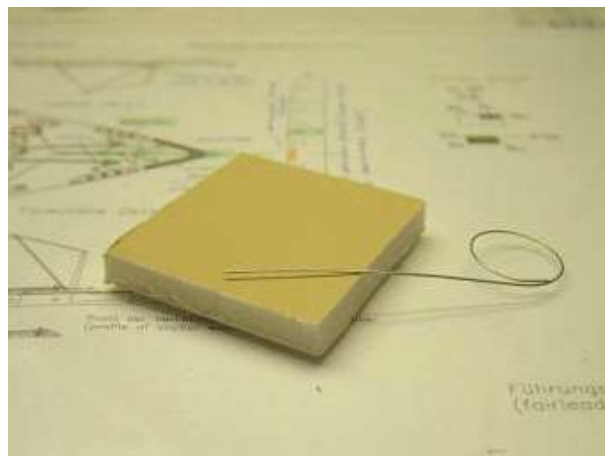


However, the **pink label** CA is ideal for photoetched parts that need to be assembled from more than one piece (like benches), or for parts that require a bend and a subsequent application of cement at a joint or seam. Its very low viscosity allows it to readily flow into joints with ease.



Micro Kristal Klear is also suitable for cementing the photoetched window parts to the model's bulkheads. Due to the glue's viscosity, it can be used to fill small gaps between the window and an opening that is larger than needed. (This is particularly important when lightproofing a model that will be illuminated.) Additionally, it dries clear and darker colored paints will show through it. Refer to Part 5 on page 8 for specific techniques applicable to windows.

You'll need to have a supply of disposable glue blocks on hand. Any material will work if it's non-porous and can be easily cut. An inexpensive choice is a sheet of foam art board at a crafts store - it's about 3/16" thick, with a foam core and outer surfaces designed for painting or drawing. Using a razor, cut it into inch-and-a-half squares. The same square can be used over and over until you run out of space.



You'll also need an applicator. A piece of fine stiff wire three or four inches long works nicely, with the back end bent in a loop for ease of handling (and so it can be seen when it's laying down). Another option is a round toothpick which can be shaved to a fine point with a hobby knife. As glue builds up on the end you can simply



discard it and grab a new one. (Use round toothpicks, not flat ones – round toothpicks are made of hard birch wood, whereas flat toothpicks are usually made of softer coarser wood that can't be filed into a hard point.)

For the next steps, you MUST use a hands-free magnifier, like a jeweler's loupe or binocular magnifiers. The amount of glue you're working with is simply too small to see with the naked eye, and it's easy to apply too much. You must be able to actually see how much glue you've applied in order not to over-glue it.

First, have your photoetched part ready to go. That means right in front of you, where you can grab it right away. Make sure it's right side up, turned around the right way. You want to be able to grab it and glue it without delay.

To glue a piece, apply one small drop of CA cement onto your glue block. Take the very tip of your wire and touch it very lightly to the glue. Apply the glue on the model where you want it. Note that CA cement is immensely strong - you don't need to coat the area - a couple of key points is all that's required. For example, if you're gluing a rectangular grill over a stokehold vent, applying glue to the corners is all that's required.

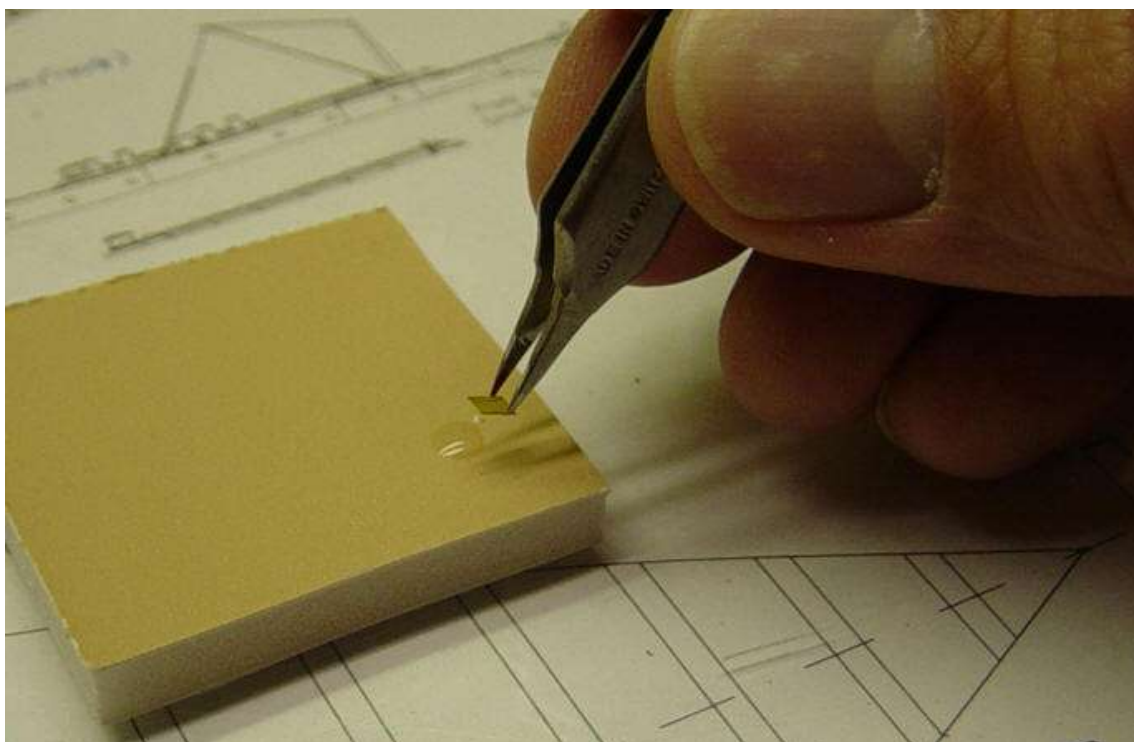
For parts that require an application of cement after bending, the same glue wire technique applies to the pink CA cement used for this application. For parts that are bent and will hold their position by themselves, make sure they will do just that - your bends should be made so your part requires no pressure from your tweezers to hold it in place. Pick up a barely detectable amount of pink CA on your glue wire, and carefully touch it to the edge of the joint. The CA cement will instantly flow into the joint.



Make sure to periodically clean the tip of your wire. As CA glue builds up on the tip, it will increase the amount you pick up each time. To remove the built-up glue, use the back edge of a hobby knife blade to scrape the wire clean against a hard surface.

For parts that require assembly, where you're joining two separate pieces, follow the instructions in the next paragraph, but do not use instant-bonding pink label CA - use yellow-label CA instead.

For some parts, especially very small ones, it's more practical to pick up a bit of glue on the part instead. LIGHTLY touch the part to the glue droplet. Using your magnifier (you should already have it on!) look to see how much glue you've picked up. You will almost always have to transfer some back - you can't usually control exactly how much glue you pick up, and for small pieces only a *minimal* amount is required - any more will



bleed out from under the part after you apply it. You should have only a barely discernable amount - if there's too much there; gently touch the glue on the piece to a corner of your glue block to wick some back.

Immediately lift your part with tweezers and put in place. Gently touch it where it needs to go. Always steady your hand by resting on something or by using your pinky finger for support – or, if that isn't possible, grasp your wrist with your other hand to steady it. With CA cement, all you need to do is touch it in position for it to hold. Immediately nudge it into place with the tip of your tweezers - don't rush, but remember that you only have about 15 to 20 seconds. When it's positioned properly, gently press down with your tweezer tip. If you don't get it right before it bonds, don't despair - a gentle but firm pressure in a lifting motion will pull it off without damaging it. Use the tip of your knife to gently scrape the glue off the model and off the part and try again.

Lastly, a note about loss prevention. Some photoetched brass parts are extremely tiny. Whether you're working with one or several, if you must set them aside at any point to work on something else, place them in a small cap from a beverage container so you don't lose them. (Plastic milk bottle caps work great.) Some pieces are so small that they're easy to sweep off the bench with your sleeve if you don't know they're there. And if you're cutting any off their sheet in advance, or painting any in advance, place them in a secure storage container with a lid - one of those multi-compartment plastic boxes with a snap lid works well. It is also a good idea to keep the parts sheets stored in their individual plastic sleeves or separated by thin cardboard when not in use.



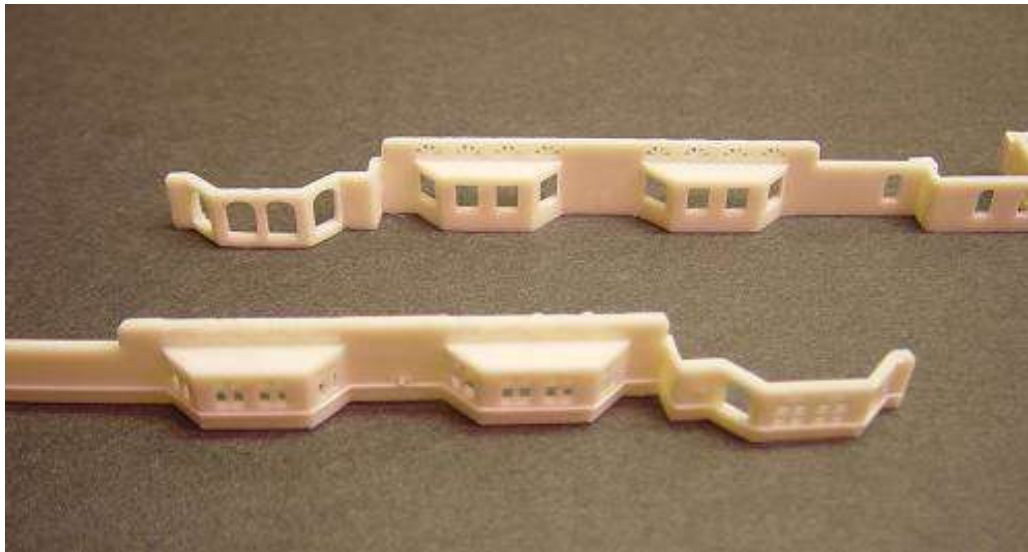
*A row of deck chairs ready for airbrushing. Here the blue painters tape has been attached to a length of plastic with double-faced tape instead of wrapping it around a stick. This is simply a different application of the same technique for a specific purpose.*

## Part 5: Photoetched brass windows

This section will cover the tools and techniques specific to using the Tom's Modelworks photoetched brass windows set for the Minicraft 1:350 *Titanic*, but they can be applied to all scales of window sets.

### Correcting window sizes:

Modelers considering photoetched brass windows should be aware that prior to installation, a significant amount of work will be required to correct the sizes of most of the window openings cast into the styrene bulkhead (wall) pieces. Most are too small and can be filed to the correct sizes but a few will require reducing the size. Each window opening must be sized so that the P/E brass window overlaps it just enough to cover it without the styrene being visible through the window itself. Of all the time required to fit, paint and apply P/E brass windows, resizing the window openings accounts for 90% of the time. You will have to decide how much time you're willing to commit for the sake of authenticity and your own personal satisfaction. Although your friends and relatives will not be able to discern the correctness of windows, they will still appreciate your work for its overall beauty, clean lines and miniaturization of detail. Photoetched brass windows do take a *lot* of time and effort, but are well worth it.



*A-Deck (Promenade Deck) windows for the 1<sup>st</sup> Class Smoking Room and the Verandah Cafes, showing the windows as cast (bottom) and after removal of the mullions and resizing (top)*

When using photoetched brass windows it is important to become thoroughly familiar with the window types and their respective locations on the model before starting. Planning ahead and knowing what needs to be done before you start will improve efficiency and accuracy and ultimately the end result. You don't want to waste time erroneously preparing openings for the wrong window type. You should have your photoetched parts on hand, and have thoroughly read the photoetched brass window set and plastic model instructions. It is advisable to add notes or highlighting to the model instruction sheets to indicate the type of window to be used for each step. The TMW instructions outline each window type, quantity and their respective locations either by part number or bulkhead reference, but do not provide a complete list. On the TRMA site, Bruce Kern's Window Cross Reference chart at

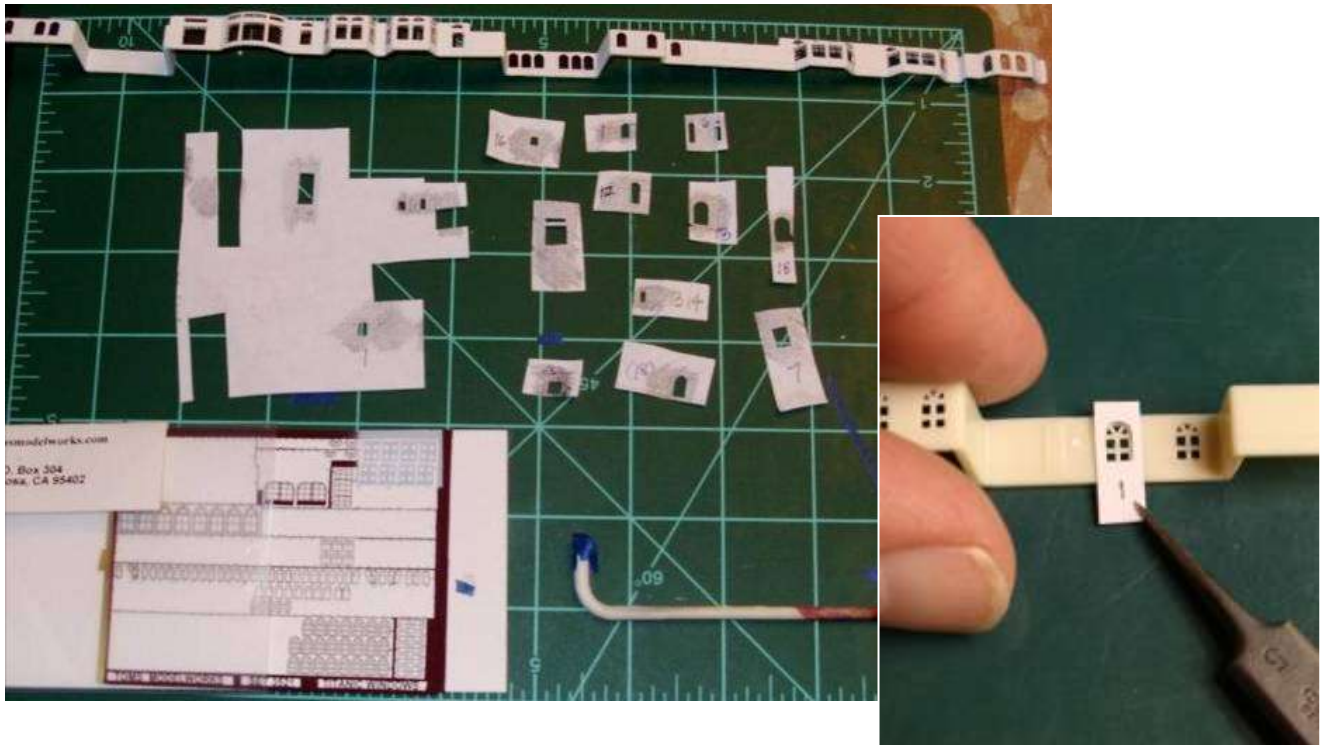
[http://titanic-model.com/articles/bk\\_window\\_ref\\_table.shtml](http://titanic-model.com/articles/bk_window_ref_table.shtml)

shows the location of *all* the windows on the 1:350 Minicraft Titanic model, referenced against all the windows on the sheet from Tom's Modelworks (TMW). A color-coded diagram within this reference helps identify the various window types on the sheet.

To check the size of each window opening during the resizing process, you can simply cut the appropriate size window off the sheet and hold it against the opening with tweezers – or, you can create a template for each

window type. (See photo below.) The latter insures against potential loss since it won't be necessary to handle the part until you are ready to glue it in place. Lay the brass window sheet on a flat surface. Take a quarter sheet of standard copy paper, lay it over the window frame of choice and hold it firmly in place. Take a freshly sharpened pencil, and with the side of the pencil lead lightly rub over the area of the windows. As you rub, the shape of the window will begin to appear. Once you have the size transferred to the sheet cut out the window from the paper just inside its outline. Now cut around this leaving enough paper to grab a hold of. Some window templates may need additional trimming to squeeze into tight spaces.

Careful examination of all the windows on the sheet will reveal that there is a very slight variation in width between windows of some types. Make sure your template for that window type is sized for an average window and not the odd one that's wider or narrower.



### Checking the size of openings:

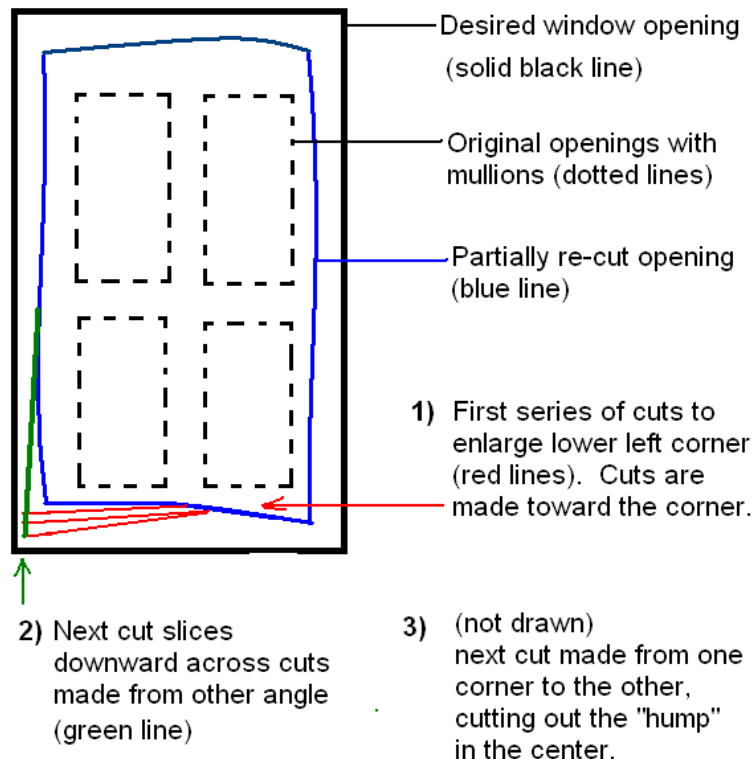
Pick up your template or sample brass window with a pair of tweezers (locking tweezers work well here) and hold it over the appropriate openings to determine whether they need to be enlarged or reduced. It is recommended to resize window openings of the same type on multiple model parts in a continuous operation. This way your eyes and hands will become trained to a particular size and you will be able to practically look at an opening and gauge by eye what needs to be done. The template or sample window frame then becomes a quick way to check your work.

Some windows will need the existing mullions (cross-bars) removed. Start by cutting the mullions apart where they meet in the center. This can be done with a sharp hobby knife, exerting downward pressure while the part is laying on a hard or semi-hard flat surface. Alternatively, a mini-rotary (Dremel) tool or variable-speed bench tool can be used. If you have one of these available, mount a small drill bit or burr tool, and holding the tool firmly drill through each mullion avoiding contact with the edges of the opening. You should always drill or cut out the centers first and purposely leave the remnants of the mullions along the edges. These are easier to cut off when not attached at the centers and you'll be less likely to gouge the openings. Leave all in place, though, until you are ready to size the opening.

### Enlarging undersized openings - there are two techniques: cutting and filing.

**Cutting:** With the mullions removed and your window template or sample window in hand, check how much material you will need to remove from each side of an opening. With a new blade in your hobby knife, work one

side at a time and in one direction. Make several thin slices into the same corner. Then cut into the same corner from the adjacent side (perpendicular to your first cuts) – the “slices” you cut will fall out of the opening when the blade reaches solid plastic. (See drawing below.) When you think the corner is close to the desired point, reverse the cutting direction and trim to the corner where you started. Working in both directions on a side will result in a flat edge in the proper location. Once you have rough-cut all sides, check with your template again, do any final shaving or filing to complete the window to your required size and standards and move onto the next opening. Care should be taken to make sure that openings are squared-off, straight-edged and oriented perfectly vertical with relation to the top and bottoms of the “walls.”



It should be noted here that it's important to use the proper type of hobby knife blade for this work. You will need to use a finely pointed knife blade, not a broad curved one. An X-Acto No. 11 knife blade made for the smaller-diameter handle is recommended, or the equivalent.



If at any time you find cutting to be difficult; its time to change your blade. Sharp blades cut with precision, dull ones push, distort and separate the plastic. With a dull blade more force is required and you increase the chances of overcutting or damaging the piece as well as accidentally cutting yourself.

**Filing:** A flat micro-file is required, as even small hobby files are too large. In some cases the initial window opening is so small that even a micro-file cannot be fit into the opening. In this case first cut the opening a bit larger using the above cutting techniques.

When filing, it's easy to inadvertently apply pressure unequally to one edge of the file or the other so that the opening begins to skew. Always file a little, check the opening, file some more, check it again, and compensate if necessary. When filing up against a corner of the window, be careful that the edge of the file doesn't cut into the adjacent edge. Some files have one edge that cuts and another that's smooth metal. If you have this option, file with the smooth edge against the corner. Some windows are narrow enough that the edge of the file must be used to file the top and bottom edges of the openings.

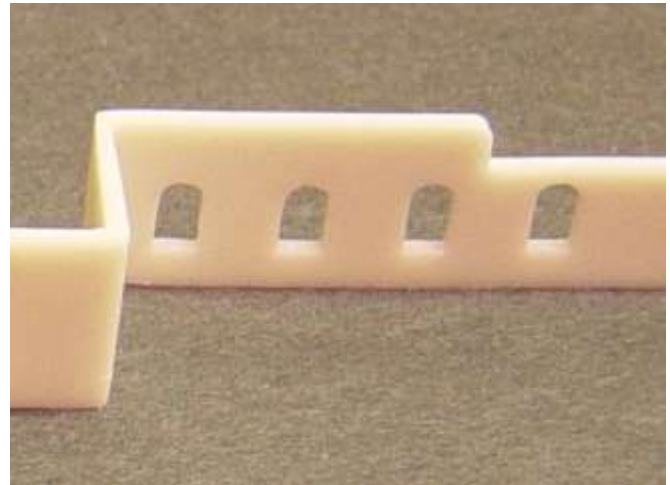
With filing as opposed to cutting, the edges of the window opening tend to be more ragged and the corners will not be perfectly crisp and clean. You'll still need to use the tip of a hobby knife to finish the openings. Trim the corners to perfect 90-degree angles and straighten any of the windows lines that aren't perfect. For openings that were filed straight but are a little rough from the file, use the back edge of the blade and gently scrape the blade along the edges, working from the corners outward, to smooth the plastic. The finished edges don't need

to be perfect, as the overlap of the photoetched brass frames will hide imperfections to some extent, but they must pass a critical examination and be reasonably clean.

### A word or two of caution for both techniques:

Some window positions are molded very close to the top of the bulkhead, in which case most of the trimming will occur at the bottom and little if none at the top. Also, windows that are grouped closely together will require you to leave enough plastic between them to support the brass.

When resizing a series of windows that will be equally spaced, make sure you enlarge the windows an equal amount on both sides so that the windows remain equidistant from each other once enlarged. If the end window is very close to a bulkhead, check how much space you have to work with on the inside of the piece. If the opening is already very close to another wall at right angles, you may have to enlarge each window by removing all the material from one side only (such as the left side of each window).



*Windows that are positioned in a row must be finished to identical proportions, equally spaced and at equal heights.*

Use care not to cut into the handrails where they are cast into the bulkhead pieces below the window openings. With the exception of the tall windows of the Verandah Cafés at the after end of the Promenade Deck on either side, there are no handrails that need to be removed when enlarging window openings to accommodate photoetched brass windows. Always enlarge upwards before enlarging downwards to avoid coming too close to the cast handrails. You will need to enlarge the openings for the Verandah Café windows below the handrails. Lower these openings enough to allow the top of the photoetched frames to be mounted flush with the top of the wall. For all locations where arched windows are used (see photo above) the bottoms of the windows extend below the handrails, which sit between them. Using a flat chisel-type blade, you will need to remove a very short segment of handrail on either side of these window openings after enlarging them to allow the P/E brass frame to sit flush against the plastic.

### Reducing oversized openings:



If you over-trim a window by mistake or find windows that have been molded too large, filling will be required. However, if the window is oversize by no more than the width of the frame edge and in one direction only (meaning the opening is either too wide or too tall) no filling is required and the oversize can easily be corrected by another method. This is covered under the window installation step.

For larger gaps or when you must create wider headers for specific windows (see [Bruce Kern's Window Cross-Reference Table](#)) for notes on this) use a plastic filler like Testor's Contour Putty or Squadron White Putty. The techniques explained below are for minor filling for windows that are too large. If you are closing in a window completely, cement a thin styrene piece behind the opening, fill with putty, and sand flush with the opening.

Minor oversize corrections can be filled and trimmed by eye. For all others, begin by applying a strip of painters tape to the outside face of the bulkhead. Position the edge of the tape where the openings edge should be. In some cases you may need to form a corner, so your tape should be cut in an L-shape accordingly. Apply firm pressure with the back of a fingernail or a smooth, flat rigid tool to press the tape down firmly without indenting it into the opening.

(A flat burnishing tool works well for this.). Your goal is a straight, clean edge. Then, from the back, fill in the space behind the tape, overfilling it past the tape edge. (The tip of a miniature screwdriver works well as a tamping tool.) Allow it to thoroughly dry. When you remove the tape a line will be molded right into the putty. Trim the excess putty to the line, gently file and then sand any “overage” sticking out beyond the wall and you have a correctly sized opening.

The mullions in the diagonally oriented windows of the First Class Lounge on the Promenade deck should not be removed. Leaving them in place will aid in supporting the filler. Tape over the entire opening and fill from the backside. When you are ready to cut in the window opening, begin by drilling out the rough height of the window then trim with your hobby knife and/or files to the proper size.

### **Adding and removing window openings:**

There are a few modifications you may choose to perform to create a more historically correct model, as a number of window locations cast into the 1:350 Minicraft kit pieces are now known to be incorrect. Information about correcting specific window locations can be found in the Rivet Counter Titanic Scale Modeling Tutorial. See Section 45, “Windows”, at [http://rivetcounter.txc.net.au/Tutorial/Alteration\\_Pages/45Windows.html](http://rivetcounter.txc.net.au/Tutorial/Alteration_Pages/45Windows.html) (The initial information in this section covers techniques not involving photoetched brass; page down to the section titled “Corrections”).

If you’re performing any modifications on window locations to achieve a historically accurate model, these modifications will need to be performed concurrent with the re-sizing operation to avoid wasting time on windows that will be filled in completely. Furthermore, you’ll need to review your inventory of photoetched window frames to verify that you have enough for all the window openings you want to add them to. It should be noted that the 1:350 Windows sheet from Tom’s Modelworks does not have enough windows to replace every single window on the ship. Plan ahead and refer to Bruce Kern’s Window Cross-Reference Table to see where you’ll be short and what options you have for leaving windows off in non-essential (non-visible) locations.

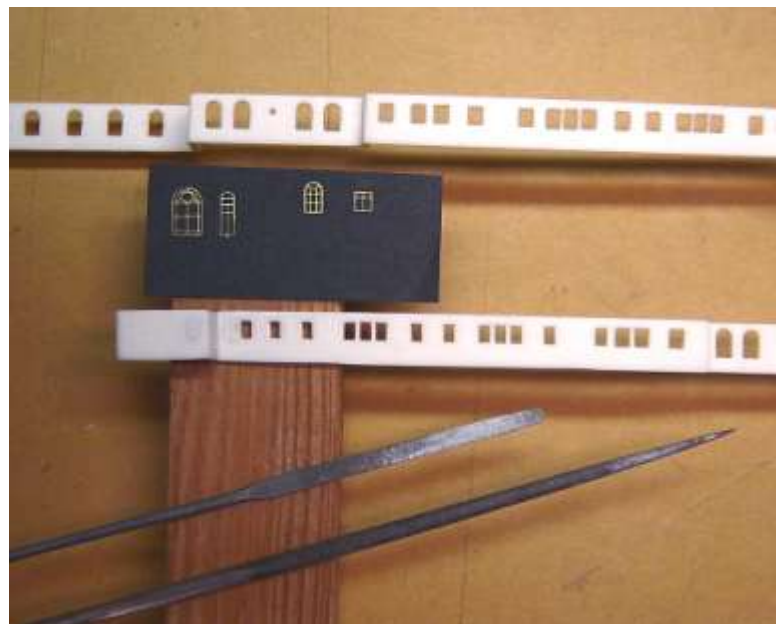
### **Painting or not painting the inside edges of the window openings:**

A decision you’ll need to make is whether to paint the inside edges of the window openings the same color as the windows themselves. Painting them has the advantage of hiding any imperfections, especially those parts of the window edges not covered by the photoetched brass frames. On the other hand, painting the inside edges can make the windowframes look heavier and thicker than they really are once the P/E brass parts are installed. Leaving the insides white accents the P/E brass windows and gives a more slender appearance to the window edges. As this is a personal choice, it’s recommended that you paint the inside of one window opening after you have some P/E brass windows painted and ready for installation. Hold a painted frame against a window with an edge painted to match, and then against a white-painted one. Compare the two and decide for yourself.

### **General repairs and painting preparation:**

All windows should be sized and corrected **before** painting the bulkheads. As openings are enlarged you will cut into the handrails cast into the bulkhead (wall) pieces. These will need to be trimmed back just a bit to allow the photoetched brass to lay flat on the bulkhead surface. An easy way to do this is to locate the desired ending point and press your blade into the rail making a cut line. Then, take a spade-tipped hobby knife blade and holding it flat to the bulkhead surface, slide it along the toward the cut to cleanly shave off the handrail between your two cuts.

When you are satisfied with the size of all openings do a final check of the entire part and correct any molding problems (backward



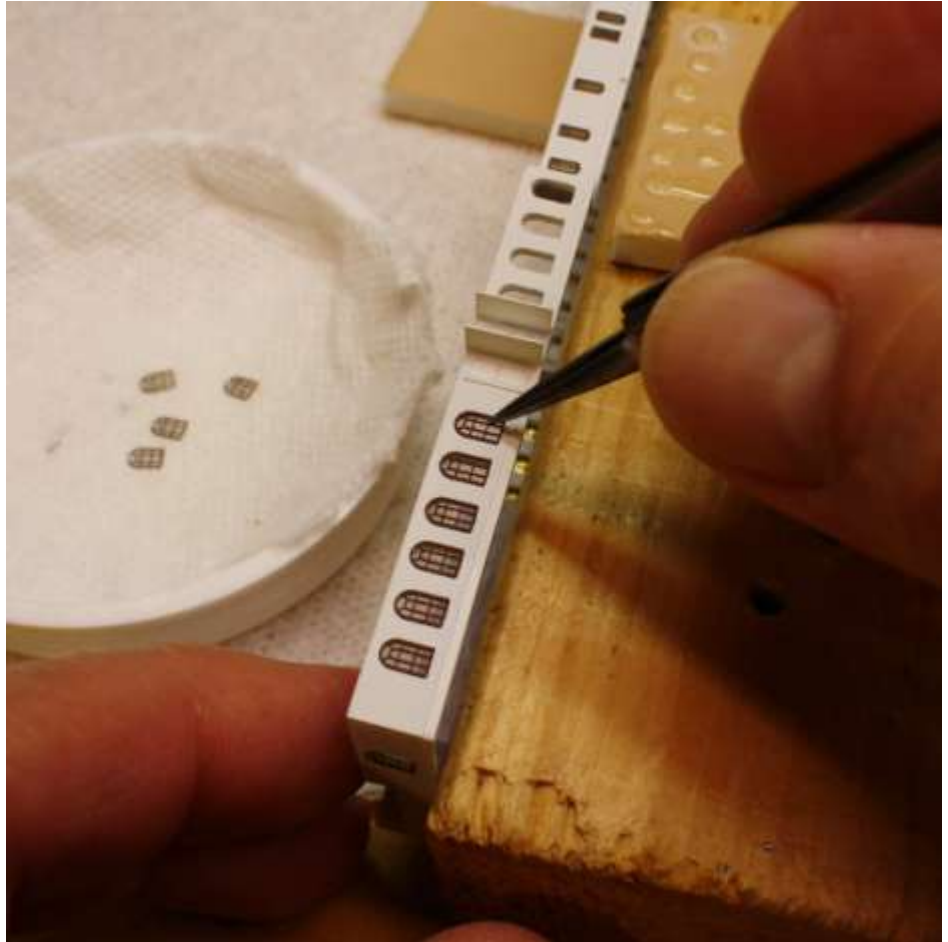
*Two rows of windows resized by filing and cutting. The rattail file at right was used for the arched windows. .*

portholes, flash removal, etc). Clean up any rough edges, complete all final filling and sanding and check again. Now airbrush the bulkheads. Deckhouses should be assembled and joints filled prior to installing the windows.

### Window installation:

Begin by choosing a bulkhead piece or deckhouse to work with. Working with one window type at a time remove the required quantity of photoetched frames from the brass sheet for the part you have chosen, unless you've previously removed them and painted them off the sheet. Trim any excess sprue from the loose windows before

you begin any gluing operations, and touch up any bare brass spots with a very fine-tipped modeler's brush (available at a hobby store or artists' supply stores.). Set up an assembly operation with window frames oriented for easy pick-up, glue bottle and glue block nearby, and glue wire or presharpened glue toothpick handy. If using CA glue, follow the instructions in Part 4. Since it is difficult to apply the CA glue to the edge of the opening, glue must be applied to the window brass. Any mistakes could result in a glossy sheen of glue on the bulkhead which will then need touch-up paint. Note that with CA glue, you do **not** need to apply a line of glue to the back edge of the window all the way around. Applying the slightest amount of cement just to the four corners will suffice. Openings that are slightly oversized make this method of application impossible so you should use Kristal Klear as explained below if you forgot to resize an opening.



*What every modeler should strive for: a row of windows identically sized and equally spaced, with photoetched brass frames that are flawlessly painted and perfectly positioned.*

If CA cement sets too fast for you, Kristal Klear can also be used. Even with Kristal Klear, though, do not attempt to position and glue more than one window at a time as KK begins to form a skin almost immediately. If the photoetched window is not placed in time it will not have a good bond. After placement of windows with this method it is a good idea to *lightly* tap the photoetched frame from the inside. If one dislodges, re-glue it and trace a line of glue around the inside as described below wherever the frame does not appear to have a solid overlapping contact.

For openings slightly larger than the photoetched window, apply a strip of painter's tape over the entire window opening. (The tape should be no larger than what is required to cover the window opening plus sufficient overlap to hold it – it should *not* be applied over any P/E brass windows installed on adjacent sides.) Then turn the piece upside down so the back side (inside) is facing up. Pick up the photoetched window in reverse (upside down) and insert into the opening from the backside of the bulkhead. While keeping the bulkhead piece on a flat surface, position the photoetched window with your hobby knife. After you're satisfied it's centered in the opening, apply even pressure to adhere it to the tape. With your glue wire or pointed toothpick pick up small drops of Kristal Klear and trace around the window until you have bridged the gaps with glue. Remove the tape after the glue has thoroughly dried. To avoid pulling off the frames, pull the tape back on itself during removal



instead of lifting straight up. When you paint the interiors of the frames this area will absorb paint and virtually disappear.

For openings of the correct size using CA glue, follow the procedures outlined above. If continuing to use Kristal Klear (KK) you can follow these steps. Use a glue wire or toothpick shaved to a fine point and dip in the KK bottle. Pick up a droplet of KK about 3mm long and 2mm in diameter, more or less depending on the opening size. While holding the part facing you, trace around the inside of opening depositing KK to the inside surfaces. As you trace around KK will spill slightly over the front edge. Continue quickly until a small bead (not too much) builds up around the opening. With your tape stick or tweezers pick-up a P/E window by a corner and set it into the KK. If using a pick-up stick, detach the stick by making a sliding motion away from the window. Position the window correctly with your knife or tweezer tip and apply even pressure to set it. Any KK that squeezes out onto the bulkhead can be gently removed with the point of a hobby knife. Do one more window first to allow the excess KK to set, then remove the KK from the previous window – by now it will have set and can be removed before it dries clear. It will be tacky and can easily be pulled up.

#### **Final check and paint touch-up:**

After the photoetched windows are installed hold the part up to the light and check for any gaps. Large gaps will require filling with Kristal Klear while small hairline gaps can be bridged with white paint. If you do not intend to paint the inside edges of the window openings to match the windows it is suggested that you paint any KK used as filler with white paint to match the bulkhead. Apply paint to the backside of the filler and be careful not to accidentally apply white paint onto the window frames. If you do, just touch-up the paint on the window frame from the front side before final assembly. You should now have all the windows installed and be ready to assemble the individual parts and complete the build. For added realism, acetate sheets can be applied to the insides of the windows to simulate glass as recommended in the Rivet Counter Tutorial.

The detailing and painting of photoetched brass figurines is covered in its own article, “Detailing and Painting the GMM Ocean Liner Figures” at [http://titanic-model.com/articles/painting\\_figures/detailing\\_gmm\\_figures.htm](http://titanic-model.com/articles/painting_figures/detailing_gmm_figures.htm).

***Congratulations on making the step up to using photoetched brass parts - and good luck!***



*Promenade Deck of Art Braunschweiger's model showing photoetched brass windows, deck chairs and figures.*

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