# Raw To Mirror

## In As Little As Two Quick Steps…

By Joe F. Merritt
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***This is how the brass cap rail appeared prior to finishing.***

***Editor's Note:*** *The NOMMA office regularly receives questions on finishing brass. We asked Joe Merritt to come up with some definitive answers on this most popular topic:*

Brass cap rail and brass castings are common elements used by NOMMA members in the everyday construction of railing systems. Brass items are a beautiful enhancement to any project, but getting the metal to the proper finish is sometimes a challenge.

As I began doing research for this article, I realized that the information should be presented from both the viewpoint of the fabricator and the supplier, since each have their own unique requirements. Typically, a supplier needs a process geared toward mass production, while a fabricator must often custom polish and buff a job before, during and after installation. This means the fabricator is more likely to use portable tools for the entire railing system.

In addition to making the distinction between suppliers and fabricators, I've also divided this article between cap rail and castings because the finishing processes are completely different.

As with all of my projects, my goal in this article is to bring 21st century technology to Old World craftsmanship.

**Section I: Cap Rail**

The fabricator needs to produce cap rail in long or short lengths either at his own shop or after assembly at the job site. Because the cap rail is not flat on top, the abrasive needed to prepare the brass for mirror finishing must be extremely flexible but aggressive, while leaving the best possible finish. The process that I have developed uses a Trizact™ abrasive that's available from 3M.

To see why the Trizact product is unique, you need a microscope [Figures 1 & 2].

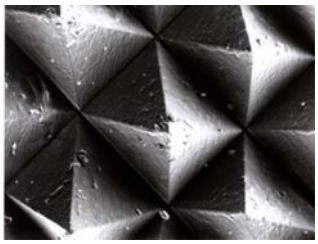

*Figure 1 : 3#M Trizact*

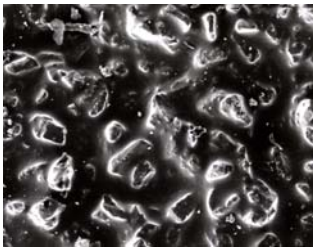

*Figure 2: conventional abrasive*

***Under a microscope, the Trizact belt surface looks like small pyramids. Figure 2 is a close-up of a conventional abrasive surface.***

As 3M explains, " The random arrangement of minerals on conventional coated abrasives has been replaced by a revolutionary new abrasive construction. Using an advanced technology called microreplication, 3M has developed a way to bring unprecedented consistence and precision to the abrasive surface. The Trizact abrasive surface consists of precise structures that are uniformly applied to the back. This construction provides a very even distribution of mineral and grinding aid over the entire surface of the abrasive for more dependable results" [1]

**The Procedure**

In many cases I have used the Trizact abrasives to drastically reduce the steps needed to produce a perfect mirror finish or to achieve mirror quality results without buffing. I have been successful on all types of substances, including stainless steel. The Trizact abrasives produce a better finish than any other abrasive I've tested. I have been working with the Trizact products for about 12 months but only in belt form. Therefore, I contacted the 3M technical staff and conveyed my desire to try the Trizact material in a slashed assembly to prepare cap rail for buffing. The slashed assembly is loaded into a steel head that is basically a renewable brush backed flap wheel [Figure 3].

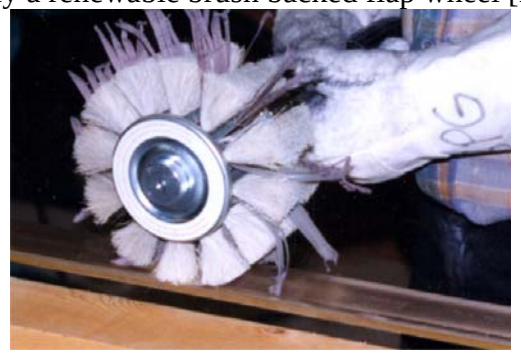

***Figure 3: The Trizact slashed assembly is placed on a reusable steel head. Shown is the first step of the cap rail finishing process.***

The sandpaper loadings are perforated with one of many die pattern choices. When contact is made with an irregular shaped part like a cap rail, the abrasive strips become slashed and conform to the part, making it possible to sand the cap rail without changing any dimensions. The head can have either short or long trim brushes. The long trim brushes allow the abrasive to reach into a deeper radius.

I knew that if I was successful with the portable tool, automating the process for fabricators and suppliers would be even easier. The heads are available in either a 12

brush portable, or the 16 and 32 brush stationary models. The portable head can accept abrasive widths of 1, 1 ½, or 2 inches, while the 16 and 32 brush heads can accept abrasive widths of 1, 2, 4, and 6 inches. Each size head has specific minimum horsepower and maximum r.p.m. requirements. I used the 12 brush short trim, 2 inch wide portable head at 1,000 to 1,900 r.p.m. to develop the first step process to be used by the fabricator. The portable head should be used on a tool having at least ¾ horsepower. The ideal tool for this application is the three-phase, 7 speed, 1.34 h.p., flex shaft system [Figure4].

***Figure 4: A three-phase, 7 speed flex-shaft system.***

If only single phase power is available, the best tool would be the 3 speed, 2.5 h.p. flex shaft system.

After trying several grades of the abrasive, I determined that the Trizact 307 EA – A45 aluminum oxide mineral "J" weight cloth back material is the best starting point on the cap rail. Trizact abrasive material is available in grades ranging from A100 through A6 (US 200 – US1000 grit). A stiffer "X" weight backing is provided in selected grades but does not conform as well to the cap rail. By the time you read this article, Trizact material will probably be available in other minerals and grades. If your cap rail has bad handling marks, you might have to start at the coarser A65 level.

The A45 prepared my brass samples for the one, two, or three remaining steps. The reason I say one, two, or three remaining steps is that many of the NOMMA members are very pleased with a finish that is a mirror but not what I would call perfect. In this case, the 80/20 rule applies, which means 80 percent of the members would be happy with my two step portable tool process on the cap rail. Trizact A45 abrasive would be the only sanding step. The fabricator would then use a 6 inch orange mill treated buff with X67 Tripoli compound at 3,800 r.p.m. or slower for the one cut buffing step [Figure 5].

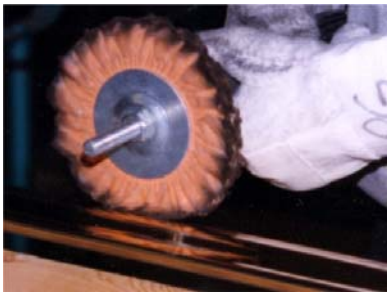

***Figure 5: A 6-inch orange mill treated buff is applied (step 2).***

The resulting two-step finish will satisfy 80 percent of the members [Figure6].

***Figure 6: This cap rail sample shows the 2-step process.***

The remaining 20 percent of NOMMA members who want to take this finishing even further should consider using a product like the CLEO® BUFF-BELT® brand with X67 Tripoli compound at a speed of 3,800 r.p.m. or less [Figure7].

***Figure 7: An optional third step creates an exceptional finish.***

This third step straightens out any random buff lines left by the orange buff. For the ultimate finish, a fabricator can use a CLEO® wool BUFF-BELT® product with Y86 mint green compound at the same speed. This final fourth step achieves a finish that is as close to perfect as possible.

Typically, a supplier needs to produce the cap rail in 20 foot lengths and in medium to large quantities. The automated process consists of two to four steps depending on just how good the final finish needs to be. The first step uses a slashed assembly in a 16 or 32 brush head. The Trizact abrasive A65, A45 or A30 is the only sanding step. The choice of grade is based solely on the quality of the raw material. The sanding head should be run at 1,200 r.p.m. on a 5 h.p. buffer. The second step uses a 14

inch orange mill treated cut buff running a 1,800 r.p.m. with X67 Tripoli compound. The third step, if desired, utilizes a 14 inch white untreated buff with Y86 mint green coloring compound running at the same 1,800 r.p.m.. I recommend at least a 7 ½ h.p. pedestal buffer to carry the 14 inch diameter buffs. The 20 foot part should be fixtured so as to pass by successive heads of each of the three steps for both the sides and the top of the cap rail simultaneously. If a better finish is desired, a fourth step using a CLEO® wool buffing belt could be added to the process.

**Section 2: Brass Castings**

The intricate designs of brass castings make it impossible to use the slashed assembly. I have access to virtually every type of abrasive that exists, and I tried about a dozen types before settling on what I believe is the best choice at this time. The challenge was to have an abrasive that was aggressive enough, in one step, to prepare the casting for buffing while leaving the original dimensions unchanged. The product I settled on is known generically as "greaseless" compound. The product must be applied to a spiral sewn cotton buff with a diameter usually between 6 and 14 inches. The buffer should be running at 1,800 r.p.m. with enough horsepower to prevent slowing when pressure is applied to the part.

I recommend using 180 grit greaseless because it cuts coarse but leaves a nice finish that is easy to buff out. The greaseless compound is applied while the buff is running like the regular grease based compounds and need to air dry about 10 seconds (longer in high humidity). After drying, this flexible sanding head is very forgiving and yet aggressive enough to prepare the surface of most brass/bronze castings.

**Procedure**

**The castings should always be polished and buffed prior to installing.** After installation, it is always easier to remove a scratch or handling mark than to produce a perfect finish from a raw casting. The three-step process is the same for the fabricator and supplier. The best machine for the first two steps is a 7 ½ h.p.-1,800 r. p. m. pedestal buffer. For the first step, I recommend a 14 inch spiral sewn buff using the aforementioned 180 grit greaseless compound [Figure 8].

***Figure 8: Finishing the castings (step 1).***

You can utilize a smaller 6 inch diameter buff at the same speed for getting into extremely tight areas if the 14 inch buff is too large [Figure 9].

***Figure 9: A 6 inch spiral sewn buff with 180 grit greaseless compound.***

For the second step, I would use a 14 inch white dip treated buff with X67 Tripoli compound [Figure 10].

***Figure 10: A 14 inch white dip treated buff with X67 Tripoli compound is used for the second step of finishing the castings.***
***Note: Castings should always be polished and buffed PRIOR to installation.***

Because the buff is "concrete hard" out to the edge, it removes the marks left by the greaseless without jerking the part out of the operator's hand. The ideal third step would use a different buffing machine. A casting like a lamb's tongue would be extremely difficult to buff in a safe manner at the higher 1,800 r.p.m. speed of the 7 ½ h.p. buffer used in the first two steps. So, instead, I recommend using a 5 h.p., 1,200 r.p.m. buffer with a 14 inch white untreated buff and Y86 mint green coloring compound [Figure 11].

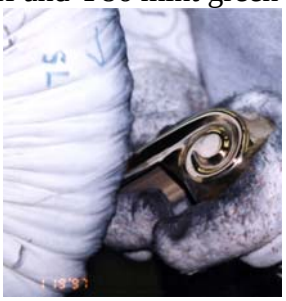

***Figure 11: The third step of the finishing process for castings uses a 14 inch white untreated buff with &86 mint green compound.***

This large diameter buff turning at the lower 1,200 r.p.m. is fast enough to produce a brilliant finish but in a safe manner and with less generated heat. The lower heat factor results in a lower cost per part because the buffs and compound last longer. The combination of less heat and operator comfort and safety will result in a much higher

production rate with virtually a zero rejection rate. The near perfect results of the three step process for the castings can be seen in the close-up photograph [Figure 12].

***Figure 12: A close up of the mirror-finished castings.***

**Touch Up**

You can remove a scratch or an unseen flaw from your work without committing major resources, tools, or manpower to the project. Simply use the Trizact abrasives or other buffing materials in a form that suits your needs. A polishing or buffing disc removes a scratch extremely fast because of its increased mechanical ability. The straight line motion produced by a belt of the same material will straighten out the swirls left by the disc. Using the appropriate grade of either Trizact abrasive or a buffing belt, you can duplicate your original finish quickly. There is no need to use any other type of product because you will eliminate your problem while producing the exact degree of mirror you desire. □

*A thanks goes to Joe Merritt for his many hours of research. A thanks also goes to Ken Argroves of Tennessee Fabricating Co. for providing the brass castings and cap rail used in this research project. For more info contact Joe Merritt of Buff Polish & Grind Industrial Supply Co. Inc. at (940) 455-2269. Fax: (940) 455-7385.*

[1] 3M™ Trizact™ Abrasives Brochure.