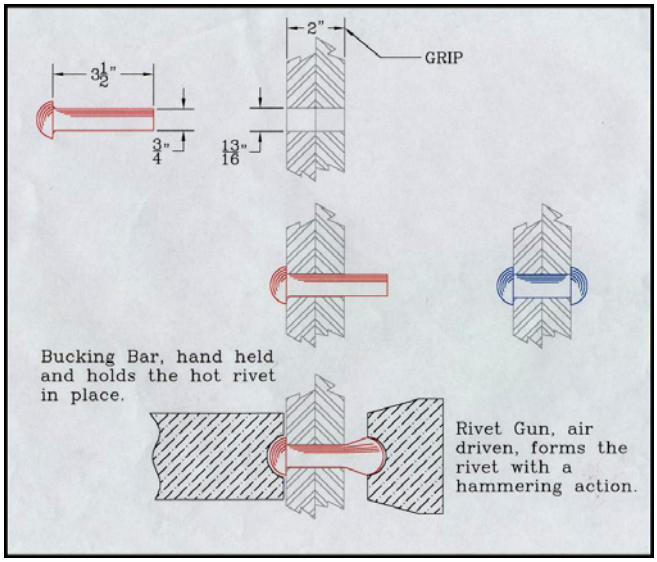
Charlotte Highway Bridge Update (November 25, 2006)

Vern Mesler, Project Manager for the restoration of historic bridges for Calhoun County Historic Bridge Park

No. 90 Rivet Hammer

John Tisron lifts the No. 90 dark gray rivet hammer with his finger firmly set behind the trigger. A large industrial air compressor runs in the background. Tisron gives the worker at the air compressor a quick glance and the air valve is slowly turned on. Compressed air fills the 3/4" hose. The hose stiffens and buckles, then compressed air fills the No. 90 Boyer. Tisron presses his index finger tighter against the trigger. The rivet hammer is a familiar tool to Tisron and he handles it with respect. The feel and sound of it tells him when it is ready, a sense intrinsically developed from years of operating industrial tools. A 3/4" rivet is pulled from the coal forge and quickly slipped into the 13/16" hole. A worker sets a bucking bar over the head of the hot rivet and the shank of the rivet is now ready for the rivet hammer. Tisron quickly positions the rivet set (snap) of the hammer over the rivet shank and holds it firmly as he presses trigger of the No. 90 Boyer. The internal piston hammers against the rivet set. Tisron drives the hammer straight and steady against the hot rivet shank and it quickly forms the familiar button head shape of a rivet.



Sketch by author

Chicago Pneumatic Tool 1924 catalog supplied by Robert Arthur

Great idea, let's rivet!

During one of my welding lectures in the fall of 1997, I mentioned in class my efforts to save a historic metal truss bridge in Jackson County around 1984 but had to give it up because I couldn't find a way to fund the restoration or find a location for the bridge. One of my students was Professor Frank Hatfield, P.E., from the Civil and Environmental Engineering department at Michigan State University, who was taking my welding class to help his engineering students with their welding for the National Student Steel Bridge Competition. When he heard my bridge story, he told me about Dennis Randolph, Managing Director of Calhoun County Road Commission, and his efforts in establishing a park for historic metal truss bridges. I contacted Mr. Randolph in December of 1997 and by January 1998 I was working as an Independent Contractor for Calhoun County to restore two historic riveted truss bridges. After working for Randolph for about two weeks I stopped in his office to discuss some restoration work and mentioned to him that we should not replace rivets with bolts or welds but with real rivets. "Great idea, Vern! Lets do it." There was only one problem with that great idea of mine: I had never riveted. I had worked as a steel fabricator for over thirty years, and at the same time as a welding instructor, but I had never riveted.

"If you want to learn to rivet, call John Tisron. He riveted on the Mackinac Bridge and he knows how to rivet." I called the phone number I received from the business agent of Ironworkers Local Union No. 340 in Battle Creek, Michigan, and a very pleasant and friendly lady answered the phone. It was Tisron's wife Betty. After I explained what I wanted, she called John to the phone. Tisron was excited about doing some riveting

again and was hired as an Independent Contractor for Calhoun County. We set up a training session soon afterwards.

John Tisron taught me a lot about riveting and the rivet hammer, especially handling the rivet hammer safely. One of the first rules when picking up a rivet hammer is to place your index finger firmly behind the trigger. After accidentally hitting the trigger of the rivet hammer and having the piston and snap fly from the end of the rivet hammer and disappear in some dark corner of the shop or hitting someone, it didn't take long to appreciate this safety rule. How Tisron handled the tools of his trade is something I recognized in all craftsmen, their respect for the tools of their trade. This respect for tools I discovered in my wife Nan Jackson when I first met her. Nan and her family exchange letters and cards; they all have a love for the hand written word. We were setting at a table and Nan just finished writing a letter and set down her fountain pen. I needed to make a quick note and casually grabbed her fountain pen and from the expression on her face I quickly learned this fountain pen was no ordinary ball point pen and promptly laid it back down. Over the years I occasionally get to use her fountain pen when she hands it to me to sign greeting cards. This fountain pen is an important tool for Nan, in her writing and her professional life as an educator, and she has as much respect for this fountain pen as Tisron has for his rivet hammer.

Michigan Pneumatic Tool, Inc.

Our riveting equipment came from Douglas Steel Fabrication in Lansing, Michigan, who donated it to the Calhoun Historic Bridge Park. The rivet hammers were last used in early 1950's and they set in storage for over forty years and needed rebuilding. I was told by many that riveting was a lost art and that it would be difficult finding anyone who riveted, sold rivets, or repaired riveting equipment. I've always had a problem with the comment "it can't be done" and started searching the phone book and industrial directories for anyone with experience in repairing riveting equipment. I found a number of companies that repaired pneumatic tools and started calling.

MICHIGAN PNEUMATIC TOOL, INC.

From left, Bob Arthur (Vice President)
Jeff Dever (Project Coordinator/Technician)
Ken Thompson (Sales Representative)
Photo by Michigan Pneumatic Tool staff

Michigan Pneumatic Tool, Inc. was one of the first companies I contacted, and my call was directed to Bob Arthur. Riveting historic metal truss bridges sounded like a great idea to Arthur, and he suggested I should make a trip to Detroit and tour the Michigan Pneumatic Tool warehouse. The warehouse is a large nondescript building on the outside, but inside the rows and rows of shelving loaded down with every type of new, used, and rebuilt hand industrial tool would make any industrial craftsman's day. I've worked with both Arthur and Ken Thompson at Michigan Pneumatic and have always been given good service and advice. Restoration riveting on the historic riveted truss bridges for the Calhoun Historic Bridge Park has been successful, and we have encouraged other historic bridge restoration projects to replace rivets with rivets, where rivets are missing or damaged, and not with bolts, welds, or the ultimate insult to the old rivet craftsmen, fake rivets. I've recommended Michigan Pneumatic Tool to other craftsmen restoring historic riveted truss bridges, most recently to those restoring a 1905 Stearns Truss wrought iron bridge in Delphi Indiana and the 1868 Zoarville Station Bridge in Logan Ohio.

Beyond Calhoun County

Eight years after Randolph's "let's do it" mandate to rivet, we have successfully restored five historic riveted truss bridges and riveting has been an important part in their restoration. The successful replication of ten riveted floor beams for the Charlotte Highway Bridge was the work of the Calhoun County Historic Bridge

Park's two craftsmen Wayne Conklin and Rob Denniston. The original floor beams had deteriorated, and over the years steel plates and angles had been arc welded to the original wrought iron floor beams. We prefer not to replace original parts of a historic bridge, but at some point the cost of restoring an original member will exceed its historic value.

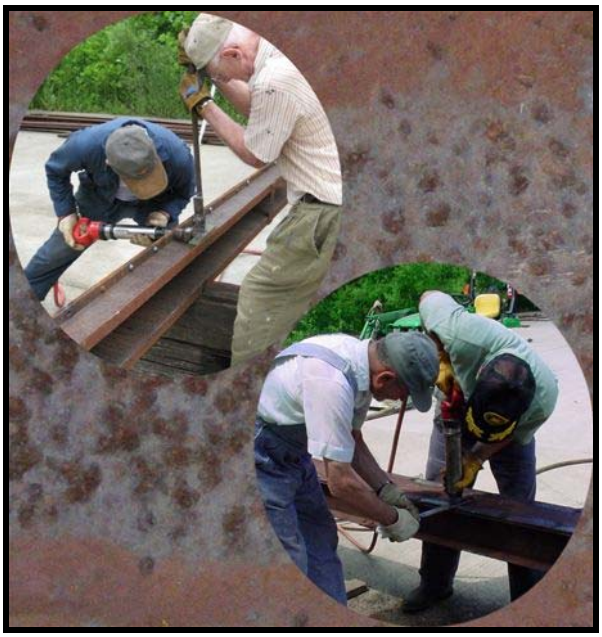
The restoration skills developed at the Calhoun County Historic Bridge Park have benefited many historic metal truss bridge restoration projects in Michigan and other states. I've worked with contractors in dismantling historic bridges and introduced them to riveting either by training them or putting them in contact with riveters such as JAG Maintenance & Riveting, 4391 E. Territorial Road, Camden, MI 49232 (email: hjag@frontiernet.net) or Bach Ornamental & Structural Steel (email: nraynor350@aol.com).

This year I had an opportunity to work with two groups, each restoring a one-of-a-kind wrought iron bridge, the only bridges of their kind left in the United States: The Winamac Bridge Company's 1905 Stearns Truss wrought iron bridge, and the 1868 Zoarville Station Bridge, a Fink through truss.

Stearns Truss Bridge

The Winamac/Stearns wrought iron bridge is being restored for the Wabash and Erie Canal Park in Delphi, Indiana. The restoration work on the Stearns Truss Bridge is being done by a team of volunteers led by Dan McCain, President of the Canal Association, and Dr. James Cooper, professor emeritus of history at DePauw University and author of *"Iron Monuments to Distant Posterity: Indiana's Metal Bridges, 1870-1930."* Cooper, widely recognized for his role in preserving Indiana's historic bridges, has led Canal volunteers through the process of obtaining this unique wrought iron bridge and is supervising the historic restoration process.

Canal association volunteers, front row left, Jim Cooper, Dan McCain, Vern Mesler,(Calhoun County Historic Bridge Park),Ron Dust. Back row left, Don Smith, Bill Draper, Roy Patrick, Charles Johnson, and Dave Smith. Insert; Ed Gruber. Photo by author



Volunteers riveting a top chord section of the Stearns Truss bridge (top picture) and removing pack rust (bottom picture)
Photo by author

I was contacted by Cooper and asked to work with McCain and his canal volunteers on riveting and the restoration techniques developed at the Calhoun County Historic Bridge Park. Removal of pack rust from the top chords and inclined end posts of the Stearns truss bridge was the first work that needed to be done. This involved the use of a rivet hammer McCain purchased from Michigan Pneumatic Tool and an oxygen fuel heating torch. After the pack rust was removed, the canal volunteers replaced missing or damaged rivets with new rivets purchased from Jay-Cee Sales & Rivet, Farmington, Michigan. The restoration work on the Stearns truss bridge is proceeding well with an enthusiastic and dedicated crew of volunteers. After the restoration and painting is complete, the canal volunteers will erect the bridge with a historically accurate wooden gin pole.

Zoarville Station Bridge

The restoration work on the wrought iron Zoarville Station Bridge is being done by two blacksmiths, craftsmen who formed a partnership to complete this restoration project: Doug Lockhart, "The Makers of Hand Forged Iron," and Jeff Gawell, "The Forge at Cedar Hill." David Tschantz, Zoarville Station Bridge Project Manager had asked me if I would work with the blacksmiths. I had a training session scheduled with the Delphi Indiana volunteers July 13th and 14th and decided to schedule a meeting with Lockhart at his shop in Logan Ohio for July 15th. "He's a young guy with lots of enthusiasm and very willing to accept competent advice." This description from Tschantz's email I found to be accurate for both Lockhart and Gawell. I suggested that Lockhart contact Arthur at Michigan Pneumatic for riveting equipment and Jay-Cee & Sales for rivets, and he later purchased a rivet hammer and holder-on from Michigan Pneumatic.

Left to right, Dave Tschantz, (Zoarville Station Bridge Project Manager), Vern Mesler, (Calhoun County Historic Bridge Park), Jeff Gawell, (The Forge at Ceder Hill), Doug Lockhart, (The Makers of Hand Forged Iron), and Neil Campbell.
Photo by author

Jeff Gawell and Neil Campbell hammer a rivet in a restored Phoenix column from the Zoarville Station Bridge. Gawell and Campbell fabricated a fixture (right) that holds in place a holder-on that keeps the hot rivet firmly in place as the rivet hammer drives the rivet.
Photo by author

From left to right, Neil Campbell, Doug Lockhart, and Jeff Gawell. Lockhart's blacksmith shop The Makers of Hand Forged Iron is located in the same building as the Columbus Washboard Company, makers of the only washboard manufactured in the USA today.
Photo by author

David Simmons, editor of *Timeline*, the journal of the Ohio Historical Society, also attended the meeting in Logan, Ohio, having worked with the Zoarville Station Bridge group as an adviser. Simmons has written articles on historic bridges, including a very informative article in 1997 for IA, the Journal of the Society for Industrial Archeology, on the history of the Boyer field riveting hammer. "The need for a pneumatic tool comfortably handled by a single individual and yet powerful enough to drive the largest rivets then in use was finally filled by inventor Joseph Boyer in October 1898. To strengthen the blow without making the tool cumbersome, Boyer reduced both the diameter of the tool's cylinder and the size of the reciprocating piston but increased the length of the piston stroke. The impact of each blow was greater, but, with a longer distance to travel, the rate was dropped to as few as 10 per second, making it easier for a workman to hold." Historic bridges being restored with the field riveting hammer were originally prefabricated and shop riveted. Today, the field riveting hammer has proven to be a versatile and easy-to-learn tool for the restoration of historic metal truss bridges.

For more information about the Historic Bridge Park, please contact Annette Chapman, RLA, Director, Calhoun County Department of Parks and Recreation, 269-781-9841 or achapman@cccd.net

We are always looking for new sources of funding for the Historic Bridge Park and in particular funding for historic bridge restoration workshops. Please contact Annette Chapman with your suggestions.