

RESTORING HISTORICAL IRONWORK

A Case Study





Spirit Ironworks was approached by a local client who wanted to have her antique fencing possibly from the late 1800's restored. The ironwork, located in Historic Old Field on the North Shore of Long Island, was badly damaged when a large tree and other debris fell on it during hurricane Sandy in 2012.



A number of metalworkers viewed the damaged fencing but turned down the project due to their lack of experience in historical restoration and repair. The fencing itself was constructed entirely without the use of electric welding. Instead, the original ornamental blacksmith who built the ironwork used methods such as forge welding, hot bending, forging and riveting. In addition, there were cast white metal ornaments, hot fit collars, slot and tab joints and others methods rarely seen today. This type of construction is generally not used in a modern metal work. Working this way is considerably more difficult and time consuming, though the results are often more pleasing to the eye. Furthermore, it is very difficult to find competent workers capable of executing this kind of work. As you can see, the damage was extensive.





Here is a picture of the fencing after it was removed from the client's estate. Given the fencing's unique handmade quality, no section or post was exactly the same. The restoration process is much like fitting together pieces of a puzzle with no two exactly alike. Therefore everything had to be carefully assessed and cataloged before removal. In addition, much of the ironwork showed significant corrosion due to its age. This is very common in historical ironwork that is not regularly maintained.



Once the ironwork was uninstalled, it was transported back to our yard for dismantling. The severely damaged sections were sent out and sandblasted to remove the old paint. This was done so our workers could see the full extent of the damage and work with clean material free of paint that would not produce harmful fumes when heated. We then removed all of the pins, rivets and bars. The bars were then separated and straightened by hand.



Here, one of our workers is using a hydraulic press to straighten one of the large posts. The bar was heated and pressed between flat platens. This process results in a very straight bar free from hammer marks. Additionally, by doing the work hot, the metal is less likely to crack in the future. Cold bending previously bent and stressed material can result in fatigue cracking. The stock was then cooled so that it could be handled safely.



The fencing contained many quatrefoil rings that were crushed. In order to return them to their original shape they were heated and dropped over a cone mandrel. The smith then carefully hammered the ring back to round. Bolts were used to hold all of the parts in place prior to riveting.



Many of the white metal ornaments had been damaged. They would have to be re-cast around the iron bars as they were originally. We decided to use pewter as it is nontoxic and has a low melting temperature. The old leaves were cast from a lead zinc alloy that was extremely toxic and difficult to work with. A mold was made of an original and molten pewter was poured around the steel post end. As the metal cooled it shrank around the steel and resulted in a strong, water tight mechanical bond. Some filing and chasing was required to refine details and remove excess material.





Once the parts were straightened, they were placed on the layout table and reassembled. Bolts were used to as stand-ins for the rivets during this part of the process. One by one, the bolts were removed and new steel rivets were installed into the existing holes. They were then hammered down while hot with a cup shaped tool to form a new head. As the rivets cooled, they shrunk and formed tight solid joints that created a water tight seam when painted.



Here we can see a fully reassembled gate. Many hours of work has gone into getting this far. This gate was badly damaged. Our crew worked to preserve as much of the original material as possible. New steel was used to replace the badly damaged sections which could not be saved. The frame was entirely held together with mortise and tenon joints. The tenons had to be forged on the ends of the bars using tooling made in house. The cast lead/zinc balls were replaced with new steel balls to make a stronger more rigid gate. It was then sandblasted as light rust and oxides had formed during the work performed.



The final step before installation was to have the ironwork painted in a custom blended color in order to match the ironwork's existing finish.



Here we can see the restored ironwork in its splendor ready for another 100 years of service.