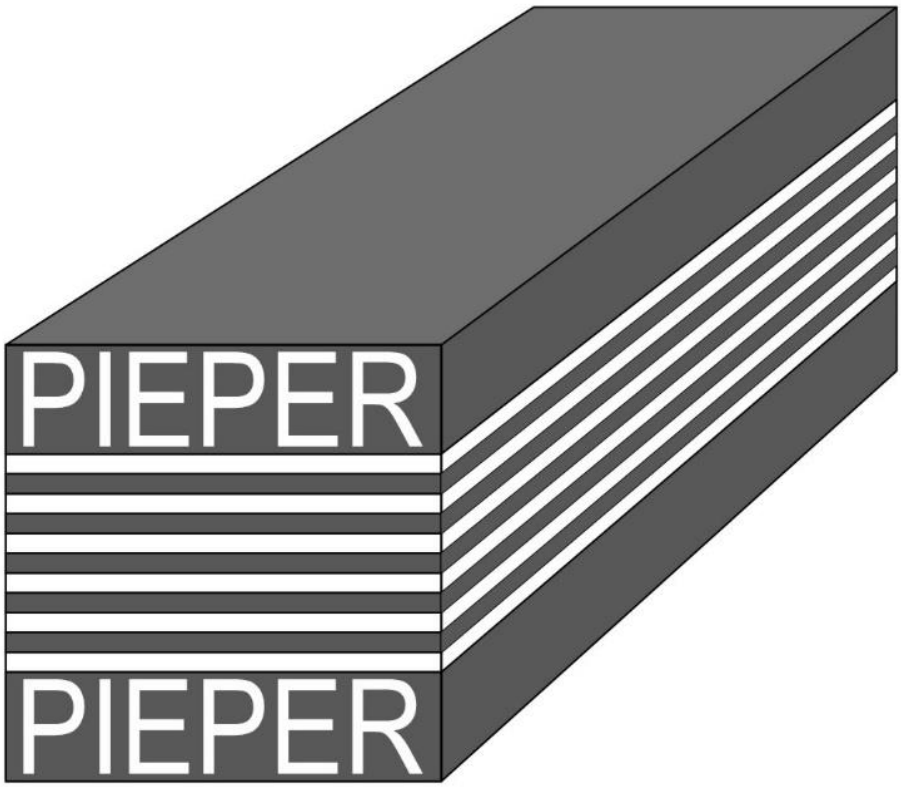
“Word” Damascus Gun-barrel Patterns – By Steve Culver

Gun barrels with damascus patterns were made in several countries. The names of the sub-assemblies used in the barrel making process varied by location and language. Likewise, the names of the individual damascus patterns varied by location, language, barrel manufacturer and firearm manufacturer. The language in this document has been “Americanized” in that I have chosen terminology most often used by modern English language writers when commenting on either modern damascus fabrication, or vintage gun barrels. A brief “Glossary of Terminology” is provided on pages 34 and 35 for clarification of the words used.

A majority of pattern welded gun barrel damascus incorporates twisted rods of barrel material, which are then forge welded together to create a riband. This riband is then wound around a mandrel to create a coil. The coil is then forge welded solid to make a barrel tube.

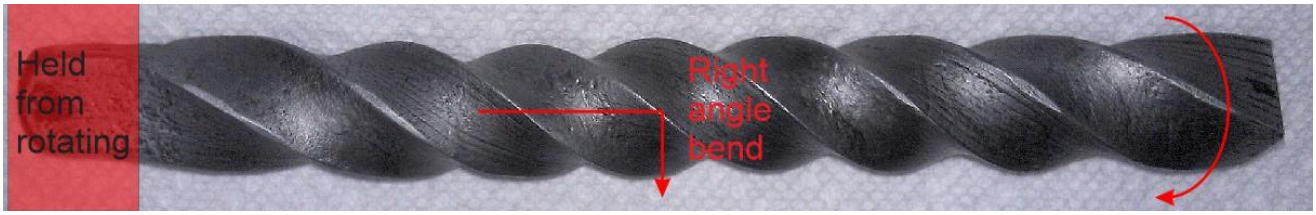
The process of twisting the damascus rods is done for a variety of reasons in damascus pattern creation. It was a necessary step in the process of creating gun barrel damascus patterns which include words.

Below is an illustration of the billet stacking arrangement for the Pieper pattern barrel. It can be seen that the words are in the END of the billet. If drawn out into rods in this state and used to make a gun barrel, the words would only be seen at the muzzle and breech ends of the barrel tube. The letters must be moved to the edges of the rod, to make them visible in the finished barrel tube. Twisting of the rods was used to reposition the lettering in the rod and place the words where they would later be revealed in the finished gun barrel.

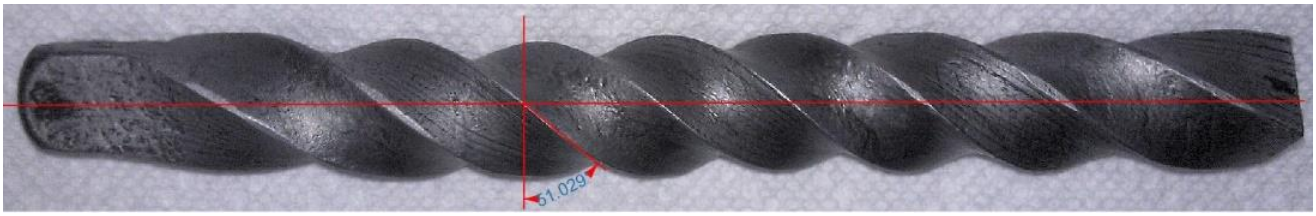


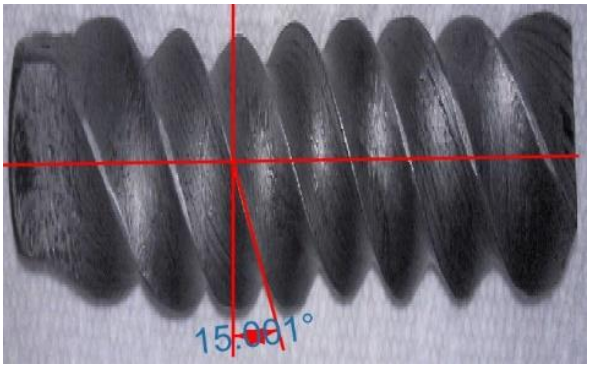
Understanding what happens to the material of the rod during twisting is helpful in understanding damascus patterns created by this twisted rod process.

Because one end of the rod is held to prevent it from turning during twisting, the mass of material at the center of the rod rotates upon itself and also becomes a relatively fixed pivot point. Thus, moving the outer material of the rod at a continually winding right angle to the center of the rod.



Early stages of twisting generate a low angle to the center mass. Tighter twisting increases the angle, approaching 90 degrees to the center of the rod when wound tightly.





Twisted rod images by author.

When a square rod is twisted, the sharp corners of the square create an appearance like that of a threaded rod. Every full 360-degree twist of the rod brings around the four corners from the square and they create four ridges on the twisted rod. This can be seen in the photos of salesman's damascus barrel demonstration tubes. I have seen statements in old documents on the manufacture of damascus gun barrels, asserting very high twist rates in the rods, such as 15 to 20 twists per inch. These would be extremely tight rates of twist and are likely stated incorrectly, as the result of an inexperienced eye counting single ridges on the rods. The rate of twist is calculated by counting the number of ridges in a given length of rod, then dividing that number of ridges by four.

Below is a photo of actual twisted damascus rods, which the author prepared for making one of his damascus gun barrels. These rods are twisted 3 1/2 full revolutions per inch. There are 14 ridges per inch on these rods.

Twisted rods image by author.

As the twisting progresses, the material nearest the exterior of the rod is effectively wrapped around the center mass. The former flats of the square rod spiral around the outside of the twisted rod in a manner similar to that of a ribbon wound around a solid rod.

Once the twisted rod has been welded into a riband, it is very difficult to determine what the original rate of twist in the rod was. High rates of twist in the rods are rather necessary. In the author's experience and seen in every damascus barrel demonstration piece, the total mass of the rods combined to make the riband is much more in a given length than the mass of the riband in a comparable measurement. This being the case, the riband will be longer than the rods that make it up were originally. This lengthening of the material will increase the distance between the damascus pattern centers in the riband, compared to the distance between them in the twisted rod.

Below are photos of an actual damascus barrel demonstration piece. These are thought to have been used by damascus gun barrel merchants to advertise their products. It can be seen how the large mass of the three twisted rods has been forged into the smaller cross-sectional mass of the riband.

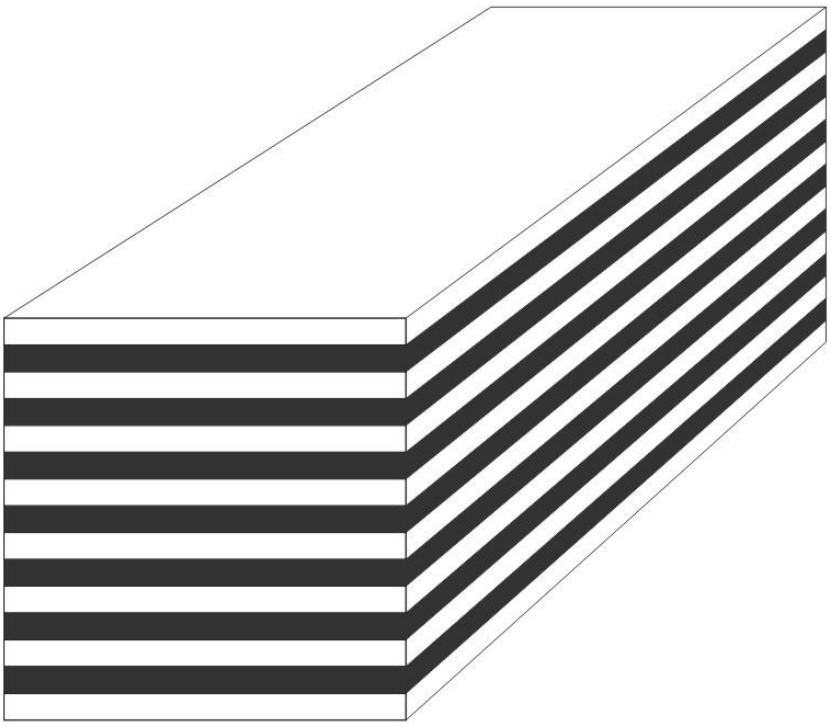
Damascus barrel demonstration piece images, by Dr. Oscar Gaddy.

Besides twisting of the rods being a necessary part of damascus pattern creation, stock removal from the twisted material is another aspect of how the pattern appears when it is displayed. There is no better pattern to examine the results of stock removal than Crolle*. A working knowledge of how Crolle pattern is created, helps in visualizing how "word" patterns are created. A Crolle pattern section, is the center core of several of the "word" damascus patterns.

*See "Glossary of Terminology", for more information on damascus pattern names.

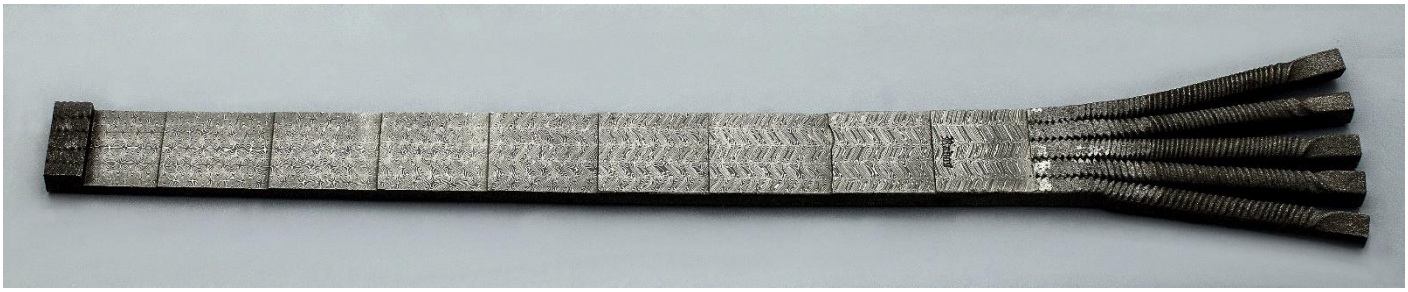
Crolle, Horseshoe and some Herringbone patterns, are all variations created from a flat stacked, alternating arrangement of two different ferrous materials. Chemical composition analysis of turn-of-the-century Crolle and Twist barrels highly suggests that the iron component was wrought iron and the steel was low carbon, low alloy "mild" steel. All of these patterns begin as a similar billet/lopin/faggot, which is then drawn out by a rolling mill into rods and twisted. Typically, two or more of these twisted rods are forge welded together to create a bar of patterned damascus, or a riband for winding into a gun barrel tube. The rods are usually flattened during the forge welding together, and then some degree of stock removal from the rod's surface is done during the finishing process of the material. What creates the variations between these patterns is the depth of grinding into the twisted rods. The very same twisted rods are capable of being made into a multitude of damascus patterns, all controlled by the depth of stock removal done to them.

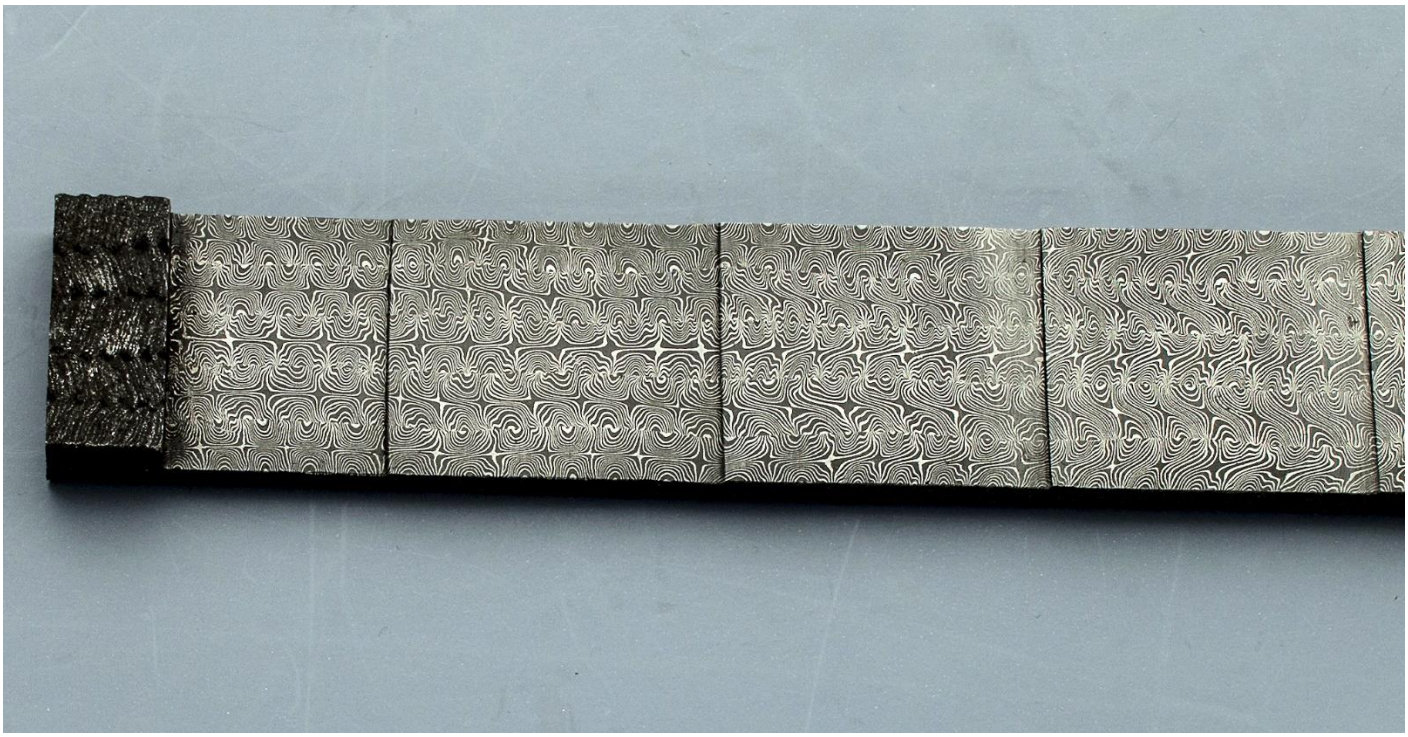
Below is an illustration of a billet, which can be used to create Crolle, Horseshoe and some Herringbone damascus patterns.



The following photos are of a damascus demonstration piece, which was made by Jerry Rados. Rados is known throughout the knifemaking world as “The Master” of Turkish damascus. Jerry has been making this pattern for nearly 35 years.

This demonstration piece is forged to 3/8-inch (.375”) thickness. The first step is milled to a depth of .045”, to get just below the forge scale and the unclosed gaps between the twisted rods. The remaining steps are each milled at an additional .020” depth increments, along the rest of its length. The first step reveals Herringbone pattern. As each additional .020” is removed, the pattern changes, progressing through Horseshoe and ending with Turkish/Crolle, where the bar is ground to near the center of its thickness. On the last step, where the material is cut away to a depth near the center of the rods, the four pointed “stars” can be seen forming a nearly perfectly shaped cross.

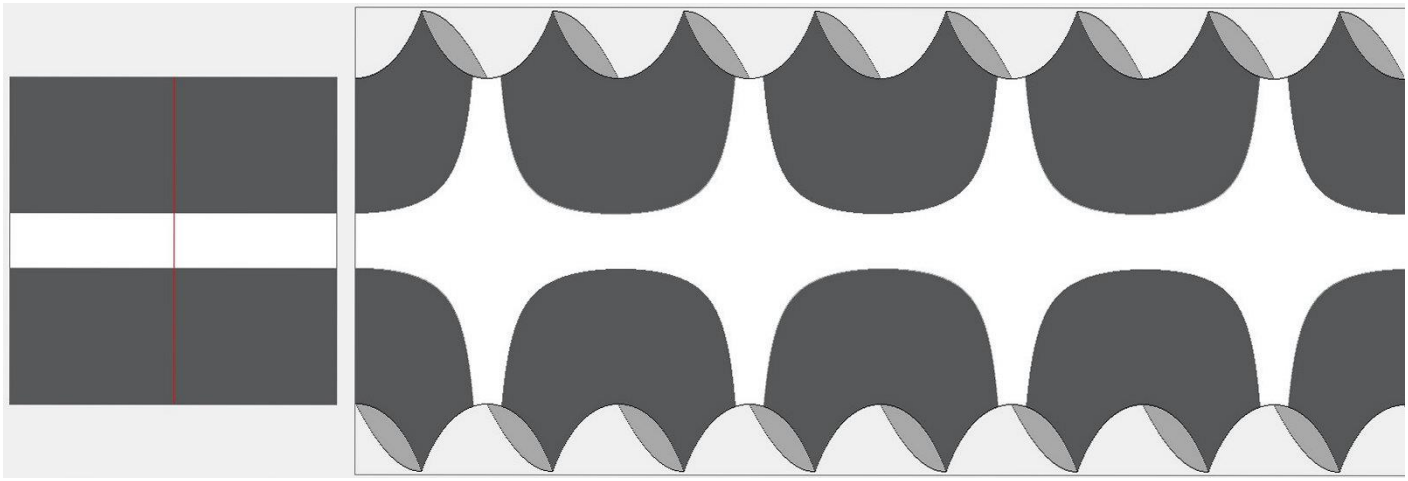




Photos of Rados demonstration rod by author.

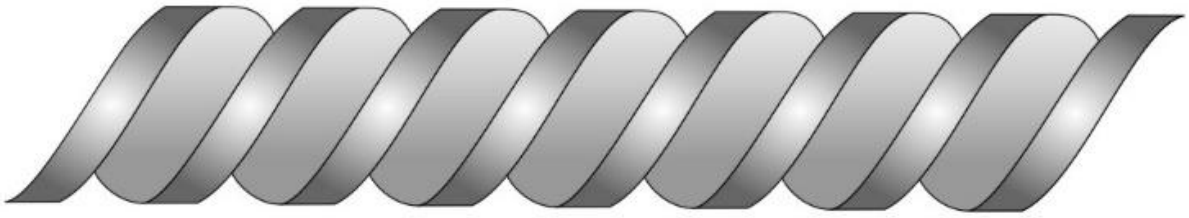
Simplifying Crolle pattern down to only three layers. The focus is on the white piece in the exact middle of the stack.

The darker top and bottom layers in this three-piece stack end up arranged between the twists of the single piece in the center of the stack. The twisted rod display generated by Thor II©. The grind amount selected is 50%, indicating that this rod has been ground down to the exact center of the rod.

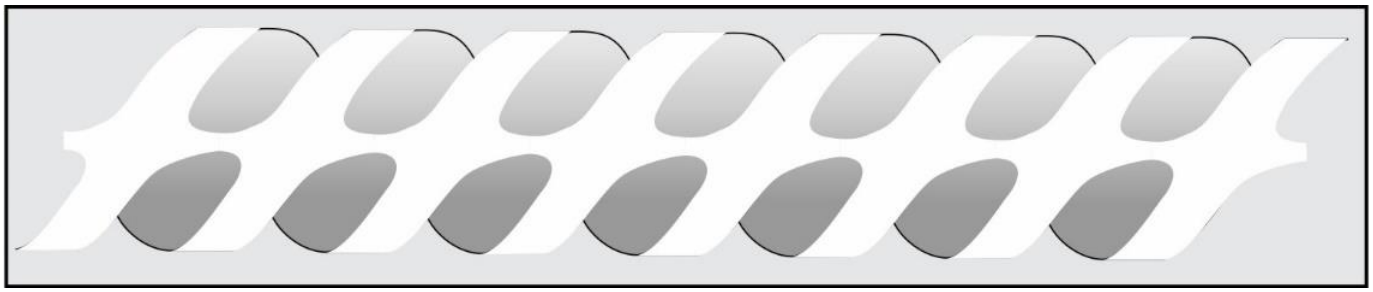


Every one-half twist of the rod (180 degrees of rotation) creates within the layer of material at the center of the stack the condition for the formation of a star with four points at right angles to each other. Notice the two ridges between the stars, at the edges of the rod. Two ridges indicate one half twist of a four cornered square rod.

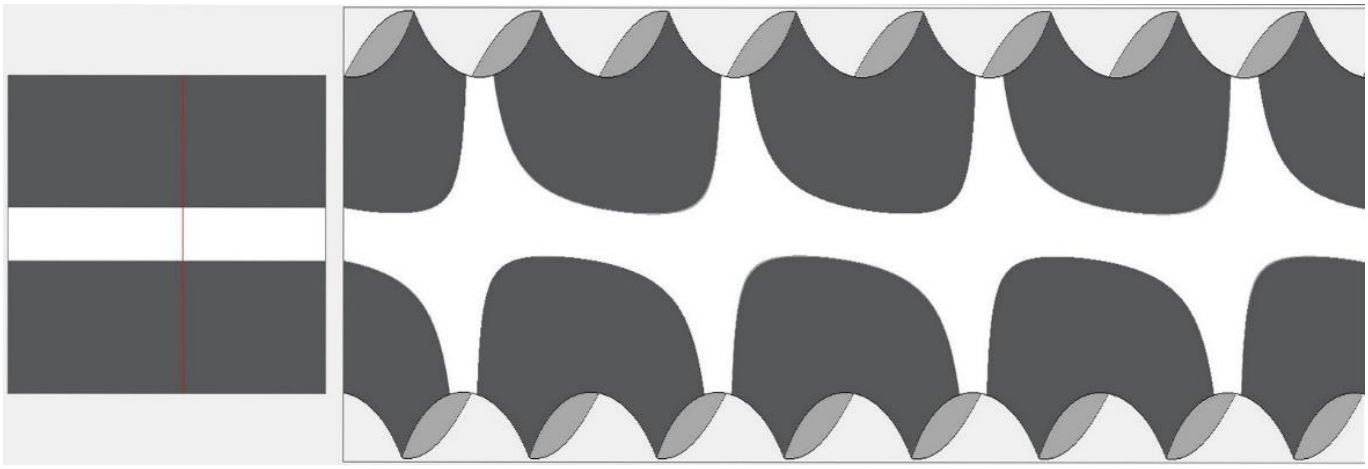
Minimizing further to only the center piece and imagining twisting only that single flat strip of steel, the result will be something resembling an auger, or a twist drill bit.



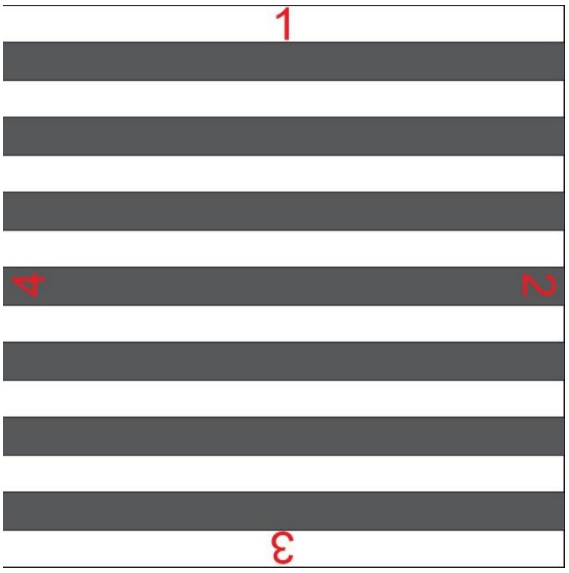
If the top half of this single twisted strip of steel is ground away along a flat plane, intersecting the twisted strip of steel at near its exact center, the plane of grinding will expose the surface where the upper half of the twists have been removed, plus the narrow strip of the material remaining between the twists.

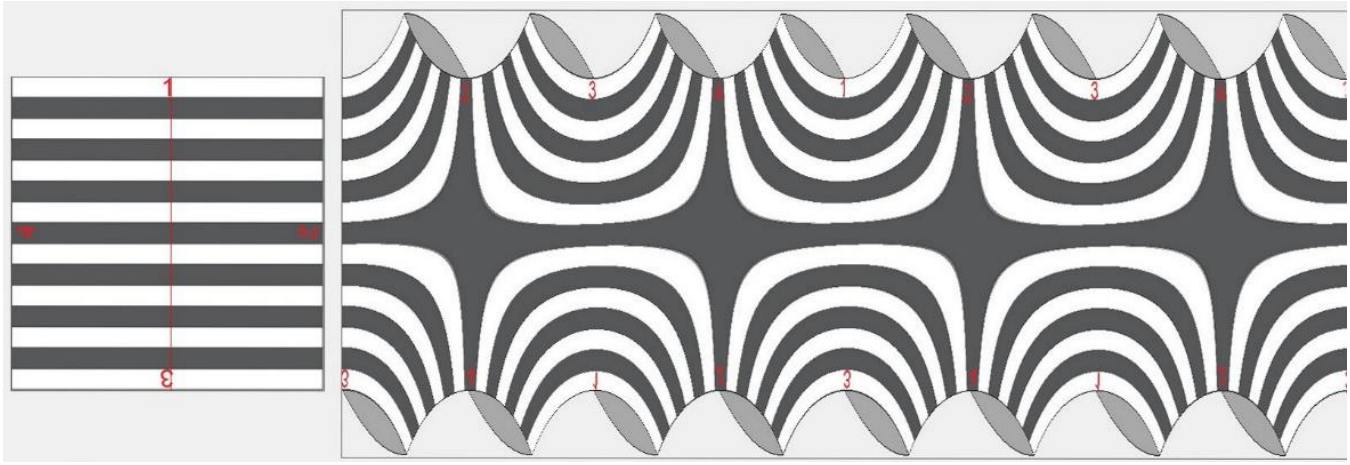


The before mentioned arrangement of three layers has been loaded again to Thor II©. The grinding amount has been set to 45% in Thor, as this most closely resembles the sketch above.

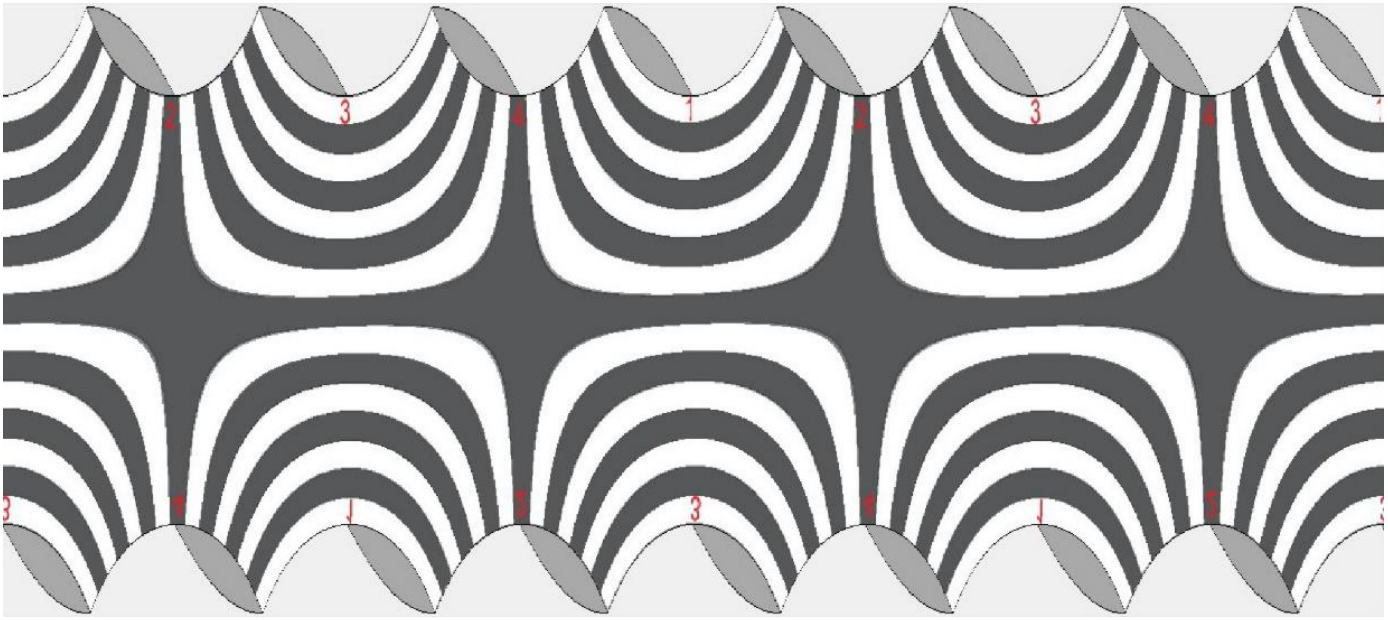


Loading a flat stacked billet of 15 layers into Thor II© in the image below, the center layer has been numbered 2 and 4 at its outer edges. The top and bottom layers have been numbered 1 and 3. At 48% grinding depth, the center layer forms the “star” with its numbered edges running out to the sides of the rod.



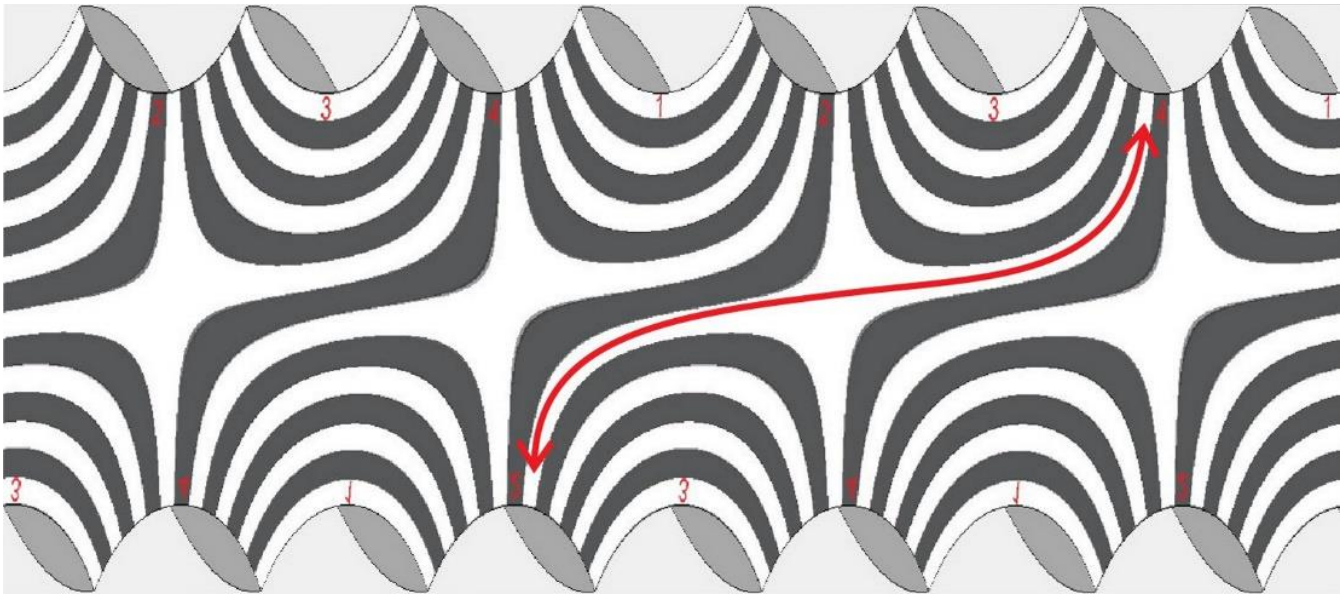


The layers above and below the center layer (areas 1 and 3), create the area of the pattern for which Dr. Oscar Gaddy coined the term “scrolls”. Areas surrounding numbers 2 and 4, are the outer edges of all of the layers in the billet.

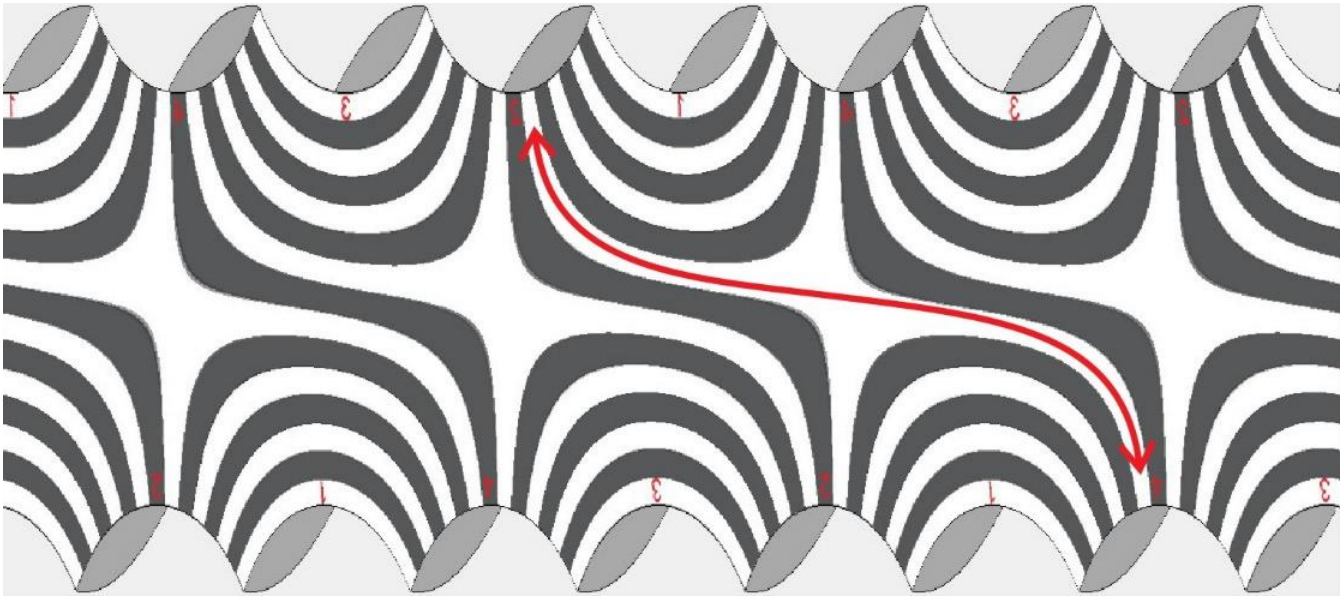


The angularity of the “stars” is a very good indicator of the depth of the stock removal. The deeper the stock removal, the more defined the stars become and the lower their angularity. Very close to the center of the rod they become a near prefect cross. The direction of twisting can also be determined by the angularity of the pattern. However once the grinding reaches enough depth for the star to start shaping up into a cross, determining twist direction can become more difficult.

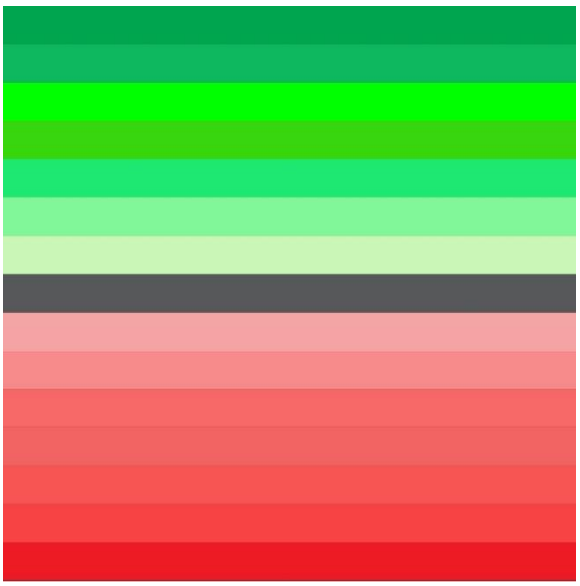
Right twisted rod.



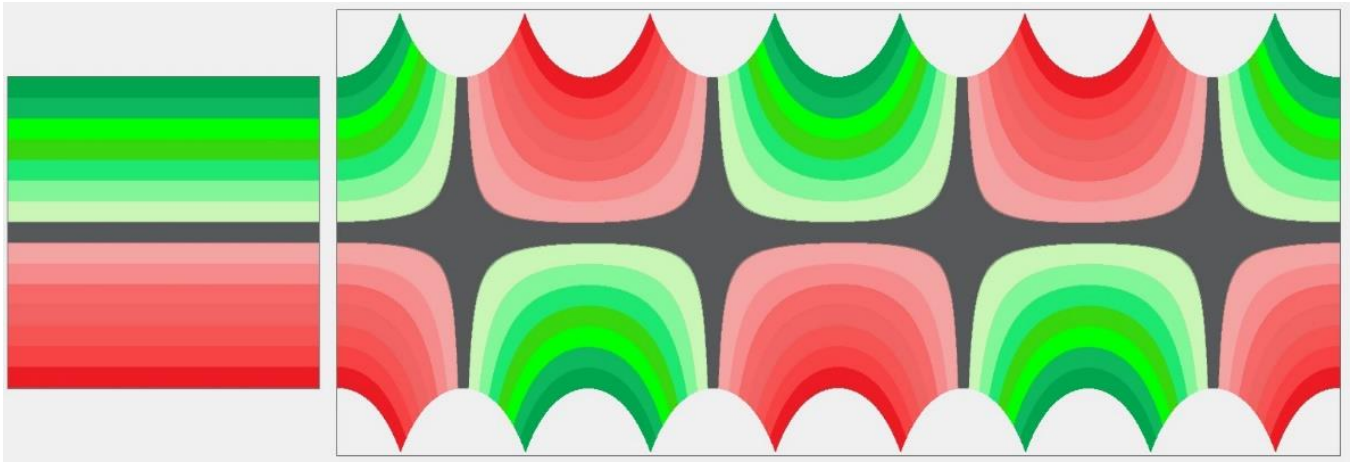
Left twisted rod.



A billet with colorized layers helps with being able to see where the individual layers wind up in the pattern.



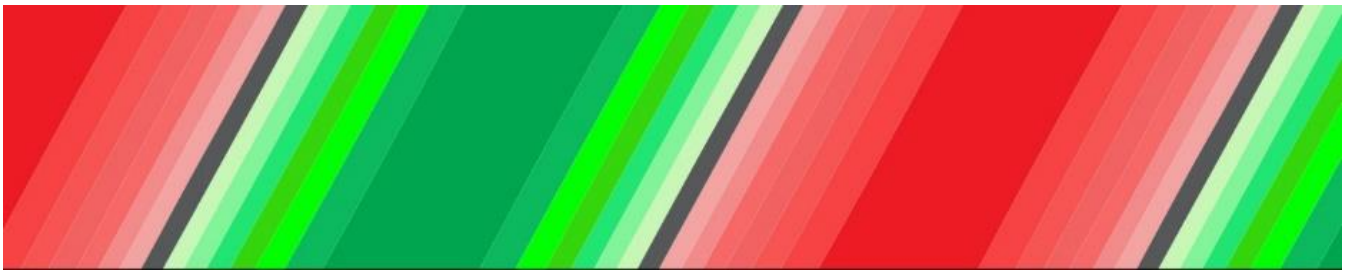
The Thor II© screen with the colorized billet loaded. The grinding amount selected is 50%.



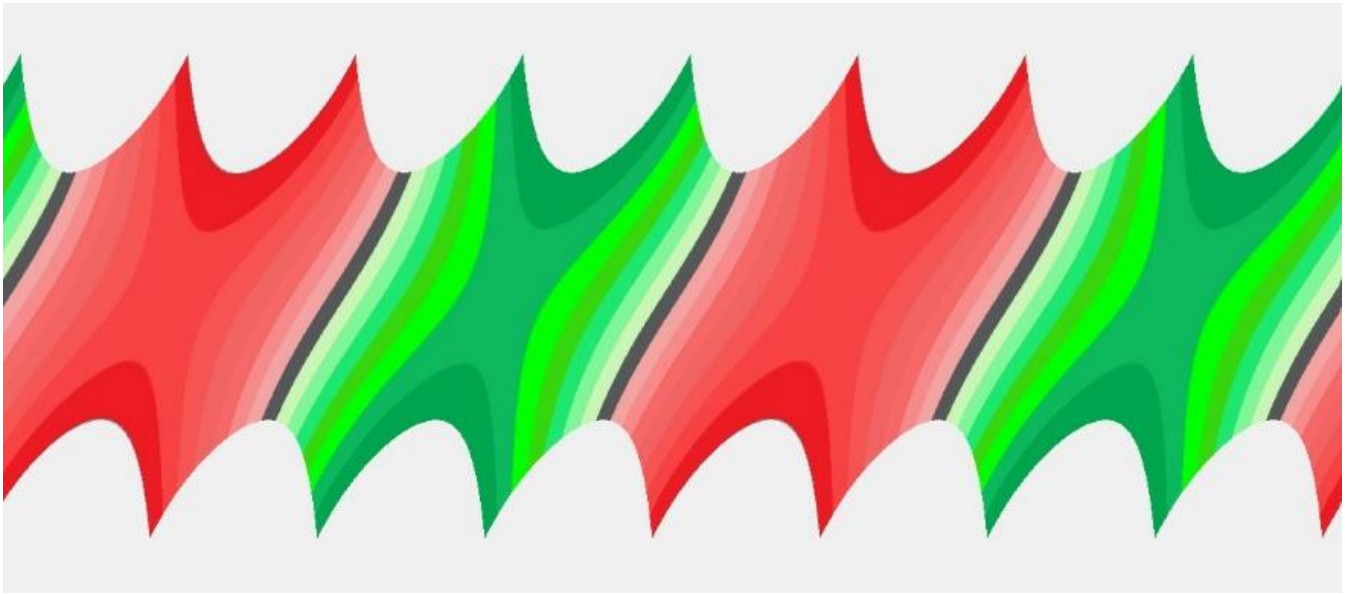
Notice how the red and green sections alternate positions in the twisted rod.

Below is the colorized pattern at 1% grind depth. Heavy editing of the 1% Thor II© display had to be done to create an image which appears logical. All following views are of the unedited Thor screen.

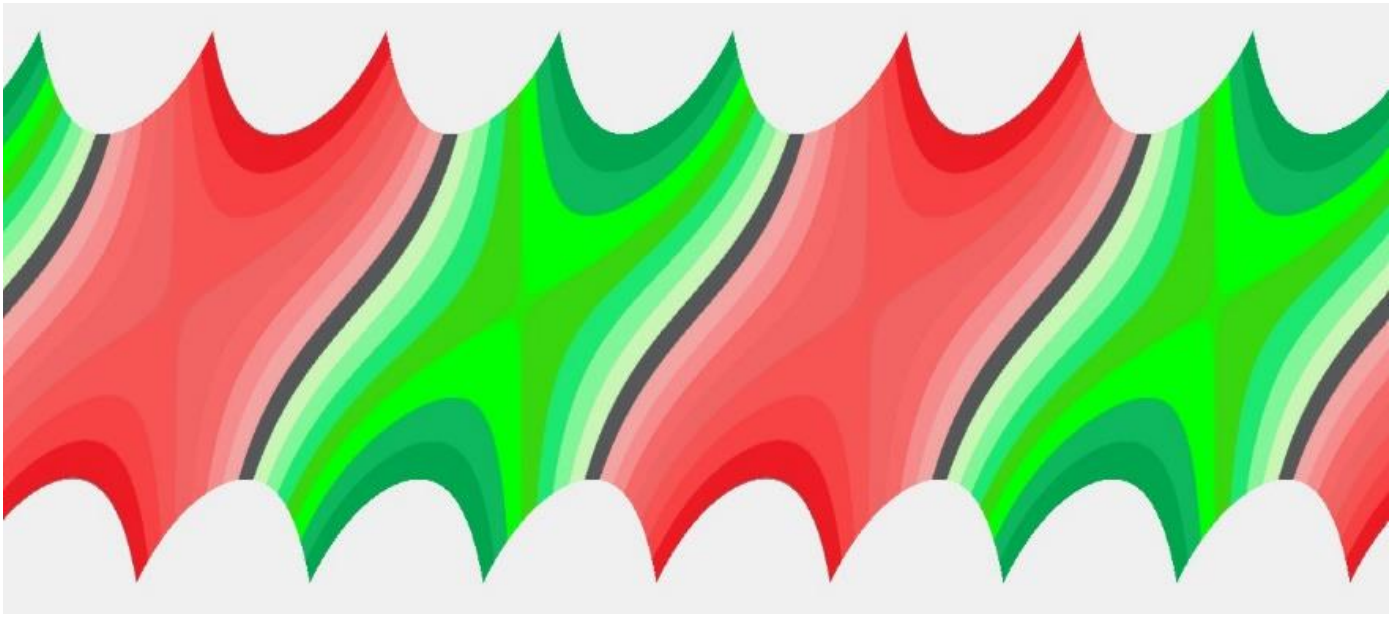
At 1% depth, you can see all of the layers of the billet, laid out in order. The dark green top layer and the dark red bottom layer are displayed across the entire (top to bottom) width of the pattern.



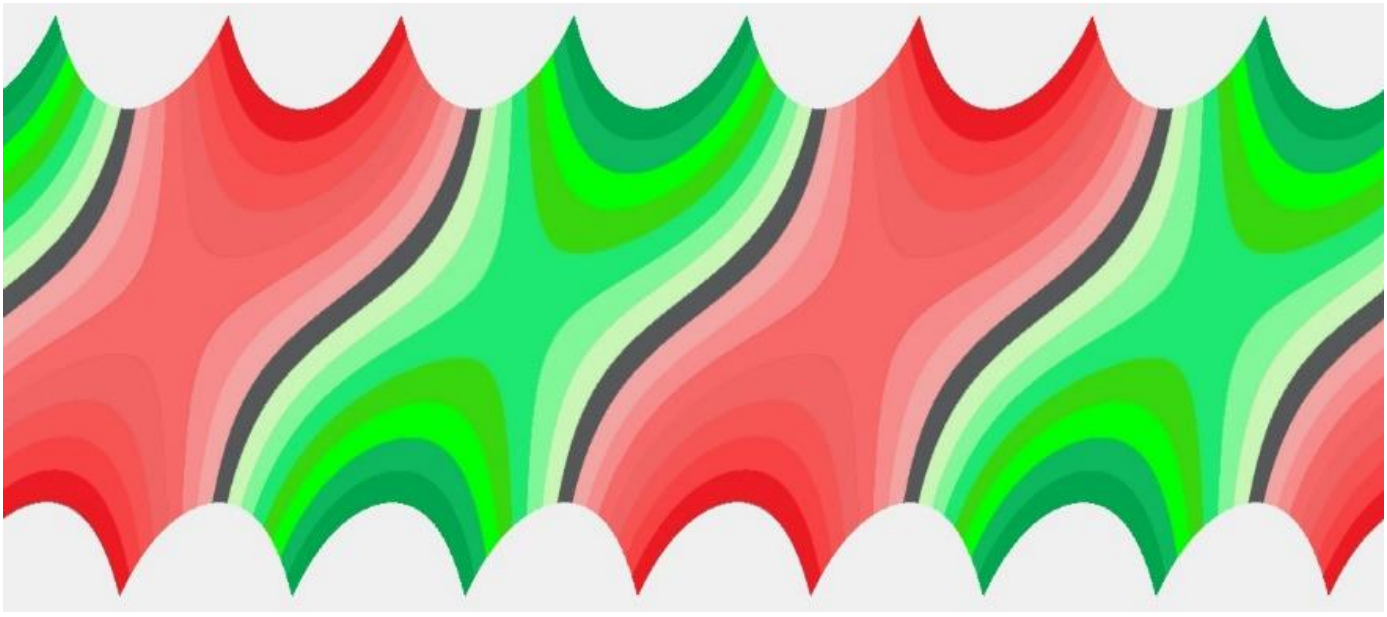
Below is the pattern at 10% grind depth. The dark green and dark red layers, which are closest to the outside of the billet, have been sectioned through by the grinding. These layers now only appear in the pattern along the outer edges of the rod. They establish the beginning of the "scroll" element in the pattern.



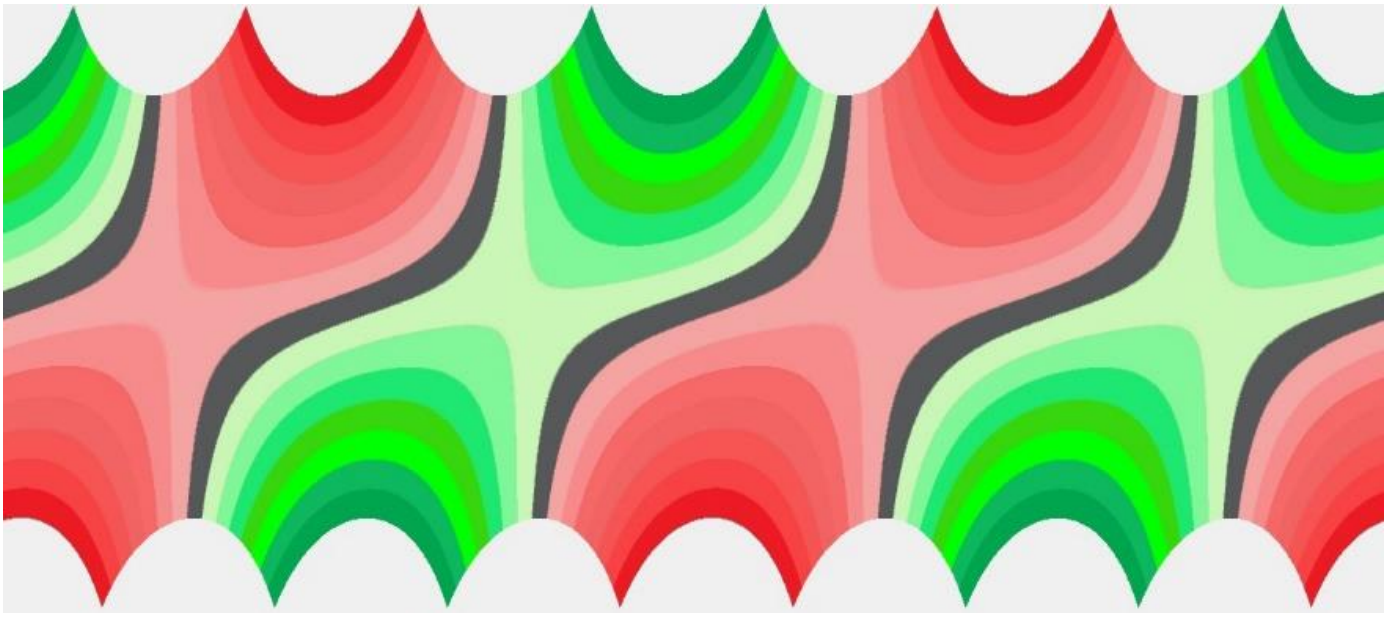
At 20% grinding depth, the second and nearly the third layers which are closest to the outside of the billet have been sectioned through. They too are now found as narrow strips along the outside of the pattern.



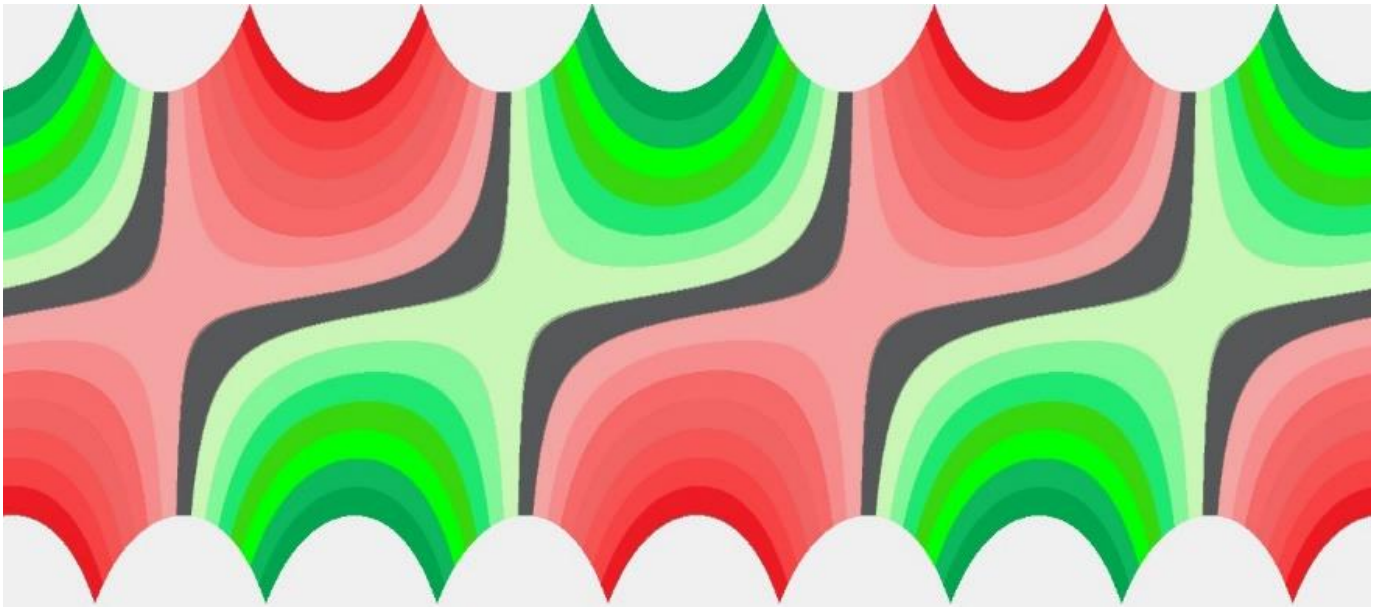
The pattern at 30% grind depth. More layers are sectioned through. The gray layer at the exact center of the billet is beginning to display in an “S” shape, as it is being cut through closer to the center of the twisted rod.



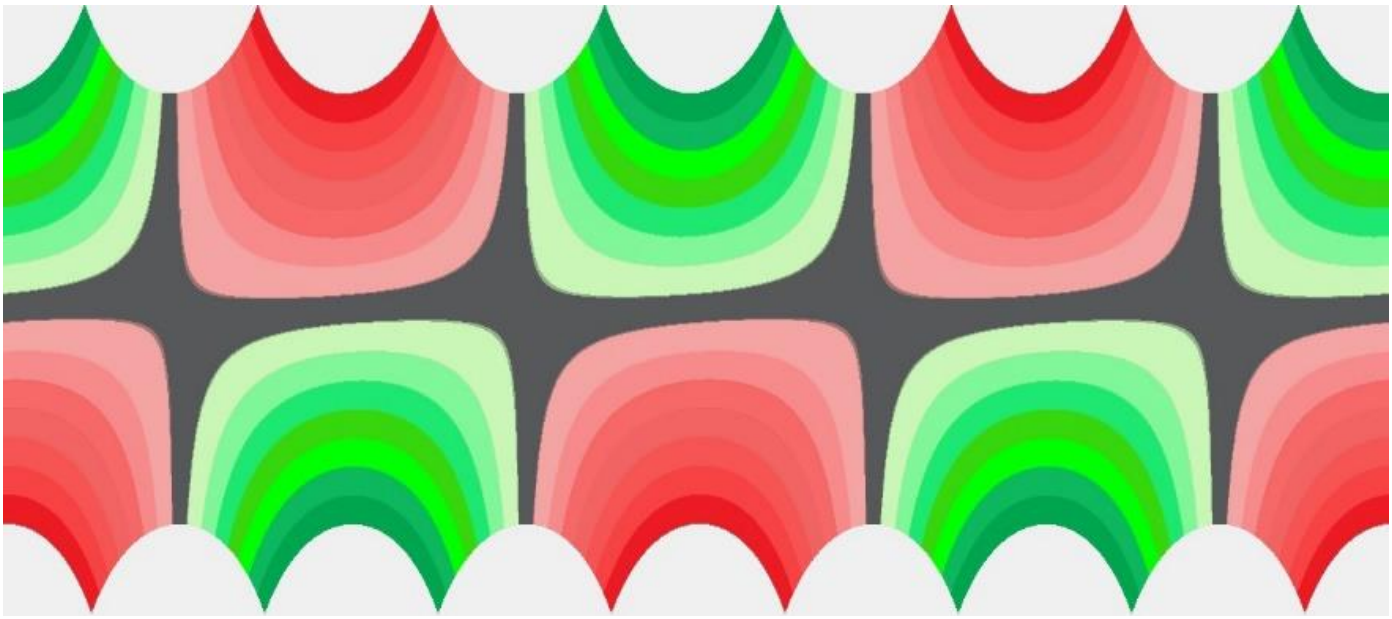
Below is the pattern at 40% grind depth. Grinding has reached the layers closest to the center of the rod.



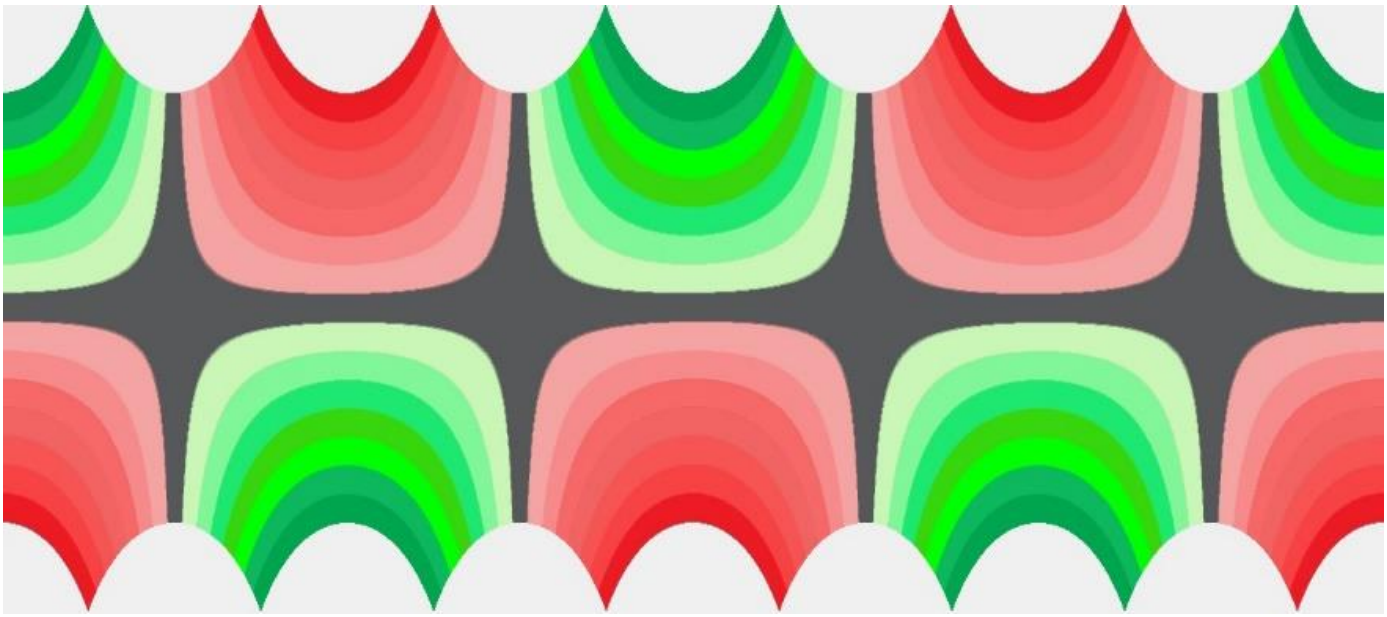
45% grind depth.



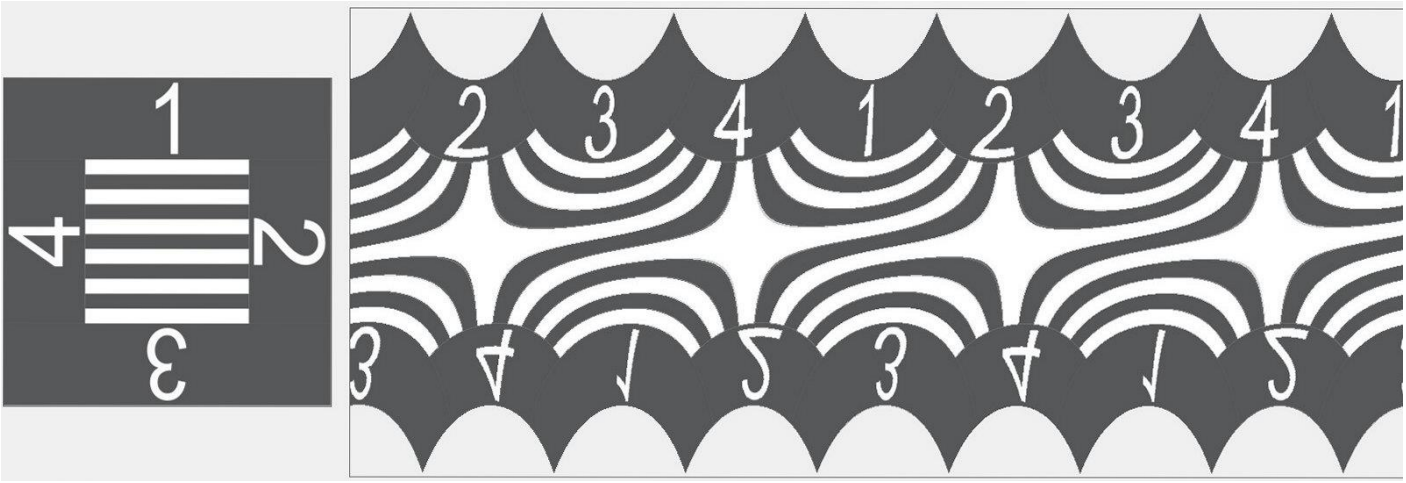
At 48% grind depth, the gray layer at the center of the billet is now being ground into for the full length of the rod. All of the other layers are completely sectioned through and can now only be seen in the ‘scroll” area of the pattern.



Below is the pattern at 50% grind depth. At the exact center of the twisted rod, the gray center layer displays as a four-pointed star.



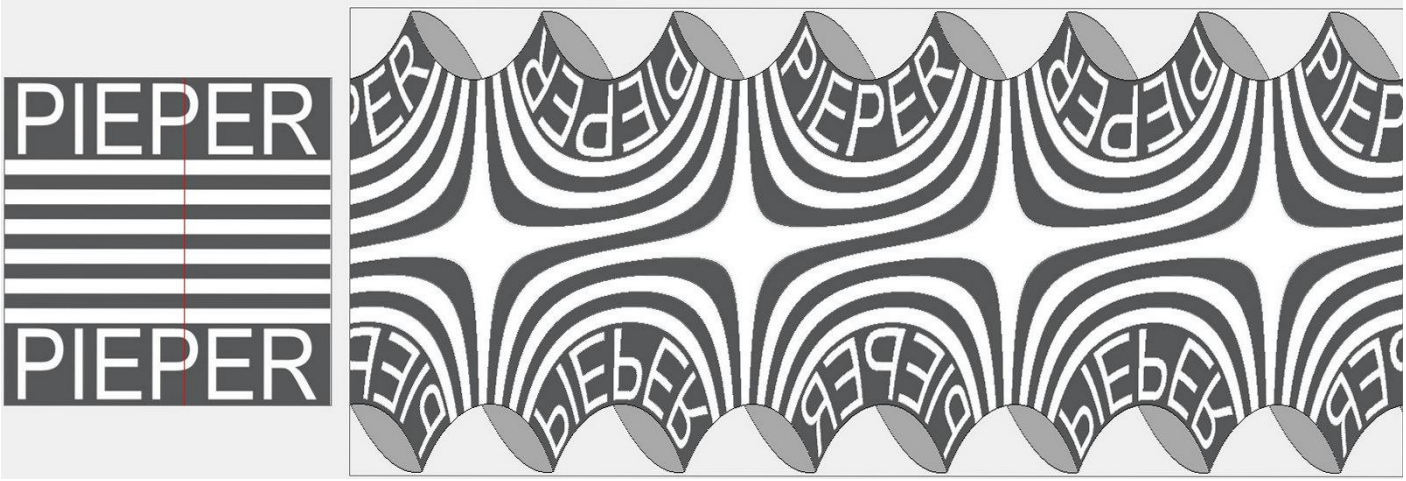
A numbered billet arrangement has been loaded to Thor II©. This billet stacking arrangement includes numbered areas to indicate the four flats of the square rod. In the center of the billet are flat stacked layers. This is a right twisted rod, with 45% of the thickness of the rod ground away.



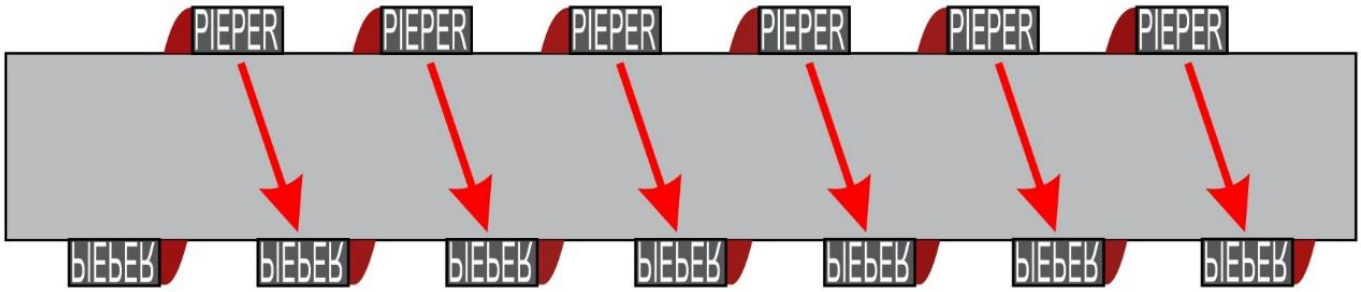
Notice how the numbered flats follow each other in order, at the top of the twisted illustration. Notice too, how the numbers at the bottom of the rod are mirror images of the upper numbers. As the flats carrying the numbers are wrapped up and over the rod, they present themselves on the opposite side of the rod as mirror images of the right-side-up numbers.

Below is the billet stacking arrangement for the Pieper pattern, loaded to Thor II©. This is a right twist to the rod. The grind amount selected is 45%.

Notice the mirror image lettering at the bottom of the twisted rod.

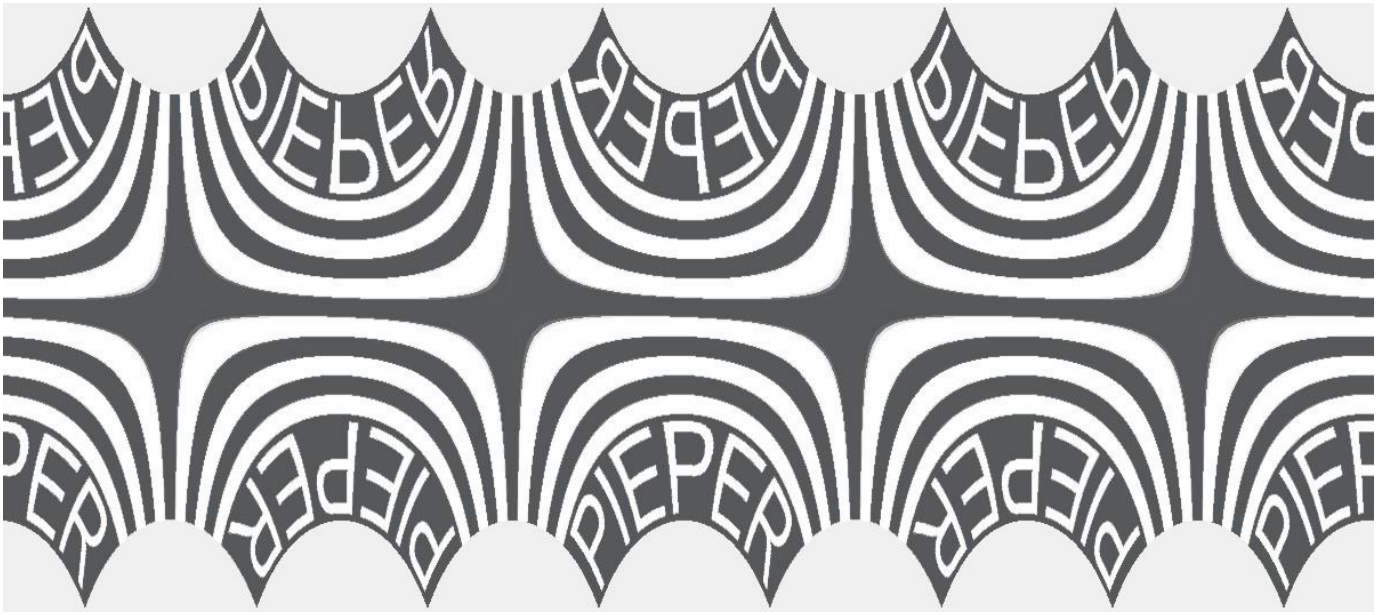


Another illustration of the upright and mirror image lettering, presented in the format of the earlier "ribbon wrapped around a solid rod" image. Represented in this image, is just the lettering section from the top of the Pieper billet. This illustration shows the path it will take around the twisted rod, resulting in mirror image lettering opposite the upright lettering.

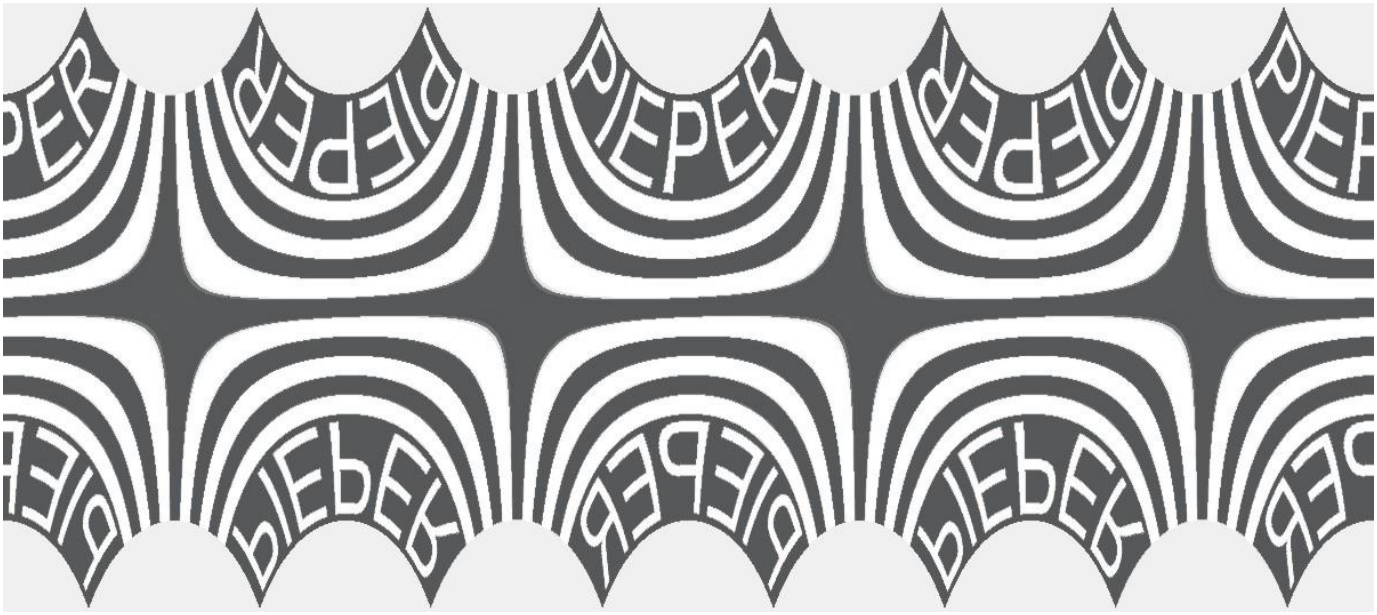


To create the Pieper Damascus pattern, two rods must be used. One rod twisted to the right and one rod twisted to the left. This opposite twisting provides for joining together correctly oriented lettering along the weld line between the rods.

Left twisted Pieper rod. The properly oriented words are at the bottom of the rod. The grind amount selected is 48%.

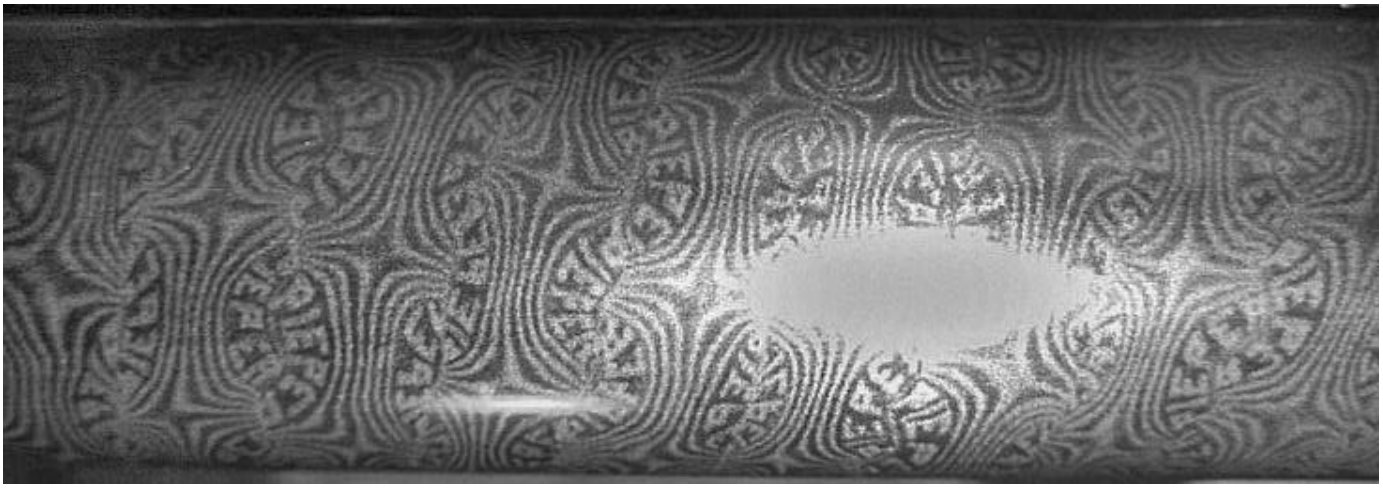


Right twisted Pieper rod. The properly oriented words are at the top of the rod. The grind amount selected is 48%.



Note: the perfectly aligned patterns in the images created by Thor II©, do not reflect the imperfect world of actual damascus barrel creation. In the damascus pattern in the actual gun barrel, the words are not all arranged one over another.

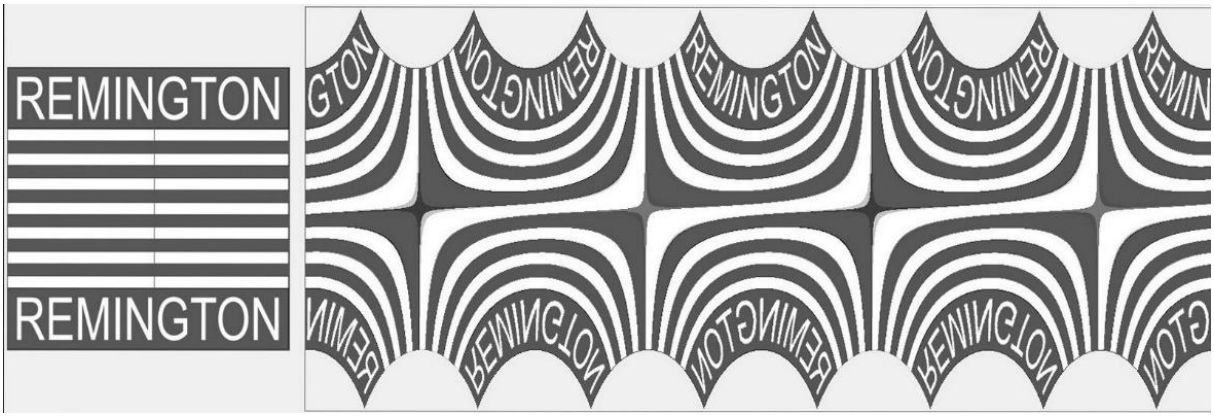
Welded riband of right and left twisted rods.



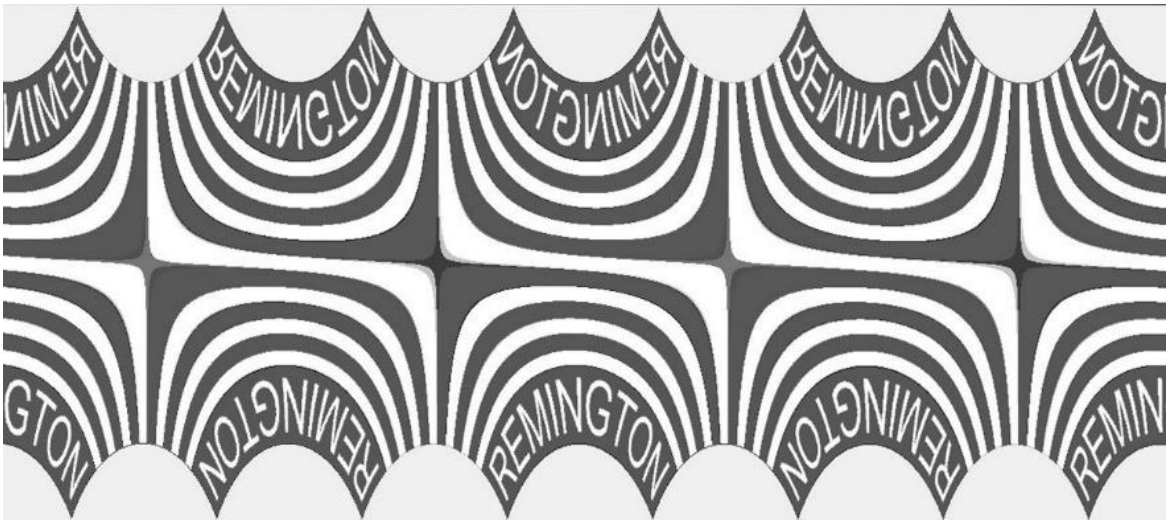
The "Pieper" barrel image, courtesy of Andrew Lohmar.

Notice that in the damascus pattern on this barrel, the mirror image words remain and can be seen along the riband weld lines. More about his "feature" will be discussed later as the other word barrels are examined.

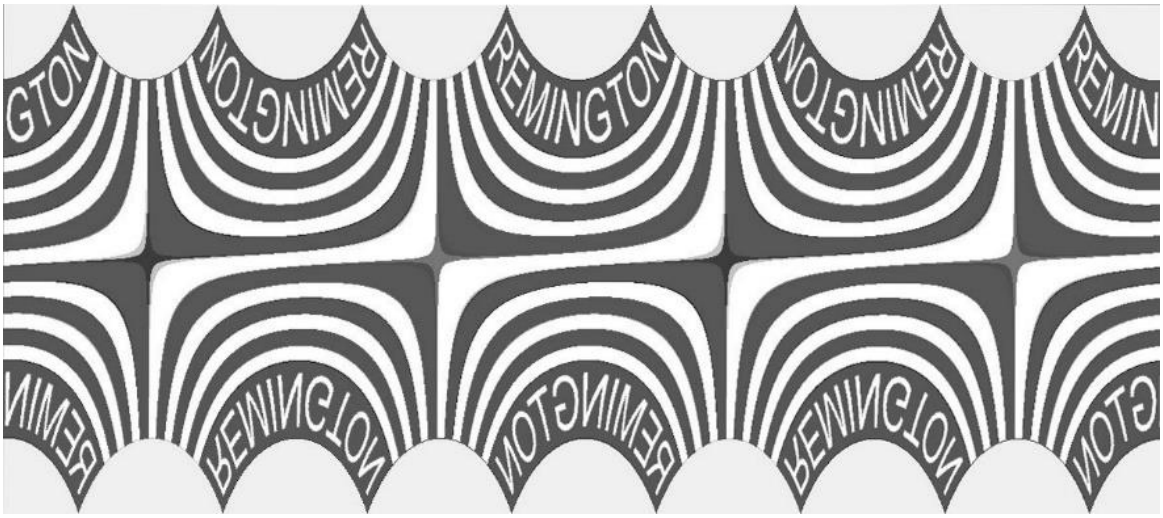
Below is the billet stacking arrangement for the Remington pattern, loaded to Thor II©. This is a right twist to the rod. The grind amount selected is 48%. That's a lot of letters to stack into a billet this way. The barrel pattern shows it, as it is difficult to read.



Left twisted rod.

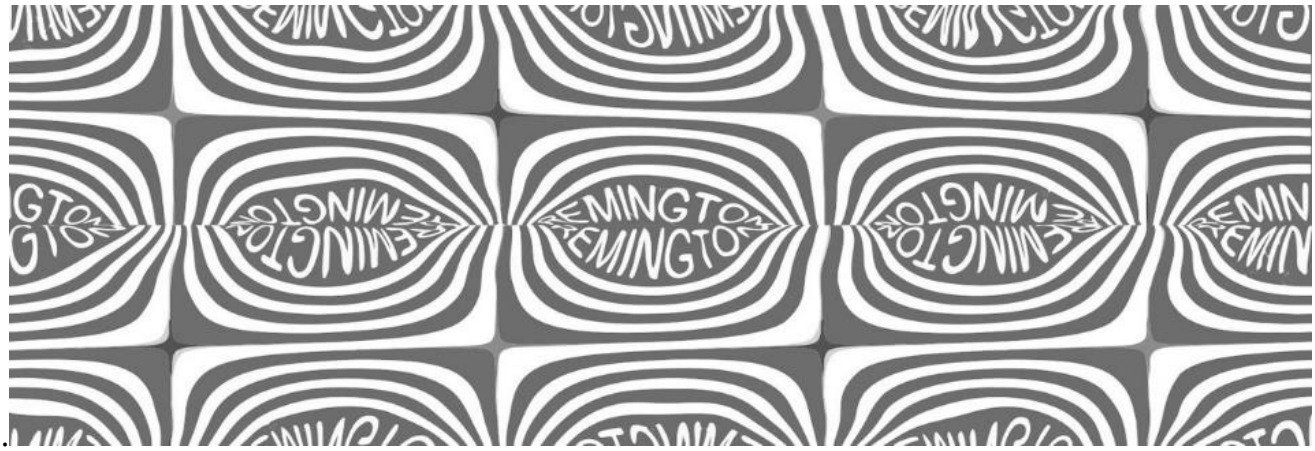


Right twisted rod.



The same as for creating the Pieper damascus pattern, two rods must also be used for the Remington pattern. One rod twisted to the right and one rod twisted to the left. This opposite twisting provides for joining together correctly oriented lettering along the weld line between the rods.

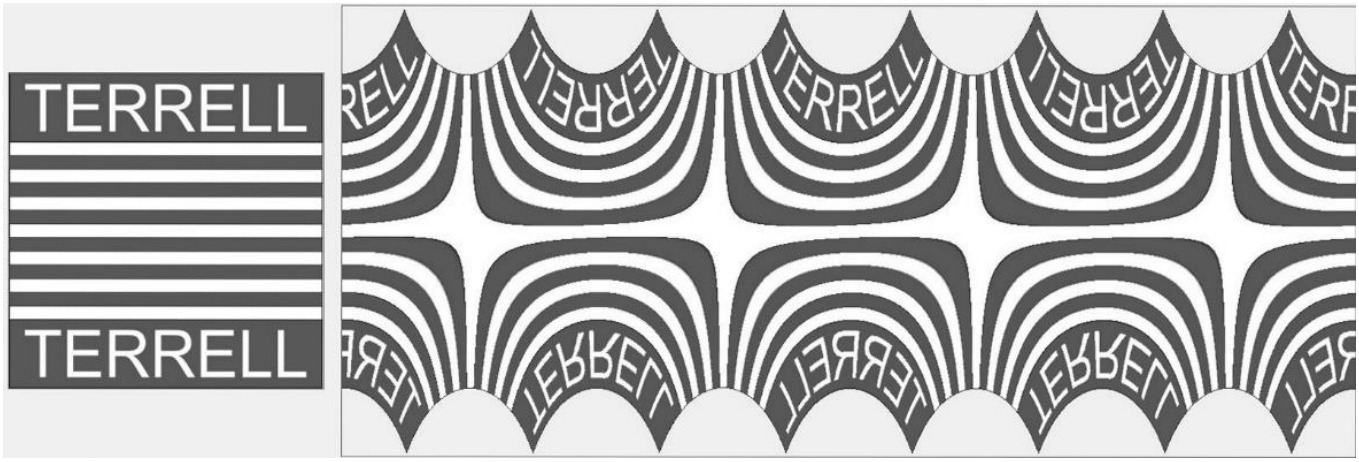
Welded riband of right and left twisted rods.



The "Remington" barrel image, borrowed from the internet. Original source uncertain. The image will be removed, if notified that the use thereof is a violation of Copyright or Intellectual Property restrictions.

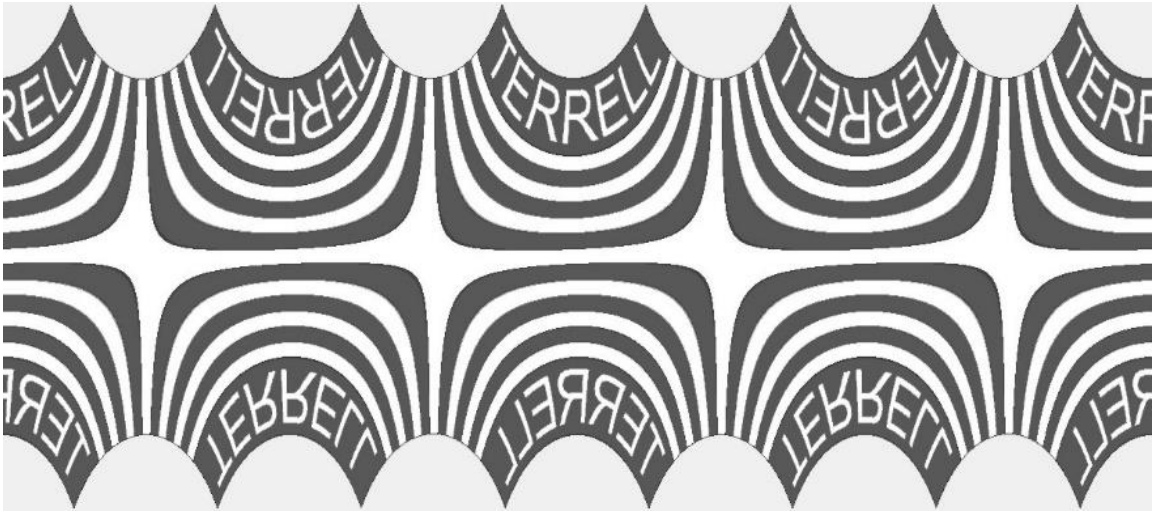
In the Remington barrel pattern, an attempt was made to remove the mirror image words. To remove the reversed words, the two twisted rods were forge welded together into the riband. After welding them together, some of the material was ground away from both outside edges of the riband to remove the mirror image words. Certainly, this was an intentional effort to tidy up the pattern displayed in the barrel tubes.

Below is the billet stacking arrangement for the Terrell pattern, loaded to Thor II©. This is a right twist to the rod. The grind amount selected is 49%.

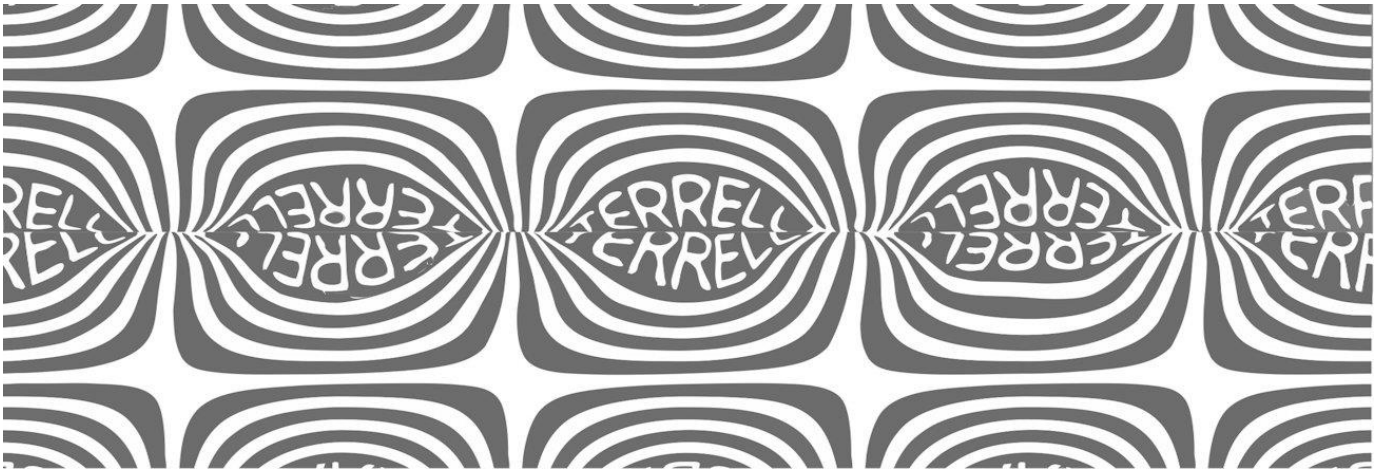


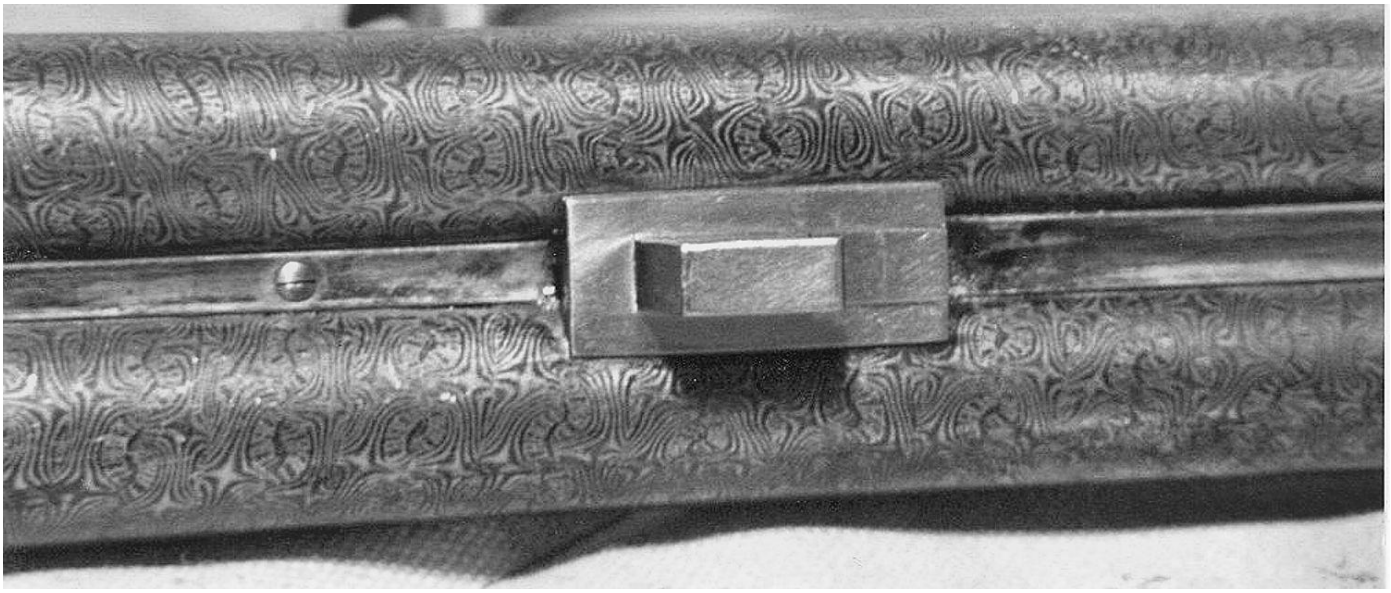
Left twisted rod.

Right twisted rod.



Welded riband of right and left twisted rods.





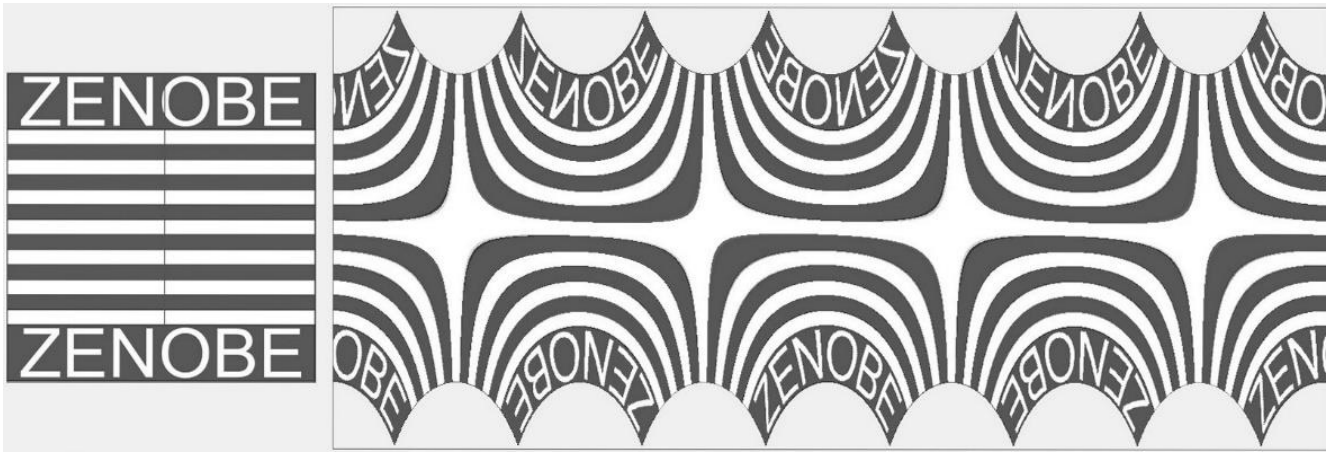
The "Terrell" barrel image, courtesy of Bill Jolliff

The Terrell pattern also has had the mirror image words ground from the riband. A largely successful job on this pattern, as very little of the mirror image words can be seen on the barrel.

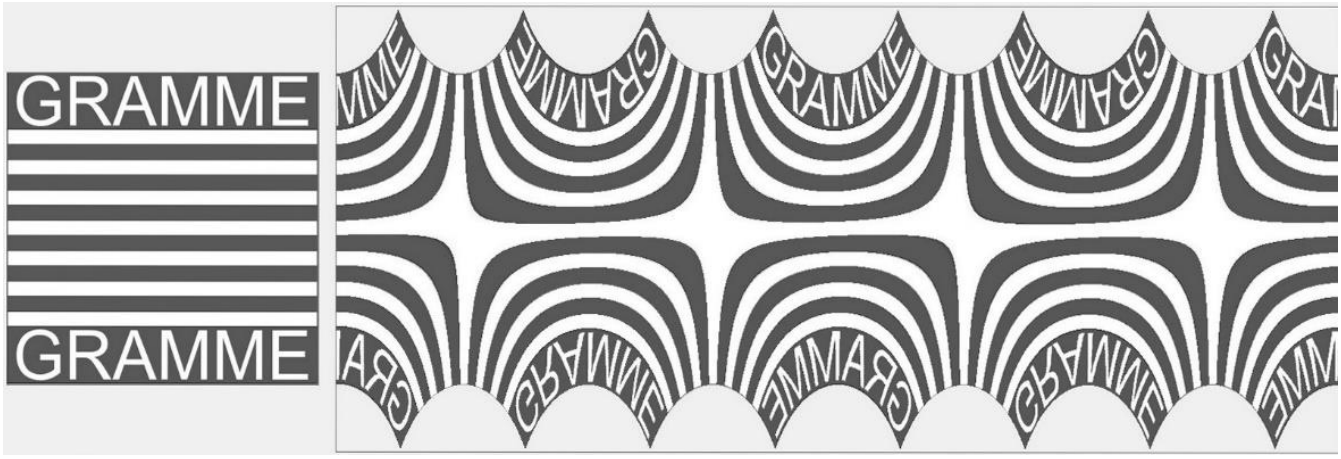
Note that grinding away of the mirror image words is done blindly. Whoever grinds the outer edges of the riband, cannot see the words in the pattern and is simply hoping to have removed enough for good results.

Word pattern barrels in which the mirror image lettering has been removed are two-iron construction; the riband is made up of two twisted rods. If three or more rods were welded together, there would be no way to remove the mirror image lettering from rods in the center of the riband.

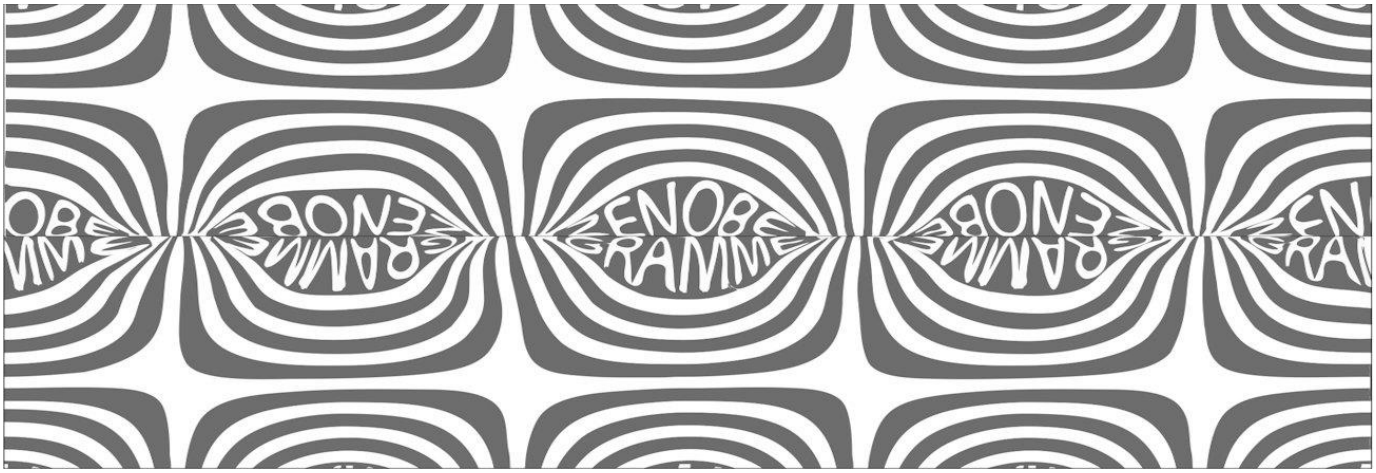
Below is the two billet stacking arrangements for the Zenobe Gramme pattern, loaded to Thor II©. This is a left twist to the rod. The grind amount selected is 49%.

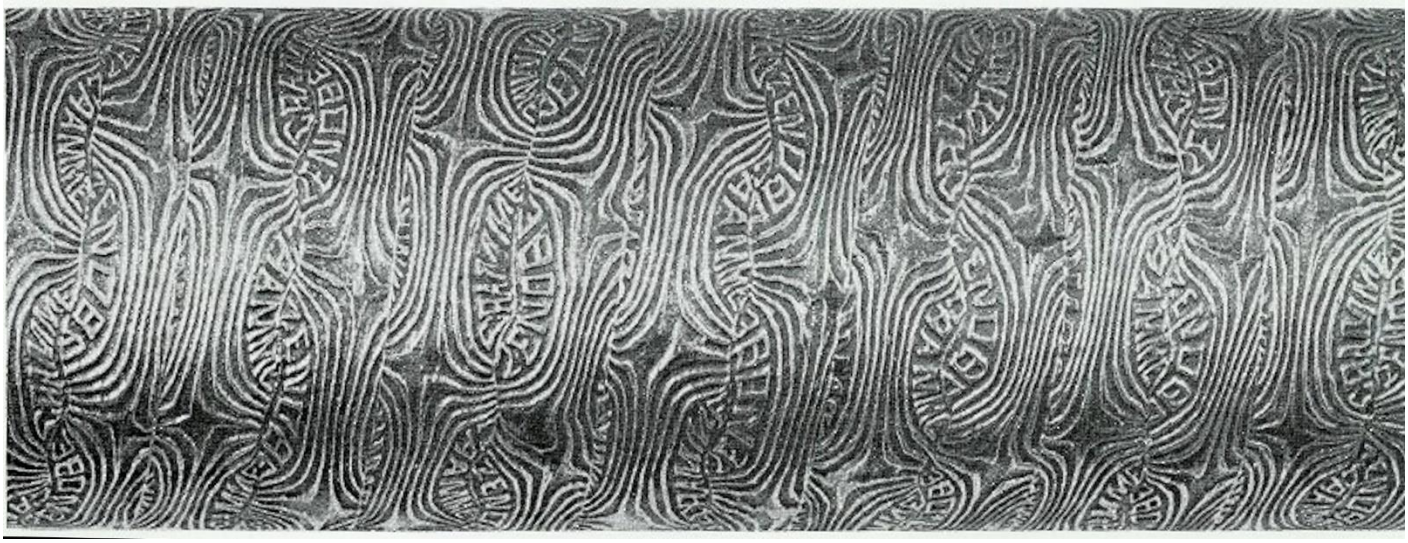


Below is the Gramme billet stacking arrangement, loaded to Thor II. This is a right twist to the rod. The grind amount selected is 49%.



Welded riband of right and left twisted rods.





The upper left photo of the Zenobe Gramme gun barrel, was obtained from the movie; "The Making of Damascus Barrels". Permission to use, courtesy of Pete Mikalajunas.

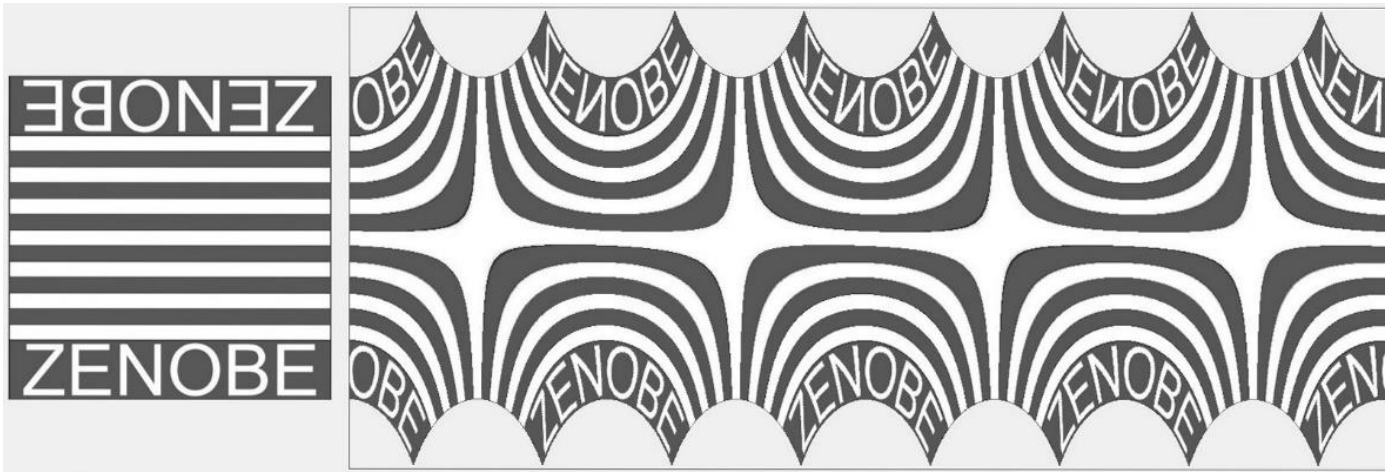
The upper right and bottom images of the Zenobe Gramme barrel, from "Le Demas"; by Jean Puraye. Permission to use the images, courtesy of Cornell Publications.
http://www.cornellpubs.com/old-guns/item_desc.php?item_id=2891

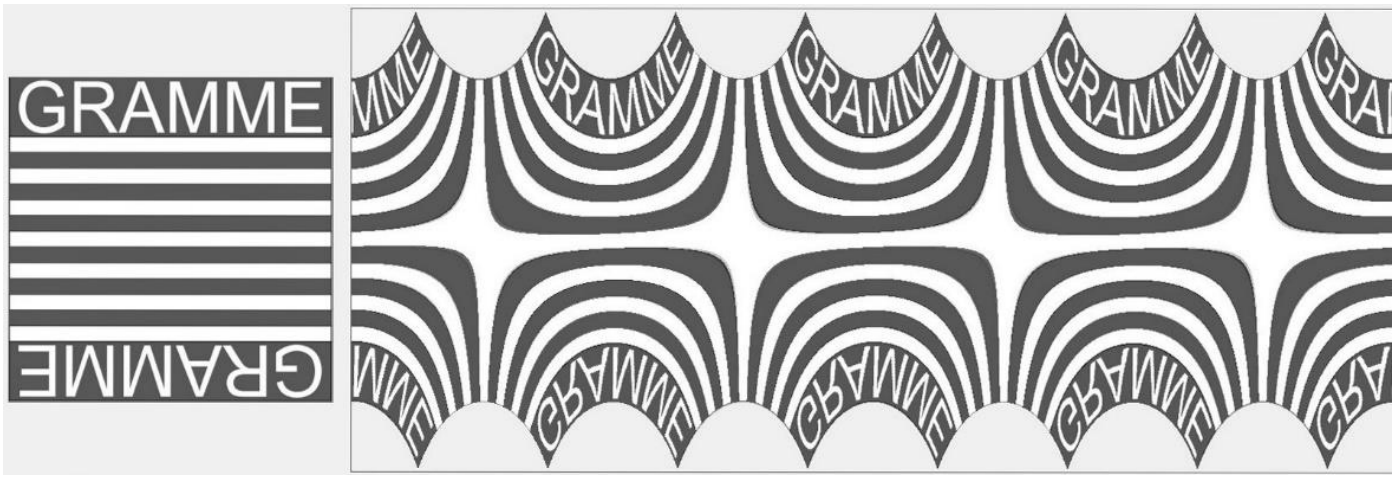
A decent job of grinding away the mirror image words was done on the Zenobe Gramme pattern. Small pieces of the mirror image words can be seen in a few places.

Each of the “Word Pattern” barrels that I have seen, have their own peculiarities in design and execution. In the Pieper, Remington, Terrell and Zenobe Gramme barrels, the makers chose to place the words so that they were reversed on every other occurrence in the pattern. Perhaps they wished that the words could be read from either the muzzle, or breech end of the barrel. This arrangement is particularly odd on the Zenobe Gramme barrel, as in half of the placements, Zenobe is properly over Gramme. Whereas in the other half of placements, Gramme is over Zenobe.

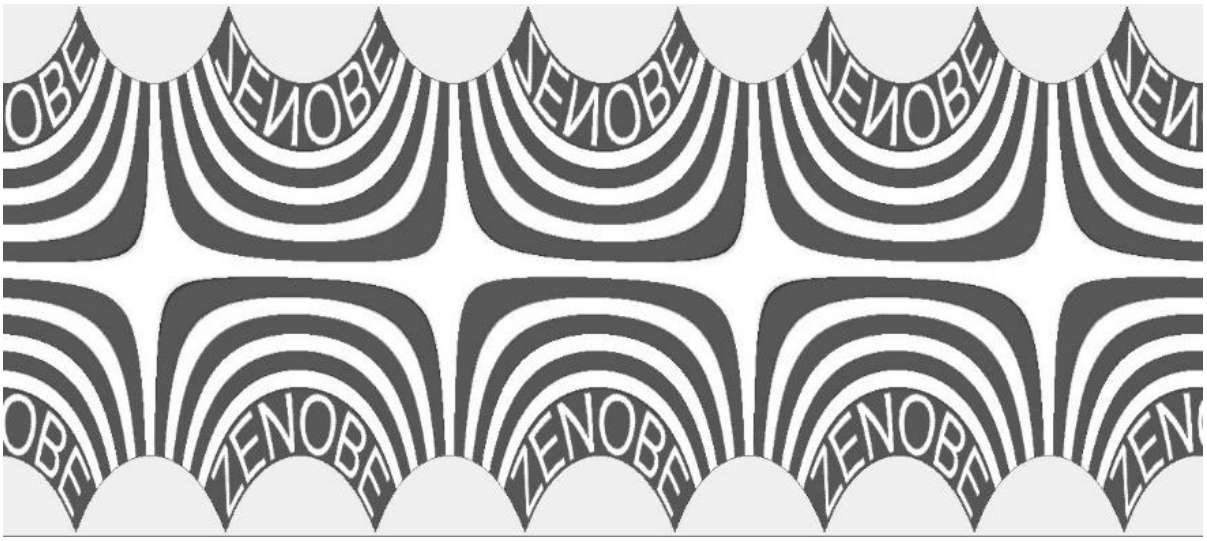
It would have been quite simple to flip one of the “word” segments over in the billet, resulting in all of the words along one side of the rod to display in an upright position. When the two patterned rods are forge welded together to create the riband, all of the words would line up in a logical order and sequence.

The following images are THE AUTHOR’S modification to the Zenobe Gramme pattern. Arguably, more logical and less confusing to read.

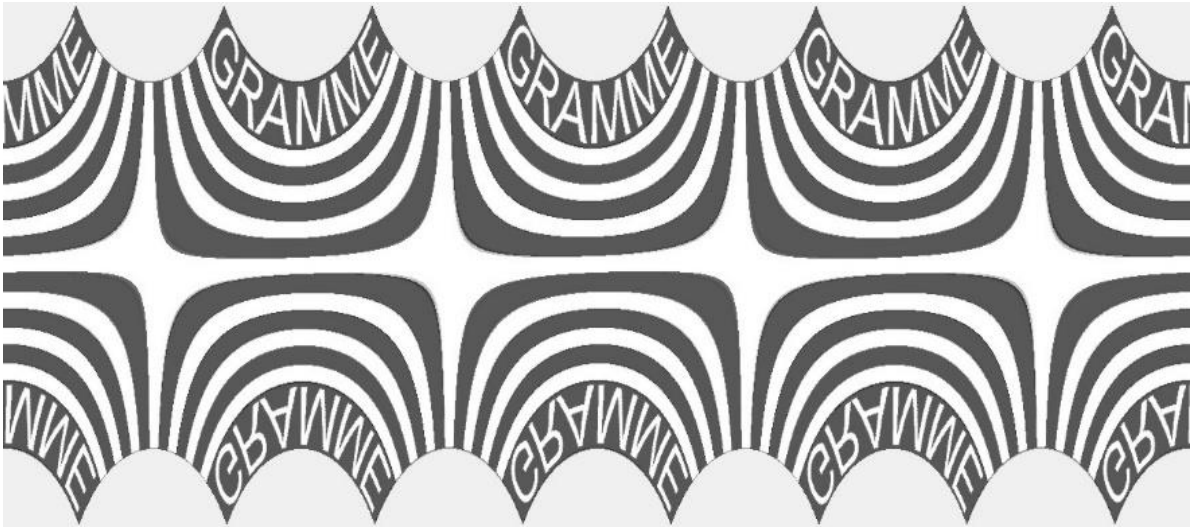




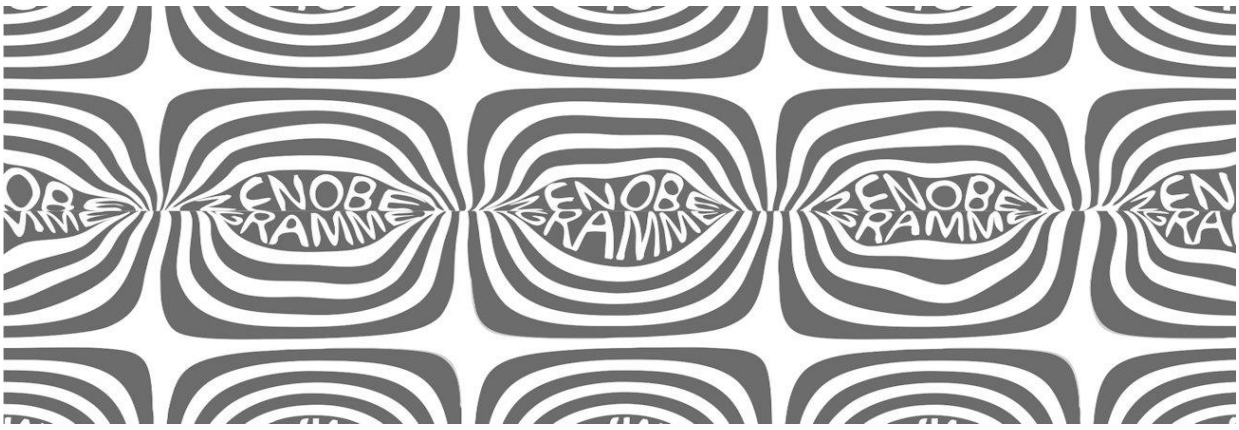
Left twisted Zenobe rod.



Right twisted Gramme rod.



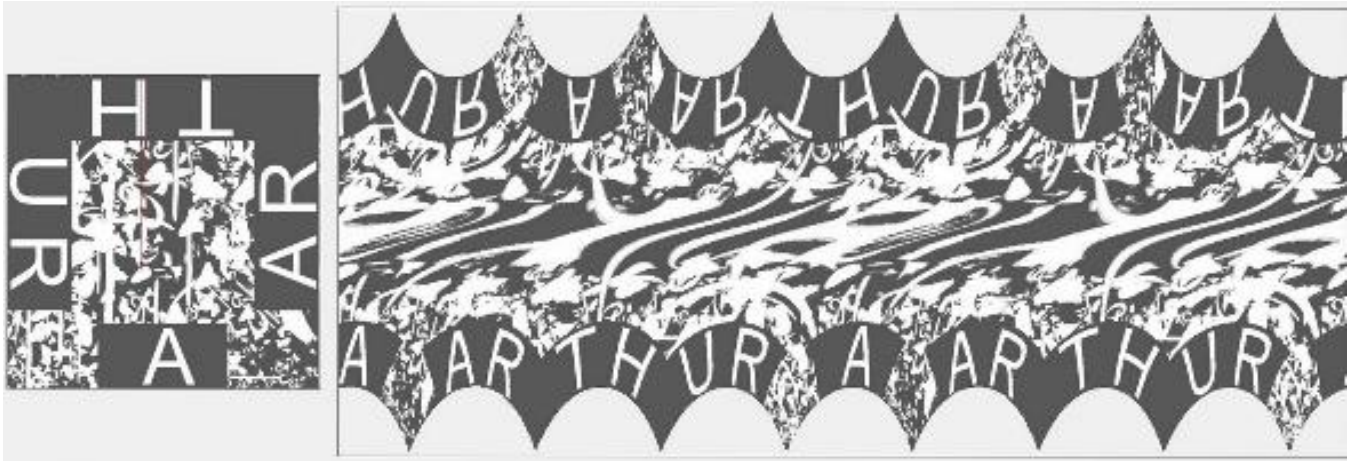
Welded riband of right and left twisted rods, in the author's modified version of the Zenobe Gramme pattern.



The shotgun that was made for President Arthur, is quite a different "word" arrangement than all of the other barrels presented here. Rather than just stack words on the top and bottom of the billet, the makers of this barrel used the entire outer area of the billet for the lettering. By arranging the lettering with the tops towards the center of the billet, the words display in a straight line along the edges of the twisted rod.

Instead of using flat stacked layers for the center of the billet, the A Arthur billet appears to utilize laminated steel for the core. Additionally, the single letter "A" looks to be separated from the word Arthur by small pieces of laminated steel. It is interesting that this barrel art does not include the President's first name; his full name being Chester Allen Arthur.

Below is the author's attempt to create a billet arrangement that decently represents laminated steel patterning in Thor II©. It is possible that the actual gun barrel rods were twisted both right and left, though it is hard to tell with this pattern. It is also possible that a single rod could have been used to create this gun barrel. The Thor II© image shown here is a right twist. The grind amount selected is 43%.



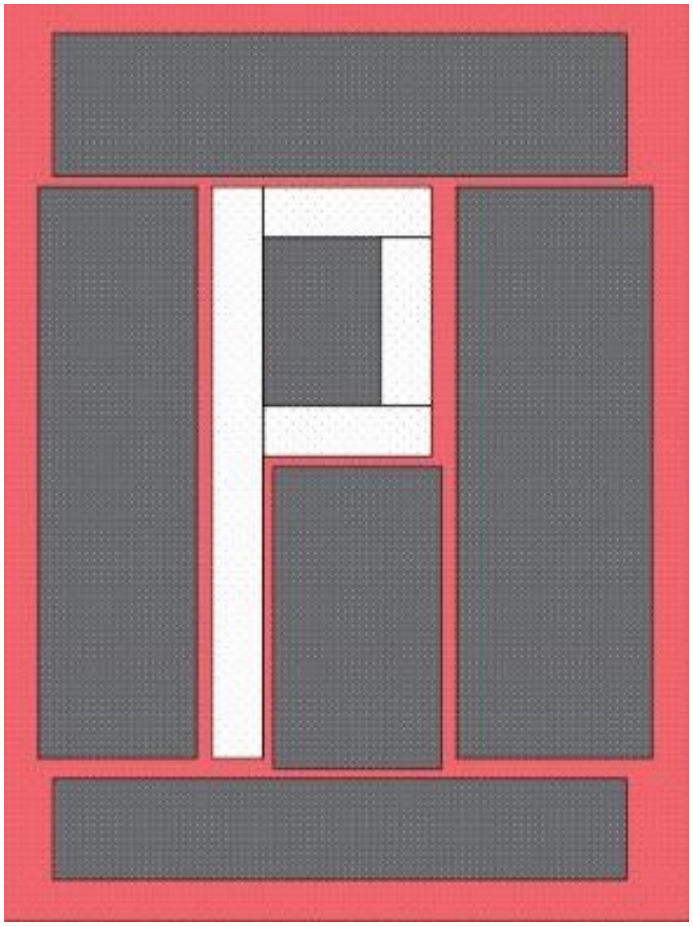
The pattern as seen in the gun barrel. The mirror image words have been ground from one side of the rod.

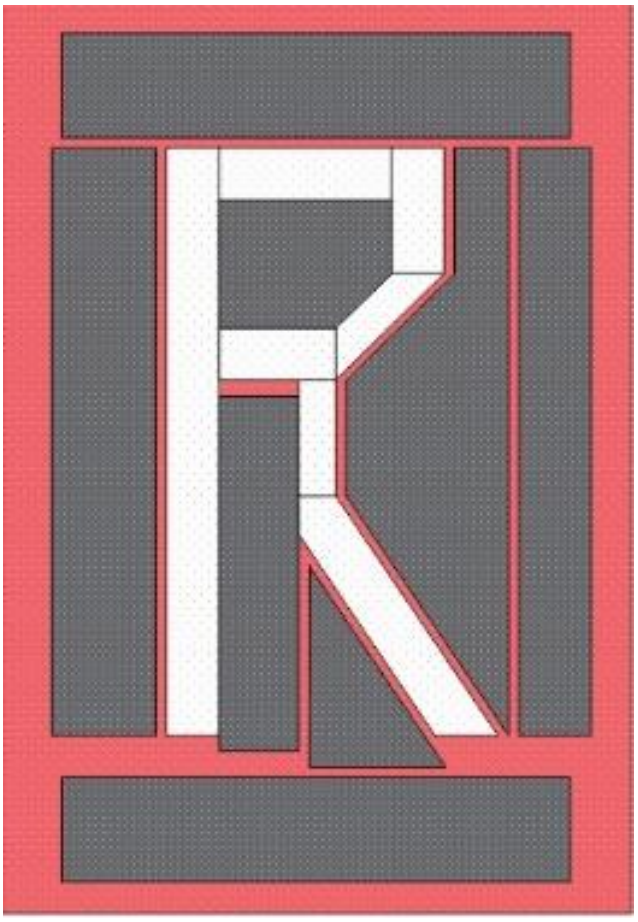
Images of the Chester A. Arthur shotgun, courtesy of Rock Island Auction.
https://www.rockislandauction.com/detail/65/3063/belgium-double-barrel

The A. Arthur barrel is the only one showing an effort to create letters with some flourishes, most notably in the T and E. One E in President appears to have an arrowhead at the bottom of it, although the other E does not. I suspect the arrowhead was an accidental displacement of material during forge welding. The D in PRESIDENT appears to be a quite decorative engraving type font. However, I think this to also be accidental and more likely to have been caused by a forge weld line that did not color black. The same can be seen more minimally along the edges of some of the other letters. An impressive flourish is also found on the letters A on the barrel rib. These too are more likely to be weld lines, or displaced material.

All of the letters in these word damascus patterns are assemblies of individual pieces of steel and iron that have been arranged to form the letters. At the time these barrels were made, the technology existed to both forge and machine complex shapes for creating the letters. In the Pieper, Zenobe Gramme and Remington barrel patterns, the letters are created by using some very basic shapes in the assembly. You can see how the corners of the letters, O, P, R and B are square, indicating that the letters are created with flat stock and the holes in these letters are filled with square stock. The lettering for all of the "Word" Damascus patterns, were created with simple flats, squares, rectangles, and triangles.

Below are possible arrangements for assembling letters. The P is from the Pieper pattern. The R is from the A Arthur pattern.





It is known that very large billets of damascus were made for production runs of damascus rods for the barrel welding trade. But when only one set of barrels were to be made in a custom damascus pattern, there was no need for producing massive quantities of barrel material. Thus, a small billet of barrel damascus was entirely enough material to produce for the single project. That being the case, the work to create words in the pattern would not have been a very laborious task.

W.W. Greener stated in “The Gun and its Development”, that it required 18 pounds of prepared gun iron to make a set of 12-gauge barrels. Steel weighs .283 pounds per cubic inch. 18 pounds of steel is 63.6 cubic inches of material. An 18-pound billet would roll out into 447 inches of 3/8 inch square rod; not taking into account material loss from forge scaling. My calculations for the amount of rod required to wrap a 30-inch 12-gauge barrel, suggest that it would require about 225 inches of 3/8” rod per barrel. Thus for two barrels, about 450 inches of 3/8 inch square rod. So, Greener’s statement of how much material is required to make two 12-gauge barrels is at least in the ballpark.

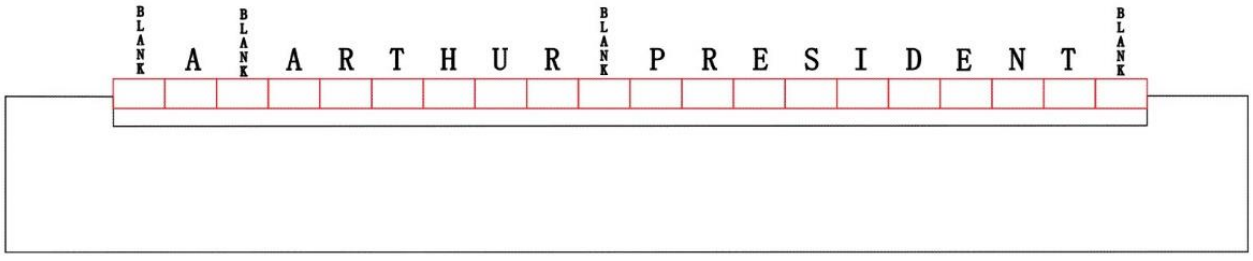
A billet in the dimension of 3 inches X 3 inches square and 7 inches long (3 x 3 x 7) equals 63 cubic inches of material; or very near the 18 pounds of gun iron Greener suggests is required for a set of 12-gauge tubes. As a blacksmith who has made damascus gun barrels, this seems to be a surprisingly small billet to make two 12-gauge barrels from. No doubt, the makers of the “word” pattern barrels welded up more than this minimum amount of material to make these barrels. Perhaps the billets prepared for these special barrels were 3 x 3 x 10 (90 sq. in.) inches in dimension. Or, 4 x 4 x 6 (96 sq. in.) inches. This observation provided to give an idea of the possible size of a damascus billet for a set of “word pattern” barrels and additionally an approximation of the size of the letters placed in the billets.

Sizing the digitally created billets found in this document to 3 inches square, the letters in the words are approximately ½ inch tall. While it is entirely possible to create such small letters in steel, as a blacksmith, I would begin by creating the lettering section of the billet on a much larger scale. After forge welding this assembly together, it could then be rolled/forged down to whatever dimension fits the intended size of the billet that will be stacked to create the damascus for the barrel. Two sections of this rolled down letter grouping would then be placed in the assembled billet: one on the top and one on the bottom.

The letters for the A Arthur shotgun were not stacked together in a single block to create a word, as was likely done in all of the other patterns. For the Arthur pattern, all the letters were created individually as a single long rod, with the letter running down the center of the rod’s length. This is apparent, because on close examination, the letters which are used in multiple locations all have the same anomalies in and around them. Rods of each letter were then stacked into the billet to assemble the words.

For the Arthur gun’s barrel rib, short segments (tiles) were sliced off of the end of each of the letter rods, to be forge welded in place on the material that would be used to make the rib. Illustrated below, is the author’s idea of how to create the barrel rib. A channel would be cut in the rib material, just large enough to fit the letter tiles into. Below is an illustration of the side view of this operation. The letter tiles are facing up, so cannot be read from this side view. The tiles are shown elevated over the slot that they would be fitted and forge welded into. Text is included in the image to identify the pieces.

Once the letters are forge welded into the rib material, excess stock would be cut away from the bottom of the bar to leave only what is required to make the rib for the gun.



Glossary of Terminology:

"Word" damascus patterns used in gun barrels, could correctly be labeled as being either of pattern welded, or of mosaic construction; or perhaps more properly, a combination of both methods.

Pattern Welded Damascus:
The making of pattern welded damascus, is the forge welding together of layers and/or shaped pieces of chemically different ferrous materials, for the purpose of creating a pattern on the surface of a finished product. The patterns are created by manipulating edges of the layers and/or pieces to the surface of the finished piece where they will form a predefined pattern. As the ferrous elements are chemically different, they will be differentially affected by etchant and/or patina solutions to make the pattern visible.

Mosaic Damascus:
Mosaic damascus steel differs from pattern welded damascus, only in that mosaic construction more accurately describes stacking of shaped ferrous pieces in an arrangement which will create words and/or pictures on the surface of a finished item. This arrangement is then forge welded into a solid mass. As with pattern welded steel, some form of distortion manipulation of the forge welded arrangement is necessary to bring the pattern to the surface of the finished item.
Mosaic definition:
A surface decoration made by inlaying small pieces of variously colored material to form pictures or patterns; also: the process of making it. "Merriam-Webster Dictionary"

The word "Twist" is used differentially in damascus gun barrel manufacturing, to describe either a method of manufacturing gun barrels, or to separately describe the process of twisting the square rods/baguettes.

"Twist/twisting" as applied to the process of twisting of the individual rods/baguettes:
Twisting of the rods is one of the processes used in developing patterns in pattern welded and some mosaic damascus. Production of all of the "Word" damascus gun barrel patterns, employed the process of twisting of the rods/baguettes, which were used to make the riband.

Twist gun barrels, as explained by Dr. Oscar Gaddy:
"Twist barrels are made from a single laminated blade of iron and steel (thin strips of iron and steel in a 1:1 ratio hammer welded together) then wrapped around a mandrel and hammer forged. They have a helical or spiral pattern of lines like a candy cane."
Two or three blades were usually required to finish the barrel, the thicker at the breech. About 7 feet of rod, which was **NOT** twisted, was required for 1 foot of barrel.
Cheaply made Belgian guns with Twist barrels, frequently with British-sounding names may be labeled "Laminated Steel" or "Untwisted Damascus."

Twist Gun Barrel Pattern Examples & Methodology – DamascusKnowledge.com
https://docs.google.com/document/d/1BdbWHfJmr2EyvzcPybid7pwlEliH6m9pr1LxMESM3W0/edit

Names of individual pieces and assemblies, used in the construction of damascus gun barrels:

The stacked assembly of iron and steel, used to create the intended damascus pattern:
Billet – Modern American
Faggot – British gun trade
Lopin – French/ Belgian gun trade

The individual iron and steel pieces stacked into the billet/faggot/lopin:
Layers - English
Alternees/Laminees - French

The square rods drawn out from the stacked assembly, after it is forge welded into a solid mass:
Rods - English
Baguettes – French
Strips/Stripes – Occasionally used in various documents.
'Iron,' 'band,' 'rod,' 'rope', and 'blade', also mean the same thing.

The strip of barrel material created by forge welding together the rods/baguettes:
Riband/Ribband/Ribbon – English
Ruban –French

Damascus pattern names – DamascusKnowledge.com
Unfortunately, no *European and British Union for the Standardization of Nomenclature of Damascus and Twist Barrels* existed in the late 1800s. Makers could name their barrels whatever they wished, and certainly Ernest Heuse-Lemoine selected 'American' sounding names for several of his patterns. One maker's 'Boston' was another maker's 'Oxford', and English 'Boston' didn't necessarily look like a Belgian maker's 'Boston.' And 20 barrel makers in Liege were probably making 'Boston.' Trying to connect the Damascus barrels with the (mostly) Belgian makers is quite a challenge since the maker's marks were usually ground off the raw tubes that arrived in New York or Connecticut as part of the final fit and finish. Very few US gun makers selected trade names for their barrels, but chose to identify 'Fine', 'Very Fine', etc. One maker's 'Very Fine' might be another's 'Good', 'Highly figured', or 'Choice' however. Then, as now, marketing, rather than accurate descriptions, ruled. Some U.S. makers provided a description of the Damascus offered on various grades.

Crolle patterns: – DamascusKnowledge.com
From 'crullen' or 'krolle' meaning to form into coils/to twist. ***Crolle – Crullen,*** are also Middle English words: "To form into coils or ringlets."

"Turkish" Crolle – DamascusKnowledge.com
https://docs.google.com/document/d/1CoKDDpfuagGo1E3yMvwyjsO6d8BO0tyx7bBbxycuwp0/edit

Damascus Pattern Classification – DamascusKnowledge.com
https://docs.google.com/document/d/1IHGMMB82PAgFIzHTeoepYvzzE1uqDZSC_MTWH8vv0fE/edit

Acknowledgements:

Many of the illustrations shown in this thread, are screen captures of a computer application designed to display twisted damascus patterns, called Thor II©. Thor was developed by a knifemaker/blacksmith who lives in Germany. His name is Christian Schnura. Christian first developed the Thor application some years ago, to run on 16-bit computer operating systems. The old version of Thor will still run on older Windows operating systems but will not run on the newer 64-bit systems. Christian has re-scripted Thor to run on 64-bit operating systems and has renamed it, Thor II ©.

Were it not for Mr. Schnura's skill and his time devoted to creating this marvelous computer application, this treatise would not have happened by my hand. I would have long ago given up in frustration, from trying to create illustrations similar to what Thor II© can do with ease. Christian allows anyone to download Thor II©, absolutely for free! The download can be found at the link below, courtesy of "The Telchinen Forge". Thank you Christian Schnura!!!

https://www.telchinen-schmiede.de/wissenswertes-zum-thema-schmieden/praktische-tipps-und-antworten-zum-schmieden/mustersteuerung-beim-torsionsdamast/

Some of the photos included in this document were provided to the author by Dr. Drew Hause. As well, much of the terminology and damascus barrel explanations found in the "Glossary of Terminology", are taken from Dr. Hause' tremendously informative antique shotgun web site; DamascusKnowledge.com. I cannot imagine how many hours Doc Drew has put into gathering information and organizing it on his web site for ease in researching. There is also an extensive collection of Kansas literature, art, and history on Dr. Hause' site. Thanks Brother Drew!!
https://sites.google.com/a/damascusknowledge.com/www/home

One of the photos of the Zenobe Gramme gun barrel, was obtained from the movie; "The Making of Damascus Barrels". Permission to use the photos was given to me by Pete Mikalajunas. Pete was kind enough to spend countless hours on the phone with me, sharing his experiences from his trips to Belgium and visits to the firearms museums there.

The Turkish damascus demonstration piece shown in this document, was made by Jerry Rados. I appreciate Jerry allowing me to purchase this piece from him, to use in explaining Turkish damascus pattern. Jerry has been making knives of his Turkish damascus for decades. Thank you Jerry Rados!!

Additional References:

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Shop - Cornell Publications (cornellpubs.com)

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