If you’ve been following my other recent reviews, you know that I have a new-to-me 2011 Harley Ultra Limited. The bike was purchased used, meaning some changes made to the bike might not have been what I would have chosen. One such change was the exhaust system. The headers remain stock; but, with a certain device internal to them removed. The stock slip-on mufflers were removed and replaced with Vance & Hines (V&H) 4” round, slash cut mufflers with 2.5” baffles.

With some intake and engine modifications that were also done, along with the header; the V&H pipes were quite loud, much louder than my taste. So, was faced with a few options –
- Live with it, which wasn’t really an option, just didn’t like the sound or the volume.
- Replace the pipes - would rather not spend the money until all other options were exhausted (unintentional pun…).
  - When replacing the pipes, there is a need to be careful to get something with the same baffle diameter, to not alter the dyno tune – otherwise, the change would require even more money to have the bike re-tuned. Kind’a like the 100hp and 113tq it’s producing.
- Replace the baffles with ‘quiet baffles’ from the pipe manufacturer
  - This option brought so many mixed comments; preferred to try something personally done before on my ’06.
- The ‘done before’ - removing the baffles and wrapping them with a muffler packing material.

The last option it was, having successfully done this previously on my ’06 to quiet down some Rineharts. Figuring things had changed since the last time, started a search for packing material choices. Found there are a lot of choices out there. Most require wrapping loose material around the baffle as tightly as possible and trying to keep it compressed with masking tape or other method. With ‘trying’ being the operative word – previous experience with the Rineharts was a struggle to get enough material held in place with the tape to create a full ‘stuff’. Then there is the wonderful smell as the fair amount of tape burns off during the first few rides.

The search brought attention to two possibilities not found when working on the Rineharts. One was using a material not specifically intended for exhaust systems - wood burning stove, rope-style, gasket material. While an interesting concept; the same issue of being a struggle to get enough of the material, wrapped properly to fill the void and still be able to re-insert the baffle; seemed like it would be as difficult as using loose material.

The other alternative found was a product used ‘across the pond’ for quite some time. A high temp resistant non-woven material that is compressed during manufacture into a relatively thin blanket. The key to the process is the thread used to hold the material into its compressed form. The thread is designed to melt away at a temperature well below what is experienced in an exhaust system. Once the thread melts, the material is free to expand within the void, completely filling the void at a higher density then it was felt could be otherwise accomplished using loose material and tape.

Before getting to the process of installing the material into the V&H pipes and the results, described here is a bench test performed on a sample of the material. For the test, a 2.5” ‘baffle’ was mocked up (tomato sauce cans); along with a 4” outer ‘pipe’ (a large pineapple juice can). The ‘baffle’ was wrapped with the material using the same number of layers as was done in the actual muffler system. To achieve the maximum density of the expanded material, the manufacturer has an Excel worksheet based calculator – enter the outside diameter of the baffle and the inside diameter of the outer pipe, from these the volume of the space between the two is determined. Then the density of the material you desire is entered and the worksheet determines the length of the blanket needed to wrap around the baffle.

Since the test dummy had the same diameters as the real exhaust system, the same length of material was used to wrap the baffle mock up. To be a little more dramatic, the outside ‘pipe’ was cut to cover only ¾ of the wrapped ‘baffle’, leaving ¼ of the material exposed. A full page of ‘before’ and ‘after’ pictures, compared side-by-side, is on the last page.

Using the oven inside the house wasn’t an option (and everyone knows why that was), instead the propane gas grill was used. The grill was heated to 400 degrees (F) and the test assembly was left in the closed-cover grill for an hour - to make sure it got thoroughly heated.

The exposed end did ‘flower’ open (think petals opening) - not as much as expected (probably due to the limited length exposed), but certainly enough to show the concept. The portion enclosed inside the ‘pipe’, at first glance, didn’t visually change all that much. To have the proper finished density, the wrap pretty much filled up the void; but was loose enough to easily be inserted into the ‘pipe’. The ‘after’ pictures obviously show the expansion of the uncovered material. Closer comparison of the pictures of the covered end shows how much the material expanded laterally - in the ‘before’ pic the material in the covered end of the test was recessed inside the ‘pipe’; in the ‘after’ pic, the material is clearly protruding. The difference in thickness of each wrap layer, ‘before’ vs ‘after’ can also be seen.
One aspect this test showed that would never be noticed in the intended application of this material - prior to heating, the ‘pipe’ (a relatively thin metal can, compared to the very rigid real pipes), with the wrapped ‘baffle’ inserted, could easily be squeezed by hand, with a fair amount of deflection in the metal. After heating, the ‘pipe’ is much more solid. Even a significant amount of hand pressure does not deflect the metal (yes, if stepped on, the can could be crushed – but ‘before’ compared to ‘after’ is significantly different). This demonstration was intended to show how the material expanded to completely fill the void, filling in all possible space, and its density after the melting of the thread released the compressed material. The demonstration was a success – with the exposed material obviously expanding; the internal material expanding both laterally and in thickness; and making the ‘pipe’ resistant to pressure. Impressive.

Now for the real thing...

Each baffle is removed by taking out the two mounting screws on the underside of the pipe. Sliding the baffle out was assisted by the use of a slide hammer with custom made hooks to grab the inside, where the 2.5” diameter baffle met the flange end. A couple of pops on the hammer for each side and out they came.

The material blanket was cut to be about an inch wider than the length from the baffle flange end to the last row of perforations. This covered all the perforations and left enough of the solid baffle pipe exposed so as not to interfere with reinstalling the baffle.

The length of the blanket (the wrapping length) was cut to be 770mm – the length determined by the density calculator. The flange end of the material tucked nicely into the flange as it was wrapped. A single wrap of tape was used on the insertion end to facilitate sliding the wrapped baffle back into the pipe. Probably could have been done without, but was chosen to do so just to make things easy. Considering it was only a single wrap of tape on each baffle, compared to using nearly half a roll of tape to get a lot less loose material in the Rineharts, thought this was a good idea to keep things easy.

The reason you see carbon on the first picture is the baffle was inserted completely and had to be removed due to the need to tap one of the screw holes – it got cross-threaded – oops.

The upside to the ‘oops’ was it demonstrated how easy it was to remove the wrapped baffle. No struggle to ‘stuff’ the wrapped baffle in without disturbing the material. Slipped in, even though it can be clearly seen the material was in light contact with the inside of the outer pipe.

Compared to the hassle of the Rineharts, with wrapping the loose fill material, then having to use a lot of tape to try to compress the material to be able to stuff it in the pipe – this was a breeze. The result was what was hoped for, both in terms of installation and the resulting sound.

The review plan originally included taking videos to compare the sound of the pipes before and after wrapping; however, both video devices attempted (cell phone and a Cannon video camera) simply could not handle the intensity of the sound. An attempt to measure the decibel (dB) levels was also going to be made – they have an app for that – but, again, the cell phone mic wasn’t up to the challenge. The mics on both recording devices are designed for optimal use in the range of the human
Acousta-fil® Muffler Packing Material

By: Gary ‘bogie’ Bogolin

voice – and the pipes are way beyond that. Being only an enthusiast, had no access to a true decibel meter. Offered here, instead, are subjective opinions on the relative loudness.

Decibel level is an objective measurement of the ‘intensity’ of the sound waves created; loudness is more subjective. Each person will have factors that affect their perception of how loud something is. Hearing loss, whether by age or environmental exposure, will likely make an equally intense (i.e. same dB level) sound seem louder to one person than another. The tone and direction of broadcast of the sound also affect the perception of loudness. With all that said – it’s pretty safe to say an individual differentiates the relative loudness of sounds all the time. This individual (i.e. bogie), as well as a friend who assisted in the packing of the mufflers, both agree on the following perceptions.

Overall, the pipes, after being packed, without the bike being run to a temperature high enough to affect the threads, produced a sound immediately perceived as quieter. The tone of the sound is deeper, less sharp – less harsh on the ear. At idle, there is a nice deep rumble instead of a sharp, almost piercing sound.

It seemed, during the initial ride, you could hear the sound changing as the exhaust heated up. The mind’s eye envisioning the material deploying and expanding as the threads melted away. As the initial ride progressed, the sound became more & more …well…, muffled.

While riding, the deeper rumble continues at a cruise, but not overwhelming the ability to listen to music, or GPS commands, at reasonable levels. When cracking the throttle into a fast acceleration, the pipes still bark nicely, then settle down as speed is leveled off. Prior to packing, anything above idle was very annoying, needing radio volume to be much higher; was just plain intrusive. To continue with the ‘barking’ theme – before packing, like the neighbors Jack Russell that has the incessant high pitched yipping that drives you nuts; after packing, like the Burmese Mountain dog with the low, guttural ‘woof’ that can be both reassuring or attention grabbing, depending on the circumstances.

After a few more rides of varying distance, the bike returned to the garage where the work was done. As soon as the bike was pulled into the garage at my friends’ house, he immediately commented on the fact the bike sounded quieter and more pleasant, confirming my perception.

Like any packing, there will come a time when the pulses coming from the 103 CID big twin will likely start to degrade the effectiveness of the packing. However, with the higher density this pre-compressed material allows you to ‘stuff’ the pipe with, it stands to reason it will be somewhat self-protecting in that there is more material to absorb the pulse, spreading the affect over a larger amount of material. Much like spreading weight over a larger area keeps things from breaking thru.

If you are looking to quiet your mufflers (silencer, pipes or whatever you might refer to your exhaust system as), the Acousta-fil® pre-compressed wrapping material makes the job easy and provides the ability to get more material into a given space. Knowing the material expands in all directions to fill the entire void adds to the confidence that the best method available was used. Acousta-fil® is highly recommended by this user.

Acousta-fil® only very recently became available in the US. Contact information for the US sales office and distribution center is below. They would be able to answer questions about availability and pricing, as well as assist with determining the correct blanket size for your application. Very helpful people with a very good product. A great, purpose-made, alternative to loose fill packing.

Contact:
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Respectfully,

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Here are the ‘before’ and ‘after’ pictures of the bench test - keep in mind the test dummy was heated in a BBQ grill - cleaned as well as possible without power washing it - hence the darkened material in the ‘after’ pics.

Take note of the degree of expansion in all directions.

Pictures 1 and pictures 2 show the full expansion of the unrestrained material, from what was easily inserted into the 4” diameter ‘pipe’ that becomes much larger than that.

Pictures 3 and pictures 4 shows the lateral expansion – with the ‘before’ pics having the material recessed just inside the ‘pipe’; to having the material protrude just outside the ‘pipe’ after heating.

All the pictures show how the individual layers of the wrapped blanket expanded, which is the reason the ‘pipe’ has more stability to it after heating. The expanded material within the ‘pipe’ would have expanded further to be like that outside the ‘pipe’, instead it remains in a somewhat, still compressed state, restricted by the confines of the ‘pipe’.