

## Testing of Wood Finishes for Durability - June 2004



We have begun a long term test to evaluate how well various wood finish products will last when exposed to outdoor use. Customers frequently ask what is the best bed wood finishing method. We have performed limited testing in the past and we always pass that information on to the customer. However, there are several product types available now which we did not evaluate and which would possibly provide superior durability for a pickup bed wood application. One oil based product which performed very well on previous testing is not even available anymore. We believe it is time for a new test of finishes and the results will be reported in this newsletter and on our website. All the products being tested were purchased locally at paint supply stores or home improvement stores.

Our testing procedure is as follows. Ten different bed wood finishing methods are being evaluated, and three oak boards have been finished by each method for a total of 30 boards being tested. The finishing products were applied to all surfaces of the boards according to the instructions provided on the can. All were allowed to cure at least 30 days before being placed in the test fixtures. The boards are attached to cross sills by our type 430 stainless bed strips using unpolished stainless bolts. This test procedure simulates the conditions of a typical bed wood floor in a truck that is used regularly and sees plenty of outdoor use.

These boards have been mounted on a display stand and are positioned outdoors near the northwest side of our manufacturing building. This will expose the boards to the extremes that Oklahoma weather has to offer - from 110-degree summer sun to rain and hail to driving snow and freezing rain. We will regularly inspect the wood for signs of failure in the finishing system and provide monthly progress reports. We will perform monthly washing of the wood and strips and will wax them about every six months, typical of the care you would give your own bed wood. Watch the website bed finish test page, which will be updated regularly.

As any of the boards begin to weather or show signs of deterioration, we will document the failures and choose whether or not to perform repairs. You would make similar repairs on your own bed wood installation as it begins to show the cracking or separation. We expect this test procedure to continue as long as we are learning meaningful information that we can pass on to you.

These are the ten finishing methods that are tested.

1. BEHR black exterior paint (their best) applied over BEHR oil base primer. Two coats brushed
2. VARATHANE exterior gloss urethane applied over bare wood. Three coats brushed, block sanded between coats.
3. VARATHANE exterior gloss urethane. Three coats brushed, block sanded between coats. Applied on boards previously sealed with several coats of linseed oil as a sealer and preservative.
4. MINWAX (Helmsman Spar Urethane) exterior gloss marine spar urethane. Three coats brushed on bare wood, block sanded between coats.
5. MINWAX (Helmsman Spar Urethane) exterior gloss marine spar urethane. Three coats sprayed on bare wood, block sanded between coats.
6. PELUCID (a moisture cured product by POR-15). Three coats brushed over bare wood.
7. WATERLOX Marine finish. Two coats Waterlox sealer and one coat Waterlox marine finish brushed on bare wood, block sanded between coats.
8. WATERLOX Marine finish. Two coats Waterlox sealer and one coat Waterlox marine finish, brushed on boards previously sealed with several coats of linseed oil as a sealer and preservative.
9. McClusky exterior clear glossy wood finish. Three coats sprayed over bare wood, block sanded between coats.
10. WFS aliphatic urethane. Two wet double coats sprayed over bare boards. The product is a two-part mixture that was mixed and applied according to instructions supplied.

All these products except the aliphatic urethane are readily available in retail neighborhood paint or wood finish supply stores. Aliphatic urethane is used by professional finishers for decorative exterior natural finishes on difficult applications such as restaurant entrance doors, wooden boat trim and other similar severe environments.

We welcome your questions and comments about this test and the finishes we have selected for evaluation. Let us know if you have experience with these or similar products. Future reports will also describe other characteristics of the finishes such as ease or difficulty of application, how well it covers the bare wood and glosses out, hiding or disappearing of brushing marks, and whether spraying or brushing is the preferred method.

## ***Bed Wood Finish Update - September 15, 2004***

We have a few results beginning to show from the bed wood finish testing. After about three months of one of the wettest Oklahoma summers ever, several of the finishes have failed to one degree or another while others show no noticeable weathering. Following are the results as of September 15, 2004. This test began late in June, 2004.

1. BEHR Black Exterior paint: No deterioration of gloss or failure of the coating.
2. VARATHANE Exterior gloss urethane: All three boards have small areas of black staining indicating the coating has failed and allowed water to penetrate to the wood. These will be sanded and recoated to continue the test. It is not peeling or separating between coats.
3. VARATHANE Exterior gloss urethane, applied over boards sealed with linseed oil: The finish is not as glossy as when originally applied. There is no failure of the coating. A few spots have noticeably dulled and it appears the linseed oil sealer may not have completely cured in those areas.
4. MINWAX (Helmsman Spar Urethane) exterior gloss marine spar urethane: Three coats brushed. No deterioration of gloss or failure of the coating.
5. MINWAX (Helmsman Spar Urethane) exterior gloss marine spar urethane: Three coats sprayed. No deterioration of gloss. Very small hairline cracks in a few isolated areas causing black moisture stains. These will be sanded and recoated to continue the testing. No separation of the coatings.
6. PELUCID by POR-15: No deterioration of gloss or failure of the coating.
7. WATERLOX Marine finish: Black moisture stains showing on all three boards. This coating has failed and will not be repaired.
8. WATERLOX Marine finish, applied over linseed oil sealed boards: Two boards show no change. The third, an edge board, has moisture stains. These will be repaired.
9. McCLUSKY Exterior clear: No change or deterioration except for a very small black stain caused by a slight crack in the film, allowing moisture penetration. This crack will be sanded and recoated to continue the tests
10. WFS Aliphatic Urethane: This coating failed almost immediately, within the first two weeks of exposure. The coats separated and also cracked to allow moisture to penetrate to the wood, causing black stain and peeling of the topcoat.

Some general comments about this test.

- This is an accelerated test and failures probably occur sooner than would be expected on a typical custom bedwood application. Most customers would not park their custom vehicle outside in the sun and rain during the heat of the summer.
- There is a wide range of coating conditions after only three months of exposure to the weather.

- Coatings with minor failure will be sanded and recoated to continue with the test. This simulates the repairs you might perform when you discover a minor flaw in your custom bedwood finish
- After complete failure of a coating, further exposure will yield little additional test information. Those which cannot be repaired will be replaced with another coating, or the same coating applied in a different manner.
- All the edge boards in this test have more extensive failure than the center boards with the same coating. For our test, all the edge boards were cut from the same long board and all appear to have a very open and porous grain structure. Such boards can be adequately coated and sealed, but may require additional coats for optimum performance. This was not done in these tests.
- The Aliphatic Urethane failed so quickly and completely, we believe the problem is how it was applied, not in the product itself. The supplier is examining the failed coating and will make a recommendation. Others have reported good success with Aliphatic Urethane for exterior applications.
- The PELUCID product appears to be a very hard and durable product. We found it difficult to apply in a smooth attractive finish. If you plan to use PELUCID, try it on some small sample boards first to be sure you will be pleased with the results
- Linseed oil may aid in sealing the boards from moisture. It appears that in our tests the linseed oil seal should have cured longer before applying the topcoats. Some areas are still soft after 3 months. Of course the topcoat prevents the linseed oil from additional "drying" so full cure before applying the topcoat is essential. This is another finish system that should be tried on sample boards to verify satisfactory results.
- Bed wood finishing is not something that you can do then just forget it. Regular repair of damage and failures is essential for satisfactory long term results.

## ***Bed Wood Finish Update - December 20, 2004***

The test has been in place continuously for about 7 months. During this time the weather ranged from over 100 degrees to the low 20's, and we had one of the wettest summers ever. The unusual weather took its toll on the sample finishes.



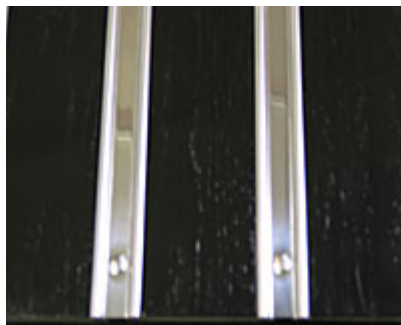
At this time, all the finishes have failed to at least some degree. We will conduct another test beginning about February 2005, using the coating systems that performed the best and adding other promising finish systems. Following are some notes regarding the performance of each coating.



Pelucid This coating seemed to be the most durable of the coatings tested. It is a one part "moisture cure" urethane made by POR 15. It developed a very small area of separation of the coatings, and also a small hairline crack in the finish which allowed moisture to penetrate to the wood substrate. Both failures occurred near the end of the test period. Another concern with the Pelucid is that the boards coated with Pelucid darkened noticeably during the test period. Pelucid goes on practically water clear so the boards were initially very light colored. During the course of the test, the boards coated with Pelucid darkened more than the other coatings. This may have been caused by the sunlight and the coating lacking sufficient UV protection to prevent discoloring. We will include Pelucid in the next test series.



McCluskey's Man-O-War and Minwax Helmsman Both of these had similar characteristics and both performed about the same. It didn't make much difference whether they were sprayed or brushed. They developed a few small cracks in the coating allowing moisture to penetrate to the wood. This of course caused the typical gray-black stain along the crack which is very difficult to remove. The minwax samples were pulled from the test and sanded and recoated. The intent was to place them back into the test and continue. However, since all the other samples failed, we decided to stop the current test. Two of the boards shown have been recoated. The sanded and recoated Minwax and McCluskey's samples shown from this first test will also be included in the next round of testing which will begin about the end of February.



Behr black exterior latex enamel. This paint also developed small hairline cracks which indicates coating failure. The gloss seemed to be still good and no coating separation or peeling occurred. We will include a paint coating in the next tests. The specific brand and type have not been selected.



Varathane exterior gloss urethane. The samples which were sealed with linseed oil first lasted much better than the samples which were applied directly over bare wood. This product was not as durable as Minwax or McCluskey's in our tests. We have decided not to continue testing the Varathane product.



Waterlox The Waterlox used with the Waterlox sealer failed fairly early in the testing. It was not repaired. The Waterlox applied over dried linseed oil sealer lasted much better. It appeared to have a few minor cracks in the coating by the end of the test, but the linseed oil protected the underlying wood from extensive damage. These will be sanded and recoated for further testing.



Using Linseed Oil to seal the wood before coating provided some benefit in preventing water damage, even when the coating film had small areas of failure. We hope to do more research here and find a way to evaluate this method of sealing the boards before coating.



Aliphatic Urethane failed almost immediately. The manufacturer has suggested an alternative coating and application procedure. These will be included in the next coating tests.

For more information see other instructions including:

See the 2005 Bed Wood Test.

See a final summary of this bed wood test.

See the June 2010 update.

Find out more about the original wood finish testing.