Weathering Narrow Gauge Steam Locomotives

By
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1. Locomotives Characteristics

a. Study prototype photos past and present. Use these pictures as a guide to determine how and where a locomotive weathers and ages.
b. Determine what type and degree of weathering you what to achieve on your locomotive.
   - For the most part the D&RGW "C" class engines were dirtier than "K" class locomotives in the 1940's.
   - K-36 class locomotives numbers 486 and 488 for the most part were dirtier then the rest of the "K" class locomotives in the 1940's and early 1950's. Number 483 was the cleanest.
c. We as modelers tend to over-weather our rolling stock as compared to the prototype. Keep this in mind when you are applying your weathering.

2. How does a locomotive get weathered?

a. Soot, water, rust, coal, road (right-of-way) grime, lubricating oils, sun, internal heat of the boiler and tender all work together to different degrees to age a locomotive. Soot and dirt kicked up by the running gear, draft, and wheels are the most apparent.
b. Soot weathers back and down the locomotive. Pictures will show soot-covered smoke-boxes that appear as black as the boiler, yet the front of the smoke-box/boiler face is still clean/silvery.

a. Dirt is kicked up and carried with the draft of the moving locomotive and is most prevalent on the running gear and the tender's lower edge. Dirt kicked up on any moving object forms patterns or waves. The rear axles of a locomotive get dirtier then the front due to this draft/wave motion. Dirt will form on the front edge of a tender, taper off some over the front truck, thicken up in the center, taper off again over the rear truck and thicken up again on the rear edge of the tender.
b. Rust is formed in areas where there is standing water or repeated condensation. Rust will form around the tender deck lip, water hatch were it is bolted onto the tender but not necessary on the lid itself. Rust will also form on locomotive boiler washout plugs after a few months of service. Rust can also be found on boiler sheets seams under the steam turret where water collects, on the counter weight under the air pump and on the firebox in and around the cock valves, and on the tender leaf springs. Rust can be found on tender sides depending on the age or if bolts have started to rust. K-37's #492 and #497 had significant rusting on their tenders in their later years.
c. Grease can be slung out onto counter weights from the axle and rods where they are attached to the counterweights. This is an often overlooked detail.

3. Getting Started

a. Tools
- Good "CLEAN" airbrush. Clean it before your project regardless of how clean it was when you put it away.
- Compressor with an air tank and regulator for a controlled and constant source of air. You can purchase a good quality air compressor from Wal-Mart for under $100. This is much cheaper then "model" air compressors.
- Safe, clean spray area and respirator if necessary
- 'Lazy-susan' . Place your item on the 'lazy-susan' and turn as needed to paint it without having to touch it
- Paint with same type of lighting your model will be displayed in.
- Latex type disposable cloves
- Lint free towels for spills.

- Foam cradle to hold your engine upside down while you spray the running gear when it's running
- Small plastic blocks (Lego works great) to support the tender up off the 'lazy-susan' so you spray the underside of the tender edges.
- A practice spray item (I use a piece of white styrene with portions painted gloss black). This ensures the color(s) are what you want, and that the paint is flowing as it should with regards to mixture ratio, volume and force. I practice spray my dirt and rust on the black, and my black on the white.

b. You and the paint environment

- Do you have enough time to do this - always add an hour plus to a project. Avoid interruptions.
- Wear a nylon jacket to prevent lint from your clothing from getting on your finish. Or just wear shorts. Lint from your clothing is the biggest contaminant you will have in your paint area.
- Turn off your heat or AC if there is a chance that something (animal hair, carpet lint, dust, etc) will be carried by your system.

c. Paints

Floquil paints seem to work the best for me for airbrushing weathering. Paints and Dio-sol mixtures I use - and for what – are as follows:

- Engine Black, 70 percent Dio-sol. Soot, coal dust and final blending color.
- Rust, 70 percent Dio-sol. Using sparing on the tender sides and tender wrapper bottom. Internal water leaks will show up on the tender wrapper bottom. Rust can also be use on the smoke box to show aging and wear cause by internal heat and outside elements effecting this area at the same time.
- Earth 20 percent, Roof Brown 10 percent, Crystal Coat or High Gloss 5 percent, 65 percent Dio-sol. Road grime color, dirt kicked up from the roadbed. The Crystal Coat or High Gloss allows this mixture to flow on smoother then a flat pigment.
- Semi-gloss black. Grease (dry brushed).
- Flat sealant used to protect your weathering. I find PBL flat very easy to use and dries to the touch within 30 seconds. This is a huge advantage in preventing contaminants getting on your finish.
- Floquil Flat, Crystal Coat/High Gloss. Used to secure coal and cinders
- Testors Leather. Cab arm rests.
- PBL's Flat. Final sealant coat. This paint dries in 20 -30 seconds and does not require any baking.

NOTE:

a. These colors are for suited for D&RGW NG weathering scheme.
b. The mixture ratios are not scientific or a steadfast rule. Your ultimate goal is a spray pattern (individual drops of paint) so fine that it cannot be readily detected by sight. Remember to use your practice item first.
c. You'll notice I never mentioned Floquil Grime. This is not a forgiving color. It goes on looking great but it dries to an almost white finish, which does not represent weathering. Floquil Grime is a good color for cement and flour spills.

4. Weathering Your Locomotive and Tender

a. Start with a newly "shopped" locomotive. The glossier the better. Unless your intent is to weather a locomotive that is rarely cleaned or shopped, the contrast of gloss/semi-gloss, weathering and flat finishes will make a striking showpiece. Before you begin to paint, always ensure the surface is free of flux, oils or anything else that would prevent the paint from bonding to the surface.
b. Brush paint the cab arm rests Testors leather and let dry for about 45 minutes or longer.
c. The first color you should use is rust. Why rust first? Because rust forms on metal not on dirt, your road grime color will cover the rust.

- To help bring out interior tender bunker detail(s) give the inside of the tender bunker a few shot of rust in the corners and on the reinforcement bars. This will give you nice contrast with the coal load and Engine Black coal board sides when you're finished.
- Spray rust on the front leading edges of your tender to represent internal water leaks coming out of the tender wrapper in this area. Most "K" class tenders when full with coal and water sat lower on the front truck, therefore water flowed in this direction and drained out. If desired, spray light rust streaks down the tender sides. These rust streaks and drainage stains should be faint.
- Lightly spray the underside of your locomotive with rust while it's upside down in your foam cradle and running at slow speed. I like to spray the rear counter weights and wheels a little more rusty than anywhere else. This portion of the running gear gets the most weathering due to heat from the firebox, ash pan, cock valves, air pump water condensation and the scouring effect of the dirt hitting these moving parts.
- You can also spray light rust streaks on each side of the fire-box to represent the metal heating and cooling effect. You'll paint soot over these streaks later on.

d. Spray your road's grime color on your locomotive while it running at a slow speed in the cradle so the weathering gets evenly applied. Once done, set it on the 'lazy-susan' for the rest of the weathering.

e. Using your road grime color, start to spray the entire engine and tender from front to rear, with fine, misting coats. Using your Lego, prop the tender up and spray along the tender frame and trucks to match what you have on the locomotive running gear. Make repeated passes in order to get the desired weathering and aging effect. Make very light vertical streaks on the tender sides and on the locomotive steam turret. When you think it's still too light - **STOP**. Step back, relax and take a hard look at it. You'll be surprised that you have used very little paint and achieved realistic effects in a short period of time. Remember that we modelers tend to overdo weathering!

f. Now spray the Engine Black on the smoke box and stack to get the soot effect you want. I spray from the center top vertically down the side of the smoke box as soot would fall (repeat for the other side). Once done, the top of the smoke box will be more weathered than the sides. Study pictures for patterns. Then give the engine and tender a complete overspray of Engine Black. Give the tender coal boards a few passes. This will simulate coal dust on the top of the tender sides. Spray

the tender deck to blend the rust in. You can use this color also to bring out/blend streaks on the tender. I spray Engine Black along the coal boards and along the top edge of the tender, muting some the weathering to represent this portion of the tender that does not get as weathered as the bottom does. This helps to bring out the illusion of the road grime being picked up and carried on to the tender from the draft. Engine Black will blend and mute your rust and road grime colors so neither one stands out over the other. For heavier soot, spray the locomotive at a high angle starting at the firebox and working back along the center top of the boiler to represent soot hitting these surfaces while the locomotive is in motion. My suggestion at this point is to wrap it up for the session and take an extended break.

NOTE: I am not a fan of baking weathering. My main concern is the temperature could affect your decals. Besides, you have used so little paint that it will dry very quickly.

5. Finishing Up/Highlights

a. Bragdon Pigments. I cannot say enough about this outstanding product. They come in variety of weathering colors and are not chalk but finely ground up pigments that will adhere very well to semi-flat or flat finishes. I use these in areas that I want to highlight and where I need exact control which I cannot achieve with an airbrush. Examples are additional rust, soot, dirt, steam turret water leaks, etc. Apply the pigments with a brush and dust off the excess. I find that I have much better control with the pigments and they are tremendously more forgiving then airbrushing. These pigments do not disappear as readily as chalks do when oversprayed with sealant. If necessary, you can add these pigments to your locomotive after you're done and they will stay in place.
b. If everything looks good, seal your work with a clear flat or semi-flat as you see fit. Give areas that are pick up points extra coats so not to damage the weathering or finish.

c. Clean all electrical points.
d. Add glass to windows. Use Floquil Crystal Coat to "glue" the glass in place.
e. After you have the coal load in place (secured solidly in the bunker with glue) drip Floquil Crystal Coat or High Gloss onto the coal load. Don't brush (it will splatter - trust me) but dab it into the corners. Once the load is covered sprinkle on scale chunks of freshly ground coal and let dry. This will give the coal load a nice luster. When I do this, I have the tender front directly in front of me. I place a Post-it-Note over the front of tender and bring the brush up and into the coal load in this direction. This will avoid any paint getting where it shouldn't. Is this luster prototypical? Yes, for an experienced fireman would hose the coal load down just before departure to reduce the coal dust; hence clean, shiny coal.
f. Add finely crushed coal representing cinders to areas on the locomotive and tender where they would gather. Cinders were generated by the hard work of the engine when either starting or going uphill and would fall back onto the locomotive from the stack as it is moving forward. Areas where cinders would collect are: running boards next to the boiler where pipes would catch cinders, base of steps on the running board, cab roof electrical conduit, cab roof hatch, cab rain gutters, sand and steam dome bases, pilot decks, tender deck corners and along conduit piping. In some videos you will see crews flooding the tender deck to wash off the accumulated cinders. Secure cinders with Floquil Flat, applied with a fine tipped brush.
g. Add crew and working essential details such as shovels, water bags, oil/lube cans, tools, chains, water hoses (angel hair electrical wire), etc. to your locomotive and tender. From my readings and first hand experience, firemen rarely hung their shovel on the tender sides. Losing a shovel would be real bad news on a run! Most engines had shovels in them as a back up due to more than one shovel being lost into the firebox by fatigue and the strong draft created when the engine was moving with a full head of steam. The D&RGW issued their shovels to the fireman, not to the locomotive. It was thus ultimately the responsibility for the fireman to have his shovel when he reported for call. Extra shovels were mostly stored on the top of the back head, next to the front cab wall.
h. For grease stains, use a fine tipped brush and lightly dry-brush gloss or semi-gloss black paint radiating out from the axle centers on the counterweights/wheels. Grease is normally slung out in straight lines from the axle - similar to the hands on a clock.
i. Cab Curtains. There are three separate curtains for most D&RGW NG locomotives. One for each side then a short top curtain running from side to side on underside of the cab roof.

I make my curtains from of tissue paper cut to the "approximate size". From what I have been able glean from pictures, the side curtains had three tiers to them. When opened the top tier some how attached/draped(?) along the top front edge of the tender. The second middle tier covered the open areas between the tender and locomotive sides. The bottom tier hung down below the deck plate. When closed the side curtains were accordion-folded to the cab and secured with straps. You can paint and stain a piece of tissue paper first then cut to size and attach or paint and stain after they are attached. If you paint them first lay the tissue on wax paper. The first coat of paint was Floquil Concrete, then Aged Concrete. While both the concrete colors were drying but still somewhat wet, I added a bit of white here and there and brushed it into the overall muted colors. This gives a new canvass/tarp look. Add weathering chalks or Bragdon's pigments to age them to your liking. I give the finished tissue paper a few coats of Testors Dullcoat for a little more strength. The top curtain was cut so the bottom of the curtain is curved to the same curvature of the cab roof. On the top curtain I touched engine black to the bottom edge. The black paint was sucked up into the tissue leaving a blackish "soot/dirt line" along the bottom edge. I secured them to the cab with ACC. The top curtain was folded 90 degrees at the top with about a 1/16th of an inch of a fold towards cab. I put ACC on the fold and secured it to the cab roof. As the ACC sets up, press it into place making a nice 90 degree fold as it would be when hanging down. For the side curtains, accordion fold the curtains to the shape(s) you want. Attach them with ACC to the cab. To have tight folds or where straps hold the side curtains tight apply a little bit of ACC in the folds and press together with tweezers until dry. Use 1/2mm or 1mm black drafting tape for straps and you have some realistic curtains. I think these curtains help disguise the large gap we need between the locomotive and tender, and provide very realistic detail.

You're Done!

NOTES: _____

PBL: http://www.p-b-l.com/
Bragdon Pigments: http://www.bragdonent.com/index.htm

Simple but Vital Tips to Preserve Your Masterpiece

Handling Your Locomotive: I strongly recommend that you never pick up your equipment with bare hands - wear clean cotton gloves. Your skin oils will get on and into the finish and damage it. Never touch your locomotive with sweaty hands - sweat will destroy a finish. BEWARE: when you are placing your locomotive and tender down, your cotton glove may catch on piping or rerailing hooks. If this happens, gently untangle the glove from the locomotive or tender. If that doesn't work, remove your hand from the glove and free it this way. I pick up my tenders by their steps and the locomotives under the cab and walkway near the steam chest. These areas are very easy to touch up versus tender sides, air reservoir tanks, cab sides, steam chest, etc.

***Mistakes*:** If you make a mistake on some factory painted locomotives or a factory painted locomotive's weathering is not to your liking there is hope. Mineral Spirits will remove Floquil paints but leave the factory paint and pad printing intact. It will return your piece to as clean as it was the day it was painted. I know this works on PBL K-36 locomotives and their newer run C-19s. Even the coal load will remain intact. So if you're frustrated with someone else's weathering try this before you strip it for a total repaint.

Packing Your Locomotive: ALAWYS wash the protective plastic wrap your locomotive and tender comes in. Why? Because oil and grease from the running gear may seep onto the plastic. These oils will in turn bleed into and stain your finish. To avoid this ugly mistake, wash the plastic in hot dish washing soap and let air-dry.

Working on a Finished Locomotive: Eventually you will have to work on your locomotive. Wear your gloves (latex or cotton) as much as you can. Use tissue paper to protect the locomotive and tender when it's in a foam cradle. Foam is somewhat abrasive and it will wear on a finish. Place a new and clean tissue between the locomotive and foam for protection. Plastic sheets work better then tissue paper - just remember to wash the plastic after every use. Wash your foam cradle periodically to remove oils and grease. DO NOT use tissue paper if you are painting while the locomotive is in the foam cradle - use plastic. The tiny lint particles from tissue paper will find a way onto your finish…trust me, they're very good at this!

Main and Side Rod lubrication: Oils will act as a solvent on paints. If at all possible, use PBL's Neo-Lube which is graphite suspended in liquid and is a great lubricant. It dries to a steel black color in seconds and leaves no residue that will transfer onto anything once dry. Another advantage of Neo-Lube over oils is that oils attract dirt, dirt affects performance and you will eventually have to clean these areas. Neo-Lube will save you a lot of touch-ups and cleanings over the life of your locomotive.

Credit to Others. I cannot take total credit for all these techniques. They come from many fine modelers and some of my own creations. I would like to thank and give credit to William Adkins, Al Boos III, Jimmy Booth, Jim Brown, Kelley Morris, Roland Shilladay, and Roger Watkins. Randy Smith took the model photographs and added the pictures to this document.