

Rust Worthy

There are many methods for rusting steel, each arriving at a different color or texture.

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Steel fence panels. Rusted with apple cider vinegar. Finished with boiled Linseed Oil. Madison Park Garden by Robert Edson Swain, Architecture + Design. Contractor: Krekow Jennings Patina Fabrication: Architectural Elements. Photo: Ken Gutmaker

If there is a signature material for Pacific Northwest modernism, it's rusted steel. These mottled, leathery surfaces are as ubiquitous in the Northwest as they are beautiful. Many of our clients love the appearance and variations of rusted steel.

Although allowing this durable and dense material to patina naturally is a good concept, this approach is sometimes unrealistic for our projects. The air is incredibly clean in the Pacific Northwest, which translates to minimal (if any) acid rain. Acid rain and the dry deposition of acidic particles

lead to the corrosion of metals, i.e. rust. Despite the tendency for steel to rust if left unsealed, it may take years for a steel surface to rust evenly.

To satisfy our requirements for a specific and consistent appearance, we proactively patina steel before installation. While contractors are becoming more acquainted with rusted steel patinas, we often turn to our own material research to achieve the desired colors and textures.

All patinas first require some measure of removing the existing oil and mill scale from the steel. This can be

achieved with acids, such as muriatic acid, sand blasting, sanding, brushing or a combination of the four. Rust will begin to form naturally after cleaning the surface, but requires further treatments to achieve an even patina.

There are many methods for rusting steel. By exploiting the chemistry of the individual alloys that compose mild steel; each method arrives at a different color or texture. An alkaline mixture of salt water creates a red-brown form of rust in steel by corroding its content of hematite. A solid red rust will form on the outside



surface of lepidocrocite. An orange rust will form on goethite. Heating steel will convert Iron Oxide to magnetite, which takes on a black hue.

Many commercial patinas with a wide range of color and depth create reliable results quickly. The breadth of patinas available by companies like Sculpt Nouveau and Birchwood Casey are impressive. Ferric nitrate, for instance, with different temperatures and application strengths will create a range of bright colors including yellow, red and purple. Commercial

formulas can create consistent results, but first require experimentation with mixture, temperature and application durations.

To ensure that the patina does not continue to change after the desired effect is reached, the surface must be depleted of oxygen. This is achieved by sealing the steel with a finish. There are solvent lacquers, acrylic urethanes, water-based sealants, oils and waxes made specifically for sealing metals. Oils need occasional maintenance, but penetrate well and

leave a beautiful rich finish. Waxes should be used after an oil or lacquer coating, and may need reapplication every six months. Products like solvent lacquers are durable, but often leave an unnatural sheen. This sheen can be reduced by coating with wax after the lacquer cures.

We highly recommend testing several finishes on a final rust sample before making a decision. Occasionally a finish will react negatively with chemicals remaining on the steel from the rusting process. These reactions can take weeks to show, so it's important to test finishes as early as possible.

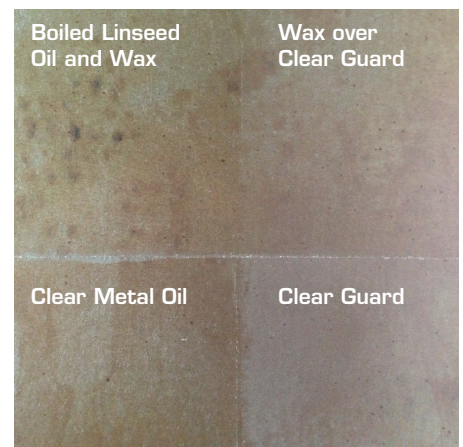
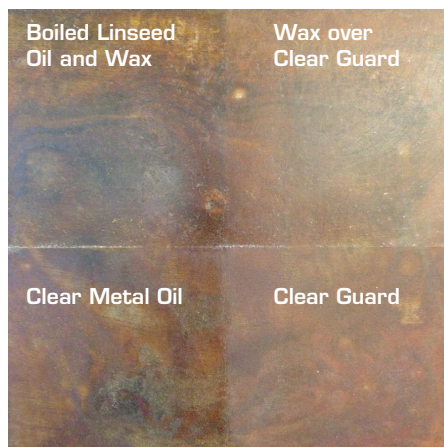
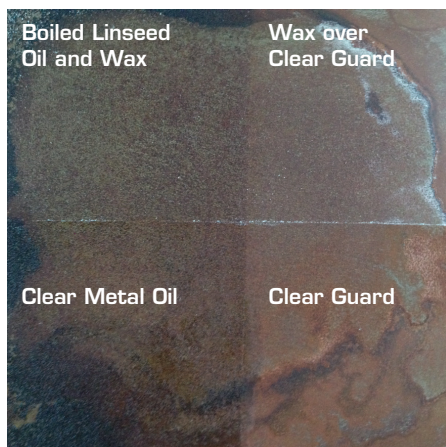
Recently, Sculpt Nouveau provided us with several patinas and finishes to experiment with. In addition, we tested a home-made patina (hydrogen peroxide, vinegar, and salt) and finish (boiled linseed oil and wax). Some patinas call for heating the steel during or before application, but we feel it's unnecessary with the wide range of available cold patinas on the market. For these tests, we focused on cold processes.

The images and descriptions following are a sample from these tests on hot-rolled steel. ■

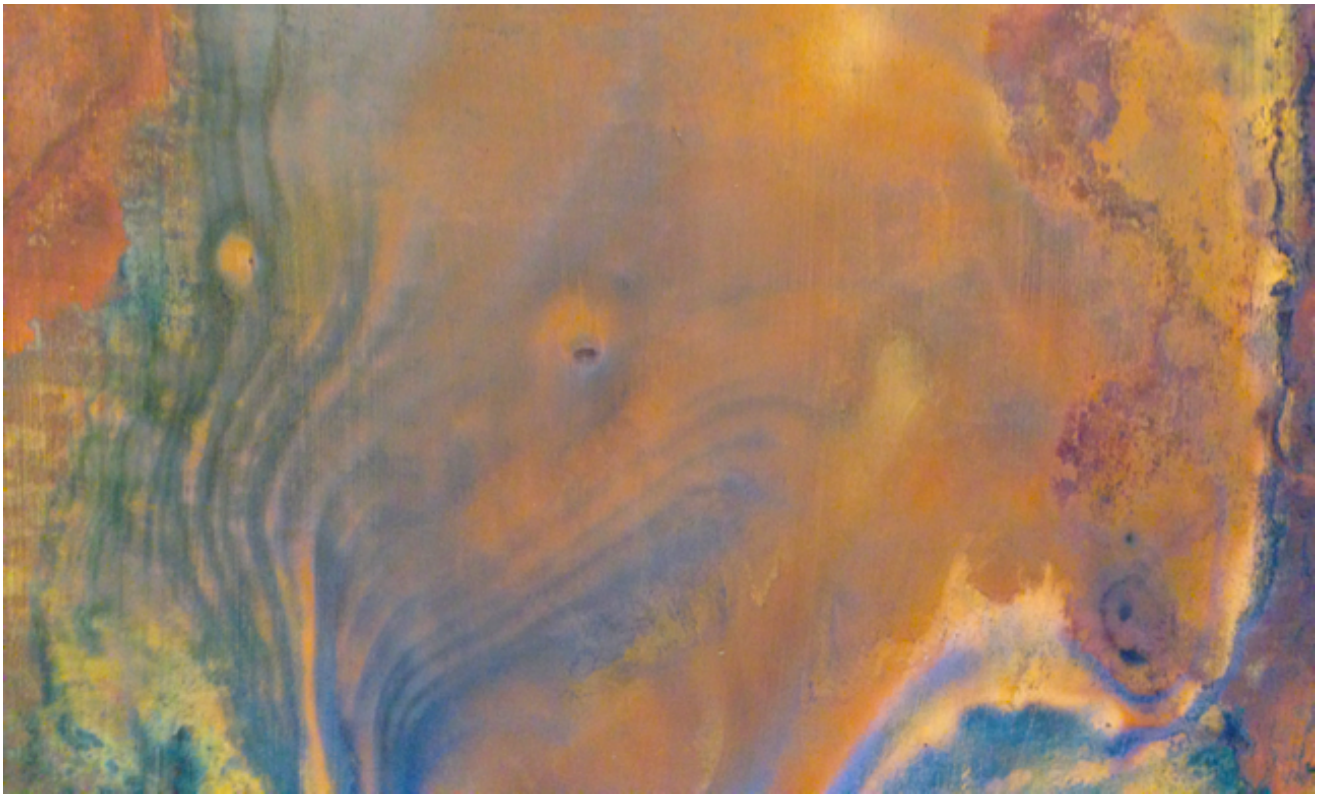
Deep Brown. Very close in appearance to blackening. 5 minute reaction. Apply multiple coats. Boiled Linseed Oil shows the most depth in this sample.

Ferric Nitrate. This is a slow reaction on steel. Allow to dry between many coats. Because of it's slow nature, consistent results are difficult. This sample shows the most depth and color with Clear Metal Oil.

Raw steel. This is the control sample, with a day of rust from air moisture. This will occur soon after removing all oil (we use muriatic acid). The different finish tests hardly affect the appearance.



Appendix. The next two pages are included in addition to the original Premier Builder article published in September 2015. These are a few samples that could not be included due to size constraints.

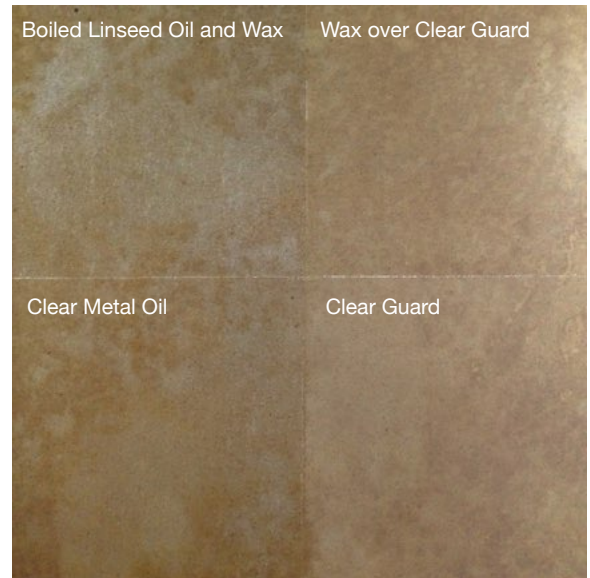


Ferric Nitrate. An incredible range of rust colors is possible through chemical reactions. This sample shows the unpredictable nature of Ferric Nitrate compared to the previously shown sample.

Japanese Brown. Instant reaction, luminescent golden rust. Easy to gain consistent results. Boiled Linseed Oil and Clear Metal Oil show the most depth in this sample.



Antiquing. Instant reaction, luminescent golden rust. Easy to gain consistent results. Boiled Linseed Oil and Clear Metal Oil show the most depth in this sample.



Tan. A very light, reflective, luminescent patina. Apply minimum of two coats. Fairly fast reaction. Matte Clear Guard is a



8oz Hydrogen Peroxide, 1oz vinegar, 1 tablespoon salt . Slow reaction, leaves a deep etc on steel. As with Ferric Nitrate the slow reaction is difficult to control.



Ferric Nitrate & Japanese Brown. We experimented with a few combinations to achieve desired effects. This sample combines the luminescence of Japanese Brown with the mottled appearance of Ferric Nitrate.