ARCHITECTS MEMO
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in the eye of the beholder

I believe that I would be on pretty safe ground in saying that the appearance of rust spots on a coated mild steel surface would be one of the least welcome sights – they are so often the harbingers of fundamental issues, often necessitating costly maintenance. Rust continues to be a costly problem.

It is not as if we haven't made headway in the treatment of rust prone surfaces with greater advances in the last two decades of the last century than in the first two of this. The automotive industry has led the way using total immersion baths to chemically remove any rust from the base chassis, and, more importantly, in a second treatment, passivating the complete chassis surface by using elegant conversion coatings, primarily based on complex phosphates, and effecting the deposition of a uniform, corrosion-resistant, chemically bonded passivating layer.

One can attempt to emulate these treatments for field application but, without the precise controls of temperature, concentration, pH and dwell time, which can be achieved in an on-line process, the field results are but a shadow of the former.

The automotive industry can also take advantage of one of the most significant coatings advances ever – electrophoretic application. The principle of this method is to formulate a paint, generally a colloidal suspension, which can hold an electric charge, and charge a tankful of it directly using electrodes. The car chassis is dipped into this tank and an opposite charge is applied to it. The charged paint particles are attracted to the counter charged chassis and move to the chassis surface, insinuating themselves totally into even the most inaccessible nooks and crannies protecting areas that other painting methods cannot reach.

The final elegance of this method is that as the primer film builds it also insulates the surface and conductivity drops off such that a very uniform film thickness results.

The corrosion behaviour of steel can be readily altered by the addition of various alloying materials and all will be aware of the minor miracle of stainless steel. Corten steel is another such family of steel alloys, which is designed for corrosion resistance and increased tensile strength – hence its portmanteau name. As is well recognised, the corrosion resistance is reduced only and can still be relatively high in humid and marine environments. Staining run-off onto adjacent areas can also become a problem.

Iron is chemically interesting being a transition metal. Among other things, this means that it has several oxidative states combining with oxygen and water to give a wide range of oxides and hydrated oxides. Transition metals are noted for producing coloured compounds and iron oxides range from yellow ochres and reds to browns and black. Iron oxides and hydrated oxides are quite voluminous creating a fairly soft, friable layer. While one wouldn't want to lean up against such a surface in one's best whites, they do produce a lovely texture and mattness.

Such surface characteristics have led to Corten steel being used for aesthetic reasons alone while trying to accommodate the associated difficulties.

I am with the aesthetics here - the soft merging of the various tones and textures can look stunning. It is the same sort of beauty you see in many older homes, especially in Italy, where gentle neglect erodes and exposes lower layers of coatings creating a palimpsest of a more genteel and prosperous history – but I digress!

continued overleaf...

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A much more synthetic way to create rust is to paint it on! 'Faux' rust paints have been around for some time with varying degrees of commercial success. We at Resene have trifled with such a rust-effect system in the past but have recently got a little more serious over it – after all, we currently market a product that is already most of the way there! I refer to a product branded as 'Magnetic Magic', which is a basecoat formulated with high levels of iron such that, even when overcoated, a fridge magnet will stick to it. We certainly know that it can rust as we had to put in quite some effort in order to prevent rusting in the can and subsequently on the wall.

The focus for the 'Faux rust' effect was to develop a post-applied activator that would produce a 'reproducibly variable' and aesthetically pleasing effect. This was an interesting and illuminating exercise where we discovered the telling effect on rust development that various metal salts, added to the activator, could have on the final outcome.

Pleasing as this final outcome was, the 'Faux' rust has the same weakness as the real rust on Corten steel; it can rub off on clothing and, while stain run-off was less important in what is principally an exterior product, finger marking could be an issue.

These weaknesses in both products can be readily overcome by the application of any one of a range of clear film forming coatings – but only a vandal would pursue that route for Corten steel. All of the beautiful features that I waxed lyrical about earlier are destroyed; one might as well whitewash the Sistine Chapel Ceiling.

The real challenge was, and as has existed for some time, to be able to design a treatment to improve the durability of the rust without altering the aesthetics. The fact that I am penning this memo is a fairly strong clue that we have a marked degree of success. In a show of bravado, we have also applied it to Corten steel and can report a significant reduction in stain run-off. We believe that the treatment may require to be redone every couple of years depending on the severity of the environment. Although this may sound onerous, the treatment is very easily and thinly applied and won't break the bank. It is also waterborne.

At the time of writing this final treatment has not been launched. I tentatively and humbly suggested it be called 'Patina Protect' but was outmuscled by 'Steel Oil'!