

Pickled surfacing increases roughness range

As an alternative to acid pickling, an Eco Pickled Surface (EPS) is achieved by bombarding the surface with an acid-free slurry, the velocity of impact controlling the surface roughness.

OVER the last few months US company The Material Works (TMW) list of Eco Pickled Surface (EPS) success stories has grown and so has the list of EPS users.

Running a normal production allowed TMW the consistency it needed to develop power settings it can simply 'punch in' to produce three different roughness ranges.

Until EPS the only option was acid pickled with only a surface roughness option: whatever happens to be underneath the mill scale.

The following are the three surfaces currently being offered with TMW's Alpha EPS line and the Ra (roughness average) range typically expected from each:

- R90: 80 - 100 microinches
- R110: 100 - 125 microinches
- R130: 125 - 145 microinches

The Beta EPS line due to be introduced in the second half of 2010 will add R70 to this list by brushing the surface after blasting. The R70 finish will typically fall into the 60 - 80 microinch range.

Since a 'selectable surface' is a brand new option in a pickled product, there are undoubtedly questions. The following are the most common ones, but do not hesitate to contact TMW to discuss any further issues.

How does the EPS process work?

At the core of the EPS process is slurry blasting. The slurry - a mixture of water and angular steel grit - is propelled on to the strip in a uniform stream that removes surface scale without removing the base steel. The extent of oxide removal is at least as thorough as acid pickling, but slurry blasting also conditions the surface so it is cosmetically uniform and there are no acid pickling's chloride residues that can accelerate rusting in conventionally pickled steel.

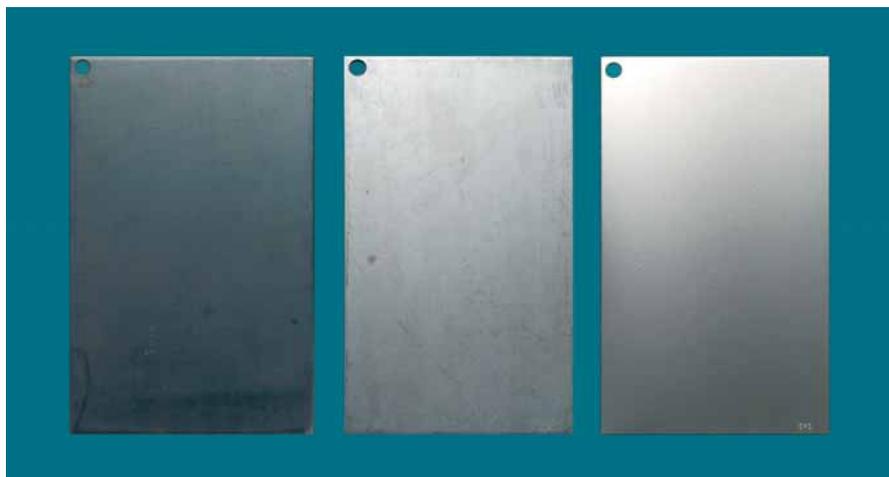
Slurry blasting is superior to dry shot blasting for removing oxides from strip. First, the angular steel grit is propelled on to the strip's surface at a slower speed. Then, water in the slurry not only cleans the grit it 'power washes' the strip surface, leaving it clean. This prevents grit and removed contaminants from being embedded in the blasted surface.

EPS processing also shape corrects material through tension levelling. Pulling forces are generated between the entry-side leveller and the exit-side recoiler to reduce bow, edge wave and even minor coil breaks.

How 'Green' is the technology?

The EPS working media, steel grit and water are recirculated for re-use. There are no hazardous chemicals or by-products involved. The removed scale plus any depleted grit filtered from the system can be used in other industrial processes or recycled with scrap steel to the EAF. The EPS processing burns no fossil fuels for process heat so energy costs are stable.

Contrast that with acid pickling's volumes of



Samples of the same coil of hot band. The one on the left is untreated, centre is acid pickled and right was EPS-processed

hazardous hydrochloric or sulphuric acid and the problems of storing and disposing of the spent pickle liquor. Acid pickling also has immense energy requirements due to the natural gas consumed in heating the acid tanks.

Why should I care about higher surface roughness?

Paint adherence. Customers and paint companies repeatedly say that a higher surface roughness results in improved paint adherence. Improved paint adherence plays a significant role in better salt spray test results.

EPS yields excellent salt spray test results for many reasons including a cleaner surface than typical acid pickled, no chloride salts as in acid pickled and it can be used dry so there is no oil to remove as there is on acid pickled. Surface roughness can be controlled so TMW can leverage this feature that only EPS processed steel can offer.

Why not just go as rough all the time?

Different processes benefit from different roughness.

- If corrosion test performance is of the utmost importance, a higher roughness can be ordered contributing to improved results.
- If producing cold roll or draw stamping, a smoother surface is preferred.
- Some companies do not want to sell the EPS advantages to their customers until they convince them it will replace their Pickled



TMW's Alpha EPS line

and Oiled (P&O product). Perception is everything so they want it to look like P&O just to get started. If a company chooses this way to approach its customers, a smoother surface and light oil is recommended to start. It truly is a head to head acid pickled replacement, bring on the advantages and later offer EPS dry with a higher roughness.

How does EPS produce different average roughness?

The EPS process employs a slurry blasting process to remove mill scale. To increase roughness the speed of the blasting wheels is increased, thus increasing the velocity of the slurry mixture. Faster slurry creates taller peaks on the surface.

Does a rougher surface provide a poor paint finish?

Because the EPS process actually creates the surface, the finish is uniform at every surface level offered. It is the difference in roughness that can exist within relatively small areas of a sheet that causes a poor quality paint finish. The slurry process creates the peaks and valleys that comprise the EPS finish, so as a beneficial by-product the EPS peaks are very consistent in height.

How do EPS surfaces compare to other surfaces?

To put this in perspective typical Ra values of other materials are:

- 304 2b Stainless: 5 - 20
- CR regular matte finish: 35 - 65
- P&O (acid pickled): 55 - 75
- Temper pass CTL P&O: 40 - 60
- Temper passed Hot Roll: 25 - 45

As the EPS finish is so consistent (low Rz value) it feels smoother to the touch and can provide a better looking paint finish than other finishes with a lower Ra and a high Rz. ■

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