

SMOOTH SURFACE

A few tips to achieve the ideal surface finish for which stainless steel is known

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From appliances to structural parts, sheet metal housings and architectural adornments, stainless steel is often the material of choice. This is because of the unmatched surface finish that can be achieved. Choosing the right equipment and consumables, however, is essential to achieve that fine finish. Beyond the finish, manufacturers are also looking for the proper equipment that can get the job done faster with less operator fatigue.

The final step in achieving a mirror finish on a stainless steel tube is using a buffing wheel and a polishing paste.



Fine grinding, by definition, is the blending of the weld to the surface of the metal for a smooth, consistent and attractive appearance. To produce the desired finishing results on stainless steel grades, there are a few tips that can help. And they often boil down to how today's handheld grinding equipment and consumables can affect a better outcome in a metals fabricating shop or manufacturing facility.

WELDS ON STAINLESS STEEL

One of the first items to tackle when producing a desired surface finish on stainless steel is dealing with the welds created in the fabrication process. Part of that process includes the regraining of the material near the weld. To begin the graining process on a stainless steel weld with a pregrind, it's recommended to use a pneumatic right-angle grinder with a plastic support plate with a cooling effect ▶

and an 80-grit fiber disc. To finish the job, use a pneumatic drum using a straight grinder.

Additional suggestions include graining the surface with a right-angle grinder with nonwoven, medium or high-hardness finishing discs as well as grinding the weld bead with a 120-grit grinding belt and following it up with a 40- to 320-grit finishing belt.

Weld beads can be an undesired aspect of the welding process that must be removed. In structural steel miter joints, use 60- to 150-grit zirconium fiber discs to remove the beads. Then, use a drum sander with a 40- to 220-grit zirconium blend belt. Cover with a template. It's also suggested to use a surface conditioning belt to achieve the final desired surface finish. For a satin finish, use a 100- to 200-grit fine flap brush.

For welds on corners, squares and rounds, many manufacturers need to blend the welded surfaces to produce an attractive welded connection.

This is especially true on stainless steel railings. To properly blend these welded surfaces, use 40-, 60- or 80-grain belts in a belt grinder to grind down the weld. Then, use a coarse, medium, fine or ultrafine conditioning belt to blend the surface.

Blending welded surfaces on corners, squares and rounds is the key to producing attractive welded connections on railings.



For flat surfaces, use an elastic drum and nonwoven nylon flat brush. For pipes and tubes, use a tube polishing wrap. Grain sizes to 320 will produce the desired results even on extremely small radii.

Getting a smooth surface finish on inside corners of a stainless steel component can also be difficult – but fortunately, there are tips for that, as well. Begin by smoothing the weld with an electric angle grinder with an

80-grain mini flap wheel. Then, fine surface grind the area with an electric angle grinder and soft disc – anywhere between an A160 and A16 grain – with a 3M Trizact grinding wheel. Finally, an electric file and nonwoven pads – between 60 and 400 grain – will define the surface grain.

TOOL NEEDS

The proper use of the regulated speed on the grinder also helps achieve an optimal surface finish, so it's key to choose tools with speed regulators. To make the tool easier to use while also reducing operator fatigue and increasing finish quality, choosing a tool with an adjustable belt grinder arm is a good idea.

With the goal of reducing downtime and operator fatigue – no matter the product at hand – tools that offer quick-change tooling systems and portability are available. When a portable tool has a detachable handpiece, the weight of the entire drive unit doesn't need to be carried. ▶

To fine grind the shaft and flanks of an extruder feed shaft, it's recommended to use a roll attachment.



Operator fatigue can also be reduced with portable models developed specifically for working in confined and hard-to-reach places.

It's also helpful to look for dust-sealed tools with low noise levels and vibration-free operation as dust, noise and vibration can be harmful to operators. Air-cooled induction motors also provide long service life and minimum wear.

THE PEEL EFFECT

While welds can create a bit of a hurdle when attempting to produce a smooth surface finish, other types of metalforming can also be detrimental to the surface of stainless steel. One of those issues is referred to as the orange peel effect.

According to Industrial Metallurgists LLC, the orange peel effect "is a cosmetic defect associated with a rough surface appearance after forming a component from sheet metal. It is called orange peel because

For welds on corners, squares and rounds, many manufacturers need to blend the welded surfaces to produce an attractive welded connection.

the surface has the appearance of the surface of an orange."

To eliminate this effect, start with a rough prep using a 40-grain belt. From there, fine grind with a soft contact roller and a belt, such as an A160 Trizact belt. For a satin finish, use a soft contact roller and medium surface conditioning belt. To achieve an industrial-grade finish, use a flap brush and 220-grain abrasive pad. ▶

A pneumatic drum using a straight grinder can help manufacturers achieve a smooth finish on stainless steel.



FINISHES ON SPECIFIC PRODUCTS

Some stainless steel products can be more challenging than others when producing a fine surface finish. Something as common as a stainless steel tube comes with its own difficulties when attempting to achieve a mirror finish.

To overcome these challenges, prepare the surface of the tube with a belt grinder using an 80- to 120-grit zirconia belt. Then switch to a surface conditioning belt for medium to ultrafine finishes. Use a pre-polish wheel and polishing compound. Finally, polish with a polishing wheel and polishing compound, then complete the mirror finish using a buffing wheel and a polishing paste.

For extruder feed shafts, start with a preliminary grind using a belt grinder and between a 40- and 80-grain zirconium corundum belt to grind and polish. Work the flanks with 80- to 120-grain Velcro fiber wheels. Fine grind the shaft and flanks with a roll

attachment. Polish with twisted polishing rings and polishing paste. In the case of prepping and finishing pressure vessels, a typical No. 4 finish with a roughness average of 15 to 25, use a 40- to 320-grain belt grind and finish with a flap brush. For a satin finish, use a nylon flap brush followed by polishing with a buffing wheel and a cutting/polishing compound.

Commercial foodservice grills are another type of product that needs to be made with stainless steel and requires a clean, smooth finish.

Reducing surface weld beads is a key challenge on these grills. That challenge, however, can be overcome by rough grinding with a pneumatic grinder with 36- to 80-grit discs. Finish grinding with a pneumatic drum with a 40- to 220-grit abrasive belt is also recommended.

Finally, work all surfaces with an extended pneumatic straight grinder and 60- to 240-grit fiber brushes. Finishing discs of synthetic fiber, ▶

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grit and resin will complete the job, eliminating welding discoloration.

The guidelines here provide a starting point to finish the job, no pun intended, and most tool and abrasive suppliers are ready to offer suggestions for everyday or particularly challenging applications. Take advantage of their experience. ■

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