Surface Enhancement

by R-V Industries, Inc

Understand the importance of buying stainless products and how to research and specify the right quality of material finish.

Law of Reflection

In our industry, there is a misunderstanding and a wide variety of positions regarding the subject of “surface finishes” as it relates to vessel fabrication and process performance after delivery and installation.

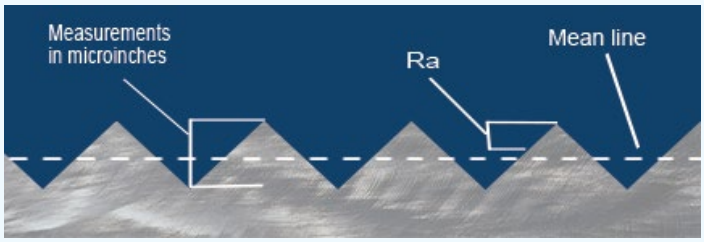
All metal surfaces have a profile consisting of peaks and valleys. If the peaks and valleys have a large vertical distance between them, light will enter the valley and not bounce or reflect back. This set of circumstances produces a relative dull surface.

Surface finish enhancement is generally accomplished by using abrasives on belts, grinding wheels, and other media to change the profile of the surface finish.

During the surface enhancement process, the vertical distance between the peaks and valleys is minimized to allow greater light reflection and a brighter surface finish. The closer the peak distance is to the valley and the greater uniformity of the finite scratches, the higher the reflectance resulting in a brighter surface.

Surface profile or finish is measured in microinches. A microinch is 1/1,000,000 of one inch. Surface profile is measured by evaluating the distance above and below an established “mean line.” Historically, microinch measuring has used two processes: Ra and RMS.

Ra or Roughness Average is an absolute average height you use to establish a mean line and a number of height samples (i.e. H1, H2, H3 etc.) above and below the line: H1 +H2 + H3etc. = Ra N (number of samples).



RMS is a value calculated from taking the square root of all samples divided by the number of samples.

RMS numbers usually run 11% to 25% higher than the Ra numbers for the same surface profile. Ra has become the industry standard and should be measured in microinches rather than microns.

Surface profile can only be measured by a profilometer. It has a stylus probe that, when calibrated properly, runs across the grain of the surface and provides a digital readout of the surface profile or finish.

Sand-like particles, referred to as grit, are used as an abrasive in the metal industry for surface enhancement. The most commonly used grit is an artificial aluminum oxide which is a sharp, hard, and fast cutting product.

Grits are given grades or numbers relative to their roughness. Standard grades are:

- 80 grit
- 120 grit
- 150 grit
- 180 grit
- 240 grit
- 320 grit

People in our industry regularly spell out surface finish requirements as standard grit grades (i.e. 120 grit, 180 grit, etc.). This is not the proper way to identify an end result because, since grit is a product or tool used to remove metal, results will be relative to a variety of variables. Also, grit cannot be measured. How would you know if a fabricator polished your vessel to a 180 grit finish?

Surface finish requirements must be specified to an Ra or RMS measurement. A 20 to 30 Ra range is recommended, or the instruction “not to exceed” 20 Ra to pinpoint your measurable requirements.

Vessel Polishing and Finish

Electropolishing is a surface enhancement procedure that produces a smooth, bright finish by leveling or rounding off both the peaks and the valleys in a process similar to electroplating, except material is removed rather than deposited. An electrolyte is subjected to a low voltage electric current, which then removes surface roughness through anodic dissolution resulting in an extremely smooth finish.

Vessel surfaces are usually mechanically polished to a 20 to 30 Ra and then electropolished, which greatly improves anti-cling and sterility characteristics. The surface enhancement of nickel alloy fermenters, reactors, tanks, and vessels is accomplished by utilizing grit abrasives on belts, grinding wheels, and other media in an effort to smooth out the surface profile, minimizing scratches, pits, and other defects.

The lower you can bring the surface roughness, the better. Corrosive media, chemicals, and bacteria will not stick as well to a very smooth surface. As an added bonus, the metal will be much easier to clean.

Selecting the right vessel surface enhancement level is vital to protecting your industrial process, whether it be in the chemical or food and beverage industries. To start a conversation about your organization's needs, reach out to us today.

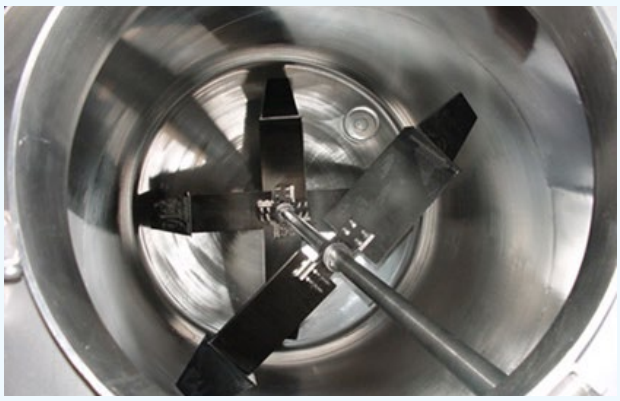
You will notice improvements in…

1 Anti-cling and sanitary characteristics

An ultra-smooth surface is essential if hygiene is your most important objective.

2 Corrosion resistance

By smoothing a surface to the point where corrosive agents cannot stick, the longevity of the metal will increase.



3 Appearance

A high-quality, polished surface shows its value. Also, because it is easier to clean, it will maintain its shine.

About Us

Quality, Safety, and Service

We are located in Honey Brook, Pennsylvania, between the logistical resources of Philadelphia and the rolling farmlands of Lancaster county. The company was founded in 1974, and has grown and diversified to include an engineering team, extensive market-specific expertise, and over 160,000 square feet of fabrication and assembly space.

We have built a team of over 250 manufacturing and engineering professionals who have experience in numerous industries. Every member of our organization shares the goal of delivering superior products that are effective solutions to each customer's biggest industrial process challenges.

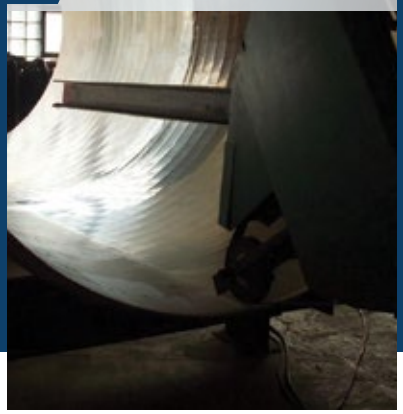
In addition, all members of our staff are trained in safety procedures which accurately prepare them for the areas they will work in or near. This effort helped us earn admittance into OSHA's Safety and Health Achievement Recognition Program (SHARP). R-V's focus on safety and health permeates our entire operation. We are 1 of only 47 companies in Pennsylvania that is still a part of SHARP.

The driving force of our business model and mission is maintain integrity in every aspect of our business and to supply superior products and services. We believe that what we create speaks for itself, and would love to show you how we could serve your organization. Please contact us if you need any additional information.

Our Projects

While R-V Industries might be best known as a leading ASME pressure vessel manufacturer, our team excels in serving customers in a wide range of demanding industries. Our extensive engineering and fabrication capabilities combine with our diverse experience and knowledge to make R-V your trusted partner for customized industrial process equipment.

Experienced



We have over four decades of experience in serving the unique needs of customers in several different industries. We provide in-house engineering and manufacturing capabilities needed to help our customers develop equipment and process solutions for the greatest possible efficiency, quality, and sanitation. Our team is able to design and fabricate ASME Section VIII vessels, and our surface finishing capabilities enable us to create some of the most sanitary, corrosion-resistant equipment available.

American Made

As a proud, American manufacturing company, R-V Industries pledges to continue making our products exclusively in the United States, which we have done since our inception in 1974. We believe in supporting our economy and providing our customers with the best services and products custom manufactured at our facilities in Pennsylvania. We will continue to compete in the custom manufacturing marketplace by engaging American ingenuity, work ethic, and superior quality.

Capable

High alloy fabrication is a requirement across the many unique industries that we serve. Our skilled manufacturers work with a wide range of carbon and stainless steel alloys, including 304 and 316 stainless steel. In addition to standard alloys, we are able to manufacture according to customer specifications using a variety of exotic alloys including Inconel 600, Inconel 601, Inconel 602, Inconel 625, Hastelloy, 2205 and 2507 Duplex, Monel, Incoloy, AL6XN, Carpenter 20, and RA 253 MA.

Contact Us

R-V Industries, Inc
584 Poplar Road
Honey Brook, PA 19344

Phone: (610) 273-2457
Fax: (610) 273-3361
E-mail: Sales@rvii.com

www.rvii.com