Pre- electro polish surface refinement with coated abrasives

We have a 7 to 16 Ra surface finish specification on 304 stainless prior to electro polishing. Can you give us finishing guidance and a reference of what abrasive belt and disc grits will achieve a given Ra finish?

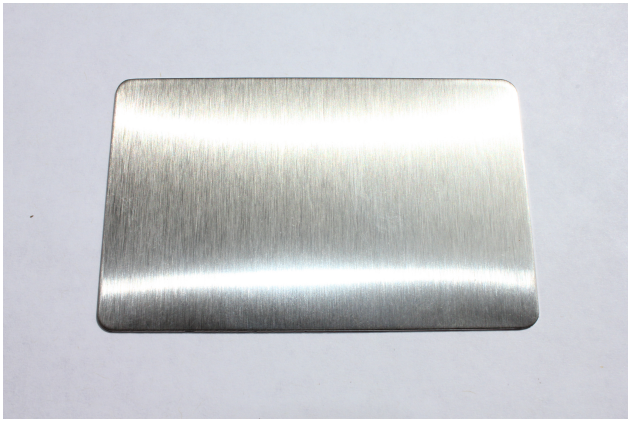
Abrasive finishing combines a harder than work-piece abrasive mineral with a bonded (grinding wheel) or coated (belts and discs) product that is rubbed and/or moved with pressure across the work-piece surface.

Abrasive processes for surface refinement works well and is commonly used. Abrasive removal and refinement rates are affected by:

1. Abrasive grit size
2. Abrasive mineral used
3. Machine or tool used
4. Pressure applied
5. Use of lubricants
6. Surface feet speed (speed of the abrasive moving by the work-piece)

When refining your stainless, start your finishing with the finest abrasive grit possible. This reduces further steps. Once the initial refinement scratch affects the surface, the rest of the work is to refine the initial scratch.

Refining surfaces require perpendicular finishing to the previous operation. Removing scratches in the same direction does not efficiently remove the depth of the previous scratch line.



Below is a chart on abrasive grit size and the approximate micro inch finish they produce. This is based on ½ life abrasive (or halfway worn abrasive). Use of lubricants will lower the micro inch finishes. The various metal alloys will also have an affect on the finish estimates.

Abrasive Grit Size/Ra, Rms Comparison Estimate Chart

Grit Size Abrasive belt polishing	Ra-Finish Capabilities Micro inch	RMS-Finish Capabilities Micro inch
24 grit	154-164	170-180
36 grit	132-141	145-155
60 grit	83-88	91-97
80 grit	66-71	72-78
120 grit	47-51	52-56
150 grit	35-40	39-44
180 grit	25-30	27-33
220 grit	14-19	15-21
320 grit	7-11	8-12
400 grit	4.5 -8	5-9
600 to 1200 grit	1-4.5	1-5

Aluminum oxide grain used in coated abrasives

Below is a surface feet speed recommendation chart for various materials.

Surface Feet Speed Recommendations For Polishing With Coated Abrasives
(note: Grinding wheels have different recommendations)

Material	Surface Speed (SFPM)
Aluminum	6500-8000
Brass	7200-7900
Composite	60000-7000
Glass	5000-(7500 with diamonds)
Stainless	6500-6900
Steel	6300-6700
Titanium	2400-3100

Surface feet speed is measured in SFPM surface feet per minute.
SFPM = Wheel Diameter (inches) x RPM x .2618

The results of running inefficient surface feet speeds are reduced production rates and premature abrasive wear. The wrong SFPM can also cause excessive heat and galling of the part , which will affect Ra surface finishes.