

ABRASIVES TECH TIPS

Introduction to Abrasive Finishing

Abrasive finishing utilizes various types and sizes of abrasive minerals. These minerals are bonded to paper, cloth, belts, wheels, non-woven products, bonded products, rubber, sponges, film, composites, or brushes.

When the abrasive product is moved across the workpiece with pressure applied, it will remove material, dimension, mechanically and visually finish with endless results. A few of the products finished are wood, glass, stone, composites, and metals.

The following pages are areas of specialized abrasive finishing knowledge.



Abrasives Tech Tips: Surface Feet Speed Recommendations

Offhand Grinding Suggested Belt Speeds Surface Feet Recommendation

<u>Material</u>	<u>Belt Speed (sfpm)</u>
Cast Iron	7000
Carbon Steel	6500
Stainless Steel	6500-7000
Aluminum	7500-8000 Coarse 6500-7000 Fine
Brass	7000-8000
Titanium	2500-3000
Glass	5000 Silicon Carbide 7500-8000 Flex Diamond
Rubber	4500
Stone (2000-3400 rpm)	7000
Cobalt	4500-5500 Coarse 3500-4000 Fine
Magnesium	5500-6000
Plasma Coating with Diamond	5000-6000

$$\frac{\text{Dia. CW} \times \text{RPM}}{12} = \text{SFPM}$$

**SURFACE SPEED CONVERSION CHART
DIAMETERS OF WHEELS IN INCHES**

R.P.M. at arbor or spindle	2	4	6	8	10	12	14	16	18	20	22	24
----------------------------	----------	----------	----------	----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------

SURFACE SPEED IN FEET PER MINUTE (S.F.P.M.)

800	419	837	1256	1675	2094	2513	2932	3351	3770	4189	4608	5026
900	471	942	1413	1885	2356	2827	3298	3770	4241	4712	5184	5655
1000	524	1047	1570	2094	2618	3141	3665	4189	4712	5236	5760	6283
1100	576	1162	1727	2304	2880	3455	4031	4608	5184	5760	6336	6911
1200	628	1256	1884	2513	3142	3769	4398	5027	5655	6283	6912	7540
1300	681	1361	2042	2723	3404	4084	4764	5445	6126	6807	7488	8168
1400	738	1466	2199	2932	3666	4398	5131	5864	6597	7330	8064	8796
1500	785	1571	2356	3142	3927	4712	5497	6283	7069	7854	8640	9425
1600	838	1675	2513	3351	4189	5026	5864	6702	7540	8378	9216	10053
1700	890	1780	2670	3560	4451	5340	6230	7121	8011	8901	9792	10681
1800	942	1885	2827	2770	4713	5650	6597	7540	8482	9425	10368	11310
1900	995	1989	2984	3979	4975	5969	6963	7959	8954	9948	10944	11938
2000	1047	2094	3141	4189	5236	6283	7330	8378	9425	10472	11520	12566
2100	1100	2199	3298	4398	5498	6597	7695	8796	9896	10996	12096	13194
2200	1152	2304	3455	4608	5760	6911	8063	9215	10367	11519	12672	13822
2300	1204	2408	3612	4817	6022	7225	8429	9634	10839	12043	13248	14451
2400	1257	2513	3770	5027	6284	7540	8796	10053	11310	12566	13824	15079
2500	1309	2618	3927	5236	6545	7854	9162	10472	11781	13090	14400	15708
2600	1361	2722	4084	5445	6807	8168	9529	10891	12252	13613	14976	16336
2700	1414	2827	4241	5655	7069	8482	9895	11810	12723	14136	15552	16964
2800	1466	2932	4398	5864	7331	8796	10262	11729	13195	14660	16128	17592
2900	1518	3037	4555	6074	7595	9110	10629	12148	13666	15184	16704	18221
3000	1571	3141	4712	6283	7854	9425	10996	12566	14137	15708	17280	18850
3200	1676	3351	5026	6702	8378	10053	11729	13404	15080	16755	18431	20107
3400	1780	3560	5340	7121	8901	10681	12462	14242	16022	17802	19583	21363
3600	1885	3769	5654	7539	9425	11309	13193	15080	16965	18850	20735	22619
3800	1990	3979	5969	7958	9948	11938	13927	15917	17907	19897	21887	23876
4000	2094	4188	6283	8377	10472	12566	14661	16755	18850	20944	22039	25198

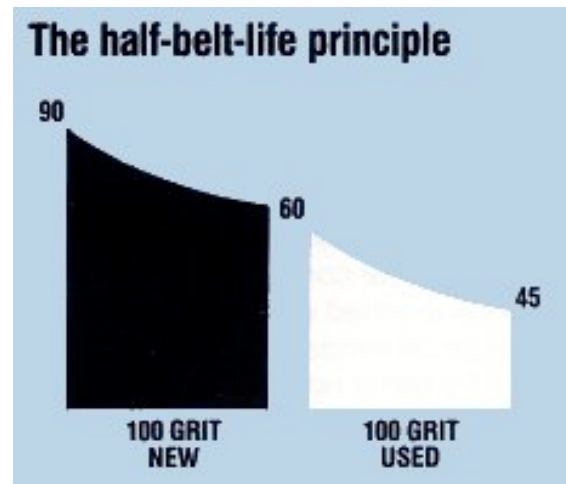
THIS IS A FUNCTION OF DIAMETER OF WHEEL AND RPM. IT'S A GIVEN SPEED (EASILY DETERMINED BY CHART) THAT AN ABRASIVE PASSES THE WORK PIECE. EACH METAL IS CUT EFFICIENTLY, COOLER, AND WITH BETTER FINISHES AT A GIVEN SURFACE FEET. ALSO ABRASIVES WORK BETTER AND LAST LONGER AT THESE SURFACE FEET.



Abrasives Tech Tips: Abrasive Grit / RMS Comparison

NOTE: THIS INFORMATION IS BASED ON ALUMINUM OXIDE HALF LIFE BELTS. A BELT GREASE AND SEVERELY WORN BELT WILL IMPROVE RMS FINISH.

24X	160 RMS	
36X	140 RMS	
40X	130 RMS	
50X	110 RMS	
60X	90 RMS	
80X	65 RMS	
100X	60 RMS	
120X	50 RMS	
150X	37 RMS	27 RMS WITH GREASE
180X	25 RMS	18-20 RMS WITH GREASE
220X	15 RMS	8-9 RMS WITH GREASE
320X	5-4 RMS	
400X	4-5 RMS	
600X	2-3 RMS	



The half-belt-life principle

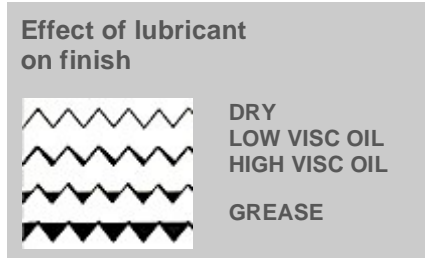
An example of the half-belt-life principle at work:

A typical 100 grit aluminum oxide paper belt will produce a finish reading of about 90 when new...and 45 when used. If it is moved at half-life, we have the effect of two different belts. The first produces 90 to 60 readings and the second, 60 to 45 readings.

Flat polishing finish requirements

Industry experience has shown that different plating systems require different finishes.

This chart shows approximate finish requirements in the automotove industry. Generally speaking, plating systems which employ less nickel or copper have less covering power, and require finer finishes on the bare metal.



Effect of lubrication on buffing time

Applying oil or grease to the belt for a polishing operation reduces buffing time. A greased belt cuts buffing time in half as compared to a dry belt.

PLATING TYPE	FINISH REQUIRED
Buffed copper plus bright nickel12-15
Buffed nickel8-10
Semi-bright plus bright nickel4-7
Bright nickel	Steel Buff

Effect of lubricant on finish

When a lubricant is applied to the belt the areas between the mineral are filled somewhat by the lubricant. This keeps the mineral from penetrating into the work piece as far as it would when dry grinding. The thicker the lubricant, the less the penetration, thus making a fine finish with the addition of grease.





Abrasives Tech Tips: Abrasive Grain Sizes

Abrasive Grain Sizes In Inches and Microns

The tables below show our grit sizes in inches and microns. The values shown are approximate and subject to normal variations. Grits in Table 1, 8-240 are sized to the ANSI B74.12-1976(R1982) Table 2, Specifications for the Size of Abrasive Grain-Grinding Wheels, Polishing and General Industrial Uses.

Table 2 gives the conversions for the microgrit sizes. The grits 240-1200 are sized to ANSI B74.10-1977, specifications for Grading of Abrasive Microgrits. The sizes 1F-6F are based on combinations of the sizes in B74-10 and are graded to General Abrasive specifications.

Table 1

INCHES				MICRONS			
Grit	Average	Maximum	Minimum	Grit	Average	Maximum	Minimum
8	0.088	0.149	0.065	8	2235	3785	1651
10	0.041	0.125	0.055	10	1880	3175	1397
12	0.062	0.105	0.045	12	1575	2667	1143
14	0.052	0.089	0.037	14	1321	2261	940
16	0.044	0.075	0.031	16	1118	1905	787
20	0.037	0.063	0.026	20	940	1600	660
22	0.031	0.053	0.022	22	787	1346	559
24	0.027	0.045	0.018	24	686	1143	457
30	0.022	0.037	0.015	30	556	940	381
36	0.019	0.031	0.013	36	483	762	330
40	0.016	0.025	0.011	40	406	660	279
46	0.014	0.022	0.0095	46	356	559	241
54	0.011	0.0197	0.0080	54	279	500	203
60	0.010	0.016	0.0066	60	254	406	168
70	0.008	0.0132	0.0056	70	203	335	142
80	0.0061	0.0111	0.0040	80	155	282	102
90	0.0054	0.0093	0.0035	90	137	236	89
100	0.0047	0.0079	0.0025	100	119	201	64
120	0.0039	0.0067	0.0020	120	99	170	51
150	0.0029	0.0056	0.0015	150	74	142	38
180	0.0025	0.0047	0.0012	180	64	119	30
220	0.0022	0.0039	0.0008	220	56	99	20
240	0.0019	0.0033	0.0006	240	48	84	15

Table 2

INCHES				MICRONS			
Grit	Average	Maximum	Minimum	Grit	Average	Maximum	Minimum
240	0.00200	0.00335	0.00106	240	51	85	27
280	0.00165	0.00323	0.00750	280	42	82	19
320	0.00134	0.00275	0.00590	320	34	70	15
360	0.00106	0.00220	0.00043	360	27	56	11
400	0.00087	0.00185	0.00031	400	22	47	8
500	0.00071	0.00157	0.00024	500	18	40	6
600	0.00055	0.00146	0.00016	600	14	37	4
800	0.00043	0.00130	0.00012	800	11	33	3
1000	0.00031	0.00114	0.00008	1000	8	29	2
1200	0.00020	0.00098	0.00004	1200	5	25	1
1F	0.00190	0.00335	0.00075	1F	47	85	19
2F	0.00150	0.00323	0.00590	2F	38	82	15
3F	0.00118	0.00275	0.00047	3F	30	70	12
4F	0.00098	0.00220	0.00031	4F	25	56	8
5F	0.00062	0.00157	0.00016	5F	16	40	4
6F	0.00035	0.00130	0.00008	6F	9	33	2



Abrasives Tech Tips: Abrasive Storage and Safety Recommendations

PROCEDURES FOR PROPER STORAGE OF ABRASIVES:

- All coated, bonded, and loose abrasives, if used or stored improperly, can be dangerous or deadly. Please consult individual manufacturers for safety and storage recommendations for each product to be used.
- All abrasives should be stored in areas that are maintained at 40% to 50% relative humidity and 60° to 80° F. Glue bonded coated abrasive products are especially sensitive to high humidity.
- Abrasives should be kept in their original packing containers for storage.

- Store abrasives away from heat sources such as radiators, steam pipes, furnaces, or windows.
- Cartons should be kept away from damp or cold walls and floor where they may absorb moisture.
- Precondition abrasive belt prior to use by removing from carton and allowing to adjust to ambient air, hanging on proper peg or bars. This is especially important for wide belts, which should be removed up to 24 hours prior to use. (Also see recommendations for abrasive belts.)
- If necessary, a pre-conditioning chamber should be built to ensure constant humidity control for coated abrasives. Humidity can cause cupping of coated abrasive products, as well as premature loading and reduced product life. In belts, high humidity can cause tracking and creasing problems.
- Bonded grinding discs and cut-off wheels should be stored flat until used.
- Bonded abrasives should be handled carefully to avoid dropping or bumping. This also applies to coated abrasive flapwheels and mop discs.
- Regular stock rotation is also recommended.