Introduction to Buffing

"Buffing" is the process used to shine metal, wood, or composites using a cloth wheel impregnated with cutting compounds or rouges. The cloth buff "holds" or "carries" the compound, while the compound does the cutting.

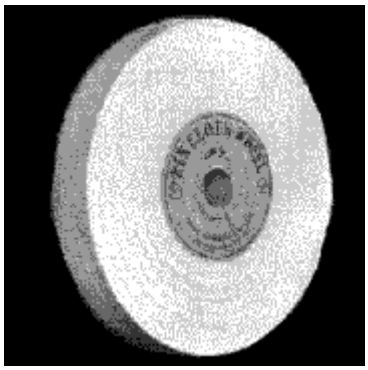
The industry refers to "polishing" as the process, which uses abrasive belt finishing.

Buffing generally requires two operations, a cut buff and a finish buff. Even the cut buff, which is the coarsest buffing operation, is too fine for removal of pits, course abrasive polishing lines, or deep scratches. This is why surface preparation prior to buffing is critical to a high luster, final finish.

Excellent pre-buff surface preparation starts with using the finest abrasive belt that production will allow. It is from this point that removal of the original scratch line needs to be accomplished to achieve the final buff finish.

The original "scratch" or polish is followed by one or two additional polishing steps. Cross polishing the abrasive lines if possible and buff off of approximately 400 grit or finer abrasive on metals.

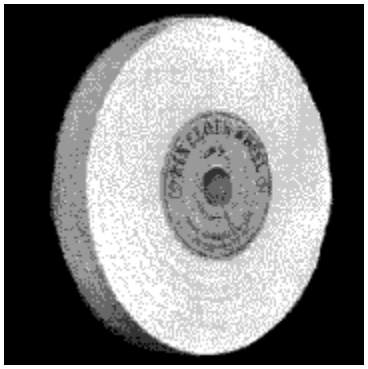
The cut buff will remove the final polishing lines, but may not be as bright as required. The finishing buff will produce the luster.



Buffing Tech Tips: Suggestions for Successful Buffing

- Dedicate a particular buff to a specified compound so that a larger grain size will not scratch the final finish.
- With each different buffing operation, switch buffing directions on the part if possible.
- Loose threads from a buff can drag over a work piece creating undesirable results. To remove any loose attached threads, run an abrasive belt attached to a board over the surface of the buff.
- To remove final buffing compound haze and very fine web type scratches, wipe the part with a nap out (soft) glove and whiting compound. Flour will also work, but not as well as the whiting compound.
- If one needs to cut faster with a given buff and compound, increase the pressure to the work piece and add more compound.
- To reduce compound left on a part, reduce the wheel pressure to the work piece.
- Fifteen to twenty-five percent of the buffing time is devoted to applying compound to the wheel.
- It will decrease the life of the buff if too little compound is used or if the buff is allowed to get too hot during operation.

- If buff wheels are worn out or allowed to get too hot, finish performance will decrease.
- If the wheel is tearing (or ragging), the buff wheel may be out of balance, running the wrong direction, being run with too much pressure, or using the wrong wheel for a particular part.



Buffing Tech Tips: Buffing Wheels and Types

Overview

The buffing wheel is the actual carrier of the compound or rouge. It becomes the transferring agent between the abrasive compound, and the work piece.

The construction of the buff becomes important to the desired performance; therefore it is important to match the construction of the buff to the work piece.

A harder buff is not as flexible and is more aggressive. It is typically used on flat surfaces. A softer buff is more conformable and less aggressive which makes it ideal for work pieces with more complex shape.

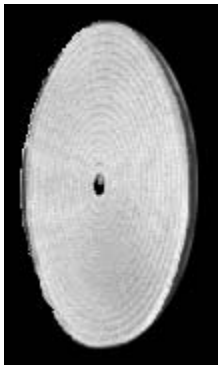
The Sisal and Airway ventilated buffs can be treated at the manufacturer by dipping the cloth or sisal in water, or solvent based resins. There are various degrees of firmness, each color-coded by the individual manufacturers. The treatments add stiffness, strength, and lubrication to the buff. Usually the stiffer buffs will cut faster. The stiff treatments are used on flat surfaces where little flexing is required. The softer treatments are used for reaching into deeper areas and around complex shapes.

In certain applications, many buffs can cut, shape, blend, deburr, and finish in one operation with automatic machines. The manual buffing operations will tend to be a cut buff, followed with a finish buff.

There are many types of cut and finish buffs being produced today, using various cloths or sisal and a variety of stitching and construction. We will cover the most commonly used buffs and their applications.

CUT BUFFS	FINISH BUFFS
• Spiral Sewn	• Loose Buffs
• Set Up Wheels	• Concentric Sewn
• Sisals	• Airway
• Treated Airways	• Flannel

Spiral Sewn

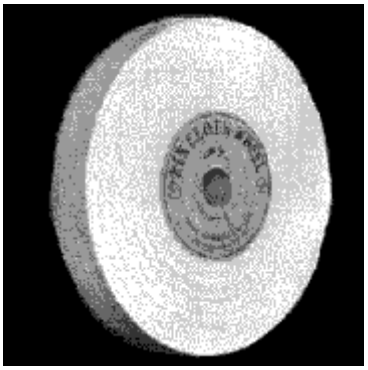


Made of various cloths or denim materials, this buff is sewn in different thicknesses, 1/4" and 3/8" being the most common. These buffs can be stacked side by side if more face width is desired.

The stitching starts from the center arbor hole and spirals to the O.D. The spacing between the stitching can be produced in 1/16, 1/8, 1/4, or 3/8" increments. The tighter they are sewn, the stiffer the buff, and usually a stiffer buff will cut faster.

The spiral sewn buff is a moderate cut buff, used commonly as a standard cut buff for all metals and composites.

Set-Up Wheels



Made up by stacking spiral sewn buffs, which have been glued together and balanced. Canvas covers are often glued to the sides. The wheels are commonly available from 1/2" through 4" face widths.

Set-up wheels can be used with grey or tripoli cutting compounds, but is mainly used with Aluminum Oxide or Turkish Emery grits.

When used with various grits of Aluminum Oxide glued to the face of the buff, it becomes the coarsest cut buff application. These wheels are used to grind steel and stainless steel surfaces.

The set up wheel, when used with any varied grits of Turkish Emery can be used as a grease wheel. For example, using grease and 180 grit emery on steel bumpers will give a good finish, which can then be nickel leveled and chrome plated.

When setting up the wheel with Aluminum Oxide grit, it is applied with cold glue. The glue is brushed on the face of the wheel and then rolled in the abrasive grit. This is repeated three times and then allowed to dry for twelve hours. This same process is used for the Turkish Emery grease wheel, except hot glue is used and the wheel is dried at 105 degrees for 12 hours.

Both the Aluminum Oxide Cutting Wheel and the Turkish Emery Set-up Wheel are then mounted onto the buffing lathe, rotated by hand and cracked with a mallet or rod to produce flexibility in the wheel. (The cracks should be approximately thumb size.) The Emery Wheel is greased throughout production to produce a better finish.

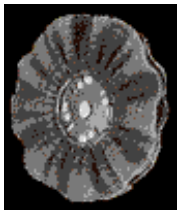
A Set-up Wheel is good for approximately two to four hours of production. Most production facilities will have multiple Set-up wheels per person made up daily. The used wheels can be faced off using a carbo grinding stone and then reglued and set up after the production shift.

Sisals

These buffs are made of a hard, cellular fiber material with high strength. It is formed into a slender cord that constructs the buff. The Sisal material has natural cutting properties. There are various stiffening treatments that will vary in color and hardness, as well as untreated sisal and cloth combinations.

Sisal buffs will remove orange peel and grit lines from abrasive belts or Set-up wheels. They are used for finishing Drawn, Roll Formed, and Stamped metals. When a sisal is combined with cloth, they can cut and finish stampings in one operation prior to pre- plating.

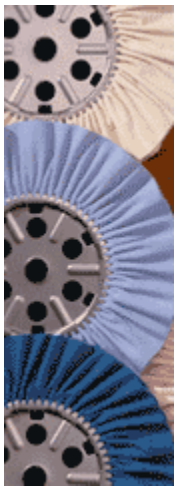
Spiral Sewn Sisals: Spiral sewn buffs are constructed with sewing from the arbor hole spiraling outward toward the outside of the buff. The standard distance between sewings are available in 1/16, 1/8, 3/8 and most common, 1/4". The buff will stiffen and cut faster as the sewings tighten. The Spiral Sewn Sisal is a very aggressive cut buff used on all metals.
Bias Spiral Sewn Sisals: This is the same construction as the previous spiral sewn buff, with the difference being that the fabric is cut on a bias to minimize raveling. This helps the buff to last longer as well as providing better cut and color. They are cooler running, thus more burn resistant. The buff is constructed with a steel center and is mainly used on automated buffing equipment.



Open Faced Sisals: The same information applies as with the Spiral sewn sisal, but this buff is constructed with a wavy, flexible open face. It holds compound better than the spiral sewn and allows flexibility to flow over a work piece and approach difficult areas.

Finger Sisals: This buff is also constructed of sisal cords wrapped with cloth. It comes in various treatments. When grouped with multiple buffs, the Finger buff contours well. The fingers can grab parts easier than other buff constructions, therefore should be used by experienced buffers. This buff is the most aggressive cut sisal buff.

Airway Ventilated Buff



Most widely used production cut buff, this buff is designed to flow air from the center and force it through the buff to cool the work piece. The Airway buff is made with a steel center and must be used with a specific ventilated flange for airflow to prevent delamination from the steel center.

The Airway buff comes in two different mill treatments; a white firm and a yellow maze. These mill treatment buffs are good cutting buffs for brass, copper, and aluminum. The Airway buff can also be treated with various manufactures colors that make them stiffer than the mill treatments. These stiffer treatments are good cut buffs for harder and tougher metals such as stainless steel and steel.

This buff is constructed with different densities (packs) 2, 4, 6, and 8 with the 2 and 4 being the most popular. The higher the density, the more cloth is used in the buff, the more flex and the longer the life of the buff. The Airway buff is also produced with different plys ranging from 12 to 20 with 16 being the most common. The ply will determine the thickness (or face width). The Airway is also available with 3", 5" and 7" center. The larger the center, the less material and therefore the less expensive the buff will be.

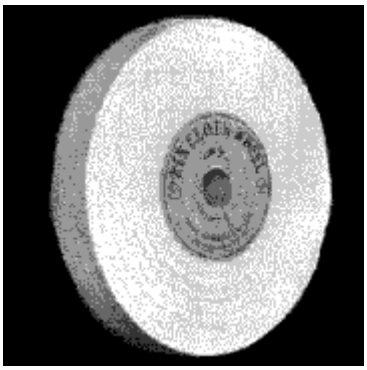
Finishing Buffs

Loose Full Disc Buffs: This buff is constructed of individual cloth sheets, sewn once around the arbor hole. Each cloth sheet is considered one ply. Sixteen to twenty ply is fairly standard. It may be necessary to stack buffs together when additional width is required. The buff cloth comes in two standard mill weaves of 6060 & 8080. The 8080 with a higher thread count produces a better finish. The loose buff lacks firmness, but is a good standard finishing buff on all metals and plastic.

Concentric Sewn Buffs: This buff is constructed of individual cloth sheets, sewn concentrically from the center arbor hole in 1" spacing increments completely around the buff. It is commonly produced in approx. 1" thickness and because of the way it is sewn; it is a firmer finishing buff than the loose buff. As the buff wears down to the seam line, it is common practice to cut the stitching and work the buff to the next seam line. This buff is very popular in the jewelry finishing industry. Because of the width and firmness it is often requested over the loose buff and produces a good finish on all metals and composites.

Airway Buffs: This buff is the most popular production finishing buff. It runs cooler because of the airflow from the center of the buff to the work piece. It is firmer and holds compound well. The standard finish buff is the non-treated mill cloth. The Airway buff is an excellent choice for all finishes.

Flannel Buffs: This buff can be constructed in the form of a loose, concentric sewn, or airway buff. It is the softest finishing buff, leaving fewer scratches than any other type of buffing material. The flannel material undergoes a "picking" operation at the mill, which pulls up the nap, giving it the softness. The Canton flannel is softened on both sides and is used in gold and silver jewelry buffing. The Domet flannel is softer on one side only and is used on fine brass and wood, such as guitar bodies.



Buffing Tech Tips: Buffing Compounds

Buffing compounds come in liquid and solid bar forms, made of binders and abrasives.

The binders used in these compounds can range from animal fats (Tallow), grease less waxes (glue and water), and petroleum based products. The binders used affect compound hardness, cutting ability, lubrication, and adhesion ability to the buff. A greasier binder tends to cut faster.

The abrasives in compounds range from Aluminum Oxide, Silicon Carbide, Calcined Alumina, Tripoli, Iron Oxide, and Chrome Oxide.

Specifications on Abrasives Used in Buffing

Abrasive Type	Abrasive Shape	Hardness- MOH's	Buffing Compound
Aluminum Oxide	Blocky	9	Grey, Greaseless
Calcined Alumina Oxide	Platelet	7	White, Liquid
Tripoli	Micro Crystallic	9	Tripoli
Silicon Carbide	Slivery	9.6	Greaseless
Iron Oxide	Spherical	6	Red Rouge
Chrome Oxide	Blocky	9	Green Rouge

Cutting Compounds

Greaseless Compound Primarily used in satin finishing, cutting and flexible deburring. The binder is glue and water, which will clean off of the work piece easier than Tallow. The abrasives used range from 80 to 400 grit Aluminum Oxide. (Silicon Carbide may be used in specific applications). The finer the grit applied, the brighter the satin finish will be. Grease less compounds will dry on the buff, but depending on the type of buff being used, will still remain flexible. Often it is used in place of a Set-up wheel for flexible applications on complex shapes. Grease less compounds may be used on all metals.

Stainless Compound (Grey) The most popular application for this compound is in cutting polishing lines on steel, stainless steel, nickel, and chrome. The binders will vary, however the cutting element is a blend of 150 to 400 grit Aluminum Oxide.

Tripoli This compound is mainly used in cut applications of aluminum, brass, copper, zinc, white metals, and die casting. It is a natural mineral classified as a silica. Proper ventilation and respiratory protection should be used when buffing with this product, and for that matter, all buffing operations.

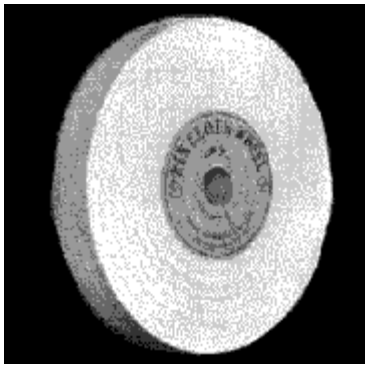
Finishing Compounds

Green Rouge Primarily used in final finish (coloring) buff operations on stainless steel, steel, brass, aluminum, nickel, and chrome. The green rouge is a chrome oxide, and is considered the best all around luster compound.

White Rouge The white rouge is the softer, calcite alumina (unfused) type. Primarily used in the final finish (coloring) of steel, stainless steel, and zinc. This compound is also a favorite in coloring aluminum and brass.

Red Rouge Primarily used in the final finish (coloring) of gold and silver, it is the finest of all rouges. The abrasive is Ferric Oxide, which is spherical in shape and gives an exceptionally high luster. It is produces an excellent finish on brass.

Calcined Alumina (Unfused) This compound is usually found in liquid form however may also be produced in bars. When produced or fired at higher temperatures, the mineral can be used as a cut on chrome and steel. When fired at a lower temperature, it becomes softer and is used as a coloring compound for aluminum, stainless steel, steel, chrome, nickel, and zinc. The structural shape is platelet, and is often used in finishing eyeglasses.



Buffing Tech Tips: Surface Speed

Surface speed, measured in feet per minute is the rate at which a buff or wheel moves over a work piece. Surface speed will determine the work rate speed, pressure required, heat build up, and the actual finish that will be produced.

The surface speed chart below indicates how wheel diameter and RPM affects the surface speed in feet per minute. To calculate; surface foot per minute = circumference X RPM. To determine circumference; circumference = (D) where D represents the diameter of the buff wheel.

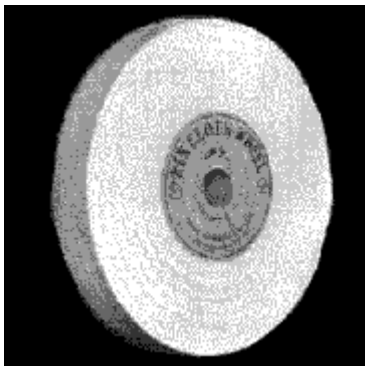
Surface Speed Chart
Buff Diameter in Inches

Spindle RPM	4	6	8	10	12	14	16	
1100 RPM	1152	1727	2308	2880	3455	4031	4608	
1200 RPM	1256	1884	2513	3142	3769	4398	5027	**Surface Speed in**
1700 RPM	1780	2670	3560	4451	5340	6230	7121	**Feet Per Minute (S.F.M.)**
1800 RPM	1885	2827	3770	4713	5654	6597	7540	
3000 RPM	3141	4712	6283	7854	9425	10,996	12,556	
3400 RPM	3560	5340	7121	8901	10,681	12,462	14,242	

Below is surface speed recommendations for various buffing operations:

		Cut Down Buffing	Satin Finishing	Color Buffing (Bright Finish)
Aluminum	**Buffs**	Spiral Sewed, Ventilated	Spiral Sewed, String Wheel	Loose, Concentric
	Compounds	Greaseless, Grey, Tripoli	Greaseless	Green or White Rouge
	S.F.M	6000 to 9000 S.F.M	3000 to 5000 S.F.M	6000 to 7000 S.F.M
Brass	**Buffs**	Spiral Sewed, Ventilated	Spiral Sewed, String Wheel, Ventilated, Loose	Loose, Concentric Sewed, Low Density Ventilated
	Compounds	Greaseless, Grey, Tripoli	Greaseless	Green or Red Rouge
	S.F.M	6000 to 9000 S.F.M	3000 to 5000 S.F.M	6000 to 9000 S.F.M
Copper	**Buffs**	Spiral Sewed, Ventilated	Spiral Sewed, String Wheel, Ventilated, Loose	Loose, Concentric Sewed, Low Density Ventilated
	Compounds	Greaseless, Grey, Tripoli	Greaseless	Green or White Rouge
	S.F.M	5500 to 7500 S.F.M	4500 to 6000 S.F.M	5500 to 7500 S.F.M
Steel & Stainless Steel	**Buffs**	Sisals, Spiral Sewed, Ventilated	Spiral Sewed, String Wheel, Ventilated	Loose, Concentric Sewed, Low Density Ventilated
	Compounds	Greaseless, Grey	Greaseless	Green Rouge
	S.F.M	8000 to 9000 S.F.M	4500 to 6000 S.F.M	7000 to 9000 S.F.M

As you reach surface speed with a given sized buff, a certain amount of horsepower is required. The larger the buff diameter and work piece, the more horse power required. For example, using a twelve inch buff on a 7" x 10" work piece will require 1 to 1-1/2 HP. A 16" buff on a larger work piece will require 2 to 5 HP. The buffer will stall easily if the proper amount of horsepower is not used. If the buff diameter and horsepower match up, but the surface speed is not high enough for a given sized part, the desired finish may not be reached and the job will take significantly longer.



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