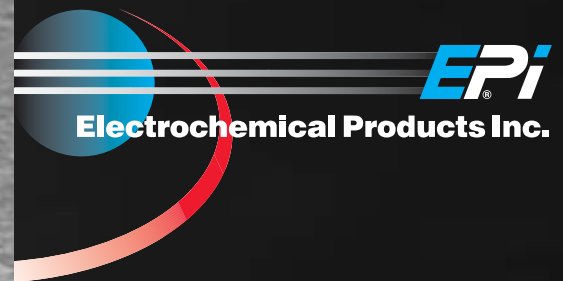


UltraBlak[®] 400



**The
Premium-
Grade Black
Oxide Which
Actually
Costs Less
To Apply**



Why Blacken?

Corrosion Protection—Adds years of service life to parts and extends the shelf life of stored parts.

Abrasion Resistance and Durability—The hard black chemical-conversion finish does not chip, craze, peel or rub off.

Anti-Galling—When it is necessary to break in mating parts, the anti-galling surface sacrifices the lubricating layer of black during initial contact and abrasion, while a work-hardened surface is formed.

Lubricity—Oil-based, post treatments not only provide protection against corrosion, they also provide for smoother running of mating parts.

Dimensional Stability—The blackening process produces essentially no dimensional change (only 5 to 10 millionths of an inch added) which means the blackened parts retain their surface properties. Polished surfaces retain their gloss and heat-treated parts retain their Rockwell hardness. Tool integrity is preserved and critically sized parts can be finished.

Esthetic Appeal—The process produces a pleasing, decorative black finish which enhances the perceived quality of the part and improves the salability of the part.

Reduced Glare—There's less eye fatigue with moving parts.

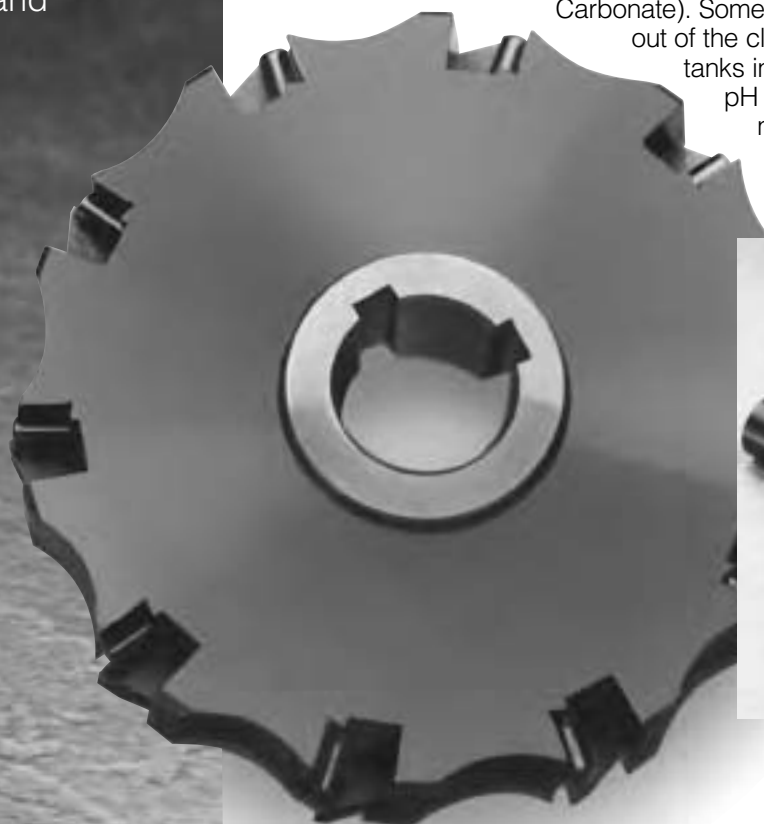
Productivity and Economy—A much faster process which saves time and money versus painting or plating processes. A simple, cost-effective means of providing corrosion protection to iron and steel parts.

Surface Preparation—For improving adhesion of subsequent paints and lacquers.

Environmentally Friendly—Usually there are no metallic ions in the rinse waters which would require treatment. However, the use of stainless steel baskets or barrels may require monitoring of the chrome concentration. The only by-product of the blackening reaction is harmless soda ash (Sodium Carbonate). Some Sodium Hydroxide will be dragged out of the cleaning tanks and the blackening tanks into the rinse tanks, but the resulting pH is usually within regulated limits. If not, the pH may be reduced economically with dilute acid.

What Is UltraBlak[®] 400?

UltraBlak 400 is a chemical solution which converts the surface of ferrous metals to black iron oxide, Fe_3O_4 , Magnetite. The black oxide penetrates the surface, becomes an integral part of the surface and provides for protection of the surfaces. Blackened parts retain their surface properties and dimensions.



Why UltraBlak® 400?

UltraBlak blackens faster than all other black oxide formulations— five to 10 minutes quicker—which increases productivity.

There is 20 to 30% less salt consumption with **UltraBlak** versus other black oxide formulations, which greatly reduces costs.

It blackens a wider range of steel alloys than other processes because it contains the maximum amount of penetrants, catalysts, activators, rectifiers and wetting agents.

Operating costs are lower because only 5.75 pounds of **UltraBlak** salts are used per gallon of water versus the 7 to 8 pounds per gallon with other processes. This also results in a lower operating temperature of 285°F, which saves energy.

Its unique wetting agent produces a more uniform black finish and a quicker reaction. The reduced viscosity ensures complete coverage of all surfaces. In addition, the wetter reduces chemical consumption by reducing the viscosity of the solution resulting in less drag-out of chemicals.

UltraBlak complies with and exceeds the requirements of military specification MIL-C-13924C and AMS-2485. It meets and exceeds the oxalic acid test and salt spray requirements.

There is no smutty rub-off as is common with other processes.

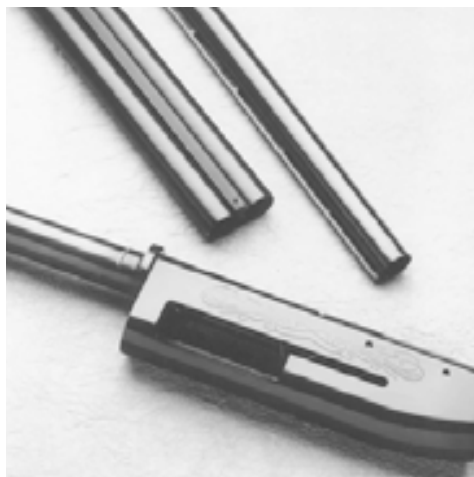
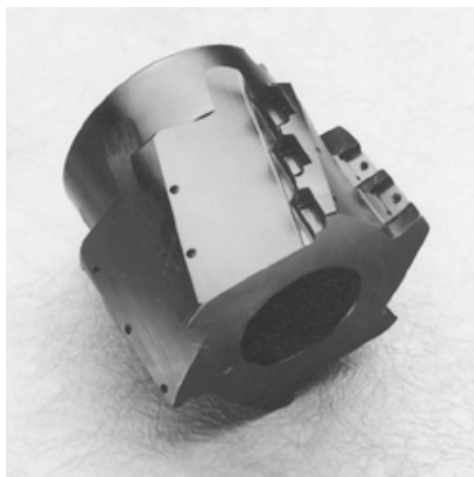
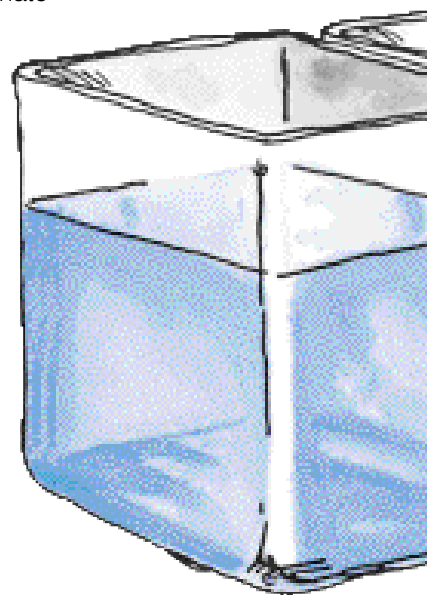
Its unique rectifier eliminates the problem of colloidal red iron in the solution by flushing it to the surface where it is removed by being carried out on the work and then washed off in the rinse water. The rectified red iron may also be periodically removed from the solution by skimming.

This eliminates the increased energy consumption and frequent tank clean-out which results from the iron settling to the bottom of the tank. In addition, the rectifier eliminates contamination of the solution with zinc, copper and lead by combining with these metals so they are removed on a continuous basis.

UltraBlak produces a pleasing anthracite-black finish—the blackest of the black.

UltraBlak offers many advantages compared to painting, including:

- No dimensional change (paint builds up)
- Reduces handling of parts—many parts can be done in a rotating barrel
- No prime or precoat phosphate required
- No bake oven
- No volatile organic fumes
- Less equipment and less maintenance of equipment
- Less set-up time and less processing time for higher productivity



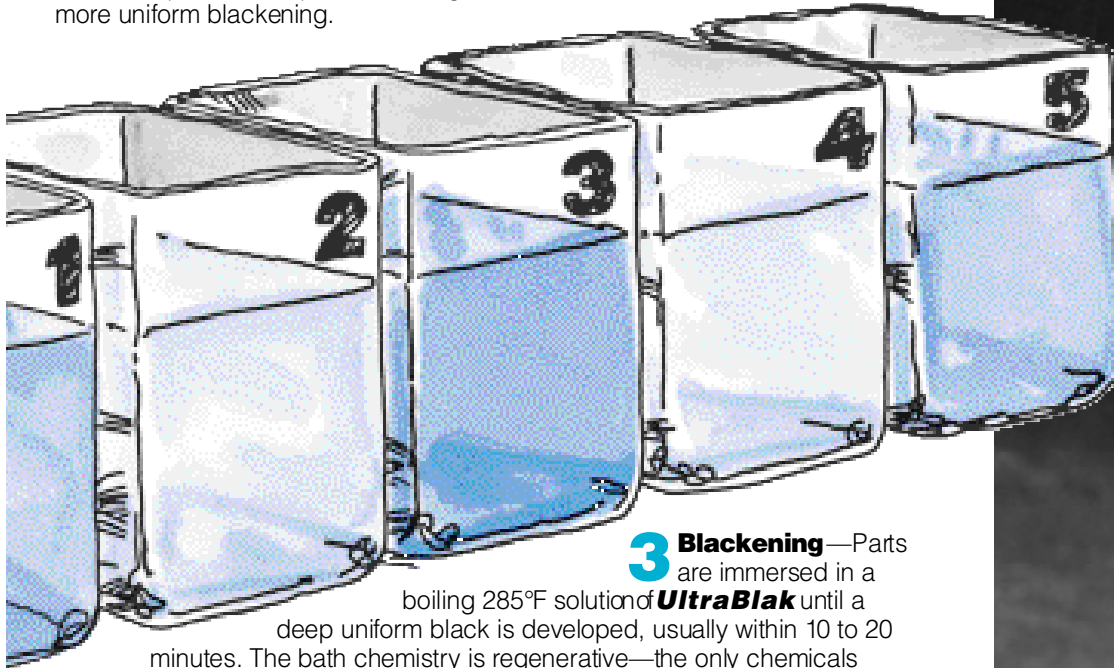
The Blackening Process

In most installations only a simple five-step process is required:

1 Cleaning --Soils, such as cutting oils, coolants, lubricants and rust inhibitors must be removed. Soils can inhibit or prevent subsequent operations. **E-Kleen SR 102, E-Kleen SR 102-E** or **E-Kleen SR 196** soak cleaners are most often used.

2 Rinse—Use cold, overflowing rinse water. It is necessary to rinse the parts to remove residual cleaning solution. Immerse for 30 to 60 seconds.

A cold-water rinse is sufficient for rinsing light parts. However heavy, thick parts may chill the blackening solution, so a hot-water rinse is preferable, which will preheat the parts, resulting in a faster, more uniform blackening.



3 Blackening—Parts are immersed in a boiling 285°F solution of **UltraBlak** until a deep uniform black is developed, usually within 10 to 20 minutes. The bath chemistry is regenerative—the only chemicals being consumed are those physically dragged out on the parts into the rinse water. Since the **UltraBlak** solution is saturated, it automatically maintains a concentration of 5.75 pounds of salts per gallon of solution when operating at its boiling point. If the solution boils below 285°F, additional salts must be added to raise the temperature to 285°F. If the solution boils above 290°F, water has to be added with an automated water-addition system until the boiling point is reduced to 285°F.

4 Cold-Water Rinse—To remove residual blackening solution and to ensure the sealant is not contaminated.

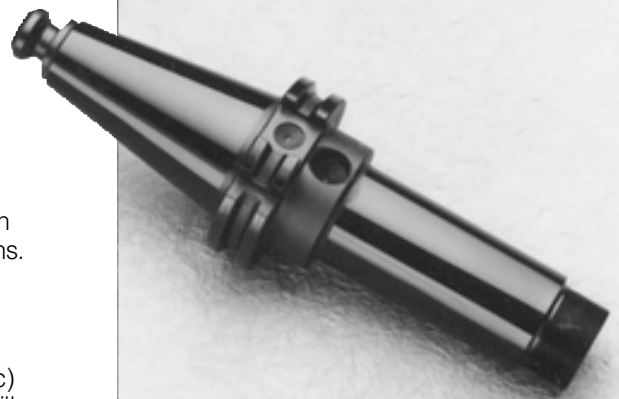
5 Seal—Parts are immersed in one of EPI's **E-Tec** brands of corrosion inhibitors to impart corrosion resistance and lubricity to the finish. **E-Tec** formulations are available to deposit an oily, slightly oily or dry-to-the-touch finish with either water-displacing solvent-based solutions or water-soluble formulations.

Optional: Activation or derusting/descaling for a seven-step process.

UltraBlak will not cover up surface rust or heat treating scale. These imperfections must be removed in a 50%-by-volume hydrochloric (muriatic) acid solution following Step 2 above. The use of a hydrochloric acid dip will also serve to activate difficult-to-blacken surfaces resulting in a faster blackening reaction and a more uniform finish. The residual acidic solution must be removed with a hot or cold-water rinse prior to the **UltraBlak 400**.

Please see the individual technical data sheets or MSDS sheets for the **E-Kleen, UltraBlak 400** and **E-Tec** products to ensure proper and safe operation.

UltraBlak®



E-Tec™ Formulations Include:

E-Tec 501—A solvent-based formulation which produces very rapid water displacement to leave an oily, thin, transparent, corrosion-resistant film. It will not gum under high-humidity and high-temperature conditions. It is an excellent lubricant.

E-Tec 502—Same as 501 but leaves a lighter oil film.

E-Tec 505—A solvent-based water-displacing formulation which leaves a “dry-to-the-touch” ultra-thin film.

E-Tec 505+—An extra-heavy-duty version of E-Tec 505 which deposits a thicker film for maximum corrosion resistance.

E-Tec 510—A rust-preventive oil concentrate formulated with emulsifiers enabling it to be diluted with water to form a 2% to 20% oil-in-water emulsion—commonly called a “water-soluble oil.” The characteristics of the deposited corrosion-inhibiting film can be varied from oily (20% by volume, slightly oily (10% by volume) to “dry-to-the-touch” non-tacky film at 2-5% by volume.

E-Tec 512 --A “dry-to-the-touch,” extremely thin, waxy, water-soluble oil that provides superior corrosion resistance --
80-150 hours salt spray over black oxide.

E-Tec 520 --A clear acrylic lacquer.

E-Tec 521 --A gloss wax emulsion used to deposit a semi-hard, clear, dry wax finish. Also available as **E-Tec 521-B** for a black finish.

E-LAQ 525 high corrosion resistance lacquer.

Other UltraBlak® Formulations

UltraBlak 400-L—A highly concentrated liquid version of UltraBlak 400 which is recommended for installations where the replenishment of blackening salt solutions is automated through a pump and liquid level-control system. It is also ideal for the initial charging of black oxide baths which will be replenished with the powdered UltraBlak 400. Liquid UltraBlak 400-L is dust-free and eliminates handling dry powder.

UltraBlak 404—The preferred oxidizing salt mixture for blackening cast iron and malleable iron, as well as some mild low-carbon steels. Concentration of 4.75 pounds per gallon of water at temperatures of 250° to 260°F.

UltraBlak 407—Black oxide finish for stainless steels. Oxidizing salts used at 4.75 pounds per gallon of water at temperatures of 250° to 260°F. The finishes comply with military specification MIL-C-13924C, Class 4. The versatile solution may also be used to blacken malleable and cast iron, as well as some mild low-carbon steels.

UltraBlak 420—Oxidizing salt mixture for blackening copper, brass and bronze. Used at a concentration of two pounds per gallon of water at temperatures of 200° to 210°F to blacken copper surfaces with a deep black, abrasion-resistant finish. It must be used in conjunction with EPI's E-Prep 220 brass activator to blacken high-zinc (15% to 35% zinc) copper-alloyed surfaces.

UltraBlak 455—Black finish for cadmium and zinc. Liquid concentrate used at 25% by volume in water at temperatures of 120° to 160°F.

UltraBlak 460—A non-chromated black chemical-conversion finish for diecast and plated zinc surfaces. Salts used at 6 to 8 ounces per gallon of water and temperatures of 150° to 170°F.

UltraBlak 466 --Black chemical-conversion finish for nickel-plated surfaces. Liquid concentration used at 25% by volume in water at temperatures of 140° to 160°F.

UltraBlak Rectifier—Additive for black oxide solutions to control the buildup of excessive red iron oxide and copper which cause off-colored reddish finishes. Liquid concentrate used at 0.5 to one ounce per gallon of oxide solution.

The *EPI* Product Line

E-Phos™—Iron, zinc and manganese phosphates, including **black zinc** phosphate coatings.

E-Brite™—Addition agents and brighteners for plating:

Copper—non-cyanide alkaline, acid and cyanide processes
Brass
Cadmium
Nickel—bright and semi-bright
Zinc—acid and alkaline

B/OX™—Room-temperature (cold) antiquing/oxidizing process for copper, brass and bronze surfaces. Produces black to blackish-brown to pleasing brown tones.

InstaBlak®—Room-temperature (cold) metal-blackening processes.

E-Kleen™—Alkaline-based hot soak, spray and electrocleaners for all metals. Acid cleaners. Liquid and powdered formulation.

E-Pik™ and E-Prep®—Acid salts, deoxidizers, desmutters, etchants and activators for metal surfaces.

E-Tec™—Rust preventives and corrosion inhibitors.

What You Should Know About The Brightest Name In The World Of Finishing

Founded in 1954, *EPI* is a name that is synonymous with plating and finishing excellence. Our strides-ahead track record includes:

- **Insta-Blak 333**, a giant step forward in the room-temperature (cold) blackening for iron, steel and powdered metal. It produces a super-deep rich blackness and corrosion resistance equal to hot oxide blackening without smutty rub-off problems of ordinary room-temperature formulations.
- First with **E-Brite 30/30** alkaline non-cyanide copper, single-additive process for plating directly on steel, stainless steel, brass, zincated aluminum and high-quality zinc diecasting.
- **E-Brite 50/50**, a non-cyanide alkaline silver plating process.
- Development of **E-Brite 23-11R**, the first single-additive brightener for cyanide copper, in 1960.
- First with **E-Brite 767**, a bright, leveling single-additive nickel process, in 1960.
- First with a single-additive brass process in 1965 using the now famous **E-Brite B-150** brightener.
- Developed **Electrosolv™**, the finest addition agent on the market today for anode corrosion and bath stabilization in cyanide copper and brass.
- Developed **UltraBlak®**, the ultimate black oxide process.



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