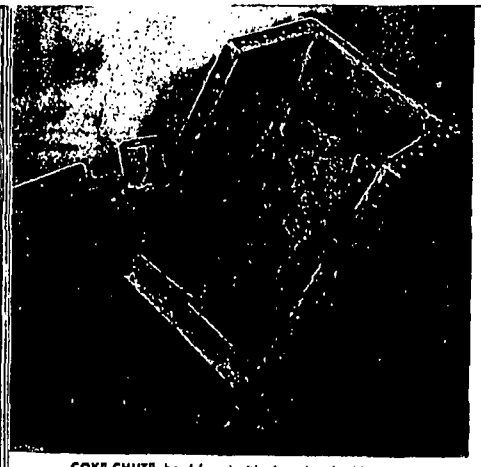
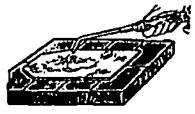
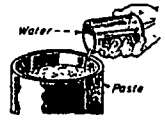


COKE CHUTE, hard faced with chromium-boride crystals applied in paste form, is expected to last about eight times longer

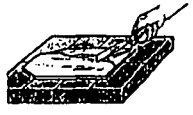
FOLLOW THESE EASY STEPS



1 Preheat base metal with torch to only about 100 F

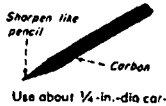


2 If paste is too thick, mix with water to thin out



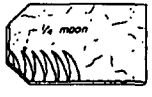
3 Spread on about 1/16 in. thick, as if icing cake

4 Let paste dry—the preheat does the job quickly

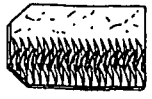


5 Use about ¼-in.-dia carbon, pointed like pencil

6 Use straight dc polarity and hold carbon as shown



7 Weave quarter moons, and use lowest amperage



8 Reverse, overlap the previous stringer, as shown

4—Spread Alloy in Paste Form as if Icing a Cake

Some hard-facing materials come in paste form. One of these is chromium-boride, which reads 68 to 72 on Rockwell C scale. It has good resistance to extreme abrasion, is found in materials-handling chutes, fan blades, pump impellers, scraper blades, crusher rings, screw conveyors, etc.

In addition to resisting abrasion, chromium boride has hot-hardness qualities against corrosion and impact, has hot-hardness qualities. It is easy to apply, by carbon arc or oxyacetylene torch.

Applying Paste. Clean base metal thoroughly. If it has scale or rust, remove by grinding, shot-blasting or scouring with abrasive cloth. Amount of preparation needed depends *on previous service of material to be coated.* Watch out for problems like oil-soaked castings. If not baked out, will cause hard-surfacing job to fail.

Ordinarily, preheat the work to about 100 F. Play oxyacetylene flame or blow torch back and forth across piece until it heats up slowly and evenly.

Paste comes in cans, mixed with water. If it's too thick, add water and stir to the right consistency. Then spread on metal with a putty knife, a stiff brush or a piece of scrap. *Coating thickness runs about 1/16 in. Putting on the coating* is much like icing a cake. Next, let paste dry. The preheat evaporates the water quickly.

Sweating. If metal to be coated is 14-gage or less, use oxyacetylene or carbon arc torch. Spread paste about 1/16 in. Heat base metal up to sweating temperature. Fusing of the metal and paste will show as a dark line ahead of the torch flame. Move torch across work, keeping the dark line ahead of the flame.

For metal of over 14-gage, use standard carbon electrode of 3/16, ¼ or ⅜ in. dia, depending on thickness of the metal. Have straight polarity with just enough current to maintain arc. Hold carbon about 80 deg to the vertical.

Using Carbon Arc. Work with a quarter-moon weaving motion, not over 2½ times diameter of carbon. Point carbon on pencil sharpener or by holding against grinding wheel. When handled right, carbon melts so point stays as it should. Have about 3 in. of carbon sticking out of holder.

Keep black spot of carbon floating on the surface just in front of the point. After sweating-on first weave, pass back to work and return with about half the width of the stringer. Weave overlapping the first. If you get porosity on the edges of the weave, pay no attention. It will disappear when you overlap the next weave.

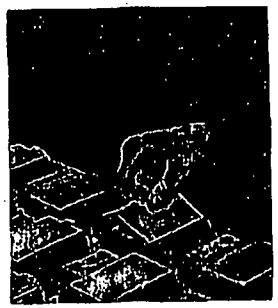
Use paste made of chromium-boride crystals only on parts of work that is not to be finished.

Sweating-On Powder. Chromium carbide comes as a powder, mixed with flux. Sprinkle it on the base metal and fuse with a carbon arc or carbon arc torch for a smooth, dense abrasion-resisting surface, which can be as thin as 0.025 in.

Hardness depends on mixing with base metal, runs about 54-61 Rockwell C for one layer and 57-63 for second. Deposit develops full hardness in resisting scaling at high temperatures. Corrosion resistance is like that of stainless steel. Don't use this type of alloy where impact is great.

1 Grit-blast the tungsten-carbide inserts to remove the surface oxides and clean. Machine surface of the base metal. Then do a thorough degreasing job

2 Flux surface of the base metal with brush. Before fluxing, clean in carbon tetrachloride. Degreasing, cleaning and grit-blasting must be done properly



3 Position silver-solder strips after fluxing. Place one strip on base metal, a copper screen on the solder strip and second solder strip on copper: flux

4 Put the tungsten-carbide inserts in place on top of "sandwich" of all-metal strips and copper screen. Six inserts are butted together on this job

5 Heating to 1350-1400 F by the propane-air burners against underside of base metal bonds the inserts. Test bond by tone of a hammer blow as shown

6 Attaching hard-faced peg to moving rotor of coal pulverizer. Coal gets pulverized by *impact and attrition* between moving and stationary pegs shown

5—Brazing Tungsten-Carbide Plates

Diamond-substitute alloys of Type III, A (see p 112) come as inserts of various shapes. Some contain 90 to 95% tungsten carbide. Remaining 5 to 10% is nickel, cobalt, iron or other elements to give the desired properties.

Braze these carbide plates to wearing surfaces because brazing heat (torch flame) will not melt the carbide materials. They do "wet" easily, so can be brazed to metal surfaces.

Because stationary and moving grinding pegs of the coal pulverizer shown take heavy punishment from impact and abrasive wear, they are hard faced with inserts of tungsten carbide. Here are steps in typical application:

Operations. (1) Machine surface of base metal to be hard-faced. (2) Degrease with trichlorethylene, clean with carbon tetrachloride. (3) Grit-blast tungsten-carbide inserts with silicon-carbide grit *to remove surface oxides* and other films.

(4) Flux machined surface of base metal with brush. (5) Cut strip silver (silver solder) to size and dip in flux. Then put in position on base metal. (6) Dip a copper screen or copper sheet in flux and place on strip silver. Because insert's coefficient of expansion is not the same as the base metal's, always put copper between. This also takes impact shock, as inserts are hard, with no "give." (7) Flux second strip of silver alloy and place on copper. (8) Put inserts in position on top layer of strip silver. (9) Braze by directing flame under base metal until both strips of silver melt. (10) Test bond by tapping inserts with a hammer. Tone indicates the quality of the bond.

Tungsten carbide can also be used to tip your maintenance tools. Technique is same as explained on this page.