

**DUROXITE<sup>TM</sup>**

# THE LATEST IN OVERLAY TECHNOLOGY



**DUROXITE<sup>TM</sup>**

**HARDOX<sup>®</sup>**  
WEARPARTS

# DUROXITE™ FIGHTS WEAR, GUARANTEED

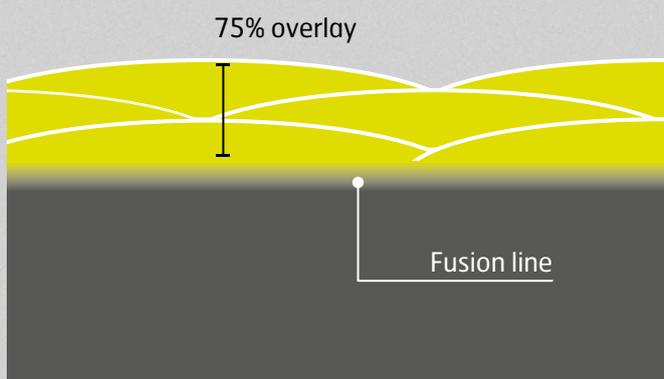
**Duroxite™ overlay products from Hardox Wearparts® can add weeks, months, even years of trouble-free operations to your most extreme wear situations.**

The Duroxite™ product range is targeted at different types of wear, such as abrasion, impact, heat, metal-to-metal and erosion wear. Duroxite™ is particularly well suited to fighting sliding wear from exceptionally hard particles such as minerals containing quartz.

By welding chromium or complex carbides, or other abrasion-resistant materials on top of mild or quenched and tempered steel, an extremely wear-resistant compound material is created.

Duroxite™ is delivered as plate, pipe, pin and wire, ready for installation on your equipment or further fabrication in your workshop. The products are available through the worldwide network of Hardox Wearparts® wear service centers.

## GUARANTEED OVERLAY THICKNESS, GUARANTEED OVERLAY PROPERTIES



Duroxite™ overlay plates and pipes are delivered with an overlay thickness guaranteed within  $\pm 10\%$ . This is consistent throughout the material and between individual plates and pipes.

The wear properties of Duroxite™ are also guaranteed throughout the overlay down to 75% of the overlay thickness.

The remaining 25% of overlay is the transition layer necessary to maintain good bonding to the base material.

# PARTNERS IN METAL

**Duroxite™ achieves its groundbreaking wear performance from a combination of metal expertise, research and development facilities, and state-of-the-art production equipment.**

As Hardox Wearparts® centers, we have a long-standing tradition of partnering with SSAB when designing new products, improving the choice of materials, and finding easier and more efficient processing techniques.

This close collaboration benefits both parties. Hardox Wearparts® centers have access to fast-track product development, as well as workshops and seminars on metals and wear. SSAB gains knowledge on the requirements and problems facing our customers, both day-to-day issues and long-term development trends.

Production of Duroxite™ is monitored at SSAB's state-of-the-art R&D testing facility, to ensure that its wear resistance, welding, cutting, bending, impact, and other properties meet your strictest requirements.



# DUROXITE™ EMPOWERS YOUR INDUSTRY

**The performance of Duroxite™ saves money and improves productivity in a wide range of applications through higher output and less maintenance.**

Duroxite™ overlay is the natural choice for industries active in quarries, mining, cement, energy, steel mills, recycling and many other areas where abrasive materials require extremely hard surfaces.



# PROVEN PERFORMANCE

**Duroxite™ is tough on wear wherever it is applied. Here are a few examples where Duroxite™ has made a difference for mining and asphalt applications.**

If you are looking for benefits for your particular business, please visit [www.hardoxwearparts.com](http://www.hardoxwearparts.com) for additional applications.

## COAL MINE

- Application: Coal discharge chute
- Wear part: Chute liner made of Duroxite™ 101
- Purpose: Discharges coal into storage bins or stockpiles
- Type of wear: Abrasion and impact
- Benefits: Increased wear life from 7 days to 6 months over previous design using overlay on mild steel  
No failure due to impact  
Notable reduction in down time



## ASPHALT

- Application: Slat conveyor
- Wear part: Slat conveyor bottom liner, 27.4 to 30.5 m (90 to 100') in length, made of Duroxite™ 100
- Purpose: Conveys asphalt up to silos
- Type of wear: High abrasion no impact
- Benefits: Replaced brittle cast Ni-hard liners with Duroxite™ extending wear life and solving brittleness and breakage issues



# OVERLAY OVERVIEW

| PRODUCT   | DESCRIPTION  |
|---|--|
| <b>SLIDING WEAR</b>                               |  |
| <b>DUROXITE™ 100</b>                              | <ul style="list-style-type: none"> <li>– Multipurpose overlay product designed for severe abrasive environments</li> <li>– Appropriate for handling moderate to low impact applications</li> <li>– Fabricated by depositing chromium-rich, abrasion-resistant materials on mild steel backing</li> <li>– Multiple layer overlay maintains full wear resistance up to 350°C (660°F)</li> </ul>  |
| <b>DUROXITE™ 100 PIPE</b>                         | <ul style="list-style-type: none"> <li>– Overlay pipe designed with extreme wear capabilities for severe environments</li> <li>– Manufactured by depositing chromium-rich, abrasion-resistant materials on a mild steel base using a traditional arc welding process</li> <li>– Available with double or multiple overlay passes</li> <li>– Can be fabricated as square-to-round transitions, elbows, T or Y-shaped, or as long sweeps</li> </ul>  |
| <b>DUROXITE™ 101</b><br><b>HARDOX® BASE PLATE</b> | <ul style="list-style-type: none"> <li>– Provides improved resistance against impact and plastic deformation</li> <li>– Greater safety margin compared to mild steel backing overlay products</li> <li>– Employs stronger Hardox® base plate and chromium-rich overlay materials</li> </ul>  |
| <b>DUROXITE™ 100 WIRE</b>                         | <ul style="list-style-type: none"> <li>– Flux-cored welding wire for hardfacing components subject to severe sliding wear</li> <li>– Appropriate for handling moderate to low impact applications</li> <li>– Weld deposit contains high proportion of extremely hard chromium rich carbides</li> <li>– Suitable for single or multiple layer deposits up to a maximum of three layers</li> </ul>   |
| <b>SEVERE SLIDING WEAR</b>                        |  |
| <b>DUROXITE™ 200</b>                              | <ul style="list-style-type: none"> <li>– Designed for extreme abrasive wear and impact up to 600°C (1100°F)</li> <li>– Provides up to 4 times longer service life than Duroxite™ 100 due to its high proportion of extremely hard multiple-alloy carbides</li> <li>– Comprised of specially formulated abrasion-resistant materials deposited on mild steel backing plate</li> </ul>   |
| <b>DUROXITE™ 201</b><br><b>HARDOX® BASE PLATE</b> | <ul style="list-style-type: none"> <li>– For severe wear and impact applications</li> <li>– Contains primary chromium carbides and refined multiple-alloy complex carbides deposited on strong Hardox® base plate</li> <li>– Provides higher impact resistance than Duroxite™ 200 at both room and elevated temperatures up to 350°C (660°F), but impact performance is best at room temperature</li> </ul>  |
| <b>EXTREME SLIDING WEAR</b>                       |  |
| <b>DUROXITE™ 300</b>                              | <ul style="list-style-type: none"> <li>– Iron-based steel alloy overlay deposited on mild steel</li> <li>– Appropriate for extremely severe sliding wear for both dry and wet (slurry) abrasive environments</li> <li>– Works well at ambient or elevated temperatures up to 600°C (1100°F)</li> <li>– Contains unique high volume of ultra-fine borocarbides, resulting in significantly improved service life</li> <li>– An excellent alternative to tungsten carbide overlay</li> </ul>   |
| <b>HEAT AND METAL-TO-METAL WEAR</b>               |  |
| <b>DUROXITE™ 400</b>                              | <ul style="list-style-type: none"> <li>– Overlay pin designed to withstand metal-to-metal wear in severe heat up to 480°C (900°F)</li> <li>– Matches with 12% manganese bushings with bearing system lasting longer than traditional hardened surfaces such as induction hardened 1040 and 4140 pins</li> <li>– Provides superior wear resistance in overlay with tough inner core</li> <li>– Performs well when torqueing and surface compression are involved</li> <li>– Designed to outlast original equipment and manganese pins by 3:1</li> </ul> |

**The ultimate Duroxite™ product for your application depends on the material—whether rock, sand, gravel or other substance—sliding along the surface of the wear part. It also depends on the angle and speed of impact, and the operating temperature.**

| APPLICATIONS   | OVERLAY PROPERTIES  |
|--|---|
| <p>Chutes/hoppers, liners for truck beds, dozer blades, shovel buckets, dragline buckets and excavators, separator guide vanes, discharge cones for clinker storage bins, chutes for sintering ore conveying, outlet ducts for clinker grinding mills, receiving hoppers, suction pipelines, pump discharges, fan blade/housings, coke vibrating screen plates, coal handling chutes, coal feeder liners, crusher screen plates, classifier cones, journal liners, silo bunkers.</p> | <p>Bulk hardness: Single pass 55-57 HRC, double pass 59-62 HRC, triple plus passes 60-64 HRC<br/>           Carbide hardness: 1700 HK<br/>           Volume fraction of primary carbides: 30-50%<br/>           ASTM G65-Procedure A weight loss: 0.18 g max.</p>   |
| <p>Slurry pumps, chutes, dredging pipes, cullet glass, air ducts, carbon injection pipes, suction lines, troughs.</p>  | <p>Bulk hardness: Double or multiple passes 59-62 HRC<br/>           Carbide hardness: 1700 HK<br/>           Volume fraction of primary carbides: 30-50%<br/>           ASTM G65-Procedure A weight loss: 0.18 g max.</p>  |
| <p>Coal discharger chutes, loader bucket liners, bucket lip shrouds, bucket side shrouds.</p>  | <p>Bulk hardness: Single pass 55 to 57 HRC, double pass 56 to 59 HRC, triple pass 58 to 63 HRC<br/>           Carbide hardness: 1700 HK<br/>           Volume fraction of primary carbides: 30-50%<br/>           ASTM G65-Procedure A weight loss: 0.18 g max.</p> |
| <p>For hardfacing wear parts undergoing wear by earth, sand and abrasives up to 350°C (660°F). Examples include crusher hammers, gyratory crusher cones and mantles, dredging pumps, slurry pipes, dragline bucket liners, coal pulverizer rolls, coke hammers, sand dredging parts, mining and earthmoving components, sorting screens.</p>   | <p>Chemical composition (wt. %): 4.7 C, 0.2 Mn, 0.6 Si, 27.0 Cr, Balance, Fe<br/>           Surface hardness: Three-layer deposit on mild steel 60-62 HRC<br/>           ASTM G65-Procedure A weight loss: 0.18 g max.</p>  |
| <p>Cement furnace components, sinter plant parts, fan blades, mixer blades, crews, gyratory mantles, coal and cement pulverizer rolls and grinding, ore sintering, crushing, riddling, blast furnace hoppers, throats and ovens.</p>   | <p>Bulk hardness: 60-65 HRC<br/>           Carbide hardness: 2500-3000 HK<br/>           Volume fraction of primary carbides: 30-50%<br/>           ASTM G65-Procedure A weight loss: 0.12 g max.</p>   |
| <p>Screen plates, loader bucket liners, feeding systems for ball mills, coal discharger chutes, loader bucket liners, bucket lip shrouds, bucket side shrouds, conveyor liners.</p>  | <p>Bulk hardness: 60-65 HRC<br/>           Carbide hardness: 2500-3000 HK<br/>           Volume fraction of primary carbides: 30-50%<br/>           ASTM G65-Procedure A weight loss: 0.12 g max.</p>   |
| <p>Crusher rolls, skip liners, slurry pipes, slurry pumps, conveyor chains, excavator bucket liners, fan blades, deflector blades, cranker crushers, surge bins, feed chutes, slurry pipes, slurry pumps, ore chutes, screw augers, wear liner plates, ash handling equipment liners, grain shredding hammers, sugar mill knives, row crop sweeps, fracking blender pumps, snow plow shoes, demolition tools.</p>  | <p>Bulk hardness: Single and double pass 67 to 70 HRC<br/>           Volume fraction of borocarbides: 60-70%<br/>           ASTM G65-Procedure A weight loss: 0.07 g max.</p>   |
| <p>Dragline buckets, dragline shovels, clam shell buckets, sheave pins, backhoe pins, crusher shafts.</p>  | <p>As-welded overlay hardness: 52-54 HRC<br/>           Work hardening hardness: up to 58 HRC<br/>           Maximum service temperature: 480°C (900°F)</p>   |

# DUROXITE™ 300

## WHEN EXTREME IS THE NORM

**Duroxite™ 300 is a high-performance and cost-effective alternative to tungsten carbide overlay.**

The specially formulated materials in Duroxite™ 300 result in a product with better impact resistance and a long service life when exposed to extremely severe sliding wear.

Duroxite™ 300 performs exceptionally well in both wet and dry abrasive environments. It can also absorb 25% more impact energy than a traditional chromium overlay plate as measured in a continuous high impact lab test.

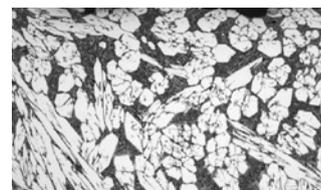
In addition, the overlay thickness for Duroxite™ 300 is reduced resulting in a lighter weight product compared to traditional overlays while increasing service life.

### UNIQUE HARDFACING MATERIAL IN THE OVERLAY

Duroxite™ 300 consists of specially formulated abrasive materials. The overlay contains a uniquely high volume of an ultra-fine complex borocarbide phase with a grain size refined down to 500 nm. The borocarbides are approximately 200 times finer than traditional chromium carbides.



Duroxite™ 300 borocarbide phase



Traditional chromium carbide phase

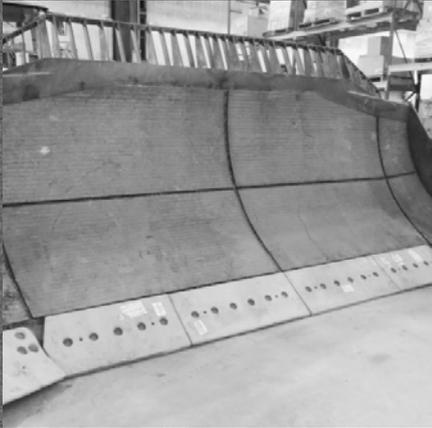
### DUROXITE™ 300 IMPROVES SERVICE LIFE IN THE STEELMAKING INDUSTRY

- Application:** Conveyor at steel foundry
- Wear part:** Conveyor liner plate using Duroxite™ 300
- Purpose:** The conveyor is used to discharge abrasive mold sand after casting
- Type of wear:** Sliding wear
- Benefits:** Only slight wear of 0.254 mm was measured after 3 months. The original liner made of cast Mn with tungsten carbide showed severe wear after 3 months.



# VERSATILITY COMES NATURAL WITH DUROXITE™

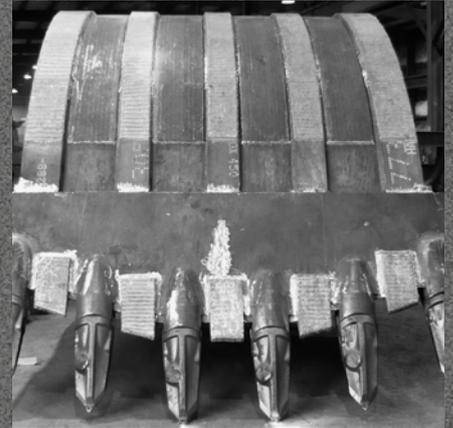
## MINING



Open pit bulldozer blades



Skip liners in gold mine



Open pit buckets

## CEMENT



Hardfacing elbows



Chutes



Roller covers

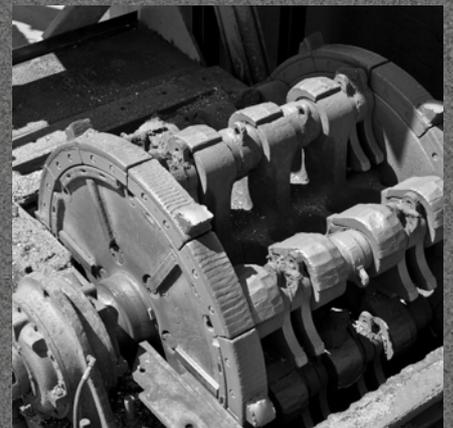
## RECYCLING



Y-shaped pipes for cullet glass



Rotor caps for aluminum recycling



Recycling shredders

# DUROXITE™ IN FABRICATION

**Duroxite™ is designed to be hard, without giving you a hard time in the workshop.**

Even the most worn-out equipment can be rebuilt and repaired to perform as new. With our broad product offering, including Hardox® wear plate and Duroxite™, and top-of-the-line processing equipment, you are able to restore products of practically any condition, size and design.

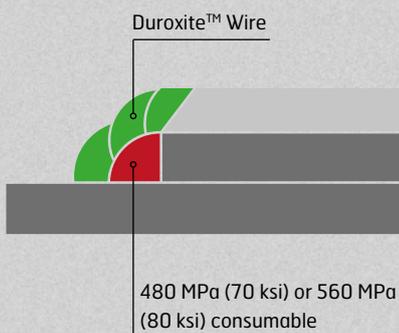
## INSTALLING DUROXITE™

No special equipment is needed to install Duroxite™ products. Welding and bolting are the common methods for installing Duroxite™ overlay plate or wear parts onto your equipment.

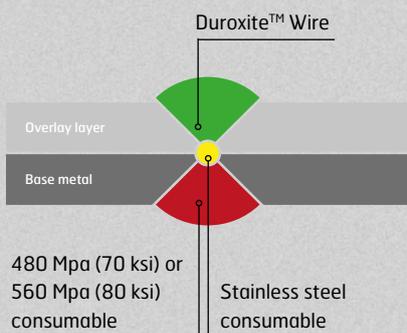
When joining base metal use 480 MPa (70 ksi) or 560 MPa (80 ksi) consumables. Any surface exposed to severe wear should be protected with hard-surfacing consumables. Cap welding a Duroxite™ product with Duroxite™ Wire ensures the weld will have the same wear resistance, resulting in a consistent service life for the entire overlay product.

## WELDING AND BOLTING DUROXITE™ TO YOUR SUBSTRATE

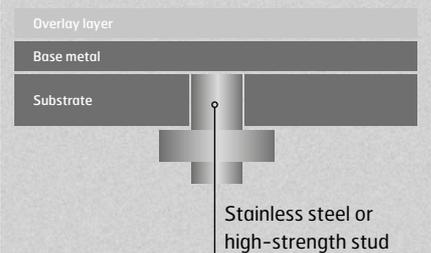
Joining Duroxite™ plate on mild steel



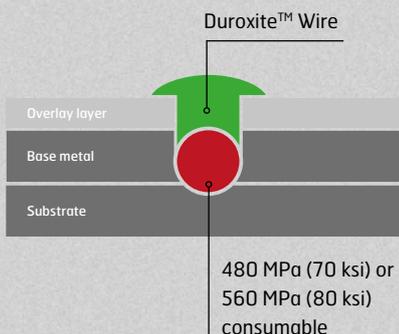
Joining Duroxite™ plates end to end



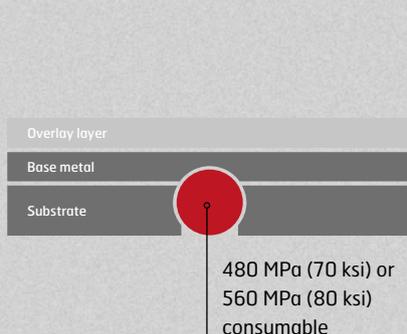
Stud welding of Duroxite™ plate from base metal side



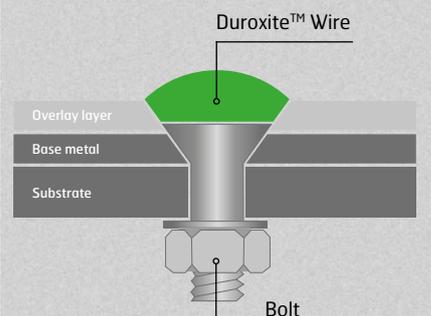
Plug welding of Duroxite™ plate from overlay side



Plug welding of Duroxite™ plate from base metal side



Bolting Duroxite™ plate through countersunk hole



## CUTTING

Duroxite™ can be cut by plasma, laser, water jet, arc gouge, and abrasive saw cutting. It cannot be cut by oxy-fuel flame cutting. Duroxite™ should be cut from the base metal side only to avoid carbon contamination. When beveling, Duroxite™ overlay plate can be burned from the hard side. Cutting speeds need to be reduced when cutting carbides.



### RECOMMENDED CUTTING SPEED AT DIFFERENT PLASMA CURRENTS AND THICKNESSES

| Plate thickness                | Duroxite™ 100                |                               |                               |                               | Carbon steel                  |
|--------------------------------|------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|
|                                | 130 amps                     | 200 amps                      | 260 amps                      | 400 amps                      | 360 amps                      |
| 6 mm on 3 mm<br>1/8" on 1/4"   | 1920 mm/min<br>75 inches/min | 2655 mm/min<br>105 inches/min | 3080 mm/min<br>120 inches/min | 3540 mm/min<br>140 inches/min | 4200 mm/min<br>165 inches/min |
| 6 mm on 6 mm<br>1/4" on 1/4"   | 1920 mm/min<br>75 inches/min | 2655 mm/min<br>105 inches/min | 3080 mm/min<br>120 inches/min | 3540 mm/min<br>140 inches/min | 4200 m/min<br>165 inches/min  |
| 10 mm on 10 mm<br>3/8" on 3/8" | 1010 mm/min<br>40 inches/min | 1265 mm/min<br>50 inches/min  | 1735 mm/min<br>65 inches/min  | 2440 mm/min<br>95 inches/min  | 4200 m/min<br>165 inches/min  |
| 12 mm on 12 mm<br>1/2" on 1/2" | 552 mm/min<br>20 inches/min  | 1225 mm/min<br>45 inches/min  | 1465 mm/min<br>55 inches/min  | 1800 mm/min<br>70 inches/min  | 4200 mm/min<br>165 inches/min |

## FORMING

Duroxite™ is typically formed with overlay to the inside but can be roll formed with overlay to the outside. Avoid bending plate parallel to the welding bead direction. The staggered cracking pattern on the overlay surface ensures good formability when bending. For bending radius recommendations, see chart on right.

The table covers bending radius recommendations for Duroxite™ 100, 101, 200 and 201. Specific forming recommendations for Duroxite™ 300 can be found on [www.duroxite.com](http://www.duroxite.com).

| THICKNESS                      | MIN INSIDE RADIUS  | MIN OUTSIDE RADIUS  |
|--------------------------------|--------------------|---------------------|
|                                | HARD LAYER FACE IN | HARD LAYER FACE OUT |
| 3 mm on 6 mm<br>1/8" on 1/4"   | 200 mm<br>8"       | 900 mm<br>36"       |
| 3 mm on 10 mm<br>1/8" on 3/8"  | 300 mm<br>12"      | 900 mm<br>36"       |
| 6 mm on 6 mm<br>1/4" on 1/4"   | 300 mm<br>12"      | 1200 mm<br>48"      |
| 10 mm on 10 mm<br>3/8" on 3/8" | 400 mm<br>15"      | 1500 mm<br>60"      |
| 13 mm on 13 mm<br>1/2" on 1/2" | 500 mm<br>20"      | 1800 mm<br>72"      |

## MACHINING

Machining Duroxite™ with conventional methods is not recommended. It can be finished by grinding. Countersunk holes can be precisely produced by EDM (Electrical Discharge Machining). Pre-machined mild steel inserts can be used if extra machining is required.



Hardox Wearparts® is a worldwide network of service centers providing wear parts and wear solutions for optimized productivity and service life. Hardox Wearparts® is a part of SSAB, the manufacturer of Hardox® wear plate.

## We would love to hear about your uptime needs



Find a center near you at  
[www.hardoxwearparts.com/contact](http://www.hardoxwearparts.com/contact)



[info@hardoxwearparts.com](mailto:info@hardoxwearparts.com)



+1 800 442 7369  
+46 243 712 00



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