Rhinoite®
Tungsten Carbide Hardfacing
Rhinoite®

Rhinoite® is a patented process that wears five to seven times longer in service operation than bare metal.

The Rhinoite® process is an innovative, patented MIG weld overlay that utilizes state of the art equipment — producing extraordinary results.

The process can be adapted to all service environments, in every wear application: erosion, corrosion, adhesion and high temperature applications (2200°F). Rhinoite® has been a proven leader of hard metal overlay on elbows, t-sections and choke tubes in chemical plants and refineries for the past six years with zero failures. The Rhinoite® weld process focuses on minimizing loss of production time by wearing five to seven times longer than bare metal. Rhinoite® overlays can be completely refurbished after years of service, reducing overall material and maintenance costs.

Rhinoite® Provides Bottom-line Cost Savings

- Minimizes loss of production time by wearing five to seven times longer in service operations than bare metal
- Reduces number of shutdowns servicing times to years rather than months
- Eliminates equipment rentals, insulation replacement, and inspection frequency
- Reduces required man-hours for overall maintenance of units
- Reduces overall material cost by being able to be completely refurbished after years of service; eliminating the need to purchase new components
Rhinoite® Weld Hardfacing
Application Process

1. **Pre-heating of component.**
   Selection of weld material; carbon steel, stainless steel, Duplex steel, Colmonoy and Inconel. The component has been preheated. The first pass of overlay is weld wire plus carbide content.

2. **Step two, second pass.**
   Overlaying of first pass with weld material only (zero carbide). The second pass normalizes the first pass with base material, minimizing the Heat Affected Zone (HAZ) with base material. The first pass then becomes molecularly homogeneous with the base material.

   This process establishes the matrix of the overlay. A percentage of the saturated carbide is diluted, with the remainder migrating to form a new alloy material called the matrix.

3. **Finishing overlay to desired dimensions.**
   Outside diameter dimensions are accomplished by diamond grinding only. Inside diameter dimensions, depending upon application, are generally left as welded. Vertical grinding is available upon request, based upon diameter and length of product.

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**Applications**
Elbows
Pumps
Valves
Stabilizers
Bearings
T-Sections
Furnace Bends
Furnace Caps
Coker Nozzles
Choker Tubes
Exceptional Wear Resistance

The Rhinoite® weld process has been subject to extensive corrosion and erosion testing. Once tested for 2000 hours with direct salt spray fog, microscopic examination of the carbide coated surfaces at the interim inspection showed little to no effect on the carbide surfaces throughout the test period. Additionally, upon removal of the Rhinoite® overlaid products after glass bead abrasive blasting, the component surfaces were virtually unaffected. (AS B117 - 90 - Standard Test Method of Salt Spray)

Test Parameters

- 48,000 psi water jet
- 250 g/min of 80 mesh fresh garnet
- .040” diamond orifice @ 1/8” stand-off with 1/8” min traverse speed
- Depth of kerf in Rhinoite® - .025/.050”
- Comparable wear resistance: 1/4” Rhinoite® = 16” Inconel 718
Rhinoite® Hardfacing

Using a MIG weld process an initial overlay of mild steel wire with dispersed cemented metal carbide pellets is applied to a base material. As the second pass is applied, a portion of the hard metal particles in the first overlay are dispersed in the weld puddle forming the Rhinoite® matrix. The result is a steel hybrid matrix that can be diamond ground down to desired dimensions. The process provides improvements in wear resistance that enable the component to have an extended service life even when used in highly erosive and/or corrosive environments.

- Custom matrix of duplex stainless steel, 309L stainless, carbon steel, Inconel, Colomony 56, tool steel and nickle alloys
- Tungsten carbide content up to 80% weight
- Fluid erosion resistant
- Corrosion resistant
- Oxidation resistant
- Hot hardness – 1200°F
- Thickness up to 5/8”
Rhinoite® Hardfacing

Cross Section

The second pass of the overlay acts as an oven baking the first pass of the overlay releasing tungsten particles into the matrix.

50X zoom showing tungsten pellets in the matrix. Notice the inner-ring shape of the pellets where the molecular reaction releases the tungsten into the matrix.

50X zoom showing pellets next to Substrate condition of heat affected zone showing no cracking or stress.
A full report of the Rhinoite® hardness test results can be requested by contacting:
sales@valv.com
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Note: The surface hardens as it wears down towards the molecular structure of the Rhinoite® hardfacing layer as it gets closer to the base material.