



**ST. LAWRENCE**

Alloys for Industry Since 1955



# Ultra-Met™

- Wear Resistant Materials
- Over 50 Years Experience
- Custom Fabrications
- Extended Service Life



## Ultra-Met Product Range

St. Lawrence has a long history in addressing industrial impact and abrasion applications with Ultra-Met. The proper material for the specific application is important. Ultra-Met grades include:

**Impact Grade** Designed especially for impact applications where the material is under crushing loads or direct impact.

**Standard Grade** Designed to be an all around product to meet the needs of both light impact and moderate to high abrasive applications.

**Severe Abrasion Grade** Designed for severe abrasion applications where there is little or no impact.

All Ultra-Met Overlay grades are produced in our North American facility under strict process controls. The result is a surface possessing an excellent combination of high resistance to erosion, severe abrasion and moderate impact strength. Ultra-Met has exhibited wear resistance; up to 10 times the life of mild steel. For extreme wear situations where surface smoothness is not a concern ask your St. Lawrence Representative about our Tungsten Overlay material.

## ULTRA-MET SUGGESTED APPLICATIONS BY INDUSTRY

### STEEL MILL

#### BLAST FURNACE

Transfer/Diverter Plate  
Hoppers  
Ore Bins  
Skip Cars  
Blast Furnace Bells  
Fan Blade Liners  
Transfer Car Wear Plates

#### COKE PLANT

Coke Guide Bottom and Side Wear Plates  
Coke Pusher Shoe  
Quench Car Wear Plates  
Coke Flapper Gate Plates  
Impactor Plates

#### SINTER PLANT

Sinter Fan Blades - Induced Air Fan  
Downcomers and Wind Boxes  
Screw Conveyor Liner  
Vibrating Hot Fines Screen  
Sinter Slide Nose Piece  
Distributor Plate - Off Feed Roll Drum  
Feed Roll Drum  
Swinging Spout  
Fan Blade Liners - Induced Air Fan  
Discharge Feeder I Hopper  
Rotary Cooler  
Sinter Leveling Blades  
Cyclones  
Scroll Liners  
Grizzly Bars  
Grizzly Screen Wear Plates

#### ROLL MILL

Flume Liners  
Shear Knives

#### STRIP MILL

Strip Mill Wear Plate  
Hot Mill Entry Guide

#### BOP SHOP

Raw Materials Feeder Chute Liner  
Scrap Box Liners

### MINING

Fan Blades & Liners  
Stabilizer Bars  
Ore Chutes and Baffle Plates  
Launders  
Sluice Gate  
Pan Feeder  
Crusher Mantle  
Crusher Liners  
Slurry Lines  
Ore Hoppers and Bins  
Crusher Cones  
Disintegrator Bars  
Grizzly Bars  
Feeder Plates  
Vibrating Pan Feeder Plates

### POWER PLANT

Mill Liners  
Cyclones  
Whizzer Blades and Disc  
Classifier Vanes  
Pulverizer Wear Plate Strips  
Coal Handling Chutes  
Slurry Lines  
Exhauster Blades  
Deflector Plates

### CEMENT PLANT

Distributing Hub Deflector Plate  
(Raw Mill Separator)  
Clinker Chutes  
Blades, Casing & Inlet Rings for Fans  
Throw Plates  
Y-section Pneumatic Piping  
Crusher Bowl and Mantle  
Cyclones  
Baffle Plates for Clinker Cooker

### DREDGING

Suction Lines  
Elbows

### PULP MILL

Flat Back Elbows  
Chipper Hoods

### Standard Overlay Plate

Product	Overlay Passes (Layers)	Nominal Thickness	Base Plate	Overlay - Hardfacing	Plate Size (W x L)
Ultra-Met	Single	3/8"	3/16"	3/16"	4' x 10'
Ultra-Met	Single	3/8"	1/4"	1/8"	4' x 10'
Ultra-Met	Single	1/2"	1/4"	1/4"	4' x 10'
Ultra-Met	Single	3/4"	1/2"	1/4"	4' x 10'
Ultra-Met	Double	3/4"	3/8"	3/16" + 3/16"	4' x 10'
Ultra-Met	Single	1"	3/4"	1/4"	4' x 10'
Ultra-Met	Double	1"	1/2"	1/4" + 1/4"	4' x 10'

NOTE: Special shapes cut to size and fabrications to specification are available. Contact your St. Lawrence Representative for more detail.



## ULTRA-MET™ CHROMIUM CARBIDE OVERLAY

**Ultra-Met** is a composite material of ultra-hard, chromium carbide crystals micro embedded in a tough, resilient alloy matrix to a carbon steel base. The result is an extremely durable wear plate.

Ultra-Met combines hardness, toughness and heat resistance to outlast almost all other materials. When wear is from severe abrasion with impact, shock or heat, Ultra-Met outlasts rubber, hard castings, heat treated AR steels, ceramics and plastics.

There are many variables that need to be considered when selecting the right overlay product. Over the years we have developed a range of Ultra-Met products that meet the needs of our customers and their specific applications.



### Advantages

- Outlasts AR steels by an average of 4 to 6 times in many applications
- Quick Payback
- Maximum resistance to abrasion
- Superior resistance to chipping, flaking, peeling or separation under severe conditions
- Produced in our North American facility under strict process controls.
- ULTRA-MET plate and pipe can be cut, forged, welded, formed and machined to close tolerances.
- Available in multiple layers and custom fabrications.
- Dollar for dollar ULTRA-MET has successfully proven itself an economical approach to abrasion control.
- Abrasion resistant properties are unaffected by sustained operating temperatures of up to 1,250°F. (676°C).

### Chemistry (General)

Ultra-Met exact composition is proprietary:

Cr	C	Ni	Mn
23 - 35%	3.5 - 4.5%	0.2% max	1.0% max

Base metal: A36 carbon standard (Alloy or stainless base furnished on special order.)

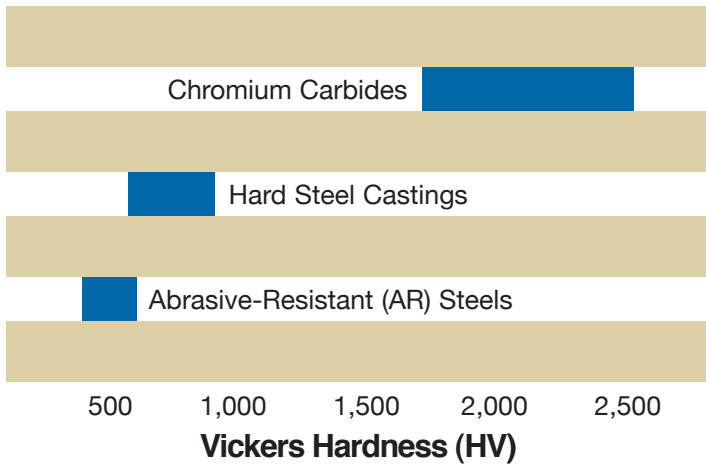
### Mechanical Properties

	Avg. Surface Hardness (Matrix Metal)	ASTM G-65 Mass Loss	Carbide Hardness (Max.)
Single Overlay	55 Rc	.085 g	1750 HV
Double Overlay	59 Rc	.075 g	1750 HV



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## Abrasion Properties



Chromium Carbides 1,750 – 2,500 HV  
 Hard Steel Castings 585 – 845 HV (= 54 – 65 RC)  
 Abrasive-Resistant (AR) Steel 380 – 540 HV (= 280 – 500 BHN)

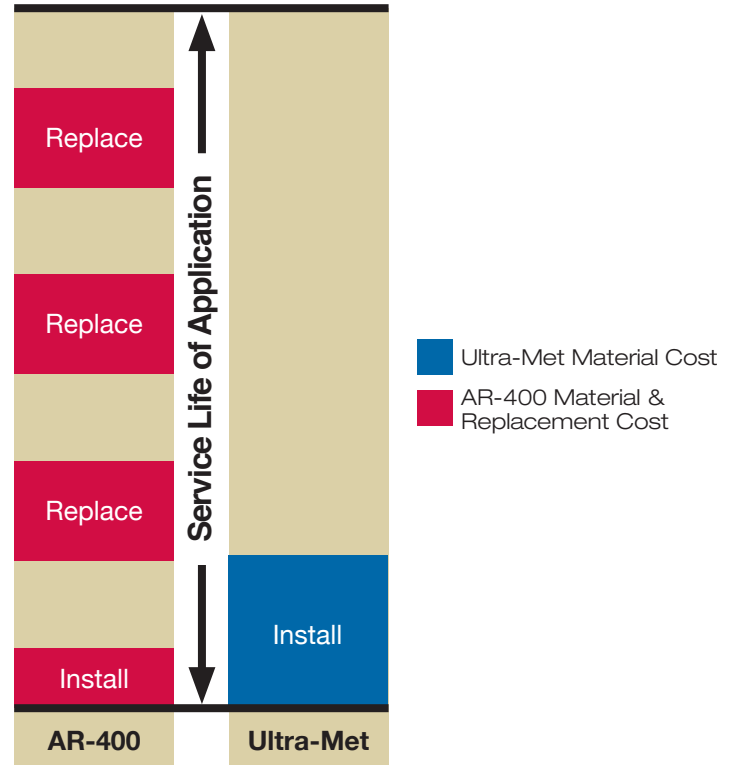
The harder the wear resistant metal is, compared to the material causing abrasive wear, the lower the rate of abrasion. The lower the rate of abrasion, the longer your equipment will last.

## Service Life Comparisons

Grade	Compared to Carbon Steel	Compared to Heat Treated AR Steels
Standard	20-25 to 1	3-5 to 1
Severe Abrasion	25-30 to 1	5-7 to 1

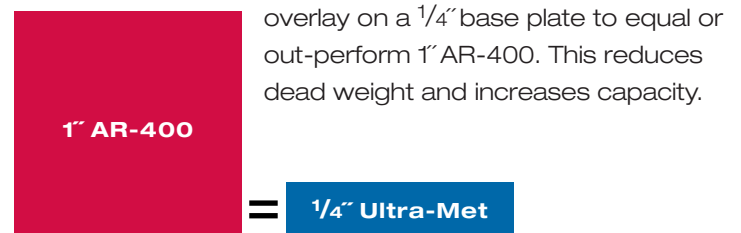
## Initial Price vs. Lifetime Cost

The **real cost** of abrasion-resistant steels (RA-360, AR-400, AR-500) can be over 50% higher than Ultra-Met™. In proper applications, Ultra-Met outlasts other steels, including heat-treated wear-resistant alloys, by an average of four to six times. Payback occurs quickly—with the third replacement.



## Weight Reduction

Ultra-Met lets you cut costs by using thinner plate. Since Ultra-Met lasts 4-6 times longer, it takes only 1/4" Ultra-Met



## Fabricating

We recommend the use of St. Lawrence Steel's fabrication services to eliminate errors in the processing and fabrication with Ultra-Met™ steel plates.

**Cutting** Ultra-Met can be cut with water jet, plasma burning equipment, air arc or abrasive saws. The minimum recommended plate temperature should be +60° F during processing.

**Gouging** (Carbon ARC) A conventional constant current DC welding supply 80V is recommended for gouging. Gouging should occur from the base metal side of the Ultra-Met plate. Remove slag with a grinding disc.

**Sawing** Although a slow process, cutting can be achieved using an abrasive silicon carbide wheel.

**Forming** Ultra-Met can be formed to a radius of not less than 20 times the thickness using press brakes or rolls. If using rolls it is recommended that a 10 ga. sheet of mild steel be placed on top of the Ultra-Met to prevent nicking of the surface of the forming rolls. It is recommended that plates be rolled in the direction of the overlay weld beads. Forming will either increase or decrease the width of the stress relief cracks in the overlay. This should be expected and should not adversely affect the performance of the Ultra-Met fabrication if the radius recommendations are followed. For sharper radii, heat plate to 1500°F. Hot form or forge at 1800° - 1850°F.

**Machining** Shearing, punching or machining is not recommended. Ultra-Met can be efficiently Blanchard ground. A magnetic table will hold base metal, but Ultra-Met is non-magnetic, so if base is to be ground, also, use mechanical means to hold the plate.

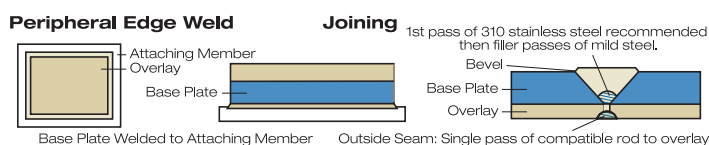
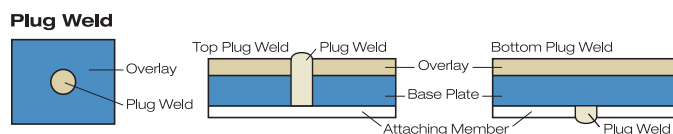
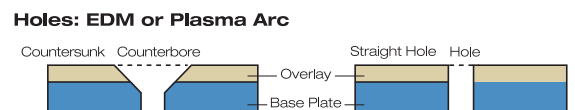
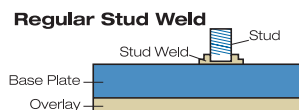
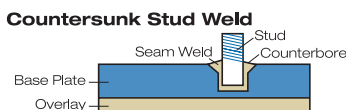
**Repairing** To repair the surface of Ultra-Met, use a manual arc welding process, St. Lawrence PN 200-W-ACF hard surface wire is recommended. Additional cracks may be noticeable, but will not affect abrasion resistance.

**Grinding** Ultra-Met can be abrasive ground with a hard grit soft bond stone.

**Welding** Any low carbon electrode is acceptable. Weld carbon steel base plate. No preheating. When welding two pieces of Ultra-Met, bevel base plate (underside) and complete normal welding procedure. Can be field pierced with covered metal electrodes; Chamfer-Trode, Rocket Groove, Cut-Trode or equivalents.

**Joining Plates** Working from the base plate side of the plate join the plates using a low hydrogen electrode (AWS 5.1 – E7018 or 7016 type). **CAUTION all structural welding must be confined to the base plate and not overlap into the overlay alloy. Inclusion of the overlay material into structural welds may lead to carbon embrittlement and failure of the weld.** After the structural welds are complete fill the joint on the overlay side of the fabrication using an approved St. Lawrence welding wire. Grind the joint down smooth with the adjacent surface.

## Bolting And Attachment Methods





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