

Mining and Earthmoving Equipment Hardfaced with Postle MIG Tungsten Carbide



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POSTALLOY is an American trademark, from **Postle Industries, Inc.**

Website

www.postle.com

www.hardfacetechologies.com

www.tungstencarbidehardfacing.com

With headquarters in Cleveland, Ohio - Postle Industries has spent almost 45 years focusing on hardfacing and reclamation, and maintenance welding. Postle has been and continues to be an innovative leader in the research and development of smaller diameter wires for the hardfacing industry.

TUNGSTEN CARBIDE HARDFACING

OBJECTIVES - BENEFITS

The number one cost to any industry is equipment downtime. This is especially true for industries that use heavy equipment, such as mining and earthmoving. Parts and equipment that are exposed to wear are subject to abrasion, impact and/or erosion. These external factors lead to equipment deterioration requiring lengthy and expensive repairs and hundreds of tons of lost production and material. Downtime and the reclamation or replacement of wear prone parts represents a significant expense to companies.

Postle MIG Tungsten Carbide provides a solution by:

1. Increasing the service life of parts that have become worn (shovel tips and adaptors, blades, dredging teeth, mixing blades, hammers) from 200% to 800% more than conventional hardfacing alloys.
 - Mining equipment – shovel and bucket wear parts, drilling parts
 - Highway and road construction equipment
 - Trenching equipment
 - Processing equipment – mixing blades
 - Dredging equipment – cutter heads and teeth
 - Recycling equipment – hammers and other wear parts
2. Improving productivity by keeping wear parts sharp and maintaining physical dimension tolerances.
3. Reducing expenses caused by frequent maintenance interruptions and downtime.
4. Reducing the cost of replacement parts.

WHAT IS MIG – Tungsten Carbide?

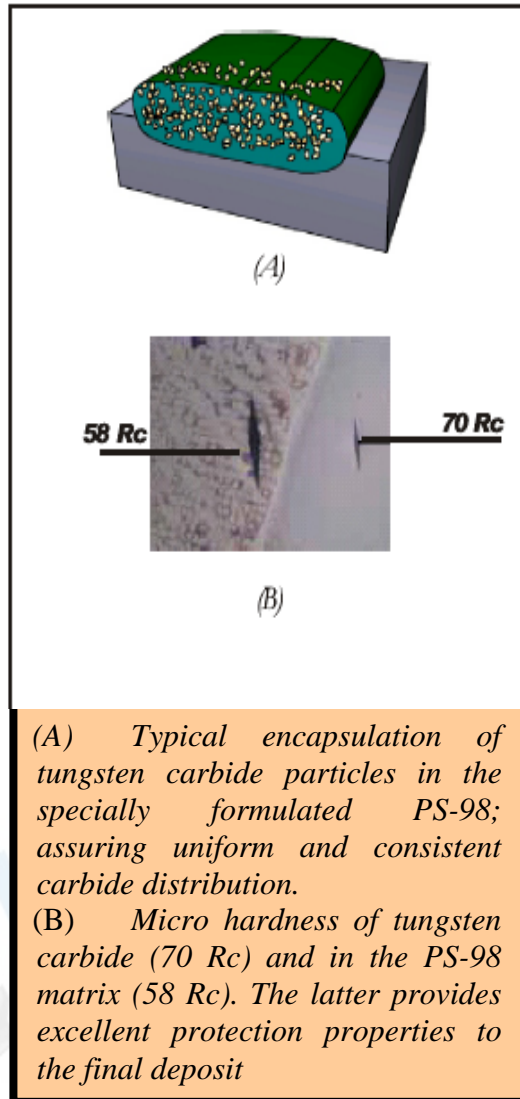
- ♦ MIG Tungsten Carbide utilizes the **MIG** welding process along with PS-98 hardfacing wire and tungsten carbide particles to form a composite hardfacing that is highly resistant to severe abrasion and impact. It is made from extremely hard (70 Rc) tungsten carbide particles, deposited in a specially designed tool steel weld matrix (58 Rc) – Postalloy PS-98.
- ♦ The tungsten carbide particles are held in a hopper located directly above the welding operation. Immediately upon beginning to weld, the tungsten carbide particles are dropped through a tube that is attached to the MIG gun nozzle and then fed directly into the molten PS-98 weld matrix.

Where is the Tungsten Carbide Applied?

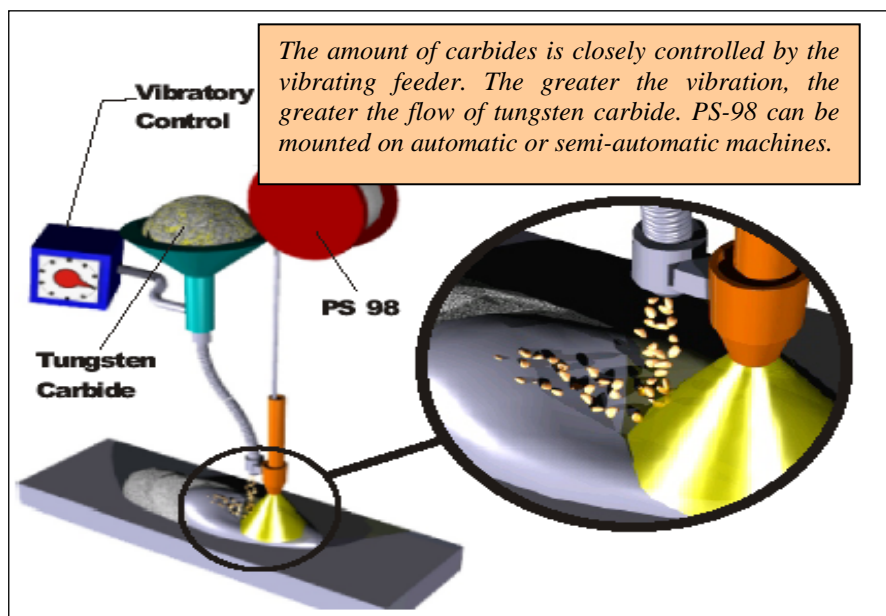
- To decrease the material lost from the wear prone parts, the critical areas should be hardfaced with MIG Carbide according to the type of material that the wear prone part will be working be encountering.

The PS-98 matrix wire with Tungsten Carbide - will have a greater hardness than the material causing the wear. This significantly decreases the loss of wear prone parts from abrasion.

Hardfacing Weld Deposit PS-98 hardfacing wire matrix with Tungsten Carbide



Vibratory Feeder and Control



Tungsten Carbide / Postalloy PS-98

Application of **MIG Tungsten Carbide** on loader and shovel tips enables them to be kept in service longer, resulting in more productivity

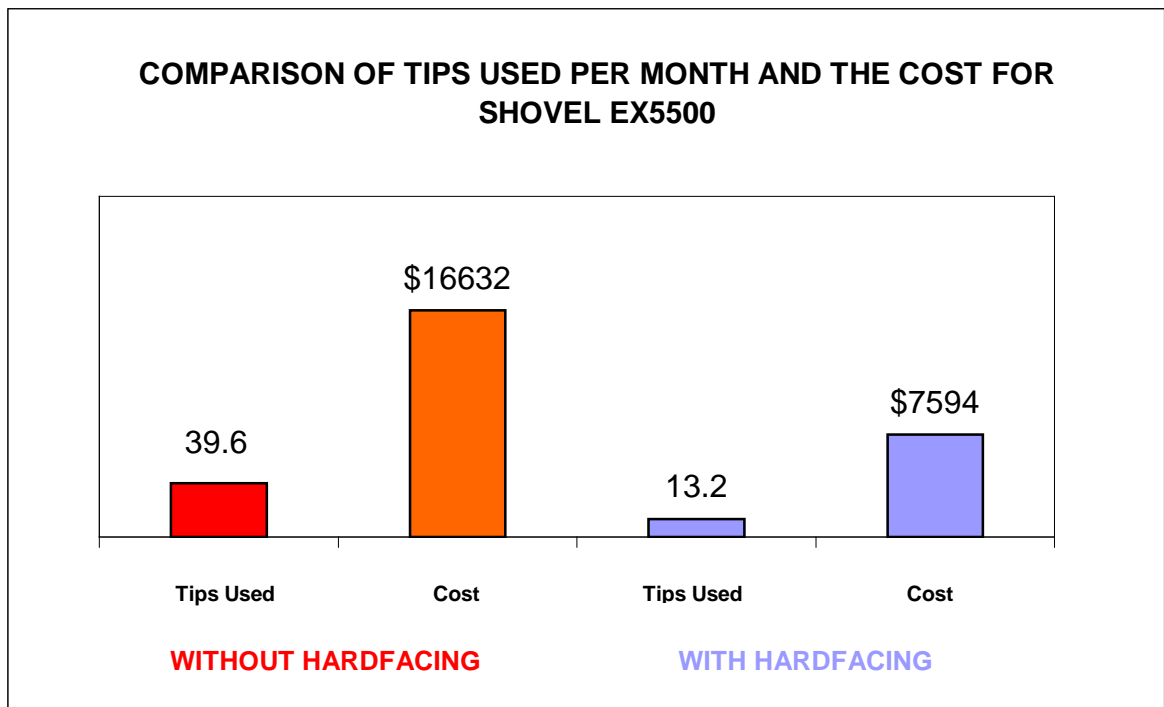
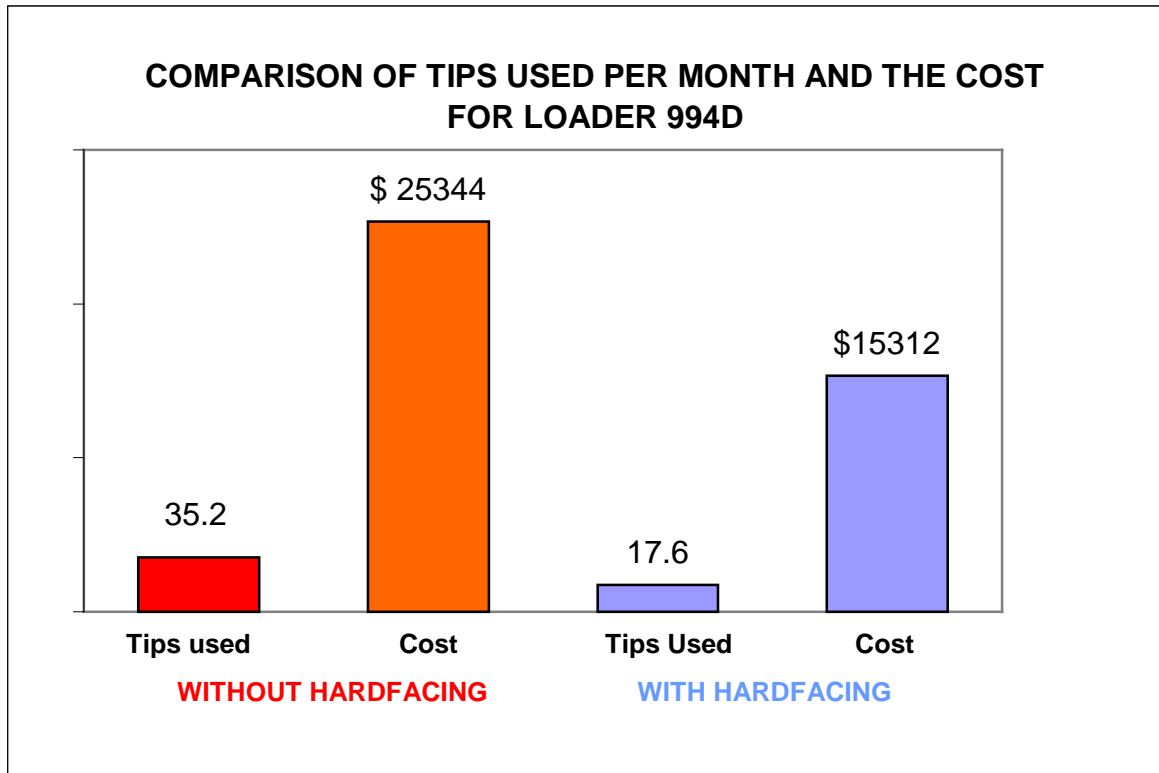
Shovel EX5500 Hitachi used at Yanacocha Mines



ESTIMATED COSTS AND SAVINGS

Tool/ Equipment	PRICE PER TIP (\$)		SERVICE LIFE Hours		TIPS USED/MONTH		COST/MONTH		\$\$\$ SAVINGS
	New without MIG-TC	MIG Tungsten Carbided	New without MIG-TC	MIG Tungsten Carbided	New without MIG-TC	MIG Tungsten Carbided	New without MIG-TC	MIG Tungsten Carbided	MONTH
SHOVEL EX5500	\$420	\$570	100	300	39.6	13.2	\$16632	\$7524	\$9108
LOADER 994D	\$720	\$870	150	300	35.2	17.6	\$25344	\$15312	\$10032

COMPARING THE COST OF PARTS PUT IN SERVICE WITHOUT HARDFACING AND WITH MIG TUNGSTEN CARBIDE

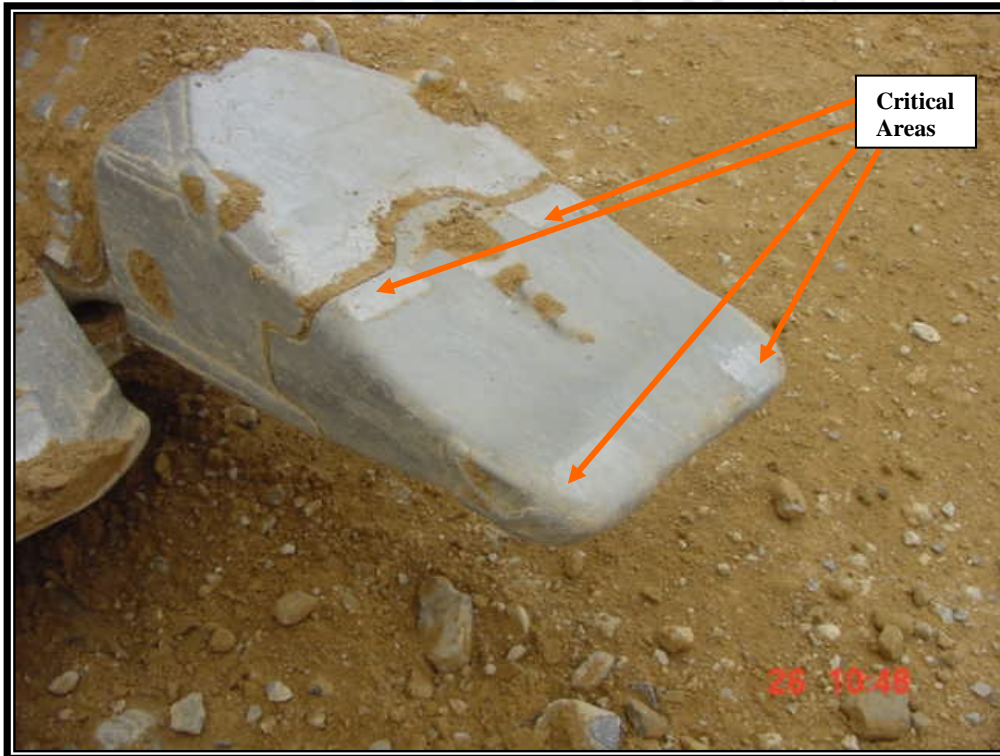


Source: Yanacocha Mines

SHOVEL TIP PROTECTION



ESCO Shovel Tips before being coated
Yanacocha Mines



ESCO Shovel Tip placed in operation at 60 hours of life
Yanacocha Mines

LOADER TIP FACING

**Hardfacing process with tungsten carbide on
Loader Tips CAT 994 belonging to Yanacocha
Mines.
Urteaga factories**

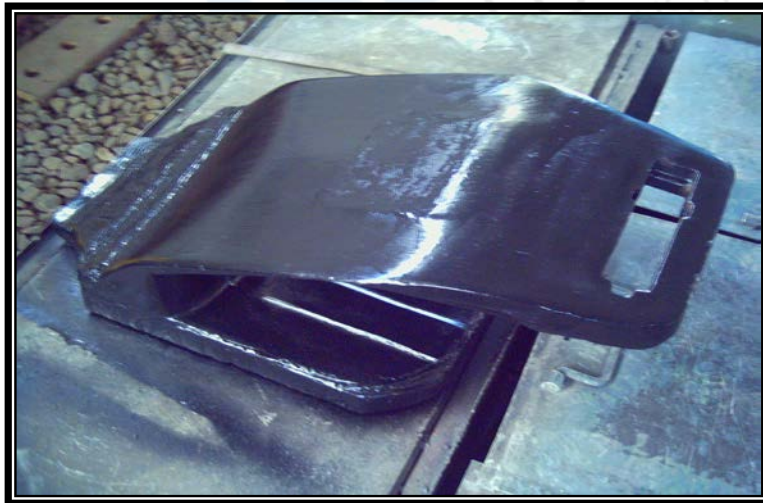


**Loader tip ready to be put into operation.
Work carried out at Urteaga factories**

LIP PROTECTION



**ESCO lip protector before being hardfaced
with MIG Carbide**



**The same ESCO lip protector ready to be put into operation
Yanacocha Mines**

FREQUENTLY ASKED QUESTIONS

- 1. Does the MIG Tungsten Carbide hardfacing application change the properties of the base metal? Will the base metal soften and wear more quickly when the tungsten carbide / PS-98 hardfacing wear away?**

No. That is what many of our competitors would like to believe. However, several metallurgical analyses have been conducted. They show that the heat affected area (HAZ) is approximately 0.040" deep (1 mm), below the hardfacing matrix and has the same hardness as the base metal.

- 2. Do I need to invest in a big infrastructure to be able to apply this technology?**

No. In fact, you only need a standard **CV MIG** welding machine and the tungsten carbide feed equipment, plus tungsten carbide particles and PS-98 matrix wire. Of course, Postle can provide the necessary technical support for your application.

- 3. Can the MIG Tungsten Carbide process be used out of position?**

No. The process is confined to the flat position because the for the carbide particles to fall by gravity into the weld puddle.

- 4. Can the MIG Tungsten Carbide Process be used on a cylinder?**

Yes

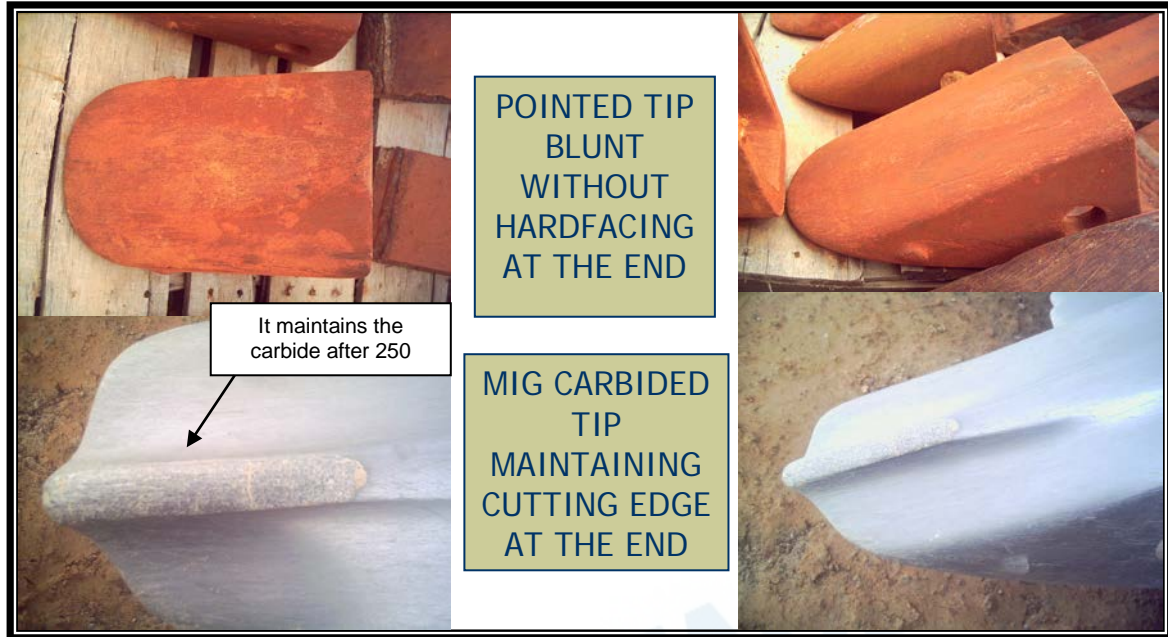
- 5. What is the longest service life that products coated with MIG Tungsten Carbide have attained?**

This is a hard question to answer because there are so many variables in hardfacing, especially when hardfacing cutting edges, blades and parts exposed to wear from abrasion, impact, erosion, etc. Generally, an increase in wear life of 6 to 10 times can be expected over parts that are not previously hardfaced. Wear parts that are currently being hardfaced with conventional hardfacing alloys can expect improvement of 3 to 6 times in wear life.

ADVANTAGES OF HARDFACING

- **LONGER SERVICE LIFE** – Fewer replacement parts are needed when parts are hardfaced with MIG Tungsten Carbide.
- **HIGHER PRODUCTIVITY** - Improving the wear life of critical wear parts contributes to equipment working and producing more per hour. This increases the productivity and therefore profits.
- **LESS DOWNTIME WITH MINING EQUIPMENT WORKING LONGER** - A longer service life of equipment means that you will spend less time replacing parts. This contributes to a reduction in total operating costs.

**“POSTALLOY IS YOUR SOURCE AND RESOURCE FOR
HARDFACING PRODUCTS AND PROTECTION
TECHNOLOGIES”**



**BULLDOZER GROUSER BARS
MIG TUNGSTEN CARBIDE AND PS-98 HARDFACING WIRE**



Blades (graders and bulldozers) hardfaced with MIG Tungsten Carbide work more efficiently in high abrasion and impact applications.



**Motor Grader Blade
Yanacocha Mines**

UNDERGROUND CONTINUOUS MINER WEAR SHOES



A Hardfacing Matrix Wire for Tungsten Carbide Embedding

Description

Postalloy® PS-98 is a metal-cored, triple deoxidized, iron base hardfacing matrix wire, alloyed with chromium and molybdenum. It is primarily used as a matrix alloy for the MIG Carbide Embedding Process and will consistently provide an even distribution of carbide particles throughout the entire weld deposit. Hardness range is 55-60 HRC. Unlike soft mild steel welding wires which are commonly used with the MIG Carbide Embedding Process, the high hardness tool steel microstructure of **Postalloy® PS-98** is designed to encapsulate and protect the tungsten carbide particles from premature erosion.

Most carbide embedding operations use solid mild steel welding wires, requiring higher voltage and amperage settings to achieve a fluid puddle. **Postalloy® PS-98** is metal cored and develops a spray transfer at very low current levels. This property, combined with its unique alloy content

forms a very fluid, clean weld puddle which promotes an even dispersion of tungsten carbide, as the particles are dropped into the weld puddle.

Tungsten carbide particles, which are extremely hard and wear-resistant, combined with the hard PS98 matrix alloy, protect a wide variety of equipment from premature wear in many challenging applications, such as bulldozer and grader blades, dragline bucket wear parts, loader and excavator buckets, railroad tie tampers, wear plate, logging and wood chipping wear parts, as well as construction, demolition, and land fill equipment including hammermills, horizontal grinding equipment and tub grinding hammers.



Hardness impression is a PS-98 Matrix 58Rc



Hardness impression in a Tungsten Carbide Particle 70Rc

Welding Parameters & Packaging

	.045" (1.2mm)	1/16" (1.6mm)
Diameter	.045" (1.2mm)	1/16" (1.6mm)
Polarity	DC Reverse	DC Reverse
Current <i>amps</i>	170-220	180-250
Wire Speed	180-210	160-190
Voltage (DCRP) <i>volts</i>	26-28	27-29
Gas Shielding (98% Argon / 2% Oxygen)	35 CFH	35 CFH
Stickout	1 - 1/4" (25-32mm)	1 - 1/4" (25-32mm)
Hardness (1 Layer)	55 to 60Rc	55 to 60Rc
Deposits are slag free		



Packaging

25 lb. spools	Standard	Standard
50 lb. spools	Standard	Standard