



OVERLAY PRODUCTS



**THE PROVEN WAY
TO PREVENT WEAR AND CORROSION**



Triten: Making History through Innovation Since 1946

1946

Roman Arnoldy founds Texas Alloy Products Co. (TAPCO, which later becomes a division of Triten) to manufacture heat, corrosion and abrasion resistant equipment for petrochemical plants along the Gulf Coast.

1954

Mobil Oil Co. (Now Exxon Mobil) commissions Triten (TAPCO) to develop steel piping with a hard metal coating to resist catalyst abrasion — a costly problem in refining.

1956

Triten (TAPCO) begins production of T200X for high temperature catalyst after superior test results. The test piece, hardfaced with T200X, was still in service 10 years later!

1957

After seeing a reduction of downtime and significant cost savings, the refining industry moves toward requiring hardfacing in the thermal catalytic cracking process.

1961

Triten (TAPCO) develops and patents the Bulk weld process.

1963

Triten (TAPCO) is the only producer of hardfaced pipe. Triten then develops and patents the concept for hardfaced plate.

1965

The first U.S. client for hardfaced plate is U.S. Steel in Gary Works, Indiana.

1972

Triten (TAPCO) builds the first ever fabricated slide valve.

1973

The Great Canadian Oil Sands Co. buys their first hardfaced plate from Triten (TAPCO) and remains a Triten client today.

1976

Triten (TAPCO) is growing so rapidly that it expands and relocates. Once completed, the expansion is three times the size of their original production facility.

1980

The company is officially renamed Triten Corp. signifying three decades of manufacturing. The TAPCO division of Triten is sold to General Signal Corp.

We provide the most advanced solutions for abrasion and corrosion control.

Our solutions are ideal for a broad range of industrial applications.

Triten Alloy Products Group is a worldwide supplier of hardfaced plate and a leading manufacturer of industrial materials that resist wear, corrosion and impact. We integrate our core capabilities of abrasion/wear resistant weld overlay with our specialized corrosion resistant weld overlay. Our tradition of continually improving our technology and methodology allows us to produce quality procedures and products to help your business reduce its operating costs and increase productivity.

Our processes are more economic for three main reasons

1. Our Bulk welding substantially increases the deposition rates of weld metal, especially when compared to normal single wire operation. Since our process has no increase in welding current, dilution or heat input, it allows us to provide more competitively priced products.
2. Little or no costly re-working is required because our processes produce far less distortion.
3. With a wear life multiplier as much as 20 times that of carbon steel, we can reduce costs for a variety of industries including, but not limited to, the Energy, Steel, Pulp & Paper, Asphalt, Cement, Glass, Food Processing, Mining, Refuse Processing and Scrap Steel Recycling industries.



Manufacturing TRITEN hardface plate using the bulk weld process.

Triten's T200X® Overlay

is the most popular and versatile overlay on the market today.

T200X is a very popular chromium-carbide overlay with qualities that provide extended life in applications of extreme abrasion, impact and heat. The overlay has a dense concentration of chromium carbides which are uniformly distributed throughout its matrix. It is welded to a carbon steel base, and the plate can be cut, formed or rolled into most any shape or configuration. T200X can be purchased as plate, pipe or fabricated products. Its versatility makes it an ideal choice for a variety of industries.

Our T200X has a unique chemistry

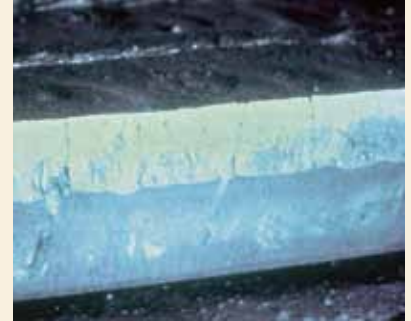
The alloy is pre-mixed and contains chromium, carbon, manganese, molybdenum and iron. This exacting formula allows an extreme saturation of chromium carbides throughout the weld matrix and accounts for about 40% of the T200X overlay. These carbides have a high Vickers hardness (appx. 1,750 VHN) and are surrounded by an iron chromium matrix that results in an overall minimum average surface hardness of 630 VHN (543 BHN). This protects against abrasion and impact and can withstand sustained temperatures up to 1200° F (648.88° C).

Plate sizes & thicknesses

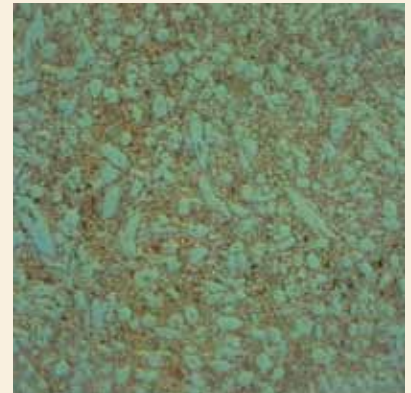
The standard sheet size is 90" x 117" and is available in single overlay thicknesses of 1/8, 3/16 or 1/4 inch and double overlay thicknesses of 5/16, 3/8 or 1/2 inch. The standard base plate can be as thin as 3/16 inch or as thick as 1-1/4 inch. Normally, a thick base is not necessary as its main purpose is to provide backing for the overlay and to make it easy to attach. Different base metals and thicknesses, other than standard ones, can be supplied upon request.

Pipe & more

The T200X overlay can be applied to all kinds of pipe whether straight sections, mitered elbows, long radius bends, flanges, couplings or other fittings. It can be applied to the outside and/or inside diameters. While there is no limit to the maximum outside diameter, the minimum inside diameter is 3 inches. Our specially developed welding manipulators can accommodate small diameter pipe in lengths up to 20 feet. This reduces the number of circumferential weld seams thus improving the quality, durability and integrity of the finished product.



Cross-section of a piece of carbon steel plate with the Bulkwelding process applied



*T200X Microstructure (200 Mag.)
Primary Chrome Carbides Are Green*



Bulkwelding process in plate form, ready to be rolled or fabricated at the customer's request



Bulkwelding process being applied to pipe



1981

Due to continuing rapid growth, Triten expands once again and relocates to the current Brittmoore Street location in Houston, Texas.

1984

T211 is developed to improve small particle impingement in fan applications. Then T223, a high temperature iron base alloy, is developed for high temperature applications.

1985-86

Triten develops and builds reactor snouts and creates T282, a Cobalt based high temperature alloy, specifically for the snouts.

1986

Triten re-acquires TAPCO and re-enters the slide valve market. This same year, Triten receives a patent for calcined coke coolers.

1991

Triten develops T382, a low-cost iron based alternative for Stellite™. T382 is patented and introduced to the offshore pumping industry for corrosion protection.

1992

Triten acquires Vidaplate Limited in the UK to expand and strengthen its international manufacturing base, while strengthening its ability to supply chromium carbide to markets such as Europe, Middle East and Africa.

1995

Triten hits another milestone in productivity by applying over 7 tons of hardfacing to plate each day.

1997

Triten develops the Patented Mosquito Welding Systems to allow the application of weld overlay using the SAW process in pipe with an “as deposited” finished diameter of 1 inch (25mm).

1998

Triten develops and installs a multiple-head, state of the art, PLC controlled welding system to increase the speed and production of hardfaced weld overlay plate.

TRITEN acquires Trimay™, allowing the application of hardfaced weld overlay in the flat position and the reclamation of rolls for the steel industry.

1999

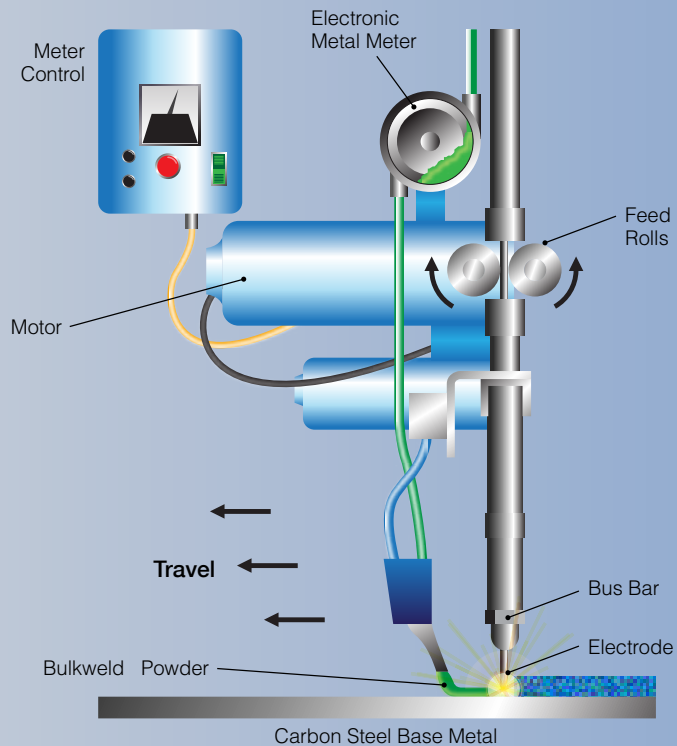
Triten develops a Specialized Weld System that allows weld overlay to be applied to elbows using an automated process.

2005

TRITEN installs a Specialized Welding System that allows the application of weld overlay with the Pulse-Mig Process on small diameter pipe and pipe components.

2008

TRITEN installs a state of the art Welding Lathe System that applies spiral circumferential welds to pipe and pipe components.



Certifications/Qualifications

Material	Overlay	Fabricate
ASME Section VIII, Div. 1 “U” and “R”	X	X
ASME Section IX	X	X
National Board — Repairs & Alterations	X	X
ASME B31: 1, 3, 4, 8 and 11	X	X

What we can do for you

Material	Overlay	Fabricate
Plate	X	X
Pipe	X	X
Fittings	X	
Flanges	X	X
Piping Systems or Components	X	X
Pressure Vessels	X	X
Valves	new or used	

Flux Cored Wire

Product	Composition	Hardness	Wire Diameter (in)
T200X	Alloy Content: 38% Consisting of C, Mn, Cr, Si, Mo and Fe	Typical hardness: 54-56 Rc	1/16, 5/64, 3/32 and 7/64
T211	Alloy Content: 39% Consisting of C, Mn, Cr, Si, Mo and Fe	Typical hardness: 56-58 Rc	1/16, 5/64, 3/32 and 7/64
T223	Alloy Content: 48% Consisting of C, Cr, Si, Mo, W, V, Cb and Fe	Typical hardness: 60-65 Rc	1/16, 5/64, 3/32 and 7/64
T300XT	Alloy Content: 15% Consisting of C, Mn, Ni, B, Si, P, S and Fe	Typical hardness: 64 Rc	1/16, 5/64, 3/32 and 7/64

We have developed over 300 overlay combinations...

any one of which can extend the life of your components.

In addition to our popular T200X overlay, we offer a wide range of chromium carbide iron base and cobalt base overlays. We can provide base plate materials including mild steels, stainless, chrome molys and other weldable alloys. We can also apply our protective processes to exotic components.

We provide custom solutions to even the toughest problems

Our engineering, design and technical services are second to none. We have identified 300+ overlay applications thus far. Chances are we already have an alloy that will address your particular equipment and operating conditions. If not, you can trust our experienced team to solve the most baffling problems and offer a practical solution. We can create a custom alloy especially suited to your unique situation. We give you all the extra effort it takes to perfect a formula to meet your exact needs. And our customized solutions undergo the same rigorous process controls as our standard alloys.

Why our corrosion resistant technology is an industry favorite.

Many severe environment industries, including oil and gas producers, prefer our corrosion and heat resistant weld overlay because it is time tested and field proven. Many of the pipes, valves, headers and other components with our overlay have been in service for decades. This proves that our technique and technology is not only reliable, but that it is highly cost effective.

Compared to carbon and alloy steels, solid corrosion-resistant alloys are expensive. The corrosion protection of carbon or low-alloy steel can be accomplished by applying a weld overlay. In most applications, corrosion resistance is required only on the surface in contact with the process media, therefore, carbon or alloy steel can be clad or weld overlaid with a more corrosion-resistant alloy. Weld overlays can offer exceptional savings over the cost of using solid alloy, while greatly reducing delivery times.

We can apply our corrosion resistant weld overlay on any weldable surface. Our corrosion resistant weld overlays include Inconel™, Nickel, Monel™ as well as 300 and 400 series stainless. Because our proprietary welding technology is so flexible, a completely new or modified alloy can be formulated to meet your unique overlay requirements to solve corrosion and/or erosion problems.

Some examples of our exclusive and patented weld overlay technology includes:

- Mosquito SAW System™ for overlaying small pipe internals
- El Triten System™ for overlaying 90° and 45° elbows
- Giraffe SAW System for long pipe lengths
- Specialized Welding Lathe for applying circumferential weld overlay on pipe and pipe components



Chromium Carbide Iron Base Overlays

Product	Description	Composition	Characteristics*	Applications
T223X	For severe abrasion and moderate impact Temperatures up to 1450°F	Alloy content 48% Consisting of Fe, Cr, C, Mo, Cb, W and V	Typical hardness: 1 Pass: 60-62 Rc 2 Pass: 63-65 Rc Surface conditions: As welded with slight stress cracks	Chutes, hoppers and feeders with high flow rates
T211X	For fine particle abrasion and moderate impact Temperatures up to 1200°F	Alloy content 39% Consisting of Fe, Cr, C, Mn, Mo and Si	Typical hardness: 1 Pass: 56-58 Rc 2 Pass: 58-60 Rc Surface conditions: As welded with slight stress cracks	Fan blades, chute liners, and slurry pumps
T200X	For high abrasion and moderate impact Temperatures up to 1200°F	Alloy content 38% Consisting of Fe, Cr, C, Mn, Mo and Si	Typical hardness: 1 Pass: 54-56 Rc 2 Pass: 56-58 Rc Surface conditions: As welded with slight stress cracks	Shovels, buckets, fan blades, screws, chutes, pipes and valves
T274XHS	For extreme sliding abrasion and moderate impact Temperatures up to 1200°F	Alloy content 53% Consisting of Fe, Cr, C, Mn, Mo, Si and proprietary carbide	Typical hardness: 1 Pass: 54-56 Rc 2 Pass: 56-58 Rc Tungsten carbide hardness, 2000 Knoop	Screen plates, chutes, shovels, screw conveyers, buckets, pan scraper, drill collars, earth moving equipment, cement kiln and clinker wear parts
T153X	For moderate to high abrasion and severe impact Temperatures up to 1200°F	Alloy content 24% Consisting of Fe, Cr, C, Mn, Mo and Si	Typical hardness: 1 Pass: up to 50 Rc 2 Pass: 50-55 Rc Surface conditions: As welded with slight stress cracks	Crusher rolls and liners, target plates, and shot blast liners

Higher
Abrasion
Resistance

Higher
Impact
Resistance

High Temperature Overlays

Product	Description	Composition	Characteristics*	Applications
T282X	For severe abrasion resistance and high hot hardness Temperatures up to 1600°F	Alloy content 58% Consisting of C, Mn, Si, Cr, Mo, Ni and Co	Typical hardness: 52-54 Rc Surface condition: As welded with stress cracking	Feed injection nozzles, guides and discs, valve seats and flu gas dampers
T382X	For abrasion and hot hardness Temperatures up to 1600°F	Alloy content 52% Consisting of C, Mn, Si, Cr, Mo, Ni and Co	Typical hardness: 30-50 Rc Surface condition: As welded with stress cracking	Liners, thermowells, air grid nozzles, discs and guides
T100X	For high abrasion and hot hardness Temperatures up to 1400°F	Alloy content 48% Consisting of Co, Cr, W, C and Si	Typical hardness: 48-52 Rc Surface condition: As welded with stress cracking	Feed injection, nozzles, valve seats, guides and discs, table rolls and steam nozzles
T230X	For moderate to high abrasion and hot hardness Temperatures up to 1500°F	Alloy content 52% Consisting of C, Mn, Si, Cr, Mo, Ni and Fe	Typical hardness: 46-54 Rc Surface condition: As welded with stress cracking	Feed injection nozzles, valve seats, guides, discs, table rolls, steam nozzles and pumps
T600X	For moderate abrasion and hot hardness Temperatures up to 1400°F	Alloy content 40% Consisting of Co, Cr, W, C and Si	Typical hardness: 34-40 Rc Surface condition: As welded with smooth surface and some stress cracking	Feed injection nozzles, valve seats, guides and discs, pumps, table rolls and steam nozzles

Severe
Abrasion

Moderate
Abrasion

Tubular Electrodes

Product	Composition	Mechanical Properties	Applications
T10 & T11	Extreme Abrasion Resistant Tungsten Carbide Consisting of WC	Tungsten carbide hardness 1,800 V.P.N. in steel matrix	Crusher hammers, oil drill collars and pan scrapers
T23	Complex Chromium Carbide Consisting of C, Cr, Mo, Nb, W and V	Hardness: Single layer 58-60 Rc Multilayer 62-64 Rc Hardness of carbides within matrix 2,000 HVN	Sinter fans, sinter breakers, Paul Wurth chutes, blast furnace bells and hoppers, cement kiln wear parts and clinker wear plates
T33	Chromium Carbide Austenitic Iron Consisting of C, Cr and Mn	Hardness: Single layer 50-55 Rc Multilayer 55-60 Rc	Crusher hammers, mantles and liners, blow bars, quarry screen plates, bucket lips and teeth
T34	Extreme Abrasion Resistant Chromium Carbide Consisting of C, Cr, Mo, B, V and Mn	Hardness: 58-62 Rc	Fan blades and liner plates for impeller housings handling fine materials or dust
T35	Chromium Carbide Austenitic Iron Consisting of C, Cr, Mn, V, Mo and B	Hardness: Single layer 50-60 Rc Multilayer 58-62 Rc	Brickworks, crushing equipment, earth moving and agricultural machinery
T37	Complex Chromium Carbide Consisting of C, Cr, Nb, Mo, Mn, V and Si	Hardness: Single layer 50-54 Rc Multilayer 55-59 Rc	Quarry swing hammers and shovel teeth It is particularly suitable for rebuilding worn components subject to severe high stress abrasion

Note: Do not use on any manganese steels. Not suitable for forging or machining.

We can fabricate to your specifications or applicable industry standards.

For a detailed structure of our product range and its metallurgical design, or to learn more about our many value-added services contact your Triten sales representative.

Triten provides quality fabrication services.

Imagine the cost savings of overlaying and fabricating at a single location. We have all the equipment, skills and procedures to fabricate to your exacting specifications. Just think — you can eliminate an extra step (and extra shipping costs) when you have us overlay and fabricate your pipe, vessels or other components.

Extend service life by specifying Triten Bulkweld overlays in your original design. We offer complete rolling, forming, plasma and arc cutting, welding (manual, semi-automatic and automatic), machining, and materials handling. Everything we do is governed by strict quality assurance and safety procedures. We manufacture to industry standards including ASME, ASTM, API, AWWA and UL in addition to client specifications. All testing is done in-house and our quality assurance personnel are certified in ASNT NDT Level II in Liquid Penetrant, Magnetic Particle and Ultrasonic Examination. ASTM G 65 Abrasion Test and Photo-Micro Structure Examination are also conducted/evaluated on site while an independent agency performs and evaluates radiography results.

Got a particular application or problem? Call your Triten representative today. Our highly qualified sales staff can assist you and address even the most complex abrasion, corrosion or high temp issues.

Our tubular electrodes are superior to extruded welding rods.

The Triten Armalloy™ range of tubular electrodes was developed specifically for wear-resistant hardfacing. The properties of the alloys making up the tubular range are engineered to provide extended service life at ambient and elevated temperatures in aggressive environments involving abrasion, erosion and impact. Compatibility has been developed between the alloys of the tubular hardfacing electrodes and Triten overlay plates.

Unlike extruded welding rods, the outer coatings of our tubular electrodes are moisture resistant. They do not require special storage conditions and will not flake when damp and resist mechanical damage. All electrodes can be used direct from the packet without pre-baking. They do not require de-slagging between runs and application is fast and efficient. A unified stub end allows all electrodes to be used in a standard 1/4-inch holder. Hardfacing can be carried out using most portable AC or DC welders.

Triten hardfacing welding consumables are available in a Flux Core Wire.

See wire chart (page 4) for size and materials.





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