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Our processes for manufacturing Rankin® hardfacing and PMA™ products are ISO 9001:2015 certified.

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Committed to engineering and manufacturing superior products that deliver superior performance

Hardfacing Catalog of Products

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We Get it

At Rankin® we are on your team. We are committed to designing, engineering, and manufacturing superior products that deliver superior performance. We listen to our customers to find solutions, not just answers. We have a long history of innovation and product breakthroughs, and still we never stop searching for new ways to do things better. We offer a full line of products designed to protect and extend part life of expensive equipment by addressing abrasion, corrosion, impact, temperature, and wear resistance.

This catalog is designed for our customers and users of hardfacing and metal alloy products, and to assist in the understanding of our products, their uses and applications, and to provide solutions to meet a variety of needs.

Extending and Rebuilding Together

At Rankin Hardfacing we engineer solutions that offer quality, consistency and reliability in the design, formulation, and manufacture of buildup and hardfacing products for specialized maintenance, OEM, repair industries, and commercial and industrial applications worldwide. We also offer expert custom alloys capabilities.

Pure, Precise Possibilities

At Rankin Protective Metal Alloys™ (PMA) we produce a range of specialty alloy and wear resistant products including buildup and overlay hardfacing alloys, and a selection of specialty brazing rods, preforms, and dental alloys. PMA serves a wide range of industries, from petrochemical and power generation to tool and die, rubber, mining and many more.

Our Commitment to Quality

Our processes for manufacturing Rankin® hardfacing and PMA™ products are ISO 9001:2015 certified.

Our promise is our commitment to do it right and to make it right. Call the Rankin and PMA teams for more information, to find a local distributor, and to answer any questions, at (800) 854-2159, and (909) 483-3222. Learn more at www.rankin.com and www.broco-rankin.com.

Rankin hardfacing and buildup products, and protective metal alloy products are widely used in industries around the world, including

- Aerospace Applications
- Aggregates
- Agriculture
- Brick and Clay
- Cement
- Coal Mining and Pulverizing
- Dental Applications
- Dredging
- Earth Moving
- Heavy Construction
- Foundries and Furnaces
- Glassmaking
- Iron and Steel
- Logging and Lumber
- Mining
- Petroleum Drilling and Refining
- Plastics
- Power Plants
- Pulp and Paper
- Railroads
- Rock Crushing
- Sugar Industry

RANKIN

Relative Abrasion Resistance and Impact Strength of Rankin® Electrodes

Classification	APPLICATION	PRODUCT	■ ABRASION / ■ IMPACT (LOW – HIGH)
Buildup Material	Buildup on carbon and low alloy steel	**RANITE BU**	
	Buildup and joining manganese steel	**RANMANG 1**	
	Buildup and joining manganese steel to carbon or manganese steel	**RANMANG 3**	
Iron Base Hardfacing Electrodes	For high deposition on manganese and carbon steel	**RANITE BX**	
	Hardest deposits of all RANITE rods	**RANITE D**	
	Tough, general purpose multi-pass rod	**RANITE F**	
	For best weldability	**RANITE M**	
	Soft arc, easy application	**RANITE 35**	
Vanadium Carbide	Carbides dissolve and reform in deposit	**VANTUNG**	
Tungsten Carbide	Hardest commercially made material	**RANTUNG**	

Relative Abrasion Resistance and Impact Strength of Rankin® Wires

Classification	APPLICATION	PRODUCT	■ ABRASION / ■ IMPACT (LOW – HIGH)
Buildup Material	Buildup on carbon and low alloy steel	**RANOMATIC BU and RANOMATIC BU-G**	
	Buildup and joining manganese steel	**RANOMANG 1**	
	Buildup and joining manganese steel to carbon or manganese steel	**RANOMANG 3**	
Iron Base Hardfacing Wires	For high impact resistance and good abrasion resistance deposits	**RANOMATIC BB-G**	
	For high impact strength – all-weld chemistry similar in both alloys	**RANOMATIC DD-G and RANOMATIC 969G**	
	Tough, multi-pass wire for hardfacing carbon and manganese steels	**RANOMATIC BX-2**	
	Hardest deposits of all Ranomatic wires	**RANOMATIC D**	
	High chromium alloy for applications in construction and mining equipment	**RANOMATIC R-100 RANOMATIC R-101**	
	High abrasion applications and rebuilding of Ni-Hard castings	**RANOMATIC R-100 HD**	
	Complex carbides retain hardness up to 1500°F	**RANOMATIC 23**	
Vanadium Carbide	Deposits approximate tungsten carbide in wear resistance; vanadium carbides dissolve and reform in deposit	**VANOTUNG**	
Tungsten Carbide	Wire deposits 3 to 5 times rate of electrodes; hardest commercially made carbide	**RANOTUNG WC**	

Call the Rankin Team for More Information on Specific Applications at (800) 854-2159.

Hardfacing and Buildup Welding Electrodes and Rods

RANKIN

Rankin Product	PRINCIPAL APPLICATION AND DESCRIPTION	SIZES AND RECOMMENDED AMPERAGE RANGE	TYPE OF CURRENT	OTHER RANKIN EQUIVALENT PRODUCTS	ALLOY CONTENT		MECHANICAL PROPERTIES AND CHARACTERISTICS	WELDING PROCEDURES	RECOMMENDED USES
»» Buildup Applications									
FOR BUILDUP OF CARBON STEEL									
Ranite BU	Carbon steel core wire with alloys in extruded coating; for AC or DC electric application to carbon and low alloy steels (not manganese steel or cast iron) as a buildup material or an under base for hardfacing.	1/8" ..... 125-140 5/32" ..... 140-160 3/16" ..... 175-200 1/4" 200-250	AC or DC straight or reverse polarity	**RANOMATIC BU Wire** **RANOMATIC BU-G Wire**	Carbon Manganese Chromium Molybdenum Silicon		**Typical Rockwell Hardness:** 2 Passes (weave beads) – Med. Carbon Steel ..... 24-28 2 Passes (weave beads) – Med. Carbon Steel with 500˚F Interpass temp..... 20-22 2 Passes (stringer beads) – Med. Carbon Steel .... 31-35 2 Passes (stringer beads) – Mild Steel..... 29-33 Tensile Strength ..... 118,000 p.s.i. Yield Strength ..... 113,000 p.s.i. Elongation in 2 in 6%	Can be applied AC or DC, either polarity; however, DC reverse is recommended. Deposit by using stringer or weave bead, 1/2" to 3/4" wide; multi-pass as needed with unlimited layers.	Buildup of carbon and low alloy steels; final overlay on parts that must be machined; under base for hardfacing alloys. Should not be used for joining.
FOR BUILDUP AND JOINING OF MANGANESE STEEL									
Ranmang 1	This is a manganese electrode for buildup of austenitic manganese steel parts subject to high impact loading. Can also be used for joining manganese steels.	1/8" ..... 125-140 5/32" ..... 140-160 3/16" ..... 175-200 1/4" 200-250	AC or DC straight or reverse polarity	**RANOMANG 1 Wire**	Carbon Manganese Nickel Silicon		**Typical Rockwell Hardness** As deposited – Mang. Steel ..... 15-20 As work-hardened ..... 45-50 Tensile Strength ..... 144,000 p.s.i.	Can be applied AC or DC, either polarity; however, DC reverse is recommended. Deposit by using stringer or weave beads, 1/2" to 3/4" wide; multi-pass as needed with unlimited layers. Limit interpass temperature to 500˚F maximum.	Ranmang 1 is a uniquely superior nickel-manganese electrode featuring extreme strength in joining manganese steel to manganese steel. Excellent for multi-pass buckets, crusher rolls, and hammer mill hammers; also repair cracks in manganese castings.
FOR BUILDUP AND JOINING OF MANGANESE OR CARBON STEEL									
Ranmang 3	High chromium, high manganese alloy used in the rebuilding of manganese parts subject to severe impact loading. Can be used for joining manganese and carbon steels. Can be used as final overlay in extreme impact conditions.	1/8" ..... 125-140 5/32" ..... 140-160 3/16" ..... 175-200 1/4" 200-250	AC or DC straight or reverse polarity	**RANOMANG 3 Wire**	Carbon Manganese Chromium Nickel Silicon		**Typical Rockwell Hardness** 2 Passes – 1020 Steel ..... 15-17 As work-hardened ..... 40-45 2 Passes – Mang. Steel..... 19-23 As work-hardened ..... 42-47 Tensile Strength ..... 129,000 p.s.i. Yield Strength ..... 85,000 p.s.i. Elongation in 2 in. ..... 33½ %	Can be applied AC or DC, either polarity; however, DC reverse is recommended. Deposit by using stringer or weave beads, 1/2" to 3/4" wide; multi-pass as needed with unlimited layers.	Rapid work hardening. High impact resistance for rebuilding manganese and carbon steel parts including roll crushers, hammers, wobblers, dipper teeth and lips, tractor idlers, shovel tracks, dragline pins and links. Free of porosity and cracks. Best material for weld casting hammers and similar parts.
FOR WELDING OF DISSIMILAR METALS ELECTRODE									
Ranite GX	This is a modified austenitic stainless steel, ideal for welding dissimilar metals where high strength deposits are required. It is the perfect composition to use where the alloy content of the base metal is unknown.	3/32" ..... 40-90 1/8" ..... 75-125 5/32" ..... 100-150 3/16" 140-240	AC or DC straight or reverse polarity	**N/A**	Carbon Manganese Chromium Nickel		**Typical Hardness:** As deposited ..... 300 Brinnell Tensile strength ..... 120,000 p.s.i. Yield strength..... 90,000 p.s.i. Elongation..... 35% Heat resistance ..... High	Work piece must be clean. Bevel thick deposits. A preheat of 400˚F is recommended for carbon and cast steels. Maintain a short arc, slightly inclined in the direction of travel. Use stringer beads. Peening is recommended.	For welding dissimilar metals. Other typical applications include under laying of hardfacing alloys, rebuilding shafts and agitator blades in turbine, frames, cast steel parts, and gears. Can be utilized as an extraction rod.
»» Metal-to-Metal Applications									
FOR PARTS SUBJECT TO MODERATE TO SEVERE ABRASION AND IMPACT									
Ranite F	Ranite F has a solid steel core with ingredients in the extruded coating. Deposits provide powerhouse protection. Excellent general purpose hardfacing electrode. As a modified tool steel material, deposits not machinable.	1/8" ..... 125-140 5/32" ..... 140-165 3/16" 175-210	AC or DC straight or reverse polarity	**RANOMATIC 969G Wire** **RANOMATIC DD-G Wire**	Carbon Manganese Chromium Molybdenum Silicon		**Typical Rockwell C Hardness** All-Weld ..... 54-58 2 Layers on Mild Steel..... 52-56 Water-quenched from 1800˚F..... 57-60 2 Layers on 1045 Steel..... 53-57 Water-quenched from 1800˚F..... 57-60 Melting Point..... 2550˚F	Can be applied AC or DC, straight or reverse polarity; straight polarity produces maximum density. Can be welded vertically or out-of-position. Limit weave beads to 3/4" or use stringer beads. Drag, normal or long arc can be easily manipulated with this electrode.	Excellent low cost product which produces outstanding results on parts subject to heavy impact and moderate abrasion. Used as an all-purpose hardfacing electrode in a variety of industries.

Hardfacing and Buildup Welding Electrodes and Rods

RANKIN

Rankin Product	PRINCIPAL APPLICATION AND DESCRIPTION	SIZES AND RECOMMENDED AMPERAGE RANGE	TYPE OF CURRENT	OTHER RANKIN EQUIVALENT PRODUCTS	ALLOY CONTENT		MECHANICAL PROPERTIES AND CHARACTERISTICS	WELDING PROCEDURES	RECOMMENDED USES
»» Abrasion and Impact Applications – Less Than 20% Alloy Content									
FOR PARTS SUBJECT TO MODERATE TO SEVERE ABRASION AND IMPACT									
Ranite BX	This unique alloy is used on applications of moderate abrasion and severe impact. With proper procedure, can be multi-passed to 10 layers. When in doubt as to the proper electrode, select BX on most hardfacing applications.	1/8" ..... 125-140 5/32" ..... 140-160 3/16" ..... 175-200 1/4" 200-250	AC or DC straight or reverse polarity	**RANOMATIC BX-2 Wire**	Carbon Manganese Chromium		**Typical Rockwell C Hardness** As deposited ..... 45-50 As work-hardened ..... 60 Multi-pass Non-machinable Small stress-relief cross checks	Can be applied AC or DC, either polarity. To increase deposition rates, use DC straight polarity. Deposit by using stringer beads that are 3X the diameter of the electrode. All position welding with smaller diameter electrodes. Can weld in vertical position, fast freeze.	BX has the highest deposit rate of all hardfacing electrodes. Use where the choice of a "correct" rod is difficult. Its versatility is unmatched. Use to rebuild crusher rolls, dredge pump shells, wobblers, and many other parts.
Ranite D	This is a solid steel core electrode with a special coating containing the alloys. Deposits produce superior resistance to severe abrasion and moderate impact. Deposits not machinable.	1/8" ..... 125-140 5/32" ..... 140-160 3/16" ..... 175-200 1/4" 200-250	AC or DC straight or reverse polarity	**RANOMATIC D Wire**	Carbon Manganese Chromium Molybdenum Boron		**Typical Rockwell C Hardness** As deposited ..... 62-64 2 pass maximum, generally	Can be applied AC or DC, either polarity; however, DC reverse is recommended. Use DC straight polarity for increased deposition. Welding in all positions with smaller diameter electrodes.	Ranite D is the hardest commercially available hardfacing electrode other than tungsten carbide. Put two passes on dredge cutter teeth, tool joints and drill collars, brick dies, chutes, conveyor flights, exhaust fan blades, rock washer paddles; any application where very severe abrasion is a serious problem.
»» Abrasion and Impact Applications – More Than 20% Alloy Content									
FOR PARTS SUBJECT TO MODERATE TO SEVERE ABRASION AND IMPACT									
Ranite M	Extruded coated electrode for AC-DC application. For abrasion resistance coupled with moderate impact where a minimum of cross checking and sound deposits are desirable. Good anti-galling properties. Easy to use with outstanding weldability.	1/8" ..... 125-140 5/32" ..... 145-180 3/16" ..... 180-240 1/4" 250-300	AC or DC straight or reverse polarity	**RANOMATIC M Wire**	Carbon Manganese Chromium Nickel Molybdenum		**Typical Rockwell C Hardness** As deposited ..... 46-50 As work-hardened 56-59	Can be applied AC or DC, either polarity. Use DC straight polarity to increase deposition rates. Deposit by using stringer beads that are 3X the diameter of the electrode. All position welding with smaller diameter electrodes.	An ideal, moderately priced electrode for general purpose hardfacing. Broad applications in construction, rock products, brick and clay, mining and agriculture.
Ranite 35	This solid core electrode with a heavy extruded coating containing the alloy elements has outstanding weldability and welds well out of position. Can be applied to carbon, alloy and manganese steel.	1/8" ..... 125-140 5/32" ..... 145-180 3/16" ..... 180-240 1/4" 250-300	AC or DC straight or reverse polarity	**RANOMATIC R-101 Wire** **RANOMATIC 100 Wire**	Carbon Manganese Chromium Silicon		**Typical Rockwell C Hardness** On carbon steel ..... 53-57 On manganese ..... 50-53 Work-hardened ..... 59-61 2 layers maximum Excellent cross check pattern	Can be applied AC or DC, either polarity; however, DC reverse is recommended. Best deposit rate with DC straight polarity. Smaller diameters are all-position.	Outstanding weldability for a high carbon, high chromium electrode. Used primarily in agriculture, construction, mining, dredging, and earth moving industries.
BARE ROD FOR AGRICULTURAL TOOLS – OXYACETYLENE APPLICATION									
Ranite DG	Extreme abrasion, moderate impact. Bare tube rod, for oxyacetylene gas applications. Deposits polish in service and have lowest coefficient of friction.	Length: 5/32" x 28" 3/16" x 28" 1/4" x 28"	Oxygen acetylene gas with bare rod	**N/A**	Carbon Manganese Chromium Silicon		**Typical Rockwell C Hardness** As deposited 58-62	Use 3X carburizing flame.	A high chromium carbide electrode which gives exceptional wear resistance under extreme sliding abrasion conditions. Recommended applications include tools in agriculture, such as screws, plow shares, sweeps, discs, conveyors, chutes and blades. Will flow out to thin edge.

For questions and special order information, please call Rankin Customer Relations at (800) 854-2159, and sales@rankin.com.

Hardfacing and Buildup Welding Electrodes and Rods

RANKIN

Severe Abrasion Applications

TUNGSTEN CARBIDE FOR EXTREME METAL-TO-EARTH ABRASION

Rankin Product	PRINCIPAL APPLICATION AND DESCRIPTION	SIZES AND RECOMMENDED AMPERAGE RANGE	TYPE OF CURRENT	OTHER RANKIN EQUIVALENT PRODUCTS	ALLOY CONTENT		MECHANICAL PROPERTIES AND CHARACTERISTICS	WELDING PROCEDURES	RECOMMENDED USES
Rantung 60 Bare and Coated	Extreme severe abrasion resistance; exhibits high abrasion resistance for metal-to-earth sliding abrasion in sandy soils. Graphite coated rod for arc, bare rod for oxyacetylene use. Bare rod is 28" in length. Coated rod is 14" in length.	Arc / Oxyac. 1/8" (20x30) 80 x (30x40) 80 x 5/32" (20x30) 110 x (30x40) 110 x 3/16" (10x20) 135 x (20x30) 135 x (30x40) 135 x 1/4" (8x10) 280 x (10x20) 280 x (20x30) 280 x (30x40) 280 x	AC or DC reverse polarity or oxygen acetylene gas with bare rod	**RANOTUNG WC Wire** **RANITE SP-80 Spray Powder**	60% blend of tungsten carbide granules in a tungsten steel matrix		**Typical Moh's Scale Hardness:** **Arc Oxyacetylene** As deposited ..... 9-10 Single pass deposit Sandpaper-like appearance with texture dependent upon particle size	**Arc:** AC or DC, reverse polarity. Use lowest practical amperage setting. **Oxyacetylene**: Use tip size larger than for welding steel and excess acetylene feather (3X). Avoid puddling.	For the ultimate in abrasive wear - there is no substitute. Use Rantung type tungsten carbide for extreme abrasion issues. Larger mesh sizes are used for moderate impact and heavy abrasion. Finer mesh sizes are used as impact conditions decrease and abrasion increases.
Rantung 60F Bare and Coated	Ultimate in protection against abrasive wear. Excellent service from thin coverage. Coated rod for speed and heavy parts; bare rod for oxyacetylene deposit control and better abrasion resistance.	Arc / Oxyac. 1/8" (40-D) 80 x 5/32" (40-D) 110 x 3/16" (40-D) 135 x	AC or DC reverse polarity or oxygen acetylene gas with bare rod	**RANOTUNG WC Wire** **RANITE SP-80 Spray Powder**	60% blend of tungsten carbide granules 40 mesh and finer in a tungsten steel matrix		**Typical Moh's Scale Hardness:** **Arc Oxyacetylene** As deposited ..... 9-10 Single pass deposit Sandpaper-like appearance Will not polish Avoid metal-to-metal contact	**Arc:** AC or DC, reverse polarity. Use lowest practical amperage setting. Minimum penetration. **Oxyacetylene**: Use excess acetylene feather (3X).	For the ultimate in abrasive wear when metal bearing or impact are not factors. Deposit appears almost homogeneous. Fine tungsten carbide particles suspended in a tough alloy steel matrix. Not for metal-to-metal contact. Will not polish.
Rantung HORSESHOE Bare and Coated	Deposits contain large undissolved particles, providing a maximum non-slip surface. Coated rod outstanding on selected applications. Available in 14" length, bare or coated.	Arc / Oxyac. 1/4" (8x10) 175 x	AC or DC reverse polarity or oxygen acetylene gas with bare rod	**N/A**	60+% blend of tungsten carbide particles; 8x10 mesh in a tungsten steel matrix		**Typical Moh's Scale Hardness:** As deposited ..... 9-10 Single pass deposit	**Arc:** AC or DC, either polarity. Use lowest practical amperage setting and shortest possible arc. **Oxyacetylene**: Use excess acetylene feather (3X).	Used primarily on horseshoes, but also recommended where large sized tungsten carbide particles are required. Coated electrode is excellent on hog anvils, waste disposal hammers and similar parts.
Vantung Coated	Deposits contain vanadium carbides which are close to the wear resistance of tungsten carbide with superior impact strength. Vanadium carbides dissolve and reform in the deposit, allowing for refinement in multiple layers.	5/32" ..... 80-130 3/16" ..... 130-165 1/4" 150-180	AC or DC straight or reverse polarity	**VANOTUNG Wire**	Vanadium Tungsten Chromium Carbon Boron Manganese Silicon		**Typical Microhardness (KHN):** Vanadium carbides ..... 2400-2650 Tungsten carbides ..... 2350-2750 Chrome carbides ..... 1300-1700 Multi-pass	**Arc:** AC or DC, either polarity. Use lowest practical amperage setting and shortest possible arc.	Vantung is a good choice for an economical overlay on all parts subject to severe abrasion with moderate impact.

For questions and special order information, please call Rankin Customer Relations at (800) 854-2159, and sales@rankin.com.

Hardfacing and Buildup Welding Wires

RANKIN

Buildup Applications

Rankin Product	PRINCIPAL APPLICATION AND DESCRIPTION	SIZES & WELDING PARAMETERS	TYPE OF CURRENT	OTHER RANKIN EQUIVALENT PRODUCTS	ALLOY CONTENT		MECHANICAL PROPERTIES AND CHARACTERISTICS	WELDING PROCEDURES	RECOMMENDED USES
FOR BUILDUP OF CARBON STEEL									
Ranomatic BU 1/16" & 7/64" Self-shielding **Ranomatic BU-G** .045" & 1/16" Gas-shielded	Ranomatic BU and BU-G are fabricated wires that have excellent compressive strength. 7/64" and 1/16" are self-shielding and .045" requires gas-shielding. Deposits have good machinability as welded using carbide tools. Not recommended for manganese steel or cast iron.	**Self-shielding** 7/64" ..... 200-600 Voltage ..... 30-34 ESO ..... 3/4"- 1 3/4" 1/16" ..... 175-350 Voltage ..... 24-28 ESO ..... 1/2"- 1" **Gas-shielded** .045" ..... 150-200 Voltage ..... 22-26 ESO ..... 1/2"- 3/4" 1/16" ..... 175-350 Voltage ..... 24-28 ESO ..... 1/2"- 1" Shielding Gas: 98% Ar, 2% O_2 or 100% CO_2	DC straight or reverse polarity	**RANITE BU Electrode**	Carbon Manganese Chromium Molybdenum		**Typical Rockwell C Hardness:** On .10% C steel .....24-28 On .40% C steel .....30-35 On .80% C steel .....38-42 Unlimited Layers No surface checks Machinable	Can be applied DC, either polarity; however, DC reverse is recommended. For increased deposition rates, use DC straight polarity.	For rebuilding carbon and low alloy steel parts, including tractor and shovel undercarriage components, rails, gears and shafts.
A SUPER BUILDUP FOR METAL-TO-METAL WEAR AND MACHINABLE									
Ranomatic BB-G Gas-shielded	A "Super Buildup" material, Ranomatic BB-G is a high deposition wire with good abrasion resistance and excellent impact strength.	.045" ..... 150-250 Voltage ..... 22-26 ESO ..... 1/2" – 3/4" 1/16" ..... 175-350 Voltage ..... 24-28 ESO ..... 1/2" – 1" Shielding Gas: 75% Ar, 25% CO_2 or 100% CO_2	DC straight or reverse polarity	**N/A**	Carbon Manganese Chromium Nickel Silicon		**Typical Rockwell C Hardness:** As deposited.....42-47 Three layer maximum No surface checks Machinable	Can be applied DC, either polarity; however, DC reverse is recommended. For increased deposition rates, use DC straight polarity.	Can be applied in all positions to carbon, low alloy and manganese steels. Provides excellent service on earth-moving equipment.
FOR BUILDUP AND JOINING OF MANGANESE STEEL									
Ranomang 1 Self-shielding	This is an austenitic manganese material containing nickel and chromium, producing a high strength deposit that work hardens rapidly under impact. Primarily used for buildup, repair and joining of manganese steels. Deposits thickness is unlimited.	7/64" ..... 350-450 Voltage ..... 26-30 ESO ..... 1 1/2" – 2" 1/16" ..... 150-275 Voltage ..... 25-28 ESO ..... 1" – 1 1/4" .045" ..... 145-195 Voltage ..... 18-24 ESO ..... 1/2" – 3/4"	DC straight or reverse polarity	**RANMANG 1 Electrode**	Carbon Manganese Chromium Nickel Silicon		**Typical Rockwell C Hardness:** As deposited.....15-22 As work-hardened.....48-50 Unlimited layers No surface checks Poor machinability Tensile Strength .....120 KSI Yield Strength .....70 KSI Elongation in 2 in.....42%	Can be applied DC, either polarity. Works best on DC reverse. For increased deposition rates, use DC straight polarity. Limit interpass temp to 500°F.	Self-shielding, flux-cored manganese wire for rebuilding manganese steel parts where resistance to severe impact and moderate abrasion is required. Deposit rate capability exceeds twenty pounds per hour. Broad application includes crusher rolls and hammers where low cost buildup is desired.
FOR BUILDUP AND JOINING OF MANGANESE OR CARBON STEEL									
Ranomang 3 Self-shielding	This is a modified, high chromium, high manganese steel wire used in the rebuilding of manganese or carbon steel parts subject to severe impact loading. Excellent cavitation resistance; often used as the final overlay in extreme impact conditions.	7/64" ..... 175-500 Voltage ..... 28-32 ESO ..... 1" – 1 1/2" 1/16" ..... 175-350 Voltage ..... 24-28 ESO ..... 3/4" – 1 1/4" .045" ..... 175-225 Voltage ..... 18-24 ESO ..... 1/2" - 3/4"	DC straight or reverse polarity	**RANMANG 3 Electrode**	Carbon Manganese Chromium Nickel Silicon		**Typical Rockwell C Hardness:** As deposited.....18-23 As work-hardened.....48-50 Unlimited layers No surface checks Poor machinability Tensile Strength .....129 KSI Yield Strength .....93 KSI Elongation in 2 in.....40%	Can be applied DC, either polarity; however, DC reverse is recommended. For increased deposition rates, use DC straight polarity. Use stringer or weave beads 3/8" to 3/4" wide. Limit interpass temp to 500°F.	High chromium nickel manganese alloy for joining manganese and carbon steels and alloy steels, and for rebuilding manganese and carbon steel parts. Applications include shovel pads and tumblers, roll crushers, hammers, wobblers. Best material for weld casting of carbon or manganese steel parts.

Metal-to-Metal Applications

FOR METAL-TO-METAL WEAR AND SEVERE IMPACT AND MODERATE ABRASION

Rankin Product	PRINCIPAL APPLICATION AND DESCRIPTION	SIZES & WELDING PARAMETERS	TYPE OF CURRENT	OTHER RANKIN EQUIVALENT PRODUCTS	ALLOY CONTENT		MECHANICAL PROPERTIES AND CHARACTERISTICS	WELDING PROCEDURES	RECOMMENDED USES
Ranomatic HWT-12-G Gas-shielded	This alloy is comparable to the composition of H12 tool steel. Deposits provide excellent metal-to-metal wear resistance, particularly on parts subject to high temperature and high compressive loading and impact. With proper procedures check-free deposits up to 3/4" thick can be made on 24" diameter parts. Machining requires very rigid, well powered equipment and carbide cutting tools. Deposits can be flame cut with difficulty.	**Gas-shielded** 1/16" ..... 200-300 Voltage ..... 25-30 ESO ..... 1/2" - 1" .045" ..... 175-250 Voltage ..... 23-27 ESO ..... 3/8" – 5/8" Shielding Gas: 75% Ar, 25% CO_2 or 100% Ar	DC straight or reverse polarity	**RANITE F Electrode**	Carbon Manganese Chromium Molybdenum Tungsten Vanadium Silicon		**Typical Rockwell C Hardness:** 2 layer deposit.....52-54 2 layers recommended No surface checks Machinable (with carbide tools)	Can be applied DC, either polarity; however, DC reverse is recommended. For increased deposition rates, use DC straight polarity.	Typical applications include steel mill leveler rolls, work rolls, vertical edger rolls, dredge ladder rolls, hot work extension rools, pipe forming rolls and tool steel crane wheels. It is also suitable for tool and die repair.
Ranomatic 969-O Self-shielding **Ranomatic 969-G** Gas-shielded	This is a general purpose hardfacing alloy which provides a good balance of abrasion and impact resistance. As a modified tool steel material, it is used for metal-to-metal applications and for metal-to-earth parts. Deposits are martensitic.	**Self-shielding** 1/16" ..... 175-350 Voltage ..... 24-28 ESO ..... 1/2" - 1" **Gas-shielded** 1/16" ..... 175-350 Voltage ..... 24-28 ESO ..... 1/2" - 1" .045" ..... 150-250 Voltage ..... 22-26 ESO ..... 1/2" – 3/4" .035" ..... 90-150 Voltage ..... 17-22 ESO ..... 1/2" – 3/4" Shielding Gas: 98% Ar, 2% O_2 or 100% CO_2 or 75% Ar, 25% CO_2	DC straight or reverse polarity	**RANITE F Electrode**	Carbon Manganese Chromium Molybdenum Silicon		**Typical Rockwell C Hardness:** 2 layer deposit .....55-60 2-3 layers recommended No surface checks Non-machinable	Can be applied DC, either polarity; however, DC reverse is recommended. For increased deposition rates, use DC straight polarity.	Versatile alloy which can be applied to carbon, alloy, and manganese steel. Provides excellent matrix for bulk tungsten carbide deposits. Used on tillage tools, dredge parts, tamper feet and similar components.
Ranomatic DD-G Gas-shielded	Deposits provide excellent resistance to severe impact and moderate abrasion. This is a flux-cored wire and is ideal for all position welding.	1/16" ..... 175-350 Voltage ..... 24-28 ESO ..... 1/2" - 1" .045" ..... 150-250 Voltage ..... 21-26 ESO ..... 1/2" – 3/4" Shielding Gas: 75% Ar, 25% CO_2 or 100% CO_2	DC straight or reverse polarity	**RANITE F Electrode**	Carbon Manganese Chromium Molybdenum Silicon		**Typical Rockwell C Hardness:** As deposited.....53-56 2-3 layers recommended No surface checks Non-machinable	Can be applied DC, either polarity; however, DC reverse is recommended. For increased deposition rates, use DC straight polarity.	All position alloy; use on crushing equipment, bucket teeth, hammers, pulverizers, dredging components, and draglines.

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Hardfacing and Buildup Welding Wires

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Rankin Product	PRINCIPAL APPLICATION AND DESCRIPTION	SIZES & WELDING PARAMETERS	TYPE OF CURRENT	OTHER RANKIN EQUIVALENT PRODUCTS	ALLOY CONTENT		MECHANICAL PROPERTIES AND CHARACTERISTICS	WELDING PROCEDURES	RECOMMENDED USES
»» Abrasion and Impact Applications – Less Than 20% Alloy Content									
FOR PARTS SUBJECT TO MODERATE ABRASION AND IMPACT									
Ranomatic BX-2 Self-shielding	Ranomatic BX-2 is a versatile hardfacing alloy; it has an excellent combination of abrasion resistance and impact resistance properties. The weld metal has high toughness and less stress relief check cracks. Often used as both a buildup and hardfacing alloy.	7/64" ..... 250-700 Voltage ..... 31-36 ESO ..... 3/4" – 1 1/4" 1/16" ..... 175-350 Voltage ..... 24-28 ESO ..... 1/2" - 1" .045" ..... 170-225 Voltage ..... 18-24 ESO ..... 1/2" – 3/4"	DC straight or reverse polarity	**RANITE BX Electrode**	Carbon Manganese Chromium Molybdenum Copper Silicon		**Typical Rockwell C Hardness:** Nominal hardness .....43-45 3 layers on mild steel .....43-45 2 layers on mang. steel.....38-40 Work-hardened .....52-55 Unlimited layers Small stress relief crosschecks Non-machinable	Can be applied DC, either polarity; however, DC reverse is recommended. For increased deposition rates, use DC straight polarity. Deposit maximum 3/8" wide stringer beads.	A fully self-shielding flux-cored wire for rebuilding and hardfacing carbon steel and manganese parts. Fast freezing of the weld metal allows rebuilding of sloped and vertical surfaces such as crusher mantles and liners and dredge pump shells without special positioning. Also excellent for rebuilding tractor grousers, cone crusher bowls & mantles, hammer mill hammers and roll crushers.
Ranomatic D Self-shielding	This is a chromium-boron alloy recommended for parts subject to severe abrasion, moderate impact and high compressive loads. Deposits should be limited to two layers and develop cross checks.	1/16" ..... 175-350 Voltage ..... 26-32 ESO ..... 1/2" – 1 1/4" .045" ..... 170-225 Voltage ..... 24-28 ESO ..... 1/2" – 3/4" .035" ..... 90-150 Voltage ..... 17-22 ESO ..... 1/2" – 3/4"	DC straight or reverse polarity	**RANITE D Electrode**	Carbon Manganese Chromium Molybdenum Boron Silicon		**Typical Rockwell C Hardness:** 2 layer deposit .....62-64 2-3 layers recommended Tight cross checks Non-machinable Hot wear service to 1100°F	Can be applied DC, either polarity; however, DC reverse is recommended. For increased deposition rates, use DC straight polarity. Deposit maximum 3/8" wide stringer beads.	Highest hardness of any iron based alloy. It has a highly refined grain structure to resist the most abrasive material. Popular applications for the agriculture industry are cultivator points, sweeps, plows, subsoilers, grain hammers, chisel points; in the mining industry augers, roll crushers, buckets and teeth; in the brick & clay industry augers, feeder shoes, muller plows, pug mill paddles, screw conveyors; in the construction industry asphalt mixer paddles, teeth, buckets. Ranomatic D can be applied to carbon, alloy, manganese steels and cast iron.

»» Abrasion and Impact Applications – More Than 20% Alloy Content

FOR PARTS SUBJECT TO MODERATE TO SEVERE ABRASION AND IMPACT									
Ranomatic R-100 Self-shielding	This is a high chromium-iron alloy designed for high deposition rates on large parts subject to severe abrasion. Deposits develop a tight check pattern.	7/64" ..... 300-700 Voltage ..... 30-36 ESO .....1" – 1 /2" 1/16" ..... 175-350 Voltage ..... 26-32 ESO ..... 1/2" – 1 1/4"	DC straight or reverse polarity	**RANITE 35 Electrode**	Carbon Manganese Chromium Silicon		**Typical Rockwell C Hardness:** As deposited.....58-62 2-3 layers recommended Excellent cross check pattern Non-machinable Hot wear service to 1100°F	Can be applied DC, either polarity; however, DC reverse is recommended. For increased deposition rates, use DC straight polarity. Deposit maximum 3/8" wide stringer beads.	Recommended for parts subject to very severe abrasion and low to moderate impact, crushing rolls, grinding equipment, tillage tools, augers, slag-handling equipment, pipe I.D., etc.
Ranomatic R-101 Self-shielding	A super product for parts subject to severe abrasion. Deposits develop very tight cross checks. Not machinable or forgeable. Use of gas-shielding improves welding characteristics.	1/16" ..... 175-350 Voltage ..... 24-28 ESO ..... 1/2" - 1" .045" ..... 150-200 Voltage ..... 21-28 ESO ..... 1/2" – 3/4" Shielding Gas: 75% Ar, 25% CO_2 or 100% CO_2	DC straight or reverse polarity	**RANITE 35 Electrode**	Carbon Manganese Chromium Silicon		**Typical Rockwell C Hardness:** As deposited.....58-62 2-3 layers recommended Excellent cross check pattern Non-machinable Hot wear service to 1100°F	Can be applied DC, either polarity; however, DC reverse is recommended. For increased deposition rates, use DC straight polarity.	Excellent two layer protection for parts subject to severe abrasion and moderate impact, e.g., crusher rolls, grinding equipment, tillage tools, etc.

Hardfacing and Buildup Welding Wires

Abrasion and Impact Applications – More Than 20% Alloy Content (cont'd)

Rankin Product	Principal Application and Description	Sizes & Welding Parameters	Type of Current	Other Rankin Equivalent Products	Alloy Content		Mechanical Properties and Characteristics	Welding Procedures	Recommended Uses
Ranomatic R-100HD Self-shielding	Deposits of Ranomatic R-100HD are the ultimate high chromium carbide-surfacing alloys. It can be used on components subject to the most extreme abrasive wear combined with low to moderate impact. It can also be used where high temperature (1100°F) wear resistance is required.	1/8" ..... 290-600 Voltage ..... 28-33 ESO ..... 1" – 1 1/2" 7/64" ..... 225-500 Voltage ..... 27-33 ESO ..... 1" – 1 1/2"	DC straight or reverse polarity	**N/A**	Carbon Manganese Chromium Silicon		**Typical Rockwell C Hardness:** 2 layer deposit .....57-64 2-4 layers recommended Excellent cross check pattern Non-machinable Hot wear service to 1100°F	Can be applied DC, either polarity; however, DC reverse is recommended. For increased deposition rates, use DC straight polarity.	Recommended for parts subject to very severe abrasion and low to moderate impact, crushing rolls, grinding equipment, tillage tools, shovel teeth, augers, slag-handling equipment, pipe I.D., coal pulverizer rolls, etc.
Ranomatic 23 Self-shielding	This is an outstanding open arc wire with high abrasion resistance and high hardness at elevated temperatures. Desposits are highly alloyed complex carbides in a tough matrix.	7/64" ..... 350-600 Voltage ..... 30-34 ESO ..... 1" – 1 3/4" 1/16" ..... 175-350 Voltage ..... 24-28 ESO ..... 3/4" - 1" .045" ..... 150-200 Voltage ..... 23-25 ESO ..... 5/8" – 1"	DC straight or reverse polarity	**N/A**	Carbon Manganese Chromium Molybdenum Columbium Tungsten Vanadium Silicon		**Typical Rockwell C Hardness:** 2 layer deposit .....58-62 2 layers maximum Surface cross checks Non-machinable Hot wear service to 1500°F	Can be applied DC, either polarity; however, DC reverse is recommended. Use stringer or weave beads.	Especially effective on parts subject to severe abrasion at high temperatures. Used extensively in the steel, mining, cement and petroleum industries.

Severe Abrasion Applications

TUNGSTEN CARBIDE WIRE FOR EXTREME METAL-TO-EARTH ABRASION

Ranotung WC Self-shielding	This product provides the ultimate in abrasion resistance and the ability to cut earth formations because of tungsten carbide particles imbedded in tough steel matrix. Mesh size is 40xD.	7/64" ..... 150-250 Voltage ..... 24-30 ESO ..... 1/2" – 1" 1/16" ..... 100-200 Voltage .....22-28 ESO ..... 1/2" – 3/4"	DC reverse polarity	**RANTUNG 60F Electrode** **RANITE SP–80 Spray Powder**	60% blend of tungsten carbide particles		**Typical Moh's Scale Hardness:** As deposited.....9-10 1 layer maximum Surface cross checks Non-machinable Sandpaper-like appearance	Can be applied DC, either polarity; however, DC reverse is recommended. Use lowest practical current setting. For thicker deposits, position part at angle and "shell" weld to uniformly suspend particles.	A 60% or 40% blend of cast tungsten carbide particles in mild steel tubular wire. For equipment used in the scraping, cutting, digging, and handling of highly abrasive earth-like materials, such as tool joints, dredge cutter blades, augers, conveyor flights, scraper blades and reamers.

VANADIUM CARBIDE FOR MULTI-PASS EXTREME METAL-TO-EARTH ABRASION

Vanotung Self-shielding	Vanotung deposits are comprised of vanadium carbides, which approximate the wear resistance of tungsten carbide, with superior impact resistance. A unique feature of this alloy is that the vanadium carbides dissolve and reform in the deposit, allowing for refinement in multiple layers.	7/64" ..... 350-500 Voltage ..... 32-37 ESO ..... 1 1/4" – 1 1/2" 1/16" ..... 100 – 200 Voltage ..... 22-28 ESO ..... 1/2" – 3/4"	DC reverse polarity	**VANTUNG Electrode**	Carbon Manganese Vanadium Tungsten Chromium Boron Silicon		**Typical Microhardness (KHN):** As deposited.....2400-2600 2 layers maximum Deposit cross checks Non-machinable Deposits are magnetic Deposits cannot be flame cut	DC reverse polarity is recommended. Use lowest practical amps to assure a good bond to minimize dilution with the base metal.	This alloy is for parts subject to severest abrasion with moderate impact. Approaches the wear resistance of tungsten carbide.

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Custom Blended Spray Powders

SPECIFICALLY DESIGNED TO ENHANCE WETTING CHARACTERISTICS

TYPE NAME	GENERAL DESCRIPTION	TYPICAL ANALYSIS HARDNESS	RECOMMENDED USES
RANITE SP-25	Nickel-based alloy with high ductility and toughness. Deposits are machinable and can be hand ground.	C 0.03 | Si 2.50 | Cr - | B 2.00 | Wc - | Fe 0.30 | Ni Bal TYPICAL HARDNESS 18 - 20 Rc	Used extensively in the glass industry and for rebuilding parts requiring superior finish and accuracy obtained by machining. Also used to repair cast iron.
RANITE SP-40	Nickel-based alloy which can be finished machined or ground. Excellent corrosion, heat resistance and good impact strength.	C 0.14 | Si 3.00 | Cr 9.50 | B 2.00 | Wc - | Fe 3.50 | Ni Bal TYPICAL HARDNESS 38 - 42 Rc	Best on pump parts, shafts, valves, dies. Excellent fluidity for ease of fusing.
RANITE SP-50	Nickel-based alloy with greater ductility than SP-64 (below). Can be machined with carbide tools or ground.	C 0.38 | Si 3.50 | Cr 11.20 | B 2.00 | Wc - | Fe 3.50 | Ni Bal TYPICAL HARDNESS 48 - 52 Rc	Used on parts that tend to flex or bend. Excellent on extrusion screws, wear rings, pump parts, dies.
RANITE SP-64	Nickel-based alloy with outstanding resistance to abrasion, corrosion and high heat; impact resistance is good. Low coefficient of friction.	C 0.66 | Si 4.00 | Cr 14.00 | B 3.00 | Wc - | Fe 4.50 | Ni Bal TYPICAL HARDNESS 60 - 64 Rc	Use on pump components, shafts sleeves, thrust collars, guides, bushings. Finish by grinding.
RANITE SP-74	Nickel-based tungsten carbide powder; deposits consist of undissolved tungsten carbides embedded in high strength matrix. Has proper amount of tungsten carbide to provide the excellent wear resistance.	C 0.50 | Si 3.00 | Cr 10.50 | B 2.25 | Wc 25.00 | Fe 3.38 | Ni Bal TYPICAL HARDNESS 60 - 65 Rc Matrix | 9 - 10 MOH WC	An intermediate composition for applications of severe wear and medium to high impact. Use on tillage tools, small mill hammers, bits and augers. Not recommended for metal-to-metal wear.
RANITE SP-78	Nickel-based tungsten carbide powder; deposits consist of undissolved tungsten carbides embedded in high strength matrix.	C 0.36 | Si 2.20 | Cr 7.70 | B 1.60 | Wc 45.00 | Fe 2.50 | Ni Bal TYPICAL HARDNESS 60 - 65 Rc Matrix | 9 - 10 MOH WC	Provides excellent abrasion resistance and is ideal for such applications as tillage tools, small mill hammers, bits and augers, etc. Not recommended for metal-to-metal mating parts.
RANITE SP-80	Nickel-based tungsten carbide powder; deposits consist of undissolved tungsten carbides embedded in high strength matrix. Similar to SP–78 except it has an increased ratio of tungsten to provide even greater wear resistance.	C 0.26 | Si 1.60 | Cr 5.60 | B 1.20 | Wc 60.00 | Fe 1.80 | Ni Bal TYPICAL HARDNESS 60 - 65 Rc Matrix | 9 - 10 MOH WC	Outstanding wear resistance provided by increased ratio of tungsten carbide. Excellent for tillage tools, small mill hammers, bits and augers, etc. Not recommended for metal-to-metal mating parts.

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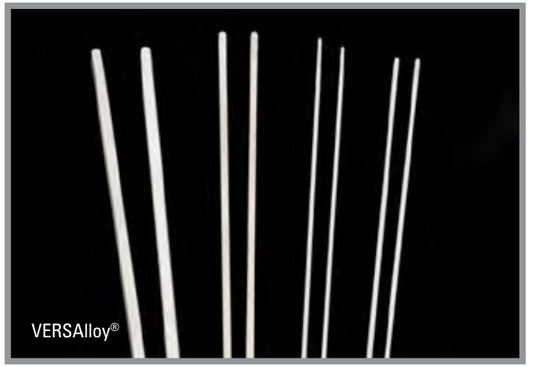
Rankin® and PMA™ Product Packaging

Ranomatic and Ranite


VERSAlloy®


Diamond Carbide

- Rankin Hardfacing and Buildup welding electrodes are available in 10 lb. boxes.
- Ranite GX is packaged in 5 lb. boxes.
- Rankin Hardfacing and Buildup welding wires are available on 10 and 25 lb. spools in .035", .045", and 1/16" diameters; 1/16" and 7/64" diameters are available on 60 lb. coils, and 125, 250, and 500 lb. drums.
- Rantung 14" length coated electrodes are available in a 10 lb. box; Rantung 28" length bare rods are in a 25 lb. box.
- Rankin bulk tungsten carbide is available in 1, 5, and 10 lb. bottles, and 25 and 50 lb. buckets.
- Rankin custom blended spray powders are available in 1, 5, and 10 lb. bottles.
- PMA VERSAlloy® Nickel and Diamond Carbide rods are available in any quantity for packaging.

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Rankin Protective Metal Alloys (PMA™) – Nickel

Rankin PMA VERSAlloy® Nickel hardfacing alloys offer excellent resistance to the effects of corrosion, erosion, high temperature oxidation, abrasion, and metal-to-metal wear. Nickel is tougher, harder, and more durable than metal steel alloys like iron. Cast iron, stainless steel, and mild steel parts overlaid with nickel alloy last up to ten times longer than untreated parts and parts coated with common hardfacing alloys. The low melting point (under 2000˚F) enables overlays to be applied with minimal dilution and base metal distortion.

Rankin PMA VERSAlloy® Nickel rods are self-fluxing on conventional base metals. PMA offers the highest purity sintered powder rods, and are never contaminated by fillers, binders or tubes. The easy to use trapezoid-shaped rods are ideal for hard surfacing, maintenance and repair welding for maximum resistance to corrosion, high temperature, and extreme wear.

Rankin PMA Product	GENERAL DESCRIPTION					MECHANICAL PROPERTIES & CHARACTERISTICS	RECOMMENDED USES
	Abrasion Resistance	Anti-Galling	Impact Resistance	Corrosion Resistance	High-Temp Resistance		
FOR SEVERE METAL-TO-METAL WEAR WITH LOW IMPACT							
VERSAlloy® 60 AWS A5.13 NiCr-A	Excellent	Excellent	Poor	Excellent	Excellent	**Typical Rc Hardness:** 57 – 61 Melting Temp: 1900°F Non-machinable	Cams, shafts, bushings, valve seats, cement pumps
FOR MODERATE IMPACT, HIGH CORROSION AND WEAR							
VERSAlloy® 55 AWS A5.13 NiCr-A	Excellent	Excellent	Fair	Excellent	Excellent	**Typical Rc Hardness:** 53 – 57 Melting Temp: 1925°F Non-machinable	Food/chemical/ petroleum processing, pumps, screws
FOR MEDIUM IMPACT AND SEVERE ABRASION							
VERSAlloy® 50 AWS A5.13 NiCr-B	Excellent	Excellent	Great	Excellent	Excellent	**Typical Rc Hardness:** 48 – 52 Melting Temp: 1950°F Non-machinable Check Free Deposits	Mining bits, agriculture implements, pulp knives, cutting bars
FOR HIGH IMPACT, HIGH TEMPERATURE AND LOW TO MEDIUM ABRASION							
VERSAlloy® 40 AWS A5.13 NiCr-A	Great	Great	Excellent	Excellent	Excellent	**Typical Rc Hardness:** 38 – 42 Melting Temp: 2000°F Non-machinable	Rock bits, impact hammers, dies, molds, plungers, valve slides

Rankin PMA VERSAlloy® rods are available in 18" lengths with diameters of 3/32", 1/8", 5/32", 3/16", 1/4", 5/16" and 7/16". Coated electrodes can be special ordered upon request.

VERSAlloy® and Diamond Carbide Application Process Procedures:

In all cases minimum dilution processes are recommended to obtain maximum wear resistance.

Oxyacetylene (OAW) – Do not melt the base metal. Use a neutral flame to preheat the base metal to a 'sweat'. Introduce VERSAlloy® rod tip into the flame. Nickel will flow freely. Manipulate to cover desired area.

SMAW (Coated Electrodes) – they can be run either AC or DC, though DC reverse polarity is recommended. Recommended Amperages:

Size – DC/RP 1/8": 80 – 100; 5/32": 110 – 140; 3/16": 140 – 170; 1/4": 170 – 220.

For questions and special order information, please call Rankin Customer Relations at (800) 854-2159, and sales@rankin.com.

Rankin Protective Metal Alloys (PMA™) – Diamond Carbide

Rankin PMA VERSAlloy® Diamond Carbide hardfacing rods are a special blend of tungsten carbide sintered with nickel, chromium, and boron powder. Fine particle tungsten combined with PMA VERSAlloy's nickel alloy matrix offers the ultimate in extreme wear protection. PMA VERSAlloy rods have a lower melting point than iron resulting in no dilution of material and the ultimate in wear protection.

Rankin PMA VERSAlloy® Diamond Carbide trapezoid-shaped rods are easy to use and can be applied using Oxyacetylene, GTAW and SMAW methods.

Rankin PMA Product	GENERAL DESCRIPTION					MECHANICAL PROPERTIES & CHARACTERISTICS	RECOMMENDED USES
	Abrasion Resistance	Anti-Galling	Impact Resistance	Corrosion Resistance	High-Temp Resistance		
FOR EXTREME METAL-TO-METAL WEAR WITH LOW IMPACT							
Diamond Carbide 60	Excellent	Excellent	Poor	Excellent	Excellent	**Typical Rc Hardness:** 57 – 61 Melting Temp: 1900°F Non-machinable	Drill stabilizers, cutting and shredding blades, digging tool blades, wood gripping tools
Uses VERSAlloy® 60 as the nickel matrix and macrocrystalline tungsten carbide							
FOR MODERATE IMPACT, HIGH CORROSION NEEDING GOOD IMPACT RESISTANCE							
Diamond Carbide 55	Excellent	Excellent	Fair	Excellent	Excellent	**Typical Rc Hardness:** 53 – 57 Melting Temp: 1925°F Non-machinable	Feed screws, rebuilding of extrusion screws and cast barrels
Uses VERSAlloy® 55 as the nickel matrix and macrocrystalline tungsten carbide							
FOR EXTREME METAL-TO-METAL WEAR AND LOW IMPACT RESISTANCE							
Diamond Carbide 50	Excellent	Excellent	Great	Excellent	Excellent	**Typical Rc Hardness:** 48 – 52 Melting Temp: 1950°F Non-machinable Check Free Deposits	Drill bits, mining tools, stabilizers, stainless type augers
Uses VERSAlloy® 50 as the nickel matrix and macrocrystalline tungsten carbide							
FOR SEVERE METAL-TO-METAL WEAR AND HIGH IMPACT RESISTANCE							
Diamond Carbide 40	Great	Great	Excellent	Excellent	Excellent	**Typical Rc Hardness:** 38 – 42 Melting Temp: 2000°F Non-machinable	Pulp chippers, debarkers, mill hammers
Uses VERSAlloy® 40 as the nickel matrix and macrocrystalline tungsten carbide							

Rankin PMA VERSAlloy® Diamond Carbide hardfacing rods are available in 18" lengths with diameters of 3/32", 1/8", 5/32", 3/16", 1/4", 5/16", and 7/16". Custom powder conversions and cladding are available upon request.

Available Variations of Diamond Carbide:

Diamond Carbide F Grade, a VERSAlloy® nickel matrix with tungsten carbide pellets and finely powdered cast tungsten carbide to toughen the matrix and improve wear resistance.

Diamond Carbide V Grade, a VERSAlloy® nickel matrix with a blend of crushed sintered tungsten carbide.

Diamond Carbide VSP Grade, a VERSAlloy® nickel matrix with a mixture of crushed sintered tungsten carbide and spherical tungsten carbides.

Diamond Carbide S Grade, a VERSAlloy® nickel matrix with a higher percentage of macrocrystalline tungsten carbide for added wear resistance.

For questions and special order information, please call Rankin Customer Relations at (800) 854-2159, and sales@rankin.com.

RANKIN MIG CARBIDE VIBRATORY FEEDER

Tungsten Carbide Powders and Vibratory Feeder

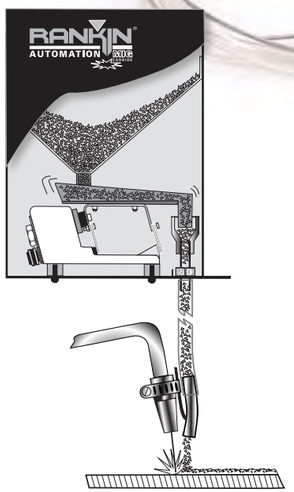
The Rankin Automation™ Vibratory Carbide Feeder is simple to operate and provides a unique handheld, automated feed for all grades of tungsten carbide. It offers extraordinary efficiency in making tungsten carbide deposits for extreme wear resistance and portable hardfacing applications on ground engagement tools in many industries, including construction, agriculture, mining, dredging, and energy and oil.

With the Vibratory Carbide Feeder, users realize:

- Tungsten carbide concentration up to 80 percent
- Extra long part life
- High deposit rates
- Thicker deposits for longer life
- Lightweight and portable
- Integration with virtually all MIG wire welding machines

Key Components of the Vibratory Carbide Feeder include:

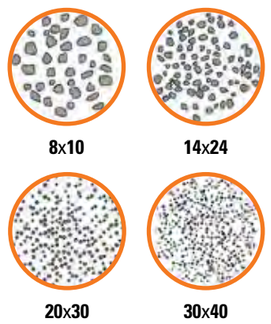
- Large volume carbide hopper
- Variable speed vibratory feeder assembly (electronic)
- Aluminum metering funnel
- 4" metering tube with collar
- 6" short guide tube with clamp for gun mounting
- Available in 110V and 220V with three prong plug
- Remote control pendant with connecting cables



Industry Uses

Agriculture:	Heavy Equipment:
Brush shredder teeth	Augers
Conveyor fans	Backhoe buckets and blades
Cultivator shovel noses	Crushing surfaces
Cultivator chisels and spikes	Dozer blades
Landside plates	Dozer end bits
Lister shares	Grader blades
Mill hammers	Hammers and bars
Plowshares	Heavy drag chains
Plow mold boards	Loader buckets
Root cutters	Paving paddles, blades and mixers
Rotary hoe teeth	Ripper teeth
Scraper knives	Rock rakes
Spring teeth and runners	Shovel buckets and teeth
Subsoiler teeth	Tractor grousers
Spike tooth harrows	

Tungsten Carbide Available in:



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Committed to engineering and manufacturing superior products that deliver superior performance.

BROCO Underwater

- Underwater cutting and welding products
- Exothermic torch systems
- Exothermic cutting rods *PLUS*

RANKIN Hardfacing

- Buildup and hardfacing products
- Rods, electrodes, welding wires
- Custom alloys available

BROCO Military and Tactical

- Rescue, repair and recovery torch sets
- Forced entry and breaching tools
- Diamond saw blades

RANKIN Protective Metal Alloys

- PMA specialty metal alloys
- Sintered nickel and tungsten carbide alloys
- Hardfacing, brazing, dental solders, preforms

BROCO Industrial

- Exothermic torch systems
- Prime-Cut cutting rods *PLUS*
- GOWELD portable welder

RANKIN Automation

- Vibratory Carbide Feeder

Broco and Rankin products are available through an international network of distributors.

For more information on these and all our product offerings, please visit www.broco-rankin.com, call Broco and Rankin Customer Relations at (909) 483-3222, (800) 854-2159 and contact sales@brocoinc.com, and sales@rankin.com.