



For our client  
this is a turnout.

For us a manufacturing facility  
contributing towards our customer's success.

# voestalpine VAE Group - Global Presence

Present in more than 50 countries as a global leader in the manufacturing, processing, and development of sophisticated steel products, particularly for the technology-intensive sectors, such as the automotive, railway, aerospace, and energy industries.



## With voestalpine VAE SA, Clients Benefit From a 155 Years of Technical Expertise

voestalpine VAE SA (Pty) Ltd is a wholly-owned subsidiary within voestalpine Austria, a leading European steel producer. The Group has four divisions, Steel, Automotive, Railway Systems and Profilform, which all enjoy leading positions in their respective markets.



Worldwide, more than 150 technical experts are employed in engineering departments to guarantee optimised designs, perfect geometry and outstanding customised solutions. Currently there are 40 production centres across Europe, North and South America, Australia, Africa, and Asia.

In South Africa, and across the African continent, voestalpine VAE SA (Pty) Ltd is the approved and preferred supplier for all permanent way rail, ranging from high speed mainlines, urban traffic, heavy long-distance iron-ore and coal haulage as well as underground mining track.

voestalpine VAE SA's commitment extends beyond products and services as it provides complete solutions from site-specific design, manufacturing and pre-assembly through to installation. voestalpine VAE SA's guaranteed quality is benchmarked against world-class best practices and backed by ISO 9001:2000 accreditation and a five star HASLAC gold star rating.



# Design, Production and Manufacturing

Switch rails are manufactured by CAD/CAM systems, using standard materials or special wear-resistant materials like HSH (Head Special Hardened). Switches have an asymmetrical transition area, which is heat-treated to guarantee a constant hardness gradient in the forged area. By lowering the forces on the rails, wear is reduced, as is maintenance.

voestalpine VAE switches are manufactured in accordance with the technical supply specifications of UIC and CEN. This is supplemented by the specific requirements of the customers and the vast experience of VAE. Tongue rails can be manufactured and delivered in one-piece lengths of 19 meters and more, with or without forging.

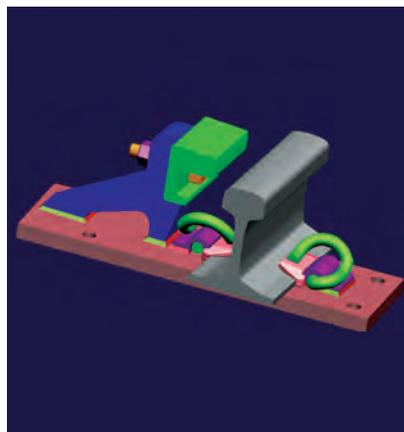
For low, medium or highest loads, rails of the type R350 LHT (S900 HSH) (Head Special Hardened) are used. These rails are manufactured according to a special heat-treatment procedure. The fine pearlitic structure is particularly suitable for rolling contact due to its high wear-resistance combined with high tensile strength and elongation.

## Forging

At the end of the asymmetrical switch section, the required rail section is obtained by forging. The tools and equipment for this essential technology are designed and manufactured at voestalpine VAE factories in order to be able to supply top quality products and provide safe manufacturing procedures. The weld joint is, in any case, outside of the transition area.

## Heat Treatment

The decreasing tensile strength in the heat-affected zone of the forging is eliminated by a computer-controlled heat-treatment process, which is a standard procedure at voestalpine VAE. This patented procedure reduces the formation of soft spots on the running surface of the switch. After the forging procedure, the fishing table corresponds to the measurements of the rolled rail. The area of the head and foot is adjusted to the required measurements by machining.





## Turnouts

voestalpine VAE SA has an extensive inventory of designs, compliant with international standards, ranging from 1:6 turnouts to the latest 1:20 swingnose units.

Existing designs are available to suit a variety of rail sections and gauges for slab and ballasted track. These include among others:

- Single Turnouts
- Curved Turnouts
- Equal and Unequal Split Turnouts
- Single and Double Crossovers
- Crossovers and Scissor Crossings
- Single and Double Slips
- Dual-gauge Turnouts
- Various Crossings
- Curved Crossings
- Stop Blocks

A number of new innovative turnout designs have been introduced since voestalpine VAE entered the South African market.



### 1:20 Swingnose Turnout

The 1:20 was developed to meet the current and future needs of South Africa's heavy-haul industry. The design is suitable for heavy traffic density, high axle loads and high longitudinal forces in the track. Its novel features include:

- A crossing frog with a movable vee housed in a robust frame. This gives high stability against vertical, horizontal and torsional forces
- A tangential switch point entry, which reduces side forces to a minimum
- In the overrun areas, the wing rails are manufactured from cast manganese steel, which forms a unit with the base plate
- Hollow steel sleepers for housing switch rodding

### 1:7 Double Slip & Single Slip

The slips were developed in conjunction with main railway operators to meet the future needs of South Africa's metro lines. The slips are designed for higher traffic densities and faster speeds.

### 1:12 & 1:9 Turnouts

The design is suitable for heavy traffic density, high axle loads and high rail-expansion forces in the track. Its novel features include:

- A railbound crossing frog with cast manganese inserts
- A tangential switch point entry, which reduces side forces to a minimum
- Hollow steel sleepers for housing switch rodding
- Adjustable check rails

### 1:4.5 Scissors Crossing

The 48kg/m 1:4.5 scissors crossing is built on either universal- or precast concrete sleepers or on wooden sleepers. 350LHT special head hardened rails, railbound crossings and adjustable UIC33 check rails are used to increase the product life cycle. The switch areas include flexible switch blades and a technological advancement through the use of insulated adjustable rodding and no fish plates required throughout the set.

### 1:6 Scissors Crossing

The 60kg/m 1:6 scissors crossing is designed on universal- and precast concrete sleepers. 350LHT special head hardened 60E1 rails, railbound crossings and adjustable UIC33 check rails with continuous welding are used in the set. The turnout area can be either secantial or tangential geometries.

### Mining Turnouts

voestalpine VAE SA is able to supply a wide range of turnouts for underground use, to any angle and length varying from 457 mm to 1 065 mm gauge or in custom specifications. Narrow gauge turnouts can be supplied to various sections to enable the splitting up of the switch. This is done to allow for transportation in confined underground environments.

### Switch Devices

The diverging path geometry of its switches is optimised according to the principles of vehicle dynamics. This reduces induced forces and thereby improves travelling comfort and service life. The use of highly wear-resistant materials together with most advanced production technologies facilitates the practical use of the knowledge gained from EDP-supported simulation programmes. These products meet the technical specifications of Transnet in South Africa, and can also be manufactured according to other required international specifications.

Flexible Switches made from specific asymmetrical or symmetrical tongue rail sections are forged at the end to match the standard rail section. The transition from one section to the other ties mostly in the clamped area at the end of the switch, which makes welding in the flexible area superfluous. The length of the forging can be adjusted to the specific connecting system such as welding, insulated fishplating or emergency fishplating. In order to reduce the setting forces and to influence the elastic line of the switch, it is possible to mill the base in the flexible area.



# Turnout Systems

Rail switches are made from standard rail sections or rails with a reinforced web (thick web rails). During the setting process the switch is elastically bent. To reduce the setting forces, a flexible area can be provided for short rail switches. Fishplating or welding to the intermediate rails is possible. Holes are provided for the mounting of operating and monitoring rods.

Spring rail switches are proven, low cost switches made from a specific asymmetrical or symmetrical tongue rail section are forged at the end to match the standard rail section and are electrically flash-butt welded to the adjacent standard rail.

The weld is located in the flexible-elastic area of the switch and is secured with safety fishplates. A flexible area can be provided for in the standard rails to reduce the setting forces. This design allows for high wear with minimal maintenance.

voestalpine VAE turnout designs may include various forms of switchblades from a semi-curved hinged type to a forged tangential-design, thick web switchblade. In addition, the company designs special products to accommodate one-off requests from customers.

voestalpine VAE SA is able to offer a variety of crossings within the turnout design:

- Rail manufactured crossing using rails to suit light axle loads and low frequency lines.
- Rail bound crossing - rail and manganese crossings with a manganese insert in the transfer or high working area for a longer life span.
- Monoblock crossing (bolted rail joint) - complete manganese steel crossings for a longer life span and minimal maintenance.
- Monoblock crossing or Centro crossing (weldable rail joint) - complete manganese crossing with rails welded to each end through a special process to allow for welding into track.
- Swingnose crossing - a combination of rail and manganese steel, the point of the vee moves from side-to-side to allow continuous support through the crossing for heavy axle loads, or for high speed, high-volume traffic.



## Switch Point Rollers

voestalpine VAE SA offers a variety of switch rollers optimised for specific requirements. The switch point roller offers considerable advantages over conventional sliding baseplates in reducing operating costs and maintenance. These rollers reduce the effort needed to operate the switch. With more secure positioning of the blade, failure rates are lower as reliability has been enhanced. Lubrication of the sliding plates is no longer needed, thereby eliminating an environmental contaminant. These rollers can be fitted to both new and existing switches.



**VAE**



## Special Track Components



### Crossings

The advantages of a moveable point crossing joint is that the continuous wheel over-running area has no running edges and head surface interruptions, making it particularly suitable for high-speed and heavy haul traffic as well as for mixed operation. This crossing type eliminates the need for check rails. Extended life is achieved, as there are reduced impacts in the wheel transitions area. These crossings can be thermit welded into the track.

Superior strength AMS high-manganese steel rails are best suited for cast manganese crossings. This steel with +13% manganese content develops an exceptionally wear-resistant surface, making it suitable for the highest axle loads. The castings are manufactured by a the voestalpine VAE affiliate, JEZ. voestalpine VAE's patented flash-butt welding process permits the connection of AMS with normal rail steel allowing manganese steel crossings to be welded into the CWR track.



### UIC 33 Adjustable Check Rail

This check rail, which has been incorporated into some of voestalpine VAE's turnout designs and open track curves, has the advantage of being easily adjustable. The design allows for 15 mm of wear and needs minimal maintenance. This check rail was designed for use with either timber, steel or concrete sleepers.

### Insulated Rail Joints

voestalpine VAE manufactures a variety of workshop-assembled insulated rail joints. The frozen joints are all assembled and epoxied in a controlled environment and are manufactured to extremely rigorous tolerances not obtainable with field-assembled joints.

Six-hole block joints have been approved and are commonly used in turnouts and open track in South Africa.





With predefined import and handling logistics, voestalpine VAE SA is able to provide a most cost-effective service.

### Rails

Various rail profiles are available in multiples of 12 m, 18 m or 60 m lengths. New as well as reconditioned rails can be supplied in lengths of up to 240 m according to customer requirements. The new rail profiles range from 22 kg/m to 60 kg/m in addition to UIC33 check rail and special crane rail profiles.

Flash-butt welding of technologically advanced new rails gives voestalpine VAE SA the edge in the South Africa market with the facilities to handle up to 240 m lengths. Secondhand or used rail can also be re-conditioned and ultrasonically tested before they are flash-butt welded into longer lengths under factory conditions.

New rails are supplied in 18 m, 36 m or 60 m lengths or multiples thereof, up to a maximum of 240 m lengths. Typical rail profiles welded include the SAR 48 kg/m, 57 kg/m and 60E1 profiles. Flash-butt welding minimises the need for in-track thermit-welding and fish-plated rail joints. The proven processes in flash-butt welding under factory conditions ensure a higher consistent quality than in-track welding.

voestalpine VAE SA is the sole importer of 60 m lengths and supplier of flash-butt welded 240 m lengths. The logistical supply process requires accurate and timeous planning to ensure cost effective delivery. With predefined import and handling logistics, voestalpine VAE SA is able to provide a most cost-effective service.



### Steel and Wooden Sleepers

voestalpine VAE SA is a leader in the design and manufacture of steel sleepers, having supplied many thousands of units over a period of 50 years. The company's range is based on the widely used, well-proven trough section.

Wooden/timber sleepers are imported in various dimensions for turnout manufacturing and open track. The sleepers are creosoted, tagged and gang nailed according to SABS and Transnet specifications.



## Signaling

As the world leader and trendsetter in the areas of turnout and driving, locking and monitoring technology, we are committed to our customers' and our success.

New challenges and needs in passenger and freight transportation require innovative and sustainable all-inclusive thinking. This is what drives the Signaling philosophy, linking together the associated turnout systems and hazard alert systems. To ensure that our customers receive the greatest possible benefit including appropriate levels of quality, all our products and system and service solutions are tailored to the specific needs of each customer. Further our "one stop service" makes material sourcing and problem solving all the more simple for our customers.

We offer our turnouts completely pre-assembled, equipped with all the necessary signalling components permitting, where required, continuous mechanical tamping.

"Just in time" delivery enables our customers to drastically reduce installation costs and time. Our solutions prioritise low life cycle costs and highest possible asset availability and reliability for the railway operator, coupled with the greatest possible safety for passengers and employees. By providing targeted information, our novel monitoring systems enable early detection of impending failures, allowing for efficient asset utilisation, including the avoidance of unnecessary preventative maintenance.

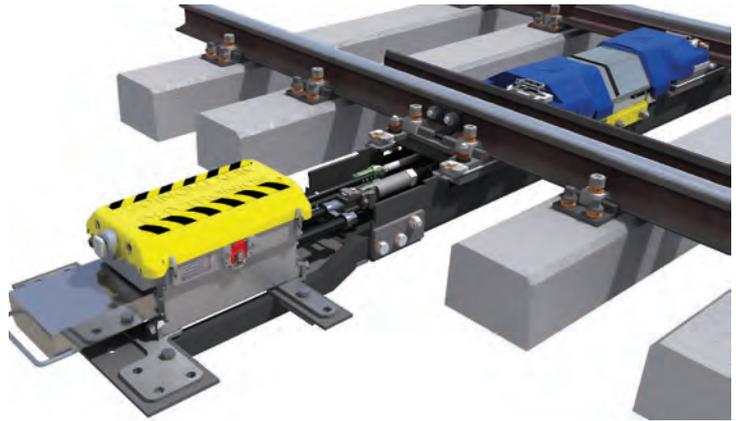


### Switch Machines (VAE DLD)

SPHEROLOCK® a completely sealed locking system, fully self-contained and largely constructed of turned parts. The locking system is dirt and weather-proof. A special link to the switch makes the system effectively independent of switch and stock rail movements. Fastenings can be specified according to customer requirements. voestalpine VAE in South Africa has combined the SPHEROLOCK® with a locally developed hydraulic drive and detection system and applied it to a three operating point 1:20 turnout. The hydraulic system has a mechanical and hydraulic retention device at each of the three hydraulic cylinders for safety purposes. These devices have been developed to be trailable in emergency situations to minimise damage to the other costly components.

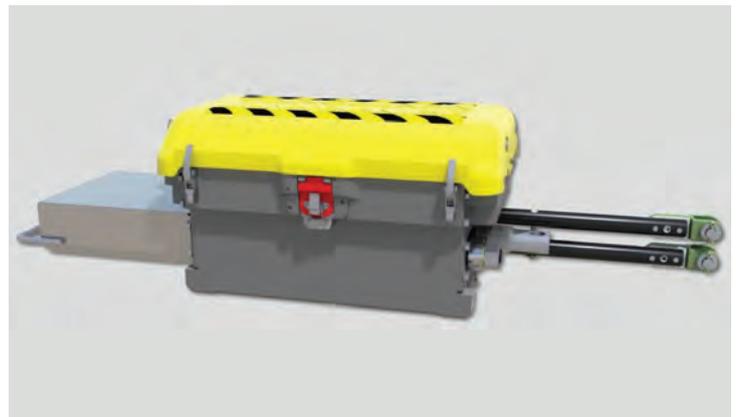
### Switch Machines (Ecostar 4.0)

The ECOSTAR is an electro-hydraulic turnout drive for mounting outside the gauge of the turnout. This machine features a monoblock hydraulic system with integrated manual pump on a separate level. Positive locking of the switch blades is achieved by the first safety level (SPHEROLOCK®) and a fallback level (locking of detector rods). Both 380VAC and 110VDC versions and trailable and non-trailable machine configurations are available. Integrated end position detection system comes standard and visual end position indicators are optional. Designed and approved according to CENELEC EN 50126/50129, available in variants for IP54 and IP67.

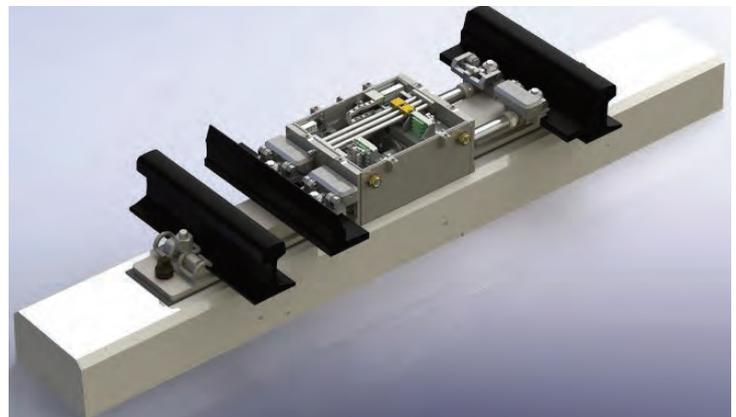


### Switch Machines (Unistar HR NG)

The reliable technology and simple design of the Unistar HR is setting the benchmark. The Unistar HR NG, designed for turnouts starting with 1000 mm gauge, is so compact it fits between the switchblades for this gauge. The CCDrive, prism locking and detecting modules are installed in one watertight and dust tight box.



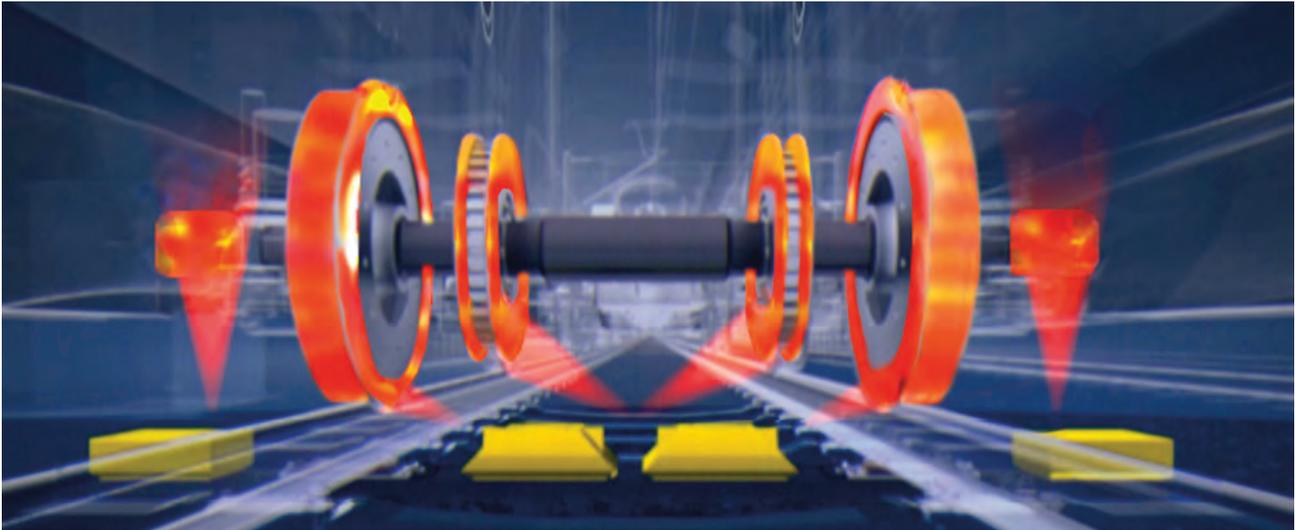
Adjustable for switch point opening from 60 to 160 mm, all components under mechanical load are made out of inductive hardened special steel, all external parts are made out of corrosion free steel, which are proven since years.



### Switch Machines (Unistar RV)

The Unistar RV is specifically designed as a self normalizing point mechanism, preferably installed in centre of gauge. It is based on the successful and field proven CONTEC Prism Lock, made of inductive hardened special steel for virtually maintenance and wear free service. As an option, detector rods are available which is locked in the end position. The locking and detection system is fulfilling the latest safety requirements for point machines. All modules are installed in a watertight corrosion free housing. Due to the encapsulated design, virtually maintenance free service is given. A mechanically independent (adjustable) damper is provided smoothing the self normalizing movement and therefore preserving the mechanism and the set of points.

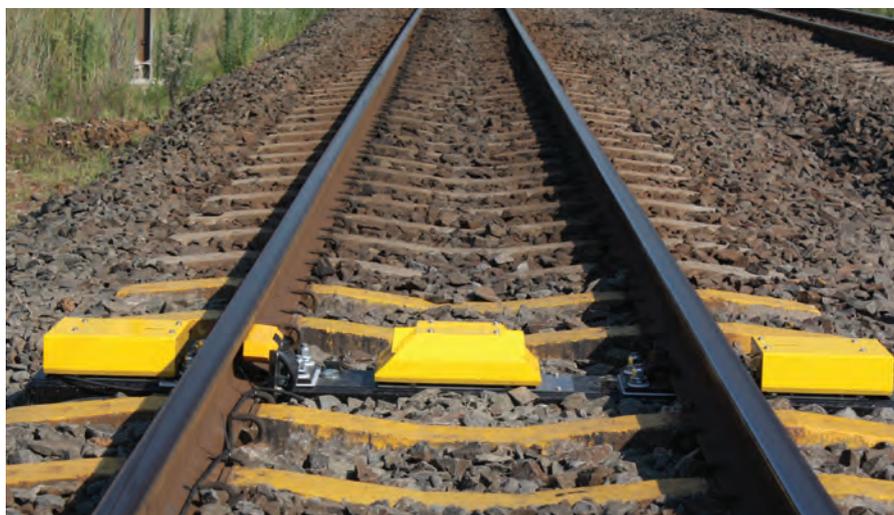




### Hot Bearing Detector

The voestalpine VAE hot bearing and hot (or cold) wheel detection system automatically checks the condition of axle bearings on moving trains as well as faulty braking systems on rolling stock, thereby avoiding costly damage as a result of derailments. This system is installed in a hollow steel sleeper and is designed to measure axle and wheel temperature.

The Phoenix MB uses contactless, fixed scanners for measuring the temperature of axle bearings and wheel sets. Train speed is not a limitation as the system can measure objects passing at speeds of up to 500 km/h. The purpose-designed scanning feature follows the direction of the train. The Phoenix MB hot wheel detection system can be installed as a stand-alone system that measures wheel set temperatures up to 650°C.





# Locations

voestalpine VAE SA's corporate office is in Isando, with manufacturing plants located in Kimberley, Bloemfontein and Isando.

The company's major customers, among others are Transnet, PRASA/Metrorail, private siding owners, the mining industry, railway operators in African countries and companies who have maintenance contracts with various infrastructure owners.



Isando Plant



Bloemfontein Plant



voestalpine VAE SA corporate office in Isando



Kimberley Plant

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