voestalpine

ONE STEP AHEAD.

www.voestalpine.com/railway-systems

TAILORED RAILWAY SOLUTIONS FOR DESERT ENVIRONMENTS

Building and operation of railroads in desert areas such as those of the Middle East region requires special considerations regarding the prevailing harsh environmental conditions, such as sand, sand accumulations, sand-storms, dust, heat and the high corrosive and aggressive ambiance in coastal regions.

Without technical mitigation measures these harsh environmental conditions are immediate safety matters, they affect the railway operations and they hamper serviceability and reliability of such railroads. Only distinct technical solutions, specially engineered track component designs – all proven under such harsh environmental conditions – will ensure a safe, efficient and reliable railway system and operation.

With decades of experience in the desert areas of the MENA region and the technical proficiency as a world market leader, voestalpine Railway Systems has developed most reliable and renowned product solutions to cope with these harsh environmental conditions, thus to ensure the safety, reliability, availability and maintainability of our clients' railway networks in the Middle East.

Desert-fit turnout design

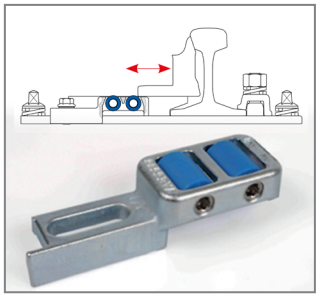
voestalpine Railway Systems customized turnouts to meet various challenges. Increased wear and tear due to added abrasion caused by sand will be compensated by developments that result from kinematic gauge optimisation. The utilisation of thicker switch blades and correspondingly bended stock rails enable considerably extended life cycles of turnouts. PIROLL, a roller system integrated in switch section, will minimize setting forces during switch blade movements and allow lubricant-free operation. Specially hardened rail profiles and setting components subjected to surface treatment will sustainably resist the challenges of harsh environmental conditions.

SWITCH SECTION:
PIROLL® (Plate Integrated Roller System)
- NO need for grease or lubricants for friction reduction
- NO requirement of additional slide plate coatings
- Self-cleaning from sand and dust (special design allows sand to fall through avoiding any sand accumulation)

KGO® (Kinematic Gauge Optimization)
- Reduction of lateral forces and rail wear (smooth sinus-run
- Thicker Switch Blade (more material to wear)

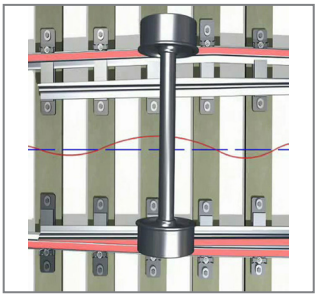
CROSSING SECTION:
Explosive Depth Hardening (EDH)
- Significant life-time extension of crossings
- Hardness of 320 – 350 HB for highest loads
- High strength & high wear resistant materials

RAIL QUALITY:
- HSH® (Head Special Hardened)

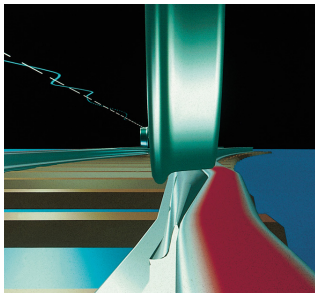


PIROLL® (Plate Integrated Roller System)

Explosive Pre-Hardening of Running Surfaces of Manganese Crossing



Kinematics Gauge Optimized Switch Device „KGO®"



With KGO® - Smooth run, high travelling comfort

Heat Treated Super Premium Rails. Rail Grade 400 UHC® HSH®

The high-strength 400 UHC® HSH® rail grade manufactured by voestalpine Schienen through its worldwide patented HSH® process is the most robust rail solution for challenging enviroments. It is applied especially in heavy haul transport with axle loads up to 30 tons and above and has become the standard grade both for curves and for straight track. Also mixed traffic railways with medium axle loads of 22.5 t andbelow are deriving technical and economic benefit resulting from the use of the 400 UHC® HSH® railgrade in higher loaded curves.The operational performance of this rail grade is characterised by:

- Highest resistance to wear compared to all other pearlitic railsteels
- Maximum resistance to formation of corrugation
- Highest resistance to rolling contact fatigue

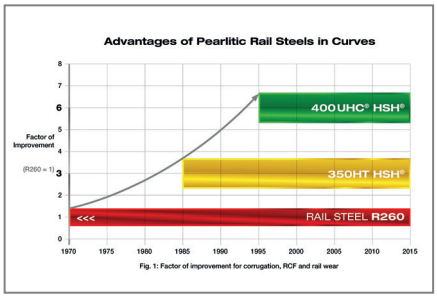


Fig. 1: Factor of improvement for corrugation, RCF and rail wear

Drive, Locking, Detection & Signaling

voestalpine Railway Systems has precisely analysed various desert conditions scientifically and adapted its turnout system technology accordingly.

Point machines (UNISTAR series)

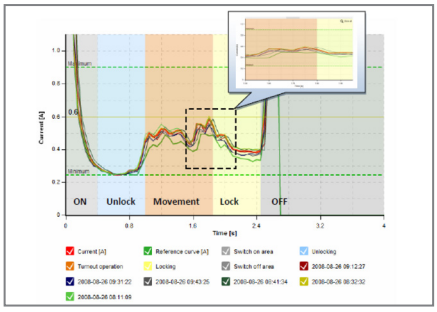
- **Environmental conditions: Temperature -40 to +80C°**
- **Solar Radiation tested with 1120W/m²**
- **Fully encapsulated, water- & dust-tight design**
- **Degree of Protection: IP67**
- **Externally lubricant- / grease-free**
- **Standard configuration: Humidity up to 95%**
- **Locking System: Integrated prism lock**
- **Trailable or non-trailable**

Wayside diagnostic and monitoring technologies for desert environments

PHOENIX^{MDS} – A new modular structure of railway diagnostic and monitoring technologies. By combining measurement technologies a wide range of functions can be offered. These functions have been designed to ensure safe operation even in harsh environments like deserts.

PHOENIX^{MDS} HBD/HWD – Compatible with all types of rolling stock PHOENIXMDS HBD/HWD Hot Box and Hot Wheel Detection functions identify and alert operators to excessively high temperatures of passing trains. With references from Europe's fastest railways HBD/HWD scanners accurately capture temperatures up to a speed of 500km/h using 8 beams with infra-red technology for a wide detection area. The desert option works at temperatures as high as 70°C and is equipped with a new generation of cover to withstand the harsh desert environment.

PHOENIX^{MDS} ECM – Environmental Condition Monitoring delivers accurate data for warning in case of hazardous weather conditions such as sandstorms and high winds. Through both a sand particle detector and wind sensor PHOENIXMDS ECM provides accurate real time alerts directly to your railway control center enabling speed reductions and safety measures to be communicated and implemented before a derailment occurs. Made with high quality components its robust construction has been proven in the world's harshest environments.



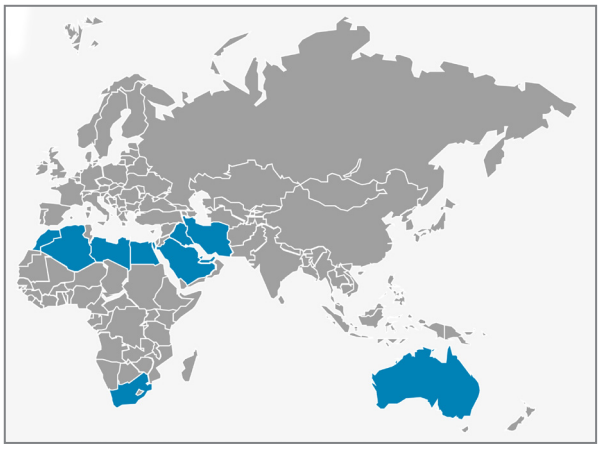
FIXED INFRASTRUCTURE CONDITION MONITORING – Important in regions where maintenance actions are hard to perform our monitoring system measures key asset performances to identify deteriorating condition and to issue automated alerts that allow scheduled maintenance before a failure occurs. Examples of monitored assets: Point Machines, Level Crossings, Power & Cables, Track & Rail Health, etc.

voestalpine Railway Systems Saudi Arabia Ltd.- first turnout production plant in the GCC region

With the establishment of production facilities in Riyadh (KSA) voestalpine Railway Systems Saudi Arabia Ltd. is setting new standards for high quality productions in the GCC.

- Production of complete turnouts in voestalpine Railway Systems Saudi Arabia Ltd's local production facilities in Riyadh, Saudi Arabia
- Just-in-time delivery of fully assembled turnouts to construction/installation sites
- Installation supervision services performed by local, experienced and trained installation teams
- Inspection & maintenance services for all turnouts and turnout components
- Grinding and re-profiling of turnouts, ultrasonic testing of rails
- Thermite welding service as well as the support of replacement of any turnout components on site
- Rail surface and manganese crossing repair welding support

Challenging extreme environments worldwide



Railways in the following countries with a challenging environment have confidence in our competence and our customised solutions:

UAE, Saudia Arabia, Qatar, Algeria,
Morocco, Australia, Libya, Iran, Iraq,
South Africa, Egypt...

Our references in the GCC region

Riyadh Metro, Haramain High Speed Line (KSA), Saudi Railways Organization (SRO), Saudi Railway Company (SAR), Dubai Metro, Dubai Tram (Al Sufouh), Etihad Rail, Doha Metro, Lusail LRT, etc.

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