

Advanced technologies for building high performing roads in extreme conditions designed by RST Solutions

A challenging road construction project for a new Australian mine has achieved success using advanced road stabilising technologies by RST Solutions to build high performing roads in remote areas that withstand extreme conditions



Gold Coast, Queensland Oct 25, 2023 ([Issuewire.com](https://www.issuewire.com)) - Thirty-four kilometres of roads at a new mine Thunderbird Mineral Sands Project, being developed by Kimberly Mineral Sands (KMS) in the Kimberly Region of northern Western Australia, has been constructed using [RST Solutions](#)' advanced road construction technologies to withstand extreme heat and humidity.

Located on the Dampier Peninsula between Derby and Broome, the Thunderbird Project has progressed from an exploration project to a substantial mining project of one of the world's largest and highest-grade mineral sands deposits, operated by KMS to mine minerals including ilmenite, leucoxene and rutile for making titanium and zircon for specialty applications including water and air purifiers.

Temperatures rising to 50 degrees at the mine site and another major issue of red Pindan soils; known for being soft and moisture sensitive with high potential for collapse, challenged KMS Senior Project Engineer Claudio Marone to take a new approach when designing the 30km haul road and 4km of service roads around the mine.

Mr. Marone's original plan was to seal the roads with a chipseal bitumen, however the extreme heat and humidity would have potentially caused it to bubble and peel off, leaving sharper, harder holes that would require specialise contractors to repair.

"The constructed Pindan subgrade was overlayed by a sub-base/ base course layer constructed with crushed rock (compliant with Main Roads Western Australia), however during heavy rain events the layer was soaking and road trains routing it, thus every time we had to grade it," Mr Marone said.

"I was looking at alternative methods to seal the roads at Thunderbird because of the hot, humid conditions and it was suggested I try a polymer soil stabiliser to strengthen the base course layer instead of putting down a top seal.

"After extensive research and consultant reviews, we visited the top companies specialising in polymer stabilisers and decided to go with RST Solutions because of their success with similar projects and the wealth of knowledge and experience they have from working in this field for 30 years. They really know what they are doing."

For the Thunderbird Project, RST Solutions prescribed advanced soil stabiliser [Titan](#), designed specifically for crushed rock road base with no plasticity to achieve greater levels of compaction. Titan was applied to the base course layer in specific doses mixed in through a stabiliser machine to control the moisture ready for compaction to form high quality roads in a third of the time and a fraction of the cost, replacing the need for a typical top seal.

When the mine's haul road opened and fully loaded triple road trains started to cart material from the site, the road surface was reported as being "like cement stabilisation" and the road responded well to the first 80mm of rain.

Mr. Marone said the road remained in excellent condition after heavy traffic use during rain, with no tyre depression noted at all and no marks on the road a week later when dry, where previously in the same wet conditions the road trains were routing the base course formation and the construction team was required to perform maintenance grading post rain events.

"The benefits of taking this approach have been outstanding. We saved millions of dollars and now have flexible, weather resistant roads with excellent dust control utilising an additional product RST Solutions suggested ([Guardian](#)) that will be a whole lot easier to maintain. Titan is comparable to cement stabilisation and replaced the need for a rigid top seal, enabling our team to carry out all the earthworks and finish off the roads without having to bring in a specialised team and their machinery to lay the chipseal. The ongoing maintenance for us now is less risky, more cost effective, and a lot easier to carry out with the equipment we already have on-site," Mr. Marone added.

Haul roads need to be in excellent condition to support road trains carting high volumes of mined product from the site 24/7. RST Solutions is advancing road construction methods to assist civil engineers in achieving high performing roads in areas with unique and challenging characteristics, such as intense temperatures, high rainfall and prolonged dry seasons.

The issues of extreme heat and humidity, dust and erosion control, and Pindan and other red soils at Thunderbird Project were addressed by RST Solutions with the company's advanced soil stabiliser Titan, for constructing high performing flexible roads that are resilient to extreme conditions, including flooding and high volumes of heavy vehicle traffic.

Titan was further tailored by RST Solutions for compatibility to the Thunderbird site, with advised dosage levels significantly improving the top base course layer, increasing thickness and flexibility to achieve the required CBR (California Bearing Ratio).

“A wide variety of factors need to be considered when building in areas with extreme weather and unique topographical conditions,” RST Solutions Business Development Manager Mark Farmer said.

“Engineers designing roads could be working with anything from red soils in areas prone to intense heat and humidity, through to silt and mud in some of the coldest, wettest parts of the world. Every location we work with is different and therefore requires a unique and targeted approach to stabilisation and dust control.

“The key issues we have been assisting with on the Thunderbird Project are extreme weather conditions and the remote location of the site Titan improves the binding of the crushed rocks who formed the Road Base layer, reducing water permeation through the layer.

“Instead of deteriorating over time or washing away, Titan works down through the road’s surface layers when it rains, tightening up road structure through particle slippage and aggregation to lower roll resistance and improve road quality, in turn reducing road maintenance and road recovery time.”

Adapting the road construction processes for compatibility to local conditions at the Thunderbird Project saved KMS a significant amount of resources, reducing construction costs by removing the expense of contracting a specialised team and their machinery to apply a chipseal, furthermore, the future maintenance or repairs of the base course layer will be more cost-effective.

Results achieved on the 30km haul road and across 4km of minor roads around the mine include a high resistance to water and significantly improved physical properties including packing density, elastic modulus, hardness, cohesion, and fracture toughness to improve the whole road construction process, achieving more durable, weather-resistant roads and pavements that keep productivity at optimum.

With three decades of experience gained from developing tailored solutions for the many various fine particle challenges presented across numerous industries, processes, and material types, RST Solutions solves complex site-specific issues caused by all types of fine particle issues for companies seeking more project optimisation strategies on range projects. RST Solutions adjusts the chemistry of its advanced technologies to target specific materials being used on-site as well as construction processes, a site’s application equipment and systems, local weather patterns and budget perimeters.

[RST Solutions](#) is an Australian business operating internationally, with presence and projects in Australia, North and South America, Africa, the Middle East, Asia and the Pacific. For more information, contact RST Solutions at (+61 7) 5522 0244 or visit www.rstsolutions.com.au.



Media Contact

Louise Carroll Marketing

marketing@louise-carroll-marketing.com.au

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