

WHAT IT TAKES TO BUILD A HIGH-PERFORMANCE RACING SURFACE



Kyalami Grand Prix Circuit,
Midrand, Gauteng, South Africa

When vehicles push speeds approaching 320 km/h (198.8 mph), pavement becomes a safety imperative. The transformation of South Africa's Kyalami Grand Prix Circuit shows how advanced materials engineering can help infrastructure perform under extreme conditions while supporting durability, safety, and life cycle efficiency.

CHALLENGE

Across infrastructure sectors, expectations are increasing. Assets must perform longer, withstand heavier loads, meet stricter safety standards, and minimize maintenance and disruption. For motorsport circuits, these pressures are even more pronounced. Originally constructed in 1961 and once host of Formula 1 races, Kyalami reached a critical inflection point when its track no longer met the stringent requirements for FIA certification. Compliance required more than resurfacing. The track needed to be rebuilt to handle extreme speeds, repeated dynamic loading, and uncompromising safety expectations.

Partner: Bituguard

Market: Paving

Product(s): HiMA

Highlights

- Required more than resurfacing to meet FIA certification standards.
- Original asphalt was reused as part of the new foundation, enabling circularity.
- Asphalt mix targeted impermeability, fatigue resistance, and deformation resistance.
- Achieved FIA Grade 2 certification following renovation with Kraton polymer-modified asphalt

SOLUTION

Instead of making incremental improvements, the Kyalami project, starting in 2015, focused on designing a surface that could deliver measurable performance under real-world conditions. The original asphalt was excavated to the base layer and reused as part of the new foundation, supporting structural integrity and resource efficiency. A new asphalt mix was developed using a 5% styrene-butadiene-styrene (SBS) modified binder engineered to withstand high-speed stress conditions. This mix was designed to meet strict performance requirements, including impermeability, resistance to deformation and fatigue, and stability under abnormal surface forces. SBS-modified binders enhance elasticity and durability, enabling pavement to recover from deformation and resist fatigue cracking caused by repeated traffic loads. The project reflects a broader shift toward materials engineered to extend service life and maintain performance over time.

IMPACT

The renovated Kyalami circuit spans approximately 4.5 km (2.7 miles) and meets FIA Grade 2 standards, making it the only motor racing facility on the continent to achieve this level of accreditation. The track consistently performs under extreme conditions, with vehicles reaching speeds approaching 320 km/h (198.8 mph) while maintaining safety and reliability. These outcomes reflect the role of material selection and design strategy in supporting long-term performance.

CONCLUSION

Kyalami demonstrates how performance-driven materials and design can help infrastructure meet rising demands. While the project was designed for motorsports, the same principles of fatigue resistance, deformation recovery, and long-term durability are relevant to high-traffic roadways, heavy industrial corridors, and demanding infrastructure environments.

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4.5km
of pavement with
vehicle speeds
approaching
320km/h

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