APAC Missouri Inc. is a division of APAC Atlanta, which is the largest asphalt and concrete paving company in the nation. Much of the company’s work includes paving roadways, streets, parking areas and bridges. While no project goes by without its set of challenges, rarely are they as difficult as the one recently completed in Kansas City, Mo.

There, the company contracted to pave the track for the new Kansas City Speedway scheduled to open later this year. This 75,000-seat facility is being built on a 1,000-acre site in Wyandotte County for accommodating both the NASCAR Winston Cup Series and Indy Car racing.

The track is, of course, central to any speedway. Aside from the driver’s skill and his specific race car, the car’s performance is greatly dependent on the track’s layout, size and the quality of the paving. It’s elementary that smoothness is of great importance when one considers cars reach speeds in excess of 200 mph.

APAC was contracted to do all the paving at the site, including the pits, inside track, parking lots, motor home parking areas and the roadway leading to the public highways. Turner Construction is the construction manager for the project.

Give it a ride

The track is oval shaped covering 1.5 miles, mid-sized when compared to the other 135 speedways approved by NASCAR for 13 series of racing. Other tracks range anywhere from 0.4 to 2.66 miles.

All speedways feature banking (sloping) for enabling drivers to bring their cars to high speeds while maintaining safe control, even in the turns. At the oval-shaped track in Kansas City, the banking is 15.5° in the end turns, 5° in the back stretch and 10.5° in the front stretch. It is this varied sloping that posed the greatest challenge for APAC.

Laying a quality mat at the specified thickness-design and mat density according to rigid rideability standards was one of the toughest tasks. Meeting rideability specifications on
A typical highway paving project can be challenging, but are relatively manageable compared to the ones involving a speedway. For example, the specified rideability minimum for this project was to have no more than an accumulated 8-in. deviation per mile of track.

Soon after being awarded the contract, APAC Missouri’s Vice President and Project Manager Patrick Burke started planning how to achieve the paving results which would be acceptable to the owner. He called in the company’s speedway paving expert, David Hay, for some insight.

Hay already had experience in repaving various speedways and paving two new ones. Both Hay and Burke agreed that success in paving this project would be contingent on the selection of paving equipment.

A paving process that sticks
All the hot-mix asphalt (HMA) was mixed in one of the company’s Astec double-barrel continuous mixing plants. The plant’s production capacity is rated at 400 tph, which is a higher capacity than needed since the rate of asphalt mix laid was 160 to 180 tph. For delivering the HMA to the project site from the plant, a fleet of company-owned, tri-axle, 25-ton payload capacity Mack trucks with aluminum dump bodies were used.

A Roadtec SB Shuttle Buggy was selected to head the paving train.
“The Shuttle Buggy MTV (material transfer vehicle) was a very important component in the paving system,” said Burke. “It eliminated some potential problems while transferring the asphalt mix from the trucks to the paver.”

One of those potential problems could have occurred as the asphalt paver laid a mat while traversing the track’s slope. If this happened HMA delivery trucks may have tipped in attempt to dump the mix into the paver. The solution to the problem was to operate the Shuttle Buggy on the level of apron which runs parallel with the track. There, the trucks were able to safely dump the mix into the MTV.

Another set of possible problems eliminated by the MTV was aggregate segregation and uneven temperatures within the mix. This was accomplished through the use of the Shuttle Buggy’s built-in mixing augers designed for remixing the HMA just before it’s conveyed to the paver. Burke pointed out that either aggregate segregation or uneven temperatures in the mix would have had an unfavorable effect on the mat’s quality, including an unacceptable uniform density of the mat and poor surface smoothness after compaction.

With the paver on the slope and the Shuttle Buggy on the level, the HMA was transferred to a second independently operated 30-in. x 45-ft conveyor. This conveyor was mounted onto a Vermeer crawler/trencher that hydraulically positioned the conveyor under the Shuttle Buggy’s conveyor transfer point and over the paver’s hopper. The trenching blade was temporarily removed from the trencher for mounting purposes.

With the track slope up to 15.5°, Burke decided on a Cedarapids Grayhound CR 561 HMA paver. The machine is a 10- to 20-ft-wide capacity paver and features a direct hydraulic crawler drive. Polyurethane pads were mounted onto the steel tracks for maximum traction needed on the slope. The three-point suspension track system spreads the machine’s weight evenly over the footprints of the crawler tracks, which helps ensure a smoother mat.

A crawler-type paver was selected over a wheel-driven model because it afforded greater stability and directional control while operating on the slope.

“A traditional paver would not work well on slopes because it would side slip,” said Hay. “Even the slightest side slipping would have affected the smoothness and ride-ability of the mat.”
Hay’s experience in paving raceway tracks led him to conclude that either steel or polyurethane grousers can be used with good results on track slopes up to 18°.

A Cedarapids CR 361 8-ft Grayhound paver was used for paving a few tight areas near the motor home parking areas. Aside from a few tight spots, the CR 561 was used for all paving done on the project.

Except for the unorthodox 45-ft conveyor/Vermeer component, the other equipment described was not modified.

Ready for training wheels
Selected for breakdown compacting were four Hypac C350 D steel drum compactors. Each compactor weighed

![Two of the problems eliminated by Roadtec’s Shuttle Buggy Material Transfer Vehicle were aggregate segregation and uneven temperatures within the mix.](image-url)
The sub-base was an 8-in. lift of soil-cement. This was followed with three lifts of crushed rock compacted in place for the base. The first was a 4-in. lift of 2.5-in. minus, crushed rock. Next there was a 3-in. lift of 1.5-in. minus, crushed rock and it was topped with a 3-in. lift of 3/4-in. minus, crushed rock.

Three lifts of HMA followed the construction of the base.

The speedway was designed to be 55 ft wide with a 25-ft-wide inside-the-track paved apron. Four to five passes were made for the track and two for the apron.

The mixing temperature of the HMA was 360°F. At the point of delivery to the paver it was 350°F, and it was 330°F during first compaction. Intermediate vibratory compactors came in when the mat was between 230 and 200°F, and cleanup compactors were used when temperatures were below 220°F.

Paving advancement averaged 20 ft per minute. The first two lifts were 2.5 in. thick, and 1,500-1,700 tons of HMA were laid per lift and compacted within eight hours. Paving the final 1.5-in. lift required 980 tons of asphalt mix laid and compacted every five to six hours.

APAC conducted the ride-ability tests using a California-style profilograph which confirmed the final track's surface did not exceed the maximum of 12 in. within the 1.5-mile stretch.

APAC laid and compacted 220,000 tons of HMA. Of that, 33,000 tons was laid on the track.

Hayes said non-articulated steering is better for operating the compactors on the slope because the steering process is less aggressive with the mat. The compactors were operated in a reverse position, with the smaller diameter drive wheel at the rear. The reason for this was to take advantage of the smaller diameter roller in front so the freshly laid mat was not pushed forward by the advancing compactor.

The intermediate and cleanup compactors used were Ingersoll-Rand DD-90 vibratory compactors. These compactors were not modified and used in a conventional manner for compacting the mat.

An unusual specification made by the owner’s engineering firm, HNTB Engineering Co., was the Hypac compactors were not allowed to be stopped on the mat, even for a moment. Further, the compactors could proceed only in a forward direction—they could not be operated back and forth on the mat. HNTB’s concern was mat imprints caused by stopped rollers.

**1-2-3 lifts**

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