USC soil expert Jean-Pierre Bardet helps to solve the drainage problem on the synthetic track at Santa Anita.

By Diane Ainsworth

When Santa Anita unveils its newly surfaced racetrack this weekend, jockeys, trainers, owners and horses will thank soil mechanics expert Jean-Pierre Bardet, chair of the USC Viterbi School of Engineering’s Sonny Astani Department, for coming to the rescue.

Bardet was called in during December to solve a drainage problem on the synthetic track after a heavy rainstorm turned the course into mush.

Collaborating with Australian racetrack builder Ian Pearse, founder and president of Pro-Ride Racing, the pair began experiments on a new additive to make the surface more water repellent and more stable.

Pearse added a polymeric binder that he designed for racetracks in Australia to give surfaces a cushiony texture. The binder replaced wax, which is used in synthetic racetracks all over the world to repel water.

“Santa Anita’s synthetic surface was created from a unique blend of sand, fibers, recycled rubber tread and wax,” Bardet said. “When the track became saturated from rain, the horse-track officials added coarse sand to try to fix the problem, only that made it worse. They thought the sand would add stability – and make the track less mushy – but it didn’t.” So Bardet began testing clumps of the synthetic material in his Kaprielian Hall lab.

Wax, which bonds with sand grains, is a common ingredient in synthetic surfaces because it holds sand grains together and allows water to flow vertically through it. But Bardet discovered that the wax did not properly coat the sand mixture, which was clogging up the base of the racetrack, seven inches below the surface. That base is made of a porous asphalt, but wax can clog and seal it up, like a clogged drain, when it settles to the bottom.

Pearse’s polymeric binder comes as a water-based emulsion that contains billions of micron-sized particles of polymer. When mixed with the sand mixture, the water evaporates and the polymer coats the sand grains. The coated sand displays a new behavior; it repels water and holds together, Bardet said. This binder proved superior to a wax-based mixture because it was able to adhere to and coat the silt.

“When you heat up wax and put it on sand, wax may not always adhere to the sand. They don’t bond,” Bardet said. “But you can mix a liquid emulsion with wet sand. When the water evaporates, the polymer droplets will coat the sand and silt particles and make them water repellent.”

Santa Anita’s racetrack woes go back to 2006, when the California Horse Racing Board mandated that California’s five major racetracks install synthetic surfaces to reduce the number of injuries.
Santa Anita replaced its one-mile course last summer with a springy new surface called “Cushion Track.” The surface was specially designed with a new microcrystalline wax that could withstand the hot temperatures in Southern California. The synthetic surface had enjoyed rave reviews from the press, which claimed it could retain its performance in the presence of temperatures of 110 degrees F or higher.

Four months later, after the first heavy rains in December, Bardet was called in to find a solution to the synthetic material, which had become unstable due to drainage problems. He was put in touch with Pearse, who had been trying to convince professional racetracks to use additives other than wax. Pearse was known for his patented binder; Bardet was known for his work in experimental soil mechanics.

Bardet spent most of the December holidays in his lab, hunched over buckets of the problematic synthetic material, measuring its permeability under various conditions to understand why waxed materials had failed in unexplained ways.

He added more wax, temporarily improved permeability and each time noticed that wax had clogged the drainage of his testing equipment. He filled up countless Petri dishes of the material, then poured water over the samples, one at a time, to see how well the water drained through. When he replaced wax with Pearse’s liquid polymer, he noticed encouraging results.

“Finally, we got a better binder than wax. It adhered quite well to the sand as well as silt,” he said.

Work began on Feb. 6 to resurface the racetrack with the polymeric binder, which is manufactured in the United States. The surface was leveled uniformly to correct all the numerous alterations it had gone through as crews tried to keep it operational under adverse conditions.

The upgrade may not be a permanent solution, Bardet said, but it will solve the problem temporarily without interrupting the current spring meet.

Bardet, Pearse and racetrack officials will reassess the situation after April 20 to determine how well the modified surface has held up. Until then, it’s business as usual. Nothing will be noticeably different, aside from the racetrack’s slightly darker color.