Establish Perfect Rolling Patterns for Bonus-Quality Mats

Rollers greatly impact your pay factor, partly because they’re the last piece of the paving train to touch the mat. The warranty, bonus and penalty prices you see at the end of a project depend on what the rollers in your paving train accomplish during the project. If your rolling pattern is not appropriate for the thickness and design of the mix, if your temperature sensors are off, or if your roller operators aren’t fully trained and comfortable on their machines, you minimize your chances of meeting spec.

Temperature, equipment, operator knowledge factor into a successful compaction equation

Temperature determines breakdown parameters

Another variable in achieving density, and one that defines the breakdown phase of compaction, is temperature. Some industry representatives hesitate to provide temperature boundaries for fear contractors may hold those measurements in too high esteem. Others readily voice opinions on temperature ranges within which breakdown compaction should occur.

Dale Starry, product and service manager for Ingersoll-Rand, Shippensburg, PA, states what most industry representatives believe: “Breakdown rolling must begin at the highest temperature possible without excessive shoving or rutting of the mix” Starry’s specific temperature suggestions depend on mix type. For instance, he mentions Superpave and Stone Matrix Asphalt (SMA) mixes. “SMA and Superpave designs require material to be compacted at high temperatures, 260° to 280°F (127° - 138° C) or higher,” says Starry, “with breakdown rollers staying close to the paver.”

Dick Draper, vice president/general manager of Sakai America, Inc., New Castle, Delaware, likes to see the breakdown roller hit the Superpave mat when its temperature is up around 300° F (149° C). “We (Sakai) advocate that you really need to get onto the mat while it’s hot in order to be able to align the aggregate and get breakdown accomplished quickly,” says Draper. He describes the basic concept behind breakdown rolling when the mat is at its hottest. “I like to refer to it as if you’re building a pillar or a piling underneath the road. You get all the aggregate locked together. If you can get on it while it’s hot, the aggregate is easier to move. The binder is of a more liquid form, and you can then squeeze the air out of it and get everything to align.”

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According to Chuck Deahl of Compaction America Inc., Kewanee, Illinois, each contractor should strive to establish ideal temperatures to establish his or her own breakdown rolling zone. Luckily, roller operators have tools at their disposal to help delineate that area. “On some of these temperature systems today, you can program in the ideal high and low temperatures,” he explains. “Let’s say the ideal rolling temperature on a given mix is up to 290°F (121°C) mat surface temperature. When the roller operator hits an area with a mat surface temperature of 250°F (121°C), a warning light goes off and warns him that he’s at that temperature.”

One such system, from TransTech Systems Inc., Schenectady, NY, flashes a warning when roller operators have strayed onto a section of the mat that is too cool or too hot. Jaret Morse, production and technical service manager for TransTech, explains that, while the temperature range will vary, the temperature sensor can be programmed to “watch for” those specific ranges. “The roller operator has the ability to set the higher limit and the lower limit,” says Morse. “If the mat surface temperature exceeds the high limit, (the sensor) will flash at him on the display and let him know that he can’t be on the mat then. The temperature is still too high.” Morse states that the same warning flashes if the roller strays onto the mat with too cool of a surface temperature. “If the operator’s lagging and the temperature of the mat cooled too greatly, and he’s supposed to be off of it, (the sensor) will do the same thing.”

Back in the old days, according to John Ball, proprietor of Top Quality Paving and Training, Manchester, NH, crew members would put their
hands on the mat to feel if it was warm or cold. “Those days are over,” he says. “We need temperature guns out there to know what the temperature of the material is.”

Whatever temperature sensing devices a roller operator has at his or her disposal, setting the appropriate temperature ranges is critical. The suggestions offered here should be taken with mat thickness, mix design, ambient temperature and many more variables in mind.

“I’ve seen mistakes that have come up as a result of people trying to (use) generic guides for temperature,” says Kevin Mann, civil engineering compaction applications for Caterpillar Paving Products Inc., Champlin, MN. “Even the asphalt cement (AC) suppliers will say that different cements require different temperatures. The asphalt plant operator will say that different mixes are mixed at different temperatures, so they should be compacted at different temperatures.” But Mann does offer hope to contractors looking for guidance. “As long as contractors have some means of measuring temperature and density at the same time, they can map out density of the breakdown roller and the finish roller, and pretty much define what temperatures are best for them to roll in.”

The “map” is generated from a test strip, which lets the paving crew experiment with the new mix design. Not every project allows the time or money necessary to perform a test strip, but the strip gives you an advantage over crews that begin without it. Placing a test strip is nothing more than setting up the construction scene and carrying out a pass with the new mix. This allows roller operators to decide on, and adjust, their vibrating force, travel speed, number of passes, etc. before they do the “real thing.” Deciding which machines to use, and in what manner to use them, after assessing the test strip, can make or break a project.

“The above article is part of a feature entitled “Roller Showcase” which appeared in the November 2001 issue of Asphalt Contractor. Reprinted with permission of Asphalt Contractor. Our thanks to Sandy Lender, Editor.”
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