Streaks in Polished Concrete Slab

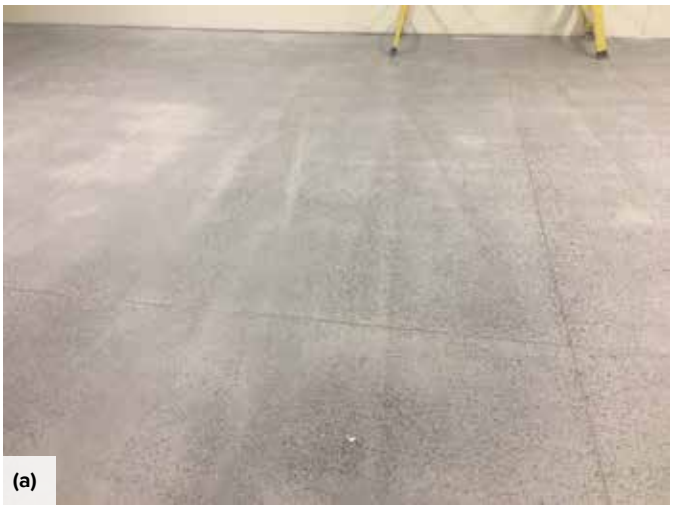
Q. *Our company was the concrete subcontractor for a small slab (5000 ft² [465 m²]). A second subcontractor polished the slab after we left the jobsite. The specification called for a flatness* F-*number (*F_F*) of 25, so we placed the slab using a wheel-mounted laser-guided screed. The general contractor didn't have the slab measured for* F-*numbers; however, we're confident that we met the specification. We have been notified that the owner has rejected the slab, citing cream streaks that became visible during the polishing process. The general contractor is looking for an answer as to what caused the streaks. What can we tell the general contractor and owner?*

A. Polishing operations abrade the upper surface of the slab and will expose mortar-rich zones (cream spots or streaks) if the coarse aggregate in the concrete mixture is not uniformly distributed. Such zones are usually the result of construction activities that occurred during concrete placement and finishing.

For example, cream spots caused by workers walking in the fresh concrete will resemble footprints. Streaks caused by movement of wheel-mounted equipment will generally appear as long parallel streaks with a consistent spacing matching the equipment wheel base. A combination of surface vibration and top reinforcement can also cause cream streaks, as vibration causes coarse aggregate particles to roll away from the bar. If this is the case, the spacing of the streaks will roughly match the bar spacing in one or both directions.

In your case, it appears that the laser-guided screed was a primary contributor to the streaking. If a vibrating screed is moved at a steady rate across a slab, the aggregate will generally be displaced a consistent depth and the cream (paste) will be brought to the top uniformly. However, the aggregate won't be uniformly distributed at locations where the vibrating head first contacts the concrete surface (touchdown locations) or where the head was stopped or slowed.

If streaks are the result of a vibrating screed, then the length of the cream streaks should roughly match the head length and width on the screed. Larger laser-guided screeds tend to follow a movement pattern that results in nonrandom cream locations. Smaller laser-guided screeds can be rotated and could result in random cream locations; however, the cream locations will still correlate with the vibrating head size.



Cream (paste) streaks in a polished concrete slab placed with wheel-mounted laser-guided screed: (a) general view; and (b) a close-up

Photos included in this Q&A show cream streaks that are not consistent with reinforcing bar spacing, footprints, or tire locations. The cream streaks appear to be the size of a vibrating head for a smaller laser-guided screed, as the locations are not consistent. It also appears that short pulls were made with multiple touchdowns or that the position of the vibrating head was paused while concrete was raked or pushed to an appropriate height.

To minimize the appearance of cream streaks like those shown in the photos, the polisher will need to grind deeper to expose the aggregate beneath the cream. This will require more grinding than planned by the polisher. Also, because the aggregate color will become more dominant, it may result in an appearance that the owner finds unacceptable.

In general, cream streaks from a laser-guided screed can be minimized with soft touchdowns and consistent pulls. Head variables such as angle of attack, vibration frequency, and intensity can also affect performance, so consider contacting your screed manufacturer for more information regarding equipment settings and operation when concrete is to be polished.

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