The Concept of a Semi-Rigid Floor Joint Filler

Forward

The June 1978 issue of *Concrete Construction* magazine featured Steve Metzger's article titled *"The Concept of Semi-Rigid Joint Sealants."* The premise of the article was that the sealants in use at that time were no longer appropriate to accommodate the changes taking place in the material handling industry. Steve advocated that a new type of filler, a semi-rigid epoxy, was needed. Within one year, both the American Concrete Institute (ACI) and the Portland Cement Association (PCA) endorsed Steve's concept and made semi-rigid epoxy joint filler the recommended treatment for joints in industrial concrete floors.

Much has changed since then, in both the construction and the material handling industries. The 8am-4pm, 5 day a week warehouse of 1978 has now evolved into the 24/7 distribution center. The conventional forklift with pneumatic tires has been replaced by hard wheeled pallet jacks, stacker/pickers and turret trucks. The term "ioint sealant" has been replaced with the term "joint filler." Semi-rigid epoxies have been joined by semi-rigid polyureas. But the semi-rigid filler concept established by Steve in 1978 remains the basis for current ACI and PCA guidelines for floor joint protection.

The Evolution of Today's Joint Filler

In the 1940's and 50's floor joints were typically left open or filled with an asphalt-type material. If the floor was to be subjected to heavy traffic, the joints might be filled with either molten lead or lead strips. In the 1960's, flexible polyurethane sealants became the most common floor joint treatment. But the introduction of the hard-wheeled pallet jack made the soft polyurethanes inadequate for joint edge protection.

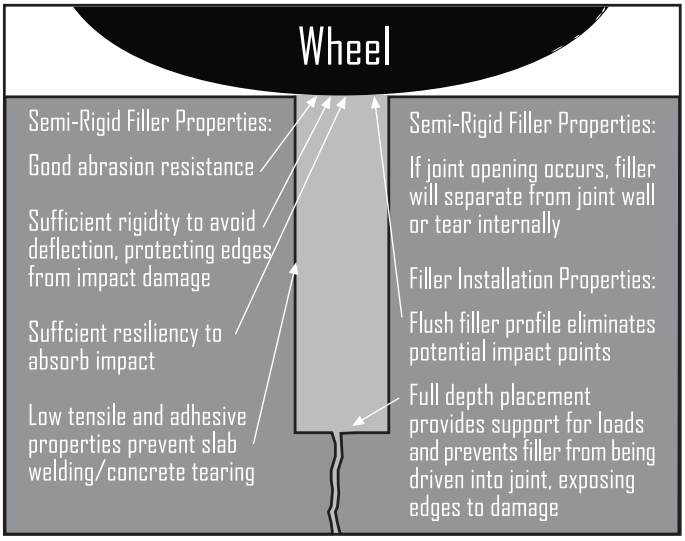
Polyurethane sealants were designed to expand and contract, and thus had to be flexible. But when the 4" diameter hard wheel of a pallet jack crossed a floor joint, the relatively soft polyurethane deflected under the load, allowing the wheel to impact the top of the joint edge. The joint edge quickly eroded, a process called spalling. Once spalling became a common occurrence, the construction industry overcompensated by switching to rigid epoxies. While these materials provided joint edge protection, they also welded the slab panels together. When the slabs began their normal shrinkage process, the high-strength epoxies would not yield, restraining the shrinkage-induced opening of the joint and causing the slab panels to crack internally.

The Concept of Semi-Rigid Joint Fillers

At this time (the mid 1960's) Steve was a major caulking/sealant contractor in the Chicago area. Recognizing that neither soft polyurethanes nor high-strength epoxies were the answer, he set out to develop a filler designed specifically for joints in industrial floors subject to hard wheeled traffic. He immediately recognized that a sealant/filler could not be both flexible and traffic-supporting at the same time, so one characteristic would have to be sacrificed. He decided to forgo expansion capability and focus on providing load support and joint edge protection.

Field tests indicated that a minimum hardness of Shore A80 was needed to support the newer material handling vehicles. This hardness is comparable to a hard rubber. But he also needed to ensure that the new material would not weld slab panels together. This feature could be achieved by having a filler with relatively low adhesive and tensile strengths. He began to formulate a series of flexibilized, or "semi-rigid" epoxies and for three years field tested them on industrial floors in the Midwest. The product that came out of this extensive testing was named **MM-80**, the "80" representing the product's original hardness of Shore A80.

The original concept of a semi-rigid filler, epoxy or polyurea, is shown on the drawing below. The only aspect that has changed over the years is that *Metzger/McGuire* has raised the relative hardness of **MM-80** and its other floor joint fillers to accommodate the ever increasing demands of point-loading and traffic frequency imposed by today's material handling vehicles.



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