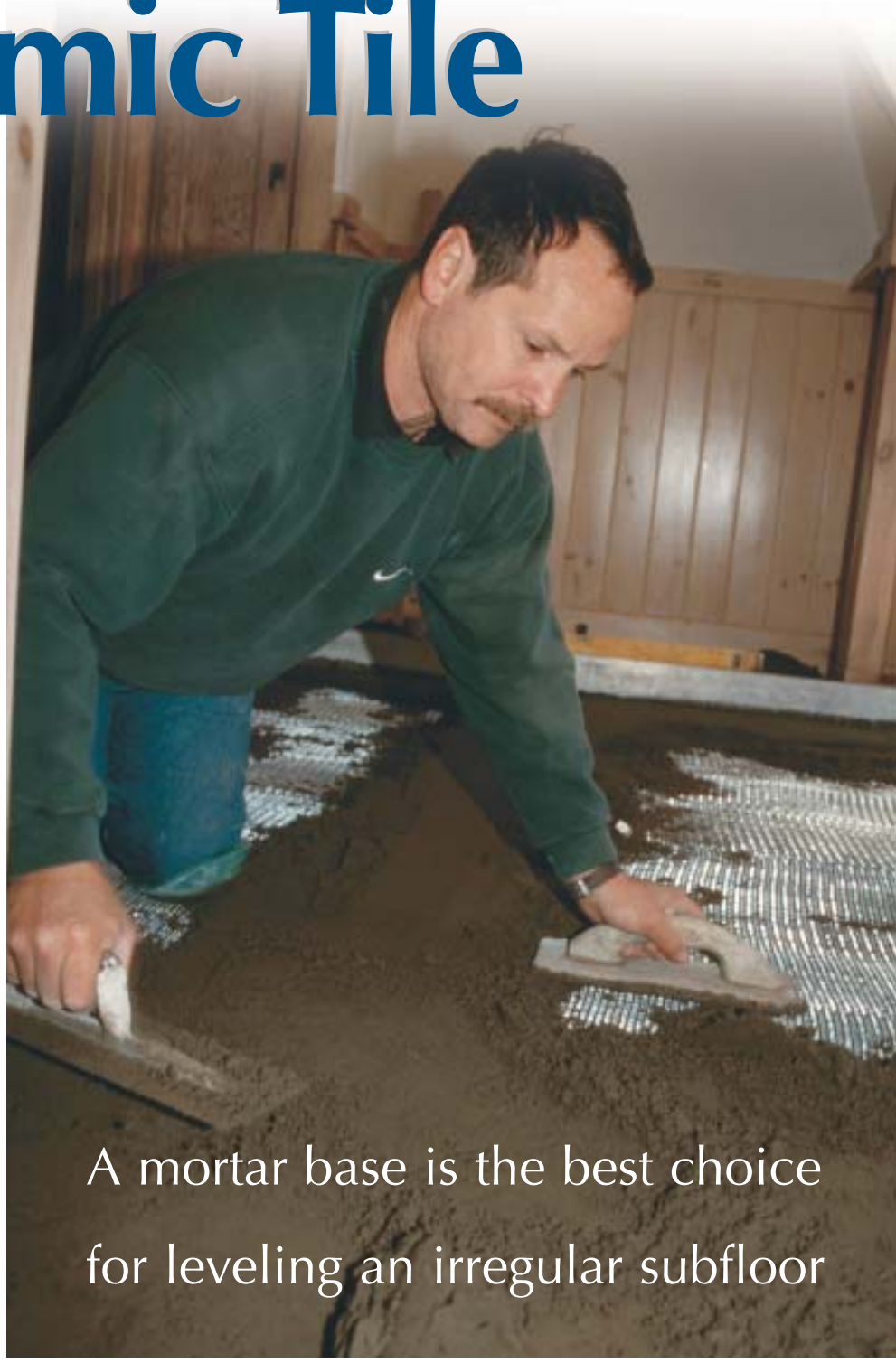
FLOATING A Mud Bed FOR Ceramic Tile



Thirty years ago, when I started working with my father as a tile and stone installer, every floor that we installed was a

by Tom Meehan

mud job. Typically, it consisted of a layer of tarpaper followed by galvanized wire mesh nailed over the subfloor, and then a minimum 3/4-inch-thick layer of concrete. Needless to say, it was a great deal of work, but that's the way it was done then. Some of the floors were quite large, and sometimes the concrete was a good 2 inches thick. All that mixing, buggy lugging, floating, and screeding, and all those hours kneeling and pushing around wet cement, explains why many of the old-timers have bad knees.

Today, new, advanced products such as latex-modified thinsets, latex additives, grouts, epoxies, and cement backerboards have radically changed the tile industry. Even so, debate continues on the merits of a full mud job versus thinset over plywood or backerboard. The bottom line is that both methods have their place.

A Call for Mud

We recently completed a project that provides a good example of an application that calls for a good old mud job.

Figure 1. Although structurally suitable for tiling, this diagonally laid plank subfloor presented irregularities in plane that would telegraph through plywood underlayment and interfere with tile placement. A mortar base, or mud job, evens out the high and low spots, making an ideal tile bed.

The existing, linoleum-topped kitchen floor showed both water damage and rot from a long-term dishwasher leak. The first thing we did was remove the linoleum and plywood underlayment, stripping the floor down to the subfloor. The subfloor consisted of diagonal wood planking and, much to our surprise, was in very good shape (see Figure 1). But because the house itself was over a hundred years old, I had two other concerns.

Dips and rolls. First, I had to determine whether the floor was on a flat, even plane. It wouldn't matter if the floor was out of level, but crowns and valleys would prevent a larger tile from sitting flat. I checked the floor with a long straightedge and discovered plenty of dips and rolls. Eliminating the highs and lows wouldn't be difficult with a mud job. With mud, I could cover the crowns with an inch of concrete, add more to fill in the valleys, and bring the entire floor into a flat, if not truly level, plane. The common alternative, a layer of plywood underlayment, would preserve the irregularity of the subfloor.

Bounce. The other concern was deflection. A simple walk across the floor proved that the 2x8 floor joists were too springy to support an inflexible tile surface. With the owner's approval, we added a perpendicular, double 2x8 girder under the joists, supported on steel lally columns, to stiffen the floor system. Had the floor been larger than its modest 120 square feet, I'd have deferred to a builder to correct the framing.

Properly installing a mud job requires experience, especially when the floor exceeds 125 to 150 square feet. Achieving a true flat plane comes with plenty of practice.

Figure 2. After covering the floor with 15-pound asphalt felt to retain curing moisture in the mud bed, the author staples reinforcing galvanized wire mesh over the entire surface.

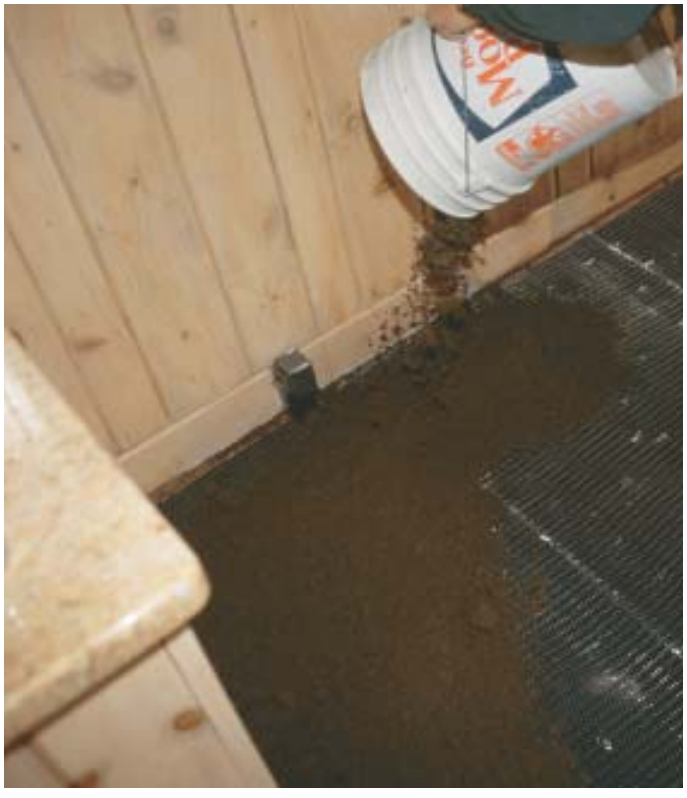


Figure 3. The mud mix, or "screed" — a combination of Portland cement, sand, and water — is mixed fairly dry, so that it holds its shape when compressed (above). The mix is first dumped around the perimeter of the room to establish screeding points for leveling the general floor area (right).

Floor Prep

To prepare a floor, we pick out all the old underlayment nails and sweep up all loose debris. Renailing the subfloor planks provides extra insurance against squeaks underfoot, although the weight of the mud and tile suppresses board movement. Over the cleaned floorboards, we lay a single layer of 15-pound asphalt felt paper. It's important to overlap successive sheets by at least an inch. The felt not only prevents the mud from slipping between the subfloor cracks, but also serves as a bond breaker, or isolation membrane, between the wood and the concrete, allowing them to expand and contract independently. Most important, the felt prevents the wood subfloor from drawing water from the mix and weakening the cure.

Wire mesh. The next step is to lay down reinforcing galvanized expanded wire lath, or mesh (Figure 2, previous page), which bonds with the concrete to control cracking and form a contiguous slab. I use AMICO's 1/4-inch-aperture, #20 expanded metal (AMICO, Birmingham, Ala.; 800/366-2642, www.amico-online.com). It comes in 28-inch by 8-foot sheets, ten sheets to the bundle. The strands and bonds of the mesh stand at a sharp angle to the original plane of the metal sheet for positive embedment in the concrete. To cut the mesh, I use a good-quality pair of wire shears — they're faster than tin snips and more accurate. The mesh should overlap about an inch for continuity.

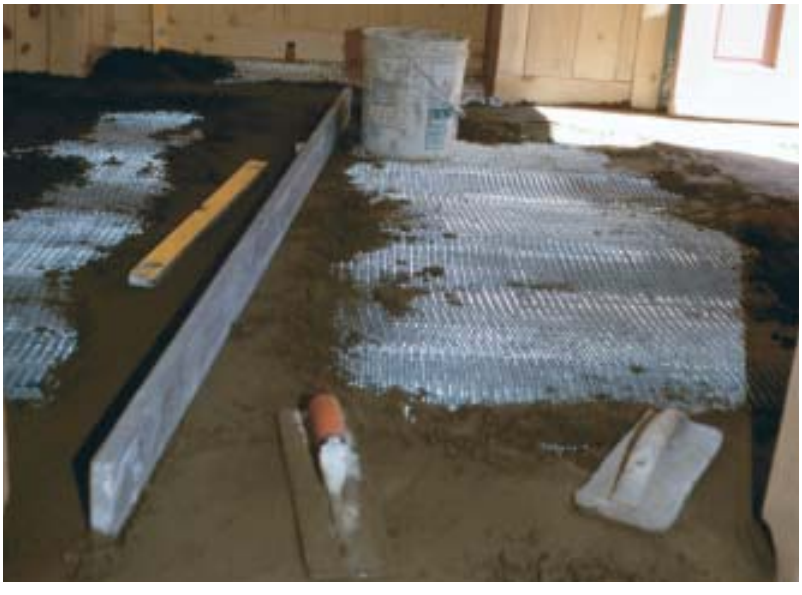
Once the mesh is fully laid, I secure it to the subfloor with 1/2-inch staples. It's important to fasten from the middle of the sheet outward to avoid bulging and rippling the wire. I also make a point of nailing all the overlapping seams tight with 1 1/4-inch roofing nails.

Just an Old-Fashioned Mud Job

What I've been calling mud is actually a combination of Portland cement and sand. I use a 4:1 sand-to-cement ratio. This type of mud is called screed, hence the expression "screeding a floor" for installing a mud job. I usually mix the screed in a large mixing box, using a shovel and hoe. Each batch of mud takes about 25 shovelfuls of sand, a full bag of Portland cement, and roughly 5 gallons of water (depending on the dryness of the sand). The mix should be rather dry, so that it will just compact in your hand and hold its form when released (Figure 3). Adding too much water makes the batch difficult to level and makes a mess of the floor. I first blend the dry materials with the mixing hoe, then gradually add the water, a little at a time to control the consistency. Once the mud is mixed, we dump it around the room in 5-gallon bucket loads.

Setting the boss line. First, we load the perimeter of the room, piling it about 8 inches deep. This allows me to establish a heavy border that I can pack down to set up screeds, or leveling points. The screeds provide points of reference for leveling and straightening the full border and, subsequently, the height, level, and plane of the entire floor. This kitchen had openings into a hallway and an adjacent dining room, as well as an exterior entry, all critical locations to get the flooring thickness right so that room transitions would be

Figure 4. The primary "boss line" of screed establishes the mud bed level between critical points — in this case opposing door openings (left). Subordinate lines are then extended and leveled to establish the overall floor plane (below).



smooth and doors wouldn't bind on the finished floor.

Using a wood float in one hand, a steel trowel in the other, and firm hand pressure, I packed the mud to uniform height at the hallway opening and the opposing entry door, roughly equal to the 3/4-inch thickness of the adjacent hardwood flooring (Figure 4). (Oak saddles, temporarily removed for the job, would disguise the difference in plane between the hardwood and finished tile floors. Note that the Tile Council of America recommends a 1 1/2- to 2-inch depth for a mud base on floors much larger than 100 square feet. On smaller floors such as this one, however, a 3/4-inch depth is acceptable.)

Then I slid my straightedge back and forth from door to opening to form a flat, 6- to 8-inch-wide, continuous "track" between points. This track became the "boss line" that determined the overall thickness of the mud base in the entire room. I made additional screed lines, using both the straightedge and a level, extending from the boss line in both directions, to the perimeter walls. This broke the floor up into fillable segments and established its general plane. Due to the permanent, preexisting sag in the old joists, this floor was higher at its perimeter than its center, making the mix thicker in the middle of the floor.

Floating the floor. After the screed lines are set comes the fun part: floating the floor. In each corner, I dump a bucket of mud, spread it high, and fan it out, filling the corner toward the center of the room. I use the trowel and float to pack the cement down good and hard as I go. The packed mud is a little higher than the screed lines, so I use shorter straightedges to scrape the level down. Sliding the straightedge back and forth across screed lines levels the floor equally. After leveling each area, I use the wood float to smooth out the floor, taking out irregularities and bumps and filling small voids. I follow the wood float with the steel trowel to give the floor a tight, smooth finish. This process is made easier when I use the wood float in my left hand and the steel trowel in my right, to provide balance as I lean over the floor (Figure 5).

Figure 5. The author floats the floor by adding mix between lines and leveling it with a straightedge. The mud is packed and floated in one two-fisted action: A wood trowel levels and fills the base, followed by a steel float for a smooth finish.

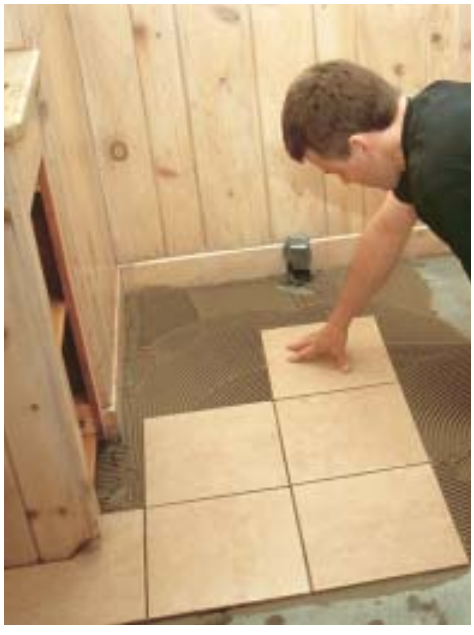


Figure 6. After curing for 48 hours, the mud base is ready for a standard tile installation. The author uses latex-modified thinset to adhere the tile.

The beauty of the mud job process is that, once you set your screeds and outside borders, all the irregularities of the subfloor are covered as flat and even as if the tide just came in. This result would be extremely difficult to achieve by any other method. The floor is quite solid by the following day, and even more so after 48 hours.

To prevent the concrete from drying too quickly in hot weather, weakening the final product, I cover the concrete with plastic sheeting immediately after the final troweling. The sheeting retains the moisture, allowing the concrete to cure more slowly and thus become much harder. Once the concrete is set, tile installation follows standard procedure (Figure 6). Latex-modified thinset isn't a must over a mud base, but it's always the strongest way to go.

I use new, current tile-setting products and methods every day in the course of my work, and enjoy their ease and quality. But all of the floors in my house are installed on an old-fashioned mud job.

Tom Meehan *owns and operates Cape Cod Tile Works with his wife, Lane, in Harwich, Mass.*