BY MARK PARLEE

Tracing a Troublesome Window Leak

Last fall, I was hired by a builder to consult about a window leak on a home he had completed only two years earlier. The owner of this home, in Slater, Iowa, had called him back because a small section of the interior MDF trim had swollen, and the paint cracked just below one of the mullions **(1, 2)**. When I inserted a moisture-meter probe just below the mullion, it registered an elevated moisture content. Taking things slowly, so as not to create too much of a mess for the homeowner all at once, I asked the builder to start by removing the exterior trim. I returned later to investigate.

On my return visit, we observed a slight opening on top of the window at the mullion where two windows joined—a clear point of water entry **(3)**. The other mullion in the three-window array had been sealed all the way to the nail fin, and there was no visible swelling on the interior.

The exact path of the leak to the interior still wasn't clear until the builder removed the interior trim. On a third visit, I conducted a light water-spray test with a simple pump sprayer and observed water dripping at the base of the window almost immediately. During the test, I directed the spray at the mullions, starting about 6 inches above the sill, moving about halfway up the window, and then proceeding to the top—at all three locations, water leaks became evident.

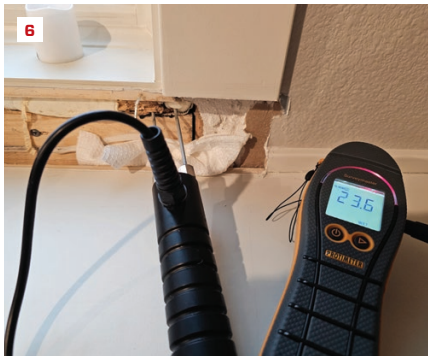
Working from the interior after spraying the mullions, I used a moisture meter to map the moisture content along the entire base of the window. The moisture content was highest at the location of the failing interior trim (44% MC) and was elevated (around 24% MC) at locations at or near shims. Between shims along the sill, the moisture content remained within the range of normal (below 16% MC). Clearly, the shims were part of the problem, but that was not all.

The builder told me that Pella service had looked at the window and reported everything was fine. I had a different outlook. The following is my assessment of the window installation:

Sill flashing. Pella allows use of DuPont flashing tapes, and the builder had used DuPont StraightFlash to form a sill pan. This was not an outright failure, but I recommend using DuPont's FlexWrap tape at the sill because I believe the channels in the flexible tape help to direct water to the exterior (in addition to FlexWrap's being easier to form a tight seal at corners).

Photos by Mark Parlee

The author was called to investigate what the builder believed was a window leak that caused the interior MDF sill trim to expand and the paint to crack near one mullion **(1)**. From the exterior, there were no apparent leaks **(2)**. It's worth noting that splash back from roof runoff was an unlikely contributor to the problem, as this house has a functional gutter system.



Once the exterior window trim was removed, the author observed a slight gap above one mullion **(3)**. Some silicone sealant had been used here, but it did not fully seal the gap. With the interior trim removed, the author conducted a light water test **(4)**. Then, using a moisture meter, he mapped the moisture content (MC) along the bottom of the window. The MC was highest (44%) below the gap in the mullion **(5)** and was elevated wherever there were wood shims **(6)**. The author used a flat bar to push a folded piece of paper towel to the exterior **(7)** during the water test, and it came out sopping **(8)**.

Fin flashing. Pella specifies that the window flashing tape should cover the nail fin and bend at a right angle onto the edge of the window frame. That was not done on this window.

Sealed trim. The exterior trim is supposed to be installed with a 3/8-inch gap around the window frame for backer rod and sealant. Instead, the trim was installed tight to the window frame without sealant.

Interior seal. The interior gap between the window frame and rough opening should be sealed with expanding foam or backer rod and sealant. When expanding foam is used, the window manufacturer does not want the installer to fill the entire jamb space. Instead, space should be left open to provide a path for incidental moisture to drain to the exterior. This window was not sealed with foam, leaving the gap, which performed appropriately.

Window shims. The window was set on wood shims, as it should be. However, the shims were pushed out all the way to the metal nail fin. During the water test, we could see water running down the interior side of the nail fin, and it was evident that the shims were wicking moisture along their length to the interior, and this water saturated the interior trim. The shims effectively compromised the drainage gap around the window and interrupted the path for water to drain to the exterior. Instead of draining down and out, as it should, the water was able to flow to the interior by wicking through the wood shims.

For preventing the shims from short-circuiting the water drainage, I recommend using composite shims, which are impervious to water. Make sure they are installed so they do not touch the window's nail fin. In addition, it's important to hold the shims back from the interior. This will maintain an even space around the entire window perimeter so the window installer can include continuous backer rod and sealant. This tight seal is important as both a water seal and an air seal; neither function can be realized when the seal is interrupted by shims.

Mark Parlee started as a siding contractor, and grew Parlee Builders into a remodeling and new home construction firm in Urbandale, Iowa. He has parlayed his expertise into building-envelope consulting. Learn more about him at thebuildingconsultant.com.