HOW PLASTERING AFFECTS THE MOISTURE CONTENT OF STRUCTURAL AND FINISH WOODWORK

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HOW PLASTERING AFFECTS THE MOISTURE CONTENT OF STRUCTURAL AND FINISH WOODWORK[1]

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During the plastering operation a large amount of water is brought into the building under construction. Most of this water evaporates from the plaster directly into the air and escapes from the building through open doors and windows, but some is absorbed by the studs, joist, and other wood members. Under favorable conditions of drying the moisture evaporates rapidly from the plaster, so that a week after the last coat is applied the wood trim and finish might be applied insofar as the condition of the plaster itself is concerned. The plaster, however, is actually drier than the wood grounds and the door and window jambs against which the trim will be placed, and it is the moisture content of such wood items, rather than of the plaster, that should be used as a criterion for determining when it is safe to install the interior finish.

Tests Show Effects

In the summer of 1930 tests were conducted by the Forest Products Laboratory in a frame dwelling in Madison, Wisconsin, to determine the moisture content of various lumber items during the construction period. The effect of the plastering operation on the moisture content of various rough-lumber items is illustrated in figure 1. The joist and studs were of air-dried material, and the record shows that late in May these items were affected by a period of low humidity, during which the studs dropped to 14 percent moisture content. During a wet spell early in June, just before lathing, the same items picked up to about 18 percent moisture content.

Green wood laths were applied, but the grounds were of kiln-dried material. The first coat of plaster had a marked effect upon the lath, grounds, lower plate, and studs, but little effect upon the joist. In the week between the first and second coats of plaster, the lath dried considerably,

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[1] Published in American Lumberman, December 22, 1934.

[2] Maintained at Madison, Wis., in cooperation with the University of Wisconsin.

but regained almost all of the loss from the second coat. The other items dried but little between coats and were not materially affected by the second coat. The lower plates picked up from the two coats about 10 percent more moisture than the studs and upper plates and subsequently dried out rather slowly. The extra moisture was undoubtedly taken up from the plaster that passed through the lath and dropped off in the space within the wall. Both the thick deposit of plaster and the subsequent installation of the baseboard would tend to hold the moisture in the lower plates and thus account for their slower redrying in comparison to that of the studs and upper plates.

Tests made on the plaster 10 days after application of the final coat indicated the presence of about 2 percent moisture. As no interior finish was installed for at least a week after the plastering was completed, the plaster itself could not have added moisture to the finish. The slower-drying items of wood, however, could have contributed to moisture gain wherever the finish covered it. This applies particularly to the base, most of which was placed about the middle of July, when the moisture content of the lower plate (fig. 1) averaged about 16 percent. During the following heating season some shrinkage developed in the base. Moisture tests on the base before installation indicated about 7 percent, which was quite satisfactory, but the shrinkage showed conclusively that there had been a marked moisture pick-up after installation. The evidence clearly pointed to the lower plate assembly as the source of the trouble.

Wood lath have been largely supplanted by other lathing materials, such as gypsum and fiberboard, that are applied in relatively large units. Since little or no plaster will be forced through the joints in these materials to fall on the lower plate, as occurs when wood lath are used, the influence of the plastering operation on the moisture content of this plate will be correspondingly reduced. Since no plaster comes in contact with the studs and plates where sheet materials are used for lathing, there should be less moisture absorption by these members from the plastering operation. On the other hand, these lathing materials are permeable to vapor, and it is to be expected that the wetting of the lath by the plaster will result in some moisture gain in the framing members, although presumably less than if wood lath were used.

Ventilate After First Coat

The atmospheric conditions in this house as they applied to the drying of plaster and wood members may be considered typical or average for summer-built houses, particularly north of the Ohio River. During damp or cold weather the drying would be correspondingly retarded, and if the plaster dried slowly, there would be all the more opportunity for moisture to be absorbed by the wood. Adequate ventilation should, of course, be provided at all times of the year, as the evaporated moisture is air-borne and a large amount of air is required to carry away the amount of water involved. During cold weather, when the heating system or portable heaters are used to prevent freezing of plaster and to hasten its drying, the windows should be properly adjusted to allow the escape of the evaporated moisture. Even in the coldest weather the windows on the leeward side of the house should be opened 2 or 3 inches, preferably from the top. The maximum amount of ventilation is required immediately following fresh coats of plaster. After the bulk of the water has been evaporated, the amount of ventilation can be reduced to permit higher temperatures.

The use of heat in houses during the plastering operation should not be considered only as a means of preventing freezing of the plaster. It has several other equally important functions, particularly when the temperatures maintained are adequate. It hastens the drying of the plaster, of green masonry, and of the moisture absorbed in the wood frame and sheathing, and thus prepares the building properly for the interior wood finish and for the painting and varnishing operations.

To Avoid Paint Blistering

Inadequate ventilation and heating of freshly plastered houses are among the most common causes of paint blistering on outside finish and siding of houses not provided with vapor barriers. In such cases, the moisture from the inside passes through the sheathing and siding, collects under the paint film, and so separates the paint from the wood that sooner or later the paint peels or flakes off and leaves bare wood exposed. Plastering conditions that promote paint blistering are present when the outside temperatures are lower than the dew point of air at the temperature and relative humidity prevailing inside the house. Such conditions are more likely to occur during relatively cold weather in the spring and fall and during the winter than during warm summer months. If the humidity inside is nearly 100 percent, a comparatively small drop in temperature suffices to start condensation in the walls. Nearly saturated air takes up moisture very slowly, and because of the colder conditions outside the moisture moves toward the colder surfaces and eventually collects below the paint film.

To minimize this condition the inside temperatures must be high enough to reduce the humidity sufficiently for the air to absorb moisture effectively. The air escaping by the method of ventilation provided carries away the evaporated moisture, and the humidity of the fresh air that is admitted is lowered by the higher inside temperatures to provide dry air to continue the process. Evaporation consumes heat; hence, if the outside temperatures are low, practically all of the heat must be supplied artificially. When the plaster is fresh and evaporation rapid, it may be difficult to keep the inside temperatures up during very cold weather. Even so, the windows must not be closed, because adequate ventilation is essential at this stage of the drying. As the plaster dries and less heat is consumed by evaporation, the inside temperatures should be raised to 60 degrees or higher to reduce the humidity and to improve the drying conditions.

Vapor barriers, although installed primarily as protection against cold-weather condensation in the occupied house, also provide the most practical method of presenting condensation in the walls during the plastering operation. A vapor barrier may be defined as a membrane, coated surface, or type of material having high resistance to vapor transmission, so installed in walls, ceilings, or floors separating heated from unheated spaces as to prevent or restrict the passage of vapor from the warm towards the cold surface. In walls, the vapor barrier is commonly an asphalt-coated paper fastened to the interior face of the studs below the lath or wall-covering material. Some types of lath and some insulating materials have integral vapor barriers.[3]

The difficulties in drying plaster properly are greatest when the outside temperatures are near or below freezing, but during prolonged periods of cold or damp weather, even when the outside temperature is considerably above freezing, plaster may dry so slowly that it will be necessary to provide heat to produce evaporation. In such cases it is desirable to follow the heating practice for colder weather, as above described.

A Hint on Back Painting

Back painting of the trim to protect it from moisture absorption is a relatively common practice. Although this idea has merit, the methods generally used are relatively ineffective. Back painting tends to cause false security in the assumption that the protection offered permits the erection of the trim before the walls are sufficiently dry. A thin coat of lead and oil offers so little resistance to the penetration of moisture that, when used for back painting, it is essentially a waste of time and money. A coat of inexpensive varnish or of asphaltic paint is more effective and, because of the protection it affords against unequal absorption of moisture on opposite faces, is of particular value when the interior trim receives part of the finishing before delivery. Another procedure more effective than back painting is to treat the trim with a water-repellent preservative, which does particularly well on the end grain of pieces where most coatings are ineffective, and which also furnishes some protection against blue stain and decay. There is no practical method of back painting, however, that will protect the dry wood finish against moisture absorption when placed against damp wood or plaster.

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[3]Forest Products Laboratory Report No. R1196, "Condensation Problems in Modern Buildings," by L. V. Teesdale. 1941.

Figure 1.--Curves showing the moisture content of framing members of the house before plastering, as affected by the plastering operation, and as affected by subsequent drying following plastering. Average outdoor temperatures and relative humidities are also shown.

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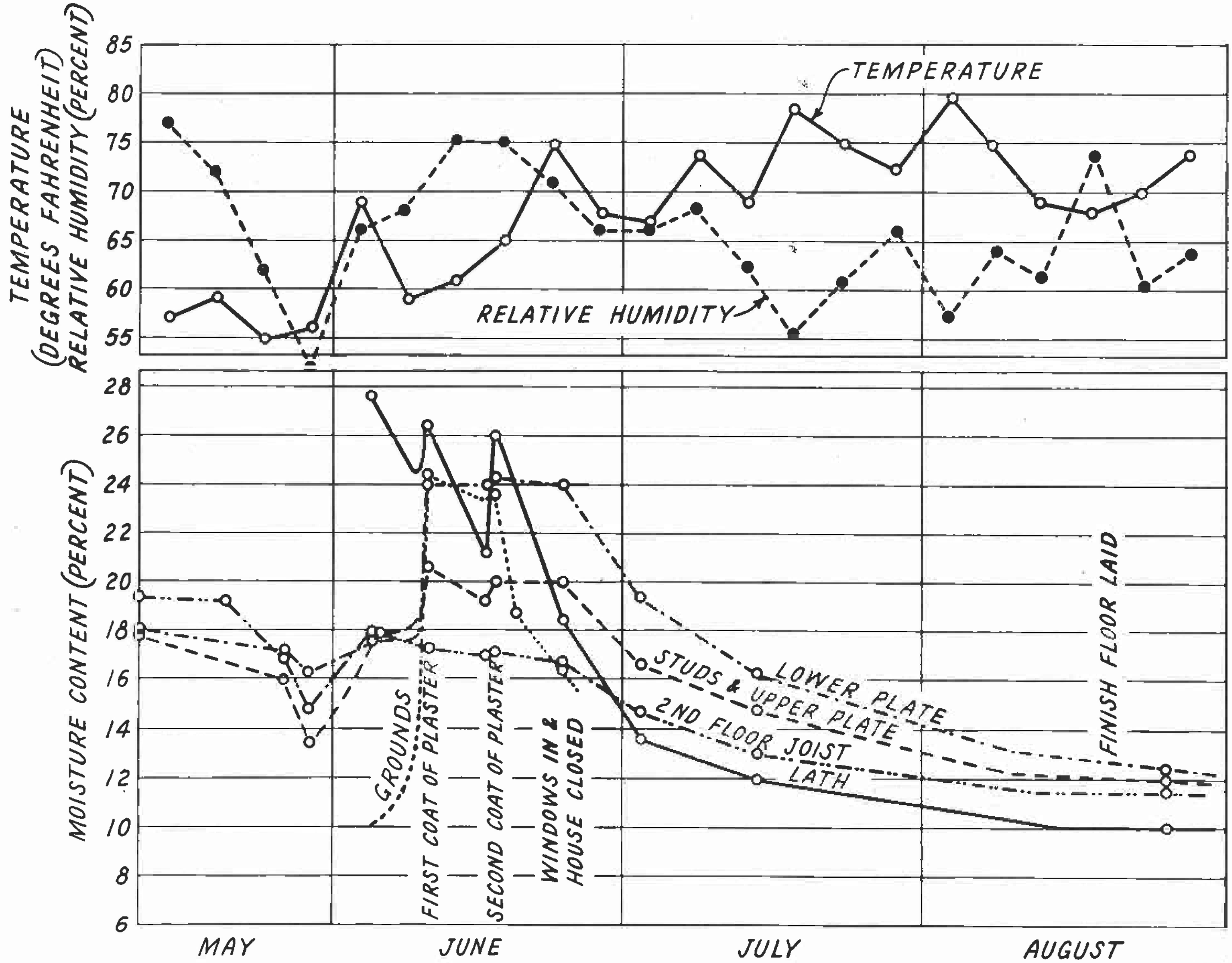

TEMPERATURE
RELATIVE HUMIDITY
TEMPERATURE (DEGREES FAHRENHEIT) RELATIVE HUMIDITY (PERCENT)
85
80
75
70
65
60
55
MOISTURE CONTENT (PERCENT)
28
26
24
22
20
18
16
14
12
10
8
6
GROUNDS
FIRST COAT OF PLASTER
SECOND COAT OF PLASTER
WINDOWS IN & HOUSE CLOSED
STUDS & UPPER PLATE
LOWER PLATE
2ND FLOOR JOIST
LATH
FINISH FLOOR LAID
MAY
JUNE
JULY
AUGUST

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