Psychrometric Chart & Wood Sorption Curve

We know the dew-point temperature of the air in the crawlspace is 65°F (18°C). We also know the temperature at the top of the floor joist is 75°F (24°C). We need to get the relative humidity at the surface of the wood at this location, so that we can use the wood sorption curve to determine moisture content. The psychrometric chart's magic gives us the relative humidity.

First, we make the simple engineering assumption that we can ignore the vapor permeance (or vapor resistance) of the fiberglass batt insulation. That leads to the second assumption that the vapor pressure in the crawlspace is uniform. Both are reasonable assumptions within the range of accuracy we are dealing with (within 10% to 20% and obtained within seconds, rather than hours using mind numbing numerical simulations based on questionable boundary conditions that are not much more accurate than 10% to 20%).

With the constant vapor pressure assumption, we can trace a horizontal line from the 65°F (18°C) dew-point state-point on the saturation curve to where it crosses the vertical 75°F (24°C) dry-bulb temperature line. Presto! We get the relative humidity at the surface of the wood, which is 70% (*Figure A*).

We take this wonderful piece of information to the wood sorption curve and get a moisture content of 13% (*Figure B*). However, look at the error bar (the shading on the curve). Neat, eh! Wood is somewhat unpredictable—a characteristic I identify with—so although I say in the neighboring column that the wood moisture content is 13%, it could be anywhere between 10% and 16%. Or, 13% ±3%. Keep those computer simulations and give me a psych chart, a sorption curve, and a beer, and I will beat you to the answer every time. Of course, the 30 years of being beat up by the old masters also helps (thank you Dr. Onysko, Prof. Timusk, Mr. Gatley, and Mr. Handegord).