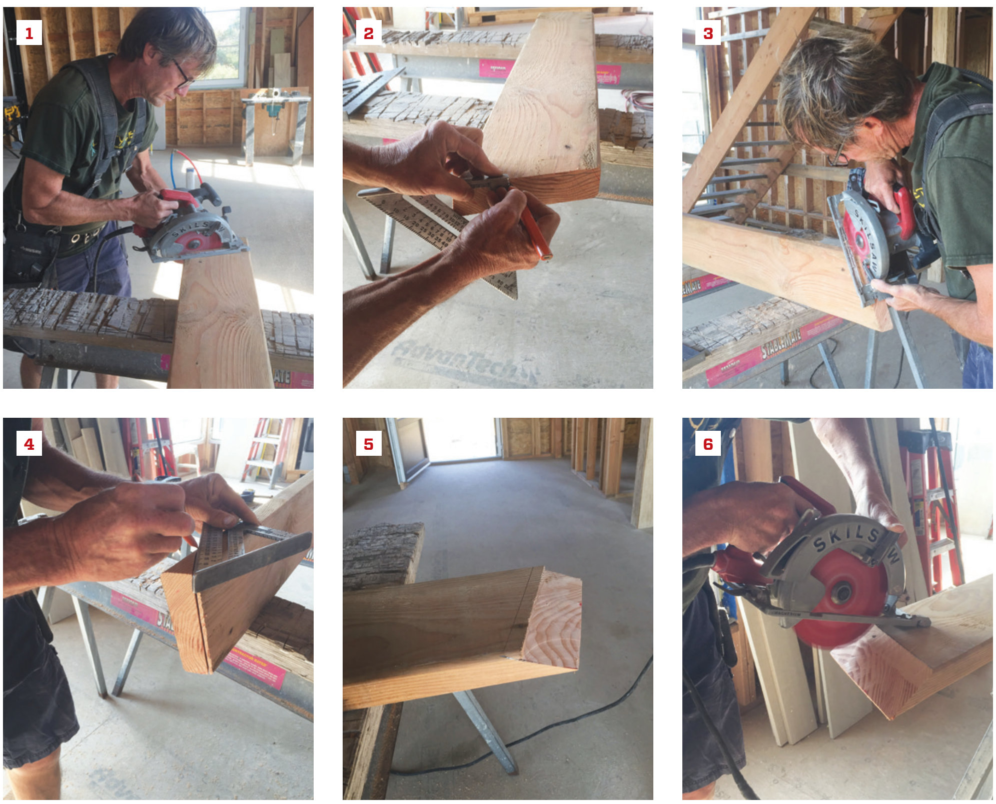
Q Stick-framing an irregular hip or valley often calls for an acute compound bevel that exceeds the capacity of my circular saw. Instead of using a handsaw to make this cut, is there an easier way?

A John Spier, a veteran carpenter who owns Spier Construction on Block Island, R.I., responds: The situation you're referring to, framing irregular hips or valleys, calls for jack rafters that die into the sides of the hip or valley rafters. Jack rafters have compound cuts; that is, cuts that are both angled and beveled. The angles are plumb cuts, and the bevels are cut to the angle at which the jack rafters meet the hip or valley. A regular hip or valley has the same roof pitch on both sides, so the bevels are 45 degrees regardless of pitch. But an irregular roof has different pitches, so the bevel is less than 45 degrees on one side and greater than 45 degrees on the other.

You can cut bevels up to 53 degrees or so with some saws, and I cheat that up to 60 degrees by tilting the saw base with my hand or a small stick. But many irregular roofs call for bevels of as much as 75 degrees. In my bad old days of production tract-house framing, we'd just cut a square plumb cut and side-nail it—perfectly strong and legal, but ugly. Here's how I cut a serviceable compound bevel up to about 75 degrees with my circular saw. It's not for amateurs, and it's not very pretty, but the jack rafters look fine once they're nailed up.

I start by marking and cutting the plumb cut angle, with a bevel the complement of the desired angle and in the opposite direction. Here, I'm cutting a 20-degree bevel to get to 70 degrees **(1)**. Next, I scribe a line along the end cut about 1/4 inch from the short edge (it's OK to leave a little shoulder instead of a feather edge) **(2)**. After clamping the rafter up on edge, I cut along the line with the saw set square and to maximum depth, keeping the base flat on the bevel cut **(3)**.

This cut won't go all the way through, so then I mark the rest of the cut around the edges and across the other side **(4)**, and rough-cut most of the waste off **(5)**. Finally, holding the blade guard up, I plant the front of the base firmly on the rafter and carve down to the line with a series of sliding cuts, moving the saw across sideways and not taking too much off at once. With practice, it's possible to make a smooth, flat surface in about 20 seconds **(6)**.



Cut the plumb cut angle with the blade set to the complement of the desired bevel angle and in the opposite direction **(1)**. Following a line marked along the end cut **(2)**, make the next cut with the blade set square and to maximum depth **(3)**. Mark the rest of the cut **(4)** and make a shallow pass to remove most of the waste **(5)**. Finally, carve down to the line with a series of sliding cuts, moving the saw sideways across the face of the bevel and not taking too much off at once **(6)**.

Photos by Gabriela Gazzo Spier

Q How does “latent heat” (used by installers of air-conditioning systems) differ from sensible heat?

A *Clayton DeKorne, editor of* JLC*, responds*: Air conditioners are designed to cool the air, but air temperature is influenced by humidity, and that needs to be part of the evaluation when you are sizing an air-conditioning system. HVAC designers need to track two types of loads: sensible load and latent load.

The sensible cooling load refers to the air temperature in the building. Factors that influence the sensible load include sunlight striking windows, skylights, and glass doors; the insulation value in exterior walls, in ceilings under attics, and in floors over open crawlspaces; air infiltration through cracks in the building; and (primarily in commercial work) the heat output of lights, appliances, and other equipment. All of these factors are included in the energy load calculation.

Latent cooling load refers to the energy carried by humid air. Water vapor holds heat and requires energy to remove it.

Conduction, convection, and radiation are the heat transfer mechanisms of sensible heat (see “Heat Transfer Through Buildings,” *Training the Trades*, Jul/19), while evaporation and condensation are the transfer mechanisms for latent heat. When water evaporates or condenses, it changes phase. In evaporation, latent heat is the energy required to overcome the molecular forces of attraction between water particles. This energy allows the molecules to separate; the liquid becomes a vapor where the attractions between molecules are minimal. When water changes from a liquid to a vapor (evaporation), or from a vapor to a liquid (condensation), there is no change in temperature between the liquid state and the vapor state. But while there is no sensible change in temperature, the air gains latent heat by gaining moisture (evaporation), or loses latent heat by losing moisture (condensation).

HVAC system designers must account for the latent heat carried in the volumes of air in a home, because it directly impacts the amount of heat that the system must add or subtract to maintain comfort. From a system designer’s point of view, latent heat can be removed by condensation (which occurs when an AC unit runs and humid air passes over the cold evaporator coil). The longer an AC unit runs, the more water condenses out of the air. Difficulty arises during shoulder seasons in a hot, humid climate, for example, when the air temperature is not high, but humidity is. Then, the AC unit doesn’t need to run very long to reduce the sensible heat, but it does need to run to remove the latent heat. The result: The system overcools the air. This becomes even more of a problem when codes require continuous ventilation (and hence, a continuous stream of humid air entering the house). In both situations, dedicated dehumidification (which pulls water out of the air by condensation but does not disperse cool air throughout the space) is needed to maintain comfort.