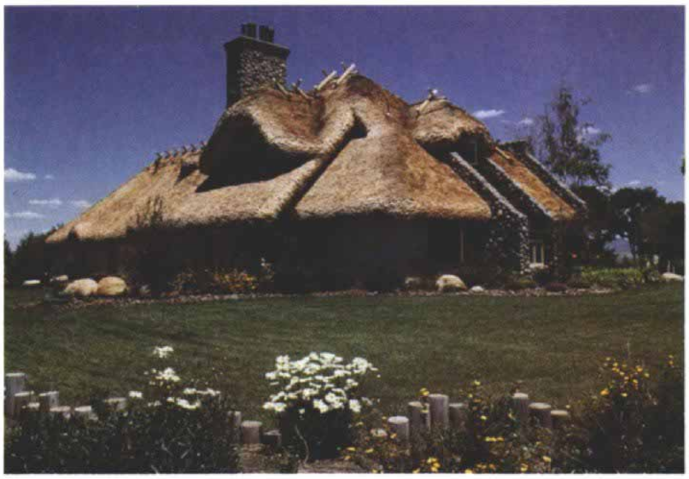
Built-Up Cedar Roofing

Common shingles mimick a traditional reed thatch

by Steve Dunleavy



About eight years ago my company was hired to put a roof on a custom home in the Sierra Nevada mountains overlooking Lake Tahoe. The house was a massive Tudor mansion with a steep roof, incorporating turrets, dormers, hips and valleys. The builder had spent a lot of time researching European architecture and wanted the house to look authentic, including the roof, which was to be reed thatching.

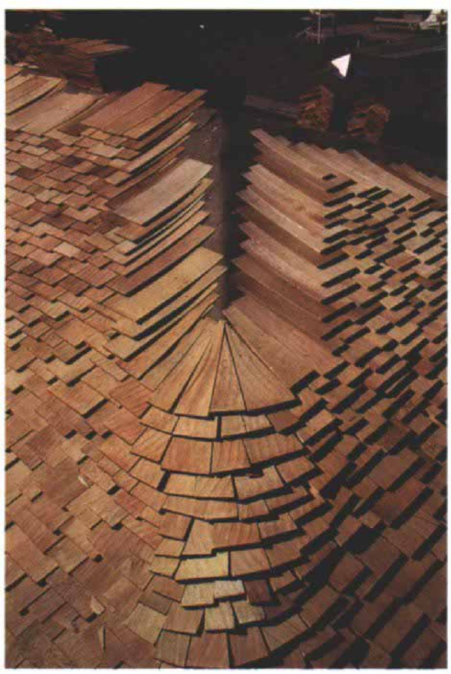
True thatch roofs are practically non-existent in North America. Importing material and labor, primarily from England, has proven to be prohibitively expensive—most companies who have tried it have met with failure. Building departments and insurance companies unfamiliar with what amounts to a Middle Ages technology have been hesitant to approve or underwrite what my dictionary calls "a roof covering made of straw, reeds, leaves, rushes, etc." Also, I've seen thatch roofs play host to every sort of insect, bird, rodent and rot imaginable. For all these reasons, the reed-thatch plan was scuttled and I was asked to simulate, using cedar shingles, the droopy, layered look of authentic thatch roofing. Beginning with that first house and refining and borrowing elements from many styles of shingling, we devised a shingle roof that we call "built-up cedar thatching." My company has now installed more than two dozen of them, and they've proven to be both durable and dazzling to the eye, capturing the velvety look of traditional reed thatch (top photo).

Division of labor—From my standpoint, applying built-up cedar thatching seems more like a military campaign than a roofing job. Everything involved is on a large scale: the intense labor; the massive amounts of material stored and then moved higher and higher up steep inclines; the wear and tear on men, tools and equipment. It's no surprise that labor is the biggest expense with these roofs. Labor costs must be budgeted carefully based on the job, the climate and the topography of the roof itself.

I break my crews into two categories: nailers and laborers (or grunts and sub-grunts, as they've graciously named each other). The nailers are usually journeymen roofers who are familiar with built-up shingle thatching (although experienced laborers occasionally nail, too). Nailers are also responsible for installing weatherproof membranes, roofing felt and metal flashings.

The laborers' job is to keep the nailers supplied with shingles, which is more difficult than it sounds. A built-up shingle thatch requires two to three times the amount of material needed on a standard shingle roof, and every shingle has to be hauled up to the roof via winch or ladder as the job progresses (there's just too much material for a rooftop delivery). Also, laborers are responsible for splitting each shingle to a width of 5 in. or less, which is critical to the appearance of these roofs.

If the roof framing is curved at the eaves, it's usually necessary to steam-bend shingles prior to nailing them up. This is a full-time job for one man (more on that later).



Though it resembles a traditional reed thatch, a built-up shingle roof consists of cedar shingles split to a maximum width of 5 in. and laid in random patterns with exposures of 3 in. or less. In the top photo the shingles wrap around radiused rakes and eaves. At hips (photo above), shingles are tapered with a utility knife and laid like pie slices. The angle of the taper depends on the roof pitch. A layer of Ice & Water Shield beneath the roofing felt at both hips and valleys adds protection against the weather.

Everyday materials—While a built-up shingle thatch might appear exotic, the materials we use to assemble it are not. We prefer 16-in. long, #1-grade Western red cedar shingles, which are 100% edge grain and clear heartwood. We've tried using 18-in. long shingles, but found them to be harder to split and steam-bend, as well as a little too thick to lie properly. We've had some success with #2-grade shingles, which are clear and knot-free for a minimum 10 in. from the butts. They cost $10 to $20 less per square than #1-grade shingles, so they're occasionally specified by clients to save money. These shingles don't affect the appearance of a roof, but they can be difficult to split and bend because of knots, leading to increased waste and more work. Generally, I figure that a simple cedar thatch roof will be at least three times the cost of a standard roof; complicated roofs run even more. Labor is easily 50% of the job.

Because of ice-dam problems in snow country, we're required by code to install an elastic-sheet membrane over the first nine feet up from the eaves. We use Ice & Water Shield (W. R. Grace and Co., 62 Whittemore Ave.,

Top photo: Staff

Cambridge, Mass. 02140), which comes in 3-ft. wide rolls that cover 225 sq. feet. The product consists of rubberized asphalt with a cross-laminated polyethylene film on one side and a pressure-sensitive adhesive backed by removable kraft paper on the other. The sheeting is installed polyethylene side up, forming an impermeable membrane that stays watertight even when nails or staples are driven through it. Ice & Water Shield has an embossed surface, so it's not slippery to walk on, an endearing feature to roofers.

In addition to using the membrane along eaves, we use it as an extra precaution under the flashing at roof-wall intersections, valleys, chimney saddles and other potential trouble spots. At about $50 per square it's expensive, but well worth its price for the protection it offers. A warning, though: Ice & Water Shield is the stickiest flypaper ever invented. On a steep roof it's a two man operation to put down, and we don't mess with it in any sort of wind.

We are also required to install tar paper over the membrane. We use 30-lb. felt affixed to the deck with barbed roofing nails. The felt is substantial enough to provide temporary weatherproofing and serves as a durable substrate for a built-up thatch.

For flashings we prefer copper, although many people ask for galvanized sheet metal to save money. We fabricate and install most of our own flashings, but if a peculiar bend or solder job is giving us trouble, we call in the experts. The quality of the flashing. material and workmanship is critical because these roofs, if installed properly, should last a century or more. There are times when nothing else will work except a tube of gun-grade urethane caulk, so we always have some available in case the need arises.

Tooling up—We prefer to use pneumatic staplers to apply shingles, as does most of the roofing industry. Indeed, roofs like this, typically requiring a quarter million or more fasteners, would be astronomically expensive and virtually impossible to apply if they had to be hand nailed. Our weapon of choice is the Senco Mil pneumatic staple gun (Senco Products Inc., 8485 Broadwell Rd., Cincinnati, Ohio 45244), loaded with 2-in. staples. These tools are almost indestructible on the outside (every one I own has cartwheeled off more roofs than my esteemed employees care to admit). When the insides go, virtually everything can be replaced using inexpensive repair kits. I've rebuilt these guns on the tailgate of my truck at the job site. Staples can be bought almost anywhere, either generic or brand name. We use Senco brand staples because the tolerances seem a little tighter and they don't seem to jam or break the tools as often as other staples do. Pneumatic tools are percussive and loud, so we wear disposable foam earplugs, which can dramatically reduce fatigue.

We use a variety of saws in our thatch work. For on-the-roof cutting of shingles we prefer small circular saws, such as the Makita 4200N. Detail work around skylights and chimneys requires plenty of cuts, and these lightweight trim saws are more comfortable and safer to use than are the larger 7¼-in. circular saws (for more on trim saws, see *FHB* #48, pp. 40-43). We use a four-tooth carbide blade, which doesn't make a really precise cut but will last the length of the job (we're not, after all, building a piano here). This combination of high-rpm saw and four-tooth blade is effective but potentially dangerous because of the size and velocity of the waste it expels (the waste is more akin to chain-saw chips than sawdust). Eye protection is a must.

Cutting through several layers of shingles, such as at the ridge of a roof, requires more power than a trim saw offers, so we switch to a standard 7¼-in. worm-drive saw. Weaving a built-up thatch over hips, curved rakes and other obstacles can require thousands of shingles to be cut at predetermined angles. We accomplish this with a radial-arm saw set up on the ground, and haul tapered shingles up on the roof as we need them.

Shingles for radiused eaves are steamed and bent to the proper curvature before installation. The author's steamer consists of a truck utility box modified to fit over a 55-gal. drum of boiling water (top photo). Once shingles are saturated with moisture and become pliable, they're transferred to the bending jig (middle photo). When the jig's lid is closed, a pressure bar in the lid forces the shingles to bend over a platen to the proper radius (bottom photo). Typically, about 10% of the shingles break while bending.

Bending shingles—The steam boxes and bending jigs we use change from job to job, depending on what's needed. Our steamer consists of an old truck utility box with a metal flange welded on the bottom that fits over a 55-gal. drum full of boiling water (top photo). Water is heated by a propane weed burner at the base of the drum, and a large opening in the bottom of the box allows steam to enter. We load and unload material through the hinged door; a 2x4 rack with a row of nails front and back holds the shingles on edge. A second rack can be stacked on top, allowing the box to hold twice as many shingles. We rotate our stock, replacing hot, pliable shingles with fresh ones. The idea is to be as efficient as possible—we don't leave the steambox door open too long, and we have the bending jig open and ready for shingles when they come out of the steamer. Shingles are usually steamed for 20 to 30 minutes. There's some springback, but not much.

Our bending jig comes from the same make-it-on-the-spot family as the steamer. It can be made out of scrap lumber in a few hours (middle photo). The jig is simply a hinged frame made of 2xs and plywood, with a strategically placed 2x2 bending platen in the base of the frame and a 2x4 pressure bar in the lid. Shingles are loaded into the base butt-end down, with the butts constrained by a 1x4 crossbar. When the lid is closed, the pressure bar forces the shingles into a curvature dictated by the relative positions of the pressure bar and bending platen (bottom photo). We usually have to fine-tune the jig to achieve a particular bending radius, and we figure on breaking about 10% of the shingles.

The jig is screwed together with "grabbers" (similar to drywall screws), both for strength and so it can be adjusted. We intentionally build our jigs small so that we can transfer shingles quickly from the steamer to the bending jig before they have a chance to cool off.

Thatching guidelines—The most important factors for achieving the look of a thatched roof are shingle size, exposure and pattern. A typical non-thatch shingle roof is composed of straight 5-in. courses made up of shingles 4 in. to 14 in. wide, and measures about ⅞ in. thick. A built-up thatch roof, on the other hand, is composed of smaller shingles (5 in. wide or less) laid in a random pattern with exposures ranging from ½ in. to 3 in. The result is a roof surface that's about 3 in. thick.

Breaking shingles to the proper width is more complicated than it sounds. We break them by hand because it's quicker and safer than swinging a hatchet thousands of times.

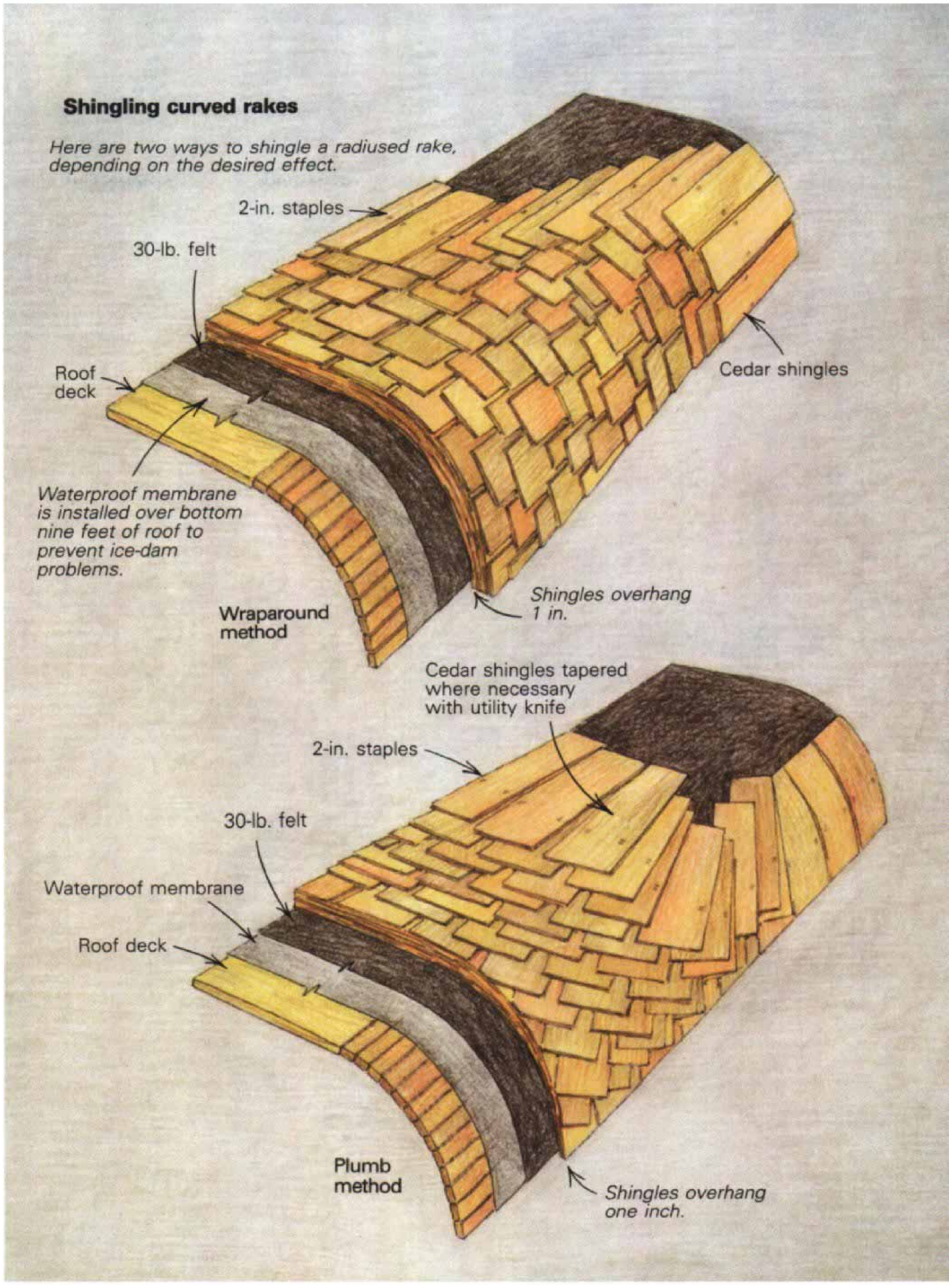
By grasping a shingle on its side edges with thumbs in the middle and quickly snapping the wrists, we usually get a clean break. Moist shingles can bend almost in half before breaking and require more effort, as do thick or dry shingles. Beginners tend to get sore hands quickly and usually try to break material over their knee caps, then get sore knees and go back to the first method. Sometimes the grain isn't straight, resulting in an angled break. These pieces are set aside to be trimmed later with a knife. Breaking wide material into smaller pieces goes against every good roofer's natural instincts, but narrow shingles are an important component of the built-up thatch look.

While there are no discernible rows in a built-up shingle thatch as opposed to a standard shingle roof, many of the same installation rules apply: all eaves have doubled, sometimes tripled courses; each shingle is fastened with two galvanized staples ¾ in. from the side edges and about 6 in. up from the butts; adjacent edges are gapped, although not as much as the ⅜ in. sometimes recommended; and joints between adjacent courses are usually offset by at least one inch (we bend this rule a little because of the number of courses in a built-up shingle thatch).

Almost all shingles are installed plumb, with butts square to the vertical fall line of the roof. This is more difficult than it sounds. On a steep pitch, material can be nailed mistakenly at a slight angle because the roofer is concentrating on a relatively small roof section, without the benefit of well-defined rows. Occasionally a nailer will have to scrutinize his work to regain an idea of what's "up" and "down."

The random pattern we apply in our thatching isn't as casual as it might appear. Many different nailers can be working on a project at once, and it's important that their work match seamlessly. From observing each other's shingling, nailers usually develop a sort of "mind meld," where individual differences in workmanship become impossible to detect.

In the last few years we've seen a growing interest in curved roofs, with architects and builders striving to design and construct eye-catching houses with radiused rakes and eaves and with virtually no joints at intersecting roof planes. As far as I can tell, there is no standard way to frame these curves (for one approach, see *FHB* #23, pp. 52-56). As for shingling them, if some crazed carpenter wants to jelly-roll sheets of plywood until his roofline looks like a roller coaster, with enough head-scratching we'll figure out a way to shingle it.



Eaves, gables, hips and valleys—The procedure for shingling eaves is basically the same whether they're square or radiused. For square eaves, we start by applying a double or triple course of shingles (depending on the desired appearance) over the elastic membrane and felt, making sure to offset the joints. If the eave is finished with a fascia board, we install our shingles with a minimum 1½-in. overhang. If there is no fascia board—if a builder prefers, say, plaster soffits butted to the shingles—we allow more of an overhang to accommodate furring strips, lath and stucco (soffits are recommended because of the large quantity of staples penetrating the overhangs). Radiused eaves require the use of shingles pre-bent to the same radius as the eave. The number of curved shingles is dependent on the pitch of the roof (the greater the pitch, the fewer the number of curved shingles needed).

To enhance either radiused or square eaves, we sometimes install the starting course of shingles so that it undulates along the edge of a roof (top photo, p. 71). We do this by tapering the shingles with a utility knife and by "wave-coursing" the shingles in convex and concave arcs, making sure the apex of the arc overhangs the roof a minimum of 1½ in. The maximum overhang winds up being about five inches, which is possible because of the added strength and rigidity afforded by the small exposures. Usually builders don't want these arcs to be uniform, preferring an edge that appears to sag or droop in spots, so we lay the shingles free-style, with no layout beforehand. After this first decorative row is installed, we fill in the low spots with the usual random coursing.

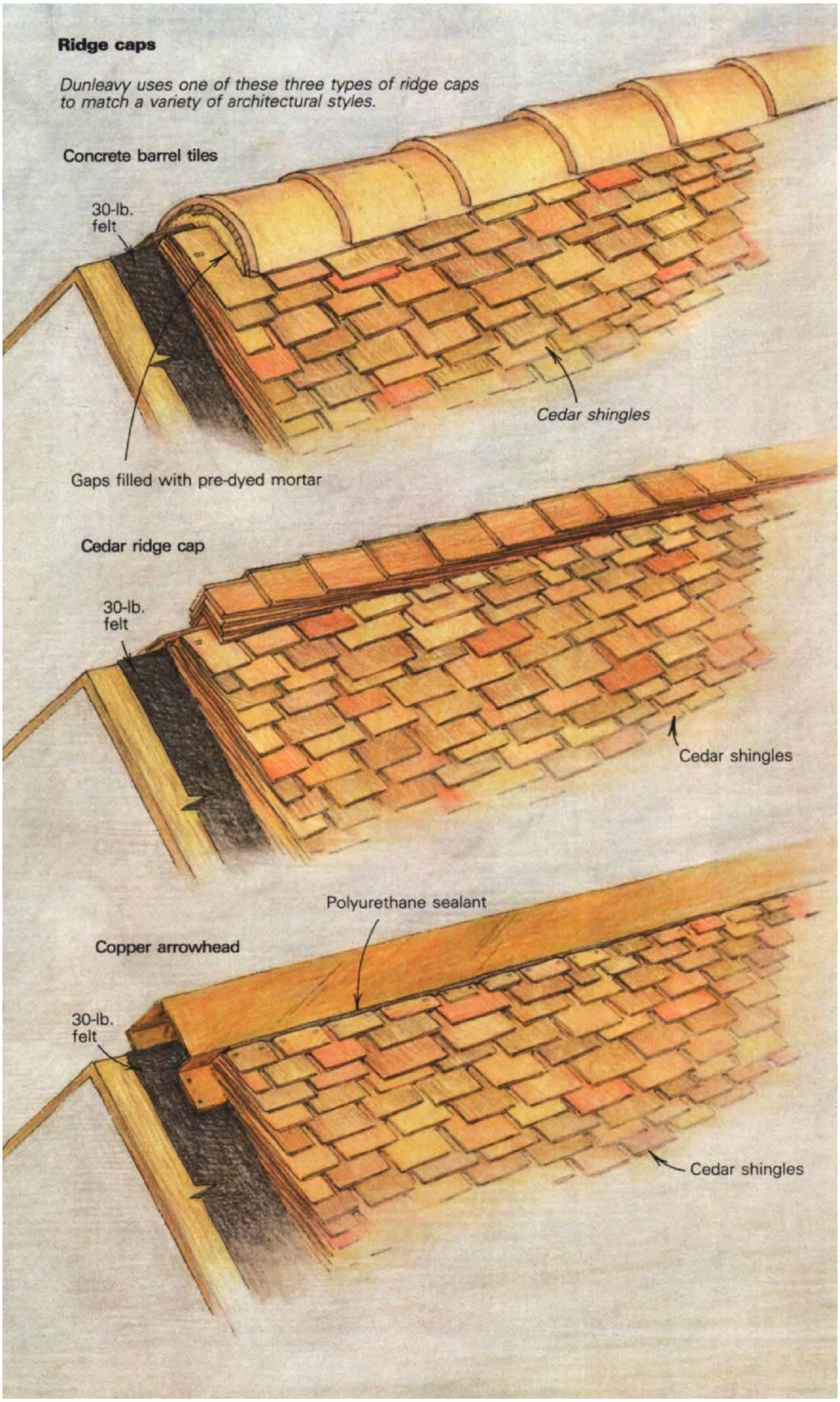
Gable ends are also either square or radiused. On square rakes shingles are applied in the usual way, with a 1-in. overhang. For curved rakes, shingles are often wrapped around the bend of the roof, with the edges of the shingles parallel to the edge of the rake (top drawing above). Unless the radius of the framing is especially tight, the use of pre-bent shingles is unnecessary (remember we're dealing with narrow shingles that di-

Drawings: Christopher Clapp

vide the radius down into small increments). The shingles are laid with a 1-in. overhang, the same as for a flat gable end. This is a fast, efficient method of shingling a curved rake, and we've done many of them this way. However, it's never appeared quite right to me because instead of the shingles being plumb along the radius, they're at an angle.

I prefer to fan the shingles down from the roof decking onto the radiused section so that the shingles remain somewhat plumb (bottom drawing, p. 69). This requires that the shingles making up the fan be tapered, that the bottoms of the shingles be cut at an angle along the edge of the roof to match the roof pitch and, finally, that a starter course be installed along the edge of the rake. It's a lot of extra effort, but I think it's worthwhile. To really confound matters, we sometimes lay the courses at the edge so that they undulate, too. In this case, we use the same procedure outlined above for the eave.

Hips and valleys, curved or not, are less complicated than curved gable ends. By weaving the shingles, we create the image of one roof section gently flowing into another. For hips, we accomplish this by tapering individual shingles to a particular angle (much like we do for arcs and curved rakes) and then combining them like pie slices until the proper turn has been made (bottom photo, p. 67). The angle of the taper depends on the roof pitch. For valleys, we simply open up the joints between adjacent shingles so that the shingles touch only at their butt ends (middle photo, facing page). Subsequent courses then cover the open joints. For both hips and valleys, a layer of Ice & Water Shield beneath the shingles serves as extra protection against moisture penetration. These same techniques allow us to roll a built-up shingle roof over virtually any rooftop structure, including all types of dormers and turrets.



Capping the ridge—For ridge caps, we use concrete barrel tiles, commercial cedar ridge cap or copper flashing (drawings left). Concrete tiles can be found in a variety of shapes and colors. We fasten them with 20d nails to allow for the thickness of the tile and the shingles, and we fill the gaps under and between the lapped tiles with mortar dyed to the appropriate color. While applying mortar, we cover adjacent shingles with polyethylene sheeting to protect them from staining.

Cedar ridge cap is made in lengths of 16 in. and 24 in. (we prefer 24 in.). This type of ridge tends to get lost on a massive thatch roof, so we recommend that adjacent lengths be lapped with about 5 in. to the weather (about one half the normal exposure), with the first course doubled on each end of the roof. This doubles the amount of ridge cap needed, but creates a bold, distinctive ridgeline. We fasten this cap with stainless-steel or galvanized 10d nails to assure adequate penetration into the sheathing.

Pre-bent copper (30 ga. or 28 ga.) also works well with a built-up cedar thatch, though it's more expensive then cedar. Our favorite design uses 10-ft. long sections bent in an "arrowhead" profile and fastened directly to the sheathing prior to shingling. Joints are lapped a minimum 4 in. and are caulked or soldered. The top few courses of shingles on either side are then cut progressively shorter so that their tops butt against the barb of the arrowhead. A bead of polyurethane sealant at the joint between the shingles and flashing prevents water from running under the shingles.

Flashing—Clients don't usually want to see lots of flashing on their roofs, so we're constantly weighing aesthetics against overall durability. Our real purpose as roofers is, after all, to make dwellings impervious to weather.

For plumbing and HVAC penetrations, the galvanized roof flashings usually supplied by subcontractors are acceptable. We install

Photo: Staff

Instead of radiused rakes and eaves, some roofs terminate at square roof edges. As shown in the photo above, wave-coursing was used for the starter courses to create an authentic droopy appearance.

them much as we would on a standard-shingle roof. For sidewall flashing, we prefer a continuous piece of pre-bent copper or galvanized sheet metal over Ice & Water Shield and 30-lb. felt. We fasten each shingle with the staples placed as far away as possible from the flashing and maintain a 1-in. wide channel between the shingles and the wall to allow for water run-off. We avoid using' step flashing because it's almost impossible to install properly on our built-up shingle roofs.

Because there are so many thicknesses of shingles in a built-up shingle thatch, we can hide the base flashing of a wall, skylight or chimney and still get a waterproof joint (bottom photo). To accomplish this, we run three or four full-length courses of shingles under the flashing and three or four progressively shorter courses over it. We're careful to place the staples toward the butts and at an angle to avoid penetrating the flashing. A high-quality caulk or flanged counterflashing is used to seal the joint where the shingles butt into the flashing. At the corners, we leave a small gap between the shingles. This method allows for drainage around any flashed component.

Roof-to-masonry joints can be handled the same way, although at times inappropriate counterflashing has been installed prior to our starting a project, forcing us to improvise. A classic example was a granite chimney and built-up cedar thatch, both intended to last a century or more, flashed with a thin piece of roll aluminum that might last 10 years.

Thatch roofs are closer to stonework than to roofing and hark back to an era in which a craftsman's work might well outlast him. As always, planning is the name of the game. ☐

Steve Dunleauy is a roofing contractor and owner of Hi & Dry Roofing in Stateline, Nevada. Photos by author except where noted.

As with hips, shingles are installed over valleys in continuous courses, creating a smooth transition between adjacent roof sections. Valley shingles are fanned out so that the shingles touch only at their butt ends. Shingles are affixed with the aid of pneumatic staplers.

The multiple layers of shingles in a built-up shingle thatch roof allow base flashings for skylights, walls and chimneys to lie hidden beneath two or three shingle courses, creating a more pleasing appearance. For the skylight pictured at right, a continuous bead of urethane caulk between the tops of the shingles and the base will keep water out. The side flashings are continuous because of the difficulty of step-flashing this type of roof, which is typically eight or nine courses thick. Water runoff is encouraged by holding shingles an inch away from the sides of the skylight, creating a gap between the shingles at the bottom corners.