Survey compares practices to problems

Project Pinpoint uncovers successes and failures

NRCA conducted quarterly surveys in 1983 to obtain data on 1,300 roofing jobs performed by Association members. The contractors were randomly selected and represented all states in the country.

The same two surveys were conducted each quarter with different contractors; one was for baseline data and the other for problem job data. Baseline data were obtained on 858 roofing projects under construction on specific dates. Problem job data consisted of reports on 404 jobs on which problems occurred or were detected some time during 1983.

The surveys have several limitations that should be noted. First, there was no attempt made to correlate answers with climates, locations or building sizes. Second, the survey did not ask for an indication of the problems' severity. Third, neither the statistical significance of the survey process nor the accuracy of the data submitted has been verified.

Still, there appears to be agreement on the trends in both baseline and problem jobs. This agreement lends some credibility to the broad interpretation of the data and some insight into how these trends, problems and performances are interrelated.

Problem jobs

The data identified specific problems with 300 of the 404 problem jobs reported. These are summarized in Table 1a.

Membrane splitting occurred on 17 percent of the problem jobs. Blistering appeared to be the second most frequent problem. This was observed in 16 percent of the cases. A combination of two or more defects, such as splits, blisters, ridges, fish mouths or minor leaks, occurred on 37 percent of the roofs in this category. Flashing failures amounted to only about 3 percent while wind damage and membrane slippage occurred on 4 percent and 2 percent of the jobs.

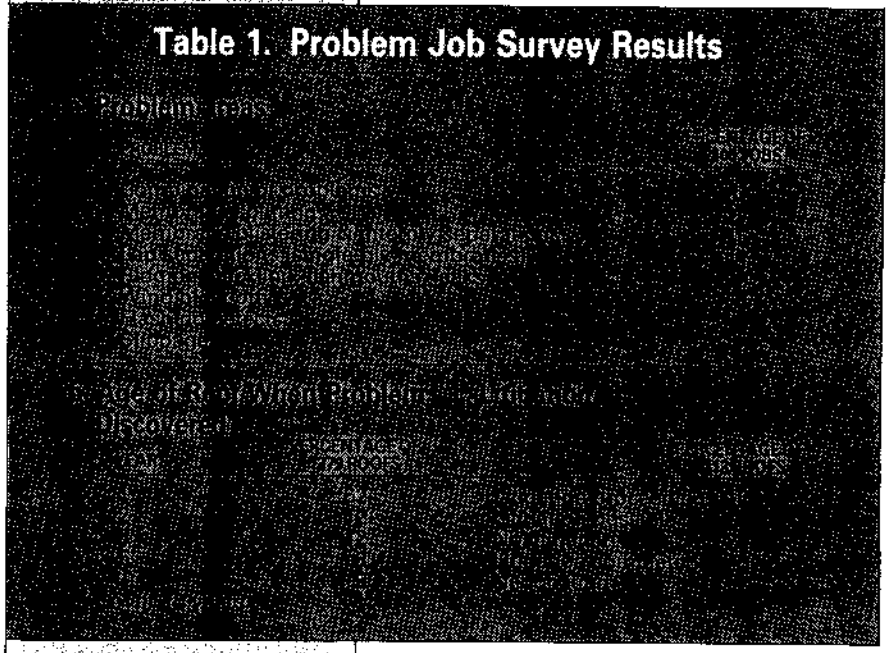
Lap deficiencies appeared to be restricted to single-ply membranes and were reported on 11 percent of the 300 roofs.

It is interesting, but not necessarily surprising, that the data given in Table 1b show the majority of problems became evident during the roofs' life early years.

A total of 62 percent of the observed defects were apparent within one year; 86 percent showed up in less than three years. Only 1 percent were observed on roofs more than 10 years old. The number of roof problems decreases quite sharply as the roof's life span increases.

Litigation is a potential indicator of roof problem severity. Table 1c demonstrates that 19 percent of the 313 problem jobs reported in this category are involved in either litigation or potential litigation. On the bright side, respondents reported that no litigation was anticipated in about 80 percent of the problem jobs.

Table 1. Problem Job Survey Results

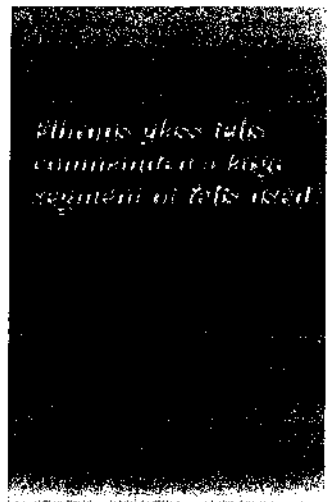


By Bill Cullen
NRCA research associate

General findings

The sum of the baseline and problem job results given in Table 2a shows that reroofing was the major type of roof construction, with about 60 percent of the market. It was rather surprising that about 85 percent of the reroofing involved tear-offs of the previous roofs.

The roof system's slope plays an important role in its performance. The information in Table 2b appears to confirm that roofs with some slope perform better than



roofs with no slope. Twenty percent of the baseline jobs and 36 percent of the problem jobs had no slope. Even gradual slopes of 1/4-inch per foot or less seem to improve overall performance.

Table 2c, which lists data collected from 675 baseline and 288 problem job roofs, including both bituminous and single-ply types, indicates that surfacing was used on 68 percent of the bituminous and 60 percent of the single-ply roofs. Smooth-surface roofs accounted for the remaining 32 percent and 40 percent. There appears to be a slight trend toward improved performance from aggregate-surface roofs.

Roofing membranes

Different estimates are heard throughout the industry on the amounts of bituminous roofing marketed in the United States as opposed to the elasto/plastic (single-ply) membranes. Project Pinpoint 1983 results indicate that all types of bituminous products, including the polymer-modified types, account for the membranes applied on 70 percent of the roofs surveyed (as shown in Table 3a). Elasto/plastic types comprise the remaining 30 percent. If we include the polymer-modified bituminous products in the single-ply category, the tally now stands at roughly 60 percent bituminous, 40 percent single-ply.

Bituminous membranes generally consist of two components: the reinforcing felt or fabric and the waterproofing/adhesive. These were handled separately in the survey questionnaires, and the results are given in Tables 3b and 3c.

It was not surprising that fibrous glass felts commanded a large (64 percent) segment of felts used (see Table 3b). These were followed by organic felts with 17 percent and asbestos at 2 percent. Felts used in cold-applied membranes also accounted for 2 percent. Modified bitumen products were used on 15 percent of the roofs surveyed.

A comparison of the baseline and problem jobs results indicate some trends of problems with the various generic products.

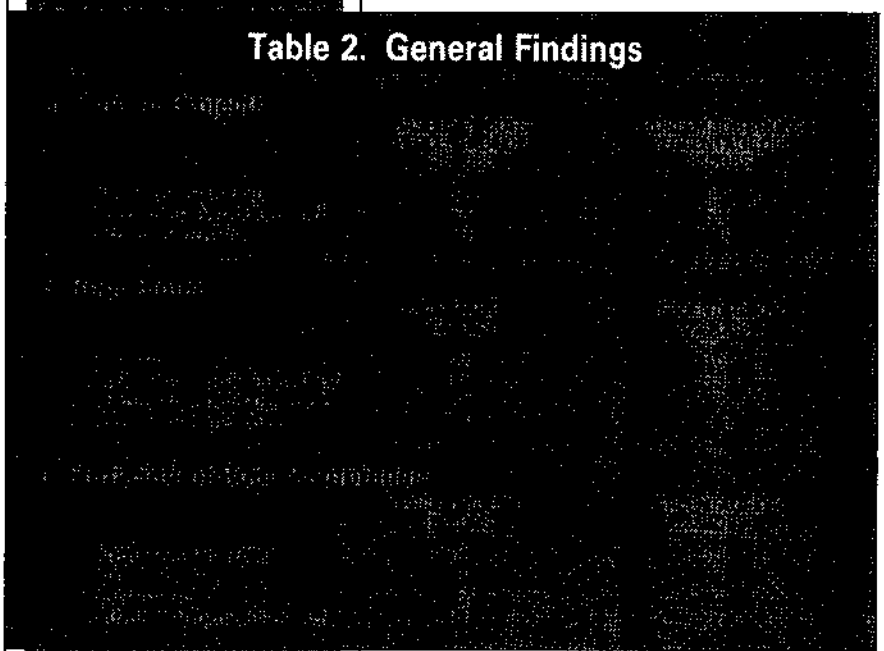
It is interesting to compare the relative percentage of baseline jobs to problem jobs for fibrous glass felts vs. organic and asbestos felts. While fibrous glass felts comprised 64 percent of the baseline jobs, only 27 percent of the reported problem jobs involved fibrous glass felts. On the other hand, while organic felts comprised only 17 percent of the baseline jobs, 35 percent of the problem jobs involved organic felts. Asbestos felts accounted for just 2 percent of the baseline jobs but 19 percent of the problem jobs.

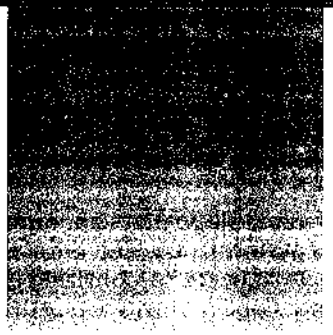
Polymer-modified bituminous products showed only a 2 percent increase, which still indicates the modified bituminous membranes are not immune to conventional roof membrane problems.

A tally of the survey results on mopping bituminous products shows that asphalt commands up to 88 percent of the survey market and asphalt was the bitumen on 82 percent of the problem jobs. Coal tar products (there was no distinction made between coal tar pitch and coal tar bitumen) were used in 12 percent of the baseline jobs and 18 percent of the problem jobs.

Steep grade asphalt conforming to ASTM Standard Specification D312, Type III, was used on almost 70 percent of the baseline roofs. Types I and II, the flat or level grades, combined to tally about 25 percent of the market. The special steep grade, Type IV, was reported at around 5 percent. Softer grade asphalts seem to perform slightly better.

Table 3d is a tally of the various amounts of single-ply membranes used on the roofs surveyed. Note that modified bituminous products are not included in this table. Based on 1983 Project Pinpoint results, it appears that ethylene propylene diene





monomer (EPDM) dominates the single-ply market with 77 percent of the 247 baseline jobs. Polyvinyl chloride (PVC) membranes are the distant runner-up, reportedly used on 14 percent of the baseline roofs. Chlorosulfonated polyethylene was rated at 5 percent and all others at 4 percent collectively.

Polymer-modified bituminous membranes are often included under the single-ply category. Table 3e breaks down baseline roof percentages for single-ply membranes when modified bitumen membranes are included. EPDM continues to lead with 56 percent, followed by the modified bitumen with 27 percent and PVC with 10 percent of the market. The remaining materials comprise 6 percent.

A comparison of the baseline results and the problem jobs results for single-ply membranes is presented in Tables 3d and 3e. Project Pinpoint data appear to indicate that EPDM membranes suffer fewer problems than the other major single-ply membranes included in the survey. According to Project Pinpoint survey results, PVC membranes comprised a higher percentage of the problem jobs (24 percent or 17 percent, depending on whether modified bitumen is included within the single-ply category) than PVC's share of the baseline jobs employing single-ply membranes (14 percent or 10 percent).

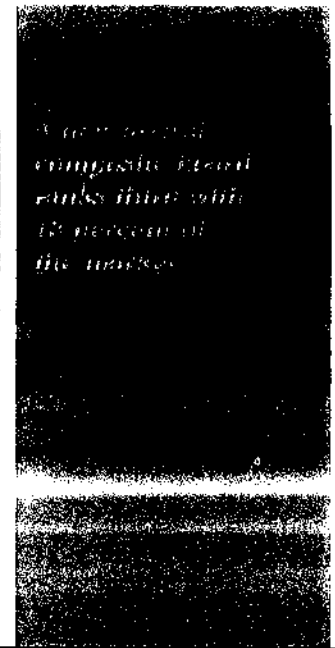
Roof insulations

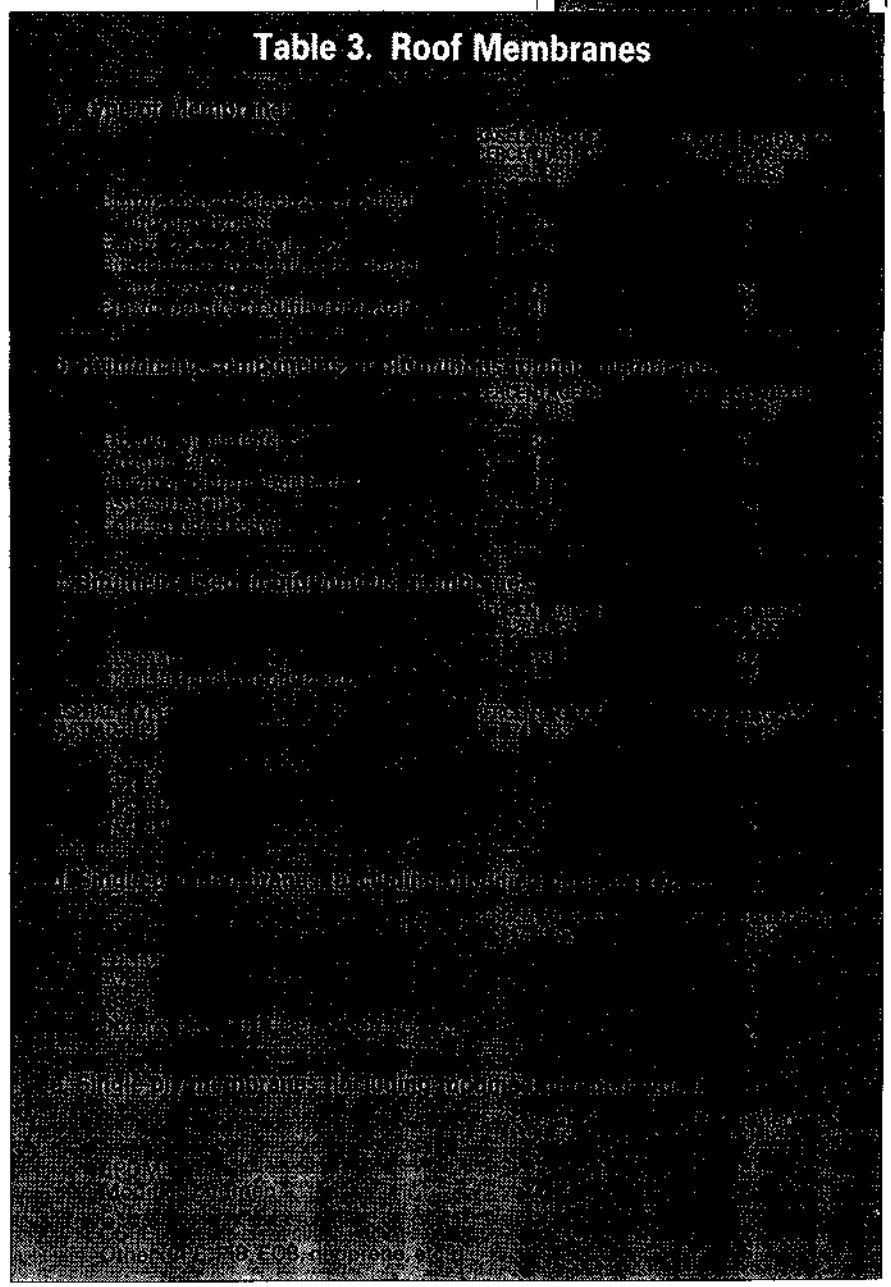
Table 4a provides results of questions on roof insulations by their generic classifications. It was somewhat surprising that about 20 percent of the 1,262 roofs contained no insulation above the roof deck. Fibrous glass insulations continue to be the most popular with 26 percent of the total amount used. Perlite types follow closely with 22 percent. A relatively new arrival, composite board, ranks in third place with 18 percent of the market surveyed. Polystyrene follows with 15 percent and polyurethane types are at 4 percent.

It appears from the survey results that composite board insulation may be less susceptible to roof problems than other types of insulation. According to Project Pinpoint, composite board was installed on 19 percent of the 488 baseline jobs and 5 percent of the 234 problem jobs. In contrast, polyurethane insulation was used on only 5 percent of the baseline jobs and 14 percent of the problem jobs.

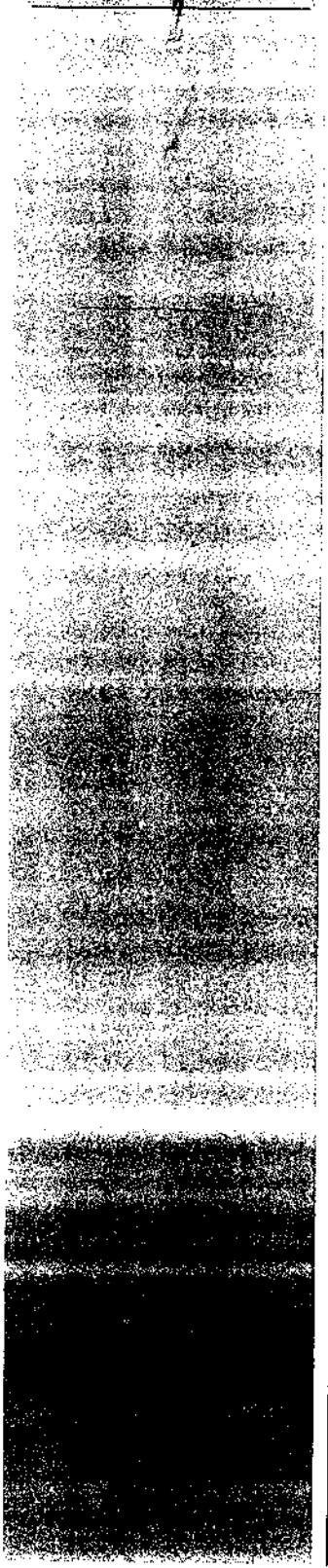
Table 4b is a breakdown of the thickness ranges of insulations used. Roughly one-third of the roofs had insulations with thicknesses of less than 1 inch. A little more than one-third fell in the 1- to 2-inch range, and on the remaining roofs the insulation thickness was greater than 2 inches. The survey results indicated that on about 10 percent of the insulated roofs the insulation was applied in a multi-layered fashion. Tapered insulation was used on about 3 percent to 5 percent of the insulated roofs.

The insulation attachment data in Table 4c demonstrates the beneficial effect of using mechanical fastening over hot- or cold-applied adhesive, in spite of the fact that it was used in only 34 percent of the baseline cases. It was also apparent that bituminous materials were used as the attachment adhesive in 64 percent of the roofs. In general, problems were less apparent on roofing employing mechanically attached insulation.





Experience shows that better steel deck performance might be expected when heavier gauges are used.



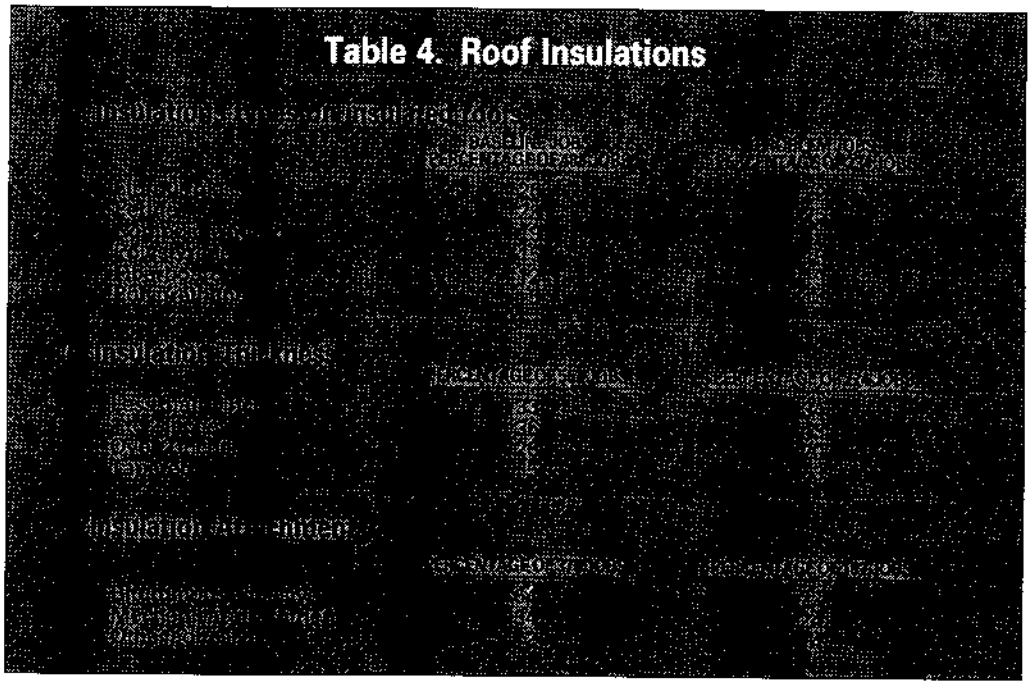
Vapor flow retarders

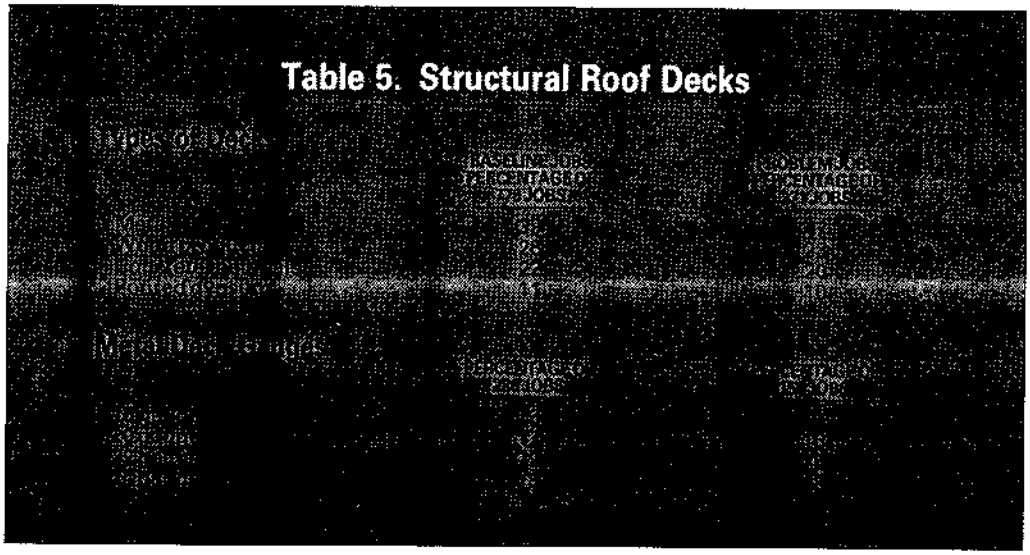
Vapor flow retarders were used in only 22 percent of the roofs surveyed. For the most part those that were used were bituminous. No particular trends were apparent between baseline and problem job results.

Roof decks

Table 5a reports data on the generic types of structural decks. It was no surprise to find that metal decks were used predominantly, types used, comprising almost 40 percent. These were followed by wood at 28 percent, concrete at 22 percent and gypsum at 11 percent. The results indicated that roofing systems with metal decks may be more susceptible to roofing problems.

Table 5b divides the metal deck category into gauge classes. The lower the gauge number, the heavier or thicker the metal from which the deck is constructed. By far the 22-gauge is the most frequently used, showing up in almost 75 percent of the metal deck roofs surveyed. There were no obvious trends between problem jobs and baseline data, although experience shows that better performance might be expected when heavier gauges are used.





Manufacturers, builders, contractors test their metal

If you can't beat 'em, join 'em.

It may sound like a gentle way to admit defeat, but in the roofing business it's become a sound survival strategy. Ever since elasto/plastic membranes began encroaching on BUR territory, roofing contractors have been quietly joining the challenger's camp. The single-ply manufacturers eagerly welcome the contractors; working through them is the best way to get their products installed.

Most contractors haven't renounced built-up entirely; they've simply added the new products to their lineup. They let the systems manufacturers battle for the hearts and minds of the architects and building owners. Contractors find that offering a variety of systems allows them to bid on jobs regardless of the roofing specified.

But now a new contender has entered the fray, bringing its own troups; contractors hoping to join this cause are scrutinized before being accepted into the ranks.

Practical alternative

The new competitor is the standing seam metal roof, and the soldiers in the field are the contractors, builders and dealers who are already selling and erecting pre-engineered metal buildings. Though standing seam roofs have been used on pre-engineered metal buildings for 50 years, it is only recently that changes in design, application techniques and manufacturer marketing strategies have made the system a practical reroofing alternative for brick, block, bar joist or concrete buildings. At the urging of metal building manufacturers, pre-engineered builder/contractors are moving into these traditional roofing markets.

The growing use of metal roofing for retrofit has been noted by the metal building industry. *Metal Building News* calls metal roofing "the fastest growing product in construction," and says, "The metal roof is fast becoming the preferred choice in covering commercial and industrial buildings, and in some cases, even residential homes." This may be a bit of an overstatement by an industry booster, but it does seem certain that roofing contractors will be finding more and more metal roofs in their bid specifications.

Crimping BUR's style?

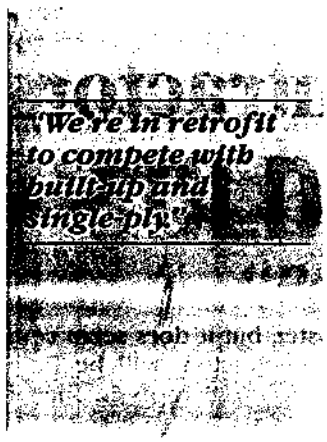
By Martin Eastman

The roofing industry has noticed the increasing use of metal as well. The early bird session at last year's NRCA Convention dealt with various brands of standing seam roofs and a new Roofing Industry Educational Institute seminar explores the technical aspects of the standing seam metal system.

Several recent innovations have made the standing seam roof a strong market competitor. In the basic standing seam roof the turned up edges of metal panels are butted and crimped together to form watertight connections. The most important advance in this design has been the incorporation of metal clips into the seams. The clips are used to attach the panels to the roof's substructure in a way that allows the panels to expand and contract. Using the clips, workers can attach the roof securely without punching screws through the metal skin.

Other design changes simplify installation. Crimping has been eliminated in some systems with seams that hook together or snap together with a long clip. Even the crimped systems install easier with machines that run along the seam and crimp it automatically.

According to H. C. McBay, a vice president of Beldon Roofing and Remodeling Co. in San Antonio, Texas, the pre-manufactured standing seam systems require little knowledge of specialized sheet metal forming to install. Manufacturers form the panels and hardware at the factory, and the complete system is delivered to the site ready to be fastened together and attached to the substructure. McBay says that flashing the roof requires the most sheet metal work, although when the roof is an integral part of a pre-engineered building, flashing is minimal.



Retrofit competition

All of these improvements have helped metal roofing move off corrugated tin sheds and onto low-rise commercial and industrial structures. Most of the larger manufacturers are setting their sights on the reroofing market. "We're in retrofit to compete with built-up and single-ply," says Mark Workman, a marketing consultant with Butler Manufacturing Co. "We have a group that is devoted solely to that market."

Workman explains that Butler formed its roofing division in 1981 to market the company's standing seam metal roof. The group operates independently of Butler's pre-engineered building business. According to Workman, the roofing division provides marketing and technical assistance to Butler's builders, showing them how to "adapt a roof to a building, whether it's reroofing or new construction."

Several other companies have instituted similar marketing approaches. Both Warren Mueller of Armco Building Systems and Ken Cole of Binkley Co. say their companies have set up roofing divisions to tap the reroofing market. These firms are offering standing seam systems for new roofing as well, but generally, they see the greatest potential for sales and growth in retrofitting buildings originally covered with a built-up or single-ply system. Mueller estimates that only 15 percent of his division's work is new roofing.

The manufacturers are building a strong case for switching to standing seam metal roofing. As one might guess, industry representatives are eager to tick off metal's strong points. At the top of the list are the two attributes architects and building owners are happiest to hear—long life and low maintenance. "We have the long-term solution to a guy's roofing problems," Butler's Workman says.

Butler, like many other standing seam manufacturers, backs up its claims of roof longevity with a 20-year warranty. Paul Nimtz, an architect with Butler, says standing seam roofs require little maintenance to reach that 20-year mark. An occasional check for debris is usually all that's required. Nimtz adds that metal roof systems are not restricted to rigid board insulation; this permits higher R-values.

Armco's Halsell sees the light weight of the metal system as an advantage. The panels and substructure add only 2½ pounds per square foot to a roof, he says. For retrofit work, the light weight of the system can make tear-off of the old roof unnecessary, lowering the cost of installation. New roll-forming technology has also brought metal roofing's cost down, according to Halsell. With most parts pre-manufactured, the newer systems do not require as much labor to install as site-formed standing seam systems.

Metal roofing may not be ready to take over the world just yet, however. Most manufacturers admit that conventional roofing is still the best choice for a roof with several penetrations or pieces of rooftop equipment. And the metal roof does require some slope, though manufacturers are quick to point out that it is a simple matter to add slope to the roof's substructure.

Building networks

But even with these few drawbacks, standing seam metal roofs are gaining ground in the reroofing market. What this means is that the conventional roofing contractor may find himself excluded from more and more bids because a metal roof has been specified. Or he may find himself competing against the Armco or Butler builder down the street for reroofing jobs even though the jobs do not involve pre-engineered metal buildings.

Armco and Butler are both urging their builders to get into the retrofit market. Nimtz says that Butler's builders have responded enthusiastically to the call. The builders see roofing as a way to diversify, insulating their fortunes from the ups and downs of the metal building business.

Some roofing contractors may wish to compete with the metal building builders on their own turf, but getting into the standing seam roofing business may not be as easy as getting into single-plies. Armco and Butler are offering their roofing business to their contractors first. Neither company is willing to work with roofing contractors in regions where their own builders are installing standing seam roofs. If the builders choose not to get into the market or if an area does not have a builder in it, the companies will consider contacting a roofing contractor to see if he is interested in the business.

The manufacturers are very selective about the roofing contractors they bring on board. "I doubt if we're going to throw it open to just anybody and everybody," Nimtz says. A roofing contractor must have the right mix of experience, reputation and personnel for the manufacturer to consider him.

One reason the manufacturers are so particular is so that they can maintain control of their product's quality. Nimtz believes a strength of Butler's roofing system is that it is a turnkey operation, with the manufacturer taking care of everything from fabrication to installation. There is also the fear that roofing contractors may not have the skills needed to put down a standing seam system. "It takes a different type of person to put on a metal roof," says one contractor who believes that even a pre-manufactured metal system requires more skill to install properly than a built-up or single-ply roof.

A further concern of the manufacturers is maintaining a good working relationship with their present network of builders. According to Workman, the manufacturers don't want to step on their builders' toes by setting up competitors in the same area. For a contractor to break into a metal building builder's market would be "tough to do unless he wanted to go in and work a deal with one of our dealers," Workman says. He suggests roofing contractors look into puchasing metal roofing components from a component manufacturer.

Selling metal

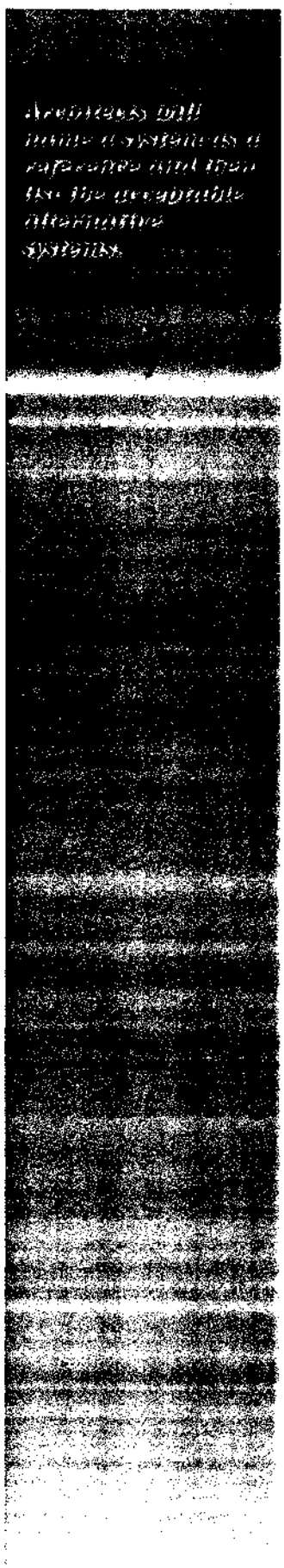
The persistent contractor may find a way to market metal, however. There are several systems available, many more than can be mentioned here; some of these systems' manufacturers may be looking for dealers in areas not already covered. Butler has signed up a handful of roofing contractors on a trial basis, according to Nimtz. And Halsell said Armco is very interested in working with roofing contractors "where the (Armco) contractor has not elected to get into the business."

Armco is moving into the roofing business much the same way Carlisle did with its single-ply system, according to Halsell. The company is using contacts who know the roofing business, such as manufacturers' reps, to find the contractors with the skills and experience it is looking for. Becoming an Armco dealer is a matter of the company going to the contractor, Halsell says.

Armco is trying to adjust to the roofing contractor's needs. Halsell states: "I think the strength of our program is the people we have in our roofing division and their knowledge of the roofing market." The company has had to learn the roofer's language. "We don't talk tonnage, we talk squares," Halsell says.

Another manufacturer is bypassing its builders altogether to market its standing seam system. Ken Cole, vice president of the Binkley Corp., says, "The standing seam roof, as far as we're concerned, has nothing to do with pre-engineered."

Getting into the standing seam roofing business may not be as easy as getting into single-plies.



It is Cole's belief that standing seam system manufacturers and roofing contractors need each other. Roofing contractors will need to add metal roofing to their lines to remain competitive, Cole says, and Binkley needs the contractors' knowledge of roofing and the market to put down successful roofs.

Binkley is still selective about who it chooses to be installers, however. To become a Binkley dealer a contractor must be in business a certain number of years, have a certain number of employees, have a good reputation and have a sufficient net worth. In addition, the contractor must attend a three-day training session to learn the art of metal roofing.

Binkley isn't the only company training its metal roofing contractors. "What we're doing is setting up roofing contractors through a two-day training seminar," Halsell says of Armco's schooling. The program shows contractors the layout design and erection of the metal roof. Butler has two different seminars, one that concentrates on marketing and another that concentrates on installation and estimating.

Beldon Roofing and Remodeling Co. recently added the Armco system to its line. McBay says the company got into metal because it frequently received calls to reroof metal buildings. A pre-engineered metal building's design makes it costly to reroof with anything other than another metal roof, so Beldon needed a metal system for those particular jobs. The company also offers a site-formed standing seam metal roof, which McBay says company salespeople will sometimes suggest to clients. Beldon doesn't actively sell its premanufactured Armco system, however. "Preformed panels we normally wait for the architect to specify," McBay says.

Frequently, architects will specify a particular company's metal system, according to McBay. This doesn't necessarily prevent contractors with other systems from bidding on the job. McBay says architects will name a system as a reference and then list the acceptable alternative systems or simply state that equivalent systems are satisfactory.

No offense

Working with a manufacturer that also sells its roofing system through its own contractors takes a little extra care, according to McBay. "It's not difficult, but it gets tricky. They normally have a certain number of dealers set up in a certain area," he says.

Beldon tries to avoid competing directly with metal building contractors. A school reroofing job Beldon is presently bidding on is a typical example of the pre-manufactured metal roofing work the company goes after. The building is not a pre-engineered metal structure, and the reroofing, for which an Armco roof has been specified, is the only renovation the building requires. Consequently, the local metal builders are not interested.

McBay doesn't see the metal roof as a major threat to other types of roofing at this moment. He estimates his company's metal work to be less than 10 percent of its business. But he does see the use of metal roofing increasing. "People are looking for a roof they can put on and forget," he states. When it comes to moving into other roofing materials' territories, however, he doesn't see metal jeopardizing BUR's market dominance. "The big fight will probably be between metal roofing and single-ply," he says.