

LOADMASTER ROOF DECKS

BY LYNN NUNLEY

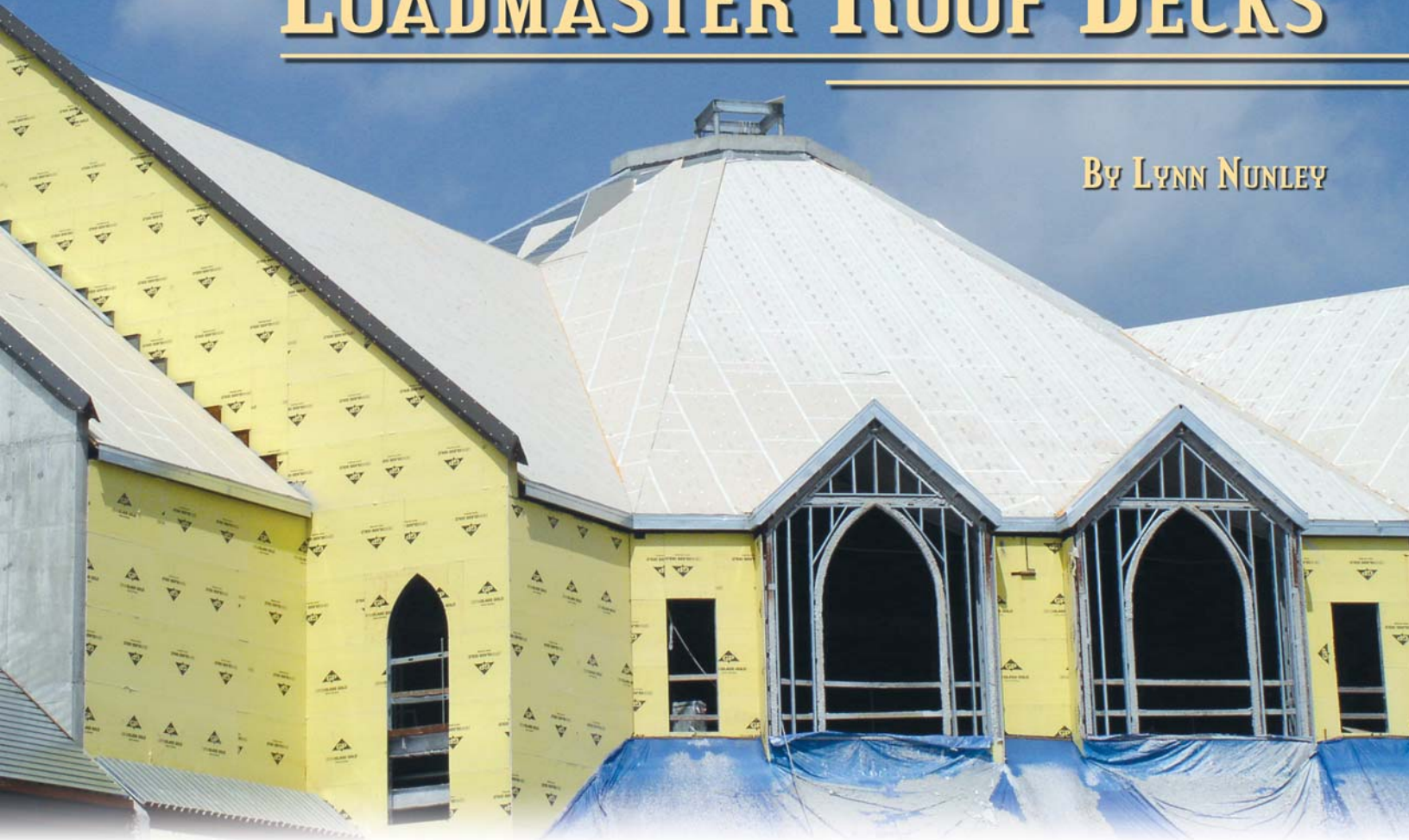


Photo 1 - Loadmaster steep-slope assembly with shingle application on a church facility.

INTRODUCTION

Prior to 1970, the vast majority of non-combustible composite roof deck systems required a wet application of standard-weight concrete over Steel B-deck, lightweight concrete over light-gauge steel deck, or poured gypsum over various substrates. Each of these products had its benefits and performed very well, but they did require a drying and curing time that, in some cases, presented difficulties in construction scheduling. Thus, there was a need for a non-combustible roof deck system with a dry application.

Through a series of tests and experimental products, the Loadmaster Roof Deck System was introduced to the construction industry in 1970. It utilized the engineering concept of composite design in a dry application through the combined use of light-gauge metal deck and a noncombustible substrate board structurally screwed together for increased load capacity and shear transfer. Within a very short period of time, this system became very popular

throughout the South in the construction of warehouses and distribution centers, ultimately providing “shade-and-shelter” roofs that were stable and offered wind uplift resistance to meet building code and insurance requirements.

As construction requirements changed and more demanding standards for roof construction developed, Loadmaster responded with additional system developments that expanded its use into higher-performance structures. It found new markets in monumental construction and experienced wide use in all phases of educational facilities, extended care structures, worship facilities, and airport concourses.

The system utilizes various steel deck sections with or without insulation, covered by various thicknesses and layers of a dense mineral board trade-named Duraflex Mineral Board. Duraflex is a unique composite board with tongue-and-groove edges. Loadmaster steel deck sections are attached to structural framing with screws, pins, or various types of welded connections.

Insulation and Duraflex Mineral Boards are placed over and attached to the steel deck sections with special screws installed in specific engineered patterns that create composite structural performance of the components. Various load distribution devices are used with the screws to improve uplift, shear, and gravity load resistance of the assembly.

Full-scale flexural and diaphragm testing of these assemblies established that composite action provides increased flexural strength and added steel deck rib stability under diaphragm shear. Thus, composite action provides added stability to the assembly under wind loads. Since both of these forces exert maximum loads simultaneously, composite action becomes a major stabilizing factor in preventing blow-offs.

Loadmaster assemblies have been installed on all types of roof structures, including steep-sloped, low-sloped, and curved. Loadmaster assemblies will be found on sloped construction with asphalt shingles, slate, tile, and standing-seam

Photo 3 – Loadmaster nailable assembly over cold-formed framing with shingle application on an assisted-care living facility.



Photo 2 – Loadmaster barrel roof assembly with standing-seam metal on an airport concourse.



metal roofing. On low-sloped structures, it has been used in conjunction with built-up, modified-bitumen, and various single-ply roofing membranes. It is used in roof assemblies that are combustible, noncombustible, fire-rated, and/or exposed.

In 1995, Loadmaster introduced its Terminator system. This consists of termination and transition assemblies for both steep-sloped and low-sloped structures. Termination assemblies are for edges, eaves, rakes, expansion joints, and parapet walls. Transition assemblies include valleys, hips, and ridges. All assemblies are constructed of galvanized steel-gauge metals and do not include any wood. They provide the structural function of resisting gravity loads at the edge of the roof assembly, act as

shear collectors for the shear resistance provided by the roof deck, and resist wind uplift pressures that produce wind peel at the perimeter of the structure. They also provide steel flanges for screw attachment of roof flashings.

Loadmaster installations are performed by licensed erectors whose workmanship is guaranteed for the life of the warranty on the system.

RETROFITTING LOADMASTER ROOF DECKS

When existing roof coverings are to be removed and new ones installed, special attention should be given to the structural requirements and the condition of the roof assembly. Due to the numerous arrays of Loadmaster assemblies, it is recommended that Loadmaster be contacted for assistance in evaluating the assembly. The type and extent of any damage will dictate the corrective steps, if any, that are needed prior to the new roof-covering installation. Damage can range from none to required removal and replacement of all components. One should note that, absent severe attachment corrosion, steel deck corrosion, or severe board damage, none of the board components require removal. All are reusable as an underlayment and/or insulation for the roof deck assembly.



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Photo 4 – Loadmaster insulated barrel roof assembly with standing-seam metal roof on an airport concourse.

Replacement of damaged components should be performed by a licensed Loadmaster erector in order to restore the assembly to its original structural performance level. Should conditions require removal of all board components, replacement of damaged steel sections, and reinstallation of board components, Loadmaster will provide engineering and specification assistance at no charge to roof consultants to meet the current International Building Code performance requirements.

LOW-SLOPED RETROFITTING

Roof covering retrofit on low-sloped structures can be accomplished in various ways. For adhered roof coverings, bituminous or single-

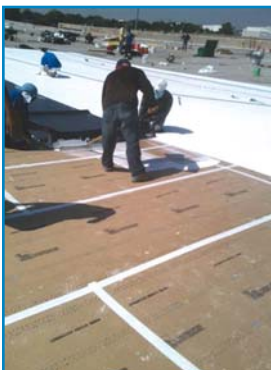


Photo 5 – Fully adhered single ply over finished Loadmaster assembly on a low-sloped roof.

ply, experience has shown the most efficient removal is accomplished by the use of powered roof cutters to cut the membrane into manageable pieces that can then be peeled up in rolls from the Duraflex Mineral Board surface. This rolling and peeling action will remove

two or three layers of the board facer and leave a relatively smooth surface. All existing insulation and board components can be left in place and need not be removed. After completion of any required remedial work, an additional layer of insulation (if desired) and a new layer of Duraflex Mineral

Board should be installed over the existing board and attached into the steel deck with the required engineered screw attachment pattern to reestablish the composite action of the components and meet required performance criteria.

Loadmaster systems are specifically designed for fully adhered hot-mopped roof coverings. Torch-applied membranes (with asphalt primer) and fully adhered single-ply membranes can also be applied over Loadmaster. Consult with a representative or the technical department for limitations and recommendations.


Most early low-sloped Loadmaster installations utilized steel deck sections that, in and of themselves, do not meet the current building codes as stand-alone deck sections. They require the composite action provided by the Duraflex Mineral Board in the correct engineered attachment patterns to meet the code. Therefore, should one specify or accept some other board in lieu of the Loadmaster Duraflex and attach it with conventional patterns, the completed assembly will not have the structural performance required and will not be building-code compliant. This can also have a detrimental effect on insurance coverage and is a liability that any prudent designer should avoid.

STEEP-SLOPED RETROFITTING

When the roof covering is nail-attached, such as with asphalt shingles, slate, or tile, experience has shown that removal with shovels and forks can damage the top surface of the Duraflex Mineral Board sufficiently to require the addition of another layer of Duraflex. None of the existing boards need be removed. The new layer of Duraflex can be installed directly over the existing surface with the required engineered attachment pattern and the new covering nail-attached using specified fasteners.

Should a standing-seam metal roof require removal, as long as reasonable care is utilized to remove the covering and clips, one should be able to install new clips and new roof panels directly over the existing roof deck. A new roofing underlayment may be required.

RETROFIT DESIGN ASSISTANCE

For existing system evaluation, design, and specification assistance, please contact Loadmaster's technical department at 1-800-527-4035 or e-mail dcobb@loadmaster.net for free technical assistance and a list of qualified Loadmaster erectors and representatives. To locate a representative, consult www.loadmaster.net. 

Lynn Nunley



Lynn Nunley is the founder and president of Loadmaster Systems, Inc. He received a BS in math and mechanical engineering from the University of Houston in 1960. In 1961, he joined the roofing industry as an estimator and later founded his own roofing, sheet metal, and roof deck business. In 1965, he purchased a perlite expanding plant and joined the LWIC roof deck industry, which led to the development of the Loadmaster Roof Deck System in 1970. Nunley has been instrumental in leading-edge roof deck technologies for over 40 years.

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"Let me help!"

Captain James T. Kirk – 1967

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