

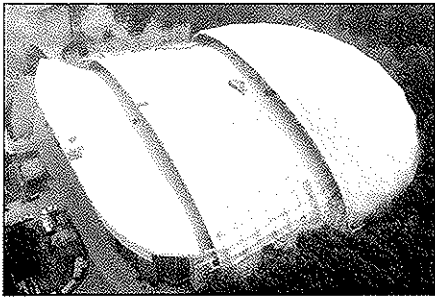
## SCAFFOLDING

# Keeping crews on the level

It's not every day that almost half the cost of a new roof is in the scaffold used to apply it. But the many slopes and angles of an expansive Princeton University gymnasium roof called for a one-of-a-kind scaffold that needed great pains to keep it on the level. In doing so, it ate up \$1.4 million of the \$3-million project cost.

The three shells that shape the roughly 400 x 336-ft Jadwin Gymnasium in Princeton, N.J., dominate the mid-60s design of New York City architect Steinmann and Cam. A half dome at the rear with a 168-ft radius and a clear span of 336 ft was the most difficult to reach. But even the middle saddle-shaped shell measures 140 ft front to back and up to 100 ft high. Though the exterior is almost all roof, no access for maintenance was provided on the \$7.6-million building.

The shells consist of structural steel arches with diagonal intermediate braces that outline a pattern of diamonds at constantly varying angles. A



Gym in Princeton, N.J., needed a new roof.

rigid insulating material topped with single-ply roofing covers the steel and forms a surface of slight ridges and valleys. The original neoprene rubber roof had already been recoated, but leaks persisted.

The current reroofing job, by CEI Midwest Inc., Brighton, Mich., involves removing the neoprene layer and gluing rolls of a felt-backed polyvinyl chloride material over the insulation. The work requires maneuvering 200-lb rolls of PVC and big tubs of glue.

It was necessary to design a scaffold that would provide level work platforms over a slippery surface with an ever-changing slope, says Alan J. Shalders, chief engineer for Universal Builders Supply Inc., Mount Vernon, N.Y., the scaffolding contractor. Also, the scaffold couldn't pierce the surface or obstruct the reroofing work. Rust dripping from the scaffold was also a concern, and the scaffold support towers couldn't block emergency exits.

The solution was to hang work platforms from a non-rusting, aluminum scaffold that consists of a series of twin-channel ribs, spaced 16 ft apart along the sloping areas of the roof. The ribs are hinged every 22 ft to conform to basic roof contours. They are located directly above and supported by the roof's main internal arches on adjustable double-legged brackets that allow the rib sections to remain at a set angle despite the irregular angles of the roof surface.

The legs of each bracket bear on a 4-ft-long cross beam with a central foot and a screw jack at each end. Neoprene pads protect the surface from both the foot and the screw jack legs. The bracket is jacked to allow the new roofing material to pass underneath it.

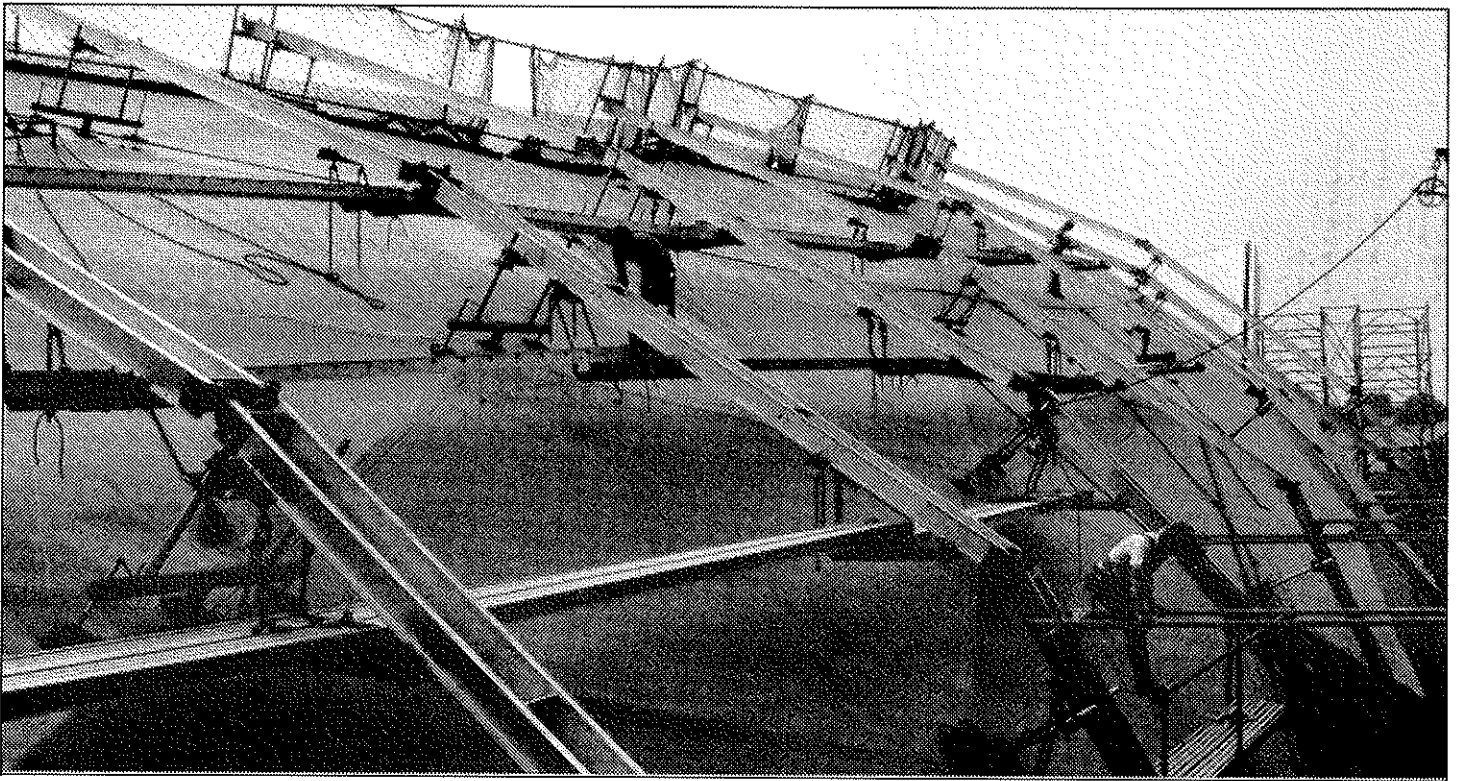
The work platforms themselves rest on short tubular arms that are connected to the ribs through a clamped bracket at one end and a chain mechanism at the other. The tube-chain configuration allows the platforms to be fixed in a level position despite the changing slope of the ribs.

Similarly, for level stairs, UBS mounted a standard-component ladder on a pair of ribs. The treads, however, are assembled into a parallelogram support system that, when fixed into position during installation, maintains level steps. This avoided different ladders for each rib section.

On each side of the gym, the hinged ribs are clamped to vertical channels that are either bolted to an existing concrete walkway or connected to the scaffold's buttress towers on the ground. The towers pick up each rib's weight and resist horizontal thrusting.

The roof's flatter areas needed safety netting only, which caught three workers who lost their footing on the slippery surface. Work that started last spring is set to be completed this month. ■

By Nadine M. Post



**Work platform ribs** are kept at set level because their legs adjust to the angles of the roof.

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