



## Ironing out the wrinkles on metal roofs

Differential stress in the metal used in roofing and wall panels can cause a condition called stress wrinkling, or oil canning. New Millennium has a solution to help iron out this problem.



*As seen here, oil-canning, or stress wrinkling, is an unsightly problem associated with several different causes but avoidable with the use of longitudinal stiffeners*

Oil canning is visible waviness in the flat areas of metal roofing and wall panels seen when light hits the metal just right. The condition — also known as “stress wrinkling” and “elastic buckling” — is a construction headache.

The aesthetic appeal of a roof can be ruined when the customarily smooth metal appears warped. This condition can occur in any type of metal panel, including steel, aluminum, zinc, and copper. However, the occurrence and severity of the condition can be lessened through several pre- and post-construction methods.

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## Causes of oil canning

Oil canning is caused by metal trying to alleviate differential stresses within itself. When metal panels have a high width-to-thickness ratio, it buckles out of plane. This produces the stress wrinkling known as oil canning. These differential stresses can be caused by a number of factors.

### 1. Coil production

Stress wrinkling can occur during coil production because of the pressure used to create metal thin enough to be coiled. The condition becomes greater as the metal's tensile strength increases. Improper storage and handling of metal can introduce stress wrinkling as well.

### 2. Metal forming

Forming sheet metal can cause stresses to be introduced to the material. The differential stresses that cause oil canning can be reduced through adjusting feed rates, designing tools properly and keeping them maintained, and fine-tuning equipment.

### 3. Structural shifting

During or after installation, if the primary structure moves because of deflection, drifting or other causes, this may induce oil-canning. Even the intentional camber designed into rafters and trusses to alleviate deflection under load can cause oil canning.

### 4. Improper installation

When roof or wall panels are not installed true to their intended coverage dimensions, oil canning can occur. Improper installation of joints and over-driving of fasteners can also be a factor.

## What can be done?

Some designers consider oil canning to be unavoidable and may even treat it as a desired effect that accentuates the metal's natural characteristics. However, there are a number of measures that designers, manufacturers, fabricators, and installers can take to reduce the likelihood and degree of the condition. Tension precision leveling, usage of heavier gauge metal, proper attachment system installation, and even the use of low-gloss finishes may help lessen the prominence of the condition.

## New Millennium's solution

The introduction of intermediate longitudinal stiffeners can help minimize oil canning and improve the structural effectiveness of the stiffened flange when compressed.

"Our 3.5-inch-deep Versa-Dek® 3.5 LS and 2-inch-deep Versa-Dek® LS ES have small longitudinal stiffeners in the middle of relatively wide bottom flanges that help us to reduce oil canning," says Vitaliy Degtyarev, Design and Research Engineer for New Millennium Building Systems. "This is true for acoustical, non-acoustical, composite, and roof profiles. The stiffeners help us achieve greater section properties in the negative bending, when the bottom flange is in compression."

For more information about oil canning and how to avoid it, contact one of our deck specialists at [www.newmill.com](http://www.newmill.com).



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