DOW CORNING

High Performance Building Solutions

Advanced Silicone Structural Glazing

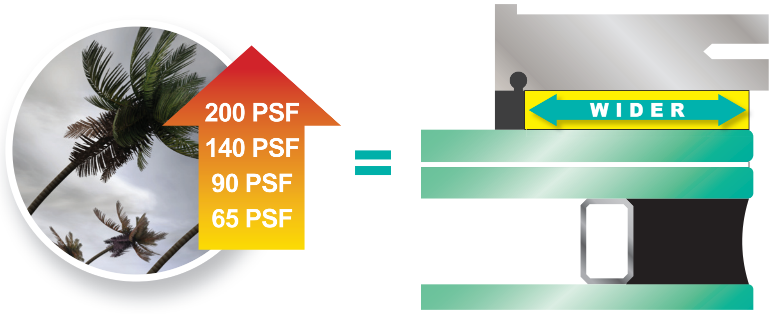
DEVELOPMENTAL DESIGN

CDC
CURTAINWALL DESIGN CONSULTING™

Features/Benefits

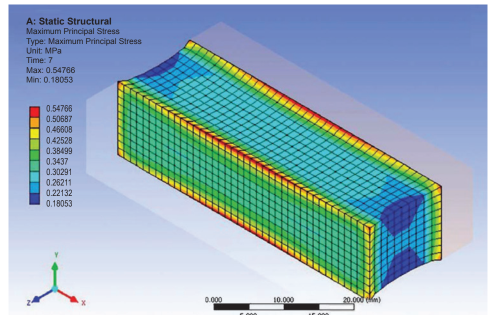
- Enables narrower mullions for high performance curtainwall designs
- Improve design aesthetics for high wind load applications
- Reduce bulky structural silicone glazing (SSG) profile dimensions in hurricane zones and high wind load designs
- Engineered design to better distribute stress under load and lower peak stresses in the structural silicone
- Increase natural daylighting by increasing vision width when mullion sizes are reduced

Higher Wind Loads Result in Increasing Sight Lines



Innovation Through Design and Engineering

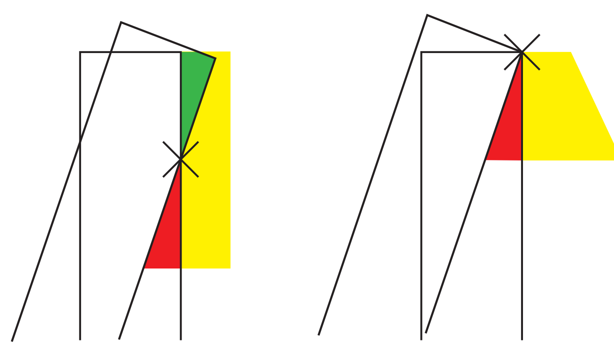
Architectural desire for aesthetically slender curtainwall framing sight lines prompted Dow Corning and CDC to collaborate to optimize silicone joint designs. Extensive computer modeling using finite element analysis was conducted on silicone joint designs.



At right: Stress distribution at 200% of allowable nominal silicone stress.

Engineered Trapezoidal Silicone Joints

In a typical curtainwall assembly, where silicone is adhered in a square cavity, the finite rotation of the glass at the perimeter seal under negative load will induce the greatest movement at the edge of the silicone joint. The concept behind the new sealant joint is that rather than force the sealant to fight against the finite rotation of the glass at the perimeter, the sealant joint is designed such that the silicone at the perimeter joint has additional movement capacity to allow for the glass to rotate more freely. FEA modeling indicates stress reduction can be achieved by allowing the silicone to rotate with the glass under large wind loads.



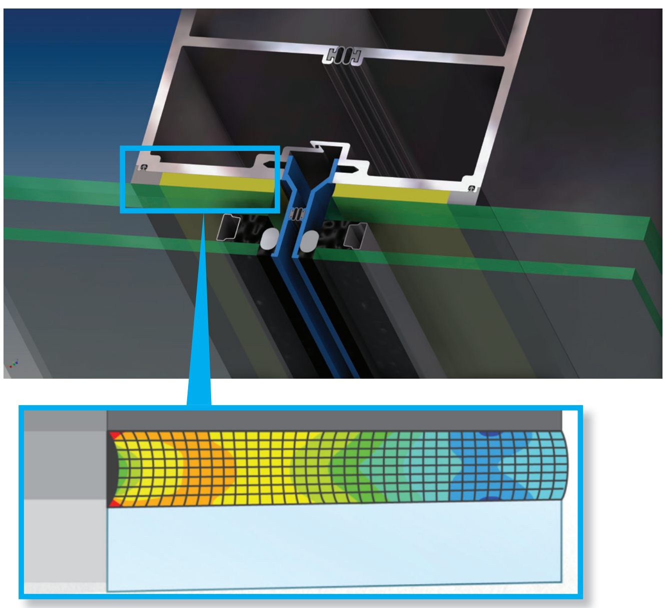
Traditional Joint *New Trapezoidal Joint*

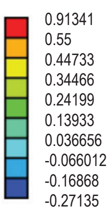
High Wind Loads in Hurricane/Typhoon Regions

Wide Mullion – Miami Skyline

Narrow Mullion – Miami Skyline

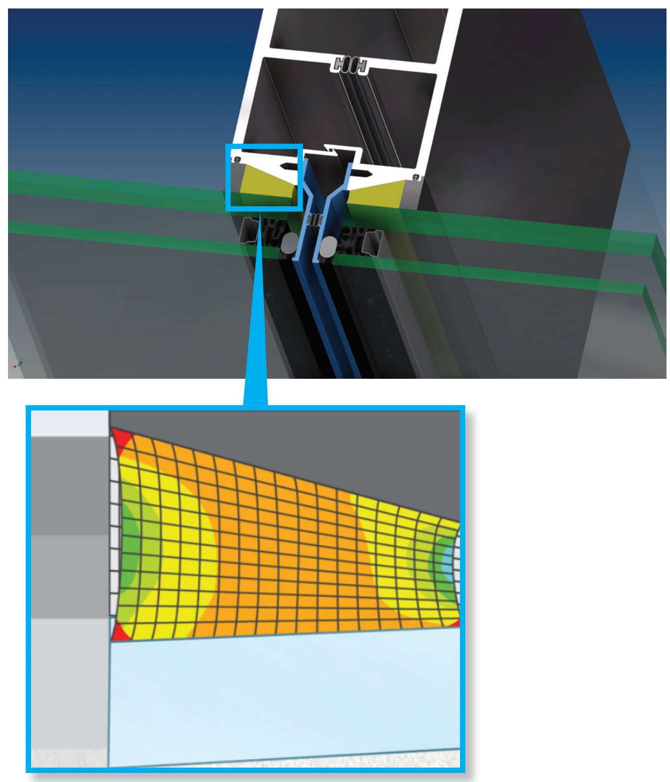
Wide Mullion at Miami Skyline Assembly

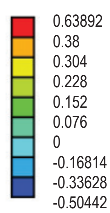




A: Static Structural (ANSYS)
Maximum Principal Stress 2
Type: Maximum Principal Stress
Unit: MPa
Time: 1
Max: 0.91341
Min: -0.27135

Narrow Mullion at Miami Skyline Assembly





A: Static Structural (ANSYS)
Maximum Principal Stress 2
Type: Maximum Principal Stress
Unit: MPa
Time: 1
Max: 0.63892
Min: -0.50442

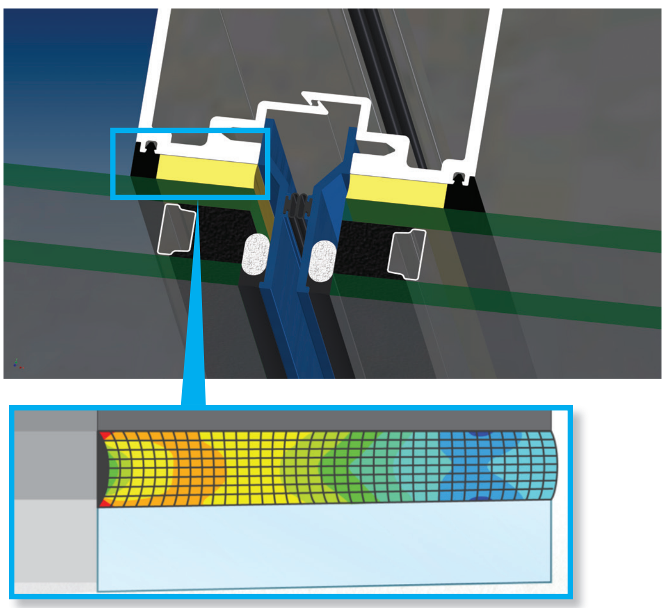
Finite element analysis confirms better distribution of stress under load and lower peak stresses.

High Rise Buildings with High Wind Loads

Wide Mullion – New York City Skyline

Narrow Mullion – New York City Skyline

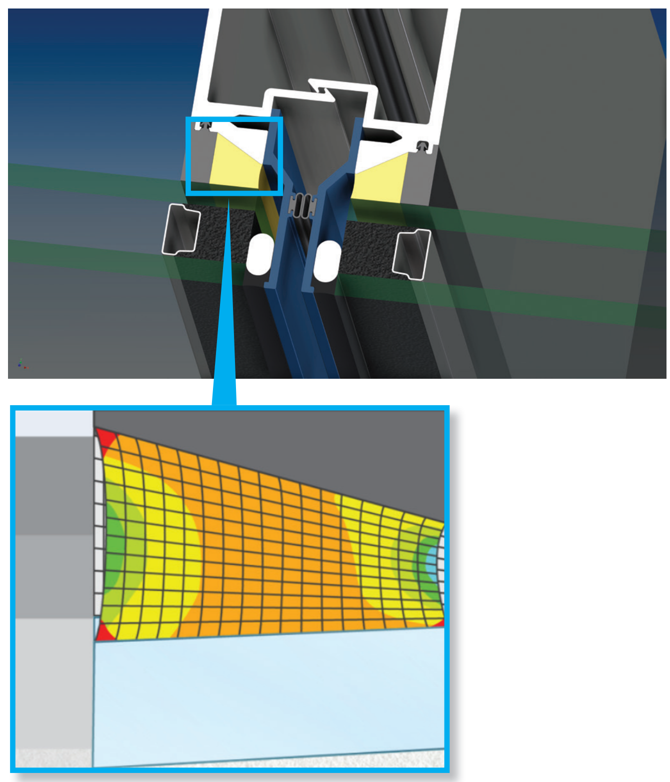
Wide Mullion at New York City Skyline Assembly



0.91341
0.55
0.44733
0.34466
0.24199
0.13933
0.036656
-0.066012
-0.16868
-0.27135

A: Static Structural (ANSYS)
Maximum Principal Stress 2
Type: Maximum Principal Stress
Unit: MPa
Time: 1
Max: 0.91341
Min: -0.27135

Narrow Mullion at New York City Skyline Assembly



0.63892
0.38
0.304
0.228
0.152
0.076
0
-0.16814
-0.33628
-0.50442

A: Static Structural (ANSYS)
Maximum Principal Stress 2
Type: Maximum Principal Stress
Unit: MPa
Time: 1
Max: 0.63892
Min: -0.50442

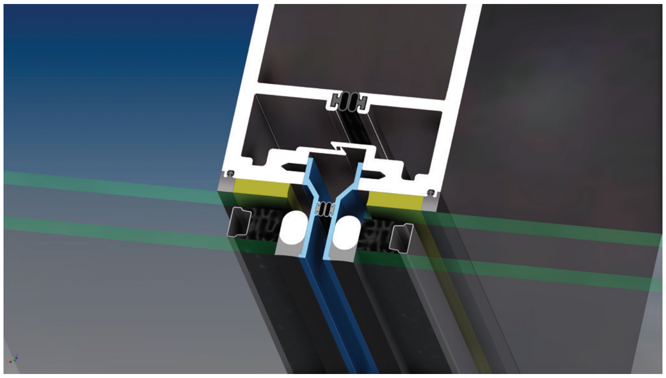
Finite element analysis confirms better distribution of stress under load and lower peak stresses.

Jumbo Glass – Lobby

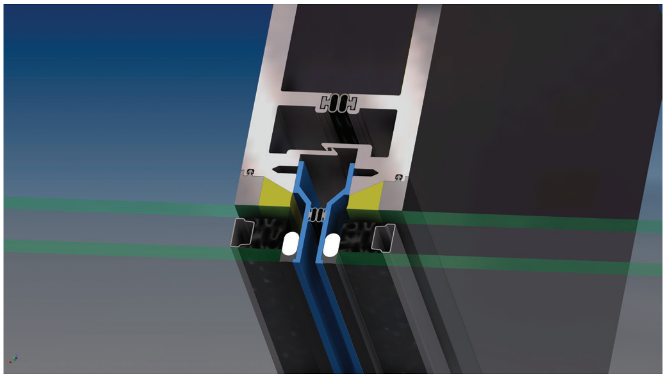
Wide Mullion – Lobby

Narrow Mullion – Lobby

Wide Mullion at Lobby Assembly



Narrow Mullion at Lobby Assembly



Finite element analysis confirms better distribution of stress under load and lower peak stresses.
For finite element analysis details, refer to the Miami analysis on page 2.

For more information

To learn more, read our related white paper, “Next Generation Structural Silicone Glazing” by Charles D. Clift, Lawrence D. Carbary, Peter Hutley and Jon Kimberlain, which is available upon request from your Dow Corning representative.

Images: Page 1 – AV25314, AV19081; Page 2 – AV25323, AV25322, AV25320, AV25321; Page 3 – AV25326, AV25324, AV25327, AV25325; Page 4 – AV25317, AV25316, AV25319, AV25318

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