STUTZKI ENGINEERING

AAMA Consultant

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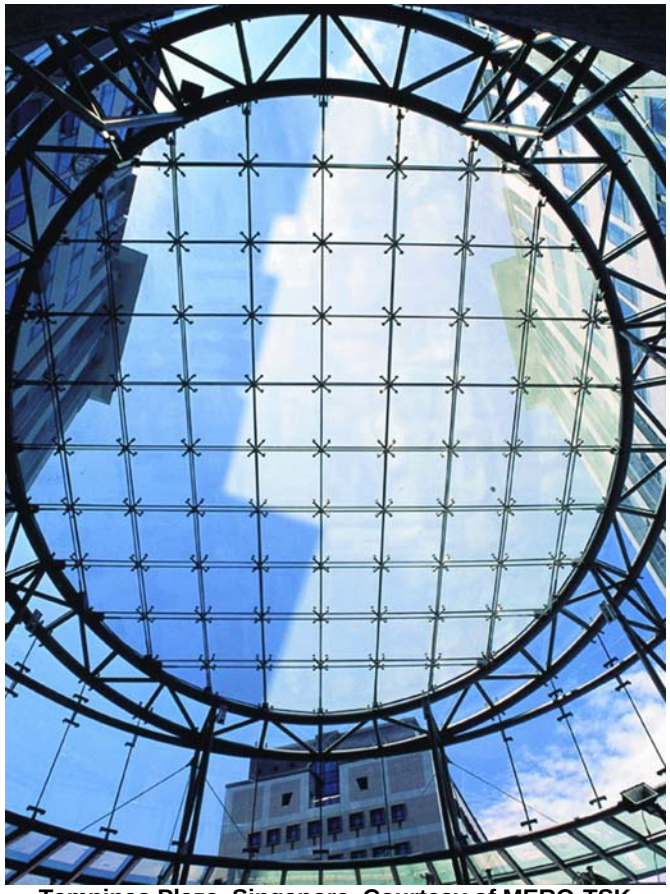
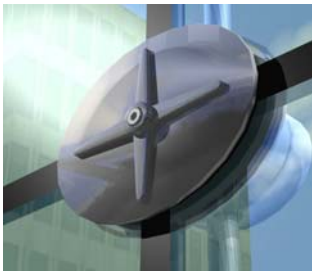
TOPIC OF THIS NEWSLETTER: Cable Nets

Concept



Tampinas Plaza, Singapore, Courtesy of MERO-TSK

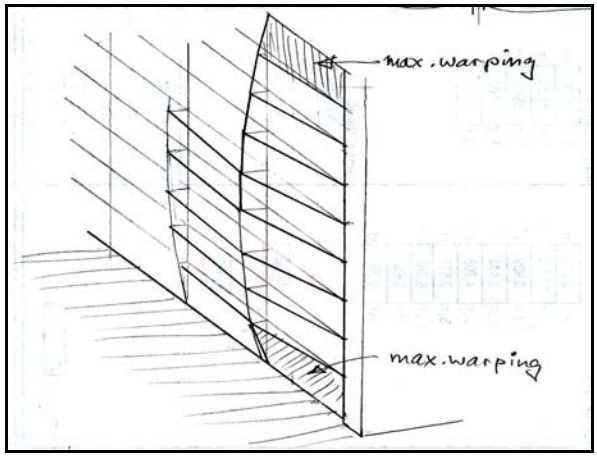
The governing idea behind cable nets in architecture is to use thin, highly pre-stressed steel cables as a substitute for wide and bulky mullions. The available daylight opening is then practically the full size of the glass.



The tensioned wire strands work like the strings in a tennis racket, they provide bending strength as a function of length and the magnitude of the tension force.

Using a tensioned wire mesh moves the supporting structure away from the glass creating an enhanced level of transparency.

The engineering challenge is that the tension forces in the cables have to be very high in order to generate sufficient stiffness. The deflections, in the range of $\Delta := \frac{edge\_length}{30}$, are still large in comparison to “rigid” systems, which are approximately $\Delta := \frac{edge\_length}{175}$. This requires careful detailing and special consideration for the glass and movement of the system.

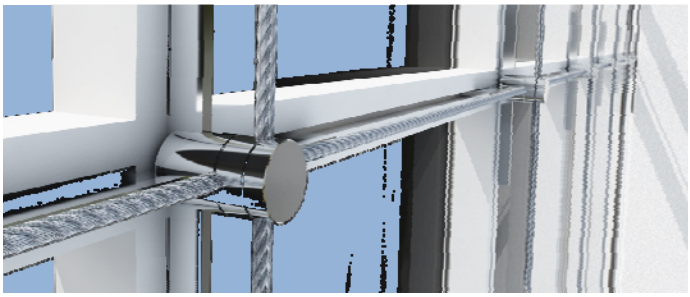


The large deflections may cause warping of the glass panels near the corners that can easily destroy the seal of insulating glass. STUTZKI developed design criteria for insulating glass in cable net walls *[Ref.1]*. This method was successfully employed in several large projects. Selected examples are:

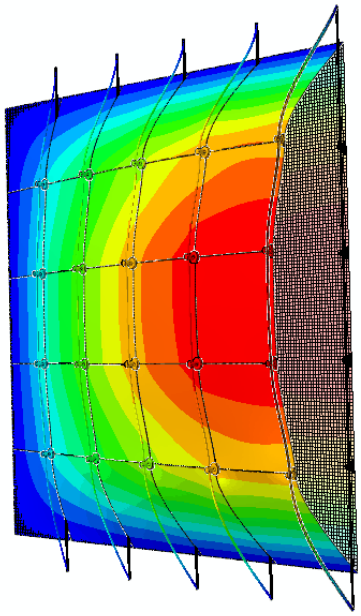
New Terminal at the Mumbai Airport; Architect: SOM

Lotte Tower II, Korea; Architect: SOM

The location of the cable nets for the Lotte Tower, above floor #125, required a unitized glazing system that could be installed from the inside, without exterior scaffolding. STUTZKI, in a team with the SOM engineers, developed the cable net and the integrated glazing system.



The combination of strength, flexibility, and transparency makes glazed cable nets an ideal candidate for glass walls with blast resistance requirements. The land side of airports is one example of a location that might have these requirements. STUTZKI offers research-based blast simulation studies, with the goal to simultaneously optimize security and transparency.



Cross section of cable net wall exposed to blast load, original position in grey

[Ref1]: Tamai, Stutzki, Buckholt, Weglarz:……. Determination of warping deformation limits for insulating glass units in cable net facades; Proceedings of the 6th International Conference on Computation of Shell and Spatial Structures IASS-IACM 2008, May 2008, Cornell University, Ithaca, NY

STUTZKI Engineering provides innovative solutions to Architects and Contractors. We specialize in the structural applications of glass products, cable structures, blast resistant design, and thermal analysis.

STUTZKI Engineering is an AAMA Consultant and a registered Small Business Enterprise.

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www.stutzkiengineering.com
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338 N. Milwaukee Street
Milwaukee, WI 53202