

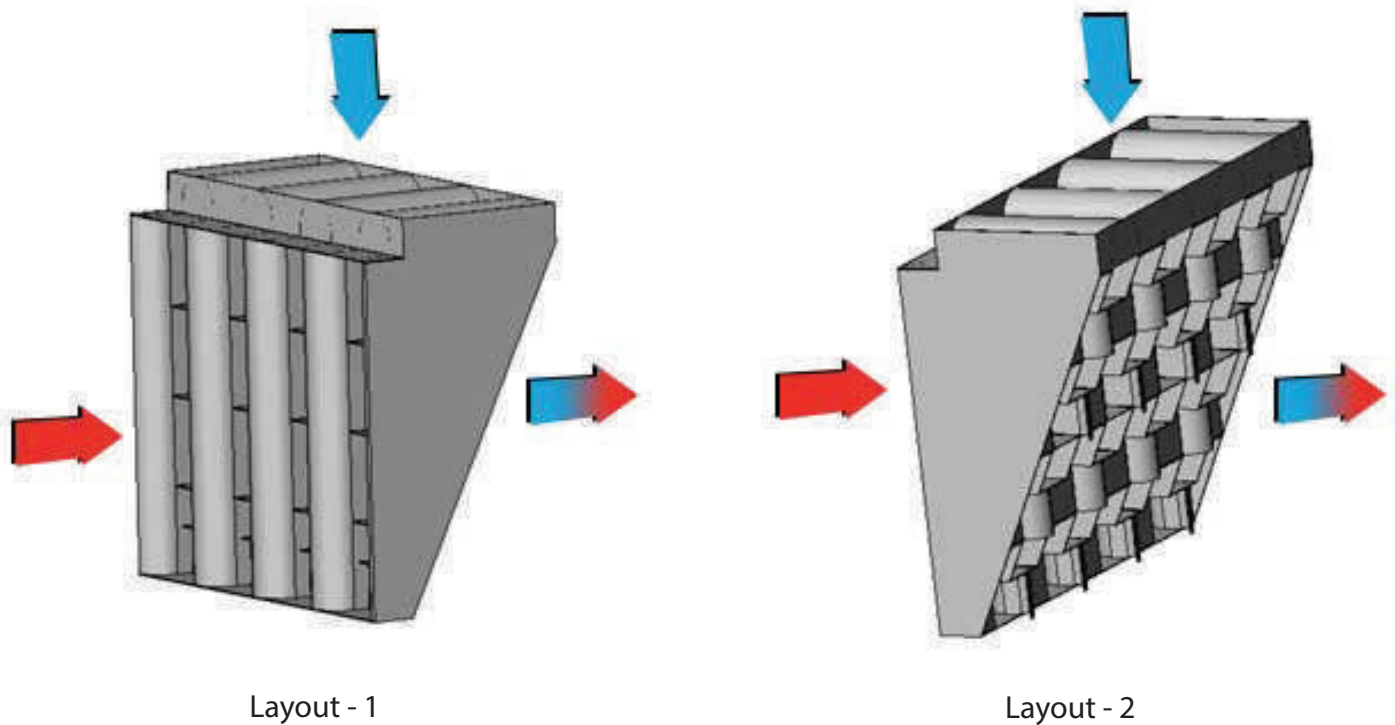


PROBLEMS OF AIR STRATIFICATION/FREEZE UPS/FAILURES

In HVAC Air Handling system, air stratification resulted from the improper design inherent in moving air streams by keeping air streams of different air temperatures from mixing effectively for a long distance. As a result, it was very difficult to effectively operate an Air handler as well maintaining the Indoor air quality. In the winter as a result of no mixing, coils often got frozen, which damaged the coil as well causing freeze stat trips and sensing errors. In summer, both streams of air were not mixed properly causing additional load on the heat transfer coils leading to large energy bills. Over time the air mixing problem became a serious matter as Outdoor air percentage started increasing as result of mandate IAQ requirement.

CURRENT PROBLEMS VS. EFFECTIVE ECONOMICAL SOLUTION

We have seen many solutions adopted in the market to resolve the problem of air stratification and nonmixing of two temperature air that were brought into a given space. Earlier glycol additives were used to prevent frozen coils, dampers, high velocity jets, baffles and specially designed apparatus were conceived to help in mixing. In each case use of a technique slacked the capacity of the air handler like lower capacity, higher pressure drops and increase of motor horsepower. Some custom designed mixers were offered in the past to improve mixing criteria however it was found that air was forced to pass under high velocity through narrow chamber. These mixers required more downstream space, non-uniform velocity profile and high pressure drop. Also, it was seen that non uniform velocity caused additional pressure drop at the downstream components like coils, filters etc.



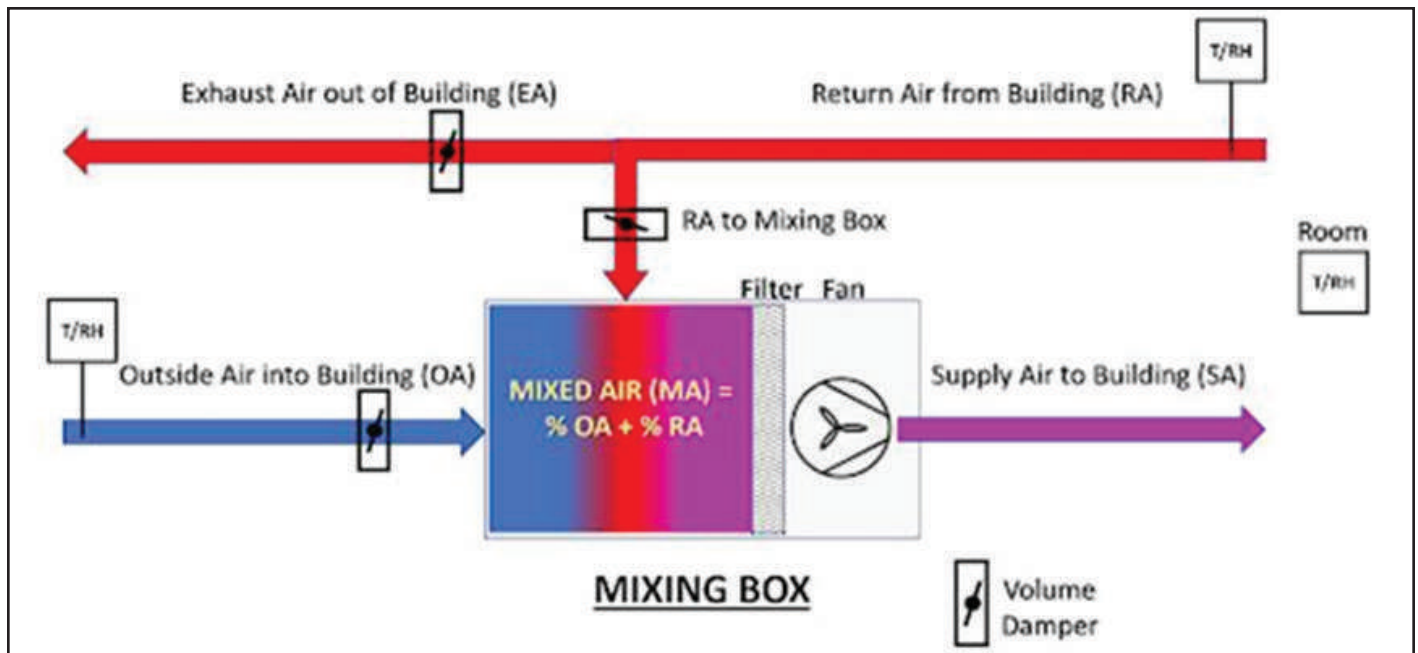
GEOMETRY AND MECHANISM

EB Air Mixer provides a full solution to reducing air stratification in the plenum. The design was conceptualized by looking at existing problem and devising solution that best fit the market requirement at an affordable cost. Various programs were used and was studied to see what design and size worked the best. Few principles were considered,

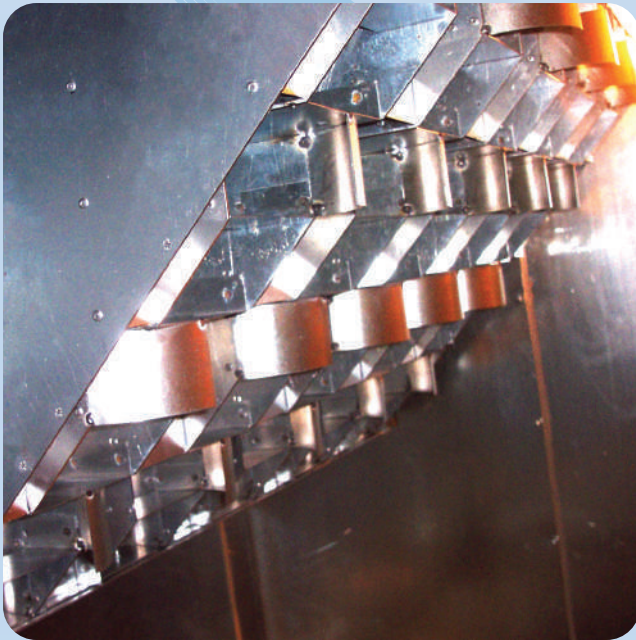
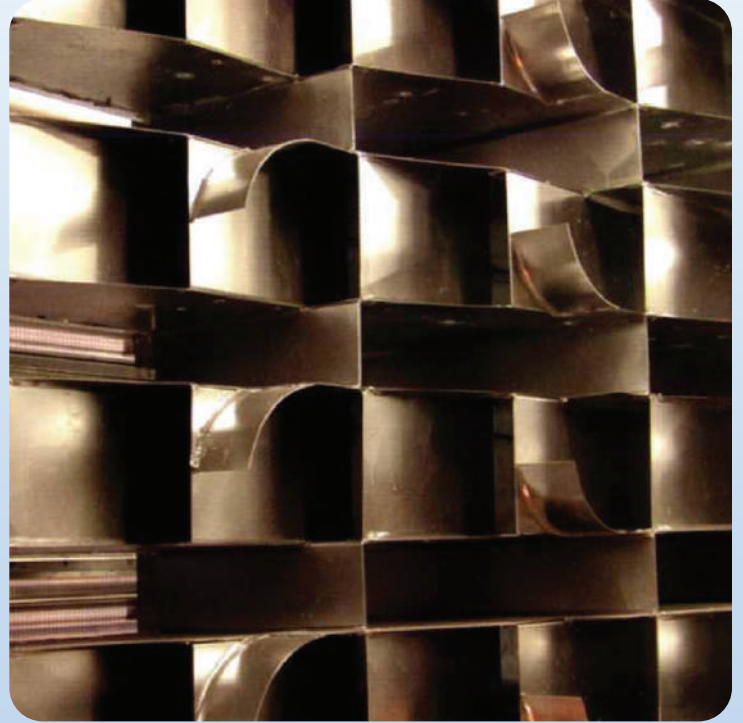
- a. Layer by layer meshing of two gradients of air across the full plenum.
- b. Effectively churning the air within the Plenum/ box itself without requiring additional space
- c. Optimizing the flow field with high ratio of mixing per unit of air.
- d. Energy savings

In present case, the new design allowed to bring air from the side of the plenum effectively at the same time able to mix warm and cold air effectively inside the whole cross section of the mixer with minimum fallout of temperature and mixing. The mixing takes help with thermal dispersion across the thin sheet metal wall inside the mixer along with aerodynamic braiding bars to accentuate mixing within a short distance. This combined with effective mixing and low pressure drop makes the unit a suitable choice for most AHU manufacturers. The mixing device is one of the most effective means of stirring air as well uniformly mixing two gradients of air temperature homogeneously without causing abrupt temperature blocks in certain areas at the entry to the coil. The downstream area is of the mixing device is shorter than standard mixing devices in the industry given only 2-3ft of distance is required to optimize mixing without causing stratification. The Mixing device uses alternating layers of Cold (O/A) and warm (R/A) passageways. The R/A is then directed towards the O/A using diverters located on alternate R/A passageways.

If the O/A and R/A dampers be located on the sidewalls of the mixing plenum; then the design must ensure that bottommost passageway is dedicated to the R/A so that cold O/A does not stratify the bottom and thereafter free the coils. Alternately, if the O/A is on the side wall and R/A is on the top (or vice versa) then it must be checked that there are no outer passageways on the edges of the mixer where the O/A is not mixing with R/A (Return Air is not deflected toward that passageway, if so the opening passage to be blocked). (Alternately EB Air innovative Mixer allows air to be churned at a certain speed by braiders/petals allowing complete mixing without any block of unmixed air. EB Air Mixer is designed and also suited for heavy mixing with control mechanism that adjusts to changing conditions) Noise of the mixing device should be checked for low attenuation requirement. Special acoustical media can be embedded in the construction to prevent any unwanted noise breaking out of the device. For details on design and selection, contact factory.



- Energy Savings
- Low Installation Cost
- Overall Better Payback and Investment
- Units Available for Old and Retrofit AHU Installations
- Helps to provide ideal indoor comfort



For details and information on design assist,
contact **EB Air Control** - info@ebaircontrol.com

EB AIR CONTROL INC.
MANUFACTURERS OF INNOVATIVE HVAC PRODUCTS

www.ebaircontrol.com



ISO 9001:2015
CERTIFIED



Precisely Right.
KTA 1401 Certified
(Nuclear Safety Standards)