Ventilation Control In Terminal Units With Variable Speed Fan Control

By: John Murphy, an applications engineer with Trane, La Crosse, Wisconsin
ASHRAE Journal, December 2013 pages 12-19

Comments January 17, 2014
by: Dr. S. A. Mumma,
Prof. Emeritus Penn State University & ASHRAE Distunguished Fellow

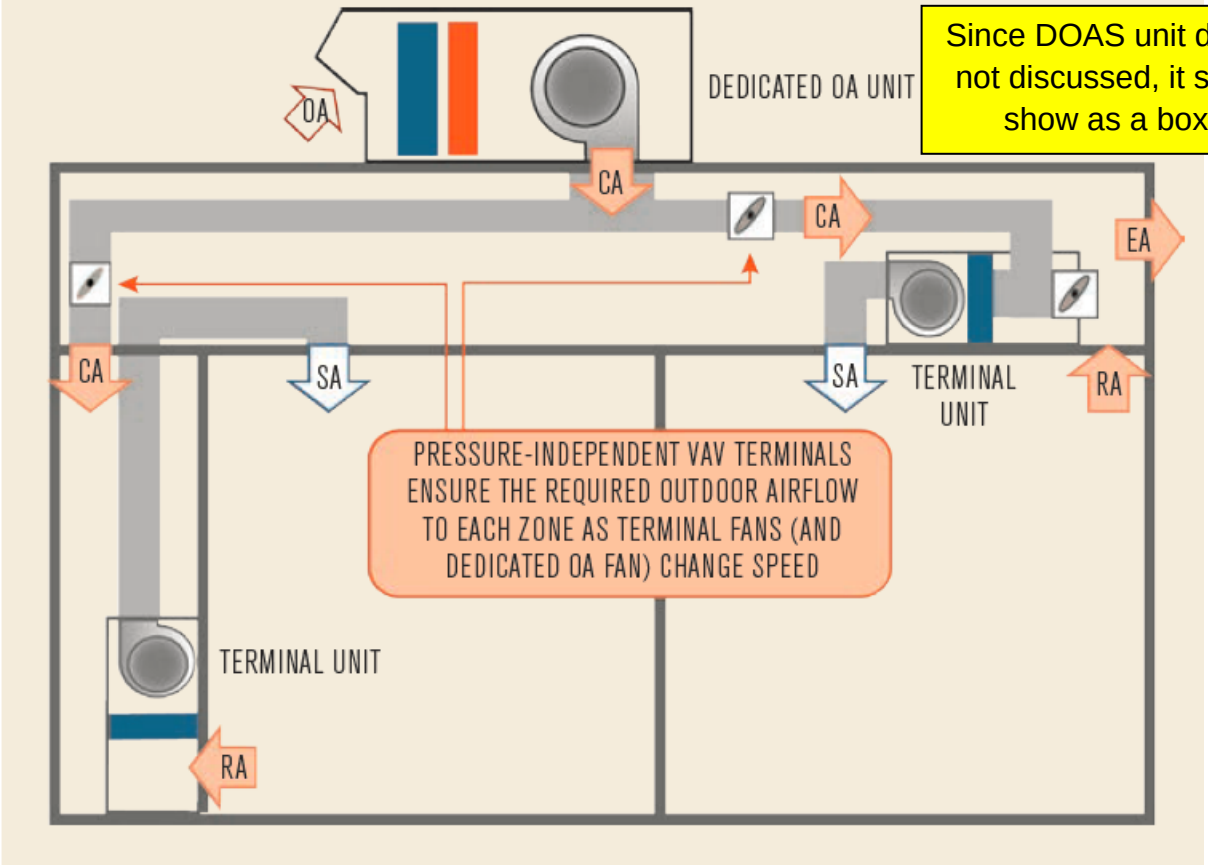
The article presents useful information. However it leaves several incorrect impressions.

Incorrect impression 1:
The author's Figures in this article, and others of his papers, depict a Dedicated OA unit (DOAS Unit) consisting only of a cooling coil, a reheat coil and a fan. ASHRAE Std. 90.1 almost universally requires total (sensible and latent) exhaust air energy recovery (TER) for USA locations east of the Western Continental Divide which runs along the crests of the Rocky Mountains. In addition to the use of TER, DOAS units are also manufactured using many other configurations applying for example desiccants, sensible heat recovery etc. So to avoid this highly restricted incorrect impression, DOAS units should only be shown as a properly labeled box unless the unit's contents are the subject of the article.

Incorrect impression 2:
Conditioned DOAS air (CA) should not be introduced at the discharge of the terminal unit ***is implied*** by its lack of discussion or illustration in this article. This is most unfortunate since there are major benefits to this parallel arrangement of the DOAS unit and the terminal units. The benefits are discussed in Mumma's article: Terminal Equip. w/ DOAS. Series vs. Parallel.

Article Figure 3 below should be selected only as a last resort. The arrangement is made thermodynamically inefficient by placing terminal unit cooling coils in ***series*** with the DOAS unit CA supply.

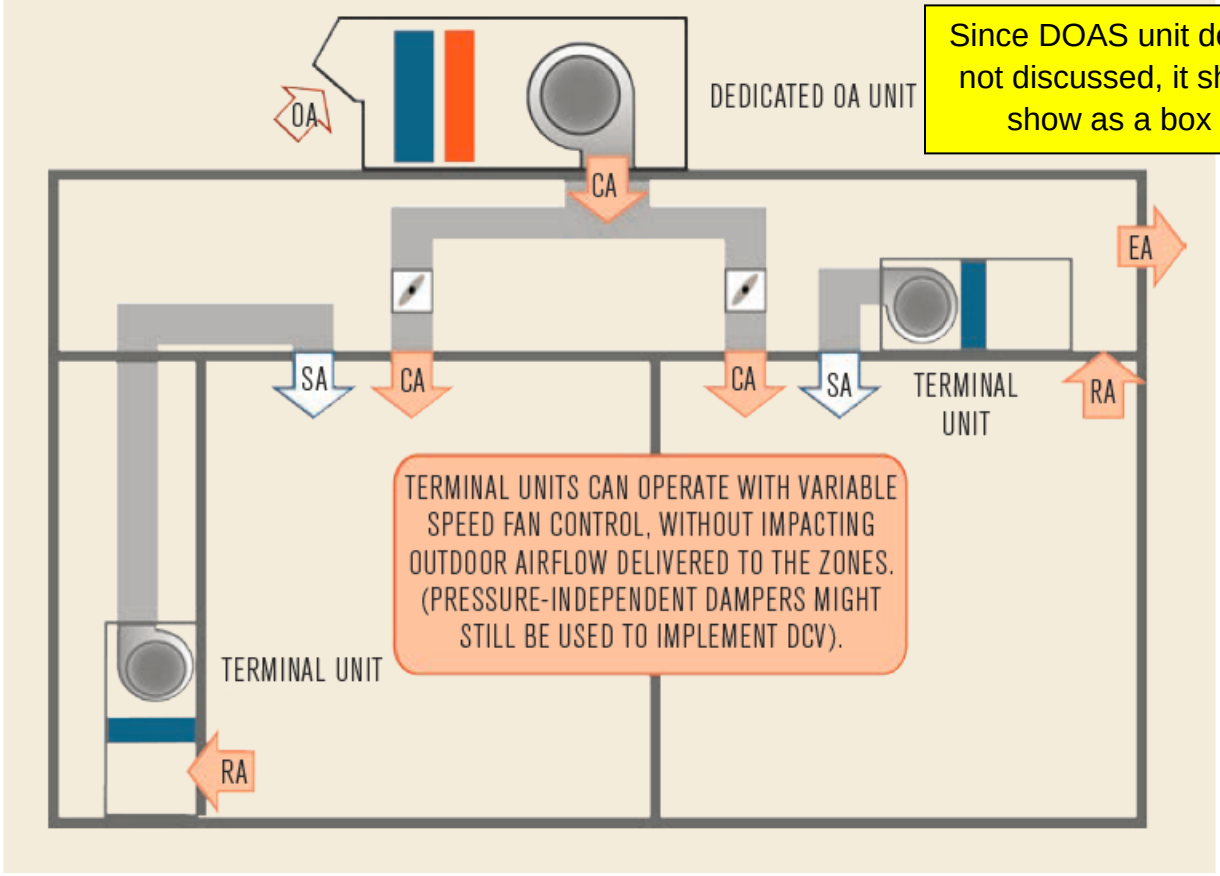
FIGURE 3 Conditioned OA delivered to the inlet of each terminal unit.



Since DOAS unit details are not discussed, it should be show as a box only.

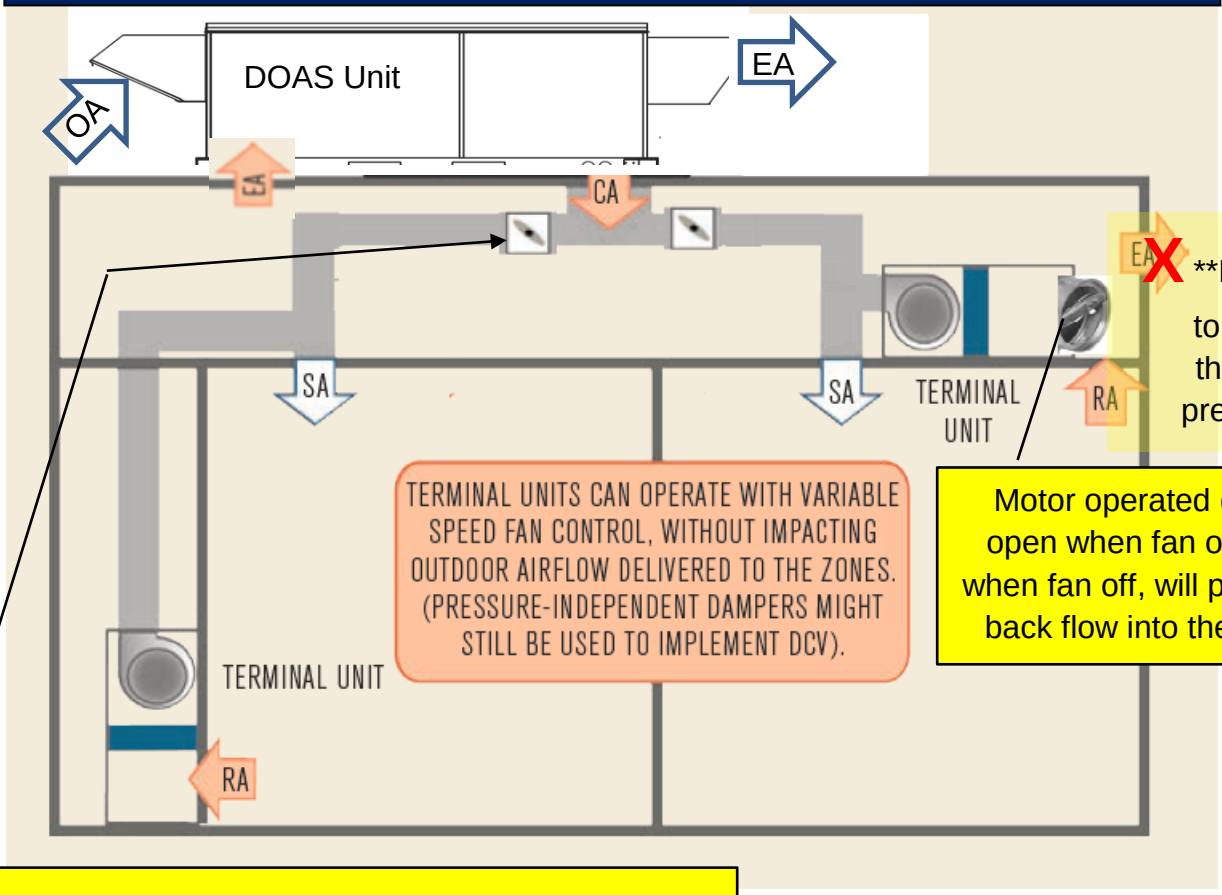
In an effort to rectify the inefficiencies of the series arrangement, the author included Figure 4 below in the article. This is a fine arrangement, but for small spaces the arrangement often makes extra diffuser placement problematic. Unfortunately, the author did not illustrate how to achieve parallel DOAS CA and terminal coil placement and overcome the problematic diffuser issue. Mumma has added below a “Modified” Figure 4 illustrating how this can be achieved.

FIGURE 4 Conditioned OA delivered directly to each zone.



Since DOAS unit details are not discussed, it should be show as a box only.

Mumma Modified Fig. 4: DOAS CA delivered to terminal unit discharge



**EA returned to DOAS unit; this flow is for pressurization.

Motor operated damper, open when fan on-closed when fan off, will prevent CA back flow into the plenum

Need not be VAV boxes. Control dampers must have authority over full range of CA flow. For acoustical reasons position back from diffusers.

Note: An alternative to “pressure independent” is “flow (i.e. thermal dispersion) measurement” controlled dampers.