DBBS. Technology *Advancing Building Energy Innovation*

# HVAC DESIGNERS' CONUNDRUM.

Denering Berrio – HVAC Specialist - DBBS Technology January 12, 2019

HVAC Engineers today are confronted with the daunting task of designing systems to perform at maximum capacity that can also excel at part-loads. But, under existing design practices and the current state of technology for system piping networks [hydronics]; favoring system Water-Mixing conditions, that is not possible.

Water-Mixing in system hydronics arises from the encountering of boiler(s) hot-water supply with system colder-water returns. Increasing temperature in resulting mixed-tempered-water is the major threat to boiler performance operation, while poor system Thermal-mass, Mixed-Water temperature signaling, and their effect on boiler cycling are the real culprit of overall system efficiency. Boiler cycling is not a simple phenomenon, it arises from the interactions that take place between two or more of the processes described above. There are system conditions that arise from optimal performance of the heating system's terminal units and/or Domestic Hot Water [DHW], and there are system conditions that are optimal for efficient boiler(s) performance. Under the current state of technology, these two set of conditions are rarely, and perhaps only accidentally, the same. What is optimal for the former is usually not optimal for the latter, and vice versa. Attempts by designers to accommodate the needs for the boilers when designing system hydronics can; and often do, compromise the performance of their systems. Ignoring the needs of the boiler creates cycling, and the energy lost from it often serves to undo the gains made by state-of-the-art system designs.

A designer must acknowledge that in reality there are two systems being designed – the building heating system and the boiler plant – and that their requirements are always different, usually different enough to make that difference almost irreconcilable.