Commissioning (Cx) a building is like a person going to the doctor for a checkup.

While buildings — like patients — may look fine on the outside, their overall health cannot be determined without measurements, tests and exams conducted by specialists with the proper training and experience to analyze results and recommend proper treatment plans.

Cx begins when a building is just an idea, a drawing or schematic. It is a systematic process of verifying and documenting that a facility and all of its systems and assemblies are planned, designed, installed, tested, operated and maintained to meet the owner’s project requirements. Ideally the commissioning process begins in predesign, continues into the warranty period for a minimum of one year after construction, and involves the proper preparation of operations personnel. Unfortunately, most buildings have never gone through any such a preventive medical exam, and therefore perform well below their potential.

Retro-commissioning (RCx) is when a building undergoes the Cx process after the building has been constructed but performance has degraded. The building’s processes and systems are tested and tuned to perform optimally. Low-cost and no-cost improvements such small repairs and set-point adjustments as well as energy conservation measures and reliability enhancements are determined and implemented.

Cx and RCx focus on the ability of facility systems — HVAC, electrical, controls, IT, baggage handling, building enclosure and many others — to function the way they’re supposed to according to the needs of the owner and occupants. These are critical factors in the effective operation of a facility that affect its energy consumption and operations and maintenance costs as well as its overall environmental comfort for its occupants.

An owner may ask: Do my buildings need commissioning? Among obvious factors that often lead to a resounding yes: rising energy costs or a catastrophic failure, a visible consequence of poor or no maintenance. But often the culprit is...
more insidious: While a poor or deteriorating building envelope can lead to greater volumes of outdoor air being drawn into a building — wasting large amounts of energy for heating and cooling — the problem can go unnoticed. If the building’s systems have the capacity to handle the increased energy volumes, after all, why would anyone suspect something was wrong?

According to the National Institute of Building Sciences’ Whole Building Design Guide, one of the main benefits of implementing Cx or RCx is cost savings. Cx produces a monetary and emotional return on investment with reduced energy costs and peace of mind in the form of reduced change orders, reduced contractor claims, reduced contractor callbacks, avoided project delays, improved project scheduling, improved documentation development and improved communications to keep the project team focused on properly turning over a facility. RCx produces a monetary and emotional return on investment through energy savings, increased reliability and decreased liability. Once the energy savings begin to be realized, the payback period represents the amount of time before RCx pays for itself and even begins to produce a return on investment.

A recent RCx effort of a large metropolitan airport revealed more than 2,600 operational, maintenance, condition and infrastructure deficiencies, including poor-performing air handling units, inadequate lighting controls, simultaneous heating and cooling, and degraded building enclosure systems. This airport checkup resulted in an RCx strategy for prioritizing and correcting problems and optimizing systems so that they operate in an integrated manner, which created the opportunity for a 173 percent return on investment for the airport.

Brian Lindstrom, PE, DCEP, is the national director of commissioning for Burns & McDonnell, and David Meyers, AIA, CxA, PMP, LEED AP, is a regional manager of commissioning for Burns & McDonnell.

TREATMENT PLAN

Checklist for retro-commissioning a building:

- **Plan.** Interview the patient, decide which systems should be analyzed and assign responsibilities.

- **Investigate.** Determine how selected systems are supposed to operate, implement a diagnostic monitoring plan to benchmark current conditions, perform functional testing, prepare a prioritized list of recommended solutions.

- **Implement.** Correct the highest priority operating deficiencies and verify proper operation.

- **Hand off.** Measure and report improvements made and show the building owner how to sustain proper operation and wellness.