

Running an efficient building has many benefits including reduced operating expenses, prolonged building life, and satisfied tenants, yet there are barriers to achieving this goal for a single building, let alone a portfolio of diverse facilities. To address this challenge, Pacific Medical Buildings (PMB) engaged Altura to develop and implement a program designed to systematically identify and implement energy efficiency measures across their portfolio.

Early program results have delivered energy cost savings of **over 20% per building**, representing annual **cost savings of more than \$65,000 across just two buildings**. As a result, PMB is benefiting from lower operational expenses for each commissioned facility, which positively impacts the bottom line and allows PMB to keep lease rates competitive.

The Process

Altura's **Connected Building Commissioning (CBCx)** process has four key components:

- **Discover** – Building asset information and performance data are collected, analyzed, and benchmarked.
- **Connect** – Remote access to building management systems (BMS) is established to unlock stranded data, improving visibility of building performance.
- **Implement** – Based on results of the data analysis, adjustments are made to building systems to improve performance, maximizing energy savings and occupant comfort.
- **Train** – Building operation staff are given the tools and techniques necessary to ensure that system performance and operational cost savings persist over time.



*St. Joseph Medical Tower
Orange, CA*

1. Discover: Analyze Current Operations

In this initial phase, the project team visited the buildings, met with key staff and tenants, and gathered data to gain a better understanding of building systems, performance metrics, and known issues. This information was then used to benchmark building performance and establish a foundation for prioritizing improvement measures and next steps.

2. Connect: Unleash Stranded Data

Throughout the Connect phase, data from the building management system (BMS) (which controls HVAC, domestic hot water, and lighting control systems) was extracted and analyzed. Building upon the foundation established in the Discover phase, the Connect phase enabled a deep understanding of systems performance and the discovery of improvement opportunities.

Using a remote fault detection and analytics platform known as SkySpark, a detailed set of building and system-specific “rules” were developed for each facility. Using this system, the project team was empowered with the ability to cost-effectively analyze and identify issues across thousands of data points for all building systems.

This process allowed the team to uncover issues which might otherwise have gone unnoticed, or been deemed too time consuming to troubleshoot. In the following example, a rooftop HVAC system for one of the facilities was experiencing a high frequency of cycling due to poor system tuning and control.

With a relatively simple fix (new control logic and tuning parameters), the system was tuned and tested to decrease the cycling frequency. As a result, the equipment is now at a much lower risk of failure, comfort control is improved, and operational costs were significantly reduced.



Figure A: Before and After Supply Air Temperature Control. Note the significant cycling of supply air temperature from the unit before the changes. As a result of the improvements, occupant comfort is greatly improved and the lifetime of compressors is extended.

3. Implement: Tune for Increased Performance

Using data gathered and organized during the Connect phase, the project team was able to take action and implement improvements. Implementation activities were not static, but were iterative to ensure optimal solutions for both energy performance and occupant comfort.

Once issues were identified and a fixes implemented, SkySpark was used to watch the resulting performance and ensure the dual goals of energy optimization and occupant comfort were attained. This involved continued “tweaking” of the controls parameters around the new sequences of operation, which were accomplished through a combination of the remote BMS access and performance analysis in SkySpark.

In the following example, trend data from a facility collected from the automation system revealed several problems, including an early-morning drop in static pressure (item 1 in Figure B) and erratic operation of the return fan (item 2 in Figure B).



Figure B: Initial Fan Speed and Static Pressure Control

By adjusting the controls parameters for operation of the return fan, consistent static pressure was achieved (item 3 in Figure C). Also, the return fan is now tracking the supply fan with an adjustable offset, thereby eliminating frequent and inefficient cycling (item 4 in Figure C).



Figure C: Current Fan Speed and Static Pressure Control

4. Train: Persistent Savings through Training, Support, and Documentation

Performance improvements cannot be maintained in the long-term without proper training and support. PMB's program includes continuous training for staff on the use of the tools, techniques, and operations procedures to ensure they can continue to optimize performance and identify issues in the future.

Additionally, because no two facilities or building operators are alike, it is necessary to have a unique systems manual for each facility. These "go-to guides" provide resources for building engineers to make quick and meaningful operational decisions when alerted by the systems, staff or tenants. The manuals each include a thermal comfort decision matrix, which allows building operators to perform root-cause analyses when responding to zone temperature control issues or comfort calls.

The combination of training on the CBCx process and systems manuals significantly "raise the bar" for performance of the facility, and ensures the preservation of energy efficiency measures by building capacity for operators to identify and troubleshoot issues in the future.

Conclusion

PMB's connected building commissioning process has delivered strong results and led to **increased energy efficiency, lower operating expenses, lower tenant costs, and enhanced operator training**. Since most of the energy efficiency measures are low- or no-cost operational changes, **the investment required for this program is relatively low, while returns are high**. This is especially true when considering the other long-term benefits of running an efficient facility: longer equipment life and lower total maintenance costs.

Commissioned buildings have also seen significant **declines in the frequency of comfort calls from occupants, coinciding with marked improvements in tenant satisfaction**. Additionally, systemic operational issues, such as equipment cycling and premature failures, have been resolved, thus reducing lifecycle operating costs.

Over time, as data analytics become more sophisticated and operators receive more training, PMB will continue to achieve even deeper savings and increase property values across their portfolio.