

The Marriott Retrocommissioning Program

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Synopsis

Marriott International, Inc. is a leading worldwide hospitality company with over 2,700 lodging properties, totaling approximately 490,500 rooms, including over 8,000 vacation ownership villas, in the United States and 67 other countries and territories.

During the 11th National Conference on Building Commissioning, the successful RCx testing activities performed on the Marriott's Rancho Las Palmas Hotel in Palm Springs piqued the interest of Marriott's Engineering Team and inspired the development of the Marriott Retrocommissioning Program (MRCx). The follow-on pilot project at the LAX Marriott is helping to prove to Marriott hotel owners and Marriott Internationals upper management that saving energy through performing RCx on selected hotels throughout the U.S. could increase hotel profitability as well as increase guest comfort.

The Marriott's approach puts facility staff in the driver seat, uses sweat equity to reduce costs, and strategically engages third-party assistance. In this method, the commissioning consultant and other contractors are resources that are wisely integrated into a project where they can provide the most benefit.

Skilled, willing, and available building engineers along with a supportive and involved facility management staff, who encourage creativity within the ranks, are two key ingredients for obtaining a successful in-house RCx program. Based on evidence thus far, the Engineering Team is convinced that moving ahead with their MRCx Program is a sound energy and facility management strategy and will eventually become business-as-usual for Marriott International.

Why did you initiate in-house commissioning?

Prior to the 11th NCBC held in May 2003 at the Marriott's Rancho Las Palmas Hotel in Palm Springs, California, the hotel's Facilities Manager was asked if he would allow a team of commissioning providers to do a modified RCx exercise as part of the conference activities. After some discussion, he was convinced of the value and agreed. During the conference, RCx tasks were carried out by a team of conference attendees, led by David Sellers of PECEI, to determine if there were cost-effective operational improvements that could save the hotel energy and improve comfort. The results were reported out at the lunch on the last day of the conference. Altogether, there were 27 findings having an estimated total energy savings that ranged from \$52,000 to \$90,000, with an estimated simple payback of less than three years. The Las Palmas RCx exercise demonstrated to the Marriott Facility Team that implementing RCx could reap comfort benefits for their guests, and save energy.

Who were the catalysts - VPs, managers, technicians? What did you do to get started?

After the success of the RCx activities carried out at the Marriott's Rancho Las Palmas Hotel, a taskforce of Marriott facilities engineers was formed by Marriott's Western Region Vice President of Engineering, Rob Bahl, and Marriott's Regional Director of Energy, E.J. Hilts. The taskforce is comprised of staff from Marriott's Engineering Team, including: Tracy Tomasek, Doug Rath, Paul Beyer, Steve James, and Jake Cormier. The goal of the taskforce is to develop an RCx program that could be deployed throughout the Western Region's facilities by 2005.

What is the process you are using now? Describe it.

E.J. Hilts, Marriott's Regional Director of Energy, is responsible for spearheading the Marriott's Retro-commissioning Program (MRCx). Because of the Facility Team's high level of skill and commitment to O&M excellence, Marriott decided to develop an in-house RCx program using the "minimum use of third parties for the maximum benefit" approach recommended by PECEI. In this approach, the facility staff is an active partner with the commissioning provider (Cx Provider) from developing the program design through performing follow-on activities that ensure the persistence of the RCx benefits.

The Facility Team's tasks may include utility bill analysis, benchmarking, data gathering, and performing easy-to-fix O&M work, as well as, on going tracking of benefits. The third-party Cx Provider leads tasks such as design review, identification of hard-to-find operational improvements, and identification of the root cause of problems, data analysis, and development of systems drawings. The implementation of measures that are beyond the staff's expertise are done by service or control contractors. Even when third-party services are engaged, the facility staff remains closely involved in the process as part of their training and quest to learn and take on more of the RCx tasks over time.

The MRCx Guide describes how the process should be applied in the Marriott population of hotels. The Guide, shown below in Figure 1, is based on the Oak Ridge National Laboratory's publication, A Practical Guide for Commissioning Existing Buildings (RCx Guide), published in 1999. The RCx Guide was selected as a model because it was developed specifically for owners of large commercial building, institutional owners, and private owners with multiple facilities.

Figure A: MRCx Guide



Although the Program encompasses tune-up procedures, it goes beyond quick-fix solutions to systematically optimize the hotel's systems so they operate more efficiently and effectively together. Similar to traditional retro-commissioning, MRCx identifies problems that might have been missed during construction or initial equipment installation and identifies issues that develop during a hotel's life. The Program targets those hotels that have highly skilled teams and interest in obtaining cost-effective operating improvements that do not entail large capital investments.

The MRCx Program consists of three phases: the initial Retrocommissioning, Ongoing Commissioning, and periodic Re-Commissioning. Each phase is described in detail in the MRCx Guide and summarized below.

Retrocommissioning

The first phase closely follows the typical retro-commissioning process and involves four steps:

- 1.) Project planning,
- 2.) Performing an investigation or facility assessment,
- 3.) Implementing the improvements or "fixes," and
- 4.) Handing off or transferring information to the facility staff from any third parties involved in the project.

During the RCx part of the program, the in-house team can play a significant role, reducing the overall costs of the process. The following lists most of the tasks and responsibilities that a skilled staff can take on during the RCx planning step:

- Benchmark to determine the hotel's energy use index (EUI), or Btu per square foot, and determine how it compares to similar hotels.

There are several benchmarking tools available for accomplishing this task; however, the MCRx Program encourages the use of the U.S. Environmental Protection Agency's (EPA) ENERGY STAR[®] Benchmarking tool. The tool requires a knowledgeable building engineer to enter easy-to-obtain data that the tool then uses to provide a score that shows how the hotel compares to other similar hotels. If the hotel scores a 75 or higher, they can apply for an Energy Star rating. RCx may significantly increase the score for some hotels that fall short. The Marriott team understands that a high Energy Star rating does not mean there are no RCx opportunities and it does not preclude pursuing RCx if the team deems it valuable.

- Develop the objectives for the project in writing.

Objectives may include improving energy efficiency, improving hotel guest comfort, reducing maintenance costs, ensuring indoor air quality issues are addressed, and recommending possible retrofit opportunities. These objectives then become part of the scope of work and RCx plan.

- Investigate any outside resources that may be available to help offset costs.

There may be utility, federal, state, or local government programs that can be tapped to help fund the project. Hotels that fall into locations that have incentive programs for RCx or building tune-ups may be considered first for implementing the MRCx Program.

- Develop a scope of work for the third-party Cx Provider.

The *MRCx Guide* includes an extensive appendix on obtaining third-party services along with forms and a web site to help Marriott hotel facility staff with the Request for Qualifications (RFQ) and Request for Proposal (RFP) processes.

- Put together a package of information on the building that includes a brief description of the hotel, such as number of guest rooms, square footage, number of stories, and anything unusual about the construction.

Include any of the original design intent information, drawings, control system information, and any benchmarking information, such as EUI. A Property Information sheet, Checklist of Property Documentation, and other related forms are provided in the *MRCx Guide* appendices.

- Perform a walk-through of the hotel with the potential RCx service provider.

Whether using an RFP or an RFQ process to obtain third-party services, it is wise to make sure they walk through the facility and review the building documentation before they provide a cost proposal for the work. The walk-through also provides them with a chance to spot potential improvement opportunities or problem areas for further investigation.

- Perform and document Maintenance Pre-work using the checklists examples provided in the *MRCx Guide* appendices.

Because RCx targets operational opportunities, it is important that all preventive maintenance tasks are performed on the systems that the RCx is targeting. This may include calibration of strategic sensors that affect building control performance, such as: outside air, mixed air, discharge air, and return air sensors, along with any sensors involved in resetting temperatures or pressures. Other tasks include: cleaning coils, tightening belts, cleaning fan blades, and cleaning condenser and evaporator coils.

- Provide the package of building documentation, benchmarking results, and Pre-work checklists, findings, and resolutions to the Cx Provider.

This upfront work greatly improves the for the project cost-effectiveness by reducing the need for the Cx Provider to obtain and complete the work prior to investigating operational problems, improvements, and possible needs for additional equipment or replacements.

- Assist the Cx Provider in developing the MRCx plan for the facility and set the agenda for the initial “Scoping / Kick-off Meeting” for the project.

There are two important deliverables from the planning step of the process: the hotel-specific RCx Plan and the meeting minutes from the Scoping / Kick-off meeting. Having the Cx Provider develop a plan that the facility staff approves ensures that the consultant understands the scope and objectives of project. The plan is then presented at the initial meeting, where everyone gains an understanding of their roles and responsibilities and agrees to the plan.

Once the investigation is initiated by the selected Cx Provider, the building engineers assigned to the project continue to play a significant role. Also, by shadowing the Cx Provider, the operations staff receives training throughout the investigation step. The program designers recognize the importance of this for obtaining persistence of the benefits of the MRCx process.

The following lists the two primary tasks that a skilled facility staff can take on during the RCx investigation step:

- Assist the Cx Provider with diagnostic monitoring and functional testing of systems and equipment. Sophisticated and well trained facility engineers may have enough training on the building automation system (BAS) to help set trends, thus alleviating the need to hire a controls contractor or have the Cx Provider do it. In this case, the Cx Provider would provide a trend plan to the facility staff person.
- The facility staff can help with the deployment and retrieval of portable data loggers that be deployed when the BAS is not sufficient for use as an investigation tool. This reduces the time that the Cx Provider needs to spend on this task and, at the same time, trains the building engineers to use portable data loggers. In the future, they can periodically deploy loggers in order to check that any improvements made during the process remain viable over time.
- Perform simple repairs as the project progresses. Some repairs, minor installations, and control changes may be made by the facility staff as the project progresses. This is a “fix-as-you-go” approach and can save time by avoiding the need to come back to it in the future.

The last step in the RCx phase of the MRCx Program is the project hand-off step. This step mainly involves any third-party providers (Cx Provider and service contractors) handing over all the information gathered during the project in the form of a Final RCx Report or enhancements for the O&M manuals for approval by the hotel’s engineering staff. The Program recommends that a Project Close-out Meeting be held, at which time the results of the project, lessons learned, and next steps are presented. If the final report recommends doing a more in-depth energy study of potential retrofit measures, this may become a next step for discussion.

The MRCx Program also requires that the Cx Provider return one year after the completion of the findings report to ensure findings have been implemented, and to evaluate their actual impact. Additionally, this gives the Cx Provider an opportunity to pass along new information and lessons learned to the hotel’s building engineers.

Ongoing Commissioning

This phase involves enhanced O&M and continuous commissioning strategies that are carried out by the in-house engineers. The primary purpose of this phase is to help ensure that the benefits realized during RCx persist. The Cx Provider may be retained to help develop the Ongoing Commissioning plan and strategies. This phase of the program includes the following tasks:

- Perform tracking strategies, such as ongoing utility bill analysis and periodic re-benchmarking, in order to identify any unjustified increases in energy.
- Incorporate the new RCx measures into the hotel's preventive maintenance program including trending points in the building automation system (BAS) to ensure the new measures perform as intended.
- Update building documentation to include any new documentation resulting from RCx and continue to update all building documentation to reflect any changes as time goes on.
- Remain vigilant in identifying and solving any O&M related problems as quickly as possible.
- Train staff on the new measures and evaluate staff training needs on an annual basis with an emphasis on proper control sequences, sound energy management practices, common troubleshooting, and review of O&M manuals.

Subsequent to RCx, the Program designates a property "Energy Champion" to oversee the continuous commissioning activities. The following lists a few of the tasks carried out by the Energy Champion during Ongoing Commissioning:

- Develop and implement a metering and field measurement plan of important control points to regularly track. This can be done through trending with the BAS or periodic deployment of portable data loggers.
- Develop and distribute energy or system reports that reflect savings and opportunities and keep staff informed of any unexplained increases in energy.
- Supervise technicians that are implementing mechanical system changes or control changes for their affect on any RCx benefits.

Other responsibilities fall to the facility's Director of Engineering and include the following:

- Support the Energy Champion in carrying out the Ongoing Commissioning tasks.
- Ensure building documentation remains current.
- Assess engineering training needs annually.
- Periodically retest equipment using original RCx checklists and tests.

Re-commissioning

Re-commissioning is the third phase of the MRCx Program. This phase is scheduled to take place no longer than five years after the initial retrocommissioning. It entails reviewing the original Master List of Findings according to the current energy and asset metrics and determining the need, as well as the timing, rigor, and extensiveness of re-commissioning activities.

Depending on how many changes to the building's spaces have been made, how much the RCx opportunities have changed, how much energy consumption has increased, the significance of staff turnover, and any other new issues that have developed, re-commissioning may be a more or less rigorous exercise that repeats much of the original RCx investigation activities. It may also entail hiring a third-party provider to guide the process. If some of the equipment is now at or near the end of its life, evaluating retrofit opportunities may also be an objective of the re-commissioning exercise.

How did you fund the initiative?

Implementation is often the most difficult step in the process because it requires obtaining more funding. The following lists most of the tasks and responsibilities that a skilled staff can take on during the implementation step:

- Obtain buy-in from those who need to approve the implementation budget. This may entail developing an action plan with dates and accountability for implementing the selected findings along with the justification for the implementation. The justifications may consist of a cost/benefit analysis that includes energy and maintenance savings as well as the elimination of guest comfort issues.
- Perform those improvements and 'fixes' that are easily done in-house. Depending on the skill level and how "tooled up" the facility staff is, they may be able to resolve most of the issues from the Master List themselves. This reduces the cost and improves the payback significantly. However, to understand the true cost of RCx, staff time should be logged and given an economic value as part of the final cost/ benefit analysis.
- Develop the specification or scopes of work for implementing those 'fixes' and improvements that cannot be performed in-house or assist the Cx Provider with the task. The engineering staff reviews and approves the specifications and scopes developed by the Cx Provider. In some cases, the estimated cost may be high enough that the staff may want to obtain bids from qualified or known contractors. In other cases, they may have a contractor (such as a controls contractor) with whom they already have a relationship give them a cost proposal for the work.
- Verify that the improvements were implemented. The building engineers may want to retest and re-monitor (initiate original EMCS trends) those systems that received the improvements to ensure the improvements were implemented correctly and other problems weren't unmasked once the improvement or initial problem is alleviated. Engage the Cx Provider where needed for their expertise in analyzing the trend or logger data.