

Panel: Owner's Strategies for In-house Commissioning

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Synopsis

Target Property Development constructs, manages, and operates projects valued at over \$3 billion per year. This includes 100 new stores, major remodels of 80 stores, a couple of distribution centers, and corporate buildings to support the company's 1300 existing stores. This paper will describe Target's initiatives to use the commissioning process to improve the turnover performance of our stores while reducing life cycle costs. It includes why and how Target initiated commissioning, describes the balance we have reached between in-house versus third party commissioning. Timing and cost of implementing the commissioning process are highlighted along with the progress to date and potential future commissioning efforts. Also included is the difficulty of justifying the costs of commissioning, including attempts at Six Sigma analysis. Lessons learned from efforts in retro-commissioning and changing standard construction practices are presented.

About the Author

Scott Williams, PE is Manager of Mechanical Engineering for Target. In addition to a Bachelor of Science in Mechanical Engineering from the University of Minnesota, he holds a Masters in Business Administration from the University of St. Thomas. Prior to joining Target in 1999, Scott spent 18 years with a Minneapolis consulting firm, most recently as Vice President. At Target, he manages the development of mechanical prototype documents, R&D efforts, and refrigeration engineering. As a consultant, Scott managed projects for health care facilities, college campuses, and corporate clients. He is a member of ASHRAE and past president of the Minnesota Chapter.

Commissioning at Target

Target is rather unusual in the retail industry by maintaining a significant Property Development group responsible for the construction and operation of our stores. Real Estate, Construction, Building Services, Store Planning, Architecture, and Engineering all reside under Property Development. Architecture and Engineering consists of a staff of over 100. Target opens stores three times each year (March, July, and October). The construction documents for each store are started from a prototypical set of documents based on one of three store types. P – Prototype has approximately 110,000 ft² sales, G- prototype has 125,000 ft² sales, and SuperTarget adds a full grocery with a total of 140,000 ft² sales. The prototype process allows for continuous improvement of the construction documents and the construction process, so the quality of our buildings has traditionally been high and turnover issues have been rather low. As more of our stores are becoming unique in design, (i.e. multi-level, unique footprint, developer's shell) we are finding more design and coordination issues that lead to costly field change orders, construction delays, or poor operation at turnover to store operations. We looked at the commissioning process as a way to improve the construction of our prototype stores and leverage the process to reduce costs and improve quality of our unique stores.

Background

In 2001, Target Engineering performed functional testing on a new store after two months in operation. Approximately 250 tests were performed and 61 functional issues were uncovered. Several Target team members, including the Manager of Mechanical Engineering and the National Energy Manager attended the NCBC in 2002. An internal group, including representatives from Engineering, Building Services (including Energy Management), and Construction, was formed after discussions from the conference. This group discussed the role of the commissioning process in Target's construction process. Around this same time, Target hired a third party to perform retro-commissioning functional tests on the refrigeration system at several SuperTarget stores. The results of the refrigeration tests and adjustment showed a \$5,000 - \$10,000 per year savings in energy. Building Services funded the refrigeration commissioning effort as an energy savings measure.

The conclusion of the internal group review was that although our stores are turned over in good shape, there was room for improvement and the commissioning process seemed like a good tool to use in review of our processes.

New Target Store Commissioning Report

Target decided to hire an independent commissioning agent to complete a review of our new store construction process. Funding for this study was provided by our Construction Department. In selling the idea for the third party analysis, we emphasized that the goal was to incorporate the commissioning process into our standard construction process without the need for another third party into the construction phase. Target's Construction Department is driven by meeting the construction schedule. All stores within a cycle open on one of three dates each year in March, July, or October. Disruptions to the schedule that may delay an opening date are not acceptable. Initially, any change to the process, such as Commissioning, is greeted with concern, even if the intent of the process improvement is to benefit scheduling efforts.

A Minneapolis based firm was selected by an RFP based on qualifications. The review of the new store construction process took place over the summer and fall of 2002 and resulted in a final report and recommendation late in 2002. The review included visits to four (4) stores in final construction or recently completed. Interviews were completed with GCs, Target On-Site Representatives (OSRs), T&B contractors, start-up contractors, and store operations teams. The commissioning consultant also met with Target Headquarters' A/E Design, Construction, and Building Service representatives.

Based on the completed report, the internal committee recommended the following items be further studied and incorporated into our construction process:

- Produce "Owner's Project Requirements" for all systems. Conveys owner's needs in non-technical terms.
- Require basis of design (BOD) from design teams
- Modify "Peer Review" of documents.
- Incorporate CxP into construction documents and schedule.
- Incorporate "System Readiness Checklist" into construction process
- Provide store specific punch list and site observation
- Functional performance tests on selected equipment
- Scan and record as-built documents
- Electronic operations and maintenance manuals (O & M) (Turnover manual)
- Improved on-site training
- Involve A/E in sampling of 10-month walk-through

A summary of the New Store Commissioning Process Report was presented to Vice Presidents and Directors of Property Development in mid-2003, and support was provided to continue the process of implementing the recommendations into Target's existing processes.

Implementation of the Commissioning Process

Over the past year and a half, Target has taken steps towards integration of an internal commissioning process into our standard construction process.

- A program manual has been developed for all rooms and spaces within a store. Although not yet fully including all engineering requirements, it is a good start at "Owner's Project Requirements". This was an all internal effort.
- A basis of design (BOD) is provided on all Unique Stores in the form of project scope at S/D and D/D. BOD documents have also been completed for three recent LEED stores. This document will be updated for more typical prototype stores. Target A/E worked with external consultants to produce this document.
- A/E has started a full internal peer review of all projects.
- The commissioning process changes to date have been incorporated into construction documents and schedules. This is done through the internal prototype process.
- System readiness checklists are not yet in the construction process, but with a new project management software system being implemented, scheduling should improve.

- Punch lists are in the form of an “Expectation Matrix” (EM) provided by Target to the GC. The EM is now maintained by our prototype group to assure it is up to date. In the future, the goal is for the store design team to edit EM for store specific requirements.
- Functional performance testing is completed on all refrigeration equipment. Currently the testing is done by a third party agent. Acceptance testing is being done on a trial basis for RTUs prior to turnover. Internal Building Service Technicians are being used for this test.
- Scanning and recording of as-built documents is not yet implemented.
- Electronic O & M manuals have been a continuous discussion but a challenge to set requirements and format electronic media.
- Trials were completed with Store Planning and A/E design teams visiting stores at 10-month walkthrough. Although the information gathered from the store teams was valuable, the challenge is to have the proper team members involved with site visits that have the experience and initiative to bring back and implement lessons learned.

The implementation of the commissioning process is being monitored by an internal “Clean Turnover Committee” that was created to improve the “turnover” condition of our stores as determined by a turnover score card filled out by store teams. This committee is made up of the original group that spearheaded the commissioning effort, along with representatives from Procurement and Store Operations.

A new internal Process and Quality team was formed late 2004 within A/E with the goal of helping implement cross-discipline strategies such as QA. This team will also have more interface with Construction sites and is charged with bringing constructability issues back to the design teams for quick implementation of changes.

Justification and payback

The commissioning process changes implemented to date have not had significant costs that required payback analysis. Groups within Property Development have the common goal to improve turnover quality, and there has been good support to date. The most significant direct cost has been the functional testing of all refrigeration systems within our stores. This was justified due to the significant energy use of refrigeration systems, and also the potential risks associated with food quality if refrigeration systems do not perform. Currently all refrigeration performance testing is third party, but Building Services is reviewing possible internal forces for this effort. Functional performance testing is also performed on all alarm systems by internal teams. The critical nature of the alarm systems provided the justification of this internal team.

Six Sigma is a process analysis tool that is used to review a defect or problem and recommend process changes to reduce the occurrence of the issue. Target has embraced Six Sigma as a tool, and it was hoped that Six Sigma could help justify the implementation of the Commissioning Process. Six Sigma is a very analytical process that requires exact measurement of the defect. Unfortunately, although Target has records such as work orders sent out for equipment repair, there has been no follow up on what was wrong or what was repaired. Without knowing the actual problem or resulting repair, it could not be determined if some form of the commissioning process such as punch lists or functional tests would have prevented that problem from

occurring. This analysis did lead to a new Six Sigma project directly related to work order reduction. The focus of this study is to determine the source of the work order and set goals for acceptable levels of work orders in areas such as HVAC, Refrigeration, Alarms, Doors, etc. The commissioning process may be used as a tool to help reduce work order quantity once goals are set. The Six Sigma process is completed internally by a team of Black Belt Six Sigma experts, and Green Belt discipline experts.

A retro-commissioning project was completed by an independent commissioning firm to help us determine if the costs of the retro-commissioning could be recovered in reduced energy costs and work order avoidance. Although several store specific issues have been discovered, it does not appear that a total retro-commissioning effort could be justified. The retro-commissioning team did discover some global issues such as discrepancies in air balance information that led to an internal review of the test and balance program by Target.

Lessons Learned

The internal review of Target's processes using the commissioning process has led to several internal changes that will help improve turn over quality of our Stores. An internal Property Development group that understands the construction process along with Target Store requirements helped ease implementation of changes. Through the process, Target has relied on outside commissioning experts to help in analyzing our procedures and recommending changes. The implementation of the changes is smoother using internal staff that understands the complexities of the internal systems. A drawback of using internal staff is the speed of change. The commissioning process implementation is spread among several individual's responsibilities. Process is often slow and these tasks are often lower priority than primary responsibilities. An internal dedicated individual(s) focused on the Commissioning Process would be more efficient than spreading of responsibility.

A significant number of turnover issues related to controls and building automation systems. Many internal and external design engineers do not have experience to understand and specify control systems – particularly when they have unique elements. Target hired an experienced control engineer to review control design and spend time in the field with installing contractors. This has greatly improved field coordination and when problems do arise, they are addressed quickly. The Control Engineer is taking on some of the commissioning process as well.

Future Commissioning Challenges

Target is working on three LEED stores, and third party commissioning agents have been retained for these stores. We are supporting the process internally, and may take over the commissioning role on future LEED projects.

In addition to continuing to implement the Commissioning Process changes discussed, Target is looking at continuous commissioning through feedback from the Building Automation System primarily related to RTU operation. With refrigerated display cases in all Stores, commissioning will play an important role to assure proper operation while maintaining energy efficiency. Continuous commissioning along with retro-commissioning should be easily justified with refrigeration systems.