

# The Impact of Systematic Incorporation of ASTM C 840 Standards on Gypsum Board Installation

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Skilled construction trade workers rank 4th and 1st as the most difficult jobs to fill in the US and the rest of the world respectively (Manpower Group, 2012). Labor costs on a construction project often are 30 to 40 percent of the total projected costs. While other industries have implemented uniform manufacturing techniques and quantifiable tolerances for production thus insuring the quality performance of a less skilled workforce during the dynamic supply and demand cycles, the construction industry struggles to implement uniform standards and adopt improvement systems that have been proven successful elsewhere. Years of on-the-job training are required for the construction craft worker to understand and recognize the tolerances and parameters required to build a quality project. Even then, without the implementation of a uniform standard, methods and quality vary both between and within projects. As a result, construction is one of the least efficient industries and one of the most hazardous occupations (Bentil, 1989). A 2014 study demonstrated an inconsistent application of specifications between designers and contractors in the installation of drywall with the most commonly used standard the American Society for Testing and Materials guideline C 840 (ASTM C 840) (Bradford, 2014). This study demonstrated that while there is a lack of consistency of specifications between designers, contractors could use the ASTM C 840 reference standard as a baseline for quality and tolerances (Bradford). The impact of consistently and systematically employing reference standard tolerances to components of a large construction project has yet to be demonstrated. In the construction industry, little research exists directed at the quality of performance at the worker level. There is a need to provide substantive solutions to contractors faced with craft worker shortages. In September 2015 the Association of General Contractors, (AGC), survey found eighty-six percent of the contractors were having difficulty finding qualified workers. A recent article identified a craft labor shortage as being a major contributor to increasing project durations. It is not unknown for project duration to double given current labor conditions. This research seeks to investigate the impact on production and quality measures for gypsum board installation when tolerances of ASTM C 840 are actively incorporated. Specifically, are there measurable differences in time and the quality of installation of gypsum board when an installer receives the ASTM C 840 training in addition to the project plans and specifications? Is there a measurable difference in overall quality of gypsum board installation when ASTM C 840 is used as a guide to compliance as compared to the project plans specifications only? Approximately, eighty construction management students will represent construction workers in this experimental study. Six apparatus will be constructed to simulate the installation of gypsum board on a wood frame structure. Students will be randomly assigned to experimental and control groups. The experimental group will construct the gypsum board wall based on compliance with the ASTM C 840 standards in addition to the projects plans while the control group will only be provided project plans. Random assignment to construction teams will control for the age and experience of the test subjects. Blinded raters will assess the completed structures for quality based on the number and depth of installed fasteners. The results of this study will provide insight into the training of unskilled workers to meet a craft worker shortage. A quantifiable difference in quality and production will inform the benefit of training workers on a strict standard of installation. The knowledge gained can be expanded into other areas of the construction installation. Training techniques and quality techniques from other industries will be validated in a controlled environment prior to application in the construction industry. A shift from traditional craft based workers to rapidly trained workers will be difficult without significant research in the practical application.

**Key Words:** Gypsum, Training, Craft-worker, Tolerances, Quality