

1 EXECUTIVE SUMMARY

This project updates research that was conducted in 2005. It examines the lessons learned in other industries (non-construction) in applying the concepts of Lean thinking and how those concepts are being applied in construction. The need for the update is driven by the increasing complexity of the construction industry. Increasing technology, financial pressure, and customers seeking greater involvement and value from their projects are the main contributors to this complexity. The objective of the research was to identify the Lean principles and techniques used successfully in other industries, which could be and were most easily implemented in construction. To accomplish this, the project concentrated on:

- Identifying the Lean principles used successfully in manufacturing and service industries;
- Defining how “Lean” applies in the heating, ventilation, and air conditioning (HVAC) and sheet metal construction industry;
- Determining which Lean techniques were most applicable and useful in the construction industry; and
- Identifying how HVAC and sheet metal construction companies were already successfully applying these Lean principles.

Since Lean thinking is relatively new to the HVAC and sheet metal industry, this research also reviewed basic Lean principles as developed to lay the foundation for applying the Lean tools and techniques.

What does Lean look like?

- Fast, uninterrupted flow of construction;
- Elimination of waste in the shop, yard, and construction sites;
- Flexible planning process effectively responding to changes;
- Design process supporting the “pull” of construction. Pull refers to a construction technique where work is not performed until needed;
- Low inventories and no stashes of materials on site;
- Frequent replenishment of materials;
- Safe work environments;
- Empowered and engaged workers;
- Organized yards, shops, and offices; and
- Rapid response to problems.

Key findings of the research are:

1. Lean works in manufacturing. There are numerous examples of how Lean has been and is successfully applied in various types of manufacturing companies and industries.
2. Lean works in construction, both in field installation and in shop fabrication. It has also proven useful in the office and other support functions and in service work. While Lean is relatively new to the construction industry, there are enough successful applications to demonstrate its value.
3. Customers will demand Lean of contractors. Large customers are

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increasingly aware of the value of using Lean in construction and are beginning to demand Lean applications of their contractors.

This research concludes that the Lean principles that have led other industries to higher profitability and lower costs are easily applicable to the HVAC and sheet metal industry. Some HVAC and sheet metal contractors have already successfully applied Lean, and most contractors are interested in learning about Lean. Those contractors that learn how to use Lean effectively will have a definite competitive advantage in their productivity and in meeting customer needs and expectations.