Lean Six Sigma Analysis to Improve Space Shuttle Orbiter Tile Removal and Replacement Process

ProModel
VISUALIZE ANALYZE OPTIMIZE VAD

Vertical

Manufacturing | Pharmaceutical | Healthcare | Portfolio | Logistics | Financial | **Government** | Business

Genre

Case Study | **Project Review:** | White Paper | Technology Overview

Client

United Space Alliance

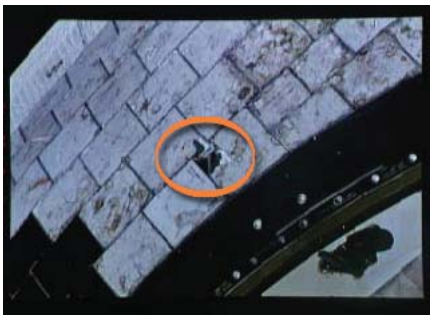
Situation

United Space Alliance (USA), a prime contractor to NASA, is responsible for all space shuttle fleet and international space shuttle processing operations. The special silica coated tiles that cover the Orbiter space shuttle provide critical thermal protection during ascent and re-entry. USA is responsible for removal and replacement of these tiles after each shuttle mission. More and more tiles need to be replaced for a variety of reasons including:

- *Damage during launch and landing*
- *Required shuttle modifications*
- *Required access to other shuttle systems*
- *Aging fleet*

The tile removal and replacement process needed to be improved because of:

- *High scrap rate*
- *Long cycle times that do not meet increasing demand*
- *Limited resources*
- *Increased volume expected to support Orbiter Major Modifications (OMM)*



Damaged Tile

Objective

Use Lean Six Sigma methods to increase throughput of the tile removal and replacement process.

Results

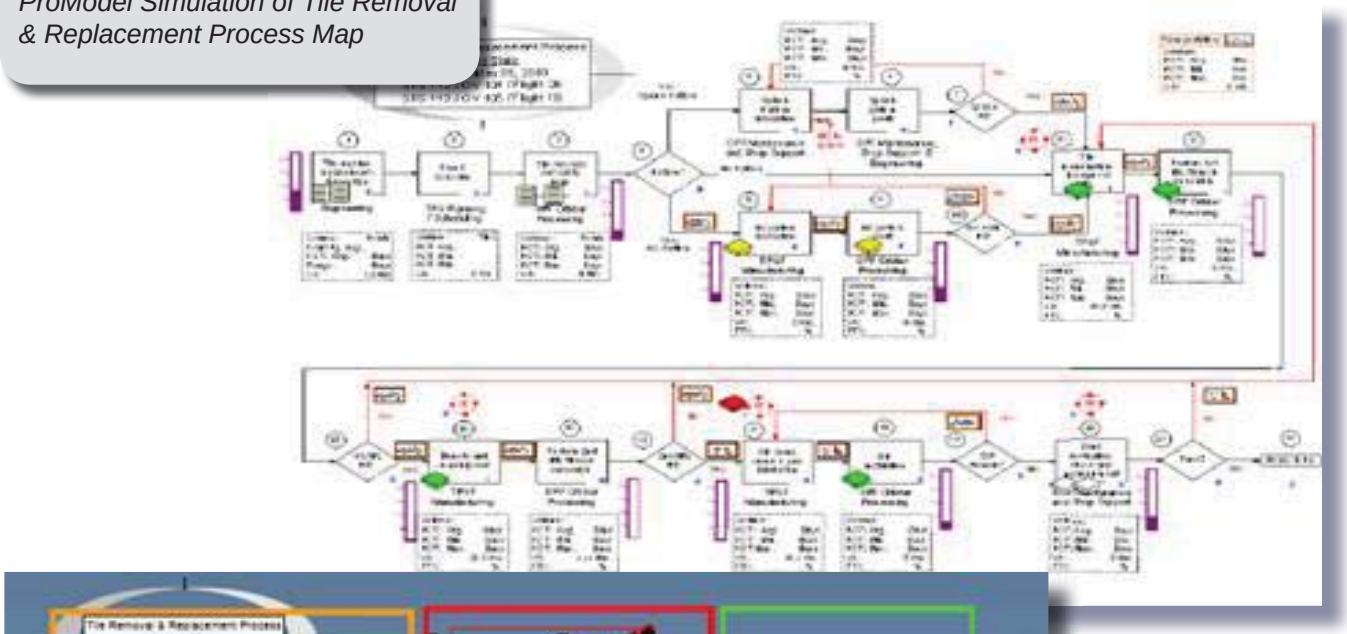
By combining Lean Six Sigma methodology and simulation technology, USA was able to define some areas; such as, cycle time, pattern rework and tile scrap rates, where measurable improvements could be made.

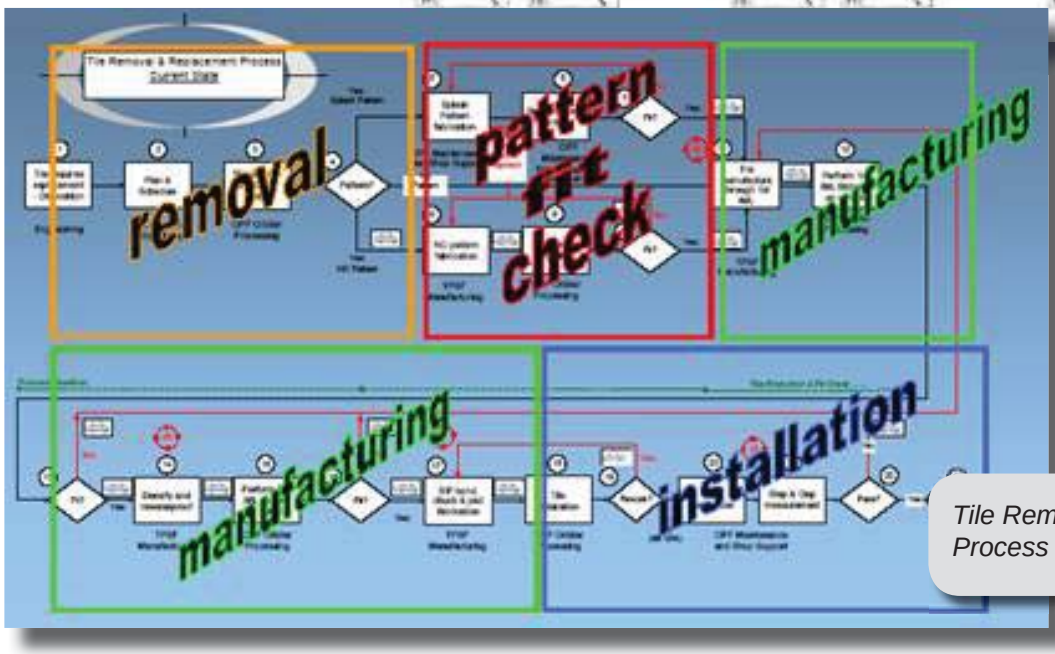
Performance Measure	*Predicted Results*	*Actual Results*
Cycle Time	25% Reduction	To be determined
Process Cycle Efficiency	25% Improvement	To be determined
Pattern Rework Rate	8% Reduction	8.1% Reduction
Tile Scrap Rate	50% Reduction	54% Reduction
Post Tile Bond Rework	25% Reduction	To be determined

Solution

USA's Processing and Manufacturing Group developed a model of the Tile Removal and Replacement process with ProModel's Process Simulator, a plug-in to Microsoft's Visio. The model's ability to simulate the real world variations and interdependencies around the tile pattern rework rate, scrap rate and cycle time provided USA the practical information they needed to see where improvements could be made. ProModel has a proven track record working with USA and its process improvement efforts.

ProModel Simulation of Tile Removal & Replacement Process Map





Tile Removal & Replacement Process Map

"Process simulation is a vital tool in our Lean Six Sigma Team process improvement efforts. USA is using ProModel simulations to help reduce cycle times, predict resource needs, determine work completion dates, justify electronic systems, and improve overall process performance. USA has also used simulations in the past to optimize shop layouts, determine production capacity, and identify shift and equipment utilization in a number of key areas."

- Project Leader in the Processing & Manufacturing Group at United Space Alliance located at the Kennedy Space Center in Florida