Recently Toyota Texas Manufacturing has recognized an excess of waste within their tape application process. A synchronization system was proposed in order to minimize inefficiencies during this portion of the painting process. Using lean manufacturing methods (muri, mura, muda) combined with ergonomic principles allows the prototype to be designed in such a way that can provide continuous improvement (kaizen) during this process. In this research, the cart system is tested to determine if its implementation can be feasible and effective.

Objectives
- Reduced inventory
- Reduced energy consumption
- Reduced process cycle time
- Improved reliability and accessibility
- Improved optimal application of black tape
- Combined tool sets to reduce team member movements
- Reduced energy consumption by 88%
- Reduced process inventory by 60%
- Used F.I.F.O. concept to control inventory

Methodology
* S-why technique was developed to determine the root cause of the problems which helped us find excess in energy, movement, and inventory.
* Use of concept matrix to compare our prototypes on a point scale, 1 being least desirable and 5 most desirable.
* Performing time measurements.
* Implementation of First In First Out.
* Designed new prototype using 3D modeling software. (Fig. A)
* Reliability and accessibility of the new design had nemawashi events (team discussions) to confirm that it can meet the process standards.
* Quality assurance trials in an offline dojo were executed to standardize the process with the new design. (Fig. B)

Abstract
Recently Toyota Texas Manufacturing has recognized an excess of waste within their tape application process. A synchronization system was proposed in order to minimize inefficiencies during this portion of the painting process. Using lean manufacturing methods (muri, mura, muda) combined with ergonomic principles allows the prototype to be designed in such a way that can provide continuous improvement (kaizen) during this process. In this research, the cart system is tested to determine if its implementation can be feasible and effective.

Methodology

Data Analysis
The graph below represents the cycle time fluctuation before and after the implementation of the new cart system. Our goal is to minimize fluctuation between cycles and maximize full work within the process.

Work Balance Chart
Current Process vs Proposed art System

Results

Reduction Comparison of “Muda” (Waste)
The graphs to the right depicts the reduction of heating plate energy, as well as, the reduction of inventory in the process. Our team was able to reduce energy consumption by 88% of its original usage. We also reduced the inventory amount by 60%.

Reduced energy consumption by 88%
Reduced process inventory by 60%
Implemented First In First Out concept to control inventory
Combined tool sets to reduce team member movements
Reduced process cycle time by 8 seconds

Future Work
Toyota will continue to test our proposed design and work to constantly improve this tape application process, to obtain an optimal solution that will reduce fluctuation between cycles. Before the proposed solution can be implemented Toyota will still need to create a guidorial system for synchronization system to travel, establish a tracking/sensor system to control boundary limits for new system, and implement a heated storage container for excess raw materials.