DEFINE

Problem Statement: Stickley personnel have identified that the output per person (drawer manufacturing) is significantly lower than the expectations. Drawers must be produced a shift in advance to keep up with the cabinet area.

Goal Statement: Increase the output per person by 15%. Decrease non-value-added activity time in the drawer assembly cell.

SIPOC Diagram:

Supplier	*Input*	*Process*	*Output*	*Customer*
Inventory		Parts retrieved from Roll Coat Area		
		Match Drawer Fronts	Scrap	
	Glue Applicator	Glue and Press	Scrap	
	Sand Paper	Sand off Glue		
Hardware supplier	Hardware	Hardware put on		
Drawer Department		Stack Drawer Sets	Finished Drawers	Cabinet Department

MEASURE

Data Collection Plan:

Performance Measure	Data Location	Method of Collection	When to collect
Numbers of orders received	Supervisor	Order Sheet	1st Shift 2nd shift
Drawer part search duration	Inventory	Time put in Excel	When order received
Drawer hardware search duration	Inventory	Time put in Excel	When order received
Number of cart errors	Inventory	Performance sheet	On order completion
Duration of match	Drawer Assembly	Performance sheet	On shift completion
Drawer part quality	Drawer Assembly	Performance sheet	On shift completion
Drawer part rework	Drawer Assembly	Performance sheet	On shift completion
Drawer part Scrap	Drawer Assembly	Performance sheet	On shift completion
Number of glue collections	Drawer Assembly	Performance sheet	On shift completion
Duration of glue collections	Drawer Assembly	Time put in Excel	On visit completion
Duration build	Drawer Assembly	Performance sheet	On shift completion
Number of pallet collections	Drawer Assembly	Performance sheet	On shift completion
Duration of pallet collections	Drawer Assembly	Time put in Excel	On visit completion
Sanding Belt Replacements	Drawer Assembly	Performance sheet	On shift completion
Duration of sanding belt replacement	Drawer Assembly	Time put in Excel	On visit completion
Duration of sanding	Drawer Assembly	Performance sheet	On shift completion
Drawer scrap	Drawer Assembly	Performance sheet	On shift completion
Duration of cleaning sanding machine	Drawer Assembly	Time put in Excel	On visit completion

Method of Data Collection: Using daily time sheets and 360° camera. *Video footage timing took precedence over time sheets.*

Observations from Data: Non-value-added activities contributes to around 20% of operational hours in drawer assembly. Major NVAs are retrieving carts, retrieving glue and pallets, rework or quality issues, contacting supervisor, moving stacked pallets from point A to point B.

Limitations in Data Collection: Lack of historical data. Occasional lack of drawer assembly activity, which resulted in lack of non-value-added activities being conducted.

STICKLEY AUDI & CO.
FINE FURNITURE SINCE 1900

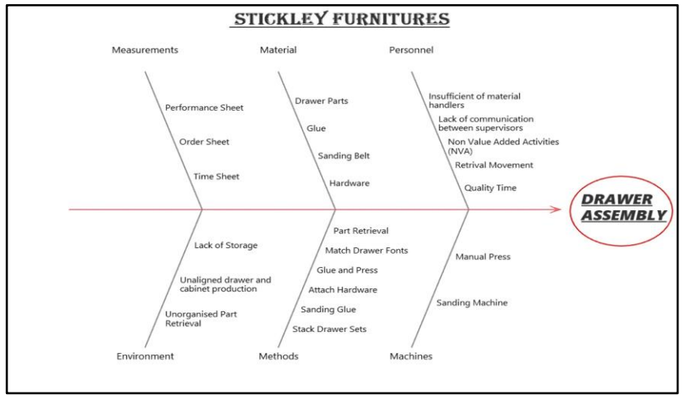
Process Improvement at the Drawer Assembly Cell

SCM 755 – Lean Six Sigma

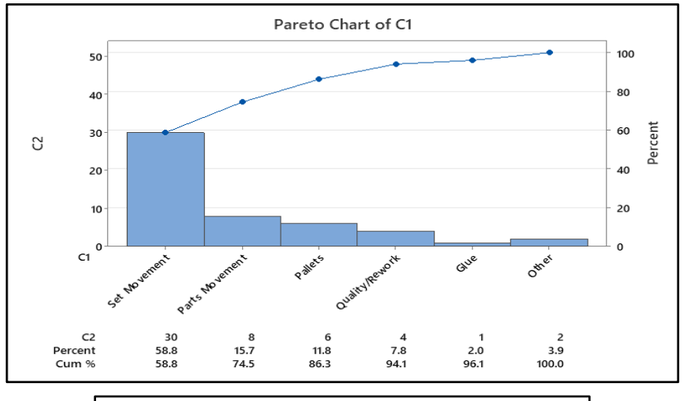
Team Members – Philip Toro, Manas Engineer, Saket Sharma, Rahul Kotian

ANALYZE

Fishbone Diagram:



Pareto Analysis for NVA Activities:



Annual Cost of Non-value-added Activities:

Workdays per year	Shift Time	Average Number of Workers Day and Night	Worker Salary	Percent of time as NVA	Total Cost of NVA
223	10.5	3	30$/hour	18.20%	**$38,353.77**

CONTROL

Control Plan

Process being Measured	*Measurement Method*	*Frequency of Data Collection*	*Who will collect*	*Reaction Plan*
Part Retrieval from roll coat area	Manual Time Measurement	Weekly	Shift Supervisor	Operators need to be re-trained regarding whiteboard system
Set movement to staging area	Manual Time Measurement		Shift Supervisor	Operators need to be re-trained regarding pallet handles and its usage
Attaching Hardware Duration per set	Time Sheet	Daily	Operator	Attention from supervisor
Match Duration per set	Time Sheet		Operator	Attention from supervisor
Build Duration per set	Time Sheet		Operator	Attention from supervisor
Sand Duration per set	Time Sheet		Operator	Attention from supervisor
Number of Reworks	Time Sheet		Operator	Attention from supervisor and higher management needed
Number of drawer scrap	Time Sheet		Operator	Attention from supervisor and higher management needed
Number of glue collections	Time Sheet		Operator	Attention from supervisor
Number of pallet collections	Time Sheet		Operator	Attention from supervisor

Control Plan: Critical parameters that need to be in check when the new recommendations are put in action across the drawer assembly cell.

Check List for Reaction Plan:

1. Check whether operators are complying to the procedure
   i. Are the improvements communicated?
   ii. Is the process being measured appropriately?
2. Verify that new process is not causing more downtime as compared to the old process

IMPROVE

Recommendations:

1. Pallet handles; holds on pallet for safe and fast movement
2. Cart labeling system and tracking board
3. Additional glue station, with bigger bottles
4. Walkie-Talkies for cell to supervisor communication
5. Shift to shift communication sheet
6. More detailed time sheet
7. New performance efficiency sheet
8. Reducing excess parts stack for more space
9. Establish a pallet collection area

Pilot Test and Results:

1. Cart labelling system and tracking board – Labeled 26 available carts used for stacking work orders, board is used to note in which cart the job ID is stacked. Reduces per cart retrieval by 7 minutes and eliminates any confusion about the missing parts, saving 45-60 minutes.
2. Pallet handles – Handles fashioned with a mouth in the front which latches on to the pallet, allowing easy maneuvering of the pallet without the parts toppling off. Reducing chance of damaging the drawers and effectively doubles the movement speed.