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Redesign of Schneider electric rack layout into a centralized warehouse layout

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Creative Inquiry

Centralized Warehouse Layout

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Abstract: In partnership with Schneider Electric's Seneca Facility, this senior design project's primary objective was to move all parts kept on Kanban for Schneider Electric's Motor Control Center product line to a centralized warehouse within the plant. The team first analyzed the current system and conducted interviews and observations to identify customer needs. These identified needs were used to create a list of metrics to benchmark against and set ideal and marginal specifications for the final concept chosen. It became apparent that a lack of centralization created several non-value added system losses. The process of identifying system losses, performing Pareto analysis, and conducting root-cause analysis revealed three main contributions to system losses. These system losses were the main focus as the project progressed to the stage of concept generation. Five concepts were generated for the layout organization and three concepts were generated for a tool for layout adherence post implementation. An initial performance evaluation was done on all eight concepts to reflect on how each concept compared at meeting the four key business goals, seven updated metrics, and three main system losses. The results of the concept generation portion and initial performance evaluation will be used as a basis for the concept selection process as the project progresses.

Introduction:

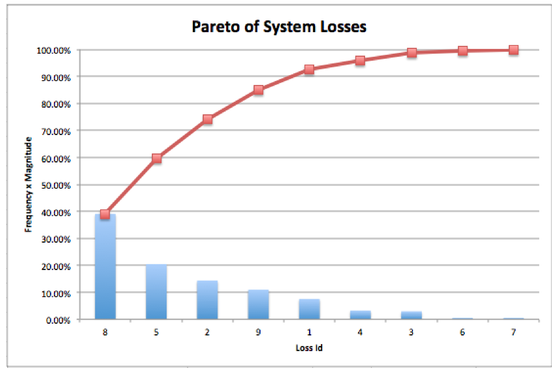
- Four key business goals were identified at the start of the project
- Team conducted interviews with parts pullers, Waterspider attendant, Kanban attendants, and builders and translated their statements into customer needs
- Team identified customer needs then translated them into marginal and ideal metrics
- Root cause analysis was performed to identify the most important metrics; included the use of a Pareto Chart, 4 Fishbone diagrams, and a Why-Why analysis
- Team generated 5 layout concepts and 3 tools for post-implementation

Methods:

- Identified Key Business Goals
- Analyzed Current State of the System
- Developed List of Important Customer Needs
- Translated Customer Needs into Metrics
- Observed and Recorded System Losses
- Conducted Root Cause Analysis on System Losses
- Updated Product Specifications
- Generated Initial Layout and Tool Concepts
- Created Performance Evaluation

Results:

Pareto Chart of System Losses



Loss	Frequency	Loss Id	Time (minutes)/ Order Round	Percentage
Traffic interference	5-6/order round	8	495	39.10%
Waterspider attendant traveling between departments to replenish	4/ order round	5	260	20.54%
Walking to various departments	2-3/ order round	2	182.5	14.41%
Searching for WIP	15-25/order round	9	140	11.06%
WIP Running Out	0-1/order round	1	95.5	7.54%
Searching for "excess" supply	0-1/order round	4	41	3.24%
Searching for supermarket supply	0-1/order round	3	37.5	2.96%
Picking wrong part	Very Infrequent (5% chance/order round)	6	7.3	0.58%
Picking wrong quantity of part	Very Infrequent (5% chance/order round)	7	7.3	0.58%

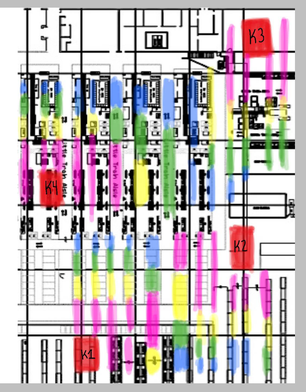
Performance Evaluation

	Goal/Specification	Layout: FMR	Layout: Part Relationship	Layout: Weight	Layout: Quantity	Layout: Department	Tool: Access	Tool: VBA	Tool: Excel
Business Goals	Dec. avg. travel time to fill BOM	+	+	0	0	+	0	0	0
	Inc. accuracy of picking	0	0	0	0	0	+	+	+
	Dec. searching time	0	+	0	0	0	+	+	+
	Dec. travel distance	+	+	0	+	+	0	0	0
Metrics	Avg. distance to parts from dept. Kanban station	+	0	0	+	0	0	0	0
	Avg. distance between parts with relationships	0	+	0	–	0	0	0	0
	Avg. distance to "F" items from dept. Kanban station	+	0	0	–	0	0	0	0
	Weight lifting constraints	0	0	+	0	0	0	0	0
RCA	System loss 1: Traffic interference	–	–	0	+	+	0	0	0
	System loss 2: Waterspider Attendant	0	0	0	–	0	0	0	0
	System loss 3: Parts-pickers travel time	+	+	0	0	+	0	0	0

Results:

Layout Based on FMR Data

Red – Kanban Attendant Station
Pink – 'F' Fast Moving Parts
Yellow – 'M' Medium Moving Parts
Green – 'R' Rare Moving Parts
Blue – Special



Results:

- The Pareto Chart of System Losses (Figure 1) identified that the majority (75%) of the system loss was caused by three main problems
  - Traffic interference
  - Waterspider attendant travel time between departments
  - Parts-pickers travel time between storage departments
- The Performance Evaluation (Figure 2) aided in determining which concepts to consider and combine in the future
  - The layouts pertaining to FMR data (Figure 3), part relationship, and storage department all yielded a +4 rating
- The three tools considered to aid Schneider post-implementation are Access, VBA, and Excel
  - All three tools met the same business goals
  - Access and VBA were determined to be most beneficial

Conclusions:

The Pareto analysis played a key role in the determination of the main system losses. The results from the analysis indicated three main system losses that account for about 75% of the total lost time. These losses were time loss due to the parts-puller traveling between storage departments, traffic interference, and the WaterSpider attendant traveling to different departments. These system losses along with the key business goals and target specifications were the important factors when conducting preliminary concept generation. The first stage of concept generation yielded 5 layout concepts and 3 tools for initial implementation and future modifications. A simultaneous comparison of concepts was conducted to see how each concept met the key business goals, target specifications, and the main system losses from root cause analysis. The results from this comparison indicate a need to combine aspects of a few of the layout concepts in order to meet all this criteria. This initial performance evaluation will play a key role in the next stage of the project. The group will use the data from the concept selection phase.

References

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