PRIDE INDUSTRIES: WAREHOUSE OPTIMIZATION

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MEETING AGENDA

Project Background

Data Collected

Data Analysis

Design Solution

Implementation

Technical References & Bibliography

PRIDE INDUSTRIES

- Founded in 1966 in Auburn, California

- Has around 6,000 employees, from which 4,000 have disabilities.

- Largest nonprofit employer of people with disabilities.

- Partnerships with Amazon and the U.S. Department of Defense.

- Handles the management and maintenance of facilities at Fort Bliss.

- Own 3 warehouse areas at Fort Bliss, Texas

WAREHOUSE BUILDING LOCATIONS

BUILDING 1288

- What can be considered as the "main" warehouse where they have most of the resources available for technicians and military personnel

- Also stores what are known as purchase orders, which are special materials or equipment that are not in any warehouse and that require purchase.

- The scope of the project will focus on addressing the concerns of stakeholders that are involved with building 1288.

PROBLEM STATEMENT

PRIDE Industries facilities at Fort Bliss present some problems and areas for optimization in their warehouse facilities with the main issue being that their service has been affected by the delays occurred in the warehouse area. Due to these delays, there have been complaints that technicians take too long to receive the materials that they need for their work orders.

Before February 1st, there was no perceived problem. Jobs were estimated and approved beforehand. Now, under a new contract that took place February 1st, technicians can go freely to pick up parts without having to get an estimate or get pre-approved. This created the problem of having too many requests at a given time for the warehouse.

PROJECT OBJECTIVES

- To utilize Industrial Engineering tools and procedures in order to identify and tackle the problems at hand

- To accelerate service times in order to minimize waiting times while working with the constraints given

- To present a solution that falls under the defined constraints

- The concerns/interests of the stakeholders should be identified and addressed with the design solutions

PROJECT CONSTRAINTS

- Major delays in service cannot be allowed when making new arrangements for the warehouse.

- The space provided for storage in the warehouse cannot be extended.

- The company does not contemplate the hiring of new workers in the near future.

- There are around ten workers for the warehouse facilities.

- Warehouse facilities are considered historical buildings and therefore cannot be majorly changed.

- The solution should be affordable according to the budget assigned by the company to the project.

DATA COLLECTED

Interviews- warehouse crew, managers, and stakeholders of the system were interviewed in order to obtain the information related to the needs that the project solution will address.

Observations- by taking a tour of the installations and observing the operations and layout of the facilities.

Measuring- taking time measurements for the processes of operations.

DATA COLLECTION METHODS

CRITICAL INITIAL DATA

Stakeholders		Concern/Interest
Pride Industries' Warehouse Personnel	**Management**	Improvement in the efficiency of the warehouse operations
	Warehouse Work Crew	More space in the work areas
Users of the Warehouse	**Technicians**	Decrease the waiting times for service
	Military Personnel	Quick & efficient service
	Delivery Workers	Quick & efficient delivery of products to the warehouse

THE 5S METHODOLOGY

- Sort: Dispose of non-essential items

- Set in order: Organize to reduce waste.

- Shine: Good maintenance.

- Standardize: Inform workers of process

of operations .

- Sustain: Ensure there is no regression.
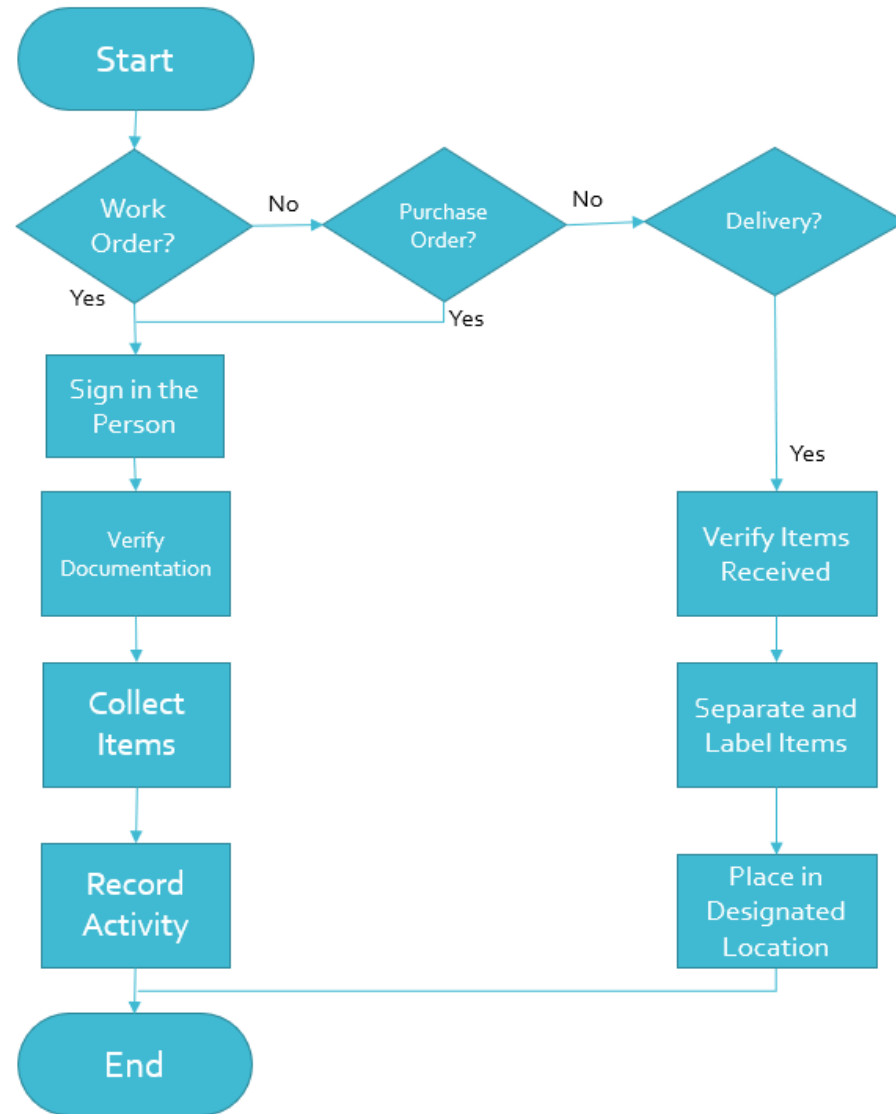
WAREHOUSE PROCESS OF OPERATIONS

LAYOUT OF BUILDING 1288

#	Arrival time	Departure
1	7:43	8:00
2	7:44	8:03
3	7:51	8:10
4	7:57	8:07
5	7:59	8:21
6	8:09	8:25
7	8:10	8:31
8	8:13	8:43
9	8:20	8:41
10	8:30	8:46
11	8:31	8:53
12	8:34	8:52
13	8:41	8:58
14	8:43	9:02
15	8:48	9:06
16	8:55	9:07
17	9:02	9:11
18	9:05	9:23
19	9:06	9:29
20	9:20	9:28
21	9:27	9:43
22	9:35	9:47

# INITIAL TIME DATA COLLECTED

DATA ANALYSIS

RELATIONSHIPS BETWEEN AREAS

- Receiving worker area=1
- Technician-assistance work area= 2
- Receiving dock= 3
- Purchase order storage= 4
- General storage= 5

	1	2	3	4	5
1	---------------	O	A	I	O
2		---------------	U	O	E
3			---------------	I	I
4				---------------	O
5					---------------

Rating	Definition
A	Absolutely Necessary
E	Especially Important
I	Important
O	Ordinary Closeness OK
U	Unimportant
X	Undesirable

RELATIONSHIP DIAGRAM
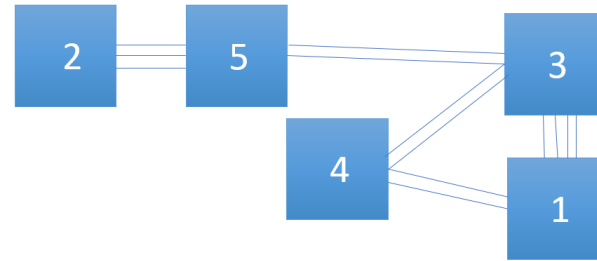
Value	Closeness	Line code
A	Absolutely necessary	≡
E	Especially important	=
I	Important	=
O	Ordinary closeness OK	—
U	Unimportant	
X	Undesirable	∿

ANALYSIS OF TIME DATA

- λ=9.7768 technicians/hour

- μ=3.448 technicians/hour

$$S > \frac{\lambda}{\mu} = \frac{9.7768}{3.448} = 2.835$$

#	Arrival time	Departure	Duration	Interarrival Time
1	7:43	8:00	0:17	xxxxxxxxxxxx
2	7:44	8:03	0:19	0:01
3	7:51	8:10	0:19	0:07
4	7:57	8:07	0:10	0:06
5	7:59	8:21	0:22	0:02
6	8:09	8:25	0:16	0:10
7	8:10	8:31	0:21	0:01
8	8:13	8:43	0:30	0:03
9	8:20	8:41	0:21	0:07
10	8:30	8:46	0:16	0:10
11	8:31	8:53	0:22	0:01
12	8:34	8:52	0:18	0:03
13	8:41	8:58	0:17	0:07
14	8:43	9:02	0:19	0:02
15	8:48	9:06	0:18	0:05
16	8:55	9:07	0:12	0:07
17	9:02	9:11	0:09	0:07
18	9:05	9:23	0:18	0:03
19	9:06	9:29	0:23	0:01
20	9:20	9:28	0:08	0:14
21	9:27	9:43	0:16	0:07
22	9:35	9:47	0:12	0:08

SIMIO QUEUEING SIMULATION #1

RESULTS FROM SIMIO #1

Throughput	NumberCreated	Total	92.0000
	NumberDestroyed	Total	44.0000

HoldingTime	TimeInStation	Average (Hou...	2.5286

HoldingTime	TimeInStation	Average (Hou...	2.0931

NEW PROCESS OF OPERATIONS

- Proposal of self-service system

- Technicians would sign in and pick up the needed items

- Technicians would check out with warehouse worker to confirm items match work or purchase order

- Technicians exit through designated location

NEW TIME DATA

- $\lambda = 11$ technicians/hour

- $\mu = 7.1$ technicians/hour

$$S > \frac{\lambda}{\mu} = \frac{11}{7.1} = 1.549$$

1	7:54	8:08	0:14	xxxxxxxxxxxxxxx
2	8:01	8:04	0:03	0:07
3	8:03	8:33	0:30	0:02
4	8:04	8:07	0:03	0:01
5	8:09	8:23	0:14	0:05
6	8:13	8:20	0:07	0:04
7	8:20	8:28	0:08	0:07
8	8:21	8:28	0:07	0:01
9	8:28	8:34	0:06	0:07
10	8:32	8:38	0:06	0:04
11	8:33	8:40	0:07	0:01
12	8:38	8:44	0:06	0:05
13	8:41	8:46	0:05	0:03
14	8:55	9:06	0:11	0:14
15	9:02	9:13	0:11	0:07
16	9:05	9:15	0:10	0:03
17	9:06	9:17	0:11	0:01
18	9:09	9:18	0:09	0:03
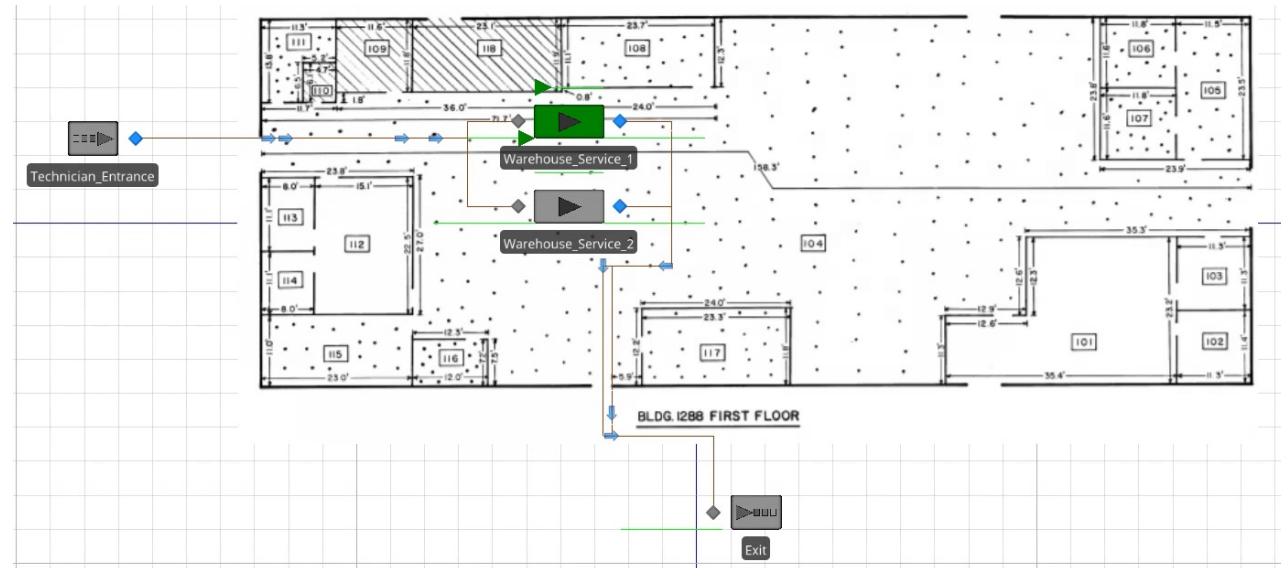
SIMIO QUEUING SIMULATION #2

RESULTS FROM SIMIO #2

Throughput	NumberCreated	Total	101.0000
	NumberDestroyed	Total	99.0000

HoldingTime	TimeInStation	Average (Hou...	0.4295

HoldingTime	TimeInStation	Average (Hou...	0.1973

DESIGN SOLUTION

DESIGN SOLUTION

RELOCATION OF AREAS

NEW PROCESS OF OPERATIONS

5S METHODOLOGY IMPLEMENTATION

RELOCATION OF AREAS

NEW PROCESS OF OPERATIONS

IMPLEMENTATION

IMPLEMENTATION PLAN

The implementation plan of the design solutions followed the following sequence:

- An implementation of the first steps of the 5S methodology (1 to 3)
- The relocation of areas
- Implementation of the new process of operations
- Final steps of the 5S methodology (4 and 5)

STEP 1

· For the implementation of the first steps of the 5S methodology, it requires to first dispose of the equipment/resources that are, and have been, of no use. It would then be followed by a rearrangement of the remaining structures/resources, all the while paying attention to the "shine" portion of the methodology.
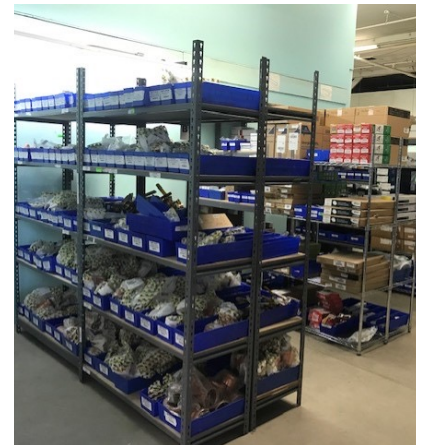
STEP 2

· Clear the spaces to which the areas are going to be relocated, followed by moving the desks and corresponding furniture for the receiving worker area as well as transferring the purchase orders in stock to their new room.

STEP 3

· Available space was used to its fullest by having the desks of the technicians-assistance workers positioned in a manner that would allow for the technicians with their carts carrying the materials to go position themselves next to their desks, and later to exit through the indicated door, thus creating a flow for the process of operations.

STEP 4

- Ensuring both users of the system and the workers in the warehouse are informed in the changes in process of operations and relocations.

- Ensuring that the 5S methodology steps are being followed and revisited will allow for a continuous improvement of the warehouse system

Welcome to Pride Industries Warehouse
Please follow the following instructions:
- Please sign in
- Take a cart
- Pick up any materials needed
- Proceed to checkout with warehouse worker
- Use designated exit door

TECHNICAL REFERENCES & BIBLIOGRAPHY

- Eastes, A. (2020, March 26). Warehouse Optimization Tips To Help Your Business Right Now. Retrieved April 4, 2020, from https://www.skuvault.com/blog/warehouse-optimization-101/

- Exponential Distribution: Definition: Memoryless Random Variable. (n.d.). Retrieved April 15, 2020, from https://www.probabilitycourse.com/chapter4/4_2_2_exponential.php

- Grassmann, W. (1988). Finding the Right Number of Servers in Real-World Queuing Systems. *Interfaces, 18*(2), 94-104. Retrieved May 4, 2020, from www.jstor.org/stable/25061076

- Hierarchy of Facility Planning - ppt video online download. (n.d.). Retrieved April 15, 2020, from https://slideplayer.com/slide/4387427/

- Kulatunga, A. K. (2011, January 22). PDF.

- Our Story. (n.d.). Retrieved March 5, 2020, from https://prideindustries.com/about/our-story/

- Pride Industries. (n.d.). 2019 Annual Report. Retrieved from https://prideindustries.com/wp-content/uploads/2019/12/PRIDE_Annual_Report_2019.pdf

- Saha, V. (2020, January 18). 50 Expert Warehouse Design and Layout Ideas and Tips. Retrieved March 2, 2020, from https://www.camcode.com/asset-tags/warehouse-design-and-layout-tips/

- Sreeshylam, S. T. (n.d.). 5S Methodology in Warehouse Management. Retrieved March 15, 2020, from https://www.linkedin.com/pulse/5s-methodology-warehouse-management-sudheer-t-sreeshylam

- Teknomo, K. (2014). Arrival Distribution. Retrieved April 10, 2020, from https://people.revoledu.com/kardi/tutorial/Queuing/Arrival-Distribution.html

- Teknomo, K. (2014). M/M/s Queuing System. Retrieved April 10, 2020, from https://people.revoledu.com/kardi/tutorial/Queuing/MMs-Queuing-System.html#MMsQueuingSystem

- Teknomo, Kardi. (2012). Queuing Rule of Thumb based on M/M/s Queuing Theory with Applications in Construction Management. Civil Engineering Dimension. 14. 139-146. 10.9744/ced.14.3.139-146.

- Teknomo, K. (2014). Service Time Distribution. Retrieved April 10, 2020, from https://people.revoledu.com/kardi/tutorial/Queuing/Service-Time-Distribution.html