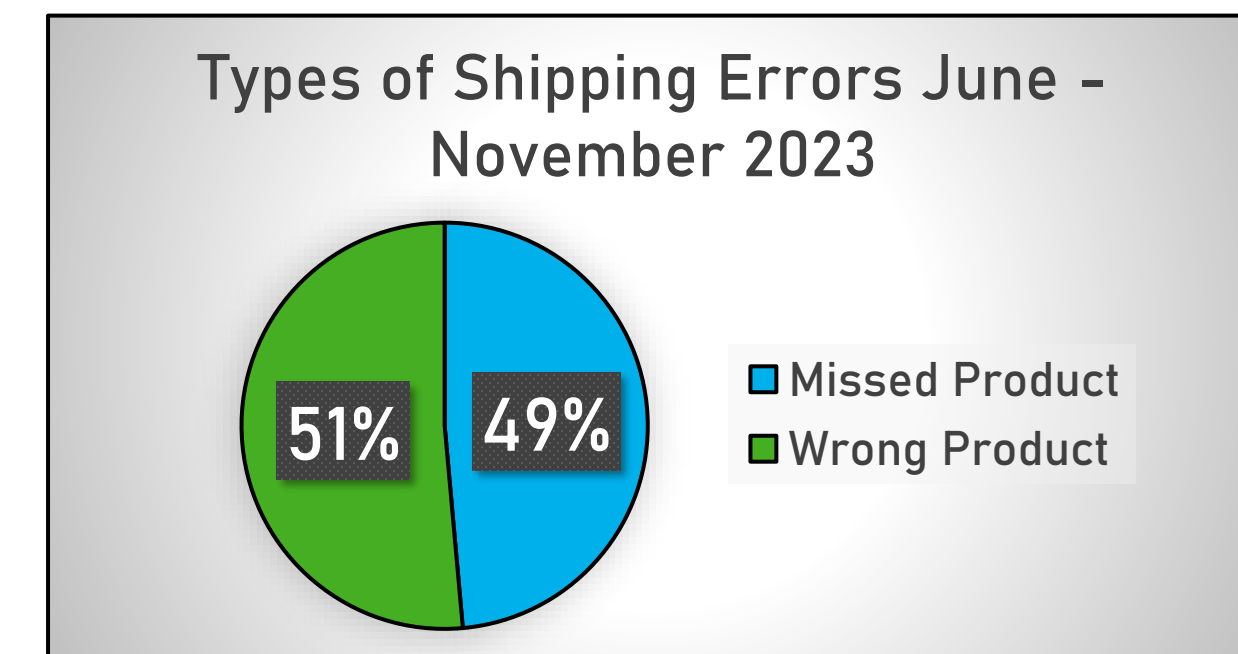


## Problem Description

### Solution 1: Employee On-Boarding Training Package

- 100% of the loading team has been at Shaw less than 2 years (High Turnover Rate).
- 49% of load errors are due to the wrong product shipped:

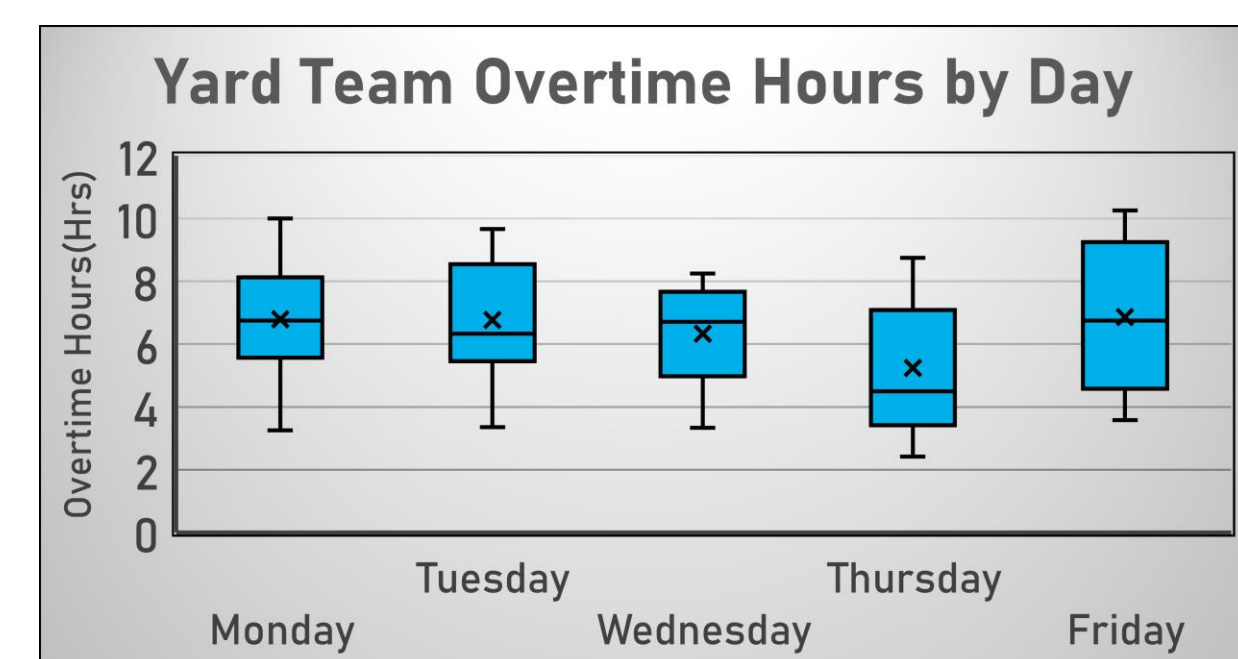


### Solution 2: Yard Quality Sampling Plan Tool

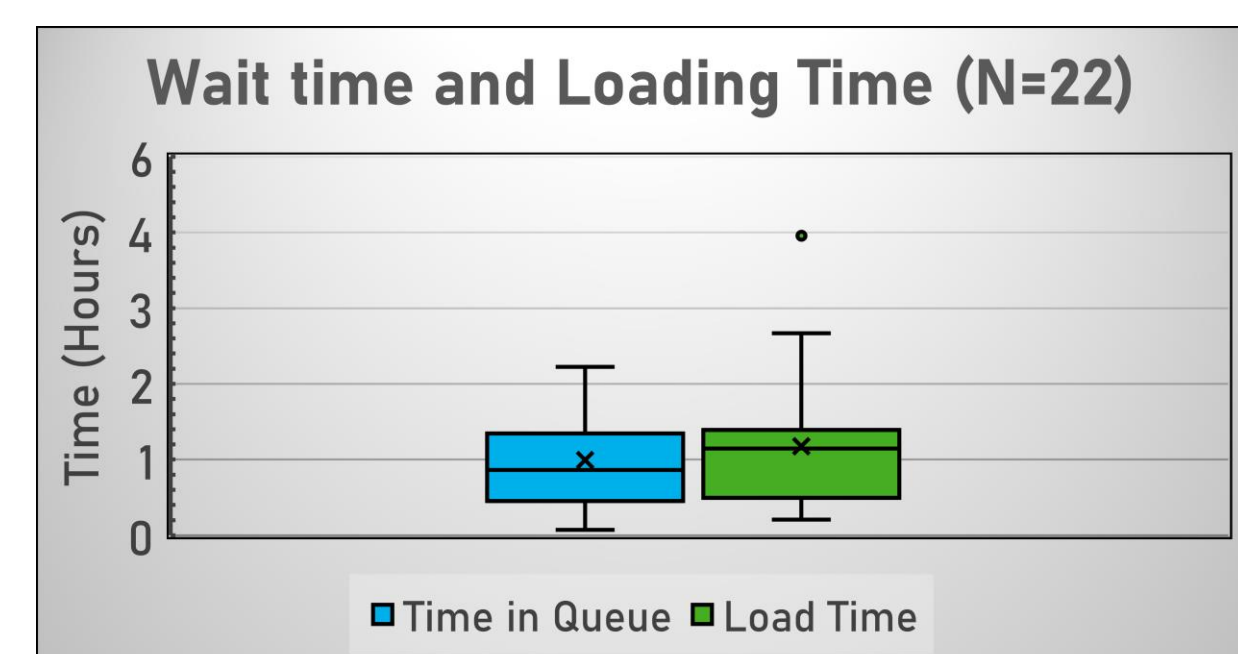
- 51% of load errors are due to wrong products being loaded and defects.
- Prolonged storage of concrete products in the yard increases the risk of quality damage, and without quality inspections, defects may remain undetected until the time of delivery.

### Solution 3: Simulation & Recommendations

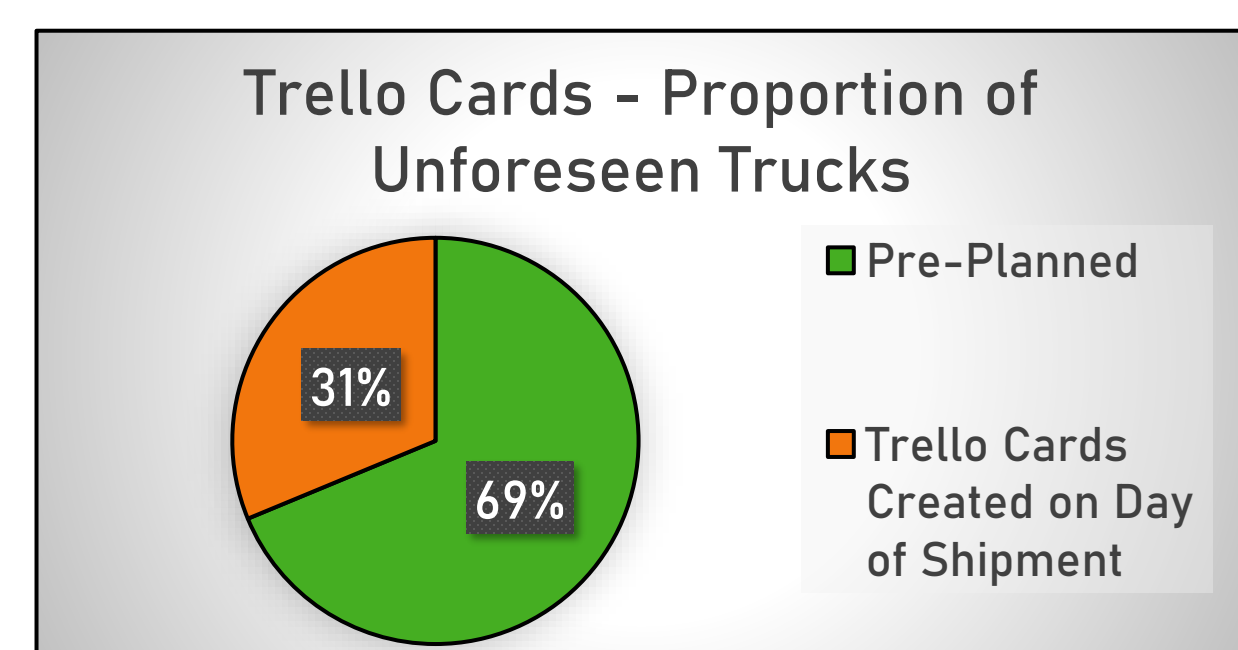
- Average of 6.3 overtime hours during peak season (Avg = 21 trucks/day):



- Trucks wait on average 1.18hrs before service and service takes 1.24hrs:



- 31% of truck arrivals are unforeseen:



## Objective

- Standardize loading cycle times and develop onboarding package for new and current yard operators.

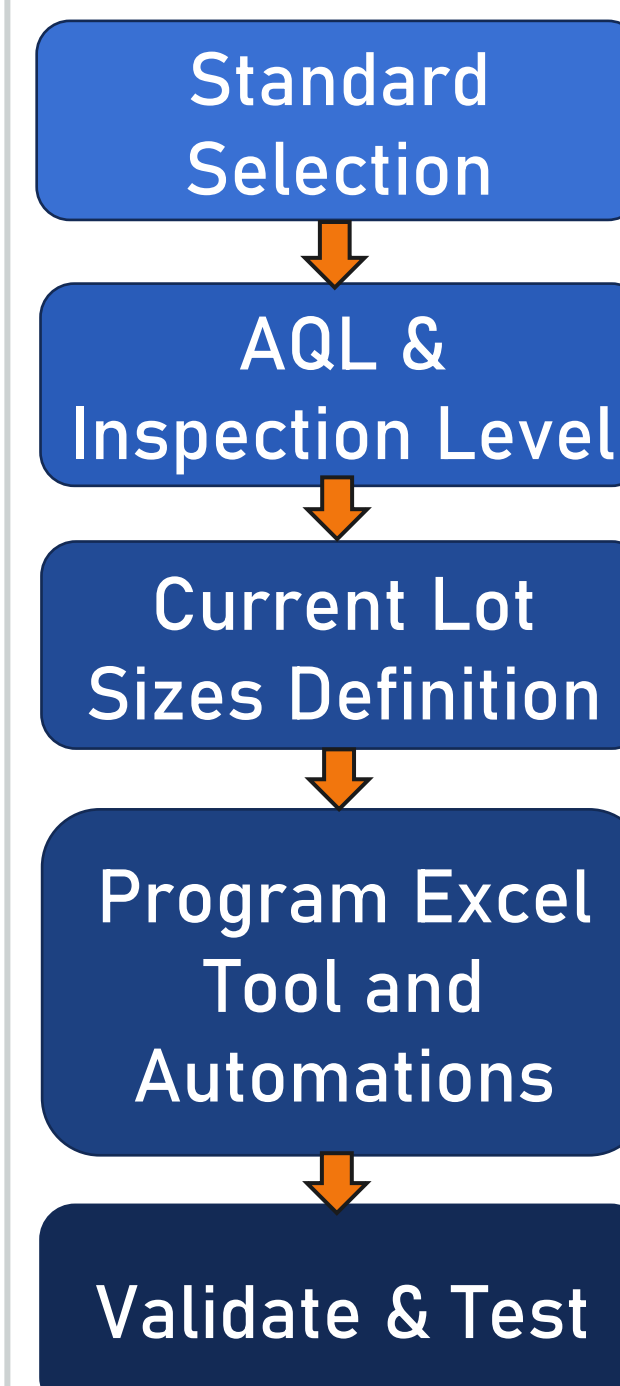
- Design efficient sampling procedures for outbound delivery trucks.
- Design efficient sampling procedures for stored products in the yard.

- Provide full time employees (FTE) requirements to meet current customer demand.
- Provide recommendation to reduce truck wait time in queue.
- Provide recommendations on employee and truck scheduling practices

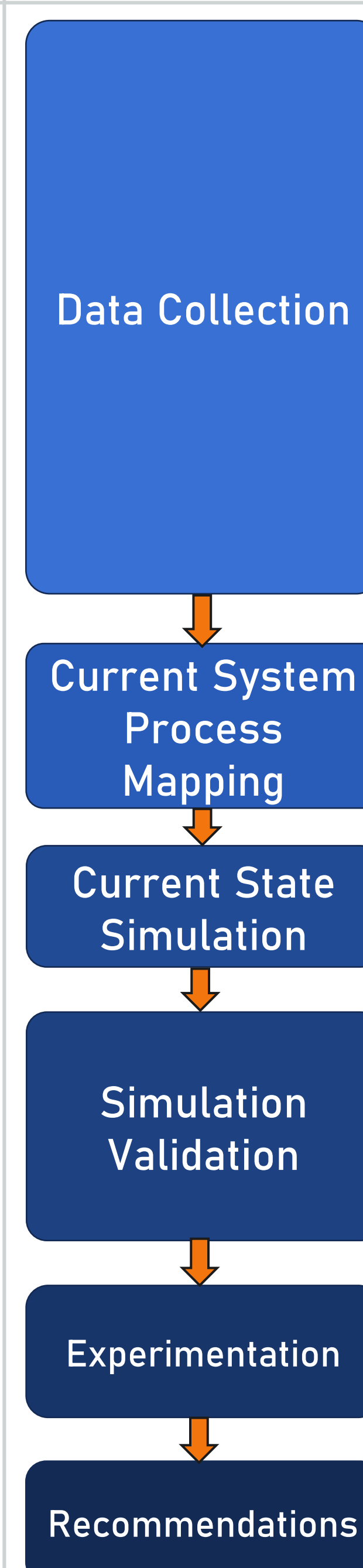
## Design Process



- Compiled extensive data on current assets, inventory, and material handling procedures.
- Consulted yard employees and extracted knowledge from the most skilled workers.
- Visually documented the yard, assets, products, locations, and procedures.
- Developed the guide and procedures in a cohesive training manual.
- Revised the manual with the stakeholders and held a kick-off meeting with yard employees.



- Selected standard: ISO 2859-1.
- AQL= 2.5 with a Level of Inspection II.
- Current yard inventory level and the average number of outbound trucks per day as the lot sizes.
- Configured ISO 2859-1 sampling plan tables, user inputs, and outputs.
- Validated the tool's outputs with manual calculations comparison with multiple case scenarios.

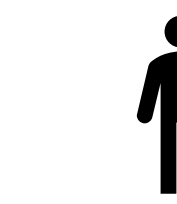


- Collected the data required to model current system and conducted outbound loading process time studies:
- 
- Truck arrivals process, outbound loading process, information flow, and scheduling.
  - A current state simulation of the yard was built based on the current yard processes and the data collected.
- |                | Time in Queue     | Total Time        |
|----------------|-------------------|-------------------|
| Observed Avg.  | 01:11:30          | 02:42:26          |
| Simulated Avg. | 1:09:37           | 2:36:59           |
| 95% CI         | [1:01:11-1:18:03] | [2:26:31-2:47:26] |
- Created experiments targeting the goal parameters: employee number and shift, servicing practices and truck arrivals.
  - Provided 4 scenarios that improve the system to meet the customer's demand.

## Deliverable

**W** A document designed to be printed and used as a hands-on reference guide for new yard operators, covering multiple aspects of yard operations which will contribute to reducing the effects of the high learning curve and to reduce loading errors.

**Who?**



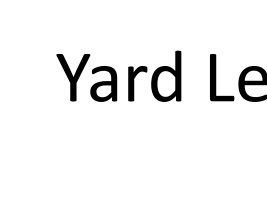
New Yard Operators & Shaw Transport Employees

### Table of contents:

- Yard Layout with Forklift Attachment Locations
- Yard Loading Zones Layout
- Loading Zone Expectations
- General Yard Expectations
- Vehicle/Products Guide (For all types of forklifts)
- Product Code Reading Procedure
- Common Mistakes
- General Loading Rules (Distribution, Center of Gravity, Securing Tools)
- Even Distribution
- Loading Pipes (Single and Multiple Layers)
- Rework and Patching Procedure
- Yard situations and actions

**X** A sampling plan Excel tool designed to determine sample sizes and number of defects to reduce defective products stored in the yard and in the outbound delivery process based on ISO 2859-1 standards.

**Who?**

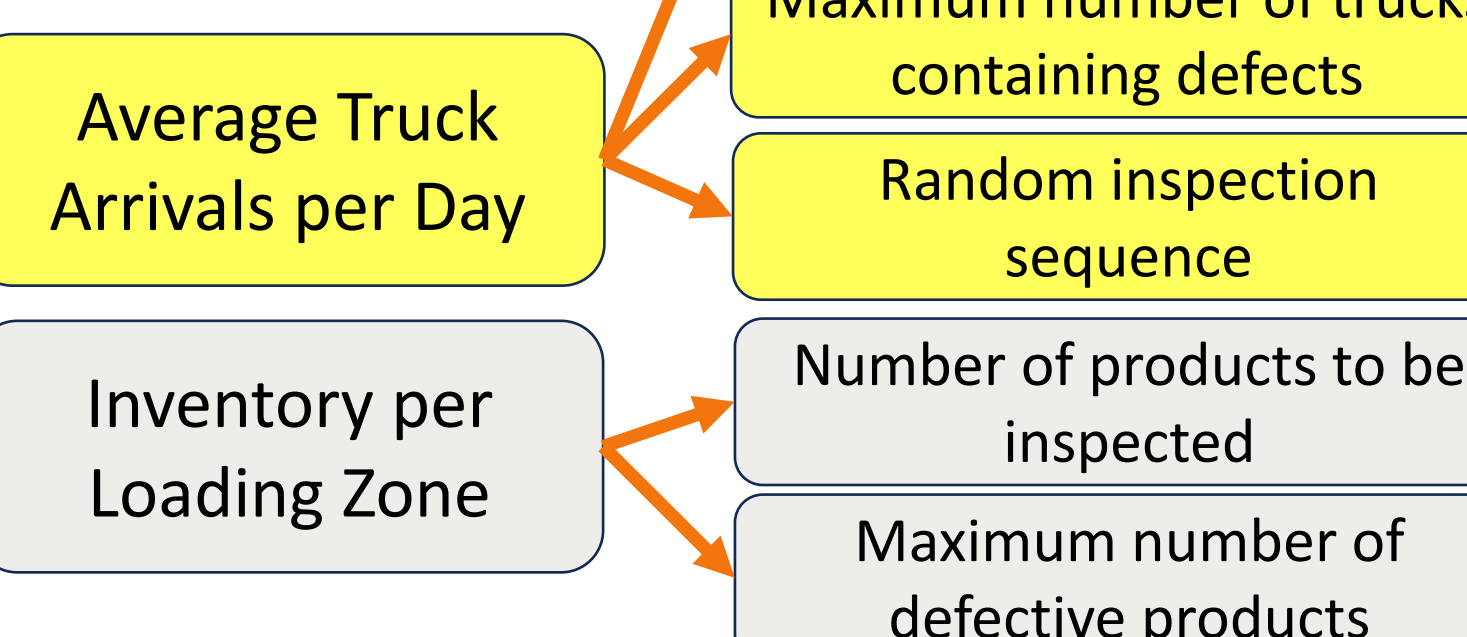


Yard Lead

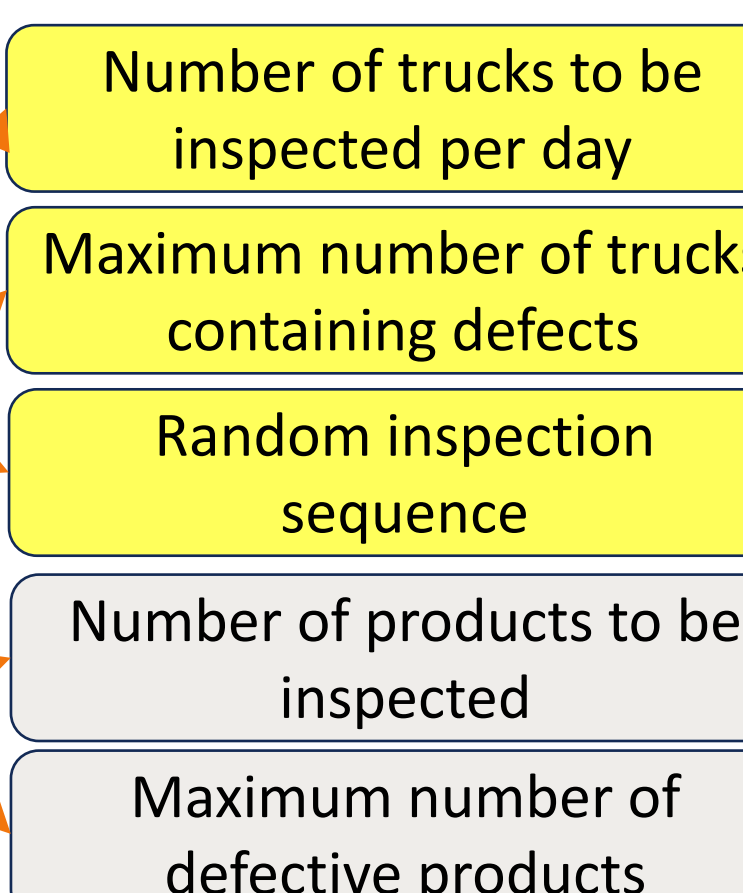
### Inspection Condition Selection



### Tool Inputs



### Tool Outputs



**Simio** A Simio simulation of the Shaw's outbound loading system was developed to experiment with different variation of employee scheduling and truck arrival practices with the objective of reducing the time in queue and the truck time in system while meeting the current demand.

### Simulation\* Results:

Scenario	# of Full-Time Employees	Schedule strategy	Trucks Processed	Total Time in System	Total Time in Queue	Overtime
Current State	3	Random truck arrivals	17	2:36:59	1:09:37	05:12:53
1	4	Random truck arrivals	19.62	1:58:12	0:47:24	00:30:00
2	3	2 trucks /hr	16.96	1:58:48	0:32:47	00:55:48
3	4	2 trucks /45 min	21.15	1:58:12	0:29:46	00:41:24
4	4	3 trucks /hr	24.59	2:11:13	0:42:54	02:42:36

\*The Simulation runs 100 replications, and includes the removal of a 15min daily meeting

Based on the simulation experiments, **scenario #3** is recommended:

- Introduction of an additional employee to the full-time load team
- Introduction a scheduling system to schedule 2 trucks every 45 minutes

### Benefits of scenario #3:

- 24.71% reduction in the total truck time in system
- 57.21% reduction in the total truck time in queue
- 86.71% reduction in employee overtime while processing 5 more trucks