I2.03 – Toyota Simulation

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Problem Statement

Due to the launch of new models, the current bumper paint line is experiencing bottlenecks

- Sequoia parts take 2 jigs, where Tundra parts fit on 1
- Throughput capacity had been reduced due to production ratio
- Toyota lacked method to understand current throughput capacity

Project Purpose

What are Toyota's current throughput capabilities?

Create simulation model to gain understanding of bottlenecks.

Test "what-ifs".

Collect data during Spring 2023 and finalize simulation during Fall 2023

Tools and Methods

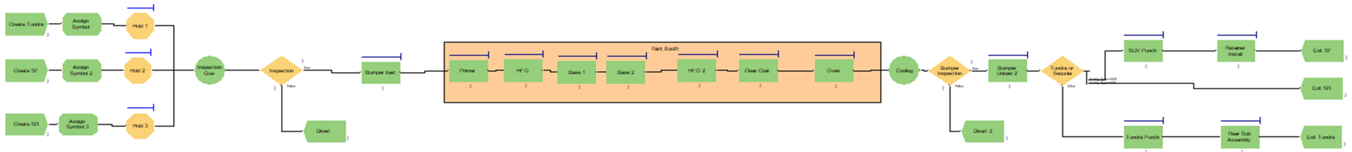
Data collected will be analyzed using

- Power BI
- Excel
- Arena

Objectives

Evaluate	Present	Visualize	Determine
Evaluate Tundra/Sequoia Process to determine the best approach to optimize performance.	Present system performance such as throughput, cycle times, equipment utilization and resource availability	Visualize results with Animation via simulation using Arena	Determine the impact of uncertainty and variability on system performance. Run "what-if" scenarios to evaluate effect of proposed process change on ratio of Tundra/Sequoia

Simulation



Attribute Assignments

	Type	Attribute Name	Row	Column	Definition Method	Entity Picture Name	New Value
1	Active Entity	Base 2 Time			Entity Picture Name	Picture.Report	53
2	Active Entity	Base 1 Time			Entity Picture Name	Picture.Report	53
3	Active Entity	Clear Coat Time			Entity Picture Name	Picture.Report	56
4	Active Entity	Oven Time			Entity Picture Name	Picture.Report	60
5	Active Entity	Bumper Unload Time			Entity Picture Name	Picture.Report	26 + ERLA(11.3, 2)
6	Active Entity	Tundra Punch Time			Entity Picture Name	Picture.Report	64 + 55 * BETA(0.966, 1.67)
7	Active Entity	Rear Sub Assembly Time			Entity Picture Name	Picture.Report	33 + WEIB(25.9, 1.99)
8	Active Entity	Primer Time			Entity Picture Name	Picture.Report	53
9	Active Entity	Bumper Load Time			Entity Picture Name	Picture.Report	27 + ERLA(11.3,2)
10	Active Entity	Entity.Picture			Entity Picture Name	Picture.Blue Ball	1

Results

Throughput					Bottlenecks					
Tundra	Sequoia	T Out	S Out	Total	Bumper load	Tundra Punch	Primer	Base 1	Oven	HFO
7	1	322	48	370	511.7	9.4	14.1		15	
6	1	316	52	368	421.8		20.7		15	8.4
8	1	322	42	364	598	13.5	20.3		14	
0	1	0	364	364	148.2		15.7	20		7.3
5	1	302	60	362	345.0		20.4		15.2	8.2
1	0	286	0	286	174.2	49.3	18.1		14.3	

Human Factors

- Mental health of employees is vital
- Takt time: 55 sec (goal of 49)
  - Team members skip breaks to meet quotas
  - Improving system would reduce stress

Recommended Plans

Future tasks could include:

- Analyze impact of the jig switch station
- Improve accuracy of simulation
  - Include down time of each machine
  - Include data for defective parts

Team Members

From left to right:
Reagan Chojnacki- Project Manager
Max Grossi- Process Data Analysis

Acknowledgements

Special thanks to our instructor, Dr. Michelle Londa, and our sponsors, Paulo Cesar Varela, Julio Mata, and Abigail Montalvo