

Problem Statement

Lencore suffers from an unbalanced production line, non-standardized processes for intricate assembly tasks, and unoptimized material handling. The lack of accessible work instructions further causes training and quality control complications.

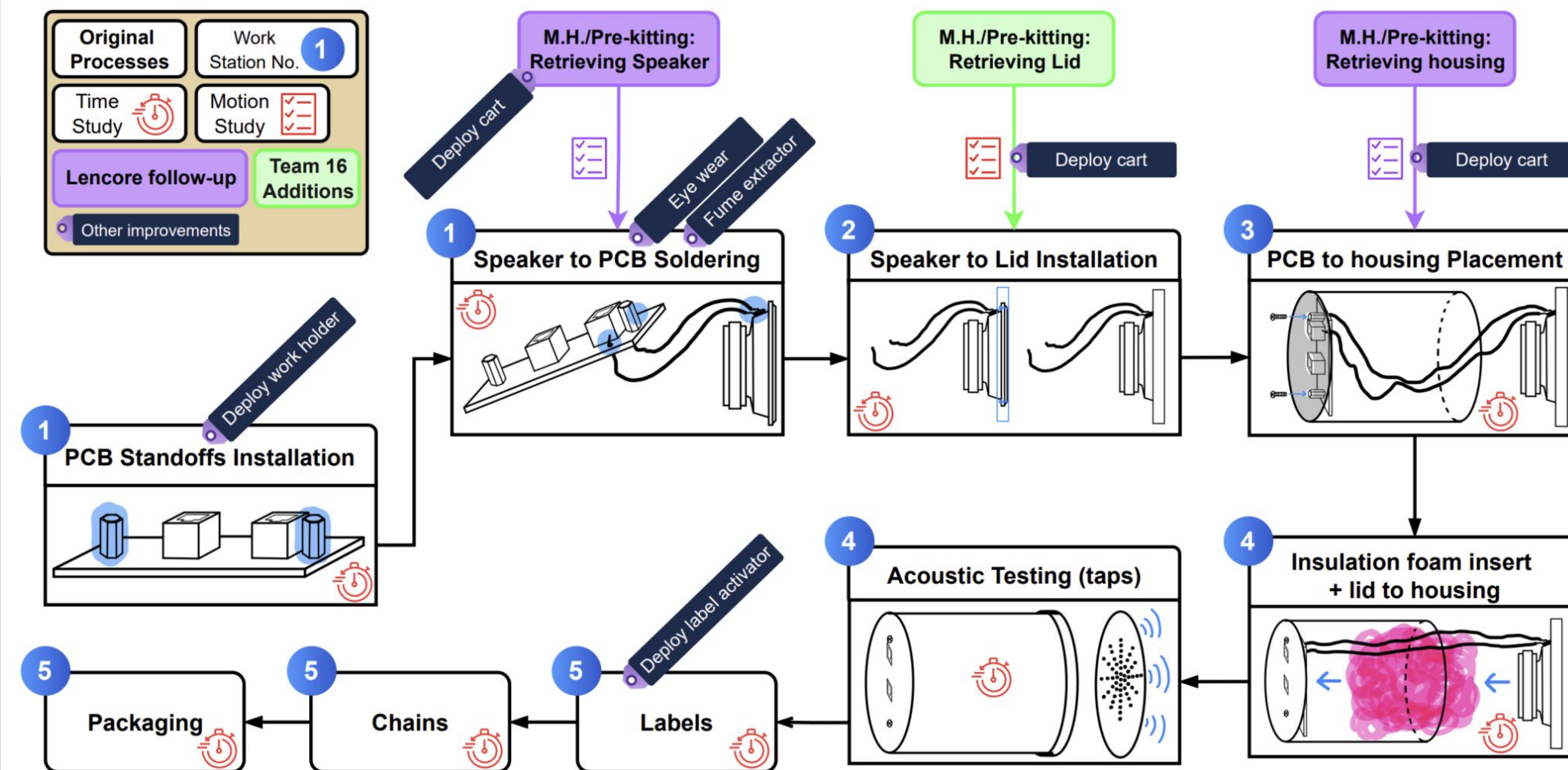
This results in **increased idle time** due to waiting periods between workstation flow, line leads' **shifted focus on quality control** instead of process management, and **difficulties with training** new workers.

Client Background

Goodwill Commercial Services (GCS) specializes in providing advanced supply chain and logistics solutions, and supports a greater social mission of providing opportunities to those faced with exceptional challenges, including disabled or formerly incarcerated individuals. In 2020, Lencore contracted a product line through GCS to produce paging & audio systems, where Lencore handles the sale of the product and GCS oversees assembly and distribution.

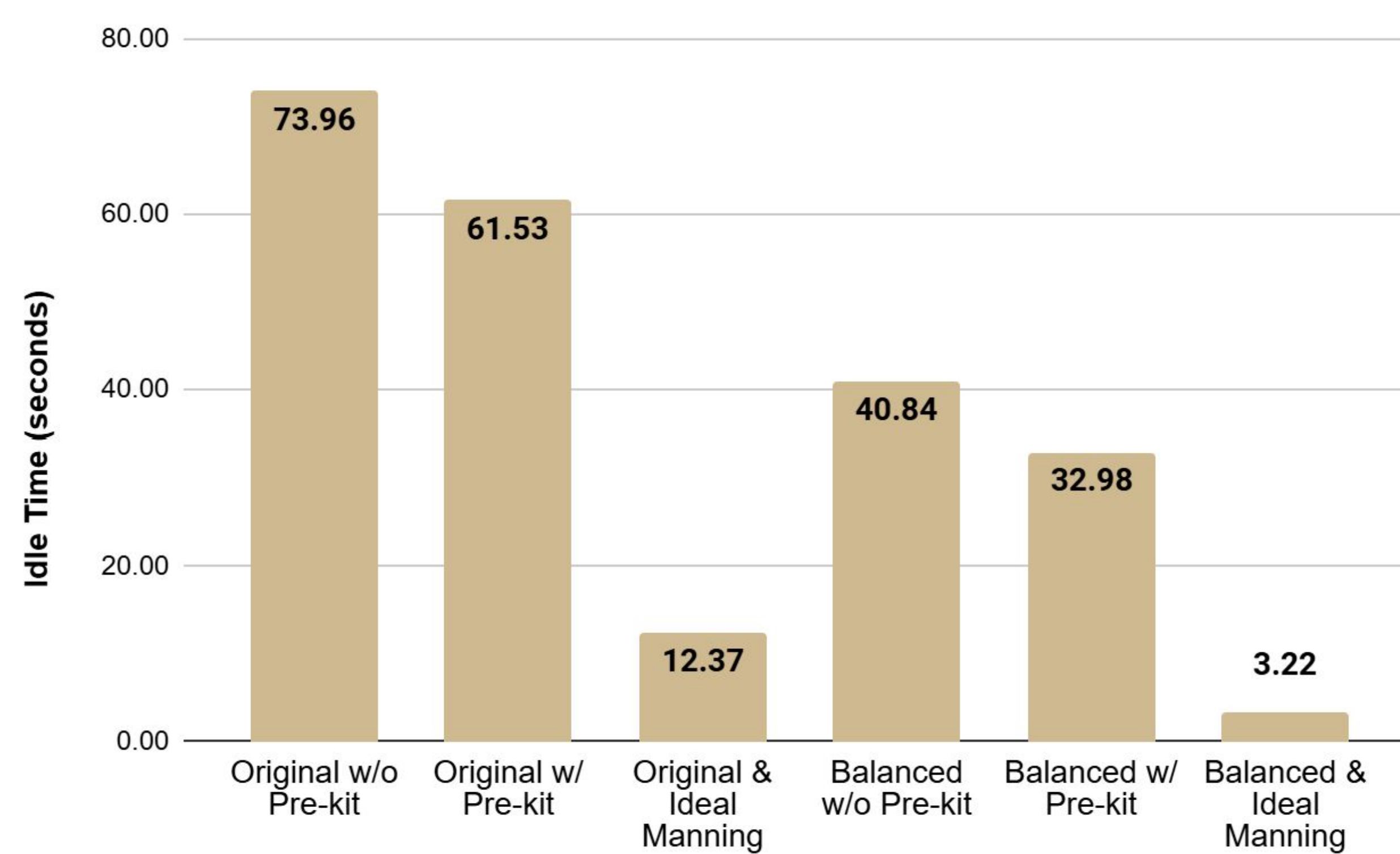


System Model (Speaker Model: LC-545-U)



Recommendations

Idle Time Reduction by Line Balancing Method



Workstation Manning Ratios

Original
Balanced

	Number of Workers per Station					% Idle Time
	WS 1	WS 2	WS 3	WS 4	WS 5	
6 people	2	1	1	1	1	15.21%
	2	1	1	1	1	1.54%
7 people	2	1	1	2	1	6.95%
	2	1	2	1	1	11.09%
9 people	3	2	1	2	1	2.12%
	3	2	2	1	1	3.61%
10 people	3	2	2	2	1	7.06%
	3	2	2	2	1	2.64%

Return on Investment

- Implementation of pre-kitting **increases production rate by 1.61 times** for LC-545-U model
- Ideal manning ratios **reduce idle time up to 94.5%**, saving up to 2 hours of idle time per day
- Decentralization of work instructions into station-specific reference materials lowers supervisor and QC time burden

Spend 25-30% less on labor per unit
 Ideal production improvement of 61%

Dividing Work Instructions into Station-Specific Manuals

- Improved station modularity
- Clarified and standardized training
- Improved ease of reference and use of WI

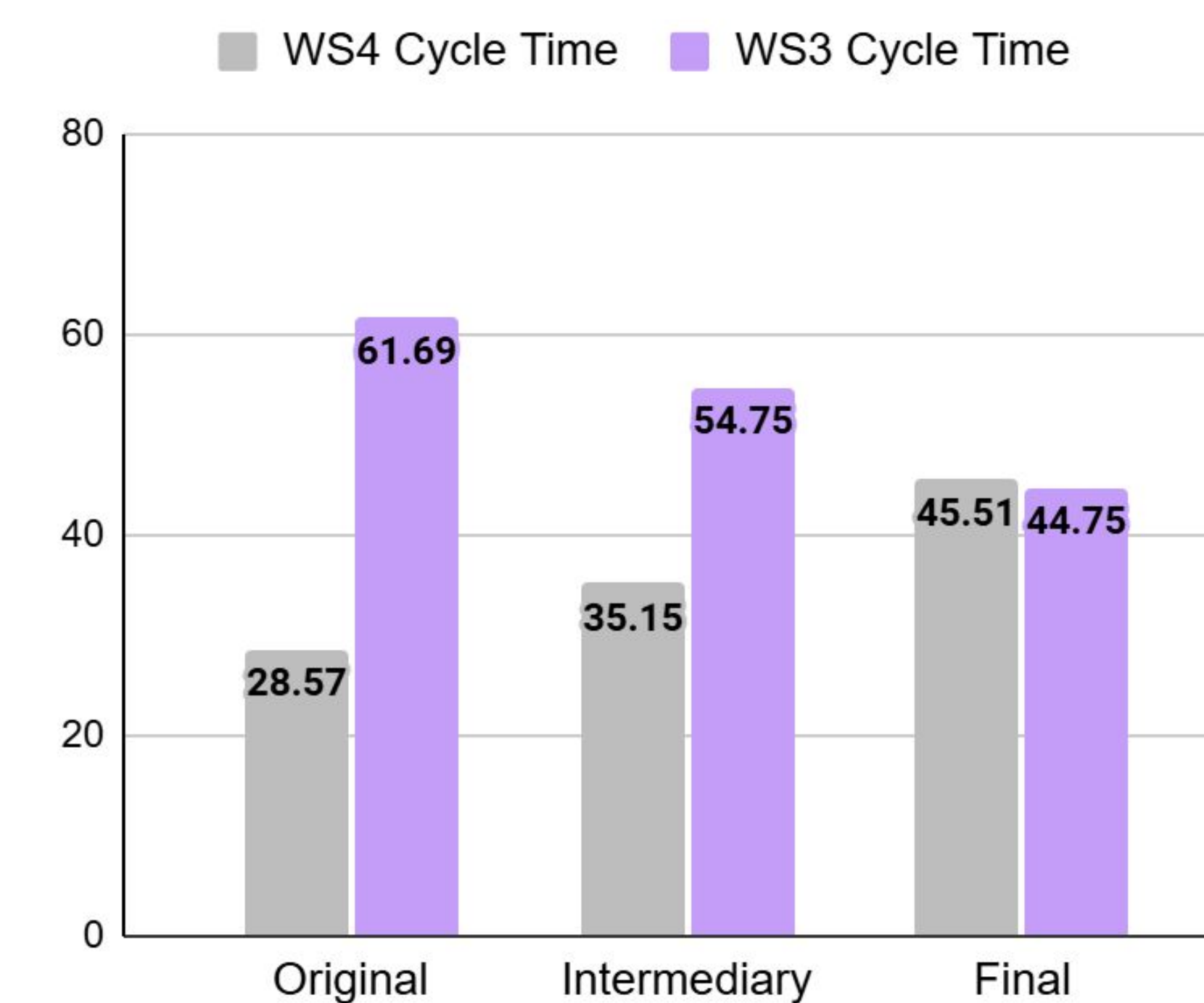
Interfacing with Quality Control

- Creation of documents to support head unit
- Proposal for strict use of tablets on inspection

Methods

Workstation Line Balance

WS3 and WS4 Cycle Times (seconds)

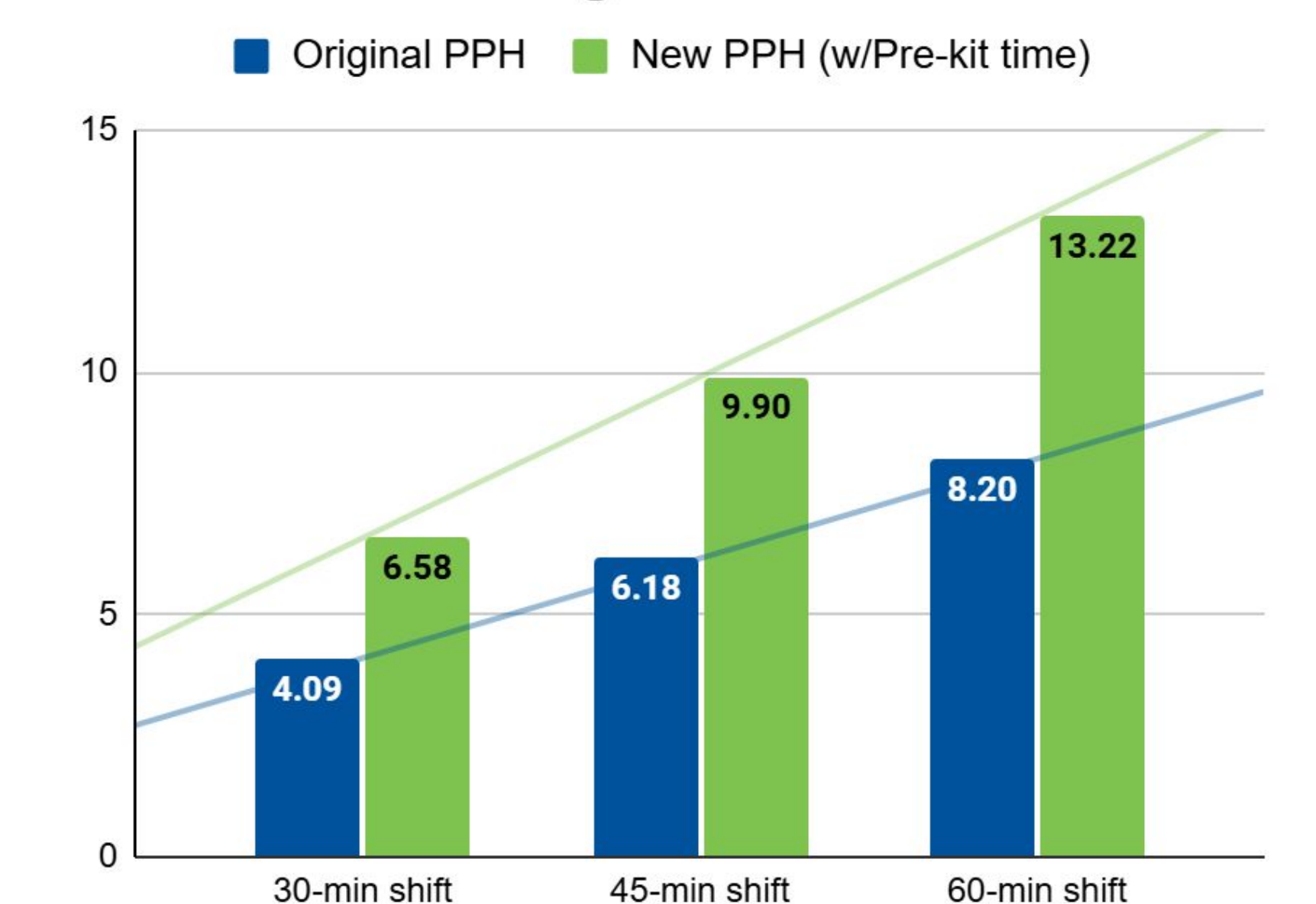


- Balanced tasks between different workstations, tackling most idle time

Ideal Pre-kitting/Assembly Time Equation

$$\frac{T_{M.H. \text{ setup}}(s) + (n \times T_{M.H. \text{ per unit}})(s)}{60} + \frac{n}{T_{\text{prod. rate}}(\text{parts/min})} = D(\text{min})$$

LC-545-U PPH: Original VS Pre-kit Addition



- Pre-kitting increases PPH by 61.2%
- Kitting lids only (takes the longest)

Discussion

Challenges: Optimizing a non-automated transfer line with high employee turnover, a wide range of products, and non-standardized material handling.
Impacts: Provide options to management for agile responses to maintain a balanced line and implement smooth employee training and QC.