A Project on Process Improvement

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Executive summary

Kilian Manufacturing, founded in 1920 and headquartered in Syracuse, New York, is a leading producer of precision-machined bearings and value-added assemblies. With additional facilities in Toronto, Canada, Kilian employs approximately 180 people and serves a diverse range of industries, including aerospace, defence, automotive, agriculture, and medical.

In March 2023, Kilian's parent company, Altra Industrial Motion Corp., was acquired by Regal Rexnord Corporation, a global leader in industrial powertrain solutions, power transmission components, electric motors, and electronic controls. This acquisition has integrated Kilian into a broader network of companies specializing in bearings and related technologies, offering new opportunities for growth and collaboration.

Despite successfully delivering products to meet customer needs, Kilian Manufacturing was operating at an efficiency level of 80%, revealing significant gaps in resource utilization and operational performance. This inefficiency raised concerns about the company’s ability to consistently meet the demands of its top 10 customers, potentially impacting customer satisfaction and long-term competitiveness. Additionally, Kilian lacked measuring metrics to evaluate its capabilities or track performance effectively, making it difficult to identify bottlenecks or areas for improvement.

As part of the Kilian Manufacturing Process Improvement Project, several key initiatives were undertaken to address these challenges:

1. **Work Cell Optimization**: We grouped parts with similar production steps into dedicated work cells, streamlining workflows and enhancing efficiency.
2. **Lean Training**: Employees were trained in lean manufacturing principles to better identify and eliminate waste in daily operations.
3. **Visual Dashboards**: Real-time dashboards were implemented to track daily demand, manage inventory, identify bottlenecks, and enable prompt actions to address delays in deliveries.

These improvements introduced measurable metrics and data-driven decision-making into Kilian’s operations, empowering the company to better understand its performance and optimize its processes. By addressing inefficiencies, the project successfully reduced costs, increased productivity, and improved resource utilization, ensuring Kilian’s ability to maintain high customer satisfaction and reinforcing its position as a leading global manufacturer.

Assumptions

Each day consists of two shifts, a day shift and a night shift, with each shift lasting 7 hours. Each person works only one shift per day, resulting in 7 working hours per day per person. Over the course of a month with 20 working days, each person completes 20 shifts, equating to a total of 140 working hours per month (20 shifts × 7 hours per shift). The total number of shifts increases with the number of tables available. For instance, if there are two tables, the team can effectively complete double the number of shifts within the same shift duration. This means that with two operational tables, a single 7-hour shift can perform the equivalent workload of two shifts, maximizing productivity and resource utilization.

DEFINE PHASE

Project Charter

1. Project Champion

Tony Kurucz, facilitator at Kilian Manufacturing - Regal Rexnord. He will provide strategic leadership and ensure that the project aligns with the company's strategic goals.

2. Opportunity/Problem Statement

Kilian Manufacturing is successfully delivering products to meet customer needs, but current efficiency levels of delivering on time is at 80%, indicate significant gaps in resource utilization and operational performance. This inefficiency raises concerns about the company's ability to consistently meet the demands of its top 10 customers, potentially impacting customer satisfaction and long-term competitiveness.

3. Goal Statement

The goal of this project is to evaluate and enhance Kilian Manufacturing's operational processes to achieve a lean and efficient production environment. By addressing current uncertainties in resource utilization and process efficiency, the project aims to improve overall efficiency from the current 80% to 99.97%. This will involve designing efficient work cells by grouping parts with similar production steps, facilitating streamlined workflows. Additionally, visual dashboards will be developed to provide real-time insights into production status and resource usage, supporting data-driven decision-making to optimize performance and maintain high customer satisfaction.

4. Business Case & Impact

Kilian Manufacturing aims to enhance resource utilization and process efficiency to maintain its competitive edge in the bearing industry. Current challenges include inefficiencies in inventory management, workforce allocation, and machinery utilization, which risk increasing operational costs and hindering the company's ability to consistently meet customer demands. Addressing these issues is critical to ensuring long-term customer satisfaction, competitiveness, and operational excellence.

5. Project Scope

The scope includes analyzing Production processes, Inventory usage, Workforce allocation, Machine efficiency, Quality assurance, Shipping logistics to ensure optimal resource utilization and streamlined delivery.

6. Team Members

- **Char (Team Leader)** – Oversees production and team alignment with project objectives.
- **Muljiah (Team Leader)** – Coordinates workflow and manages team productivity.
- **Shawn (Quality Representative)** – Ensures quality control and addresses any quality issues.
- **Scott (Buyer)** – Manages procurement and material sourcing.
- **Vic (Customer Representative)** – Liaises with customers to meet their needs and provide updates.
- **Lisa (Assistant Leader)** – Supports team leaders in task coordination.
- **Jim (Segment Manager)** – Provides strategic direction and ensures alignment with company goals.
- **Additional Roles**:
  - **Tony** – Responsible for machining (Syracuse Inserts, Toronto Washers) and reviews action items.
  - **Cassie and Bob** – Handle supplier updates and inbound/outbound logistics.

7. Project Plan

Phase 1: Project Initiation and Planning
Start Date: September 2, 2024
End Date: September 15, 2024

- Establish project goals and scope.
- Identify team members and stakeholders.
- Develop a communication plan and define roles.

Phase 2: Data collection
Start Date: September 16, 2024
End Date: September 29, 2024

- Collect data on current production workflows and resource utilization
- Identify and document Key Performance Indicators (KPIs) such as efficiency rates, takt time and inventory levels.

Phase 3: Design of work cells and Dashboard
Start Date: September 30, 2024
End Date: October 13, 2024

- Design work cells by grouping parts with similar production steps.
- Design Visual dashboard for the new implementation

Phase 4: Initial Implementation of Work Cells (Pilot Group -2)
Start Date: October 14, 2024
End Date: October 27, 2024

- Pilot the work cell design with a selected group.
- Monitor performance and gather feedback.
- Refine work cells and dashboards as needed.

Phase 5: Sequential Rollout of Work Cells
Start Date: October 28, 2024
End Date: November 10, 2024

- Gradually implement work cells across all production lines.
- Ensure smooth transition with minimal disruption.

Phase 6: Final Review and Go-Live Preparation
Start Date: November 11, 2024
End Date: November 16, 2024

- Conduct a final review of the implemented changes.
- Prepare for the official go-live.
- Train staff and provide final documentation**.**

Go-Live Date: November 17, 2024

Communication Plan

Audience	Media	Purpose	Key Messages	Owner	Frequency
Project Team	In-person	Update on project progress	Status, milestones, issues	Char	Daily
Executives	In-person	Ensure alignment with goals	Progress, cost savings, efficiency gains	Tony	Bi-weekly
Quality Control Team	In-person	Track quality improvements	Daily metrics, process feedback	Shawn	Daily
Production Teams	In-person Meetings	Inform on new processes	Work cell roles, efficiency targets	Team Leads	Weekly
Customers (Internal)	Monthly Newsletter	Inform of benefits	Production efficiency updates	Vic	Monthly

Stakeholder Analysis

Stakeholder	Impact	Influence	Attitude	Explanation	Score	Action Plan
Tony (Champion)	High	High	Positive	Ensures alignment with strategy	5	Frequent updates, strategic review
Char (Team Leader)	High	High	Positive	Critical for team alignment	5	Weekly coordination meetings
Jim (Segment Mgr)	High	High	Neutral	Interested in results, cautious	4	Ensure clear communication on goals
Shawn (Quality)	Medium	Medium	Positive	Supports quality improvements	4	Daily QC updates
Scott (Buyer)	Medium	Medium	Neutral	Interested in procurement efficiency	3	Bi-weekly procurement updates
Vic (Cust. Rep)	Low	Medium	Positive	Customer satisfaction focus	3	Monthly status on project benefits

Voice of the Customer (VOC)

The VOC represents customer expectations, preferences, and feedback regarding the products and services. Based on the problems you've mentioned and inferred, here's a VOC for Kilian Manufacturing:

Customer Need/Expectation	Customer Voice (Sample Statements)	Key Requirements
Reliable delivery of products	"We need our parts delivered on time without delays."	On-time delivery with no missed deadlines
Consistent product quality	"The bearings must meet exact specifications every time."	Zero defects in products
Value for money	"We expect every dollar we pay to reflect the value delivered."	Efficiency and cost-effectiveness
Clear communication on progress and delivery timelines	"Keep us updated on when and how we'll receive our orders."	Transparency in process and delivery schedules
Operational efficiency without downtime	"We can't afford to pay for an hour's worth of missed work!"	Minimize downtime to avoid disruptions

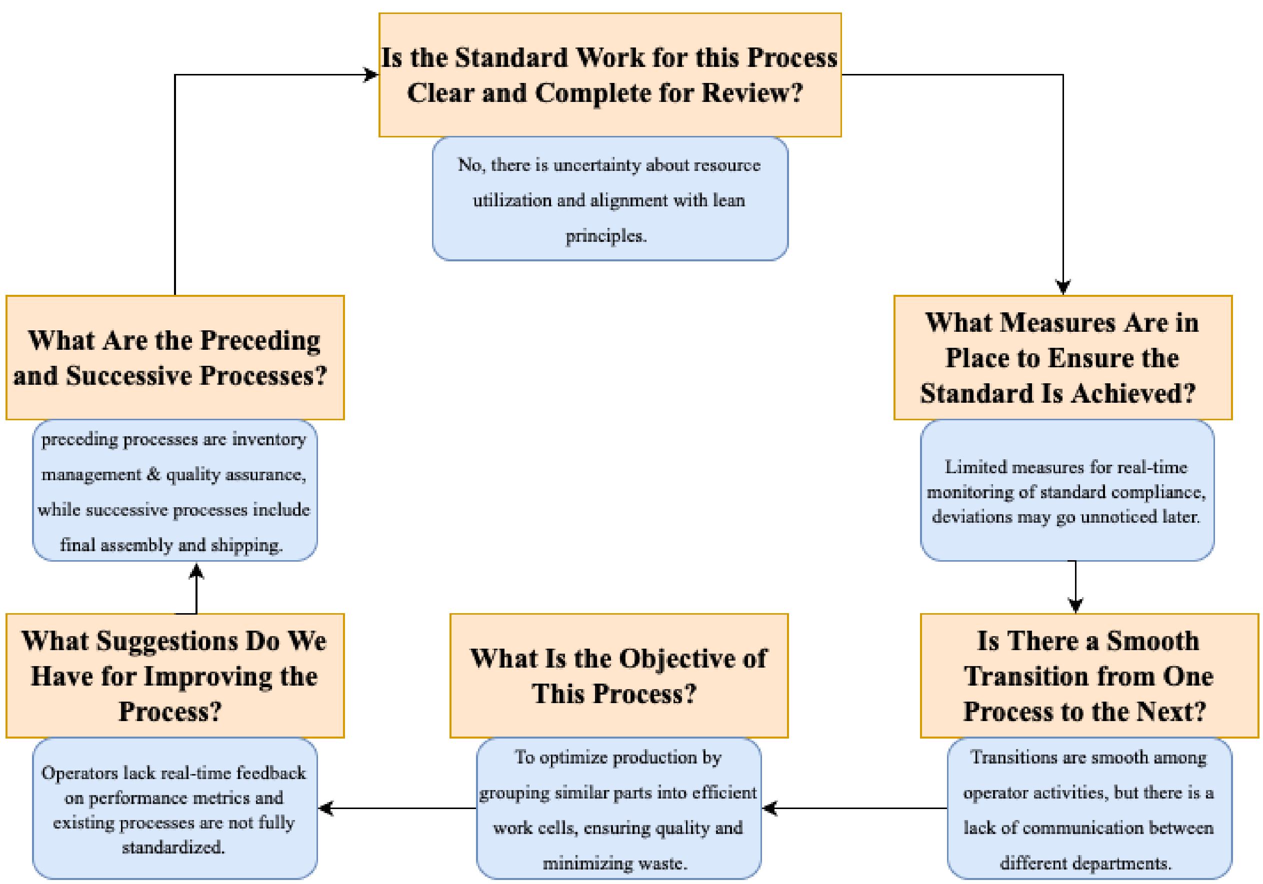
CTQC Table

CTQC (Critical-to-Quality Characteristic)	Customer Requirements/ Needs	Specification/Standard	Measurement Method	Target Value
Work Cell Design	Efficient and streamlined production workflows	Grouping of parts with similar production steps	Review of work cell designs against production requirements	100% alignment
Production Efficiency	Higher output with minimal waste	Increase in efficiency from 80% to 99.97%	Efficiency calculation: Output/Input × 100	99.97% efficiency
Dashboard Usability	Intuitive and accessible visual dashboards	Dashboards displaying real-time data	Real-time testing and user feedback surveys	Intuitive, visually clear, and easy to understand
Resource Utilization	Optimal use of inventory, workforce, and machinery	Utilization rates: Inventory ≥ 95%, Workforce ≥ 90%, Machinery ≥ 95%	Resource utilization reports	≥95% utilization

Lead Time Reduction	Shorter production cycle times	Reduction in lead time by 20% from baseline	Time studies of production workflows	-20% from baseline
Quality Control	Consistent and defect-free production	Defect rate ≤ 0.5%	Daily defect tracking and analysis	≤0.5% defect rate
Customer Satisfaction	High product quality and timely delivery	On-time delivery rate ≥ 98%, Customer satisfaction score ≥ 90%	Delivery and satisfaction surveys	≥98% on-time rate, ≥90% satisfaction
Training Effectiveness	Employees trained to adapt to new processes	100% of relevant staff trained, ≥85% training effectiveness score	Post-training tests and feedback surveys	100% trained, ≥85% effectiveness

Gemba Walk: Process Analysis

Gemba is a Japanese term that translates to "the real place." In the context of business, it refers to the actual location where work is performed or value is created, such as the shop floor in manufacturing. The Gemba process involves observing workflows, engaging with employees, and identifying areas where inefficiencies, problems, or opportunities for improvement might exist but are often overlooked in daily operations. By closely examining activities on the floor, managers gain valuable insights to enhance processes, ensure quality, and optimize performance.



SIPOC diagram

Category	Details
Suppliers (S)	- Internal: Assembly Bench Teams, Dial Operations, Inspection Teams, Sorting Teams
	- External: Material Suppliers, Logistics Providers, Machine Manufacturers
Inputs (I)	- Components: Washers, Rivets, Assemblies
	- Equipment: Assembly Benches, Dial Gauges, Inspection Tools, Sorting Tables
	- Data: Production Schedules, Cause-and-Effect Analysis, Historical Demand Data
	- Human Resources: Operators, Supervisors, Quality Inspectors
Process (P)	1. Assembly at Benches (Grouped by Work Areas: Groups 1–4)
	2. Dial Gauging for Quality Checks
	3. Wait Time Management (Monitor delays at hour-level intervals)
	4. Inspection of Parts
	5. Sorting of Finished Components
	6. Final Shipment to Customers (Includes Packaging and Logistics Coordination)
Outputs (O)	- Finished Products: Assembled and Inspected Components (Washers, Rivets, etc.)
	- Quality Data: Reports on Defects, Inspection Metrics
	- Optimized Workflows: Streamlined Group Operations (Group 1–4)
	- Delivery Readiness: Products prepared for shipment
Customers (C)	- Internal: Assembly Management Teams, Logistics Departments
	- External: End Customers, International Manufacturing Plants (e.g., Korea)

MEASURE PHASE

Data Collection Plan

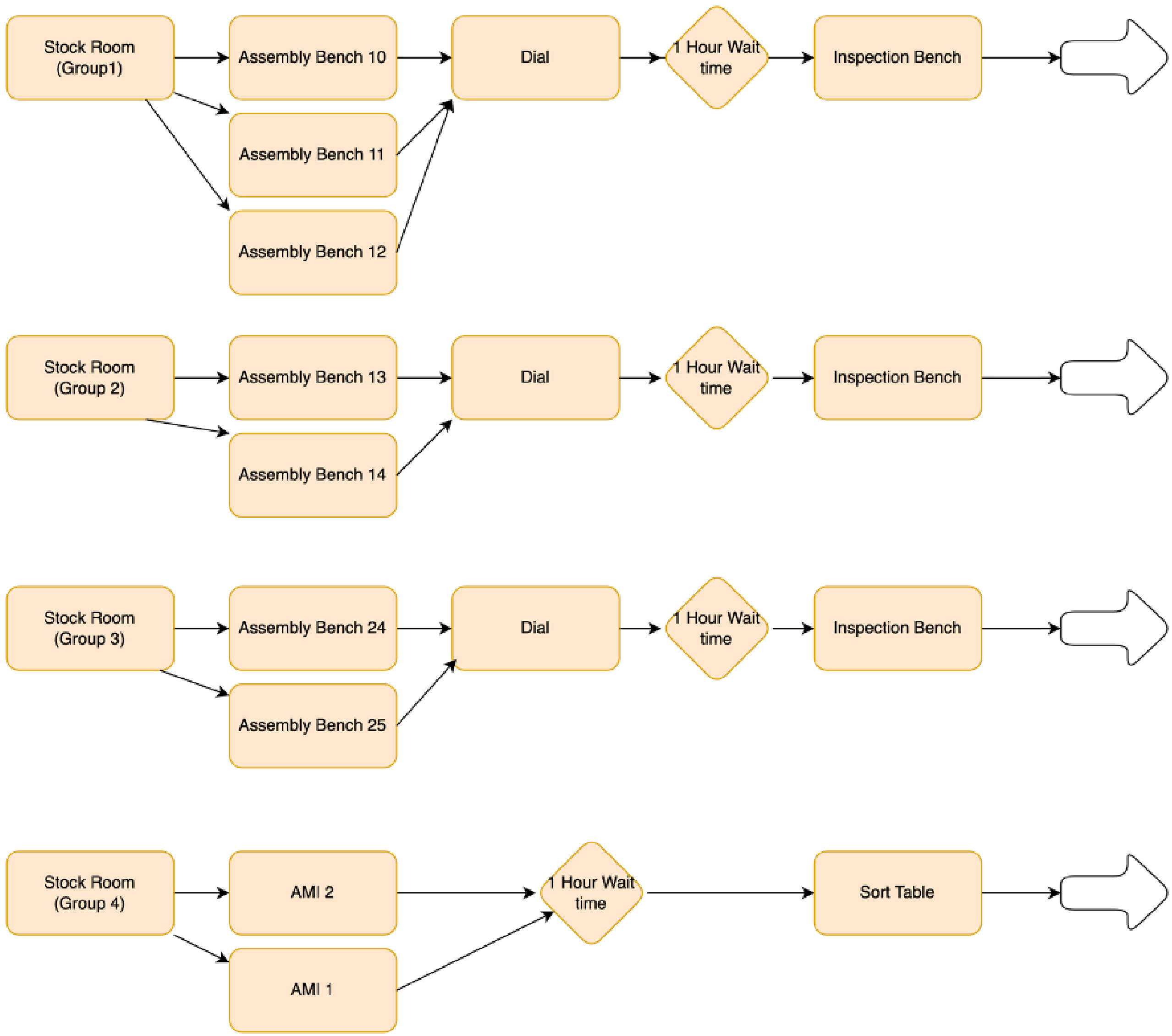
This data collection plan is designed to gather critical information to optimize inventory, improve operational efficiency, and enhance delivery performance. By analyzing run rates, monthly demand, resource allocation, shipment priorities, machine requirements, and component stock levels, we aim to address key bottlenecks and streamline processes. The collected data will be used to develop interactive dashboards for real-time tracking, enabling informed decisions and actionable insights. These insights will help achieve our KPIs, such as on-time delivery rates, improved inventory turnover, and reduced component lead times, ensuring efficient production, balanced inventory management, and timely shipments.

Description of Data	Unit of Measure	Source of Data	Purpose
Run Rate for All Groups	Per hour	Assembly Line	Determine production capacity and identify bottlenecks.
Monthly Demand for All Parts	Units	Tony Kurucz	Forecast production and inventory requirements.
Hours Required	Hours	Self	Estimate resource allocation and machine utilization.
Priority of Shipment	1/2/3/4	Tony Kurucz	Optimize scheduling based on delivery urgency.
Machines Required for Each Group	AMI/FNG Assembly Bench	Tony Kurucz	Ensure efficient machine allocation.
Rivets Required for All Parts	Units	Tony Kurucz	Maintain sufficient stock of essential parts.
Races Required for All Parts	Units	Tony Kurucz	Maintain sufficient stock of essential parts.
Washers Required for All Parts	Units	Tony Kurucz	Maintain sufficient stock of essential parts.

Process Flow Chart

The process flow chart outlines the standardized workflow across four groups, starting from the **Stock Room** and progressing through assembly and inspection stages to ensure quality and efficiency. While the processes for Groups 1, 2, and 3 follow a similar structure, Group 4 operates slightly differently due to the use of an automated machine.

1. **Stock Room**: Materials for all groups originate here, segregated for each group to ensure streamlined operations.
2. **Groups 1, 2, and 3**:
   a. **Assembly Benches**: Materials are processed at specific assembly benches (e.g., Assembly Bench 10, 11, 12 for Group 1).
   b. **Dial Process**: Dials attached to the assembly benches are used for precise calibration and alignment.
   c. **1-Hour Wait Time**: A standardized wait time is applied post-dialing, likely for component settling or preparation for inspection.
   d. **Inspection Bench**: After the wait time, components proceed to the inspection bench for quality review before final output.
3. **Group 4**:
   a. **AMI (Automatic Machine)**: Unlike the other groups, Group 4 uses the **AMI machine**, which automates the assembly process, eliminating the need for separate assembly benches and dials.
   b. **1-Hour Wait Time**: Post-AMI processing, the standard wait time is maintained.
   c. **Sort Table**: Instead of an inspection bench, processed components are directed to a sorting table for final categorization or output.


Stock Room (Group1)
Assembly Bench 10
Assembly Bench 11
Assembly Bench 12
Dial
1 Hour Wait time
Inspection Bench
Stock Room (Group 2)
Assembly Bench 13
Assembly Bench 14
Dial
1 Hour Wait time
Inspection Bench
Stock Room (Group 3)
Assembly Bench 24
Assembly Bench 25
Dial
1 Hour Wait time
Inspection Bench
Stock Room (Group 4)
AMI 2
AMI 1
1 Hour Wait time
Sort Table

KPI Tree

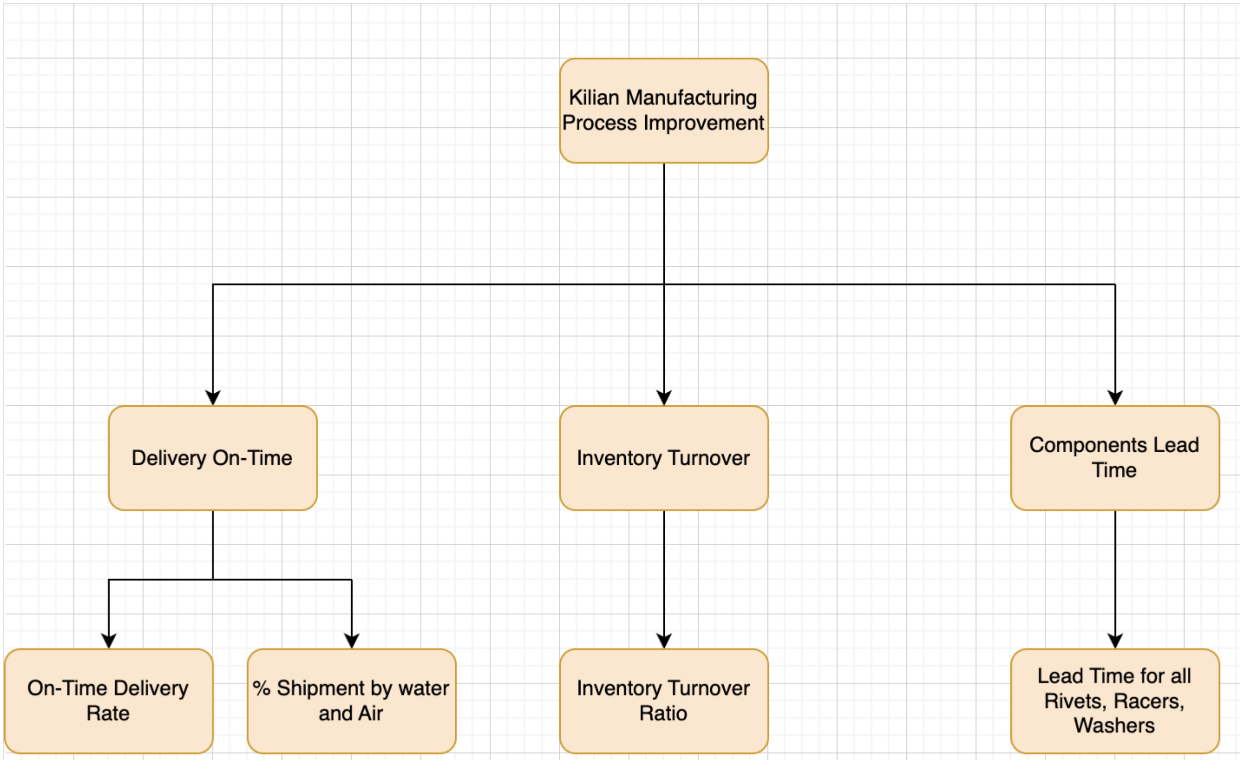
The KPI Tree for the Operational Efficiency and Optimization project is designed to provide a structured framework to monitor and evaluate critical performance metrics. It is divided into three logical categories: Delivery on Time, Inventory Turnover, and Components Lead Time, each aligning with the overall goals of improving operational efficiency and ensuring smooth workflows.

1. **Delivery on Time:**
    a. **On-time Delivery Rate:** Tracks the percentage of orders delivered within the promised timeline, reflecting how effectively production and logistics processes are managed.
    b. **% Shipments by Water/Air:** Analyzes the transportation method's impact on delivery performance, ensuring faster delivery for priority orders.
2. **Inventory Turnover:**
    a. **Inventory Turnover Ratio:** Measures how efficiently inventory is utilized by comparing the cost of goods sold (COGS) to the average inventory. A higher turnover ratio reflects optimized inventory management and reduced excess stock.
3. **Components Lead Time:**
    a. **Lead Time for Components:** Tracks the time taken from placing a raw material order to its availability for production, ensuring streamlined procurement processes.

The KPIs collectively reflect the achievement of key project goals:

- **On-Time Delivery:** The "Delivery on Time" metrics directly measure the project's success in meeting delivery commitments, highlighting the effectiveness of production scheduling and logistics planning.
- **Reduced Inventory Cycle Time:** The "Inventory Turnover" metrics ensure inventory is efficiently managed, reducing the time materials spend idle in storage, thereby lowering cycle times.
- **Reduced Lead Time for Inventory Components:** The "Components Lead Time" metrics emphasize minimizing delays in procuring raw materials, ensuring they are readily available for production.

By tracking and analyzing these KPIs, the organization can monitor its progress in achieving on-time delivery, reducing inventory cycle times, and minimizing lead times for raw materials. This, in turn, will result in improved operational efficiency, reduced costs, and enhanced customer satisfaction, ensuring the success of the project.



Productivity Table

The productivity table highlights the current performance of various parts at Kilian Manufacturing, with efficiency levels ranging between 55% and 65%. These efficiency variations directly impact productivity, as seen in the data, and reflect the current state of operations. Moving forward, with the implementation of better inventory practices, lean training for employees, and Visual delivery management (VDM's), we aim to enhance efficiency levels to the range of 75% to 80%. This improvement will not only boost overall productivity but also streamline workflows, reduce waste, and ensure more consistent output across all part numbers, positioning Kilian Manufacturing for sustained operational excellence.

Part Number	Efficiency (%)	Productivity (Units/Hour)
RT263-126NPS ASM HD	58.75	136.0
D2254-41PS ASM HD ZN	64.51	173.0
D2254-43PS ASM HD ZN	62.32	167.0
RT263-129NPS ASM HRD	60.99	141.0

RT240-53N ASM PIN&RO	56.56	131.0
RT240-72NPS ASM HD Z	56.56	131.0
RT240-78NPS ASM HD Z	55.58	129.0
RT342-454NPS ASM HD	63.66	147.0
RT342-491NPS ASM HD	61.01	141.0
RT342-485NPS ASM HD	62.08	144.0
RT263-152N ASM PIN&R	55.21	449.0
RT263-125N ASM PIN&R	64.7	526.0
RT263-151NPS ASM HD	63.32	792.0
RT263-153NPS-2 ASM H	57.12	714.0
RT290-898 ASM HD ZN	56.82	1705.0
RT342-459NT ASM GRS	56.83	1705.0
TR258-61 ASM HD GRS	58.04	1037.0
RT253-231NRS ASM NTO	60.25	753.0
RT253-233NRS ASM NTO	59.32	741.0
RT342-465NRS ASM NTO	57.91	724.0
RT266-603NRS ASM NTO	61.12	764.0
RT266-597NRS ASM NTO	56.39	705.0

ANALYZE PHASE

Design of new work cells

Our analysis involves 16 parts that represent the top 10 revenue-generating companies in Killian Manufacturing. To efficiently manage inventory, monitor daily demand, and allocate workers to specific jobs and work cells, these parts were grouped into four categories. The categorization was based on their monthly demands and the number of shifts required for their production.

Using the calculated number of shifts, tables are assigned to each group, ensuring that workers are dedicated to specific work cells. This structured approach allows for better tracking of daily production and inventory levels. Additionally, it helps identify bottlenecks in the production process, enabling timely interventions to improve efficiency.

By minimizing the need for workers to move between tables for different parts, this system reduces unnecessary downtime and enhances productivity. Workers can focus on their assigned tasks within a specific work cell, leading to better time management and smoother workflow transitions. Overall, this streamlined strategy not only optimizes production but also enhances resource utilization and operational efficiency.

Group 1 Calculations

Part- No.	Total Demand	Run Rate per hour	Hrs reqd	Shifts reqd	Priority
RT240-72NPS	14,000	185	75.68	10.81	2
RT240-78NPS	20,000	185	108.11	15.44	2
RT342-454NPS	3,150	185	17.03	2.43	4
RT342-491NPS	25,000	185	135.14	19.31	2
RT342-485NPS	40,000	185	216.22	30.89	2

Note:

Priority 2 - Biweekly shipment

Priority 4 - Monthly shipment

A month consists of 20 working days, with 2 shifts per day.

Detailed Calculation Breakdown

Part No. RT240-72NPS

- Monthly Demand: 14,000
- Production Frequency: Bi-weekly (twice a month)
- Run Rate: 185 units/hour

- Work Hours per Shift: 7
- Shifts Required: = 14,000/ (185*7) = 10.81 = 11 shifts appx

Part No. RT240-78NPS

- Monthly Demand: 20,000
- Production Frequency: Bi-weekly (twice a month)
- Run Rate: 185 units/hour
- Work Hours per Shift: 7
- Shifts Required: = 20,000/ (185*7) = 15.44 = 16 shifts appx

Part No. RT342-454NPS

- Monthly Demand: 3,150
- Production Frequency: Once a month
- Run Rate: 185 units/hour
- Work Hours per Shift: 7
- Shifts Required: = 3150/ (185*7) = 2.43 = 3 shifts appx

Part No. RT342-491NPS

- Monthly Demand: 25,000
- Production Frequency: Bi-weekly (twice a month)
- Run Rate: 185 units/hour
- Work Hours per Shift: 7
- Shifts Required: = 25,000/ (185*7) = 19.31 = 20 shifts appx

Part No. RT342-485NPS

- Monthly Demand: 40,000
- Production Frequency: Bi-weekly (twice a month)
- Run Rate: 185 units/hour
- Work Hours per Shift: 7
- Shifts Required: = 40,000/ (185*7) = 30.89 = 31 shifts appx

Shift Allocation Strategy

Total Shifts Required: 79 shifts (equivalent to 40 days) To meet this demand, we will need two tables in a work cell. The allocation of shifts across tables is as follows:

First Table

1. **RT342-485NPS and RT240-72NPS**: Assigned 40 shifts for bi-weekly delivery.

Second Table

1. **RT240-78NPS and RT342-491NPS**: Assigned 36 shifts for bi-weekly delivery.
2. **RT342-454NPS**: Assigned 3 shifts for monthly delivery.

Group 2 Calculations

Part- No.	Total Demand	Run Rate per hour	Hrs reqd	Shifts reqd	Priority
D2254-41PS ASM HD ZN	80,000	215	372.09	53.16	2
D2254-43PS ASM HD ZN	14,400	215	66.98	9.57	2
RT263-126NPS ASM HD	4,500	185	24.32	3.47	4
RT263-129NPS ASM HRD	4,500	185	24.32	3.47	4

RT240- 53N ASM PIN&RO	8,000	185	43.24	6.18	4

Note:

Priority 2 - Biweekly shipment

Priority 4 - Monthly shipment

Detailed Calculation Breakdown

Part No. D2254-41PS ASM HD ZN

- Monthly Demand: 80,000
- Machines Available: 2
- Demand per Machine: 40,000
- Production Frequency: Bi-weekly (twice a month)
- Run Rate: 215 units/hour
- Work Hours per Shift: 7
- Shifts Required: = 40,000/ (215*7) = 26.57 = 27shifts appx

Part No. D2254-43PS ASM HD ZN

- Monthly Demand: 14,400
- Machines Available: 2
- Demand per Machine: 7,200
- Production Frequency: Bi-weekly (twice a month)
- Run Rate: 215 units/hour
- Work Hours per Shift: 7
- Shifts Required: = 7200/ (215*7) = 4.78 = 5 shifts appx

Part No. RT263-126NPS ASM HD

- Monthly Demand: 4,500
- Production Frequency: Once a month
- Run Rate: 185 units/hour
- Work Hours per Shift: 7
- Shifts Required: = 4500/ (185*7) = 3.47 = 4 shifts appx

Part No. RT263-129NPS ASM HRD

- Monthly Demand: 4,500
- Production Frequency: Once a month
- Run Rate: 185 units/hour
- Work Hours per Shift: 7
- Shifts Required: = 4500/ (185*7) = 3.47 = 4 shifts appx

Part No. RT240-53N ASM PIN&RO

- Monthly Demand: 8,000
- Production Frequency: Once a month
- Run Rate: 185 units/hour
- Work Hours per Shift: 7
- Shifts Required: = 8000/ (185*7) = 6.177 = 7 shifts appx

Shift Allocation Strategy

Total Shifts Required: 79 shifts (equivalent to 40 days) To meet this demand, we will need two tables in a work cell. The allocation of shifts across tables is as follows:

First Table

2. **Parts D2254-41PS and D2254-43PS**: Assigned 32 shifts for bi-weekly delivery.
3. **Part RT240-53N**: Assigned the remaining 7 shifts.
    a. **Total Shifts**: 39 shifts out of the first 40 available.

Second Table

3. **Parts D2254-41PS and D2254-43PS**: Assigned 32 shifts for bi-weekly delivery.
4. **Parts RT263-126NPS and RT263-129NPS**: Assigned 4 shifts each

Group 3 Calculations

Part- No.	Total Demand	Run Rate per hour	Hrs reqd	Shifts reqd	Priority
RT263-151NPS	62,000	1,000	62	8.86	2
RT263-153NPS	74,000	1,000	74	10.57	2
RT342-459NT	50,000	2,400	20.83	2.98	4
RT290-898	1,20,000	2,400	50	7.14	4

Note:

Priority 2 - Biweekly shipment

Priority 4 - Monthly shipment

Detailed Calculation Breakdown

Part No. RT263-151NPS

- Monthly Demand: 62,000
- Production Frequency: Bi-weekly (twice a month)
- Run Rate: 1000 units/hour
- Work Hours per Shift: 7
- Shifts Required: = 62,000/ (1000*7) = 8.86 = 9 shifts appx

Part No. RT263-153NPS

- Monthly Demand: 74,000
- Production Frequency: Bi-weekly (twice a month)
- Run Rate: 1000 units/hour
- Work Hours per Shift: 7
- Shifts Required: = 74,000/ (1000*7) = 10.57 =11 shifts appx

Part No. RT342-459NT

- Monthly Demand: 50,000
- Production Frequency: Once a month
- Run Rate: 2,400 units/hour
- Work Hours per Shift: 7
- Shifts Required: = 50,000/ (2,400*7) = 2.98 =3 shifts appx

Part No. RT290-898

- Monthly Demand: 1,20,000
- Production Frequency: Once a month
- Run Rate: 2,400 units/hour
- Work Hours per Shift: 7
- Shifts Required: = 1,20,000/ (2,400*7) = 7.14 =8 shifts appx

Shift Allocation Strategy

Total Shifts Required: 31 shifts. To meet this demand, we will need One table in the work cell.

Group 4 Calculations

Part- No.	Total Demand	Run Rate per hour	Hrs reqd	Shifts reqd	Priority
RT263-152N	100,000	650	153.85	21.98	2
RT263-125N	8,500	650	13.08	1.87	4

Note:

Priority 2 - Biweekly shipment, Priority 4 - Monthly shipment

Detailed Calculation Breakdown

Part No. RT263-152N

- Monthly Demand: 100,000
- Production Frequency: Bi-weekly (twice a month)
- Run Rate: 650 units/hour
- Work Hours per Shift: 7
- Shifts Required: = 100,000/ (650*7) = 21.98 = 22 shifts appx

Part No. RT263-125N

- Monthly Demand: 8,500
- Production Frequency: Once a month
- Run Rate: 650 units/hour
- Work Hours per Shift: 7
- Shifts Required: = 8,500 / (650*7) = 1.87 = 2 shifts appx

Shift Allocation Strategy

Total Shifts Required: 24 shifts. To meet this demand, we will need One table in the work cell.

Supermarket Calculations

Assembled Bearings

Each assembled bearing consists of a rivet, two washers, and a race, all of which are crucial components of the final product. These individual parts are carefully assembled to create the finished product, known as an assembled bearing, which contains bearings inside for smooth rotational movement.

Components and Their Roles:

1. **Rivet:**
    - Acts as the central shaft or fastening element that holds the entire assembly together.
    - Provides stability and alignment for the washers and race, ensuring the structural integrity of the bearing.
2. **Washers:**
    - Two washers are used to distribute load evenly across the assembly and reduce friction during motion.
    - They act as spacers, preventing direct contact between the rivet, race, and other components, which minimizes wear and tear.
3. **Race:**
    - The race serves as the housing for the bearings, creating a pathway for smooth rotational motion.
    - It facilitates even load distribution across the bearings and ensures durability under continuous use.

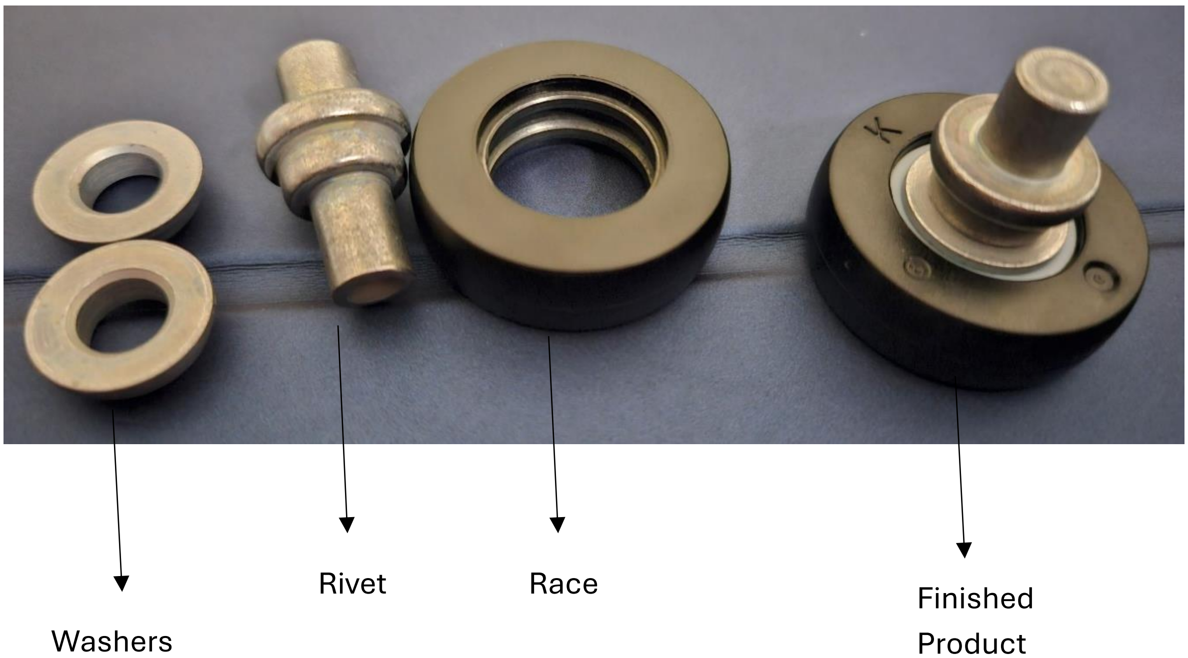
Uses of Assembled Bearings:

- **Automotive Applications:**
    - These bearings are widely used in sliding doors of vehicles, enabling smooth and efficient sliding action.
    - They provide a stable and durable mechanism to support the door's weight while minimizing resistance during movement.
- **General Motion Systems:**
    - Used in systems requiring precise linear or rotational motion, such as conveyor tracks or rolling mechanisms.
    - Their design ensures reduced friction, increased longevity, and smooth operation in various mechanical setups.

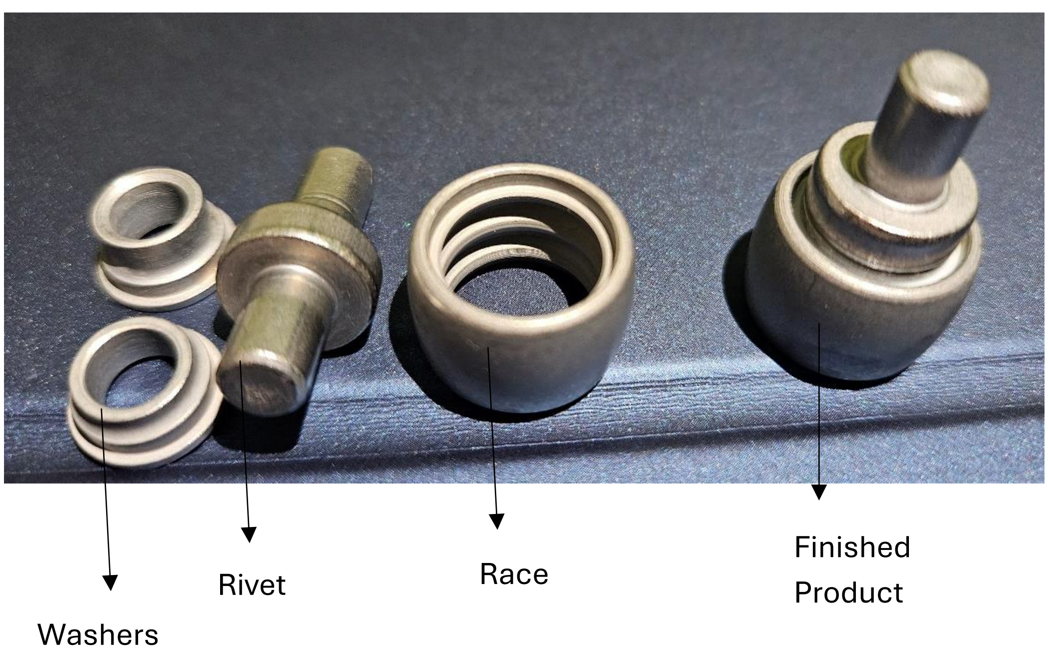
Benefits of Assembled Bearings:

- Provide reliable and smooth motion with minimal resistance.
- Reduce wear and tear on sliding systems, increasing their lifespan.
- Offer a compact and efficient design suitable for high-load applications.
- Enhance user experience by ensuring noiseless and effortless sliding motion, especially in vehicle doors.

RT342-485NPS



D2254- 41PS ASM HD ZN



Once the required number of tables per part has been identified, and the necessary workers, tables, and shifts have been allocated to the work cells, the next step is to focus on the inventory needed for production.

Each part requires specific components: 1 rivet, 2 washers, and 1 race, tailored to that part. The rivets and washers are manufactured at the company's facility in Toronto, while the races are produced at another facility in Syracuse. Given this setup, efficient inventory management is critical to ensuring smooth production.

To address this, we focus on calculating the supermarket stock required for each part. By implementing a pull system, the stockroom is replenished every 15 days, and additional inventory is ordered as needed. This approach ensures that production is not hindered by a lack of inventory or delays in its delivery.

Adopting this strategy helps mitigate common issues such as inventory shortages or downtime caused by waiting for materials. Additionally, it enables just-in-time production, reduces excess inventory, and aligns inventory levels with actual production needs. This systematic replenishment process enhances efficiency, minimizes waste, and ensures uninterrupted workflow across the production line.

Group 1 Parts

- RT342-454NPS ASM HD
- RT342-491NPS ASM HD
- RT342-485NPS ASM HD
- RT240-72NPS ASM HD Z
- RT240-78NPS ASM HD Z

Part-No.	**Monthly Demand**	**Demand per shipment**	**Actual Demand Rivets per shipment**	**Actual Demand Washers per shipment**	**Actual Demand Races per shipment**	**Total Demand per shipment**	**Priority**
RT342-454NPS ASM HD	3150	3150	3150	6300	3150	12600	4
RT342-491NPS ASM HD	25000	12500	12500	25000	12500	50000	2
RT342-485NPS ASM HD	40000	20000	20000	40000	20000	80000	2

RT240-72NPS ASM HD Z	14000	7000	7000	14000	7000	22000	2
RT240-78NPS ASM HD Z	20000	10000	10000	20000	10000	40000	2

Note:

Priority 2- needs to ship bi-weekly

Priority 4- needs to once in a month

Supermarket stock Infront of the table for every shipment:

Rivet	**Count**	**Washer**	**Count**	**Race**	**Count**
Rivet -454	3150	Washer - 454/485/491	71300	Race – 72/78	35650
Rivet -491	12500	Washer – 72/78	34000	Race - 454/485/491	17000
Rivet - 481	20000				
Rivet -72	7000				

Rivet -78	10000				

Group 2 Parts

- D2254- 41PS ASM HD ZN
- D2254- 43PS ASM HD ZN
- RT263- 126NPS ASM HD
- RT263- 129NPS ASM HRD
- RT240- 53N ASM PIN&RO

Part-No.	**Monthly Demand**	**Demand per shipment**	**Actual Demand Rivets per shipment**	**Actual Demand Washers per shipment**	**Actual Demand Races per shipment**	**Priority**
D2254- 41PS ASM HD ZN	80000	40000	40000	80000	40000	2
D2254- 43PS ASM HD ZN	14400	7200	7200	14400	7200	2
RT263- 126NPS ASM HD	4500	4500	4500	9000	4500	4

RT263-129NPS ASM HRD	4500	4500	4500	9000	4500	4
RT240-53N ASM PIN&RO	8000	8000	8000	16000	8000	4

Note:

Priority 2- needs to ship bi-weekly, Priority 4- needs to once in a month

Supermarket stock infront of the table for every shipment:

Rivet	**Count**	**Washer**	**Count**	**Race**	**Count**
Rivet -41	40000	Washer - 41/43 short	94400	Race -41/43	47200
Rivet -43	7200	Washer – 41/43 long	94400	Race - 53	8000
Rivet -126	4500	Washer - 53	16000	Race – 151/153	9000
Rivet -129	4500	Washer – 151/153	18000		
Rivet -53	8000				

Group 3 Parts

- RT263-151NPS
- RT263-153NPS
- RT342-459NT
- RT290-898

Part-No.	Monthly Demand	Demand per shipment	Actual Demand Rivets per shipment	Actual Demand Washers per shipment	Actual Demand Races per shipment	Priority
RT263-151NPS	62000	31000	31000	62000	31000	2
RT263-153NPS	74000	37000	37000	74000	37000	2
RT342-459NT	50000	50000	50000	100000	50000	4
RT290-898	120000	120000	120000	240000	120000	4

Note:

Priority 2- needs to ship bi-weekly

Priority 4- needs to once in a month

Supermarket stock infront of the table for every shipment:

Rivet	Count	Washer	Count	Race	Count
Rivet -151	31000	Washer - 151/153	136000	Race – 151/153	68000
Rivet -153	37000	Washer – 459	100000	Race - 459	50000
Rivet -459	50000	Washer - 898	240000	Race - 898	120000
Rivet -898	120000				

Group 4 Parts

- RT263-151NPS
- RT263-153NPS
- RT342-459NT
- RT290-898

Part-No.	Monthly Demand	Demand per shipment	Actual Demand Rivets per shipment	Actual Demand Washers per shipment	Actual Demand Races per shipment	Priority
RT263-152N	1,00,000	50000	50000	100000	50000	2
RT263-125N	8,500	4250	4250	8500	4250	2

Note:

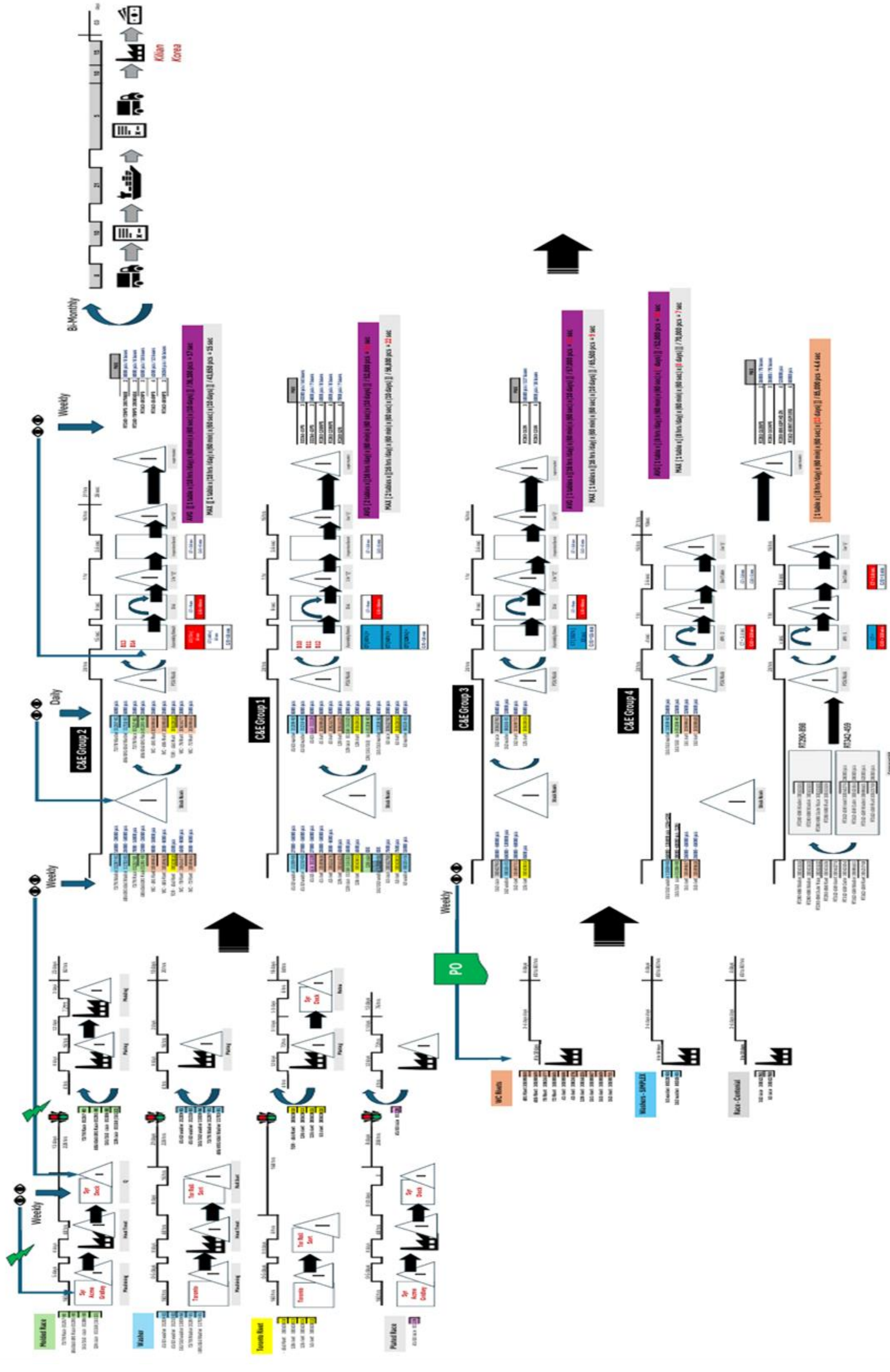
Priority 2- needs to ship bi-weekly

Priority 4- needs to once in a month

Supermarket stock infront of the table for every shipment:

Rivet	Count	Washer	Count	Race	Count
Rivet -152	50,000	Washer - 152	100000	Race – 152	50,000
Rivet -125	4250	Washer – 125	8500	Race - 125	4250

Value Stream Mapping



***1.* Material Flow**

- **Component Manufacturing and Sourcing:**
    - Rivets and washers are produced at the Toronto facility, while races are manufactured at the Syracuse facility.
    - This division of labor reduces complexity but adds dependency on inter-facility logistics.
    - Materials flow through machining, plating, molding, heat treatment, and assembly stages before reaching the stockroom.
- **Supermarket Inventory:**
    - Components are stored in supermarkets at various stages to maintain consistent supply. These supermarkets act as buffers and are replenished every 15 days using a pull system.
    - Stock levels are calibrated based on usage rates, preventing overproduction while ensuring availability.

2. Work Cell and Process Efficiency

- **Cycle Times (CTs) and Changeover Times (C/Os):**
    - CTs range from 3.6 seconds (inspection tasks) to 24 seconds (complex operations), reflecting a wide variability in process efficiency.
    - Longer C/O times (up to 120 minutes for specific operations) can disrupt flow and should be optimized.
    - Balancing tasks with faster CTs against slower ones is crucial for streamlining workflows.
- **Workforce and Table Allocation:**
    - Tables and workers are assigned based on the number of shifts required for each part.
    - For example, high-priority parts like RT342-491NPS are allocated more shifts (e.g., bi-weekly replenishment with 2 shifts per day), while lower-priority parts have less frequent allocations.

3. Inventory Management

- **Replenishment System:**
    - The pull-based replenishment every 15 days ensures inventory alignment with actual production needs.
    - Standardized replenishment schedules reduce delays and eliminate stockouts, ensuring parts like rivets, washers, and races are always available.
- **Supermarket Stock Levels:**
    - Stock levels are pre-calculated for each part. For example:
        - RT342-491NPS requires 18 boxes (6,300 pcs/box).
        - RT240-78NPS requires 8 boxes (8,000 pcs/box).

    - These calculations balance production demands against storage constraints.

4. Bottleneck and Waste Identification

- **Process Bottlenecks:**
    - Machining and plating stages have the longest lead times (up to 24 seconds CT and 90-minute C/Os).
    - Heat treatment and assembly contribute to variability in throughput, creating potential for delays downstream.
    - Transportation time between facilities (Toronto to Syracuse) adds an additional layer of delay.
- **Waste Elimination Opportunities:**
    - Excessive C/Os can be minimized by streamlining setup processes.
    - Transport delays between facilities can be reduced by synchronizing production schedules or integrating processes closer geographically.

5. Productivity and Throughput

- **Worker Efficiency:**
    - Assigning tables and workers to specific tasks reduces movement between work cells, enhancing focus and productivity.
    - Table utilization rates are optimized for high-demand parts, ensuring maximum throughput.
- **Part-specific Efficiency:**
    - High-demand parts like RT290-898 (120,000 pcs/month) and RT342-459NT (50,000 pcs/month) are assigned additional resources and table time.
    - Low-demand parts, such as RT263-129NPS (4,500 pcs/month), are scheduled less frequently to prevent resource overcommitment.

6. Strategic Insights

- **Lead Time Reduction:**
    - Current lead times for some parts (e.g., up to 12 days for specific races) indicate room for improvement.
    - Reducing transportation and setup times can significantly enhance overall production speed.
- **Load Balancing:**
    - By calculating demand and CTs, tasks are distributed across tables to prevent overloading specific work cells.
    - For example, RT342-491NPS and RT342-485NPS are split across multiple tables for efficient handling.
- **Inventory Optimization:**
    - Bi-monthly replenishment minimizes the risk of stockouts while reducing overstock issues.

    - Aligning supermarket replenishment schedules with actual production demand ensures smoother operations.
- **Quality Control:**
    - Inspection CTs (e.g., 3.6 seconds) indicate a focus on rapid quality checks. Regular audits ensure compliance with specifications while maintaining throughput.

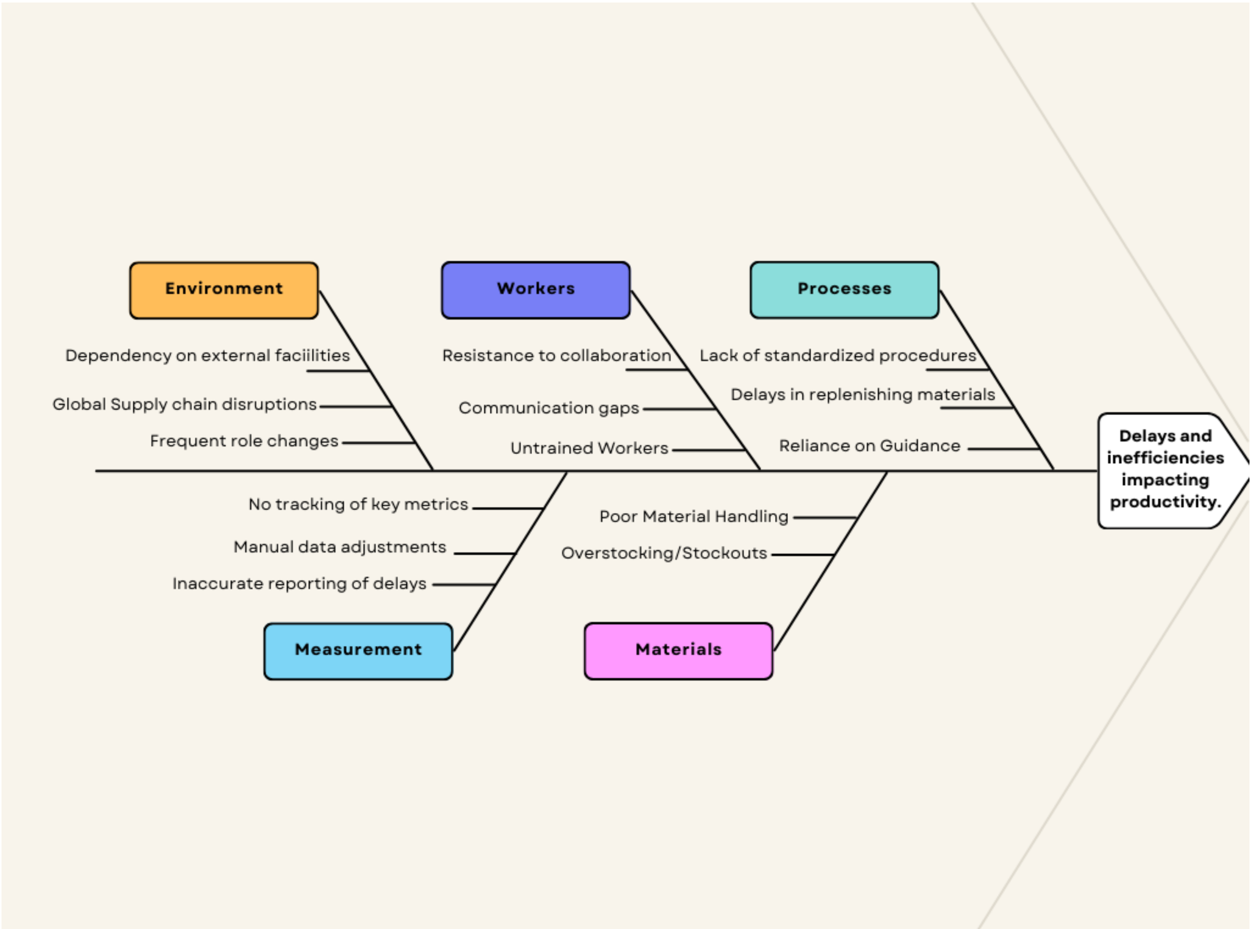
TPC Resistance Analysis

Source of Resistance	**Definition/Causes of Resistance**	**Examples of Behavior**	**Rating**
Technical	Habit and inertia, lack of skills, and difficulty adapting to changes	- Lack of proper communication between first and second shifts creates operational disconnects. - Inconsistent workflows due to frequent role and labor changes. - Absence of standardized procedures leads to inefficiencies in setup and material replenishment.	50
Political	Power dynamics, relationships, and misaligned incentives	- Lack of collaboration between teams, as individuals focus solely on assigned tasks. - Resistance to sharing best practices or assisting other shifts.	20
Cultural	Mindset barriers and resistance to change	- Operators are resistant to adopting new systems or workflows, preferring traditional methods. - Workers do not take ownership of overlapping tasks or inefficiencies. - Limited enthusiasm for collective responsibility and collaboration.	30

Threat-Opportunity Matrix for Kilian Manufacturing

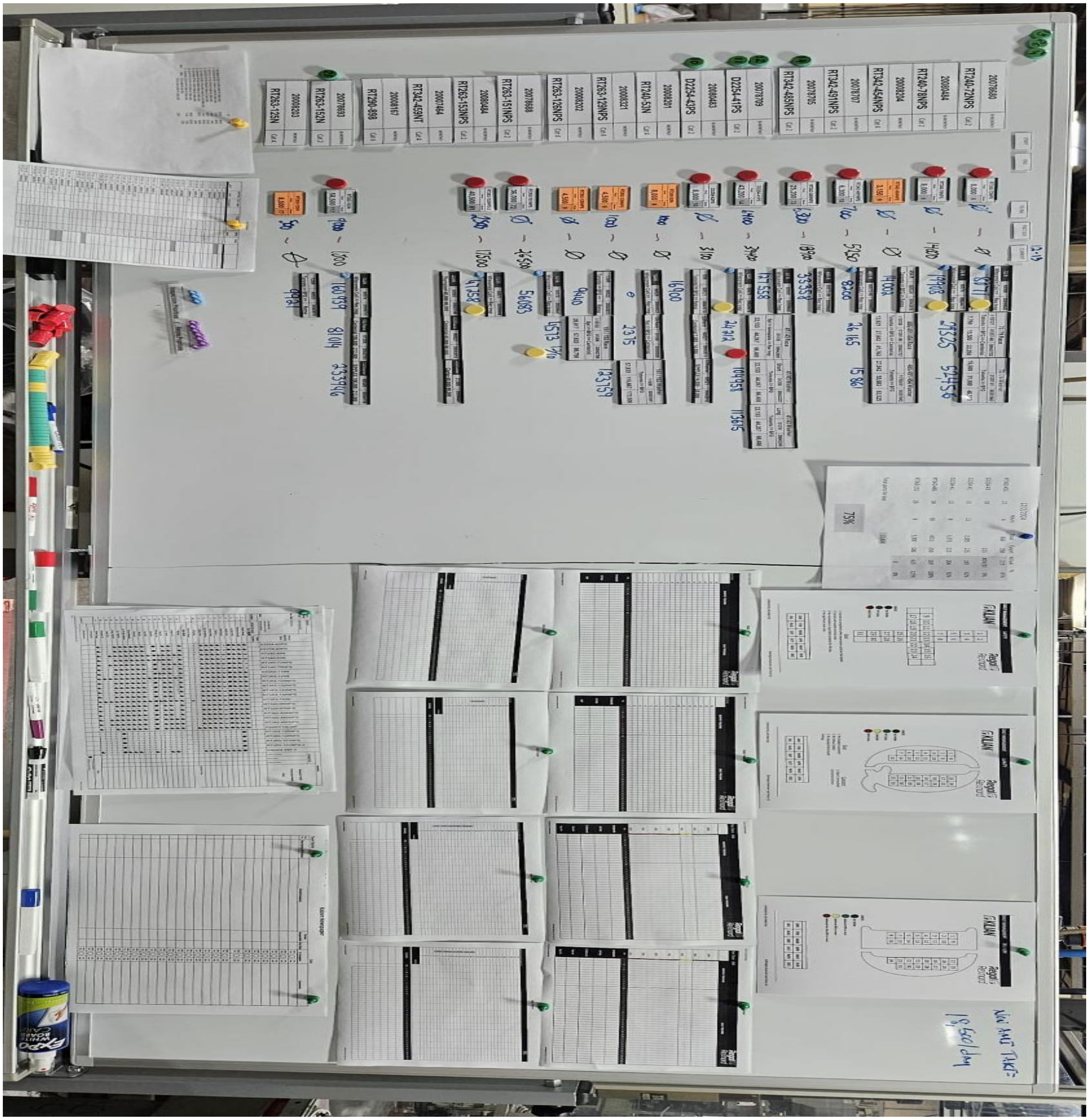
	Threats	**Opportunity**
Short-Term	- Inefficiencies in current work cells lead to high downtime. - Poor communication between shifts disrupts continuity. - Resistance to adopting new workflows and tools. -Delays in raw material inventory impact production schedules.	- Implementing visual dashboards improves real-time tracking. - Cross-training employees enhances adaptability. - Streamlined workflows reduce downtime and improve morale. - Automating inventory tracking minimizes delays in raw material and parts delivery.
Long-Term	- Lack of scalability in existing processes limits growth. - Insufficient capacity planning impacts long-term customer satisfaction.	- Efficient work cells enable better resource utilization. - Visual dashboards provide data-driven insights for continuous improvement. - Improved capacity planning ensures readiness for growth opportunities.

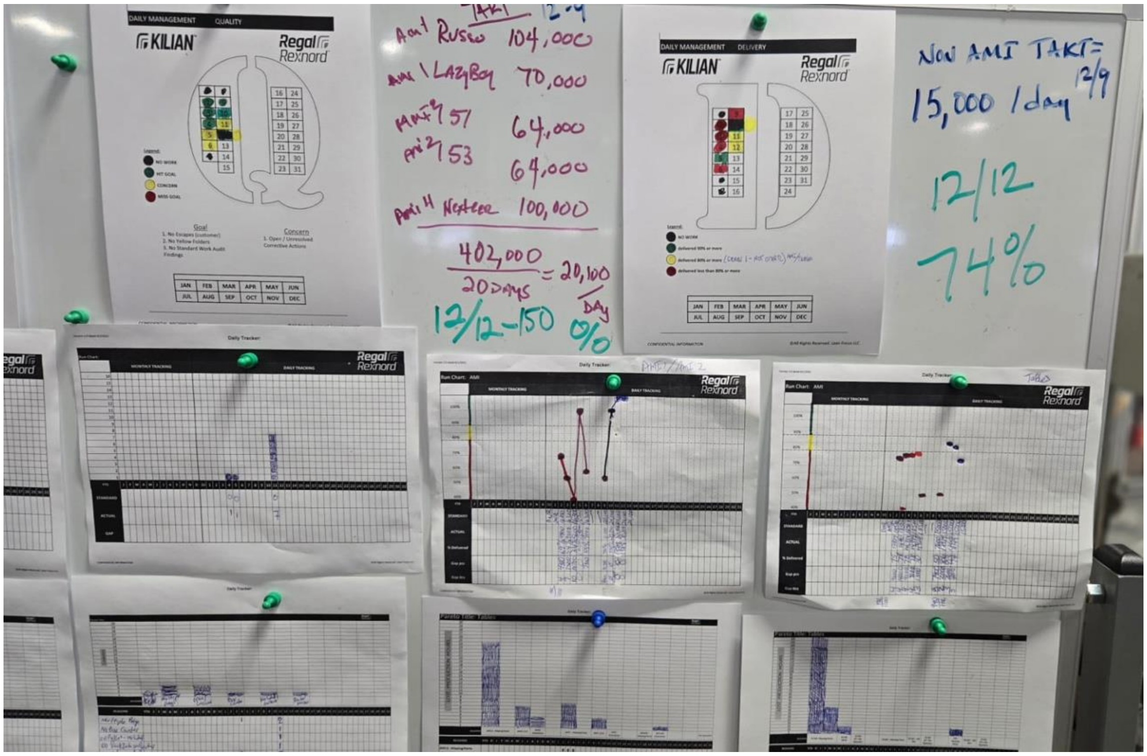
Fish Bone Diagram

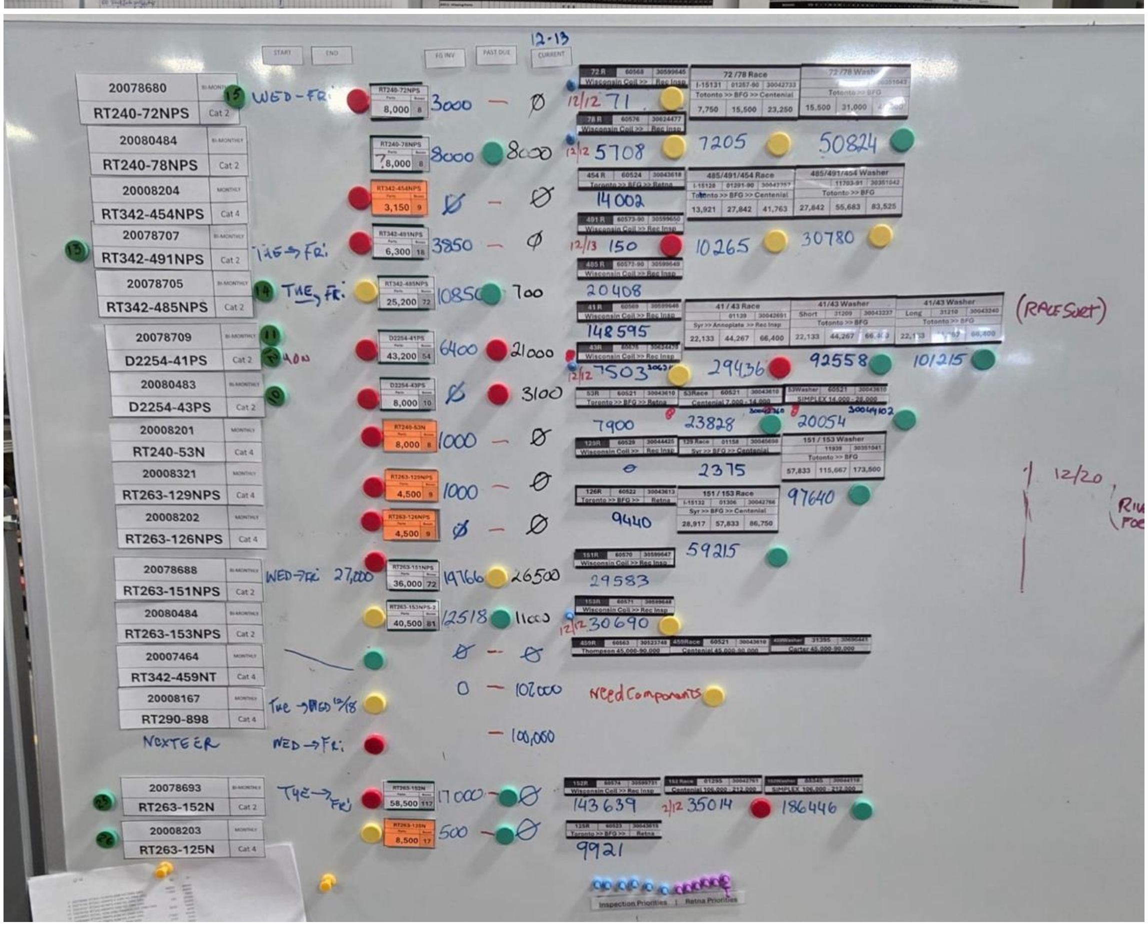


IMPROVE PHASE

Visual Delivery Management Dashboard




KILIAN
Regal Rexnord
DAILY MANAGEMENT QUALITY
DAILY MANAGEMENT DELIVERY
Russo 104,000
LazBoy 70,000
57 64,000
53 64,000
Nexteer 100,000
402,000
20 DAYS = 20,100 / DAY
12/12 - 150 0%
New AMI TAKT = 15,000 / day 12/9
12/12
74%
Daily Tracker


12-13
20078680 RT240-72NPS
20080484 RT240-78NPS
20008204 RT342-454NPS
20078707 RT342-491NPS
20078705 RT342-485NPS
20078709 D2254-41PS
20080483 D2254-43PS
20008201 RT240-53N
20008321 RT263-129NPS
20008202 RT263-126NPS
20078688 RT263-151NPS
20080484 RT263-153NPS
20007464 RT342-459NT
20008167 RT290-898
NEXTEER
20078693 RT263-152N
20008203 RT263-125N
Need Components
(RACE SORT)
Inspection Priorities
Retna Priorities

The Visual Delivery Management (VDM) board is a centralized tool designed to provide real-time insights into production metrics, streamline communication, and ensure transparency in the manufacturing process.

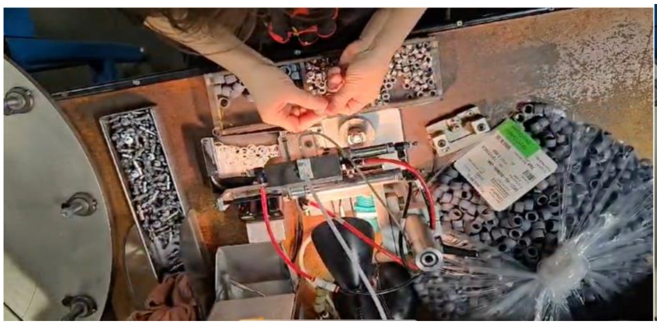
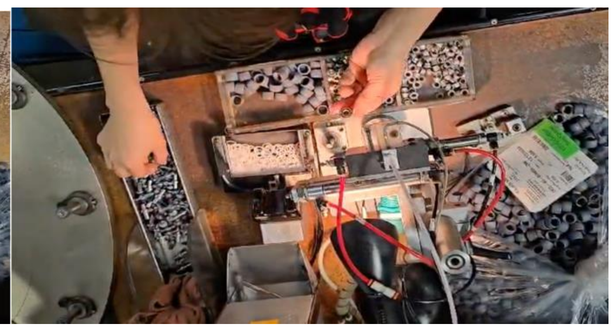
1. **Key Features:**
    a. **Production Metrics:** Display of daily and weekly production data for each part number, including targets and actual performance.
    b. **Traffic Light Indicators:** Visual cues (green, yellow, red) indicating whether the production is on track, slightly behind, or requires immediate attention.
    c. **Schedules and Plans:** Sections for production schedules, work orders, and task prioritization to meet customer demand efficiently.
    d. **Performance Tracking Charts:** Graphs and charts tracking key metrics like inventory levels, defect rates, and on-time delivery percentages.
    e. **Issues and Actions:** A dedicated area for recording issues encountered during the process and the corrective actions taken.
    f. **Inventory Tracking:** A dedicated section for inventory tracking, allowing real-time visibility of stock levels, reorder points, and material availability, ensuring smooth production flow by preventing stockouts and reducing excess inventory.
2. **Usage:**
    a. The board is updated daily by team leaders or assigned staff to reflect real-time progress and highlight discrepancies.
    b. It serves as the focal point during daily Gemba walks and team huddles, fostering a collaborative environment for problem-solving.
    c. Provides a visual summary of process performance for Tier 1 and Tier 2 management reviews.
3. **Benefits:**
    a. Enhanced visibility of production status and bottlenecks.
    b. Improved decision-making through data-driven insights.
    c. Stronger alignment across teams through consistent communication and updates.

This VDM board plays a critical role in ensuring production targets are met, maintaining high levels of operational efficiency, and driving continuous improvement initiatives.

Lean Training for Employees

The current production process involves several manual steps to assemble the components, such as picking, aligning, and fixing rivets, washers, and races to create the finished product. This process relies heavily on workers performing repetitive tasks with significant hand movements, which can lead to inefficiencies, increased cycle times, and potential errors due to fatigue or poor posture.

To address these issues, we propose implementing a **lean training program** combined with ergonomic improvements to optimize worker efficiency and streamline the assembly process. The training will focus on teaching employees to complete tasks step by step in a consistent, linear workflow, ensuring that all actions are performed in one direction. This not only reduces unnecessary movements but also aligns with ergonomic principles to minimize physical strain on workers.

This approach emphasizes:

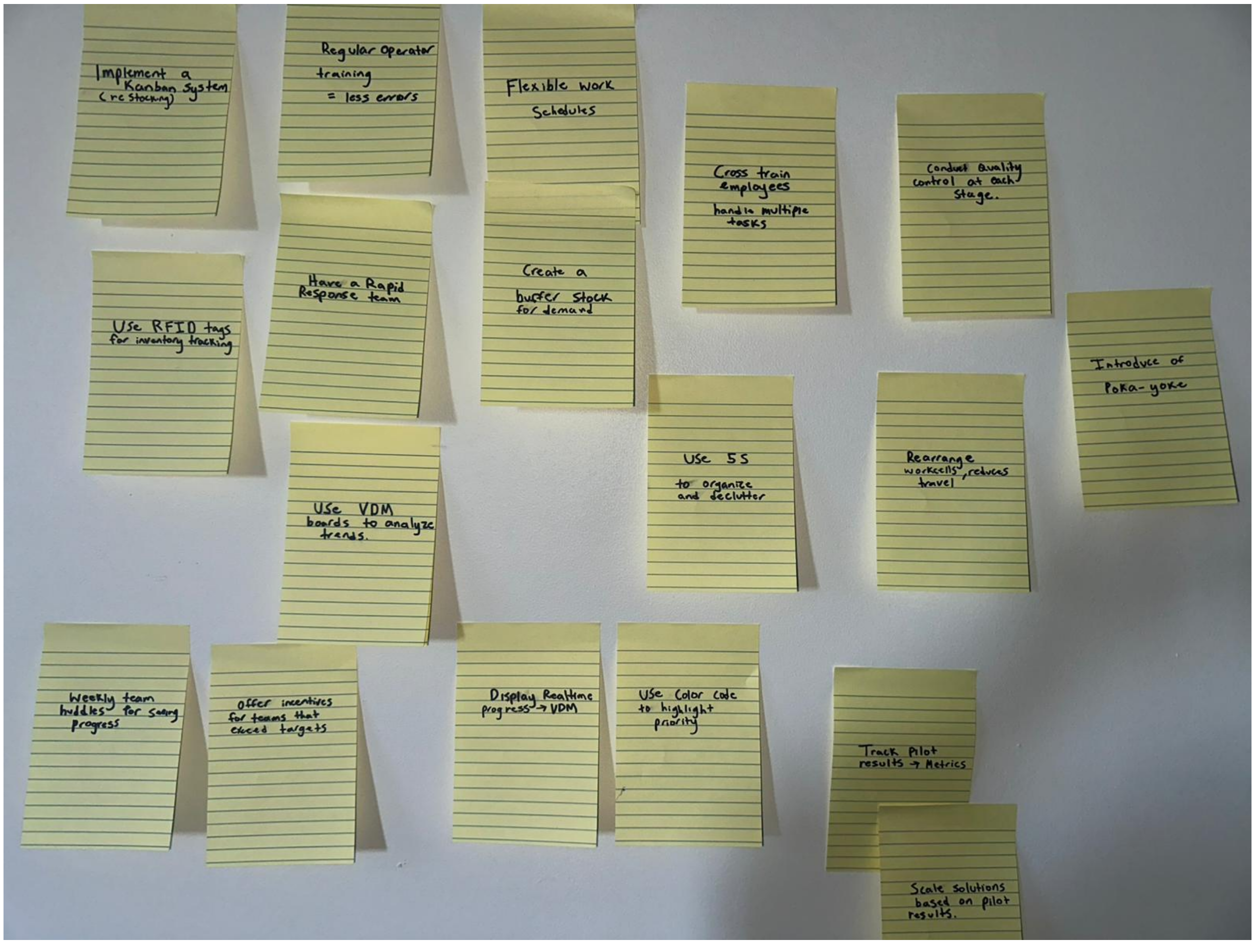
1. **Standardized Workflows:** Workers will follow a structured sequence of operations to ensure consistency and reduce variation in output.
2. **Ergonomics in Task Design:** Tasks will be redesigned to reduce repetitive strain and awkward postures, promoting better worker comfort and efficiency. Workstations will be adjusted to ensure optimal reach, height, and accessibility of components.
3. **Motion Efficiency:** The one-directional workflow eliminates unnecessary back-and-forth movements, minimizing wasted time and effort.
4. **Visual and Physical Guides:** Incorporating visual aids, jigs, and fixtures to assist workers in aligning components accurately and quickly, reducing rework and errors.

Expected Benefits:

- **Reduced Inefficiency:** Streamlined workflows combined with ergonomic task design will significantly decrease idle time, unnecessary movements, and worker fatigue.
- **Increased Productivity:** Workers will complete tasks faster and with fewer errors, leading to higher output within the same production time.
- **Improved Quality:** A consistent step-by-step approach ensures components are assembled correctly in the first attempt, reducing defect rates.

- **Enhanced Worker Well-Being:** Ergonomically optimized processes will minimize physical strain, repetitive stress injuries, and fatigue, contributing to better health and job satisfaction.

Brainstormed Solutions



Pilot Test for One Group

Pilot Test for One Group

Objective:

The goal of our pilot test was to validate the effectiveness of the solutions we implemented before scaling them across all work cells. We wanted to gather measurable data and insights that would help us refine our approach, ensuring that we addressed the challenges identified earlier and improved efficiency, downtime, and quality.

Steps We Took During the Pilot Test

1. Selecting the Pilot Group (group 2 was chosen)

We chose a specific work cell that reflected the broader production process but was manageable enough to allow for focused testing. This group was selected based on areas where we identified the most significant potential for improvement, such as high downtime and inventory management issues.

2. Applying Changes

We introduced several key changes as part of the pilot:

- VDM Board: We implemented a Visual Delivery Management board that displayed real-time data, including metrics like On-Time Delivery (OTD), inventory levels, lead times, and defect rates. The goal was to improve visibility, track progress, and drive better decision-making.
- Optimized Inventory Practices: We set minimum and maximum stock levels to avoid overstocking and stockouts, which had previously caused disruptions.
- Flexible Scheduling: We adjusted work schedules to accommodate peak demand periods. By cross-training employees and having flexible shifts, we aimed to make better use of our workforce and meet fluctuating production needs.
- Post-It Brainstorming: We conducted brainstorming sessions with the team, using Post-Its to gather ideas and solutions. This helped us prioritize immediate actions and tackle the most pressing issues first.

3. Monitoring Results

During the pilot, we closely tracked several key performance metrics to measure the effectiveness of the changes:

- Efficiency Rate: Our target was to increase efficiency from 80% to 99.97%.
- Downtime: We aimed to reduce downtime to less than 1 hour per week.
- Defect Rate: We set a goal of reducing defects to 0.5% or lower.
- Lead Time: Our goal was to reduce cycle time by 20% from the baseline.

We used the VDM board as a central tool to monitor these metrics in real-time, updating it regularly and reviewing progress during daily huddles with the team.

4. Gathering Feedback

We engaged the team in post-implementation discussions to gather qualitative feedback. We asked questions such as:

- What improvements have you noticed so far?
- Are there any challenges with the new systems?
- How can we improve the tools and processes to make them more effective?

In addition to these discussions, we circulated surveys to capture individual feedback on the new processes, VDM boards, and inventory management systems.

5. Refining Solutions

Based on the data we collected and the feedback from the team, we identified areas for improvement. Some solutions needed to be adjusted based on real-world application, such as tweaking the VDM board layout to be more user-friendly or adjusting inventory thresholds to better match actual production needs.

6. Preparing for Full-Scale Implementation

After analyzing the results of the pilot, we documented our findings and refined our solutions. This allowed us to create a clear plan for scaling the improvements to other work cells. We now had actionable insights that ensured the changes would be effective when rolled out company-wide.

Outcome

The pilot test allowed us to validate our proposed solutions with measurable improvements in efficiency, reduced downtime, and better meeting of customer demand. By using real-time data and actively engaging with the team, we were able to identify and address any challenges early on, ensuring a smoother transition to full-scale implementation. The insights from the pilot were critical in refining our approach, and we are now confident in rolling these solutions out across all work cells.

CONTROL PHASE

Control Plan

Control plans are a vital part after an implementation plan is introduced. A control plan allows the company to see if a process is in control and to constantly be updating the control plan if it is not in control/ not the outcome the company wants. It provides a document to the company that quality control is on par with what the company wants to achieve- and how to achieve the goal.

Critical to Quality Characteristics	Process Step Being Measured	Measurement Method	Specification	When is Data collected/ Action Performed	Where is the chart location
Work cell design	Efficient and streamlined production workflows	Review of work cell designs against production requirements	Grouping of parts with similarity in production steps	Data collected once per day	Assembly floor
Production Efficiency	Higher output with minimal waste	Efficiency calculation: Output/Input x 100	Increase in efficiency from 80% to 99.97%	Data collected once per day	Assembly floor
Dashboard Usability	Intuitive and accessible visual dashboards	Real time testing and user feedback systems	Dashboards displaying real-time data with < 1 minute latency	Data collected once per day	Assembly floor
Resource Utilization	Optimal use of inventory, workforce, and machinery	Resource utilization reports	Utilization Rates: Inventory > 95% Workforce> 90% Machinery> 95%	Data collected once per day	Assembly floor
Lead Time Reduction	Shorter Production cycle time	Time studies of production workflows	Reduction in lead time by 20% from baseline	Data collected once per day	Assembly floor
Quality Control	Consistent and defect free production	Daily defect tracking and analysis	Defect Rate < 0.5%	Data collected once per day	Assembly floor
Customer Satisfaction	High product quality, on time delivery	Delivery and satisfaction surveys	On time delivery rate> 98%, customer satisfaction score > 90%	Data collected every month	Online database

Training Effectiveness	Employees trained to adapt to new processes	Post training tests and feedback surveys	100% of relevant staff trained, > 85% training effectiveness score	Data collected every month	Online survey's
Waste Minimization	Reduction of material and time waste	Waste generation reduced by 15% from baseline	Waste generation reduced by 15% from baseline	Data collected once per day	Assembly floor

Reaction Plan

A reaction plan is important in having as it identifies if the process is not in control, and it allows the company to develop a plan to bring the process back in control. The reaction plan is to figure out a rational plan to bring the process back in control using logical ideas. The first step of this is to determine what caused the process to be out of control.
Reaction plan checklist:

1. **Is everyone following the proper process:**
- Has everyone received training in the new process?
- Has the new process been communicated to everyone?
- Visual instructions for everyone to follow?
- Process being measured properly
- Are all the proposed tools being used in the process/reporting results
2. **Verify the new process is not causing more work than the old process**
- Are the Workstations clean?
- Are they easy to follow?
3. **Machinery involved- verify that equipment is in proper working order**
- Input if the machines changed within the process.
4. **Verify the defects are not being passed to steps**
- Figure out ways to identify defects been developed
- Instructions to workers if they see a defect and what to do

Conclusion

The implementation of new work cells and visual dashboards at Kilian Manufacturing has significantly enhanced operational visibility and efficiency. With these improvements, it has become much easier to monitor daily performance, identify bottlenecks, and assess whether operations are on schedule, behind, or exceeding targets. The enhanced visibility has enabled more proactive management and data-driven decision-making, ensuring smoother workflows and timely interventions.

Inventory management has also seen a marked improvement, with orders now being placed on time and based on actual needs, reducing overstock and shortages. The lean training provided to employees has increased overall efficiency by minimizing unnecessary movements and optimizing task allocation. Furthermore, the inventory cycle days have been significantly reduced from 98 days to 69 days, ensuring faster turnover and improved operational agility. Components lead time has also seen a remarkable improvement, dropping from 60–75 days to just 15–21 days, ensuring that raw materials are available when required and virtually eliminating delays caused by supply chain inefficiencies.

A major milestone achieved is the transformation in transportation methods. Previously, to meet on-time delivery requirements, Kilian relied on air transport for 30% of shipments and water for 70%. After implementing these process improvements, on-time production has allowed the company to shift to a more cost-effective model, with 91% of shipments now transported by water and only 9% by air, significantly reducing logistics costs while maintaining delivery timelines.

These results were achieved within just 25 days of implementation, showcasing the rapid impact of these changes. With further refinement,

the system is expected to yield even more precise and impactful outcomes as it matures over time. The project not only demonstrates the potential for sustained operational excellence but also positions Kilian Manufacturing for continued success in meeting customer demands, maintaining its competitive edge, and driving long-term growth.

Appendix

Cycle Time (CT)

The total time required to complete one unit of work or process. It includes active working time and excludes downtime or idle time.

Changeover Time (C/O)

The time it takes to switch from producing one product or component to another. Reducing C/O time is essential for efficient operations.

Lean Manufacturing

A methodology that focuses on minimizing waste within manufacturing systems while maximizing productivity and quality.

Pull System

An inventory replenishment strategy where stock is produced or ordered based on actual demand rather than forecasted needs.

Takt Time

The maximum amount of time allowed to produce a product to meet customer demand. It is calculated as the available time divided by the customer demand.

Priority Levels (e.g., Priority 2, Priority 4)

Defined urgency levels for shipments or production tasks based on customer or operational needs. Priority 2 is given for products shipped twice in a month and Priority 1 is given for shipments once a month.

On-Time Delivery (OTD)

A metric measuring the percentage of shipments delivered to customers within the agreed-upon time frame.

PROJECT CHARTER

Project Name: *(1)*	**Business/Location:** *(2)*
Killian Manufacturing Process Improvement	Regal Rexnord: Killian Manufacturing in Burnet Ave, Syracuse
Team Leader: *(3)*	**Champion:** *(4)*
Sai Sinduri Vangala	**Tony Kurucz**

Project Description/Mission: *(5)*

The Kilian Manufacturing Project aimed to improve efficiency in on time delivery from 80% to 99.97% by optimizing work cells, implementing visual dashboards, and lean training, enhancing workflows and customer satisfaction.

Problem Statement: *(6)*

Kilian Manufacturing delivers products effectively but operates at 80% efficiency, highlighting gaps in resource use and performance, risking customer satisfaction and competitiveness.

Business Case: *(7)*

Kilian Manufacturing faces inefficiencies in resource utilization, risking higher costs and reduced ability to meet customer demands. Addressing these challenges is vital for maintaining competitiveness and customer satisfaction.

Deliverables: (8)	**Goals/Metrics:** *(9)*
Design of Work cells, Visual Dashboard management	Improve efficiency in on time delivery from 80% to 99.97%

Process & Owner: *(10)*

Bob

Project Scope Is: *(11)*

Production processes, Inventory usage, Workforce allocation, Machine efficiency, Quality assurance, Shipping logistics

Project Scope Is Not:

Marketing, Advertising, Sales

Key Customers: *(12)*	**Customer Expectations:** *(13)*
Kia	On time delivery

Milestones: *(14)*	**Completion Dates:** (15)
Project Start:	09-15-2024
09-02-2024	09-29-2024
	10-27-2024
	11-10-2014
Project Completion:	11-16-2024
11-17-2024	

Expected Business Benefits: *(16)*		Est. Savings		Brief Explanation
Check all that apply		1-Time	Annual	Improved Visibility and efficiency
x	Hard Cost	Confidential	Confidential	Improved Inventory and Lead Times
x	Soft Cost			Cost-Effective Transportation
x	Revenue			
x	Speed			
	Compliance			
	Intangible			

Team Members: *(17)*

Yeshwanth Chalapathi Sureshkumar, Hritwik Raj Agarwal, Sai Sinduri Vangala, Aanchal Narendra, Darci Johal,Char, Jim,Shawn, Scott, Vic

Expected Resource Needs: *(18)*

Not applicable

Risk Assessment: *(19)*

No risks as of now

Prepared By: *(20)*	**Date (Last Revision):** *(21)*
Sai Sinduri Vangala	12-14-2024