



5S Continuous Improvement

What is 5S and how does it relate to Continuous Improvement?

5S is a structured methodology for workplace organization that enhances operational efficiency by reducing waste, improving flow, and standardizing work environments. The five steps are:

- Sort (Seiri): Identify and remove unnecessary materials.
- Set in Order (Seiton): Systematically arrange necessary items to optimize workflow.
- Shine (Seiso): Implement regular cleaning to maintain equipment and detect abnormalities early.
- Standardize (Seiketsu): Develop uniform procedures and visual management systems.
- Sustain (Shitsuke): Establish continuous training and auditing to uphold and improve standards.

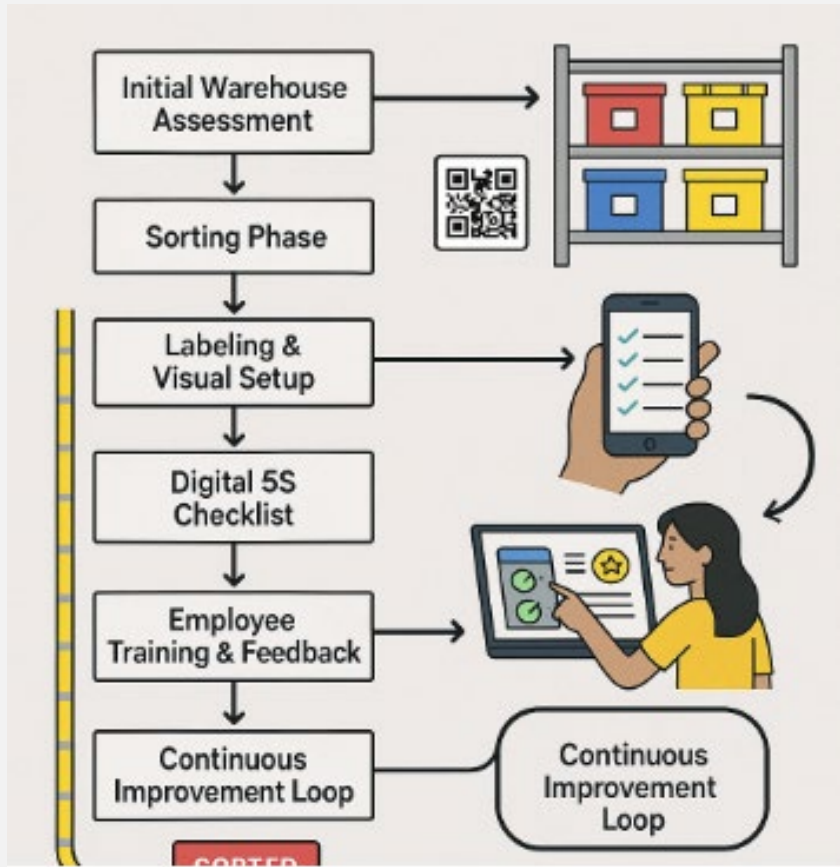
5S serves as a critical foundation for Continuous Improvement initiatives (Kaizen) by stabilizing processes, minimizing variability, and creating a baseline for measurable enhancements. A well-implemented 5S system enables data-driven improvements in safety, quality, and productivity, reinforcing a culture of operational excellence.

From Disorganization to Efficiency: A 5S Engineering Approach

Abstract: The project focused on implementing a 5S management system to improve workspace organization, reduce picking time, increase material accessibility, and sustain continuous improvement in Future Metals' warehouse operations. Emphasis was placed on demonstrating engineering analysis through time studies, risk assessments (FMEA), space utilization calculations, and technical workflow diagrams.

Background and Motivation: Before 5S, Future Metals experienced disorganized storage leading to prolonged picking times, material misplacement, and safety hazards. Motivated by the need to streamline operations, a structured continuous improvement approach was necessary to enhance efficiency and workplace ergonomics.

Preliminary Design:



Engineering Warehouse Efficiency with 5S

Methods and Approach:

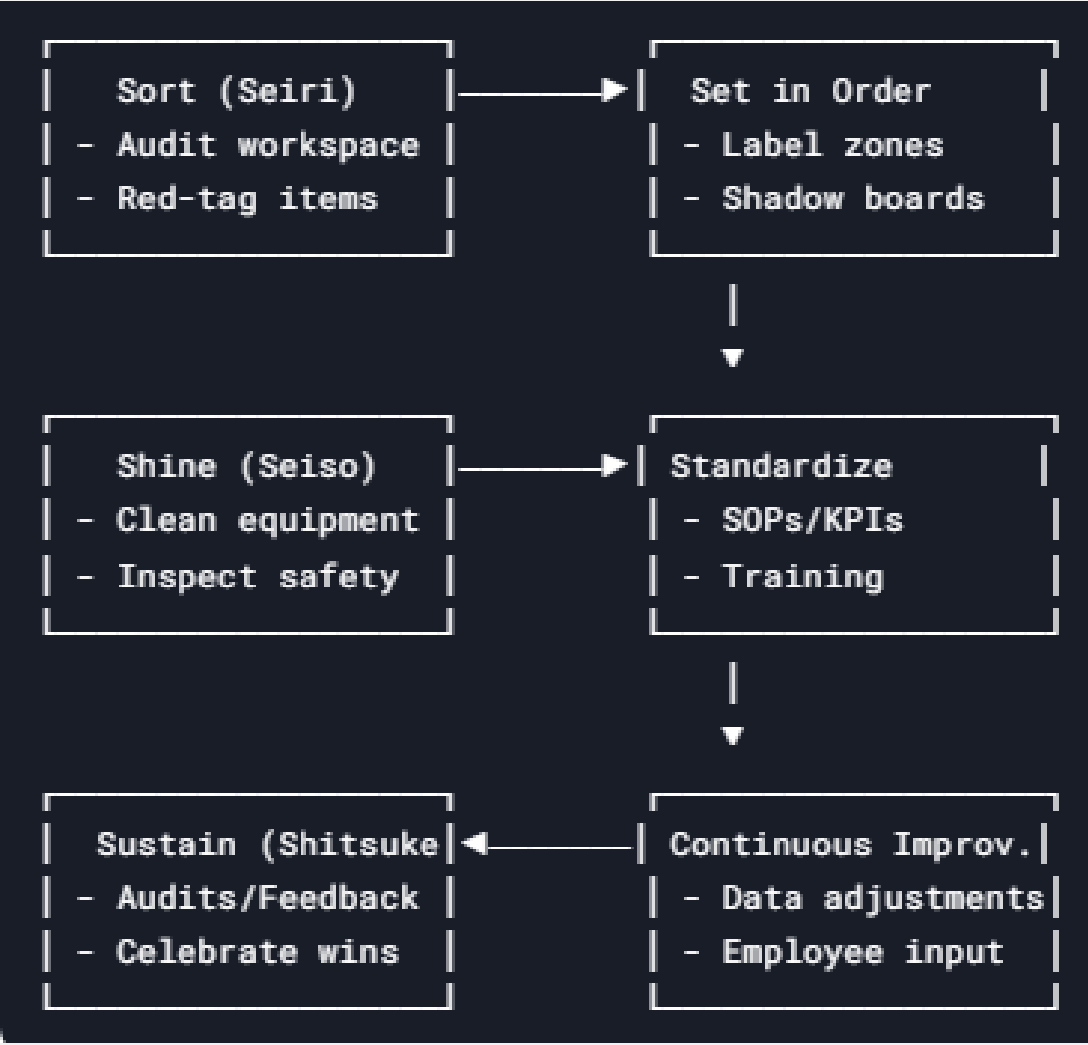
1. Initial Assessment:
 - Time studies (n=30 samples) to benchmark pre-5S picking times.
 - RULA ergonomic assessments of workstation posture.
2. 5S Implementation:
 - Reorganization of materials, labeling, color coding.
 - Establishment of cleaning and maintenance schedules.
3. Study Calculation:
 - Time Saved (%) = ((Old Avg Time - New Avg Time) / Old Avg Time) x 100%
4. Space Utilization:
 - Space Saved (%) = ((Old Space Used - New Space Used) / Old Space Used) x 100%
 - FMEA for risk identification and mitigation.
5. Sustainability Measures:
 - Standard Operating Procedures (SOPs).
 - Periodic audits.



Diagrams

Functional Block Diagram

- Simple visual tool that shows how the parts of your system are connected and how they work together



Morphological Analysis

- Tool used in engineering and design to explore different combinations of solutions

Function	Options
Sorting Mechanism	1. Manual sorting with color-coded tags 2. RFID-tagged inventory system (Zebra RFID tags)
Organization System	1. Shadow boards with labeled outlines 2. QR-code-linked digital inventory (Accuterm) 3. IoT-enabled smart bins (Samsung SmartThings?)
Cleaning Protocol	1. Daily checklists (templates) 2. Automated reminders 3. cleanliness alerts
Standardization Process	1. Printed SOP binders 2. workflow diagrams
Sustainability Monitoring	1. Monthly audit sheets 2. Real-time dashboard 3. Employee feedback app (feedback soft.)
Data Collection & Analysis	1. Excel spreadsheets 2. IoT data aggregation 3. Predictive analytics
Employee Training	1. In-person workshops/trainings 2. E-learning modules (Dozuki) 3. Gamified training app (Kahoot!)

Results

Space Utilization Improvement:

Before: 4,000 sq ft used

After: 3,100 sq ft used

Space saved: 22.5%

Metric	Before	After	Improvement
Order Fulfillment Time	47 min (avg)	32 min	⬇️ 33% faster
Worker Movement (steps)	500 steps	250 steps	⬇️ 50% reduction
Tool Search Time	8 min	1 min	⬇️ 80% reduction
Reported Injuries/Month	3	1	⬇️ 75% fewer
Employee Fatigue Complaints	4	1	⬇️ 75% fewer

Students & Faculty Advisors

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Sponsorships

Future Metals, LLC