Kaizen Implementation Using 5S To Reduce Waste In Stainless Steel Rack Manufacturing (Case study at CV. BRINJ Utama Samudra)

Final Project Proposal

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I, the undersigned, certify that the contents of part or all of my Final Project entitled: "Kaizen Implementation Using 5S To Reduce Waste In Stainless Steel Rack Manufacturing" . is my **own work, completed without the use of materials that are not permitted,** and **is not the work of other parties which I acknowledge as my own work.** All references cited or referred to have been written in full in the bibliography. If it turns out that my statement is not true, I am willing to accept sanctions in accordance with applicable regulations.

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Kaizen Implementation Using 5S To Reduce Waste In Stainless Steel Rack Manufacturing

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Abstrak

Penelitian ini berfokus pada implementasi Kaizen menggunakan metode 5S untuk mengurangi limbah dalam proses produksi rak baja tahan karat di CV Brinj Utama Samudra. Dalam konteks industri, perusahaan manufaktur menghadapi persaingan ketat yang menuntut produk berkualitas tinggi dan efisiensi produksi optimal dengan meminimalkan aktivitas yang tidak bernilai tambah (NVA) seperti waktu tunggu, pergerakan operator yang tidak efisien, dan cacat pengelasan. Pengamatan identifikasi limbah awal meliputi waktu tunggu antar stasiun kerja, pengadaan material yang tidak efisien, dan proses pemotongan dan pengelasan yang suboptimal, yang meningkatkan biaya operasional dan menurunkan kualitas produk. Tujuan studi ini adalah untuk mengimplementa sikan Kaizen menggunakan 5S untuk mengurangi limbah, mengelola limbah baja tahan karat, dan mempertahankan output produksi dengan menerapkan Kaizen pada mesin untuk mencapai output maksimum dan meminimalkan limbah. Metode penelitian meliputi tinjauan pustaka, pengamatan awal area produksi, pengumpulan, analisis limbah, dan implementasi 5S (Seiri, Seiton, Seiso, Seiketsu, Shitsuke).

Kata kunci: Kaizen, 5S, Waste Reduction, Stainless Steel Racks

Abstract

This research focuses on the implementation of Kaizen using the 5S method to reduce waste in the production process of stainless steel racks at CV Brinj Utama Samudra. In the Industrial context, manufacturing companies face intense competition, which demands high-quality products and optimized production efficiency by minimizing non-value-added activities (NVAs) such as waiting time, inefficient movement operators, and welding defects. Initial observations of waste identification include waiting time between work stations, inefficient material sourcing, and suboptimal cutting and welding processes, which increase operational costs and decrease product quality. The purpose of this study was to implement Kaizen with 5S to reduce waste, manage stainless steel waste, and maintain production output by applying Kaizen to machines to achieve maximum output and minimize waste. The research methods included a literature review, initial observations of the production area, data collection , waste analysis, and the implementation of 5S (Seiri, Seiton, Seiso, Seiketsu, Shitsuke).

Keywords: Kaizen, 5S, Waste Reduction, Stainless Steel Racks

1. Introduction

Kaizen is a Japanese management philosophy that emphasizes continuous improvement through small and consistent changes involving all employees within an organization. The implementation of Kaizen aims to improve productivity, enhance product quality, eliminate waste, and establish better work standards. One of the most widely applied Kaizen approaches in manufacturing industries is the 5S method, which consists of Seiri (Sort), Seiton (Set in Order), Seiso (Shine), Seiketsu (Standardize), and Shitsuke (Sustain). The implementation of 5S contributes to improving workplace organization, reducing unnecessary activities, and creating a safer and more efficient working environment. According to Hartono and Rival [6], Kaizen implementation can effectively reduce waste and improve production performance through continuous improvement activities. Furthermore, Restuputri and Wahyudin [4] state that the 5S method helps create an organized workplace while minimizing waste in manufacturing operations.

In today's competitive manufacturing industry, companies are required to continuously improve productivity while maintaining product quality. One of the major challenges faced by manufacturing companies is the existence of waste, which refers to activities that do not add value to the production process. Waste can increase production time, reduce operational efficiency, and increase production costs. Therefore, the implementation of Lean Manufacturing principles combined with the 5S method has become an effective strategy to eliminate waste and improve operational performance. According to Putro and Nursyamsiah [11], the implementation of Lean Manufacturing through the 5S method can improve workplace efficiency by reducing unnecessary activities and optimizing production processes.

Waste is one of the major problems commonly found in manufacturing industries. According to Lean Manufacturing principles, waste can take several forms, including unnecessary motion, waiting time, excessive transportation, excess inventory, overproduction, inappropriate processing, and product defects. These non-value-added activities reduce production efficiency and increase operational costs. Therefore, identifying and eliminating waste is an essential step toward improving manufacturing performance and maintaining product quality [10]

Samudra One of the Kaizen tools that is widely implemented to reduce waste is the 5S method, consisting of Seiri (Sort), Seiton (Set in Order), Seiso (Shine), Seiketsu (Standardize), and Shitsuke (Sustain). The implementation of 5S aims to organize the workplace, improve cleanliness, establish standardized work practices, and develop employee discipline in maintaining an efficient work environment. Restuputri and Wahyudin [4] reported that implementing the 5S method successfully reduced waste and improved workplace organization in manufacturing operations. Similarly, Hartono and Rival [6] concluded that Kaizen implementation through 5S contributed to improving production efficiency by reducing non-value-added activities..

Several previous studies have demonstrated the effectiveness of the 5S method in improving manufacturing performance. Soesilo [7] applied Kaizen and 5S in a plating process and reported improvements in workplace organization and operational efficiency. Mukhtar [1] implemented 5S in a warehouse layout and found that workplace organization and material handling activities improved significantly. Likewise, Umaisyah et al. [5] showed that implementing 5S created a cleaner, safer, and more organized working environment, leading to improved employee productivity. These studies indicate that the 5S method is applicable in various manufacturing environments and can effectively support continuous improvement.

CV. BRINJ Utama Samudra is a manufacturing company specializing in the production of stainless steel racks. Based on preliminary observations, several workplace problems were identified in the production area. Welding tools and supporting equipment were not stored in designated locations, reusable materials were mixed with stainless steel scrap, and workplace cleanliness was not consistently maintained. These conditions resulted in several types of waste, including motion, waiting, transportation, inventory, and defect waste, which affected production efficiency and workplace organization.

Based on these problems, this study aims to implement the Kaizen approach through the 5S method to reduce waste in the stainless steel rack manufacturing process at CV. BRINJ Utama Samudra. The implementation is expected to improve workplace organization, reduce non-value-added activities, and enhance production efficiency while supporting continuous improvement within the company.

a. Research Methodology

b. Research Approach

This study employed a descriptive case study approach to analyze waste in the stainless steel rack manufacturing process and implement the Kaizen approach through the 5S method at CV. BRINJ Utama Samudra. The research focused on identifying workplace problems, implementing improvement activities, and evaluating the results after implementation.

c. Data Collection

Data were collected using three techniques: direct observation, interviews, and documentation. Direct observation was conducted to identify workplace conditions and production activities in the stainless steel rack manufacturing process. Interviews were carried out with production personnel to obtain information regarding existing work practices and problems encountered during production. Documentation was used to record workplace conditions before and after the implementation of the 5S method through photographs and field notes.

d. Tools and Materials

In this study, several tools and materials were used to support data collection, analysis, and the development of improvements. Detailed list of tools and materials used in this study is presented in table 1.

TABLE 1.

TOOLS

No	TOOLS / EQUIPMENT	Function
1	Laptop / PC	Used for data processing and rep writing
2	Microsoft Word	Used for preparing the resear report
3	Microsoft Excel	Used for Waste Identification
5	Camera / Smartphone	Used to document field conditions
6	Stationery	Recording data from observatic and interviews
7	Cutting / welding machine)	Production tools for observing t shelf manufacturing process

e. Research Stages

i. Initial Observation

The initial observation was conducted in the stainless steel rack production area at CV. BRINJ Utama Samudra to understand the production process and identify existing workplace conditions. During this stage, data regarding tool arrangement, material storage, workplace cleanliness, and production activities were collected.

ii. Waste Identification

After the initial observation, waste was identified based on direct observation of production activities. The identified waste included motion, waiting, transportation, inventory, and defects. The results of this stage were used to determine the main problems that required improvement..

iii. Fishbone Diagram

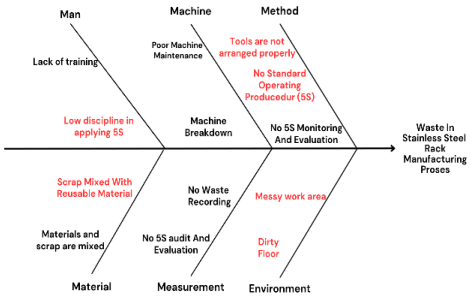

Figure 6. Fishbone Diagram of Waste Causes in Stainless Steel Rack Manufacturing Process

iv. Implementation of the 5S Method

Improvement activities were carried out using the five stages of the 5S method:

1. Seiri (Sort) : Separating necessary and unnec essary items.
2. Seiton (Set in Order): Organizing tools and materials in designated locations.
3. Seiso (Shine): Cleaning the production area and equipment.
4. Seiketsu (Standardize): Establishing standards to maintain workplace organization and cleanliness.
5. Shitsuke (Sustain**):** Encouraging employee discipline to sustain the implementation of 5S.

v. Evaluation of

Workplace conditions after implementing the 5S method were evaluated by comparing the conditions before and after implementation. The evaluation focused on improvements in workplace organization, tool accessibility, material arrangement, workplace cleanliness, and the reduction of identified waste.

f. Research Flow

The overall research process is illustrated in Fig. 2.1, which presents a systematic sequence of steps from literature study to final report preparation.

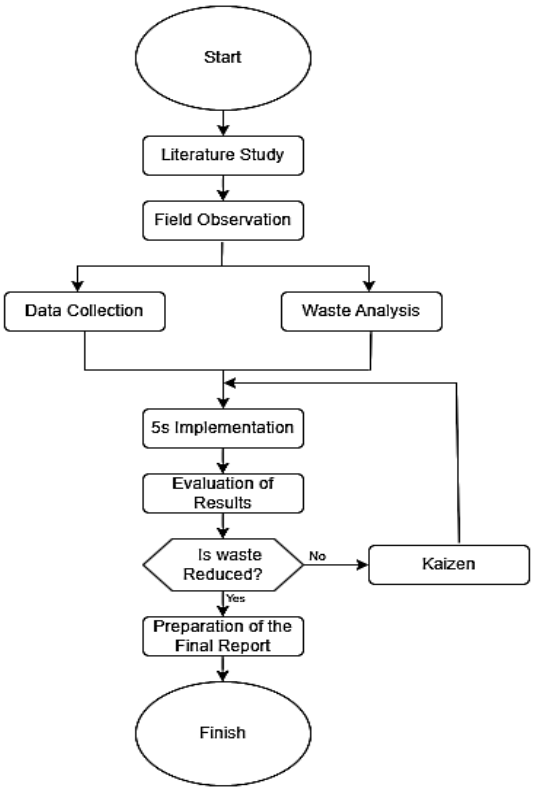

Figure 1. Research Flowchart

Source: Author's own work, 2025

2. Results and Discussions

a. Stainless Steel Rack Production Process

i. Material Cutting

The production process begins with cutting stainless steel materials according to the dimensions specified in the product design. Accurate cutting is essential to ensure that all components can be assembled correctly and to minimize material waste.

Figure 1. Material Cutting

ii. Material Cutting

After the materials are cut, the components are welded together to form the rack structure. Proper welding techniques are required to ensure strong joints and prevent welding defects that may affect product quality.

Figure 2. Material Cutting

iii. Assembly

The welded components are assembled to complete the stainless steel rack structure. During this stage, each component is positioned and adjusted according to the product design.

Figure 3. Material Cutting

iv. Finishing

The finishing process is performed to improve the appearance and quality of the stainless steel rack. Activities include surface cleaning, grinding, and polishing to remove welding marks, sharp edges, and surface imperfections.

Figure 4. Finishing

v. Final Inspection

The finishing process includes grinding, polishing, and cleaning the welded surfaces to improve the product's appearance and remove welding marks. This process also prepares the product for the final inspection.

Figure 5. Final inspection

b. Initial Condition of production area (Before 5S implementation)

Before the implementation of the 5S method, several problems were observed in the stainless steel rack production area at CV. BRINJ Utama Samudra. Tools and materials were not systematically arranged, workplace cleanliness was not consistently maintained, and some reusable materials were mixed with scrap materials

i. Tool Arrangement

Based on field observations, welding tools, measuring instruments, and other supporting equipment were not stored in designated locations. Operators often spent additional time searching for the required tools during production activities.

Before

Before

Figure 6. *Tool Arrgangement Condition Before 5S Implementation*

ii. Workplace Cleanliness

The production area contains welding sparks, metal chips, and unused materials that are not cleaned regularly, thus affecting the effectiveness and safety of the workplace.

Before

Before

Figure 7. Work Place Cleanliness Condition Before 5S Implementation

iii. Machine Condition

Production machines are functioning well; however, routine cleaning and maintenance activities have not been fully implemented.

Before

Before

Figure 8. *Machine Condition Before 5S Implementation*

c. Waste identification (Before 5S implementation)

Waste identification was conducted through direct observation of the stainless steel rack production process at CV. BRINJ Utama Samudra. The objective was to identify non-value-added activities that could reduce production efficiency. Based on observations in the cutting, welding, assembly, and finishing processes, several types of waste were identified, including motion waste, waiting waste, transportation waste, inv entory waste, and defect waste in table 2

TABLE 2
WASTE IDENTIFICATION (BEFORE)
IN STAINLESS STEEL RACK MANUFACTURING

No	Identified Waste	Findings	Potential Impact
1	Motion	Operators spent time searching for welding tools, measuring instruments, and supporting equipment.	Unnecessary operator movement occurred because the required tools were not immediately available.
2	Waiting	Operators waited for materials and completion of previous processes before continuing production activities.	Production activities were temporarily interrupted while waiting for materials or previous processes to be completed.
3	Transportation	Materials and semi-finished products were moved repeatedly between workstations.	Materials were handled repeatedly during the production process.
4	Inventory	Stainless steel scrap and usable materials were stored together without proper separation.	Difficulty in material identification and inefficient use of storage space
5	Defect	Some welding results required rework due to uneven weld appearance and dimensional inaccuracies.	Products that did not meet quality requirements required rework before the next process.

Waste identification results indicate that several types of waste are present in the stainless steel rack manufac turing process, namely production waste and defective waste. Among these wastes, residual production waste is the one that most significantly impacts production efficiency.

d. Kaizen implementation of 5S

Based on the waste identification result, improvement actions were implemented using the Kaizen approach through the 5S method. The objective of these was to eliminate non-value-added activities, improve workpl ace. organization, and enhance production efficiency in the stainless steel rack manufacturing process.

i. Seiri (sort)

During the initial observation, stainless steel scrap was mixed with reusable materials, making material identification difficult and causing inefficiencies during material retrieval activities. To address this issue, scrap materials were separated from reusable materials and stored in designated storage areas. This improvement made material classification easier and reduced unnecessary searching activities.

Before Implementation

- Accumulated production waste was not immediately cleaned but was instead left to pile up until the production process was completed.
- Material placement for production was not well organized.

After Implementation

- Accumulated production waste was then collected in one place and handed over to the vendor for further processing.
- Material storage became more organized and easier to manage.

Before

After

Figure 9. Seiri Implementation – Material Arrangement

ii. Seiton (Set in order)

The initial condition showed that welding tools, measuring instruments, and supporting equipment were not stored in designated locations. As a result, operators spent time searching for tools during production activities.

Before Implementation

- Tools were placed randomly.
- Operators frequently searched for required equipment.

After Implementation

- Tools were stored in designated locations.
- Labels were added to improve accessibility.

Before **Before**

After **After**

Figure 9. Seiri Implementation – Material Arrangement

iii. Seiso (Shine)

The production area contained dust, metal debris, and unused materials that reduced workplace cleanliness and organization. Regular cleaning activities were introduced to maintain workplace cleanliness and ensure a safer working environment.

Before Implementation

- All used work items are misplaced.
- Routine cleaning after work is not carried out.

After Implementation

- All work equipment used has been properly stored.
- Cleaning activities are routinely carried out after work.

Before

After

Figure 10. Seiso (Shine) Implementation of placemen Work Machine

iv. Seiketsu (Standarize)

After implementing seiri, seiton, and seiso, workplace standards are established to maintain these improvem ent. Visual controls, maintenance by maintaining the three implemented aspects, and cleaning practices are inriduced to ensure consistency in implementing 5S in the workplace.

Before **Before**

After

Figure 10. Seiketsu Implementation – Visual Control a nd Standardization

v. Shitsuke (Sustain)

To sustain the implementation of 5S, workers were encouraged to follow established workplace standards and maintain good housekeeping practices. Periodic monitoring and evaluations were conducted to ensure continuous compliance.

Before **After**

Figure 11. Shitsuke Implementation – Sustaining 5S Activit ies

e. Result after implementation

After the implementation of Kaizen through the 5S method, significant improvements were observed in the stainless steel rack production area at CV. BRINJ Utama Samudra. The improvements were evaluated based on workplace organization, material arrangement, tool accessibility, and workplace cleanliness.

i. Tool Arrangement

Before the implementation of 5S, welding tools, meas uring instruments, and supporting equipment were stored without designated locations. Operators often spent additional time searching for the required tools during production activities. After the implementation, tools were arranged according to their functions and stored in designated locations.

Figure 12. *Tool Arrgangement Condition After 5S Implementation*

ii. Workplace Cleanliness

After implementing routine cleaning practices to maintain workplace cleanliness, the production area became cleaner, safer, and more comfortable for operators.

Figure 13. Workplace Cleanliness After 5S Implementation

iii. Machine Condition

Production machines are functioning properly; and routine cleaning and maintenance activities have been fully implemented.

Figure 14. Machhine Condition After 5S Implementation

f. Corrective Action Based on Fishbone Analysis

TABLE 4.2

CORRECTUVE ACTION BASED ON FISHBONE ANLYSIS

No.	Most Potential Root Cause	Potential Impact	Corrective Action	5S Element	Implementation
1	Tools are not arranged properly	Operators spend time searching for tools (Motion Waste)	Arrange tools in designated locations, install shadow board and labels	Seiton	Tools are organized on racks and labeled according to their function.
2	Materials and scrap are mixed	Difficult to identify reusable materials (Inventory Waste)	Separate reusable materials from scrap and provide dedicated storage bins	Seiri	Scrap and reusable materials are stored s eparately in designated areas.
3	Messy workplace	Unnecessary movement and unsafe working conditions	Clean the workplace regularly and remove unnecessary items	Seiso	Workplace becomes cleaner, more organized, and easier to access.
4	Low discipline in applying 5S	Workplace conditions are not maintained consistently	Conduct regular 5S briefings, supervision, and periodic audits	Shitsuke	Workers consistently follow 5S practice And maintain workpl ace organization.
5	Lack of 5S monitoring	Improvements are difficult to sustain	Develop a 5S checklist and conduct routine evaluations	Seiketsu	Visual control and Chechklist are imple mented to maintain Standards.

Based on the Fishbone Diagram analysis, the most potential root causes of waste in the stainless steel rack manufacturing process were identified. These root causes were selected based on their significant

contribution to the occurrence of waste during production activities. Corrective actions were then developed by applying the Kaizen approach through the 5S method to eliminate or minimize these root causes. The implementation of each corrective action is presented in Table 4.2

g. Waste identification (After 5S implementation)

TABLE 3
WASTE IDENTIFICATION (AFTER)
IN STAINLESS STEEL RACK MANUFACTURING

No	Identified Waste	Potential Impact	After Potential Impact
1	Motion	Unnecessary operator movement occurred because the required tools were not	Tools were arranged in designated locations, making them easier for operators to locate.
2	Waiting	Production activities were temporarily interrupted while waiting for materials or previous processes to be completed.	Materials and tools were better organized, allowing production activities to proceed more smoothly.
3	Transportation	Materials were handled repeatedly during the production process.	Material arrangement became more organized, reducing unnecessary material movement between workstations.
4	Inventory	Difficulty in Material identification and inefficient use of storage space	Scrap materials were separated from reusable materials, making material identification easier and storage more organized
5	Defect	Products that did not meet quality requirements required rework before the next process.	Rework activities were reduced, resulting in better product quality and lower material consumption.

Based on the observations presented in Table 3, the implementation of the Kaizen approach through the 5S method showed positive changes in the stainless steel rack manufacturing process at CV. BRINJ Utama Samudra. For motion waste, welding tools, measuring instruments, and supporting equipment were organized into designated storage locations, making them easier for operators to locate during production activities. For waiting waste, the arrangement of tools and materials supported a more organized production process by ensuring that the required equipment and materials were more readily available. For transportation waste, materials and semi-finished products were arranged in designated areas, resulting in a more organized material flow between workstations. For inventory waste, reusable stainless steel materials and scrap materials were separated and stored in different locations, making material identification easier and improving workplace organization. For defect waste, workplace cleanliness and organization were improved through the implementation of the 5S method, providing a better working environment for production activities.

Overall, based on the comparison of workplace conditions before and after implementation, the application of the Kaizen approach through the 5S method improved workplace organization, material arrangement, tool accessibility, and workplace cleanliness. These changes were observed to support the reduction of non-value-added activities in the stainless steel rack manufacturing process.

e. 5S Implementation Monitoring Report

TABLE 4.3
5S IMPLEMENTATION MONITORING REPORT
IN STAINLESS STEEL RACK MANUFACTURING

No	Monitoring Periode	5S Activity	Findings	Corrective Action	Status
1	August 2025	Initial observation of workplace conditions	Tools were not arranged properly, scrap was mixed with reusable materials, workplace was untidy	Planned 5S implementation	Completed
2	September 2025	Seiri (Sort)	Scrap and reusable materials were identified and separated	Separate storage areas were provided	Completed
3	November 2025	Seiso (Shine)	Metal chips and dust accumulated in the workplace	Routine cleaning schedule was introduced	Completed

TABLE 4.3
5S IMPLEMENTATION MONITORING REPORT
IN STAINLESS STEEL RACK MANUFACTURING

No	Monitoring Periode	5S Activity	Findings	Corrective Action	Status
4	December 2025	Seiketsu (Standardize)	Workplace organization was not yet standardized	Visual labels and workplace standards were established	Completed
5	January 2026	Shitsuke (Sustain)	Workers began maintaining workplace organization	Periodic monitoring and supervision were conducted	Completed
6	February 2026	5S Monitoring	Tool arrangement remained organized	Continue regular monitoring	Completed
7	March 2026	5S Monitoring	Workplace cleanliness improved	Continue routine cleaning	Completed
8	April 2026	5S Monitoring	Material storage remained organized	Continue material management	Completed
9	May 2026	5S Monitoring	Workers consistently followed workplace standards	Continue periodic evaluation	Completed
10	June 2026	Final Evaluation	Workplace organization and cleanliness were maintained	Continuous improvement recommended	Completed

To ensure that the implementation of the 5S method was carried out consistently throughout the internship period, routine monitoring activities were conducted in the stainless steel rack production area at CV. BRINJ Utama Samudra. The monitoring period covered August 2025 to June 2026 and focused on evaluating the implementation of each 5S element, namely Seiri, Seiton, Seiso, Seiketsu, and Shitsuke.

The monitoring activities aimed to identify workplace conditions, evaluate the effectiveness of the implemented improvements, and ensure that the established 5S practices were consistently maintained. Any problems identified during the monitoring process were followed by appropriate corrective actions to support continuous improvement in the production area.

3. Conclusions

The initial observation of the stainless steel rack manufacturing process identified several types of waste, namely motion, waiting, transportation, inventory, and defect waste. These wastes were associated with unorganized tool storage, improper material arrangement, and inadequate workplace cleanliness.

The implementation of the Kaizen approach through the 5S method (Seiri, Seiton, Seiso, Seiketsu, and Shitsuke) resulted in observable improvements in workplace organization. Based on the comparison of workplace conditions before and after implementation, reusable materials were separated from scrap, tools were arranged in designated locations, workplace cleanliness was improved, and basic workplace standards were established.

The comparison of workplace conditions also showed that the production area became more organized and cleaner, while tools and materials were easier to locate during production activities. These changes supported a better-organized working environment and addressed the waste identified during the initial observation.

Overall, the implementation of the Kaizen approach through the 5S method showed positive changes in workplace organization, tool arrangement, material arrangement, and workplace cleanliness in the stainless steel rack manufacturing process at CV. BRINJ Utama Samudra.

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