RCMOS - Multidisciplinary Scientific Journal The Knowledge.
ISSN: 2675-9128. São Paulo-SP.

Year V, v.2 2025 | Submission: 08/12/2025 | Accepted: 09/12/2025 | Publication: 11/12/2025

The 8D Methodology as a Tool for Continuous Improvement and Reducing Non-Qualified Products Compliance in the Safety Footwear Industry

The 8D Methodology How to Herramienta para la Improvement Continua y la Reduccíon de Productos no Compliance in the Safety Shoes Industry

Kevin Uriel Reyes Hernandez (First Author)
re383175@uaeh.edu.mx
https://orcid.org/0009-0009-7062-4955
Autonomous University of the State of Hidalgo

Jorge Alonso Hernandez Vazquez (Corresponding author)
he440392@uaeh.edu.mx.
https://orcid.org/0009-0001-5397-9596
Autonomous University of the State of Hidalgo

Erick Uriel Morales Cruz
erick_morales@uaeh.edu.mx
https://orcid.org/0009-0008-2071-9713
Autonomous University of the State of Hidalgo

Demetrio Fuentes Hernández
demetrio_fuentes@uaeh.edu.mx
https://orcid.org/0000-0002-0706-6219
Autonomous University of the State of Hidalgo

Summary

This article shows a real case about the implementation of the 8D methodology to solve a recurrent problem in the production of industrial footwear. The specific problem addressed is the high rate of non-compliant products in monthly production, which generates significant losses in terms of materials, time and costs. Furthermore, the percentage of defects is not within the established limits of the organization. The first thing that happened was the acceptance that there was a problem, then we moved on to the formation of a multidisciplinary team. Data collection began from July to November, mainly in the production line where product defects were mentioned and recurred more frequently, a timely solution was implemented, the production and quality area was designated, and frequent inspections were carried out at the points of the process, and organized to find the root cause, one Instead, permanent corrective actions will be carried out as soon as they are implemented, focusing on collecting data from the following and may be observed if they were effective to move towards an action plan with a comprehensive approach that encompasses the best processes, inspection up to the learning of different methods. The study evaluated the 8D method as a tool for solving company problems, applying the methodology step by step, achieving a considerable reduction in defects, thus resulting in an improvement in product quality and increased customer satisfaction.

Keywords: 8D Methodology, Defects, Reduction, Industrial Footwear

Abstract

This article shows a real case about the implementation of the 8D methodology to solve a recurrent problem in the production of industrial footwear. The specific problem addressed is the high rate of non-compliant products in monthly production, which generates significant losses in terms of materials, time and costs. Furthermore, the percentage of defects is not within the established limits of the organization. The first thing that happened was the acceptance that there was a problem, then we moved on to the formation of a multidisciplinary team. Data collection began from July to November, mainly in the production line where product defects were mentioned and appealed more

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1. INTRODUCTION

The industry dedicated to the manufacture of industrial shoes always faces different challenges that can present themselves throughout the manufacturing process, these challenges can cause failures in the quality, safety and efficiency of the product. For this it is essential to find y solve different types of problems in an effective way to generate competitiveness within the market and ensure that the customer is satisfied with the product.

This research article will show the great usefulness of the 8D methodology for an industry dedicated to the production of industrial footwear, the article presents a practical guide for its application and the ability to achieve improvement in the problems that arise, describing its implementation, results obtained and benefits achieved. If there is a case of real study in which a special problem is solved in the production process and how it is applied 8D methodology, each of the other disciplines of the 8D methodology to detect the root cause, assign corrective and preventive actions, and verify the effectiveness of solutions.

The company's main problem manifests itself in a high number of products in the compliant in its daily production , These non-conforming products are defined as any product that does not comply with the quality specifications established by the company. For this reason The problem negatively affects operational efficiency and increases production costs. There Reducing defects in the soil minimizes costs, which also strengthens customer confidence. (Patil, R. y Balwan, 2025, p.106). Choosing suitable industrial footwear is not just a question of regulatory compliance, as a strategic decision that directly impacts security, productivity and well-being of workers. (Gaspard, 2025). Security is not something that If you can bring the due attention. Preventing risks and accidents at work must be one of them primary objectives of a company.

The 8D method (other disciplines) allowed us to determine in this context as an instrument systematic and structured to improve quality and reduce non-compliant products. This methodology can be used to solve critical, serious, chronic and recurrent problems

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(Wahyudi, PL, and Wulandari, A., 2020). Because it is a quality tool that can help to provide solutions to different problems that may arise. The use of methodologies such as 8D They are vital in any industry due to their ability to solve problems effectively, prevent its recurrence and encourage continued improvement (Veloz, 2024).

The methodology of the 8 disciplines is a problem-solving tool that serves to identify, correct and eliminate those non-conformities that may occur within the of an organization (Morales, et al., 2022). Obtain industrial footwear while reducing problems and mistakes, you have a better quality.

8D is a notable first step to improving quality and reliability when the product is in use defective or does not satisfy customer expectations and needs (Elangovan et al., 2021). There 8D methodology is a tool that requires great collaboration from everyone involved resolving problems within the team. It consists of 8 steps that the improvement equipment must follow the quality for problem solving, as well as for the improvement of products and processes (Banica, CF, Y Belu, N. 2019). Quality planning is an essential function of managing it. quality that establishes objectives, resources and necessary actions to guarantee quality of the product and the process (Radulescu, et al., 2025).

In a globalized economy with fierce competence, the quality of one's deliverables project represents a significant differentiator. Without rigorous planning, the projects You may face difficulties such as additional costs, unfulfilled deadlines or customer dissatisfaction. beneficiaries (Cirtina, et al.,2025). Within the quality planning, 8D analysis can integrated as a problem management tool during manufacturing or testing, thus ensuring compliance with standards and customer requirements (Cirtina, et al., 2025). Implementing 8D means guaranteeing benefits, obtaining improvements, reducing and solving problems.

2 Methodology

The 8D methodology is also known as “Ocho Disciplinas para la Solución de Problems” (Eight Disciplines of Problem Solving), is a quality management tool and problem solving developed by Ford Motor Company with the main objective of reduction of problems, defects or mistakes. The methodology previously consisted of 8 steps, if it added a Another step, known as “D0” to improve the effectiveness of the methodology, each step is sequential and was designed to develop problems that occur in different types of industry, focused on being able to identify, correct and eliminate recurring problems or complexes that arise to present. The 8D approach promotes problem solving through team work and being able to obtain continuous improvement, being structured helps to avoid omitting crucial steps, among them

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analytical tools are applied to be able to diagnose and carefully evaluate the problem,
With these tools you can carry out the actions that will be carried out to provide a solution.

The study was carried out within a company dedicated to the creation of shoes industrial, the company stands out for offering high quality products designed to protect workers in demanding environments. However, in recent months, I have experienced a alarming increase in the number of non-compliant products (PNC) that affect efficiency operational and customer satisfaction, which is why we decided to apply the 8D methodology.

Table 1. Methodology of the 8 disciplines. Own source.

Metodología de las 8 disciplinas de resolución de problemas (8D)	
D0	Reconocer Existe un Problema
D1	Formación del Equipo
D2	Descripción del Problema
D3	Implementar Acciones de Contención
D4	Identificación de la Causa Raíz
D5	Determinar las Acciones correctivas permanentes
D6	Implementación de las Acciones Correctivas
D7	Prevenir la Reaparición de problemas
D8	Reconocimiento al Equipo

D0: Recognize there is a problem.

Here we focus mainly on what is happening wrong, we analyze which problem is I want to examine.

D1: Team Formation.

If the formation of a multidisciplinary team is carried out, it must rely on experience in focus areas. The group must have individuals who are capable of having an active listener and a assertive communication in addition to having the possibility of accessing all pertinent information and existing documentation. It is important that those selected know about the process and the product.

D2: Problem Description.

It consists of the 8D team gathering the largest amount of data from the company to determine inconveniences, problems or defects and you can identify what is happening and where. It's It is necessary to highlight the problem, this includes a detailed description of the failure method, the frequency of failures, the quantity manufactured and the number of non-compliant products, among other elements.

D3:Implement Contention Actions.

A provisional containment plan is carried out that will provide a temporary solution, to prevent it from inconvenience persists while the team works hard to create a definitive solution. This temporal measure will serve to reduce defects.

D4:Identification of the Root Cause.

This procedure involves identifying the source of the inconvenience and suggesting solutions in a definitive. All elements that adversely affect the establishment of the fundamental cause are excluded. Methods such as cause and effect graphs, ideas flood sessions are employed. We have to make sure of all possible reasons.

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D5:Determine Permanent Corrective Actions.

Include all corrective actions to eliminate the root cause and provide a solution al problema.En el cual se describe que se hará y para que giving las soluciones.

D6:Implementation of Corrective Actions.

The previously recognized measures will be carried out, which will present the data of these measures, it will be possible to check whether they are effective or not, seeking the solution to the problem that is not generally new problems.

D7:Prevent the Reappearance of Problems.

This step will include a preventive measure that the company will adopt, its objective will be to return the error will occur again. Likewise, this can generate improvements in the product or service.

D8: Recognition of the Team.

It is of utmost importance to be able to recognize the effort given by those involved, which is why it is necessary congratulate the team for their performance in resolving the problem, in addition this will promote a mayor participation of other collaborators.

2. CASE STUDY

D0. Recognize that there is a problem.

The company is dedicated to manufacturing high safety industrial footwear. Sus products are designed for the safety of workers' feet in work environments that present specific risks. These risks may include impacts, compressions, perforations, tipping, exposure to dangerous substances and electrical risks. The company has presented a significant increase in the number of non-conforming products detected during production and customer returns. For this reason, it is known that there is a problem that is affecting the the company.

D1. Team Formation.

The company decided to create a multidisciplinary team to help analyze and solve the problem, the quality manager assumes the role of team manager, who is in charge of selecting to the most suitable members with sufficient experience in the area of production, control of quality, design and maintenance. The team was formed by the following members.

Quality Manager: You must analyze the nature of the problem in depth to determine what Specific skills and knowledge are essential for your resolution.

Process Engineer: Expert in optimizing production processes.

Maintenance Technician: Knowledge of operation and maintenance of the machinery.

Line Operator: Person with direct experience in operation and problem detection

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en la línea de producción.

Quality Assistant: Support in maintaining the desired quality of products in the solution of defects.

Design Engineer: In charge of knowing the design and material of all shoes manufactured.

D2. Description of the Problem.

For the analysis of the problem, data from 5 months of production was collected, specifically the data from July 2024 to November 2024. Table 2 presents it production of compliant shoes and non-compliant products during the months.

Table 2. Production data per month. Own source.

Pares de zapatos	Mes					Produccion Total
	Julio	Agosto	Septiembre	Octubre	Noviembre	
Producidos	57119	63838	57951	67794	63822	310524
Conformes	56164	62912	57274	67183	63125	306658
No conformes	955	926	677	611	697	3866

The company's internal quality policy mentions that within its production, monthly only if 0.5% of products that do not comply with production per month are tolerated, all These non-conforming products bring consequences such as inefficiency in processes, delays in delivery of orders to customers, monetary losses, increase in inventories and creating a suitcase company reputation.

Respect to monthly production is continued in the Graphic.1 percentages of shoes produced conforming and non-conforming during the 5 months of compilation.

Graph 1. Percentages of production per month (July to November). Own source.

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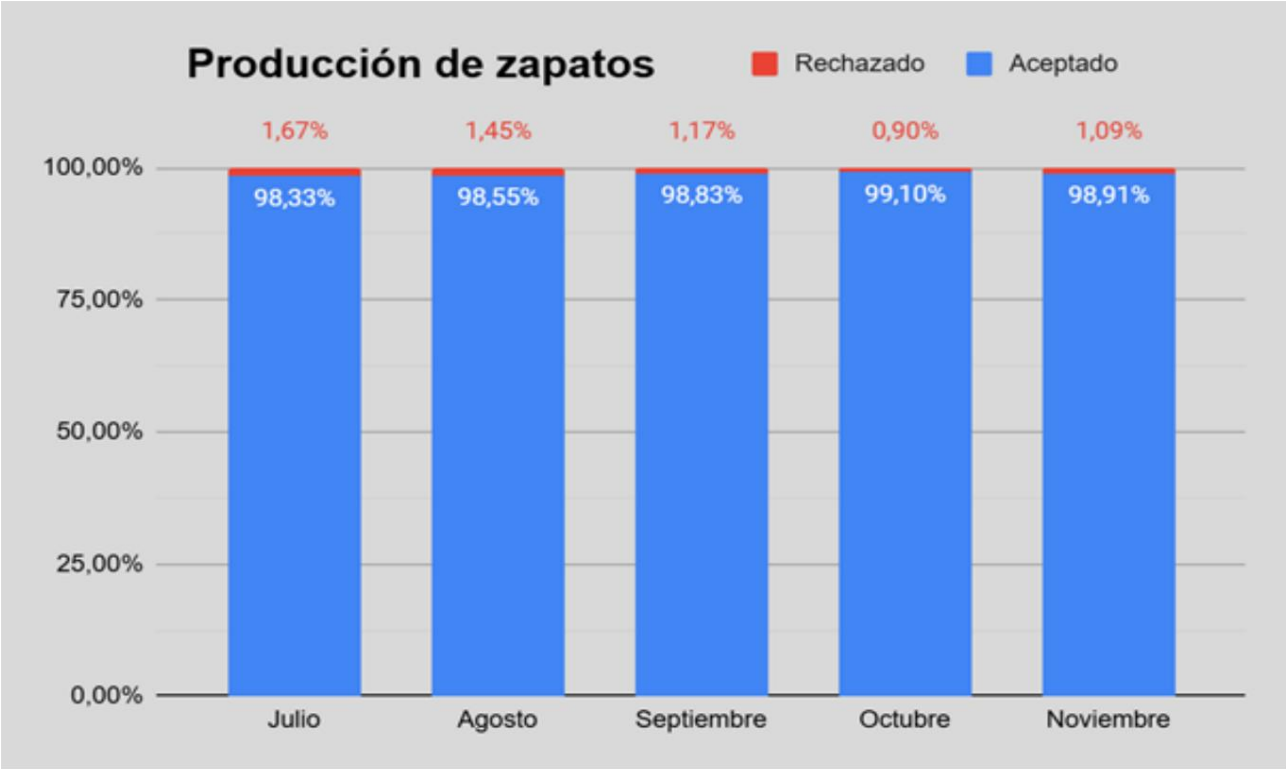

Analyzing the percentages of the company with respect to monthly production, do not comply with 0.5% of permitted non-conforming products, therefore the team creates an analysis to identify the most common defects that are present in the PNC.

Table 3. Defects. Proprietary source.

Tipo de defecto	Numero de rechazos
Falta de atención	889
Falla de inyección	721
Mal pigmento en inyección	598
Cortes en la piel	301
Mal etiquetado	294
Suela defectuosa	252
Piel quemada	240
Falta de adhesivo	236
Exceso de cintas	231
Casco equivocado	104

Figure 1. Poor pigmentation.

Figure 2. Lack of attention.

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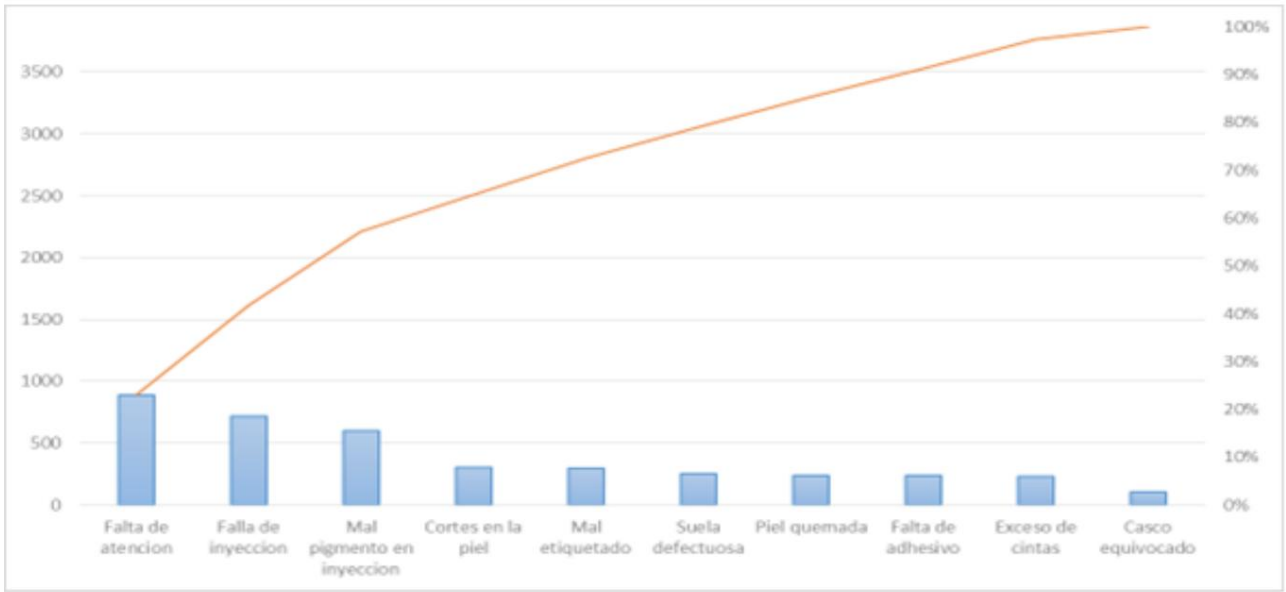
Figure 3. Defective sole. **Figure** 4. Cutting on the skin **Figure** 5. Injection failure

The equipment presents a Pareto diagram identifying which defects are repeated.

Graphic.2 Pareto diagram of types of defects. Own source.



The Pareto analysis is based on the idea that a small number of causes are responsible of the majority of consequences. It was used to classify errors, since, the Pareto principle, 20% of general errors and 80% of rejections. The graphic presents us with the three main

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defects, lack of attention, lack of injection and poor pigment in injection, but for reduction and To be able to reach 0.5%, it is necessary to work like the other defects only by paying more attention to These three mainly.

D3. Implement Contention Actions.

According to the Pareto diagram, the main defects are shown from major to minor, for him to implement corrective measures in a short period of time, the team decided to inform the all employees about the situation, the team decided to go to that part of the process where they generated these defects by prioritizing the three main ones, trying to isolate all the things that were affected so as not to continue with the remaining stages of the process, the affected parts took them to an isolated place where they were labeled as PNC, as a short-term corrective measure if he informed the production and quality area and carried out more frequent inspections at this point process.

D4. Identification of the Root Cause.

To understand the causes that generate these main defects, the team decided to use Root cause analysis tools such as the Ishikawa diagram will help the team in identify the factors that contributed to the problem.

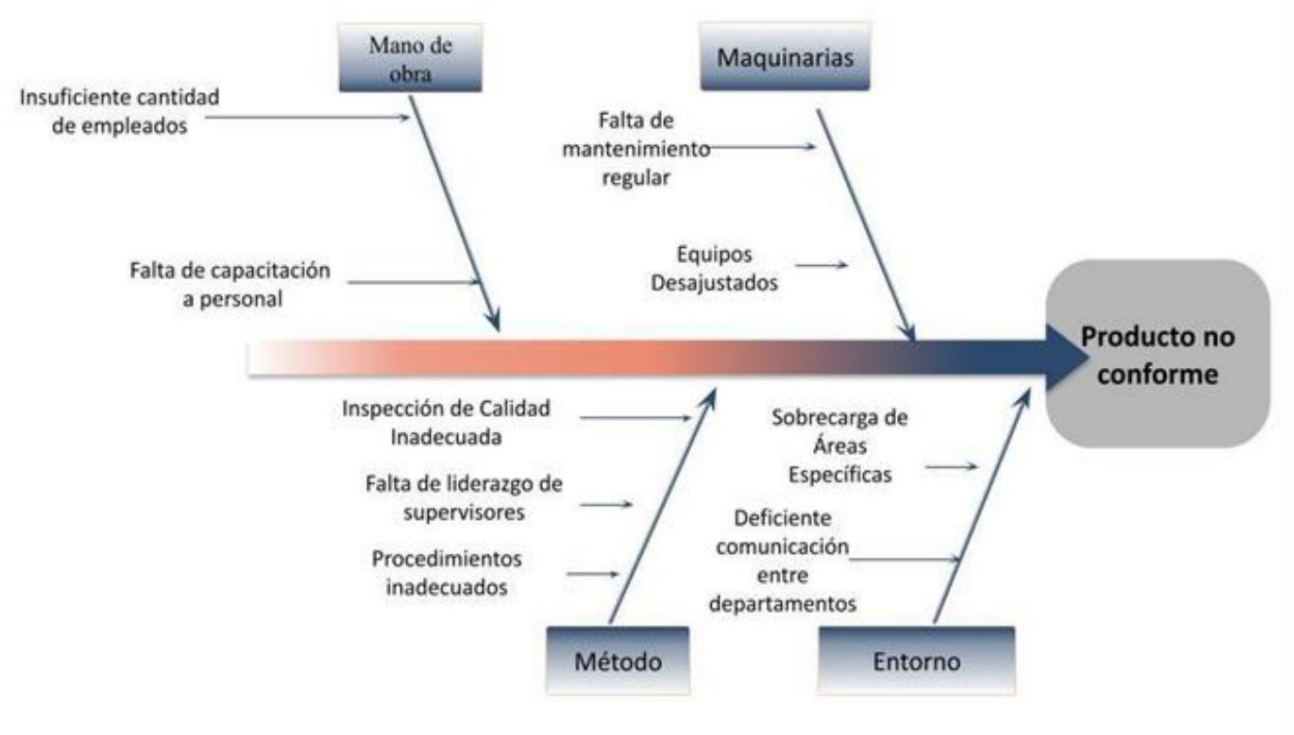

Figure 6. Ishikawa Diagram. Own source.

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Table 4 Description of the ishikawa diagram. Own source.

Causas	Descripción
Mano de obra	Se descubrió que la empresa no contaba con el numero de empleados adecuados en las áreas por el cual el empleado tenía que cambiar de actividad sin una capacitación adecuada antes de realizar una actividad diferente,
Maquinas	Las máquinas presentaban problemas en el proceso dado a que por la falta de mantenimiento presentaban problemas en la inyeccion además que en el proceso se desajustaba los moldes de inyección teniendo fugas de material.
Método	De acuerdo con los procedimientos efectuados en la operacion se descubrió que los trabajadores hacían procedimientos inadecuados afectando el producto durante el procedimiento debido a un mal liderazgo de los supervisores y una falta de inspección de calidad.
Entorno	En las áreas de la empresa se detectaron sobre cargas producción dado a retrasos por paros de emergencia en mantenimiento correctivo, esto causado por una falta de comunicacion entre departamentos de produccion y mantenimiento.al no avisar de fallos de la máquina antes de que suceda el problema, esto debido a no querer parar la producción por retraso de pedidos.

Table 4 details the fundamental causes of identified defects. The analysis reveals that a deficient inspection of procedures, resulting from ineffective quality management, constitutes the main root cause. This deficiency negatively impacts the production process, manifesting themselves in the lack of training prior to the execution of activities, the omission of reports about failures in the machinery, the absence of preventive maintenance and, consequently, in delays in order delivery.

D5. Determine permanent corrective actions.

Some corrective actions will be presented to address the fundamental causes of these Defects identified.

Table 5. Permanent corrective actions. Proprietary source.

Medidas Correctivas	Responsabilidad
Se realizara un sondeo para determinar el numero de empleados requeridos en las areas de trabajo para asi proceder a contrataciones de nuevos empleados para cada area requerida	Recuros humanos, jefe de mantenimiento, jefe de calidad y jefe de produccion todo es un trabajo en conjunto
Se integra un plan de mantenimiento para solventar los problemas de inyección este se realizara conforme la maquina en sus especificaciones lo requiera, se cuestionara 3 preguntas fundamentales ¿cuando se hará?¿quién lo hará?¿que se hará?, al igual una capacitacion sobre la calibracion de los moldes	
Se realizara capacitaciones sobre la ejecución de la operación, integrando en mayor parte a los jefes de área es decir supervisores para que realicen las inspecciones requeridas en el producto y en el proceso	
Con la ayuda del plan de mantenimiento se evitara los paros de emergencia, además se introducirá planes para mejorar la comunicación de los jefes de área, se definirá las prioridades de solucionar los fallos para no causar más retrasos	

D6. Implementation of Corrective Actions.

Through analysis, it is essential to have joint collaboration from all involved departments, it is essential that they understand the objective of all processes and goals to achieve, you must know the importance of capabilities and collaborate in them. There training is the method or fundamental strategy to achieve improvement in short, medium and wide plazo. Record production data for the following months, applying the strategies at the beginning del siguinte año.

Table 6. Registration of non-conforming product. Own source.

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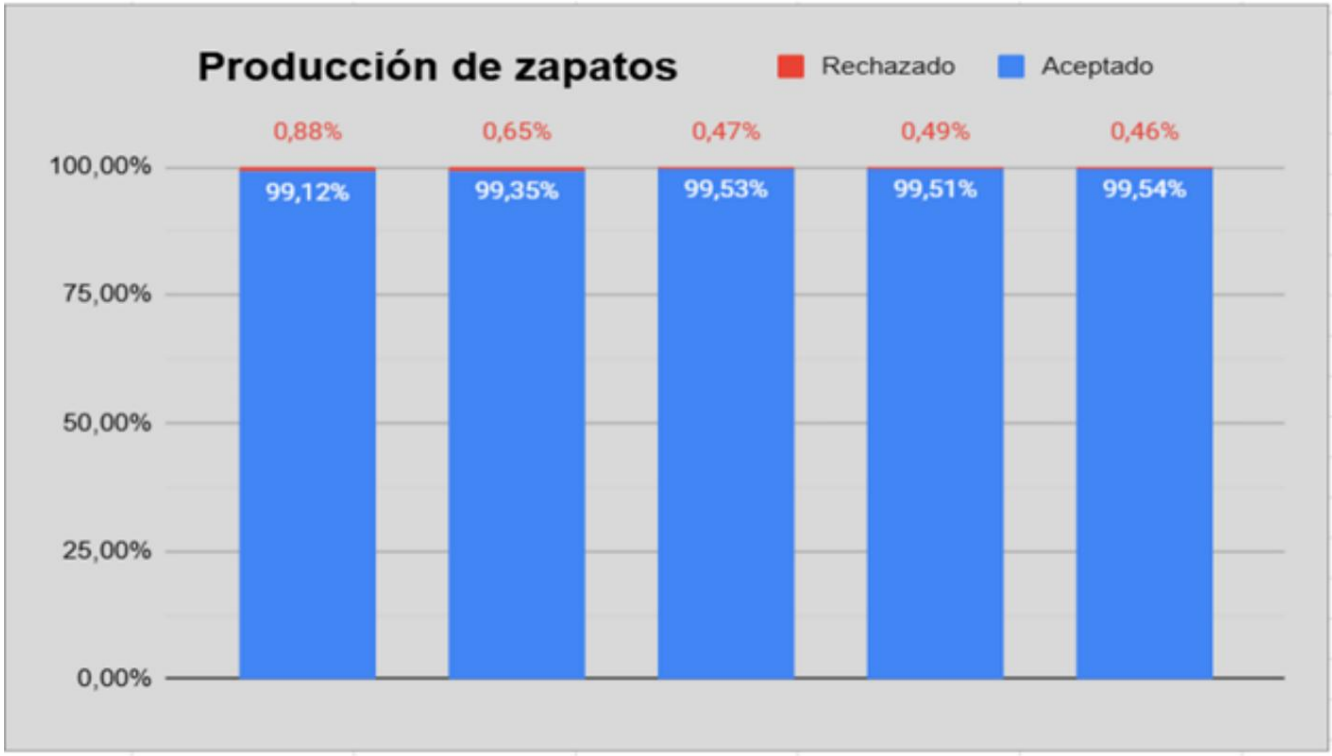
Pares de zapatos	Mes					Producción Total
	enero	febrero	marzo	abril	mayo	
Producidos	66013	57657	60719	52651	63417	300457
Conformes	65432	57281	60436	52395	63125	298669
No conformes	581	376	283	256	292	1788

With the data from the table we were able to obtain the percentage of defects.

Graphic 3 Monthly production percentage (income to mayo). Own source.



As can be seen if a significant reduction in defects was achieved, this is how resulting in an improvement in the quality of the product, reducing expenses and generating greater efficiency in it production avoiding reworks.

D7. Prevent the reappearance of problems.

To prevent future appearances of problems that affect the rate of non-conforming product a comprehensive approach covering everything from the best inspection processes to and learning different methods. As a key point, a training plan was developed, specifically designed to ensure that the new arrival staff adapts appropriately efficient and effective operation and the quality standards established in the company. There Following table describes the training plan to prevent problems from appearing.

Table 7. Capacity Plan. Own source.

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Dimensión de análisis	Unidad y/o responsable	Técnica	Profundidad de la capacitación	Lugar
Introducción General	Recursos humanos	Charla	Conocimiento general	Sala de juntas
Historia de la empresa, misión y visión, políticas y valores organizacionales				
Presentación de equipos y departamentos	Recursos humanos	Charla	Conocimiento general	Áreas de la empresa
Tour por las instalaciones	Producción	Tour	Conocimiento general	Áreas de la empresa
Capacitación Técnica	Producciòn (Coordinador de producciòn)	Teórico/Práctico	Práctica de la actividad a realizar respecto al SGC	Área específica del puesto
Entrenamiento práctico sobre las herramientas y procesos específicos del puesto.				
Calidad en el proceso	Calidad(Coordinador del departamento de calidad)	Teorico/Práctico	Conocimiento del plan de calidad respecto a productos y proceso	Área específica del puesto
Normativas y estándares específicos de la empresa respecto al plan de calidad..				
Seguridad y Normativas	Jefe de seguridad e higiene	Teórico/Práctico	Conocimiento de normativas y procedimientos de emergencia	Área específica del puesto
Capacitación en normativas de seguridad, procedimientos de emergencia, prevención de riesgos laborales.				
Capacitación en Gestión del Cambio	Reingeniería	Charla	Conocimiento general	Sala de juntas
Técnicas para adaptarse a nuevos procesos, aprendizaje de nuevas tecnologías, estrategias para afrontar la resistencia al cambio.				

D8. Recognition of the Team.

Given the 8D methodology implemented, the management department expresses its congratulations the team responsible for the notable reduction of non-compliant products, this achievement reflects the commitment, dedication and effectiveness of each team employee to bring good management of the methodology to achieve this important achievement.

3. RESULTS AND DISCUSSION

A study has been carried out on the implementation of the 8D methodology (Lestyánszka Škÿrková, K., 2023) highlighting that it is fundamental to improve quality and satisfy needs of customers, as in this article, selecting this method will achieve objective of reducing defects, achieving better quality in manufactured products. These results coincide with those reported in this article.

On the other hand, the author (Andrade Pereira, AN, 2025), 8D analysis is a pillar of the quality planning and a catalyst for sustainability in the automotive industry, as In this article, adequate planning resulted in an increase in compliant products as such as customer satisfaction. It is important to highlight that the 8D methodology allowed to reduce the % of non-compliant products up to the limits of 0.05%, also reducing reworks by 80%.

The author (Mahmood, K.,2023) mentions that manufacturing companies must operate effectively to control sustainability and reduce waste due to defects, as well as This article confirms that carrying out appropriate processes can increase efficiency and reduce defects, while reducing costs by up to 80% resulting from the reduction

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in overtime, rework and dead times.

According to (Skurkova, et al., 2022), the correct application of engineering methods Industrial or quality management helps effectively achieve goals, as well as in the present article on the application of the 8D method, which is a heat management method, where do I look for it? reduction of the different defects that were present, achieving tolerance in a few months 0.5% of non-compliant products accepted by the company.

The 8D method simplifies any operation, from planning to monitoring results (Setiawan, et al., 2021). As in this research article the 8D method achieves results based on clear and effective planning of processes in it production of industrial footwear.

The authors' study (Verma, SKM, & Dubey, D., 2023) informs about the application of the 8D approach in a crane manufacturing company, obtaining a product of good quality during a determined amount of time implementing tools and techniques, as in this article They will present several quality tools to achieve better quality products, avoiding potentially future problems. For his part, in this article, collaboration was increased of the departments within it.

CONCLUSION

The implementation of the 8D methodology demonstrated to be an effective tool to address solve complex problems such as defects in non-conforming products in a company dedicated to the creation of industrial shoes. When using the methodology step by step, the team designated achievement to find the root cause with the help of quality tools as in the diagram ishikawa and the pareto diagram, from finding the root cause to implement actions permanent corrective measures to avoid possible future problems.

The 8D methodology could obtain within the organization a joint collaboration of different areas, this can help over a long period to have a better collaboration to face new problems that could arise sooner, in addition to being able to jointly obtain new ideas, plans or strategies for the improvement of the organization.

The results obtained are encouraging for the future of the organization, as it is possible to have a benefit and a reduction in cost and time will always be of great importance within her, this equal, being able to highlight that thanks to having an improvement in the quality of the product, avoiding defects that could be emerging with greater recurrence.

The results obtained resulted in a significant reduction in the rate of defects to 0.5%, saves costs and improves customer satisfaction, highlighting that the 8D methodology can be

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applied successfully in the industrial footwear industry, and can also be a valuable tool for other industrial contexts that face similar challenges in quality and eficiencia de la producción.

ACKNOWLEDGEMENTS

The authors thank Dr. Erick Uriel Morales Cruz, who provided their valuable support and guidance during the execution of this present article. Your experience and knowledge were powerful fundamental to achieving success. Likewise, we thank our priests Aracely Hernández Hernández, Inocencio Reyes Martínez, Julio César Hernández Ortiz and María del Socorro Vázquez Vázquez for his constant support and motivation throughout our careers.

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Year V, v.2 2025 | Submission: 08/12/2025 | Accepted: 09/12/2025 | Publication: 11/12/2025

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