

Case Design Sheet



1. CASE DESCRIPTION

Complete revamping of materials and product handling systems along the assembly line.

PARTNER

AFIL

LOCATION

Italy, Lombardy

TIME/DURATION

Solution Implemented

2. DIGITAL TRANSFORMATION CHALLENGE

2.1. BUSINESS TRANSFORMATION

Industry: Manufacturing of Electrical and Electronical Equipment.

Company A is a multinational company operating in electrical and electronical equipment manufacturing and industrial automation sectors. The industrial case focuses on a plant in which Company A works on the manufacture of medium voltage devices and switchgears with a production process characterized by the assembly and testing of configurable products, starting from about ten thousands components purchased from suppliers.

In order to improve the efficiency of the production process, Company A has decided to completely revamp the materials and products handling system along the assembly line. In this regard, a combination of innovative methodologies and technologies have been applied.

2.2. CONCEPTUAL TRANSFORMATION

Initially, the assembly and testing phases of the process were completely manual handled. The production process, was based mainly on workbenches and forklifts and the automatic handling systems were not available.

Therefore, in order to improve the materials flow along the production line and thus increase the overall efficiency of the production process, Company A has decided to go for the complete revamping of the material handling system.

Conceptually, the Lean Manufacturing Paradigm has been implemented in order to foster the problem solving and the suitable implementation of innovative technologies.

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2.2. TECHNICAL TRANSFORMATION

Therefore, Company A has addressed the technical transformation of materials and product handling system by introducing new automated Industry 4.0 technologies. As previously mentioned, the process was carried out according to the Lean Manufacturing paradigm, in particular through the Role Storm and the Walt Disney methodology, two brainstorming techniques aimed at stimulate the identification of problems as well as the proposal of suitable solutions.

In particular, the Walt Disney methodology is a tool for the creative thinking inspired by Walt Disney. People are grouped and each group assume four specific thinking styles. The method involves the parallel thinking to analyze a problem, generate and evaluate ideas.

In the detail, in the first thinking style the group act as a outsiders in order to gain an analytical and external perspective. In the second phase, the group act as a dreamer to propose radical ideas. In the third phase, the group adopt a pragmatic point of view to select the best idea. Lastly, in the fourth thinking style the group acts in a critical way to review and improve the idea.

3. SOLUTION

Technically, a set of innovative 4.0 technologies have been introduced to revamp the materials and the product handling system along the assembly line.

In the detail, Company A has introduced a set of Autonomous Guided Vehicles equipped with Artificial Intelligence for material picking and the improvement of the routes management. The Autonomous Guided Vehicles were used for the handling of the semi-finished goods and for the assembly of components.

The implementation of the solution has required a system for the localization of the loads units through the use of RFID technologies and a central IoT unit (MES) in order to coordinate the multiple interconnected systems, such as the ERP and the AGVs allowing the efficient management of the production process.

Moreover, in order to allow the preventive and predictive maintenance of the AGVs, Company A has introduced an application - consisting in a Supervisory Control and Data Acquisition system (SCADA) - used to remotely monitor the AGVs, allowing the preventive and predictive maintenance.

Moreover, Company A has introduced an intelligent electronic manipulator to assist the operator during the lifting activities and assembling task, thus increasing the operator safety.

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4. KEY SKILLS AND COMPETENCES

The implementation of the solution has required an updating of the competencies of the operators involved in the revamping process. In particular, new skills and competences have been acquired in:

- Lean Production
- Creative thinking
- Brainstorming techniques
- Preventive Maintenance
- Predictive Maintenance
- Management of the introduced technologies

5. RESULTS

The implementation of the solution has allowed Company A to achieve several benefits: first of all, the material handling flows has been improved allowing to achieve a more efficient production process.

The real-time control has allowed to introduce the preventive maintenance of the AGVs allowing to identify the condition of the equipment in order to replace worn components before they fail, thus reducing breakdown and minimize production loss.

6. CONCLUSIONS AND RECOMMENDATIONS

The proposed industrial case has shown how Industry 4.0 technologies can be effective in optimizing the production process of a company. Another important recommendation is related to the theoretical methodologies used to face the problems and find the most suitable solutions.

The combination among the mentioned creativity thinking tools, and the introduction of the Industries 4.0 technologies has allowed to achieve the reported results.

7. REFERENCES

8. APPENDICES

No appendix