

Improving the productivity of production lines Case study of Tomato paste production line

Abstract:-

The study aims to increase the productivity of the production line, reduce losses and waste, and make maximum use of the available resources.

After referring to production records and reports, following up on all stages of the process, and diagnosing problems that cause waste of resources and time and stop the production line, and by dividing the production line into work areas, finding the appropriate distribution of manpower through the line, placing pallets above the floors, and adding a vibrating device, the carton losses reducing from 4.49 to .63, save seven wasted working hours, reduce downtime to less than ten minutes.

Key word: productivity, production line, losses, resources

Introduction

Industrial processes are one of the very important means in life because of their great role in providing various requirements and products these processes different from one process to another according to production inputs, required outputs, the time required for the process, the sequence of steps and operational conditions.

One of the types of industrial processes is production lines that are used to produce a wide range of products .

But the turn now is not only for the sake of obtaining products only Rather, to reach better production by reducing various costs and reducing wasted time in order to obtain high productivity so that the institution remains able to compete in the markets and achieve the highest degree of benefits and profitability.

Therefore, in this research paper, we will conduct a study in order to increase productivity in one of the production lines.

Problem statement:-

Institutions have become very competitive by making the most of the available resources, minimizing human efforts, delivering orders to customers on time and at the required quality level, reducing waste of materials, making maximum use of time, avoiding interruptions during operation and raising productivity Reduce losses.

Therefore, this study was conducted for the purpose of raising productivity and finding solutions to these gaps.

Objectives:-

- 1- Identify the problem and operation problems in production line
- 2- Observe the resources wasted during the current operating mode and find ways to reduce
- 3- Develop a method to solve the problem which are Causing production line to stop or to slow down its Production level than expected level
- 4- Giving recommendations to the institution about the procedures and modifications that can have an impact on reducing losses, making maximum use of resources and increasing productivity

Literature:-

Productivity:-

Productivity can be defined as a ratio between the output volume and the volume of inputs. In other words, it measures how well production inputs, such as labor, time, material, facility capital, are being used in an economy to produce a given level of output.

Manikandaprabu S. et al applied a study in one of the factories in India in order to increase productivity, reduce losses and make maximum use of time, and they developed the current operating situation and as a result the following was achieved.[1]

1-The significant achievement in productivity is increased by 10% and the reduction in turning cycle time is 45%.

2-It has been identified that production cost is reduced by 38% while the turning and cutting process has been outsourced through make or buy decision.

3-The raw material wastage has been reduced by 3% while applying kaizen tool in cutting operation.

P. Sundharesalingam. et al applied a study in one of the detergent factories in India in order to increase productivity and profitability.

They evaluated mechanisms and equipment, developed new methods for the flow of materials, eliminated unnecessary steps, and established work standards, and the result was a reduction in the process cycle time from 190 to 110 minutes.[2]

Ashish Kalra. et al applied a study in an assembly line for agricultural tractors to address the problem of not achieving the required production plan.

They diagnose bottleneck areas, diagnose stopping causes, and find a way to handling through the line, and as a result, the time wasted has been reduced by 14.66 % . [3]

Abdul Talib Bon et al applied a study to improve productivity in a automotive factory, After a change in the scheme of the stages of the process, conducting time studies, calculating the efficiency of mechanisms and balancing the workforce in the production line, the result is cycle time reducing as much as 11.11% at each work station with new standard time. [4]

Halimatussa.et al applied a study in PT. XYZ Company that produces a textile industry manufacturing golf gloves and caddy bag, the problem was the delay in delivering orders to customers as a result of the failure to achieve the production plan.

The current production plan was studied and information was collected from the records. The stopwatch and video recorders were used. Thus, it was reached to develop the existing situation to increase productivity and reduce losses and wasted time. An increase in productivity was achieved from 79.27% to more than 100% . [5]

Methodology:-

The methodology used in this research paper is a study of the industrial process sequence and the current operating situation, collecting production data from production records, studying the distribution of work areas and the distribution of technicians and workers in the line, observing the flow of materials and losses that occur during the process and finding the main causes of waste, Studying the different design aspects of the process As well as the study of time using the stopwatch and knowing the stops that occur and their time

Then apply the proposed solutions that contribute and help to increase productivity, reduce material losses, and benefit from time and manpower.

About the company:-

Abreen Group for Food Industries is one of the leading industrial groups in the manufacture and packaging of foodstuffs in Sudan, and the trademark of this group is (Al-Asfoor).

The production line under study is a tomato paste processing line and packing in metal cans weighing 400 grams, it is an Italian-made production line produced by the Italian Navatta Group

Process description:-

The industrial process of the production line consists of the stage of preparing tomato paste and this is done in the preparation unit by diluting the concentrates and the cooking process takes place until the mixture reaches the required concentration and temperature then the processed tomato paste is sent through lines in which it is exchanged with steam to the packing machine where the filling is done in metal cans then the metal cans enter covering machine to install covers and then date printing machine and enters the pasteurization stage for an hour, after these stages the product is transferred through conveyors with the presence of air to reduce moisture on the surface of the metal cans to avoid rust and transferred automatically to the packing machine that operates with a single operator, where the final packing is done.

Auxiliary units:-

The units supporting the production process are the steam boiler used to generate steam used in various heat exchange processes, air compressors to provide air for control valves, water treatment unit, power supply source.

Production materials used and material handling:-

The materials used in the production line are empty cans, cans covers and packing cartons.

The empty cans in the form of pallets consisting of 2,880 cans and the cans covers are in the form of bundles consisting of 300 covers moved by forklifts.

Diagnosed problems:-

When referring to production records, warehouses, malfunction reports, and performing follow-up and observation of the line for different operational periods, the following problems were diagnosed

- 1- Quantities of cartons received from warehouses, but they do not appear in production and are dissipated in the form of losses during the production process.
- 2- Quantities of empty cans received from warehouses, but they do not appear in production and are dissipated in the form of losses during the production process.
- 3- There are quantities of water vapor that condense and are discharged without benefiting from it, it is a loss of heat energy and increases the fuel consumption rate of the steam boiler.
- 4- The line stops automatically during the production process when production accumulates after exiting the pasteurization process, and there are different stops during different operational periods, sometimes more than half an hour.
- 5- There is no known and uniform distribution of workers throughout the production line.
- 6- There is a problem with the movement of empty cans at the entrance to the filling machine
- 7- There is time wasted since the beginning of the shift and the beginning of the actual production, this time represented in preparing the temperatures and preparing the auxiliary units
- 8- absence of a known time consumption rate through which materials are provided at the required time

Study application:-

After diagnosing the problems and analyzing the following treatments were applied.

- 1-Dividing the production line into work areas and distributing operators and workers to these areas.

After several operational times and with observation and follow-up of the workflow we found that the best situation four working areas is

- The preparation area needs four workers and an operator.
- Filling tomato paste and needs three workers and an operator
- Conversion lines need two workers.
- The final packing needs six workers and an operator.
- Empty cans pallet insertion area this area needs one operator.

Thus, the production line was divided into five work areas that need nineteen manpower.

2- Pallets are placed above the floors at the packing area

3- Movement of empty can pallets is reduced.

4- Additional working hour was added for the workforce in the preparation area before the start of work

5-The hourly material consumption rate was calculated according to each operational speed, and thus the handling rate became known.

6- Vibrating device has been added to help in the movement of empty cans.

7- Placing a follow-up agent and an observation that manually removes the accumulation in production when it occurs and is followed up to avoid the occurrence of accumulation

8-Vibrating device added helped in the movement of cans

RESULTS AND DISCUSSION:-

1- After the fixed and known distribution of workers and operators on the production line, the result was the acquisition of skill and specialization and the smooth running of the production process.

2- As a result of placing the pallets above the floors, the packing carton losses were reduced.

3- After calculating the material consumption rate, no interruptions due to material flow.

4- Result of placing a follow-up agent no interruptions due to accumulation in production

5- As a result of adding time to the workforce in the preparation unit before the known start time, the waiting time for the rest of the workforce has been reduced.

CONCLUSION:-

By applying the steps that aim to reduce losses and make maximum use of the working manpower and reduce downtime, the following has been reached.

1-Reducing carton losses from 4.49 to .63 .

2-Save seven wasted working hours.

3-Reduce downtime to less than ten minutes

4-Recommendation to collect condensed steam for use in the process of preheating the water used in a steam generating boiler.

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