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Improvements in the Production Line of the Cygnus Industries in Corporate using Promodel Simulation Software

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Abstract
The use of Promodel simulation software is a powerful tool for improving the production line of Cygnus Industries Incorporated. This abstract provides an overview of how Promodel can be used to identify inefficiencies and bottle neck sin the production process, test different scenarios for improvement, and implement changes that result in increased efficiency and reduced costs. By continuously monitoring the performance of the production line, Cygnus Industries can further optimize its processes and increase profitability. This approach provides a data-driven method for improving the production line, resulting in a more streamlined and efficient production process for the company. Overall, the use of Promodel simulation software can help Cygnus Industries to stay competitive in its industry and provide high-quality products to its customers.

Keywords: promodel, production line, efficiencies, simulation, process

I. Background

A. Background of the Study

The goal of a simulation study for the production line of Cygnus Industries Incorporated would be to identify opportunities for improvement in the manufacturing process. This could involve modeling the current production line system and analyzing the efficiency, productivity, and throughput, and then testing different scenarios to identify improvements.

A simulation study using Pro Model software can be a powerful tool for improving the production line of a manufacturing company such as Cygnus Industries Incorporated. It can help identify
In efficiencies, bottlenecks, and areas for improvement, leading to increased productivity, reduced costs, and improved profitability.

B. Company Profile

Cygnus Industries Incorporated is one of the Philippines' oldest and leading privately owned flexible packaging companies. Since its inception in 1968, the company has evolved under a single management and has been serving both the Filipino and Regional Markets for well over four decades. They strongly believe that through continuous investment in their people and in their technology, they can provide both high-quality packaging and excellent value to all of their clients.
Through their vast operations, we have developed extensive capabilities, technology platforms, and business concepts. Their manufacturing facility encompasses the entire range of flexible packaging production. The seinclude design preparation, cylinder manufacturing, gravure printing, lamination, metallization, film extrusion, and film finishing in bags, rolls, stand-up pouches, and sachets.Their in-house capabilities ensure the highest control of product quality, development, and production while ensuring on- time delivery to clients.

C. Objectives of the Study

Across all industries, manufacturers are being

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Pushed to re-evaluate the in operations. The goal of the production line is to increase production efficiency and quality (Sciemetric, 2022).
Here are the following objectives of the study:

1. Improve the company's production layout.
2. Identify and propose production alternatives.
3. Point out the number of outputs and a possible number of defects.

D. Scope and Limitation

The scope of using Promodel simulation software for improvements in the production line is to analyze and optimize the existing manufacturing process to increase efficiency, reduce production time, minimize costs, and improve overall productivity. This can be achieved by creating a virtual model of the production line using Promodel software and simulating the production process to identify potential bottlenecks, evaluate different scenarios, and test various improvement strategies. The software allows for experimentation with different layouts, workloads, and configurations to identify the best solutions for improving the production line.

While Promodel simulation software can be an effective tool for improving the production line, there are some limitations to its use. Firstly, the accuracy of the simulation results depends heavily on the quality and accuracy of the data used to build the model. If the data is incomplete or inaccurate, the simulation may not reflect the real-world production process accurately. Secondly, the software can only model what is explicitly programmed into the simulation, and it may not be able to capture all the complexities and nuances of the actual production process. Finally, the software may require specialized knowledge and training to use effectively, which can be a limiting factor for some organizations.

E. Significance of the Study

The reason for gathering the data is to improve, identify, propose production alternatives, and point out the number of outputs and a possible number of defects.

This research is made to provide crucial information and knowledge which is beneficial to the following:

Manufacturers
This data gathered will benefit the manufacturers in terms of identifying and learning other production alternatives which would help them in increasing production efficiency and quality.

IE Students
The study will serveas advanced knowledge for their studies and will help them understand how using promodel simulation works when it comes to the production line.

To Future Researchers
This will serve as their basis and guide on conducting another study about the Improvements in the production line, using the promodel simulation software. The study would give them more ideas and knowledge about the latter.

F. Review of Related Literature

Gwiazda, Sękala, Banaś, (2017) The advantages of performing different scenarios of production problems solving caused the increase of the frequency of using the simulation models in the production process improvement. These can be used in various areas, i.e. in the production process efficiency improvement by increasing the machine work in gperiod by manipulating only the production batches data.

Oluwole O. Akinola, Alaba F. Oyedele, Olalekan S. Fatoki (2017) The study found that the company was experiencing production bottle neck sthatled to longlead times, high levels of work-in-progress inventory, and low productivity. To addressthese issues, the company used Promodel simulation software to model its production line and identify opportunities for improvement. The simulation results showed that by making changes to the layout of the production line and the scheduling of production activities, the company

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could significantly reduce ledtimes and work- in-progress inventory, while increasing productivity. The study concludes that Promodel simulation software is a valuable tool for identifying opportunities to improve production line performance.

Rosienkiewicz et al., (2018) Simulation models are a symbolic interpretation of the input-output relationship of real processes, which are represented by symbols and mathematical relations.

Seyyed Ahmad Hoseini, Seyed Javad Mirzapour, Ali Mohammad Kimiagari, and Alireza Alinezhad (2015) The study found that the company was facing challenges wi the bottlenecks and delays in its production line, which were leading to increased costs and decreased productivity. To address these issues, the company used ProModel simulation software to model its production line and identify opportunities for improvement. The simulation results showed that by adjusting the production schedule and reducing changeover times, the company could significantly increase productivity and reduce costs. The study concludes that ProModel simulation software is an effective tool for optimizing production lines in the food industry.

Ahmed M. El-Kamel, Ahmed R. El-Zohairy, Mohamed A. El-Kholy, Mohamed S. El-Sharkawy (2014) They use ProModel simulation software to model the existing production line and identify areas for improvement. They then propose and evaluate various improvements scenarios using the simulation model. The authors found that using ProModel simulation software helped them to optimize the production line by reducing the cycle time and increasing the production rate. They also identified bottlenecks and areas of waste, which allowed them to develop solutions to increase efficiency and reduce costs. Overall, this literature shows that using Promodel simulation software can be a powerful tool for improving the production line in manufacturing companies, leading to increased productivity and reduced costs.

M.C. Cruz et al. (2019). The study aimed to improve the production line efficiency of a Philippine manufacturing company by using Promodel simulation software. The researchers created a computer model of the production line, including the different machines and processes involved. They then used the software to simulate different scenarios and analyze the performance of the production line under different conditions. Based on the results of the simulations, the researchers proposed several improvements to the production line, such as adjusting machine settings, changing the sequence of operations, and implementing quality control measures. The study found that the proposed improvements led to a significant increase in the production line's efficiency, as measured by the number of units. produced per hour. The authors concluded that simulation modeling using Promodel software is an effective tool for optimizing production processesandimprovingoverallefficiencyinmanufacturing companies

J. W. Lim, J. G. Lee, J. G. Kim, J. S. Kim, and E. J. Park (2017) the Philippine electronics manufacturing industry using Promodel simulation software to identify ways to improvethe production line.They conducted a simulationof the production line to determine the bottleneck and improve the efficiency of the production line. The study showed that by reducing the waiting time and queue time, the production line's overall efficiency improved. This research provides insights into how the use of Promodel simulation software can help improve the production line in the Philippines.

R. Borromeo (2018-) The study found that the company's producti online was experiencing bottle necks and delays due to poor production planning and scheduling, inadequate staffing, and unreliable machinery. To address the seissues, the researchers developed a simulation model of the

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production line using Promodel software. They then used the model to test various scenarios and identify the most effective solutions to improve efficiency. The results of the study showed that by implementing the proposed solutions, the company was able to increase its production rate by 23% and reduce its cycle time by 18%. The company also experienced significant cost savings due to the reduction of machine downtime and the elimination of excess inventory. Overall, the study demonstrated the effectiveness of using Promodel simulation software in improving the production line efficiency of local companies in the Philippines.

A L. Tan, M. T. Viloria, and J. B. Silvestre, (2021) In the study, the researchers aimed to optimize the manufacturing process of a Philippine automotive company using simulation modeling. They utilized Promodel simulation software to develop a model that mimics the company's production line, and then evaluated several scenarios to identify the best process improvement options. The findings of the study showed that the use of simulation modeling with Promodel software can significantly improve the production line of the Philippine automotive company. Specifically, the simulation results demonstrated that increasing the number of operators and adjusting the production rates of certain stations can reduce bottlenecks and increase the overall efficiency of the manufacturing process. Overall, this literature highlights the effectiveness of Promodel simulation software in optimizing production line processes in the Philippines, specifically in the automotive industry.

Monique Janelle A. Mapalo, Marielli U. Boquiren, and Pauline Mae B. Gan (2019) The study aimed to optimize the production line of a cement manufacturing plant in the Philippines using Promodel simulation software. The authors used the simulation model to evaluate the performance of the production line and identify bottlenecks that hindered the plant's efficiency. They then proposed and evaluated various scenarios for improvement, such as increasing the number of cement silos, optimizing the production schedule, and implementing buffer stocks. The results showed that the proposed improvements could increase the plant's production capacity and reduce its production lead time. The study demonstrated the effectiveness of simulation-based optimization in improving the production line of a manufacturing plant in the Philippines, particularly in identifying bottlenecks and proposing solutions for improvement.

II. Methodology

A. Research Method Used

This research method statement outlines the approach to be used for gathering data through interviews, meetings, and Promodel simulation software. The purpose of this research is to identify improvements that can be made in the production line of Cygnus Industries Incorporated using Promodel simulation software. The research aims to explore the current production process, identify bottlenecks and inefficiencies, and propose improvements to enhance productivity and efficiency.

The data collected will be analyzed using content analysis and statistical analysis to identify bottlenecks and inefficiencies in the production line and propose improvements. The research will be conducted in accordance with ethical guidelines for research involving human participants, and the confidentiality of the participants will be ensured.

B. Data Collection

The researchers made a letter of request for approval to gather data about improvements in the production line of Cygnus Industries Incorporated. One researcher has relatives in a CII company where we have been able to find the information that we need to identify the specific aspects of the production line that need to improve, such as throughput, cycle time, efficiency, or resource utilization. It is important to ensure that the data-gathering procedure is conducted in a systematic and objective manner to obtain reliable and accurate data that can be

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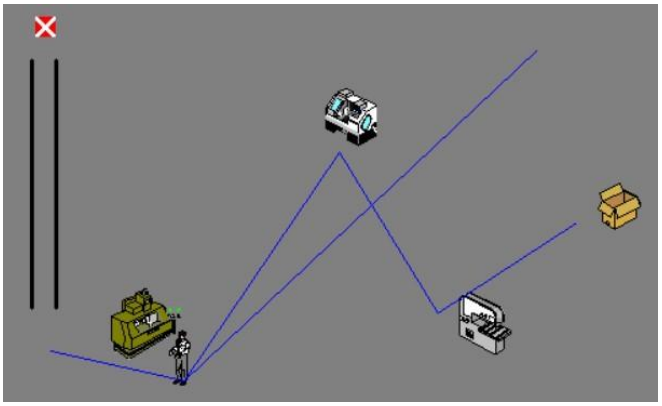
used to inform the decision-making process.

C. IE Tool Used

Using simulation software such as promodel can provide numerous benefits for improving the production line of Cygnus Industries Incorporated. A powerful tool for improving production efficiency, reducing costs, identifying



risks, and improving quality.

Here are some of the benefits of using a Pro Model in the production of a company:

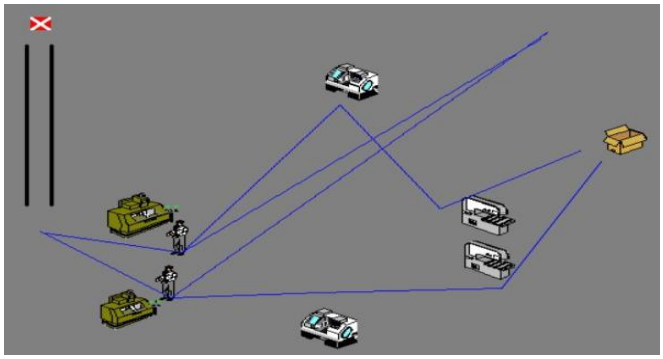
A. Improved Efficiency: A Pro Model can simulate various production scenarios and provide data- driven insights to improve the efficiency of production processes. This can result in better resource utilization, reduced cycle times, and improved throughput.
B. Cost Reduction: By identifying and eliminating wasteful activities in the production process, a Pro Model can help reduce costs associated with labor, inventory, and equipment maintenance.
C. Capacity Planning: A Pro Model can simulate various production scenarios and provide insights into the required capacity to meet the demand. This helps in capacity planning, ensuring that the company has the necessary resources to meet customer demand without in curring additional costs.
D. Optimal Resource Utilization: A Pro Model can help in identifying optimal resource utilization by analyzing the performance of each resource in the production process. This can help in allocating resources efficiently, reducing bottlenecks, and maximizing productivity.
E. Improved Quality: A Pro Model can help in identifying potential quality issues and implementing measures to prevent them. By simulating various production scenarios, the tool can help in identifying potential quality issues before they occur, reducing the risk of defects and product recalls.

In summary, a Pro Model is an essential IE tool that can provide valuable insights into the production process of a company. By identifying and eliminating inefficiencies and optimizing resource utilization, a Pro Model can help reduce costs, improve quality, and increase the overall efficiency of the production process.

III. Analysis

A. Existing Layout

The figure above shows the simple existing layout of the company where in this figure the researchers only included one machine per process just to satisfy the use of the simulation tool.



The figure above shows the average capacity of each machine, as well as the number of hours in a shift, the total entries, average time per entry, average contents, maximum contents, current contents, and percentage of utilization of the existing layout.

B. Proposed Solution:

As seen in the existing layout, there are no

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inspections after each procedure giving more possible rejects before storing. The proponents proposed adding an inspection for each procedure to minimize defects or reject. Additionally, the researcher's added a set of machine stomaximize production every shift.

C. Data Analysis:

Cygnus Industries produces high-quality packaging for different markets locally and regionally in the Philippines. The manufacturing facility encompasses the entire range of flexible packaging production including printing, lamination, and slitting. For all production procedures, there is one operator per machine. There are 2 machines for printing, 2 machines for lamination, and 1 slitting machine. The number of produced products per printing machine averages 19,389 kg. There are two types of laminations in the production which are dry/solvent-free lamination and extrusion lamination with an average of 174,546.7 meters of products. For the last machine, the slitting machine produces an average of 12,058.11 kg of products.

D. Alternative 1

The figures above show the information for the first alternative. The first figure is where the

Name	Scheduled Time (HR)	% Empty	% Part Occupied	% Full	% Down
parts	8.00	16.67	83.33	0.00	0.00
conveyor	8.00	17.71	82.29	0.00	0.00
Printing	8.00	68.75	31.25	0.00	0.00
Lamination	8.00	23.38	76.62	0.00	0.00
Slitting	8.00	99.90	0.10	0.00	0.00
Storage	8.00	21.05	78.95	0.00	0.00
Printing 2	8.00	39.33	60.67	0.00	0.00
Lamination 2	8.00	18.90	81.10	0.00	0.00
Splitting 2	8.00	24.92	75.08	0.00	0.00

researchers added a set of machines for Production. The second figure shows the locations where the average capacity of each

Name	Scheduled Time (HR)	Capacity	Total Entries	Avg Time Per Entry (MIN)	Avg Contents	Maximum Contents	Current Contents	% Utilization
parts	8.00	100.00	120.00	77.39	19.35	51.00	51.00	19.35
conveyor	8.00	999999.00	68.00	45.76	6.48	11.00	10.00	56.68
Printing	8.00	20.00	58.00	4.93	0.60	1.00	1.00	2.98
Lamination	8.00	175.00	57.00	20.04	2.38	4.00	3.00	1.36
Slitting	8.00	12.00	54.00	6.98	0.79	4.00	1.00	6.54
Storage	8.00	999999.00	53.00	177.86	19.64	53.00	53.00	0.00

machine, as well as the number of hours in a shift, the total entries, average time per entry, average contents, maximum contents, current contents, and percentage of utilization for the first alternative. Alternative 2

An alternative scenario for improving the production line of Cygnus Industries Incorporated using Promodel simulation software could involve the following steps:

A. Identifying key areas for improvement: Begin by assessing the production line to determine where inefficiencies and bottlenecks occur. This could involve gathering data on production output, processing times, and workloads.
B. Creating a virtual model: Use Promodel software to create a virtual model of the production line. This will allow you to simulate various scenarios and identify opportunities for improvement.
C. Testing different scenarios: Use the virtual model to test different scenarios, such as changes to the layout of workstations, adjustments to staffing levels, and improvements to supply chain logistics. This will allow you to see the impact of each scenario on production output and costs.
D. Analyzing results: Evaluate the results of each scenario to determine which changes are most effective in improving production efficiency and reducing costs.
E. Implementing changes: Based on the results of the simulation, implement the changes that are most effective in improving the production line.
F. Monitoring performance: Continuously monitor the performance of the production line to ensure that the change sare achieving the desired results. Make adjustments as necessary to further improve efficiency and reduce costs.

By following these steps, Cygnus Industries Incorporated could use Promodel simulation software to identify and implement improvements to its production line, result in gin increased efficiency and profitability.

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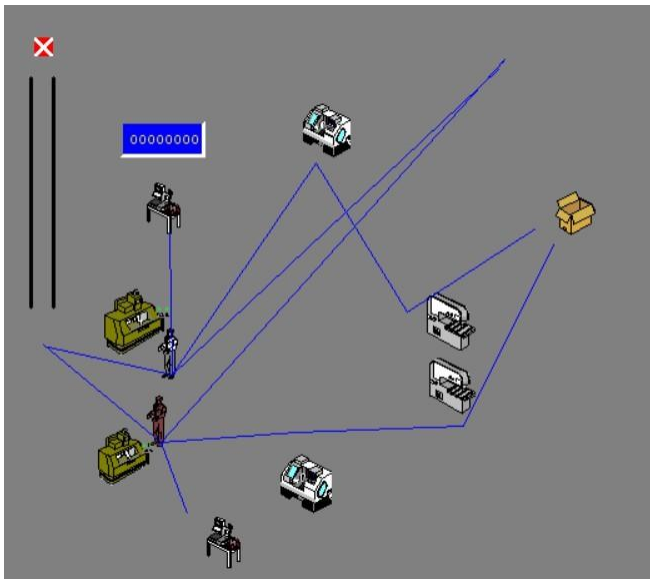
E. Alternative 3



The figure above shows the production line of Cygnus with the proposed alternatives to improve the company's production and decrease defects by adding inspection after the printing process. This can help the company maximize its profits and produce products with minimal waste.

IV. Summary:

Based on the scenario provided, the use of Promodel simulation software can help Cygnus Industries Incorporated to improve its production line by identifying inefficiencies and bottlenecks, testing different scenarios, and implementing changes that lead to increased efficiency and reduced costs. By continuously monitoring the performance of the production line, Cygnus Industries can further optimize its processes and increase profitability. Overall, the implementation of Promodels emulation software can provide a data-driven approach to improving production processes, resulting in a more streamlined and efficient production line for the company.

Conclusion:

In conclusion, using Promodel simulation software provides a powerful tool for improving the production line of Cygnus Industries Incorporated. By creating a virtual model of the production line and simulating various scenarios, the company can identify inefficiencies and bottlenecks, test different solutions, and implement changes that result in increased efficiency and reduced costs. Continuously monitoring the performance of the production line allows Cygnus Industries to make further adjustments and optimize its processes for maximum profitability. By taking a data- driven approach to production line improvements, Cygnus Industries can stay competitive in its industry and provide high-quality products to its customers.

Recommendation:

A. Based on the alternatives proposed, the company will need to add machines and on the contrary, the work force will also be increased. The calculation for the projected number of personnel will be required.
B. Adding machines can also add another cost for the company. This proposal can maximize the number of products that can be produced per shift but cost- benefit analysis anb essential to compare whether such intervention or changes is necessary.
C. The researchers cannot gather data regarding the accurate size of the production facility. Hence, it is use full to know the right size of the facility to be able to execute the proposed alternatives well.

Acknowledgment:

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