**INTRODUCTION**

This document provides a detailed description of the manufacturing dataset. The details provided here-in will showcase only the production line devices management. This will help to portray a real-world or near-real world experience of a manufacturing company involved in the production of soft drinks and water.

The dataset can be used in any matter deemed fit. To start with, here are some example use cases:

1. Production Dashboard that can be viewed on:

* A production floor,
* Management staff’s office
* Machine operators want to monitor production machinery states (operational, not operational, fault)
* Viewed on a mobile device incase executives want to be able to view machine operations or production levels constant state every hour. Etc

1. Production Quantity forecasting (predictions) and decision making in choice of equipment, determining number of days it would take to meet a production count target and so on.
2. Data analysis on the machineries, production output {total product count, total quality product count} etc.
3. ETL, ELT data movement/pipeline project that involves getting data stored in the Programmable Logic Controllers into a file server location or a cloud data store.
4. Operations Research project for process optimization
5. Manufacturing and Industrial automation projects using artificial intelligence (machine learning, robotics, etc) to automate production machineries as well as gain ideas on how companies plan their production in cycles.
6. And you may think about any other use case you wish to add to the list.

**CONTRIBUTORS**

1. Seun Shoaga: Contributions include ideas on Programmable Logic Controllers (PLCs)
2. Tosin Adeniyi Adekunle: On further ideas on the Programmable Logic Controllers (PLCs), Use Cases, Data Generation, Meta Data Development.
3. Copilot: For images and clarification of some terms.

LITERATURE REVIEW

People talk about data analysis and artificial intelligence in so many ways and use cases. One of the less common use cases include Industrial/Manufacturing use cases where there are many use cases actualized. Most importantly, large scale industries like Electricity, Cement, Food-Drinks-Beverages, Sweets & Other Concessionaries can benefit automating their production, improving their processes or optimizing their machineries operations.

Naturally, production companies use probability distributions like the exponential distribution or the more tolerant one, geometric distribution in determining the life time of the machine products like light bulbs, batteries and so on. Such may still be achieved using regression analysis or even time series extrapolation.

The fact that there are many methods of achieving these type of result make it even more interesting to expand the use case on a large scale.

I am also sure our friends who are skilled in the development of automated machineries in factories will find it interesting to know that they can do more by going beyond the usual program a PLC and setup a factory. And they can go more into the use of AI and its subs like ML and deep learning.

In the next section we will be discussing about the typical factory structure for the manufacturing line in question and then we will move to describe the equipment/machineries, how they are connected to the central logic controller and how the data format for each machine is designed.

THE DIP PLC

Dips® is a soft drinks manufacturing company (This is a fictitious company, please do not forget. They are currently not hiring 😉) . They have 8 different products in their countries of operation.

The products include:

1. cola black 350 ml
2. cola black 500 ml
3. orange dip 350 ml
4. orange dip 500 ml
5. lemon drip 350 ml
6. lemon drip 500 ml
7. water fresh 1000 ml
8. water fresh 500 ml

They have distributors all over the country who place orders before the production cycle begins and wait till their products are available for distribution/shipping to them.

Each product has a production line which is a set of machines used for producing them. A typical production line for one of the products may look like the description provided below:

1. A ticky-moving flat-bed conveyor moving bottle from washing & dryer section to the bottling section
2. The bottling section is a combination of ticky flat-bed conveyor that move bottles through the filling dispenser, sticker machine, cork machine and to a fast conveyor
3. Faster conveyor where there are two “object-detection & counter” devices and a human that counts how many bottles passing through the conveyor every x-seconds.

The diagram below provides a basic description.

Timed ticky moving conveyor



**A**

**B**

**C**

**D**

**E**

**F**

**G**

**H**



Uniform motion medium speed conveyor

Caterine removes bottles that doesn’t meet quality control

|  |  |
| --- | --- |
| Letter | Description |
| A | Liquid product dispenser |
| B | Cork machine |
| C | Sticker printer |
| D | Object-Scanner-&-Counter\_1 |
| E | Catherine who removes undesirable product |
| F | Object-Scanner-&-Counter\_2 |
| G | Ticky-movement conveyor |
| H | Uniform speed conveyor |

Introduction

Factory Description

Describe the factory briefly and provide diagrams. Areas covered:

* Description of the factory
* Description of each product line and machine setup labels.

Machine operations,

* Describe how the machines work.
* Discuss about how power, variable frequency controller, filling and cork machineries, programmable logic controllers ensure the smooth operations of the machineries.
* Discuss the type of data collected from the machines, where they are stored and how they are stored.

Expectations from anyone using the dataset:

Perform ETL and create orchestrated data pipeline from the data source to a destination database for analytics.

Create production progress dashboard that refreshes every 1 hour.