Training Tool of a new Filling & Packing Line

Motivation & Objectives
Production lines consist of several equipments such as machines, conveyors or buffers interconnected. To run these equipments, operators are responsible for their operation and daily maintenance. Therefore, operators have an essential role to play in achieving a good line performance. This makes training on the production lines of the highest importance.

The aim of this innovative project is to design and develop a training tool using simulation where operators will be able to learn and practice the main production line control concepts.

Simulation and Training
As this master thesis combines simulation and education, no one is really experienced in the field, neither at EPFL nor in the filling & packing industry.

An educational simulation could be beneficial for the user to gain awareness, understanding or know-how of the environment being simulated. Comparatively to conventional lecturing, education based on simulation has a decisive advantage: the trainees are actively involved, it is possible to experiment the topic as a whole, and its suitability to convey system characteristics allows the user to operate in an environment close to reality.

Training Concepts and Training Tool Structure
The basic filling & packing line concepts implemented in the training tool are: Line Reliability, Line Division, Line Functioning, Line Stoppages and Line Production. The objective is to show the impact of parameters such as machine reliabilities, buffer capacity, bottleneck speed or stoppage length on the production.

Training Tool Structure

Excel Interface
Excel is used in two ways in the training tool, namely as starting page, named Main Menu and for the collection and visualization of the results.

The main menu gives the opportunity to read a small description of each concept or to access the training session on Arena.

This chart allows the user to compare the different simulated cases for each concept. Key Performances Indicators (KPIs) such as efficiency, loss or production are used to compare the simulation results.

The user can then use a small tool which calculates the difference between two cases.

Arena Interface
Arena is not a user friendly software, especially for people who have not worked with it before. Therefore, Visual Basic for Applications (VBA) has been used to develop an easy to use interface. As there are a lot of buttons and settings in Arena, it has been decided to work essentially with pop-up windows avoiding that the user has to search for information.

Definition of user’s parameters

Selection of special cases

Arena Animation
Training has more impact if performed in a realistic context. In this study, the user should be able to transfer the knowledge he has obtained from simulated context to real line situations.

This means that he should be able to recognize the real line in the developed software.

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