Saker Solutions

Part of the ITI Group

Cadbury's New Chewing Gum Factory Development

- **Excel Front Ends can allow the project team to interact with the simulation model**
- **Graphics, even at a simple level, are a useful aid to the model validation process**
- **Cadbury used simulation to confirm plant capability**

Figure 1. Cadbury's new Factory in Poland

Saker Solutions use Witness at Cadbury

Building a new factory is always a challenge; ensuring the equipment selection, rules for operation, staffing levels and production capacity are all in sync with the business plan is no mean feat. Cadbury, facing these challenges with the build of a new Chewing Gum factory in Poland (see figure1), turned to simulation as a way of addressing some of these questions.

Cadbury already had access to the WITNESS simulation software but lacked any available resource to take on the model development so turned to Saker Solutions to provide simulation modelling expertise.

The scope of the model was to include the entire manufacturing, conditioning and packing process for the new facility; furthermore, the model was required to handle raw materials (almost 400 different ingredients could be specified and up to 100 different potential final products), together with a complex rework system which allowed (subject to shelf life) certain base products, which were not entirely consumed as part of one batch, to be reused as part of a future recipe, thus impacting on the overall consumption of ingredients.

Manufacturing Process Challenges

The challenges facing the project team meant the model had to provide a flexible platform on which to experiment with a wide range of variables; the batch size, volume of product per pallet, process rates, number of pieces of each type of key equipment, shift patterns, cleaning strategies, schedule mix, represent a small cross section of the items which could be varied.

The final model was driven by a front end application allowing the project team to experiment with changes, run the model and feedback results from a number of runs for review without the need for simulation expertise. In addition the model provided a simple visual representation of the process to aid with validation of the process and gaining an understanding as to the effects of process changes (see figure 2).

Avoiding Sticky Situations when Manufacturing Chewing Gum!

So What Makes Gum Manufacture So Complex?

The process, take some ingredients, mix them, pack them and ship them sounds simple enough, the challenges however only become apparent once you understand the way the gum is actually manufactured; firstly it is a multistage activity where any one final product is made in two stages; mix then coat. The raw ingredients are mixed in one of a number of mixers (taking into account that some premixed ingredients may already be available but is subject to a maximum percentage being added to any batch).

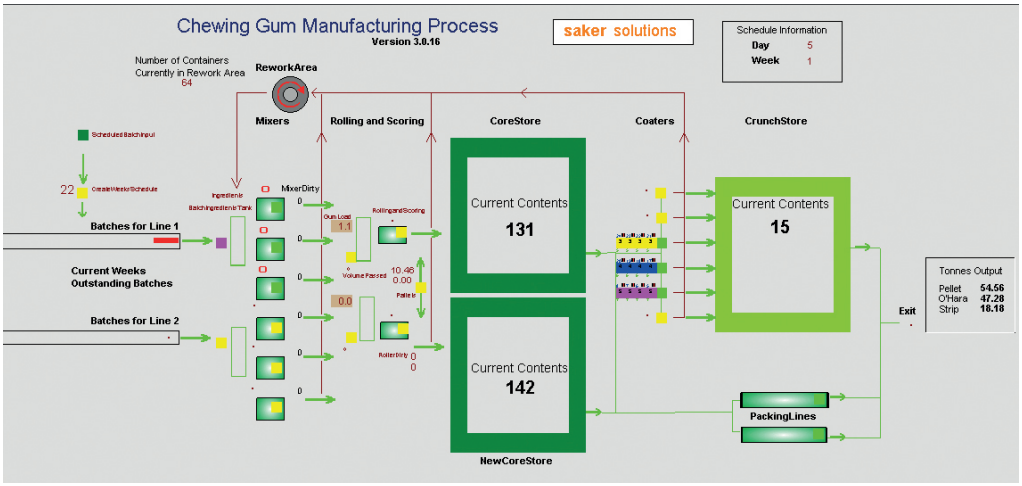
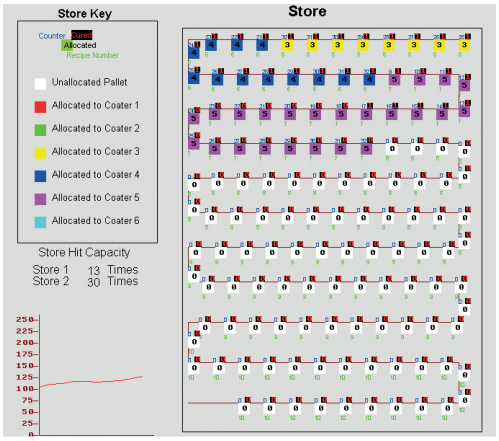


Figure 2. Screen Shots from the Model



Secondly the process feeds from multiple discrete mixers (which may be manufacturing the same or another product) into a continuous rolling machine which then splits the product into pallets, the pallets need then to spend time in a conditioning store before being eligible to move to the coating process. Coating requires a minimum number of pallets to be available before coating can commence, the coating process requires cleaning should the batch type change, hence minimising changeovers is important, however as the conditioning store is of limited size the coating process cannot afford to be so selective that the store blocks and stops the upstream process.

Furthermore, a number of coaters are competing for the batches being produced. A complex allocation method was required to ensure that batches of a certain type could be allocated to an idle coater, not split over multiple coaters, not taken from the store before conditioning had completed yet whilst trying to make most efficient use of the equipment available!

Model Results

The model allowed Cadbury to prove that facility would deliver the required volumes, justify the equipment selection criteria, the sizing of the conditioning stores, as well as gaining an appreciation of the shift patterns, operational rules, cleaning regimes and scheduling profiles. In addition the model helped in reviewing the actual ingredient usage and scrap levels anticipated by the plant.

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