

Application of Simulation Technologies for the Optimization of a Shoe Production Plant

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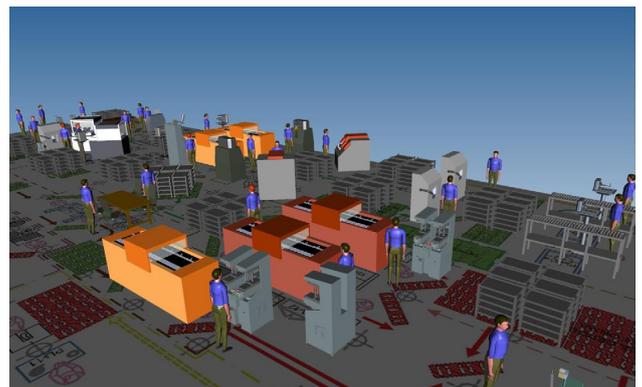
Manufacturing scenario description

A shoemaker belongs to a group competing globally in the premium and luxury segment of the apparel market was interested in optimizing the performance of a production plant. The production system was a flexible one producing up to 13 different styles concurrently, resulting in a maximum of 11 different production sequences. The production process has almost 40 different operations, grouped in work islands, and trolleys were used to move shoes between them. Approximately 70 operators were allocated to the production system. The production plant can work on more than 100 shoe variants, each one different in production routing and/or cycle times for operations. The analysis aimed at improving performance was to be made when the global competition in this industry was already eroding margins and to remain competitive meant to strive for a more and more efficient production, whilst offering a higher variety to customers.

The main challenge was to better understand the dynamic behaviour of the shoe production plant in order to be able to forecast the daily volume and to get a more smooth production flow. Impacts on these elements were mainly due to the production mix and the labour allocation. In particular, due to the high level of labour, one key element for a successful production planning was the definition of a smart strategy for the allocation of operators to working stations depending on the mix under production and the availability of workers.

Approach and results with simulation technologies

A model of the system was developed using 'Arena'. It was able to consider the full complexity of allocation rules, assembly flows and production mix. The main feature of the model was that it augmented the standard production system model to include labour movements and its dynamic allocation many times per shift that was a peculiarity of this system. The simulation was tested against different production mixes and the following variables were assessed: Daily through-put; the labour utilization; the production fluency indicated by the staking trolley in some key islands.



Simulation of the whole shoe production hall

Benefits for the Company

- Better management of the workforce that allowed, in turn, reducing waiting times
- Increased competitiveness in the premium and luxury segment on the world
- Cost savings within the same production need
- The same implemented simulation tool can be used in the future to assess the system performance in case of new products

Key Success Factors

- Comprehensive simulation tool: user-friendly interface can make easier the communication between people coming from different departments who have to make decisions related to the production system
- Different scenarios can be tested so that it is possible to forecast the system's reaction to changes