Roll shop simulation software

Author: Mr. Volker Witzleb (Project Engineer of WALDRICH SIEGEN)

Purpose:

To support, by simulation, the design of a complete new roll shop, respectively to analyze the logistics of an existing environment

Methodology:

The roll shop layout will be created in 3D animation with all roll grinders, EDT-machines and auxiliary rollshop equipment (storage racks, de-chockers, cleaning and cooling facilities, automatic loaders/overhead cranes, etc).

The under laying software will be fed with all relevant roll data, cycle times, roll change intervals, number and kind of rolls in use, etc.

The software will then calculate and later simulate the complete process within the rollshop within a given time period. This can range from a few days up to several years. The simulation can take from a few minutes up to a many hours.

Result:

The calculation and simulation will provide a detailed analysis of the bottlenecks within the rollshop, it analyzes the required machine and equipment, as well as the labor capacity. Based on these results a number of optimization runs might become necessary to achieve the optimal rollshop layout, optimizing the invested capital, the floor space as well as the required man power.
This simulation tool is to be understood as an engineering tool to assure that the investment in highly capital intensive equipment will be optimal structured.

Software package to develop a digital roll shop

- To support the ROLL SHOP EQUIPMENT a 3D simulation software package has been developed.
- It enables us to support our customers competently when planning the roll shop.
- Contacts, which are made at early planning stages for new roll shops or modernization of roll shops are beneficial to avoid planning mistakes.
- All data of a simulation study can be used to specify machine and equipment.
- All logistics, machining and auxiliary times within a roll shop are simulated.
- Detailed simulation for any period (1 day, 6 month or even years) is possible.
- All production demands can be considered.
- Comparison between different scenarios are easy to calculate by using editable Excel spreadsheets.
- Simulation minimizes the risk of planning mistakes

<u>**The result will be an optimized roll shop reflecting all demands, but the information can only be as good as the data input !**</u>

For the next *(1) minute* **you will join:**
- A (24) twenty four hours day in the roll shop of a European Cold Rolling Mill
- Grinding of (57) fifty seven work rolls for the different rolling mills.
- Texturing of (38) thirty eight rolls in EDT, EBT or SBT equipment
- Loading and unloading from (7) seven trucks.
- De- and rechocking of (62) sixty two rolls
- With all necessary movements in between

<u>**Marketing Strategy:**</u>

- While still at an early stage of planning, a digital roll shop will analyze all logistics.
- Using complex simulations, logical interfaces are demonstrated
  - between machines
  - roll shop equipment
  - transport equipment
  - with regard to personnel planning
- A simulation model can:
  - display exceptional situations
  - detect bottlenecks
  - offer an overview of solutions
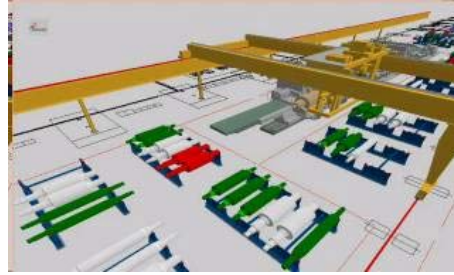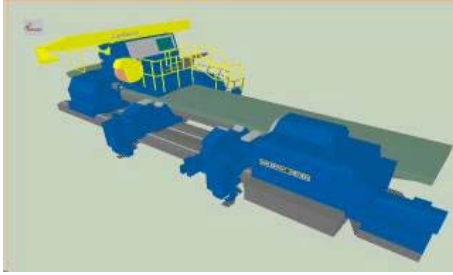
Target Project:

New roll shops for new rolling mills
Define the best solution, regarding no. of machines, no. of rolls in process, roll shop equipment and man power

For existing roll shops
Find solutions for modernizations, optimizations and relocations

Why a logistic simulation?

➢ Only flexible simulation systems can analyze

  o Complex systems
  o Dynamic systems
  o Any peaks and bottle necks

➢ What is the benefit of the simulation

  o Optimum shop layout
  o Minimum risk for planning mistakes
  o Investment insurance
  o Visual model of the roll shop

How does this simulation work?

➢ Define the project target
➢ Collect all relevant data
➢ Create a digital model
➢ Optimize the model
➢ Develop different scenarios
➢ Task → minimum machines
➢ Task → minimum man power
➢ Task → minimum no. of rolls
➢ Compare the scenarios

Again → The result is an optimized roll shop considering the specific demands of the customer

Optimized Roll Shop means

➢ Optimal utilization of floor space
➢ Optimized work flow

- ➢ Minimized cost for rolls in process / storage
- ➢ Minimized investment cost
- ➢ Minimized labor cost
- ➢ Optimized output

Required information for a scenario

- ➢ Facts:
  - o Machining times for grinding, texturing and chroming
  - o Auxiliary times for (re-, dechocking, cleaning, etc.)
  - o Cycle time of rolls in different rolling mills
  - o Time for transportation
- ➢ Priorities:
  - o Material flow for different roll types:
  - o Based on transportation equipment
  - o Based on no. of machines
  - o Based on no. of rolls in the system
  - o Based on no. of employees
- ➢ Rules
  - o What has priority at different decision points?

Example of a simulation study

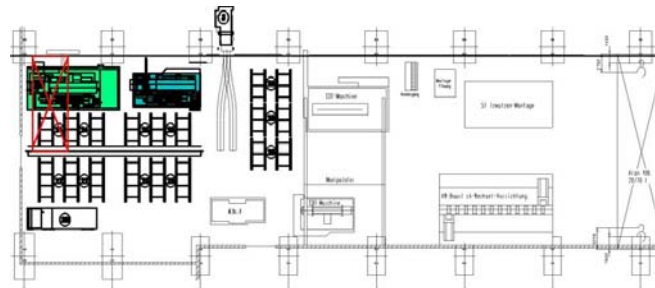A project in an existing European Cold Mill Roll Shop optimization

Target:

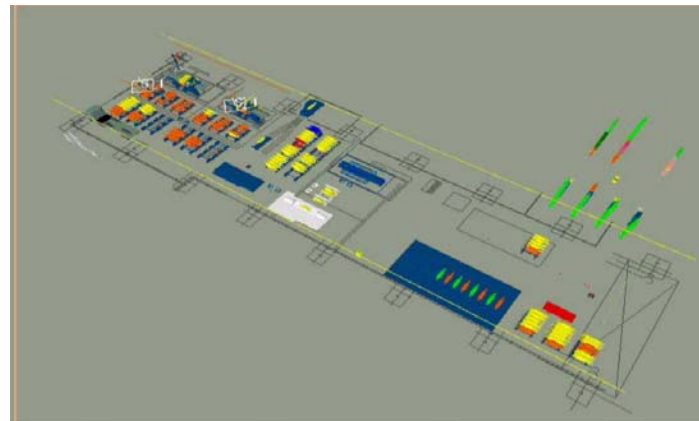Saving of 15% operating costs by deleting two older grinders and one shop crane.
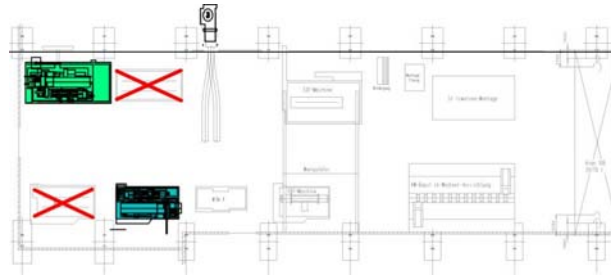
Solution:

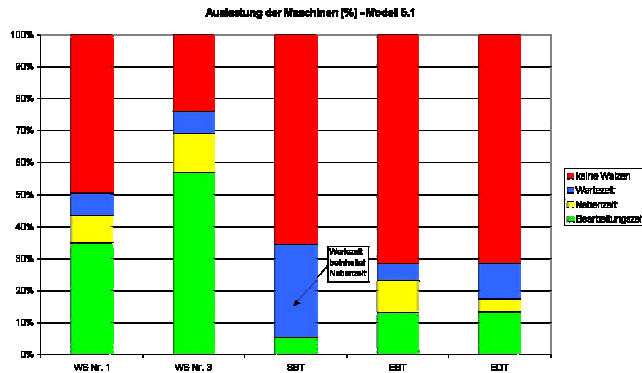Build a semi automatic zone for the two newest grinders which will be served by a semi gantry loader
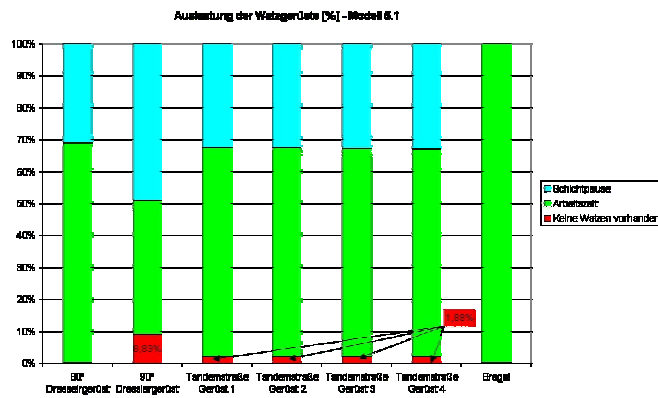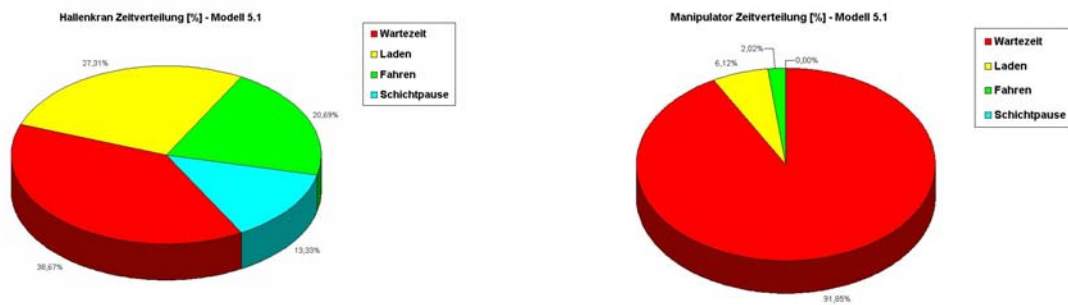

Example:

Example Results:

The graphical results are based on a simulation reflecting (1) one year of operation.
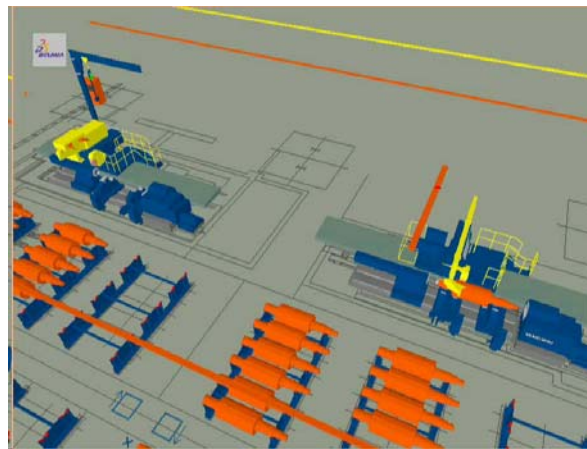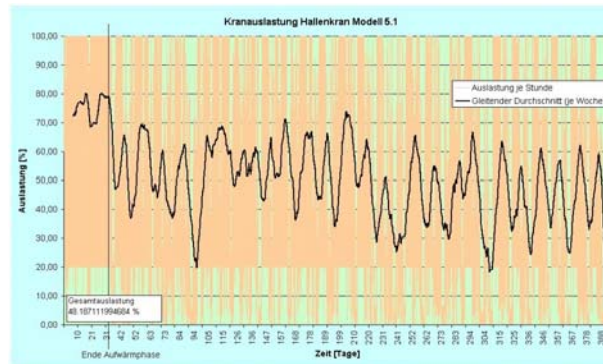
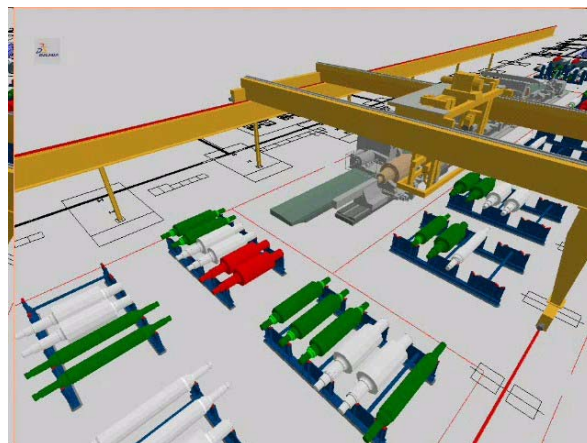

All roll production data are stored in a 25MB EXCEL file.

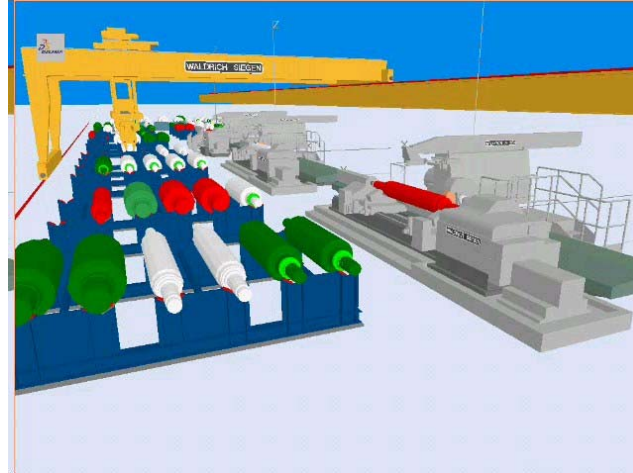Every hour within the study can be analyzed.

The overall result → <u>no risk for the new roll shop solution</u>

Example: WS III C / WS III CP

Example: TTL, UK

Example: TTL, UK

Conclusion:

The calculation and simulation will provide a detailed analysis of the bottlenecks within the rolls hop, it analyzes the required machine and equipment, as well as the labor capacity. Based on these results a number of optimization runs might become necessary to achieve the optimal roll shop layout, optimizing the invested capital, the floor space as well as the required man power.

This simulation tool is to be understood as an engineering tool to assure that the investment in highly capital intensive equipment will be optimal structured.

WALDRICH SIEGEN would like to thank you very much for your time and interest.

Roll shop simulation software

Purpose:

To support, by simulation, the design of a complete new roll shop, respectively to analyze the logistics of an existing environment

Methodology:

The roll shop layout will be created in 3D animation with all roll grinders, EDT-machines and auxiliary rollshop equipment (storage racks, de-chockers, cleaning and cooling facilities, automatic loaders/overhead cranes, etc).

The under laying software will be fed with all relevant roll data, cycle times, roll change intervals, number and kind of rolls in use, etc.

The software will then calculate and later simulate the complete process within the rollshop within a given time period. This can range from a few days up to several years. The simulation can take from a few minutes up to a many hours.

Result:

The calculation and simulation will provide a detailed analysis of the bottlenecks within the rollshop, it analyzes the required machine and equipment, as well as the labor capacity. Based on these results a number of optimization runs might become necessary to achieve the optimal rollshop layout, optimizing the invested capital, the floor space as well as the required man power.
This simulation tool is to be understood as an engineering tool to assure that the investment in highly capital intensive equipment will be optimal structured.