

Production Planning: A Practical Approach for the Use of Simulation-Based Optimization

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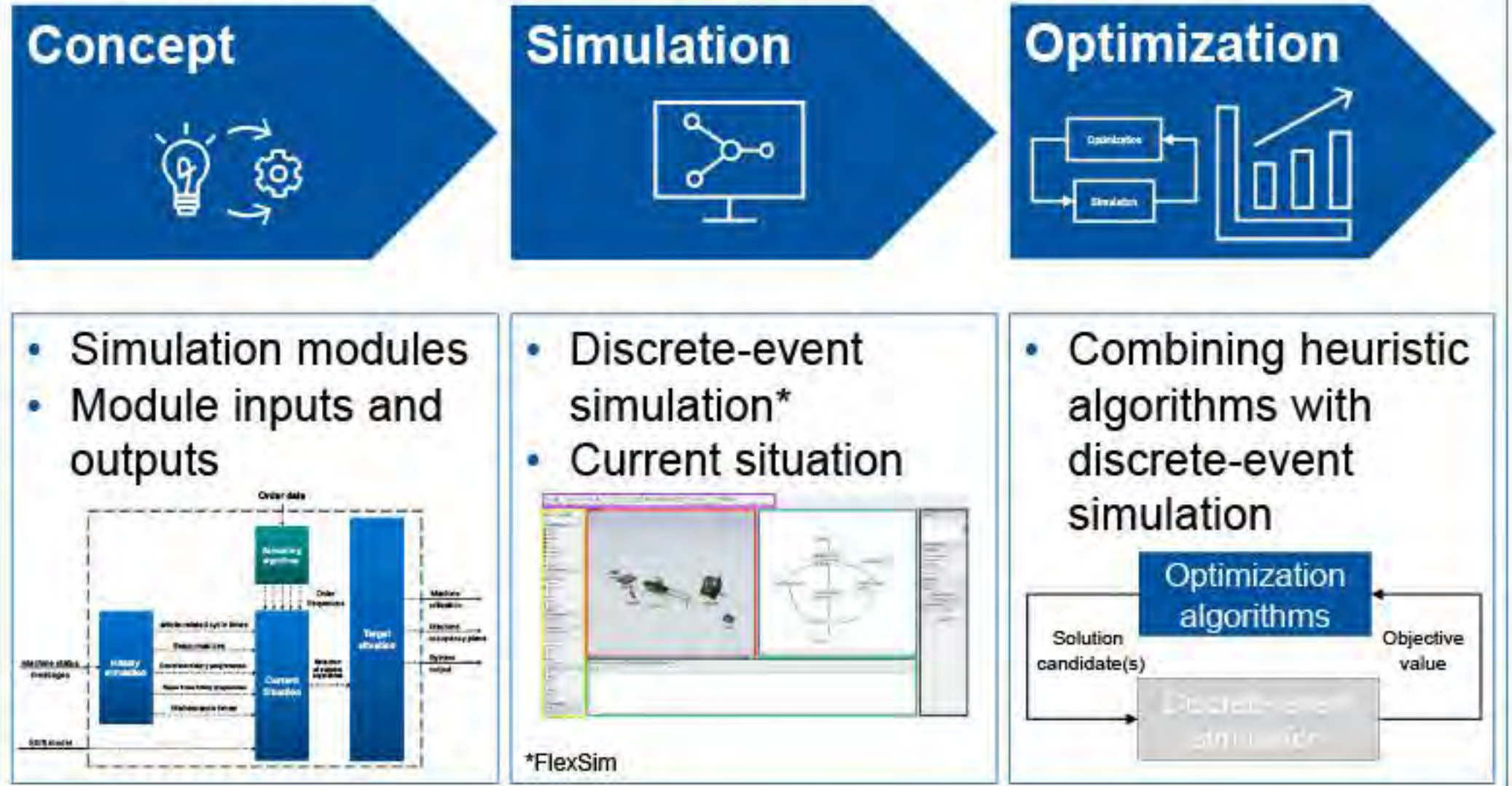
1. Initial Situation, Aim and Approach

Initial Situation and Aim

- Scheduling belongs to the group of NP-heavy combinatorial optimization problems
- The operative production planning of the pressing plant is currently a time consuming and error-prone manual task
- Aim: calculate an order sequence that is optimal in terms of occupancy time via simulation-based optimization techniques



Approach



2. Results

Simulation Study

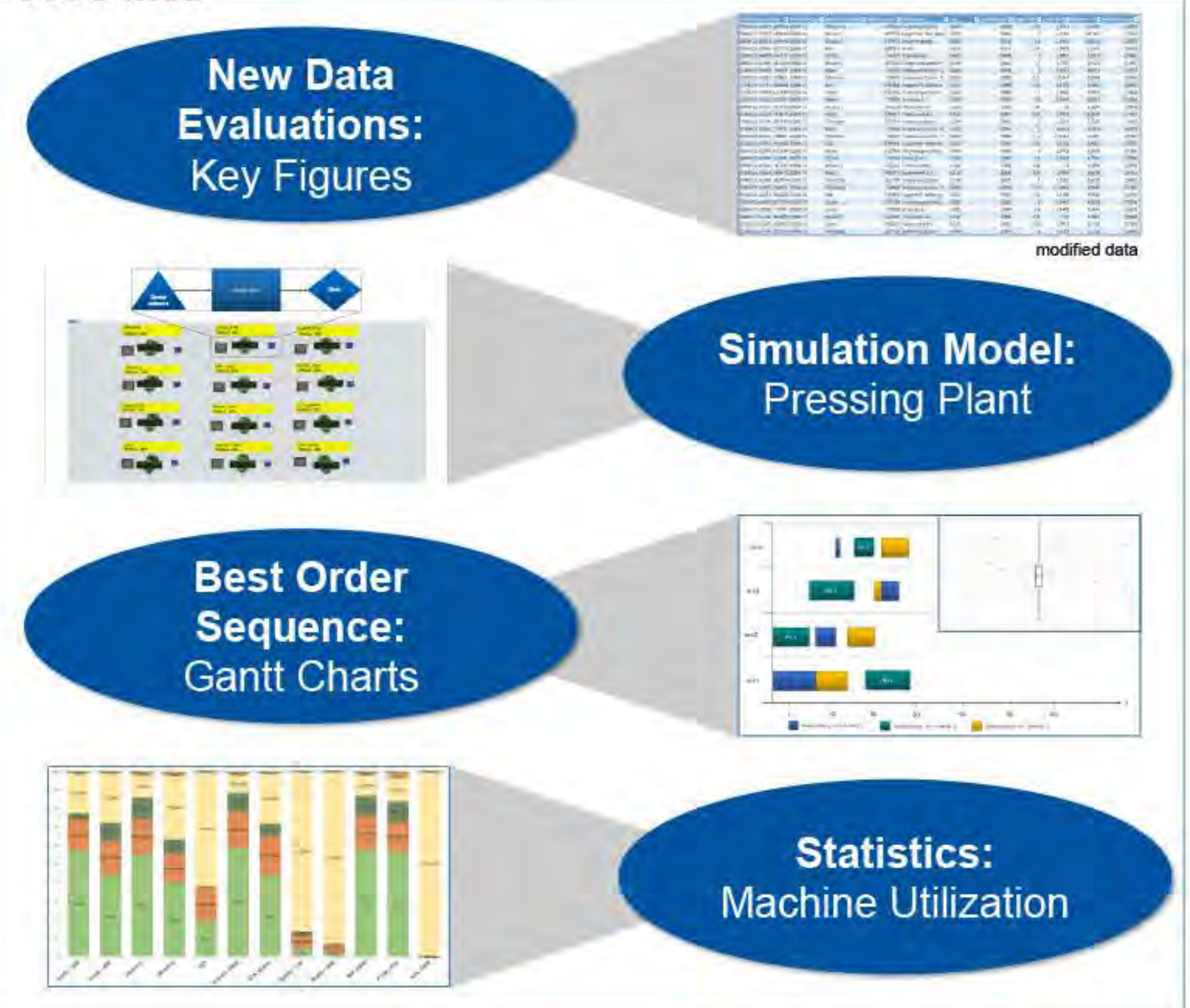
- Within the first steps, the data sources were identified and validated
- Implausible data was filtered out and missing data was added based on case distinctions
- With the help of the data, setup matrices (contain setup costs) could be derived
- Then, a simulation model of the pressing plant was implemented and validated



Heuristic Algorithm

- The Tabu-Search algorithm was chosen for the simulation-based optimization
- To create an iteration for the algorithm, FlexSim's experimenter was used
- Within the experimenter, the algorithm creates a tabu list of the initial order sequence for the scheduling and tracks their objective values

Results



3. Discussion and Future Work

Discussion

- In the simulation 14.2% of machine utilization time could be saved compared to the past data
- To be more precise, data from the material store must be collected
- Lot sizes should be formed on the basis of the real demand and make a coupling with real-time data necessary
- Based on the data, only sparse set-up matrices could be created and thus the solution space was further restricted

Future Work

- Possibility to expand personnel deployment planning
- Extension as a planning tool for work shifts
- Support of the purchasing department in material requirements planning
- The heuristic algorithm still needs to be integrated into the MES

