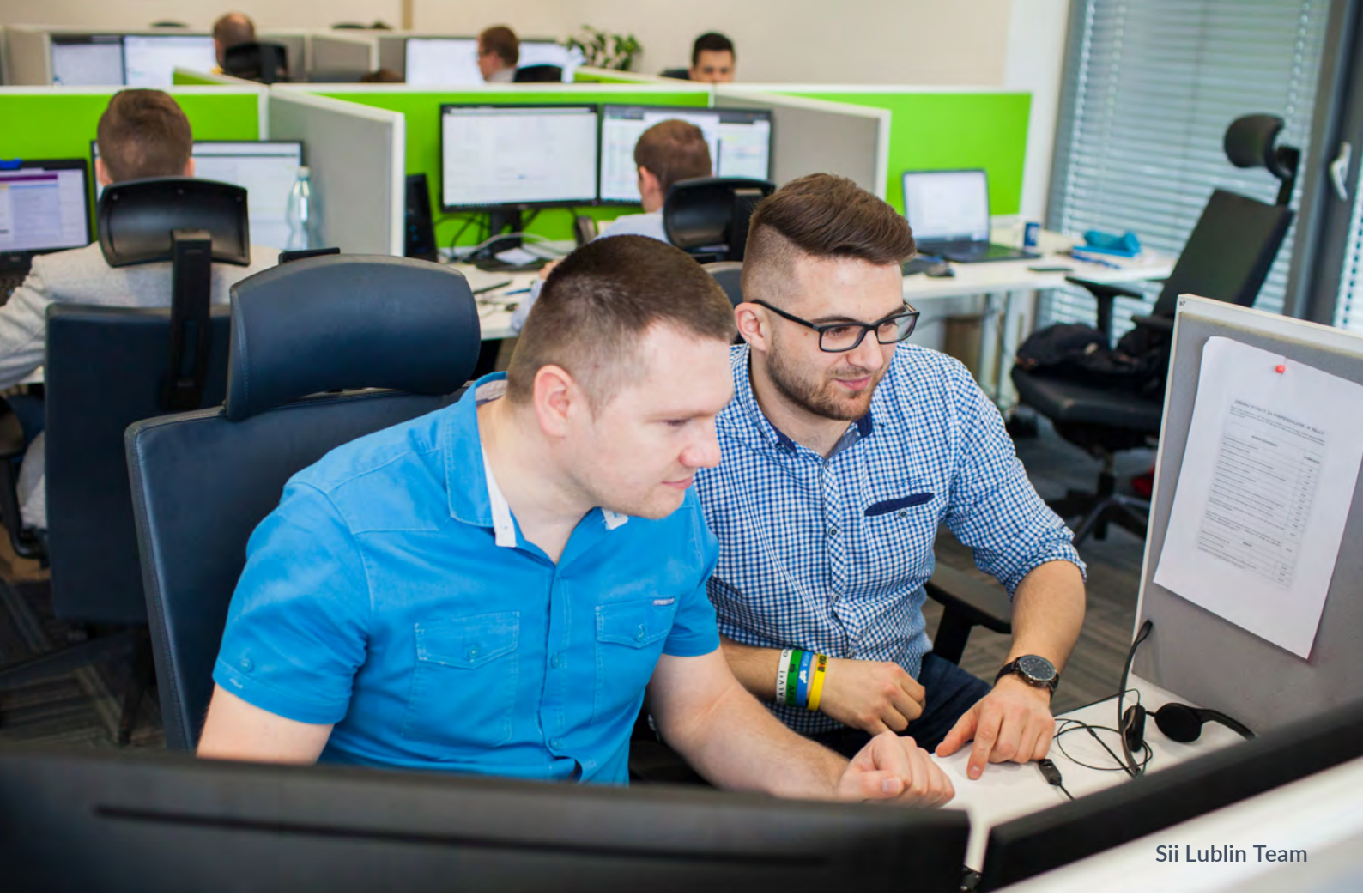
DIGITAL TWIN
– future of production plants

Mariusz, Senior Control Systems Engineer



Sii Lublin Team

Table of contents

Production needs in the context of manufacturing companies

As the marketplace expands and the competition never sleeps, manufacturing companies are looking for optimalization and best capacity of their production lines. Digital Twin is a great example of how digitalization can bring benefits to your business. Digitalization of your production lines allows you to increase productivity, control production with greater precision, implementing new and optimizing old processes and more.

Digital Twin of production plants

Digital Twin is a merge of virtual engineering model with the physical product (or equipment) in digital environment which allows for change and optimalization.

This helps finding and eliminating the “bottleneck” but also lets production companies run a what-if scenario. Digital Twin allows management to predict financial feasibility and probability of particular production line. It shows changes in production depending on seniority of staff working on particular positions, benefits and disadvantages of adding/removing a production line or even changing the speed on it. Companies can experiment and see a digital results of their decisions before implementing them in a “real life”.

Digital Twin benefits

Solution provides:

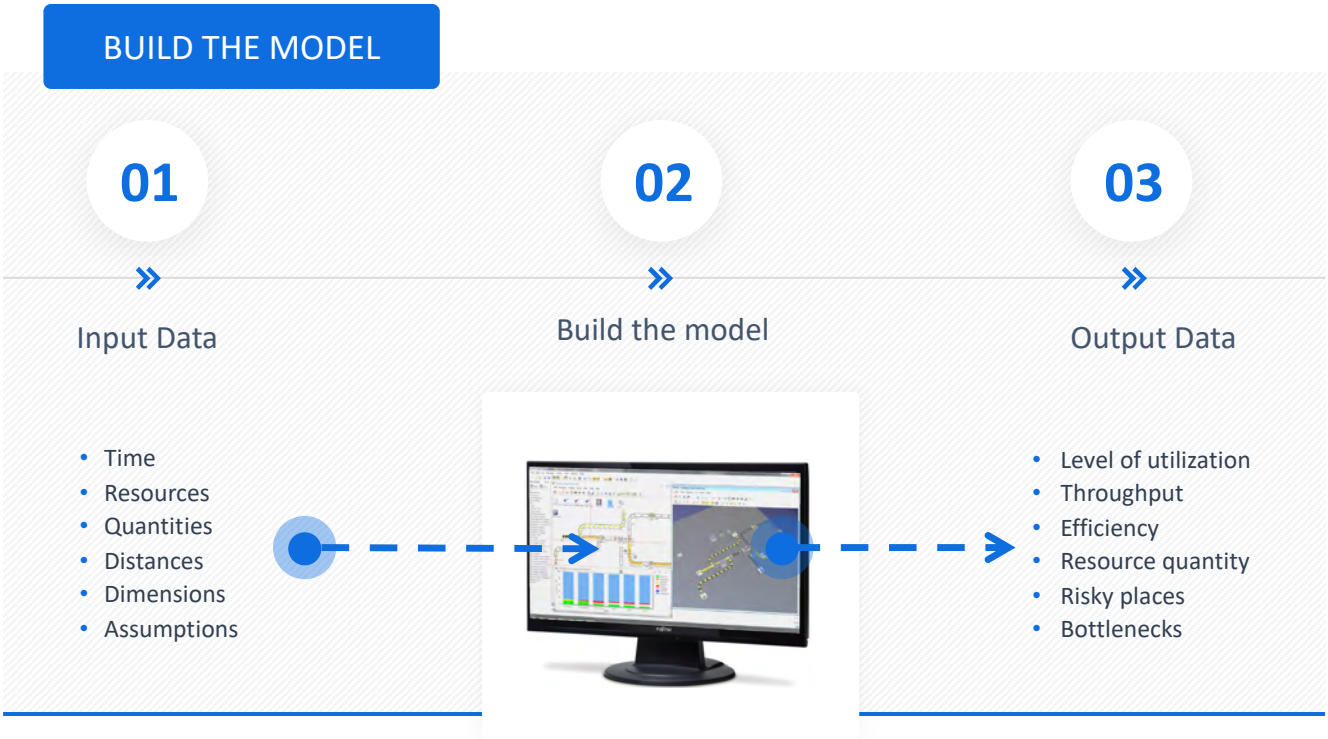
SIMULATION	ANALYSIS
OPTIMIZATION	VISUALIZATION

Applies for: production, logistics, warehousing

Key success factors

Simulation accuracy depends on the quality and quantity of data that we use in simulation. Data requirements are different for projects and depend on project scope and expected output data.

- The most frequently used input data are those concerning **process description**, **production area**, **object details**, types of **inside logistics organization**, and **storing strategy**.
- For **production area** useful are all data including layout, production plan, objects entrance and exit strategy (for flow strategy), available area for the production and storing strategy (FIFO, LIFO, etc.).
- For **production equipment and logistic organization**: type of logistic inside (crane, worker, forklifts, roller conveyor, etc.); object types (CNC machines, cranes, warehouses, transporters, etc.) and even a speed of logistic objects (forklifts, etc.); buffer capacity, expected availability (failures) and limitation if exists
- For **objects**: object quantity, objects dimensions (length, width, height); on which resources given product can be machined.
- For **timings**: machining cycle times for each object (processing times, recovery times, etc.), setup times and types.
- For **human factor**: working shifts and pauses.



Digital Twin case studies

Sii supports its clients in a number of projects in the field of Digital Twin, which concerns the analysis and verification of various issues. Implemented projects and the application of Digital Twin is not limited only to the analysis of production processes it also covers smaller issues like worker ergonomics or machinery optimization.

Below are some examples of Digital Twin simulation delivered by Sii for various sectors.


Sii Bydgoszcz Team

Changing logistic system in the factory sewing department

The factory sewing department required an improvement in the logistics of traveling the boxes with components.

Creating a model of Digital Twin enabled:

- comparison of logistics systems for boxes: mobile robots vs conveyors,
- production planning,
- verification of various scenarios and experiments,
- finding optimal parameters.

As a result, Digital Twin recommended the optimization based on connecting the sewing department with a furniture frame area.

Adding a new production line

Plan to add new production line required verification of capacity of the current logistic system. AGVs transport pallets with ready products from the ends of the production line to a warehouse or directly to trucks for fast shipping.

Creating a model of Digital Twin enabled:

- Warehouse simulation and providing the optimal capacity assessment.
- Comparison of logistics system: AGVs vs conveyors.

As a result, Digital Twin recommended an optimal number of AGVs.

Ergonomic modeling improving the comfort and efficiency of work

The production line requires the manual assembling of a product. Many hours of physical work causes discomfort that may lead to injuries.

Creating a model of Digital Twin enabled:

- make an ergonomic assessment of positions,
- provide corrective actions and optimization.

As a result, Digital Twin recommended possible corrective actions and optimization

Krystian, Senior Control Systems Engineer

Sii's approach to project implementation

The most important aspect is close cooperation between Sii and the client at every stage of the project.

Start of the project

This stage includes: checking input data (Excel sheets, layouts), familiarization by Sii with production and logistics processes, or even site tour on the modeling objects (factory, warehouse).

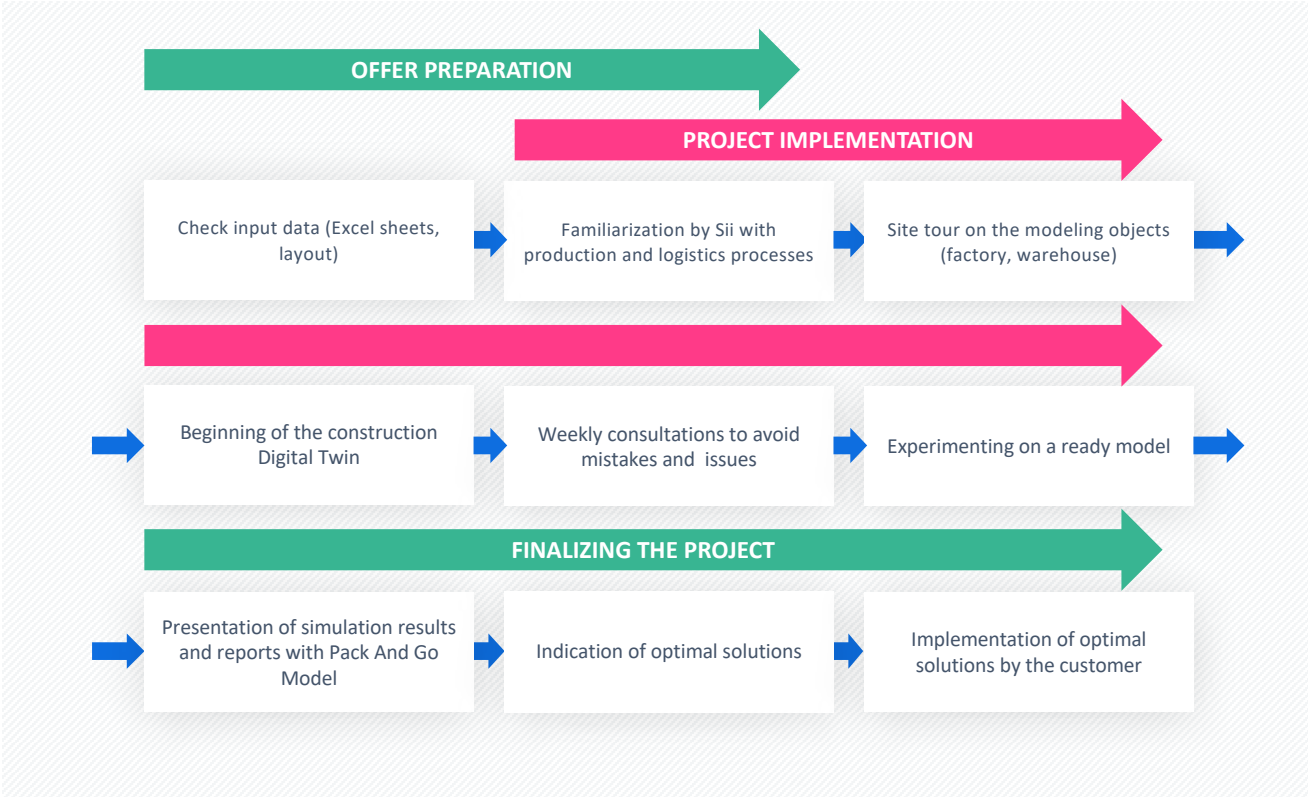
Digitization

After collecting all the data Sii begins the construction of Digital Twin and starts experimenting on a ready model.

Results

Sii presents the simulation of the results and creates a report with Pack And Go Model. As a major benefit client receives an indication of optimal solutions recommended for implementation.

Typical project implementation is as follows:



Effects of cooperation with Sii

Sii has vast experience of implementing, creating and/or optimalization of Digital Twin. Our experts will help your company save time and money, utilize your workforce, implement new processes, ensure that health and safety standards are met and many more.

We do all of this with a close cooperation with your company, applying any changes required, so that Digital Twin suits your needs. This is why the initial stage of research and data gathering is so crucial for the overall success.

Main benefits for your company:

- Reduced risk of failure or mistakes in brownfield or greenfield projects
- Finding the optimal number of resources and eliminating potential bottlenecks
- Possibility to make a what-if scenario long before investment
- Minimizing the margin of unexpected situations
- Tests of different controls logics to choose the best one
- Comparison and control of different solutions
- 3D model for presentation and discussion
- Analysis of financial feasibility and profitability of planned investment
- Defining and mitigating the risk of unexpected situations
- New business opportunities identification (mass customization, small-batch manufacturing, new product integration)
- Effective ROI calculation (not so cost-consuming)

Looking for support? Contact Sii!

To find out how Digital Twin can optimize production line and workflow in your factory, contact our experts. For more innovative solutions and inspiring case studies for production industry visit our website:

www.sii.pl/en

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