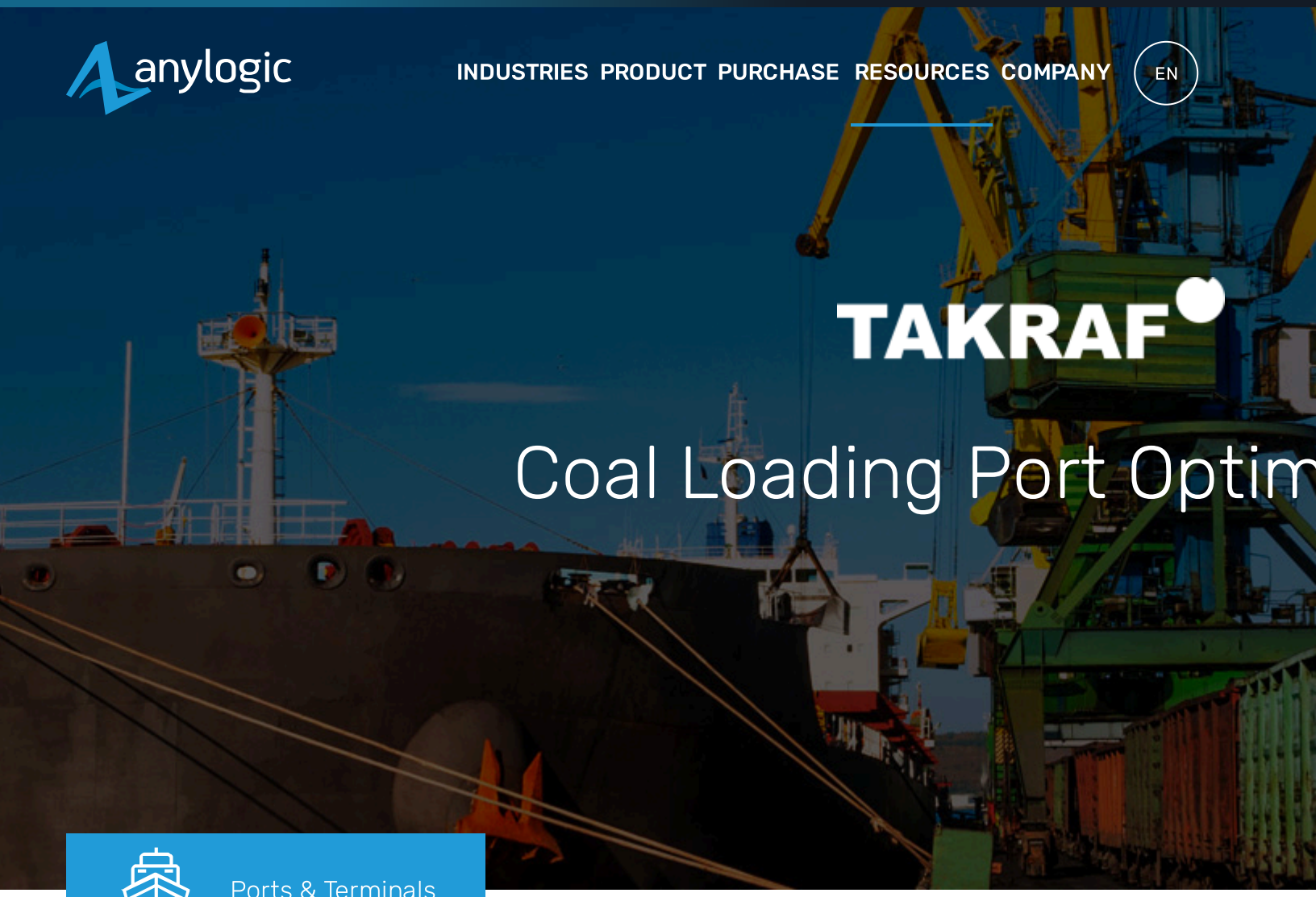

TAKRAF

Coal Loading Port Optim

Ports & Terminals

TAKRAF GmbH is a global German industrial manufacturer and supplier that specializes in planning and constructing facilities for the mining industry, including coal loading ports.

SimPlan AG is a leading German simulation service provider with expertise in material flow simulation and the creation of decision support software tools.

Problem

uncertainties. Coal is delivered from different mines and transferred to many different ships for delivery. Weather conditions, train delays, and differing types of coal also meant it was difficult for the port to modernize using traditional methods.

The aims of the port optimization project were:

- to determine the current maximum capacity of the facility;
- to identify the main bottlenecks that limit the capacity;
- to test and evaluate different extension scenarios in a risk-free digital environment.

The main issue the port operating company needed to understand was how to reorganize the heap storage area to increase its capacity. Therefore, the modeling of this area and how to make the storage logic efficient were the key elements of the simulation project.

Solution

For the port optimization project, SimPlan engineers created a model of the coal loading port using different modeling techniques. They chose AnyLogic because of its multimethod modeling environment and special

simulate the logistics of moving bulk materials and fluids. Finally, the modelling of stacker-reclaimers and ship loaders made use of the agent-based simulation capabilities of AnyLogic.

SimPlan's engineers managed to capture all the processes in the port – from delivery to shipping:

- coal is delivered from different mines (one type of coal in each wagon) and loaded from wagons to conveyors by tipping stations;
- stacker-reclaimers take the coal from conveyors and stack it at the dedicated heap area by type;
- after a ship has docked, a stacker-reclaimer takes coal from the heap area and loads it onto the conveyors that transport coal to ships;
- ship loaders load coal into ship hatches (one type of coal in each hatch, the sequence of hatches is predefined);
- ships leave the port area when loading and documentation are completed.

Storage of different types of coal (different colours) in heaps

Result

The simulation model for port optimization replicated all the stages of coal handling in the coal loading port. The decision support tool created by SimPlan helped the company management determine the maximum capacity of the facility in its current state. Initially, there was an assumption that the capacity of the port was not being used effectively.

After analysis with the tool and its simulation model, the company were able to identify strategies to enhance the port's capacity. As a result, they chose to:

- make heaps of high demand coal types accessible to several stacker-reclaimers simultaneously;
- arrange the heaps so that the loading of ships doesn't obstruct the work of the tipping stations;
- presort wagons and plan to directly load ships in order to free more storage space.

Based on the simulation modeling results from the decision support tool, the management decided to also develop a port extension strategy that would enable them to reach the port's target throughput. This included adding a new tipping station of lower capacity and new storage area.

The port optimization project highlighted the efficiency of using AnyLogic models to increase the capacity and throughput of facilities such as ports. The model could also be modified for similar sites with different layouts.

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