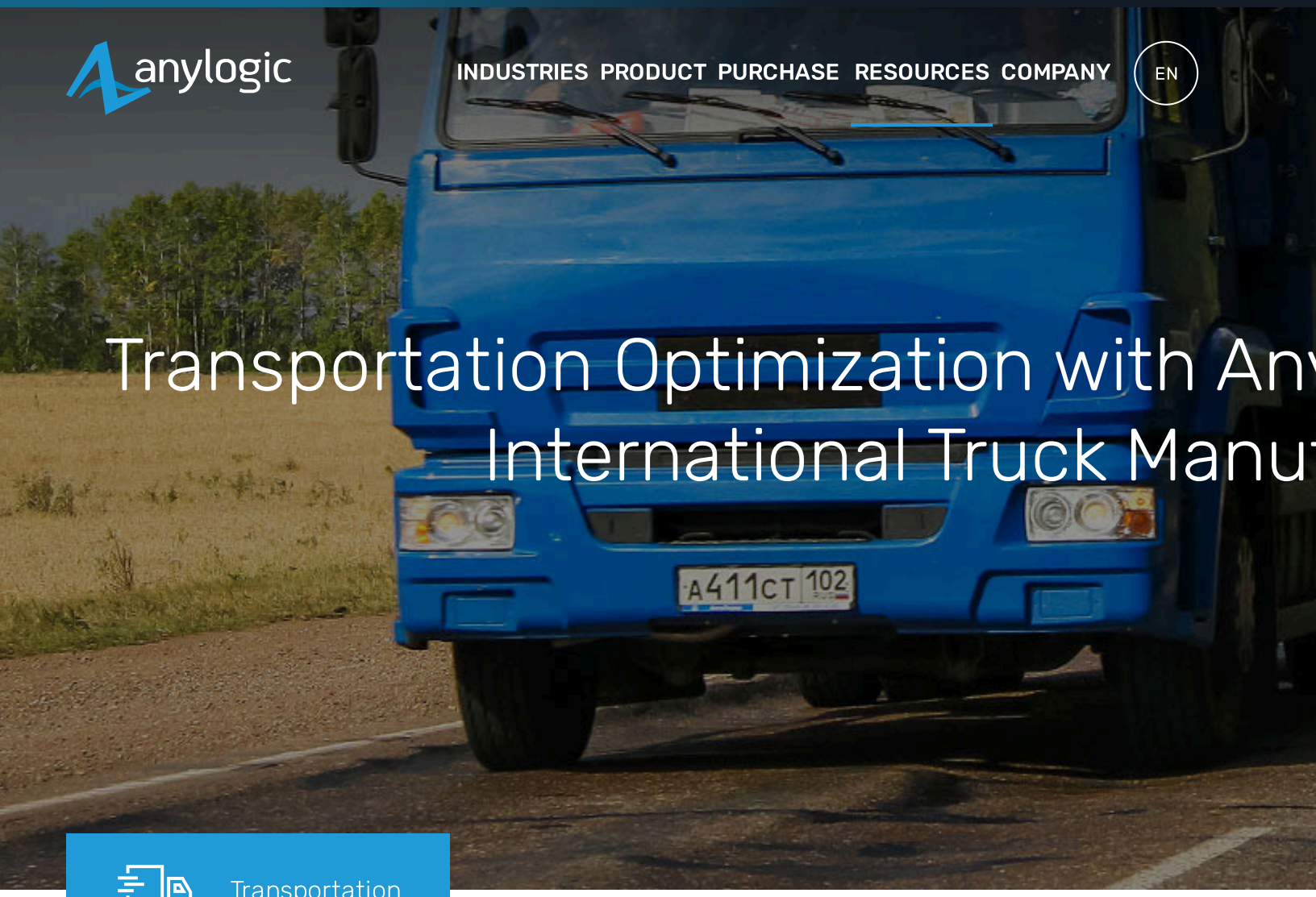


Transportation Optimization with Any
International Truck Manu

Transportation

Problem

The leading automaker is the largest CIS manufacturer of heavy trucks. It produces not only motor cars, but also buses, trailers, truck cranes, and other vehicles. One of the company's developments is the technology of a swap body container shipment. This method is used in cases when the starting and ending delivery points are located far from each other. The route is split

spacious, and easier to reload than the standard ones. The container change process takes five to seven minutes, so the vehicle travels over its route faster, passes the container to the other vehicle, and returns to its base carrying another container.

At the initial stage of the project, the management of the leading CIS truck manufacturer wanted to understand to what extent the swap body container delivery was more effective than the conventional delivery modes. This is why the company commissioned a study on the transport planning and future routes simulation.

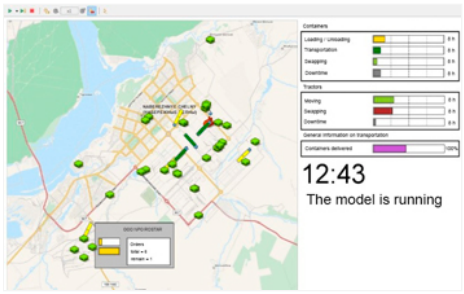
The developers simulated the real processes of intracity and intercity transportations in the company's supply network to compare the number of tractors and containers required in the case of the swap body delivery method versus the conventional ones, and to conduct transportation simulation model stress tests. The developers chose AnyLogic transport optimization software as a modeling tool and exploited one of its advantages, an agent-based approach to simulation, for describing the behavior of each component within the supply chain in detail.

Intracity transportation modeling

Solution

In the designed model, the developers reflected the transportation process of various components from the suppliers' warehouses to the warehouse of the company's assembly line facility. This process involved

and the container loading process in the suppliers' warehouses.



Intracity transport planning software (click to enlarge)

At the beginning of the work day, the containers in the warehouse of assembly line facility were empty while the containers in the suppliers' warehouses were loaded. The tractor collected an empty container from the warehouse of assembly line facility and delivered it to the supplier's warehouse. Afterwards, it collected the loaded container from the same, or the nearest site, and delivered it to the warehouse of assembly line facility. In some sites, the tractor-trailers were used to deliver two containers in one ride.

The model took into account the factors that could affect the shipment efficiency, such as:

- Truck driving speed
- Container loading and unloading time in warehouses
- Container mounting and dismounting time
- Number of empty containers at the beginning of the day
- Drivers' work time

While running, the model accumulated statistics which served for later transportation resource planning and system analysis.

- The last swap body dispatch time

For tractors:

- Last ride termination time
- Number of rides
- Transit time
- Maximum and total downtime in the warehouse of assembly line facility and in suppliers' warehouses

Outcome

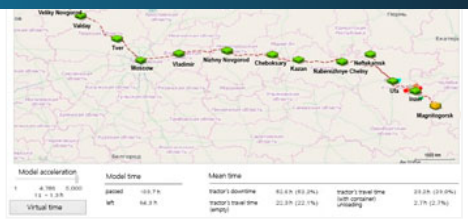
The transportation optimization model was instrumental in comparing the number of tractors, containers, and transport costs before and after the technology adoption. Simulation modeling showed that the technology of swap body delivery reduced the cost of intracity shipments nine times:

- 70 trucks could be replaced by 16 tractors, 13 demountable swap bodies, and 80 trailers.
- All deliveries were performed during one working shift.
- The tractors' downtime stood at 3% of work time.

Intercity transportation modeling

Solution

The technology could also be applied for goods shipment between cities. An intercity cargo transportation simulation model was developed to



Intercity transportation optimization software (click to enlarge)

swapping is performed
- Tractors
- Drivers
- Containers

Tractors and drivers were attached to certain points and carried goods between their own and the neighboring points. Tractors could exploit trailers in order to transport an additional container.

At the initial route points of cargo flows, the containers piled up waiting to be dispatched. The priority for transportation was given to the tractors attached to the next point on the way. This contributed to a decrease of empty runs in the opposite direction.

Drivers attached to a tractor work in shifts. Each driver could be behind the wheel no longer than eight hours during the working day and could start the next run only after a 16-hour rest.

Outcome

In order to assess the efficiency of the swap body delivery, the experimental results were compared to the actual transportation system data:

- Only less than half of the tractors were required for all shipments (46 instead of 116).
- Time of delivery of goods had decreased 2.5-fold (1.8 working days instead of 5).
- The total cost of transportation per month was

planning tools and decision-support systems (DSS). They will be helpful for:

- Identifying the system's bottlenecks while expanding transport system and projecting new points.
- Solving short-term and long-term planning problems more effectively through applying AnyLogic's visual tools.
- Mapping up shipment schedules, considering the system's capacity.

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