GERT-JAN'S CHALLENGE:

Predicting the behaviour of AGV's in order to reduce the number of congestions

Port terminals use Automated Guided Vehicles (AGVs) to transport containers between the quay cranes and the stack. Because the AGVs are used in a limited area, traffic often crosses, frequently leading to unwanted stops. This has a serious impact on the traffic flow, planning and fuel consumption.

Never finished learning

Gert-Jan van der Wielen wanted to learn more about improvement processes, so he followed the Lean Six Sigma Green Belt training programme. "You learn how to optimise business processes by identifying issues in processes, analysing them and reducing them according to a certain method. A method that is also used by the client; within the project team everyone has attained the Green Belt level as a minimum. Because I collaborate closely with them, it was only logical that I would also follow the training programme." His manager shared his opinion. Subsequently, ICT facilitated Gert-Jan in attaining his Green Belt.

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Predictable behaviour

When Gert-Jan started looking for a practical assignment to round off the course, he consulted with the client and made a proposal to investigate the traffic flow of AGVs at the terminal. "It often happened that a number of AGVs had to wait for each other for a long time, sometimes even in deadlock. In some cases waterside control had to intervene to resolve an AGV traffic jam. There were even more frequent cases of AGVs having to slow down or (almost) having to stop because of crossing AGV traffic, and naturally this interfered with the timing of activities. I have been working for this client for some twenty years now. It is my personal drive to minimise the waiting times for AGVs at the quay cranes and thus improve the terminal's performance."

Mapping out root causes

"The first part of the project consisted of interviewing the client about the issues and the improvements they wanted to realise." The complaints included undesirable AGV stops, waiting for AGVs in vain, and performing manual actions to get stationary AGVs moving again. The objective was clear: improved traffic flow of the AGVs, resulting in reduced fuel consumption, higher terminal performance and less time required from employees, for instance the waterside control, the service desk and the technical maintenance service. What was intended to be a small project turned out to be larger than conceived originally. "The analysis revealed a lot more problems than estimated at the onset. We collaborated closely with the project team in order to collect input from all possible angles and map out the root causes of the problem."

Small measures with great effects

The vital causes often turned out to be software-related. "We mapped them out and prioritised them. As a next step, we implemented software changes in the planning and control software and tested them extensively. We stored and documented the improvements in JIRA, the software package we used to manage all issues regarding the planning and control software of the equipment at the terminal. The results

Analysing data is very important work, as it creates the baseline for improvements.

GERT-JAN VAN DER WIELEN,
TECHNICAL CONSULTANT AT ICT

included improvements such as optimising the accuracy of an AGV's predicted position, harmonising the AGV claiming and the AGV claim prediction, and improving the test environment. Altogether we implemented a total of 28 small improvements during a series of several Scrum sprints."

Still more reductions

After a baseline measurement Gert-Jan set himself the target of reducing the average number of hourly obstacles by 50%. Having achieved a reduction of 76% means that this target was exceeded well and truly. "It is expected that addressing the remaining causes will lead to yet another step in AGV obstacle reduction. For instance, late arrivals of AGVs can be further reduced and the system can be made even more predictable. It's fantastic that I've managed to achieve this for my client. And what's more, it simply is a lot of fun.'

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