

# Simulation based facility layout and AGV flow-path design

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## Introduction

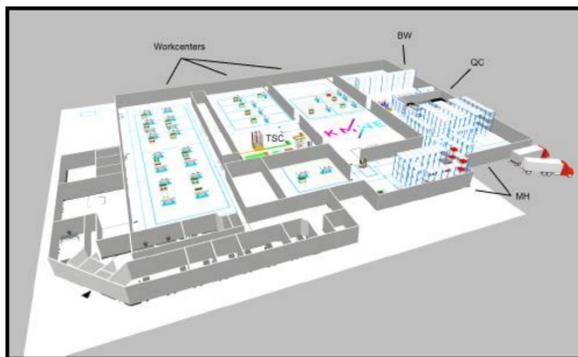
KMWE recently moved to the Brainport Industries Campus (BIC). This campus aims to develop an automated material handling system that reinforces the competitive power of its tenants. This research aims to answer design questions related to the optimal facility and allocated flow-path design for in such a way that the AGV's can work optimally and fully support industrial activities.



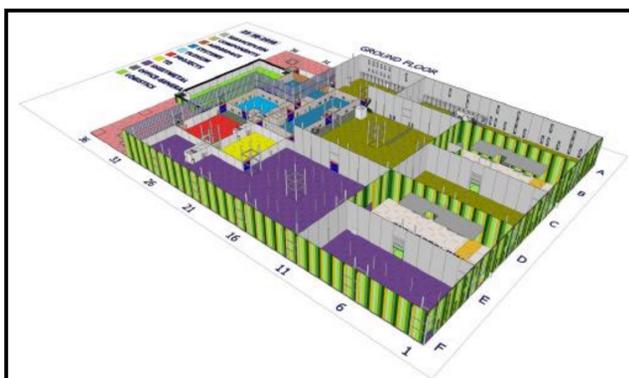
The AGV's in this system drive according to a path-guided program. This means that they cannot drive in freespace and can only drive over predefined paths. This raises the problem of possible collisions and therefore deadlocks in the logistic system. Collisions are prevented through the control software on the AGV and in the Fleet Management System, but deadlocks are not yet prevented through this system.

## Methodology

A digital representation of KMWE is build and tested in the simulation software AnyLogic©. Through a discrete-event model the current production process is mapped on the old location at the Croy. See picture below.

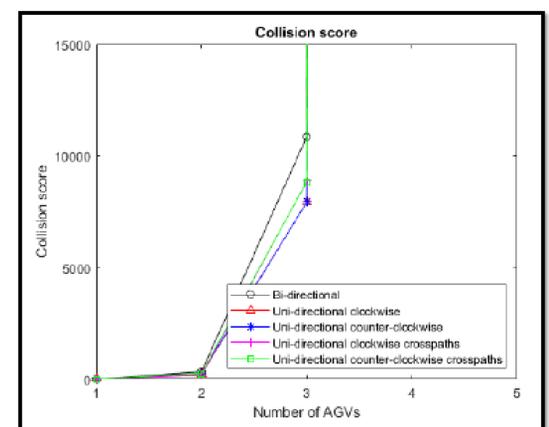


After validation, by comparing simulation outputs values to real-life output values, this manufacturing system is transferred digitally to the new location at the BIC. The digital twin enables us to calculate collision scores and travel distances based on different facility and flow-path designs. The goal was to find a method to reduce both the collisions scores as the total travel distances.

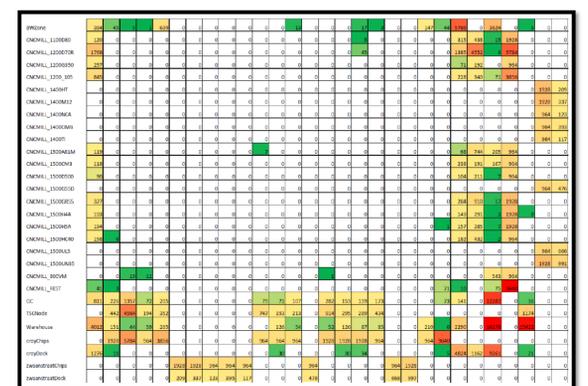


## Results

The BIC facility provides 5 meter wide paths on which a maximum of 2 AGV paths can be placed. Each path can either be uni- or bi-directional.



The collision score increased significantly after the second AGV (3 or more). The travel distances were difficult to increase with the current production system



## Managerial Insight

The current manufacturing system of KMWE, placed in the BIC, should focus on free-space AGV's since otherwise the collision score will increase. The facility lay-out is, with the current production process, difficult to gain earth-shattering benefits.