

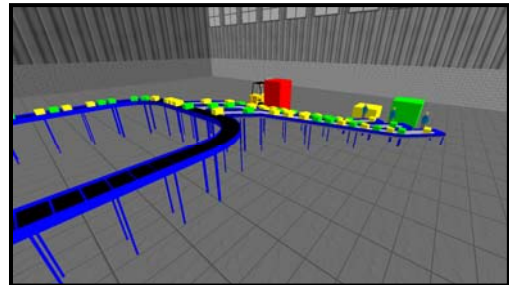


## Simulation, a valuable, if not indispensable, tool for the analysis of complex, dynamic processes

*Written by Rob Wijnen*

In our efforts to supply customers with the right support and advice, even regarding the most dynamic and complex processes within their logistics organisation, Groenewout uses AutoMod and has done so for years. This simulation tool has been applied extensively in the design, evaluation and optimisation of largely mechanised logistics processes. To enable us to efficiently simulate processes that are not so mechanised or to model processes partly at a higher, more abstract level, Groenewout has also been using Enterprise Dynamics alongside AutoMod for some time now.

In everyday life, everybody will be aware of some aspect of the increasingly dynamic and complex world of today. Globalisation and developments in telecommunication and IT enable worldwide networks and rapid changes. These developments also have an impact on logistics. Vast chains of customers and suppliers, and the demand for short delivery times, provide for greater variability, dynamics and complexity in logistics processes. At the same time, every process has to be executed as effectively and efficiently as possible. Costs have to be minimised and customer satisfaction needs to be kept up to the mark to maximise profits. In order to achieve this, manufacturing, transport, inventory management and distribution must be coordinated perfectly. Owing to the complexity and variability, dynamics and interaction between all these disciplines it is increasingly difficult, in some situations maybe even impossible, to maintain an overview. Consequently, it is very hard to take the right decisions on what strategy to choose and how to implement it. This triggers questions such as where to make investments and how to adapt processes so that the operation and organisation remain effective and efficient.



### The added value of simulation

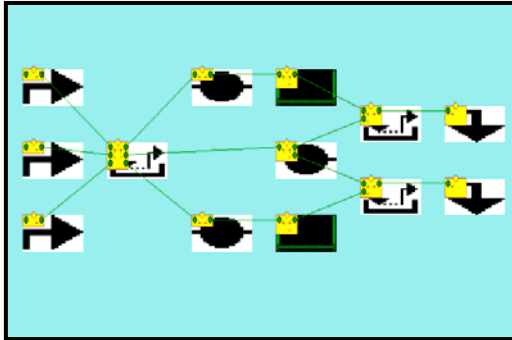
When processes experience a lot of mutual interaction, and there is a high level of variability, the complexity of an operation may become very high. It becomes impossible to make reliable statements based on static analyses alone. Compiling costs and benefits and analysing investments and savings are no longer enough. In such a situation, the interdependency and uncertainty make it very difficult to estimate reliably to what extent, for instance, cost-saving adjustments to certain processes will impact on other processes. And whether this may (partly) undo the expected benefits or even end up adding to the costs. In this situation simulation offers a solution. By building a simulation model of the operation containing all relevant and affected processes, an opportunity is created to test the complete impact of measures before actually implementing them. This way, different scenarios can be tested to coordinate all processes perfectly before executing them in practice.

### Simulation applications

In both improvement projects and design projects simulation can provide added value. Groenewout has been using AutoMod for years now in feasibility studies for new warehouses and distribution centres as well as for expansions, adaptations and optimisation studies for existing operations. In these studies, the subjects are mainly (concepts of) operations with a high level of mechanisation. For instance, automated transport, sorting and order-pick systems are modelled in detail. In the case of feasibility studies, this is done to judge the practical feasibility of the concept. Then, when working out the details of the design, the costs and benefits of the different variants can be compared based on performance. After that, the best design can be selected for the chosen concept. In the case of optimisation studies, the existing processes are modelled to test possible improvements to the systems and the system settings in terms of their effect on performance.

And as a result, the optimal layout and system settings are determined. Using simulation studies such as these, Groenewout has developed detailed concepts that have resulted in operations with optimal order throughput times, correct system capacities, for now as well as for the future, and optimal use of available space and resources. The risk of design errors is minimised because all the functions of the process and the capacities and volumes have been tested and validated within the simulation model.

## Enterprise Dynamics

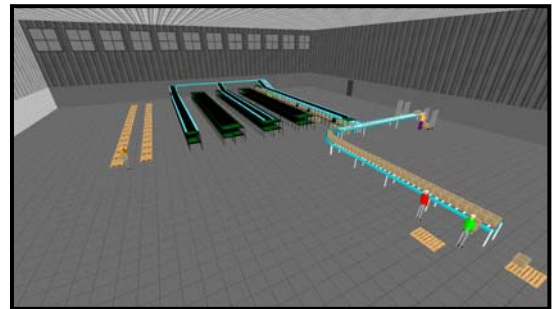


These days, many processes, both mechanised and manual, are more dynamic and have a complex mutual interdependence on account of the increasing level of automation. Therefore, it is also necessary to correctly translate those processes that are not mechanised within an operation into a simulation model. To do this efficiently, Groenewout has decided to use Enterprise Dynamics as well. With this simulation software package it is possible to capture both types of processes and their mutual interdependence at the desired level of detail in one model. The package contains many standard objects made specifically for logistics

applications, such as fork-lift trucks, racking, conveyors, cranes and operators. The operators are the employees who perform their tasks within the various processes and walk to and from the locations involved. It is also possible to build new objects that define a process exactly in the manner desired by the modeller. The mutual interdependence of all the processes is easily modelled by connecting the different processes and entering the characteristics (parameters) of these processes. In this way, it is possible to test the performance of completely new or adapted operations using scenario runs covering all the conceivable situations that could occur and thus make a sound decision on which solution to choose. Groenewout has already tested this in practice with highly satisfactory results. For instance, an analysis has been carried out into the required number of packing stations and the staffing of these stations. Additionally, the question as to whether the supply to these packing stations should be manual or mechanised has been looked into for the conceptual design of a new distribution centre.

## Visualisation

An additional advantage of Enterprise Dynamics is the integrated two and three-dimensional visualisation of the simulation model. It is possible to render the processes as a process flowchart, but for all objects two and three-dimensional views are also available that can depict a realistic view of the operation. For standard objects, these visualisations are generated automatically, sometimes even with a choice of several possible visualisations. Creating visualisations (2D and 3D) and adding them to the model for the customised processes is simple. The visualisation lends added cogency to the model. It can also serve as a tool to validate the model and work as a visual aid during instructions for the new or adapted processes.



With the possibilities of Enterprise Dynamics and the functionalities of AutoMod, Groenewout offers you immense added value in plotting the right path towards a successful logistics operation and hence a successful future. If you would like to react on this article please contact Rob Wijnen, Senior Consultant. Tel: +31 (0)76 533 04 40 / +31(0)6 54 38 06 15 or e-mail: [wijnen@groenewout.com](mailto:wijnen@groenewout.com). For additional information on Groenewout's services please visit [www.groenewout.com](http://www.groenewout.com).



*Rob Wijnen is Senior Consultant at Groenewout Consultants & Engineers. After receiving his degree in Mathematics at the Technical University of Eindhoven, Rob started at Groenewout in 1993 as simulation consultant and has done many projects since then spanning a wide range of logistics areas. He specializes in modeling, data analysis and the development of tools in Access and Excel. Rob has a significant amount of experience in designing and improving warehouses, optimization of distribution networks and inventory- and production planning. In addition, he shares for several years his expertise via the training course "Data analysis in Access".*