SIMULATION
WHY YOU NEED IT TODAY

A company was moving into a new distribution center to accommodate an explosive growth in business. The management was progressive in its thinking and the company was financially healthy. So the company decided to invest in state-of-the-art equipment for the new facility, automating many aspects of their operation. After careful planning and design, the facility was constructed and went into operation. However, unforeseen problems were encountered and the expected throughput was not achieved. The operation did not run smoothly, traffic bottlenecks developed at unexpected places, and generally, men, material and machines just got in each other's way. The outcome? Millions of dollars of sophisticated equipment had to be retired prematurely, and several executives lost their jobs.

This frightening scenario has happened all too many times. Is it a result of poor planning? A more likely reason is the inability of any person or group of persons to visualize the actual working of all the components of a complex operation and identify the trouble spots. In hindsight, the difficulties often seem obvious, but visualizing the operation in advance to see the problems before they occur is another matter. How can we sharpen our foresight?

Until recently, computer simulations were impractical for material handling operations. The cost of the large mainframes necessary to run the simulations could not be justified by the savings. However, microcomputers today are capable of running complex software (such as simulation and CAD) which in the past required a mainframe. This, combined with the increasing cost and complexity of warehouse operations, makes simulating material handling systems not only advisable, but often a necessity.

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Simulation models are written to follow the structure of the actual operation being analyzed. The model may be as detailed as necessary, but, as with any computer application the simulation is only as valid as the data that is entered into it. The running model produces statistical output in the form of tables, charts and graphs which measure the system performance. With a computer simulation, any aspect of the system can be measured, without ever interfering with the actual operation.

Taking the simulation a step further, many simulation languages are supported with animation capabilities. Animation provides a visual display of the modeled system at work and aids in verification. Modeling errors not obvious in statistical output are often apparent in animation. Animation is also an important presentation tool, conveying certain concepts more efficiently.

A typical simulation study consists of the following basic steps:

- Define the operation.
- Collect data.
- Develop the logical structure.
- Create the model.
- Validate the model.
- Run the model.
- Analyze the output.
- Modify the model.

It is not necessary to have a highly mechanized or automated material handling system to justify using a simulation model. In a typical distribution center, simulation can be used to answer basic questions.

- Does the conveyor system have enough accumulation to prevent jams?
- Is the dock staging space adequate to accommodate imbalances between receiving, inspecting and putaway rates or between picking, checking, packing and shipping rates?
- Will aisles be congested at peak times?
- What is the optimum number of

forklift trucks?

In a typical plant, simulation can be used to answer questions such as:

- How much material handling equipment will I need to move material between work stations?
- What will my equipment and personnel utilization rates be?
- What is the effect of alternative routing?

These issues and others can be addressed by using proper simulation techniques to "test drive" a material handling system before investing resources. With the rising costs and risks involved with material handling operations and the increasing availability of computer simulations it makes sense today to use simulation.

GROSS & ASSOCIATES