

# EXSYS Case Study

---

## Connecting an Expert System To a Simulation of a Complex Manufacturing System



In industry today there are complex packages running and managing manufacturing floors. This project merges a knowledge automation system with simulation into one package. The knowledge automation system's powerful reasoning logic can prevent lateness of orders, increase productivity and performance of Flexible Manufacturing Systems (job-shop), while keeping the equipment working at an optimum level (maximum utilization of machines).

Discrete Simulation is concerned with the arrival of a process and monitoring its progress through the system. This monitoring occurs anytime a process waits in a queue for a particular facility. A typical simulation model consists of entities (jobs) that have attributes (job number, starting time, type of job, etc.). The total collection of entities and their attributes at any point in time is called the status of the system, and rules called events govern changes in the status.

Typically an order will be generated consisting of many processes (20-100 jobs at a time), by using some function of time. The processes enter the queue for a machine, process the job and then release controls of the machine. At this point, the knowledge automation system is called on to decide which job should seize the empty machine.

The rules of the knowledge automation system are based on:

- ◆ Preventing Lateness of Orders.
- ◆ Minimizing Lateness of Orders
- ◆ Maximizing (Optimize) Use of Machines

These rules use the attributes of the jobs that are in a corresponding queue of a free machine to make decisions. These attributes are read in from a file, which the simulation package has previously written to. The knowledge automation system then writes back to a file for the simulation package to use. Utilizing the EXSYS knowledge automation system with a simulation package increases performance, productivity, optimization and overall quality of the job tasks performed in the manufacturing industry.