

USING GRAPHICS TO BUILD SIMULATION MODELS

Merriell C. Dewsnap
Manager, Simulations
Eaton-Kenway
515 East First South
Salt Lake City, Utah 84102

Computer graphics has become a very important part of the model development process at Eaton-Kenway. Data entry is aided greatly by user friendly software that takes almost all of the work out of building a data base. Model validity is determined in less time and customer validation has become much easier. This has resulted in more customers wanting to have models built and increased material handling and factory automation sales. Efforts are underway to incorporate CAD hardware being used by engineering into the modeling process.

1. DATA ENTRY

We first reduce the engineering drawing of the proposed wire guided vehicle system by 50% so that it will fit on our data tablet. Placement of stops, control points and nodes are added by hand using rules that have been carefully defined based on software control that will take place in the as built system. The reduced drawing is then placed on the data tablet and a specially developed digitizing program activated. Aided by menus and a light pen the modeling analyst scales the data tablet and records the location of each of the stops. The software increments the stop numbers so that all the analyst does is to point to each of the stops in order on the data tablet. Graphical information about walls and equipment and labels are then added so that the data base will be clearly recognized when displayed while the model is running. A similar process is used for conveyor systems.

2. PREPROCESSING

Data is transferred to IBM host computer and a FORTRAN based shortest root program is used to determine which path should be used to complete delivery of a load. A SNOBOL program then reads a file created by the analyst which describes the attributes of entities that are to make up the system being modeled. The output from the SNOBOL preprocessor is GPSS source code ready for execution.

3. MODEL EXECUTION

GPSS/H is used to compile and execute the source code from the preprocessor. During model execution graphic information is sent from the host system to the graphic display where results are displayed dynamically and also recorded for off-line viewing and analysis. The interactive features of GPSS/H are used to verify that the model is executing properly.

4. POST PROCESSING

The recorded history tape is frequently used to display results at a prospective customer site or the closest Hewlett-Packard dealership or during customer visits at our simulation laboratory. Frequently these remote sessions are conducted by marketing staff with very limited modeling skills.

5. RESULTS

Using graphics and a preprocessor to make use of thoroughly verified and validated GPSS subroutines has resulted in greatly reduced model development time (weeks instead of months) with models at much greater detail and complexity. This has led to increased customer confidence and improved system sales.

6. FUTURE DEVELOPMENTS

We are currently integrating our graphical data entry and display into the CAD system being used by engineering. This step will allow us to work directly with drawings being produced and expedite assimilation of simulation results into control software that operates the final system.

7. CONCLUSIONS AND RECOMMENDATIONS

Graphical display of simulation results has benefited both the modeling analyst and the final user. Models are built and validated quickly and at less cost than in the past.