



Furniture Upholstery Work Cell Simulation

PROJECT SUMMARY

Production Modeling Corporation developed a simulation model to analyze the overall throughput and labor utilization of various furniture upholstery work cells. These work cells match fabric to frame by cutting, sewing, filling, upholstering and cleaning up fabric operations. Simulation was used to identify bottlenecks, work-in-process and potential opportunities for cost reductions. The project team was able to establish the most effective sequencing of products, diversify job responsibility of operators for best utilization, and identify equipment and station requirements. The result eliminated direct labor from the system and doubled the units per hour that the work cell was producing.

SYSTEM DESCRIPTION

Daily order cards are placed onto a large fabric rack. The fabric is pulled from the rack and cut into a cover, arm covers, pillows and cushions. The groups of fabric “parts” are placed in a staging area for the sewing cell.

The sewing cell is comprised of seven sew stations serviced by four sewing operators. The operators pull fabric out of the staging area on an as needed basis. It is possible for the sewing cell to contain more than 1 fabric style at a time. However, there may be no more than 3 different styles in the cell at any given moment. The sewing cell places the sewn fabric by groups into the pillow/cushion filling cell.

After the pillows and cushion are filled and sewn, the fabric is matched with a frame in the upholstery cell. The cell is comprised of two sequential operations that completely cover the frame. The final cell in the system is a match skirt and cleanup cell that finishes the piece and sends the part to be packaged and shipped.

OPPORTUNITY

Past efforts to improve the productivity of the system did not bring about an overall improvement. A simulation analysis was undertaken to maximize the throughput of the line as well as fully utilize available labor.

APPROACH

To be successful, the management team set these objectives as key elements of the project:

- Determine the utilization of the resources of the cell.
- Determine the major constraints of the system.
- Develop a plan to reduce unit cost.
- Establish capacity of the work cell

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SOLUTION

The simulation showed that the labor in the system was being utilized approximately 40%. Additionally, the work-in-process levels between the cells were extremely cyclical during hours of production. These facts focused the project team on analysis of two areas: scheduling and labor job description.

Given the numerous amount of scheduling options, the total parts of the system were broken into 3 families: love seats, chairs, and sleepers. The simulation was used to develop a matrix of the most effective sequencing of the three families through the system.

The plant engineers performed a study to determine the feasibility of operators performing more than one assigned task within the cell. With this information, the simulation determined the operating logic to be used by the production supervisor to control the placement of the labor throughout the cell.

BENEFIT

The changing of sequencing and of job responsibilities of the labor yielded a more than 200% increase in units per hour, as well as the reduction of one operator.