10.9 CASE STUDY *Dream Desk Company*

Dream Desk Company is a major supplier of office desks for home and business. The company has been in existence since 1875. After serving an apprenticeship as a cabinet maker in the east, George Dreamer had a violent disagreement with the shop owner and quickly decided it was best to move west. He opened up his own shop for making custom desks for homesteaders, ranchers, and small businessmen who could not afford expensive imported desks. The company is still run by the Dreamer family and has maintained a niche in the middle-priced home and small business office furniture market. Dreamer furniture has a good reputation for value. This reputation has been built on sturdy construction including tongue-and-groove corners, good customer service, and strong regional marketing.

The company has three basic grades of desks, each with several styles. The grades are solid oak construction, solid pine construction, and oak veneer. All together, there are fourteen standard material-style desk combinations. Two styles, the contemporary and frontier, have accounted for 65% of sales in the past two years. The oak veneer-frontier model represents approximately 25% of sales. Pine-frontier and oak-contemporary each account for another 10% of sales. In addition to the standard styles, customers occasionally request a custom order of special design. Custom orders account for approximately 20% of sales and 40% of profits. Last year, Dream Desk sold 81,450 desks for a revenue of $15.7 million. Orders vary in size from five to 500 desks, but most orders are for 50 desks or less. Sales are seasonal with about 70% of deliveries requested for August through November, but Dream Desk has always tried to maintain a constant workforce. Overtime is used during peak seasons and machine maintenance, skills cross-training, and development of new models is scheduled for the slow season. The demand for desks also follows the 3 to 5 year business cycle. Currently, we are entering an upswing and the local market is expected to grow 20% over the next 18 months. Dream Desk can profit from this market growth if prices can be held in line and quick delivery can be promised.

Dream Desk operates a 250,000 sq. ft. manufacturing facility in Casa Petite, TX. The plant currently employs 160 full-time workers of which 125 work in production. Recent pressure from increased wood prices and more aggressive marketing from eastern manufacturers has made it clear to Jim Dreamer, Plant Manager, that the company needs to reduce its manufacturing cost and delivery lead time. Dreamer has considered developing a new production and inventory control system with some of the features of the just-in-time system he gained knowledge of at a recent seminar.

The Production Process All desks go through similar production sequences. The desk is essentially comprised of a frame and drawers. Drawers are assembled from a front, handle, two sides, back, and bottom. Veneer drawers have a two-piece front. Each piece is rough cut from stock and then one or two edges are sanded to provide a reference surface for fixturing on machines. Other edges are then sawed and sanded. During this stage, the patented Dreamer top (rounded tops to drawer sides and engraved pictograph on the top of the drawer front) is added. The priceless Dream trademark seal is then applied to the left side of the drawer. For drawers with a lock, the hole is punched and the top of the door grooved during drawer part construction. Historically, drawers were made by sending them through a series of saws, drills, routers, sanders. Parts then come together at an assembly bench for fitting and gluing. A new $1 million automated system has been installed that can fabricate parts automatically with rapid changeover between styles. The previous arrangement was a process layout with three saws, three drills, four routers, six sanders, and six assembly stations. These machines still exist, and, with the exception of assembly, require approximately 30 minutes to changeover between

part types. Over time, the market has demanded more of the six-drawer desks, and this department had become the bottleneck in production. The new system increases capacity about 80% while requiring only one additional operator. (It was felt that the new system would also improve quality and reduce the need for overtime.)

Frames are made in a separate department. Legs are cut from bar stock and sanded. The contemporary styles require a turning operation on one of the three engine lathes. The other styles require a shaping operation after cutting. Both six and eight leg versions of desks (drawers on one side or both sides) are produced. Desk tops, sides, and backs are cut and sanded. In each case, the reference surface is created first. The contemporary styles have elaborate detail on the sides and require extensive router time. The veneer models have the details engraved onto the veneer coverings which are then glued onto the plywood frames. Both manual and automated gluing stations are available with the manual stations being used for short runs because setup is quicker. All together, the frame department has 20 first shift direct-line workers with five saw operators, six routers, four gluing workstations, five shapers, and two lathe operators.

All parts and frames visit the paint department. Drawers are hung on a conveyor and frames ride on pallets. The first step is an air spray to remove dust and particles. Two coats of finish are then added followed by a clear lacquer coat. Parts require two hours to dry between each coat. The paint department requires 24 workers when operating at full strength. Turnover has been a problem in the paint department. As a result, Dream Desk has recently increased the wages in this area by $0.20/hour. Temporarily, this has solved the turnover problem.

Material handling is mainly conducted by workers pushing carts. A cart can hold 40 drawer parts (sides, backs, bottoms, or fronts), 40 desk legs, or ten desk parts (sides, tops, backs). Frames are moved on flat carts, one frame per cart or on overhead conveyors. Up to 12 drawers can be stacked on a flat cart for transport.

The final step is an assembly line. Here, the table top is hand waxed, caps are added to the bottom of legs, locks are inserted and screwed tight, drawers are added to the frame, the finish is checked for blemishes, and then the desk is boxed and moved to the shipping warehouse. Any required fit adjustments and cosmetic repairs are performed by line workers. At full speed, the line takes 12 line workers and completes one desk every 90 seconds.

Dream Desk has historically hired unskilled workers. As experience and training are acquired, wages and responsibility increase. Currently, workers have an average loaded cost of $14 per hr. On average, a desk requires four hours of labor. The plant usually operates a full first shift and a partial second shift, both shifts operate five days per week. The plant shuts down for the first two weeks of July. During this time, major machine overhauls and changes in machine layouts may be implemented.

Project Scope As plant industrial engineer, you are charged with putting together a team to design and implement a new production and inventory control system for this plant. The main objective is to reduce cost and WIP inventory. You should determine how the facility will be arranged and the procedure for controlling the flow of orders through the shop. For example, will you use a process layout, cellular layout, or product layout? What material handling load size will you use for moving parts between workstations (i.e., move one part at a time to the adjacent machine or move an entire batch at a time)? You should specify which items should be kept in inventory and which items should only be produced when ordered. You must specify production batch sizes for items made-to-stock.

The first step is to list the products and parts via a bill of materials. Document this in a flow chart. You may then decide which parts will be made-to-order and which will be made-to-stock. Using an economic criterion, select appropriate batch sizes for make-to-stock items. Document the procedure for selecting the part to produce at each stage and for authorizing production. Likewise, document the material handling system, including part transfer quantities and move equipment that will be used. You may assume ample warehousing space is available.