

Strategies for the



New American Furniture Industry

I—Introduction

North Carolina's traditional casegoods furniture industry, based on large, vertically integrated factories, is largely gone, with furniture manufacturing moving to offshore locations. Many experts claim that mass-produced casegoods furniture manufacturing is lost forever to U.S. companies, but savvy manufacturers could prove them wrong. Domestic businesses that follow a focused strategy combining strategic advantages with recent advances in design software, coupled with modern manufacturing methods, can reclaim market share and become leaders in the new furniture industry.

This section examines the advantages of manufacturing in the United States and contrasts the traditional furniture industry with "the new furniture industry." Section 2 introduces the important concepts of Modern Manufacturing Methods relevant to furniture manufacturing. The furniture Design/Build manufacturing approach is presented in section 3. Factory management using the key concepts of maximizing profit, balancing production with sales, and streamlining production-floor management is discussed in section 4. Marketing strategies of the new, smaller furniture manufacturer will differ from the traditional mass production industry that builds today's imported furniture, as discussed in section 5. The final section examines different business strategies for the new furniture industry.

The Traditional Furniture Industry

The traditional large-factory, mass-production furniture industry has largely disappeared. Domestic furniture manufacturing in the future will hardly resemble yesterday's furniture industry.

We are building a new furniture industry almost from the ground up!

Consider the weak points of the traditional furniture manufacturing business. The industry developed around the biannual High Point market and typically spent months developing newly designed groups to send to market, hoping for sufficient orders to make the group viable. Bottlenecks in design and engineering resulted in a lengthy development process. If enough orders were placed during the market, then a large production run created warehouse stock for retailers to order. Factories had been built to produce large batches of new product and as a result, they did not handle small batches efficiently, nor could they be flexible. Even when new equipment was introduced it operated in isolation, and upgraded production lines continued to operate with high inventory levels. The whole effort remained slow, inefficient, expensive, and risky.

Advantages of Manufacturing in the United States

U.S. manufacturers have the advantage of being close to the consumer and consequently can better service the market. A shorter pipeline to the market means that inventories can be much smaller. Administrative costs are generally lower than those incurred when doing business outside the country. As manufacturers abandon traditional marketing methods, they will find it unnecessary to invest in large showrooms that are unused most of the time. The domestic furniture manufacturer will be able to quickly provide a customized product using enhanced modern manufacturing methodology.

Although overseas producers can adopt the same methodology, because of the distances

involved they will not be able to provide a timely, customized product. In addition, the domestic modern manufacturer will be able to incorporate new technology developments into the manufacturing process to serve the market even faster. The domestic manufacturer will meet changing market design and needs quickly. Finally, addressing the demand for a customized furniture market—using technology and modern manufacturing methodology to hold down costs—will actually create a new market opportunity.

Comparing the Old Industry Model to the New Furniture Industry

The new domestic furniture strategy will focus specifically upon customers' needs. This is not the commodity producer of yesterday that employed hundreds to manufacture in batches of thousands. The departure of those companies from the domestic manufacturing scene provides an opportunity for energetic, smart entrepreneurs with a keen sense of the market and a knack for manufacturing organization to prosper. The new furniture companies are likely to be much smaller, energetic enterprises prepared to seize new opportunity in the marketplace by profitably manufacturing in batches of one.

The technology and manufacturing methods to quickly provide a customized or semi-customized product to the customer exist today. For example, a company could offer a standard product line with rapid order completion, yet also offer a limited number of options (configurations), sizes, and finishes beyond the standard product for a slightly higher price. This business strategy contrasts sharply with the old industry, which mass-produced large batches with no customization. Being able to communicate face-to-face with customers and responding to their needs will be a branding attribute of the new industry, focused on customer service, fast product delivery, and the ability to say "Yes!" to customer requests. The new factory concept includes constant innovation capabilities that add shapes and features easily and at low costs. This domestic industry will also be able to leverage a growing niche market demand for sustainable, green, solid wood products by using domestically grown woods.

To offer customized products, factories will operate very differently from the traditional furniture industry. Many tasks will be accomplished in the design and engineering department using 3-D software to design and modify pre-engineered products, generating a bill of materials and instructions for operations personnel and equipment. Since more tasks will be accomplished quickly, it is essential that people be adequately trained. The rough mill will differ from its predecessors by having the flexibility to process (cut and glue)

more than one species and thickness at a time. Raw materials will be on hand as standardized parts, stock plywood panels, or glued-up lumber panels to support the product lines offered. The machine room can be set up with short production lines for each type of part or subassembly needed for the finished goods, but allowing each machine center to operate independently when needed. Assembly and sanding operations can also employ the short production line approach. Finishing can occur before assembly on flat-line operations. Alternatively, standard color cases can be finished on a conveyor line, and custom color cases can be finished off line using carts. The new factory will require very limited inventory because finished goods are immediately packed and shipped. A flexible packaging system capable of providing corrugated boxes that precisely fit the various product sizes will also be essential. Small companies may be able to forgo the expense of boxing and packaging by blanket-wrap shipping directly to the customer.

Finally, how people are managed in the new furniture industry will contrast sharply with the old industry. In the past, large casegood plants employed 300 to 500 low-skilled employees. The new casegood plant will be considerably smaller, employing 50 to 250 people. Because the new workforce will be better paid, more empowered, and self-motivated, it will be able to create a flexible workplace with minimum support or management supervision. Factory floor management will be open and visual, using simple computer networks accessible to production workers to track production and visual techniques to improve flow throughout. No longer will the supervisor keep the schedule on a piece of paper in his pocket. Table 1 compares the old manufacturing concepts to the new factory manufacturing concepts.

Casegoods manufacturing is not limited to residential furniture segments, but includes the contract furniture industry servicing hotels, nursing homes, and educational markets. Using innovative marketing and manufacturing techniques, the new casegoods furniture manufacturers will seek to recapture the American market by offering:

- Faster delivery
- A focus on service (readily available repair parts)
- Better value for customer's dollar
- Customized product offerings
- Better quality of workmanship
- Use of environmentally sustainable materials

	Traditional Concept	New Concept
Main Bottleneck	Design and Engineering	Plant Capacity
Quickness to Respond to Change	Very Poor	Very Agile
Investment in Raw Materials	Large	Small
Investment in Work-In-Process Inventory	Large	Small
Investment in Finished Goods	Large	Small
Investment in Equipment	Large	Moderate to Small
Investment in Facilities	Large	Moderate to Small
Cost of Sales Force	Large	Moderate to Small
Cost to Design/Engineer Products	Large	Moderate to Small
Labor Productivity-in Sales \$/Employee	Low	Moderate to High

Table 1. Comparison Between the Old Casegoods Furniture Plant and the New Furniture Plant.

Two Successful Paths for Domestic Casegoods Furniture Manufacturers

The large mass-produced casegoods furniture manufacturers can set up large, modern production centers in their former home areas within North Carolina and Virginia. In nearby locations, a supply chain network of support vendors can establish operations to provide lumber and plywood products, finishes, hardware, packaging, and other related goods and services. The next section details how these large plants, with their local support networks, can successfully compete globally.

The second successful path involves following a business strategy of setting up a Design/Build shop to serve a local or regional area with semi-custom furniture produced on a made-to-order basis. Section 3 discusses how a small, locally owned shop can use stock materials to offer a wide variety of casegoods products designed around a common theme.

II—Modern Manufacturing Methods Can Rebuild the Mass Market Casegoods Furniture Industry

Modern Manufacturing Methods will allow a casegoods factory to quickly manufacture and deliver a semi-custom or custom product to the customer at a low manufacturing cost. The controlling principles are efficient material and information flow and manufacturing flexibility throughout the process. The major Modern Manufacturing Methods will help North American factories take advantage of their close proximity to raw materials and markets.

1—Fast Track Engineering. The goal of this concept is to eliminate the design and engineering bottleneck of traditional furniture plants and decrease the time from

idea generation to production and marketing. Ways to do that include:

- a. Use pre-engineered designs that present different styles.
- b. Offer a variety of products (SKUs) that share components. For instance, a chest of drawers, vanity, and nightstand in the same style will have many common parts (same drawer sizes, parting rails, etc.). Using standard-sized parts and panels will facilitate the design process, as they will be already available in the parts library.
- c. Offer set options on a basic model that vary the style or configuration, and set up a menu or chart that allows clients to choose quickly.
- d. Incorporate 3-D design software that automates the modification of pre-engineered products and creates a bill of materials and part drawings from the user's choices. A seed library of previously constructed designs will provide a base product that can be reused or easily modified using dynamic designs. At a minimum, the software will provide manufacturing support that will automatically or semi-automatically create bills of materials, a detailed parts listing, and job cost estimates.

2—Flexibility and Flow. The old casegoods lumber cut-up operations were designed to handle large volumes of the same lumber, cutting the same thickness and species for hours or days. In the modern manufacturing factory, we want to flow parts and components through as quickly as possible and to speed needed information from order entry to the floor. Fast Track Engineering will accomplish this rapid flow of information. The design of the new factory will need to allow process flexibility so that quick changes can be made. For example, lumber cut-up operations must be able to process more than one species and

thickness at a time. Multiple lines or workstations in the assembly area will allow more than one item to be produced if needed. Finishing can use either standard spray booths or flat-line finishing, depending on the product. Thus, finishing might be complete prior to assembly. Rather than having a long conveyor line, it may be more flexible to use carts to apply stains and a short conveyor to spray clear finishes. Two practices necessary to develop factory flexibility and flow are short production lines and reduced set-up time.

3—*Short Production Line.* The old casegoods factories were set up for large runs exemplified by the long conveyors used on the assembly and finishing lines. To achieve the flexibility previously discussed, the modern furniture factory will be organized for small runs of high variety SKUs using short production lines. Flexible processing lines or work cells will eliminate material handling and load movement by combining operations. Figure 1 illustrates a short production line for parting rails that will allow both combined or independent operation of the moulder, tenoner, and vertical

boring machine. Short production lines provide a higher part quality because production can be better monitored when work isn't scattered across multiple workstations. Higher labor productivity, shorter throughput time, reduced scrap parts, and greater customization can be achieved by carefully using short production lines in machining, assembly, and finishing operations.

4—*Reduced Set-Up Time.* Quick set up creates flexibility for the casegoods furniture manufacturer. Small batch sizes are possible only when set-up times are eliminated or significantly reduced. Smart fixturing can speed set-up times on manual and Computer Numerical Control (CNC) equipment. Converting several manual operations to a single CNC machining operation is a simple method to reduce overall set-up time. Modern Manufacturing Methods are only possible when set-up time is significantly reduced.

5—*Quality Improvement.* The elimination of large batches and development of short production lines

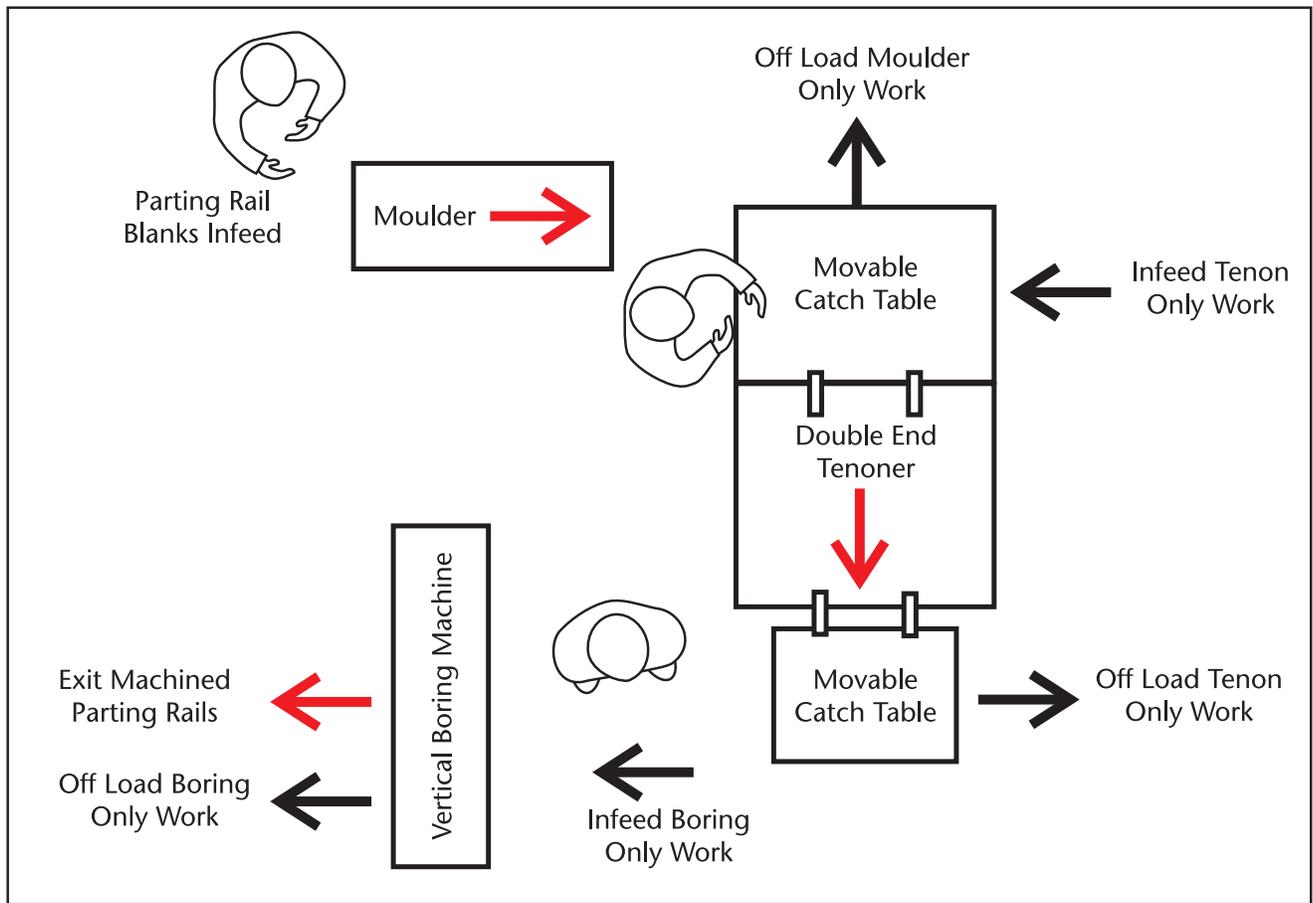


Figure 1. Example of short line production for parting rails (red arrows indicate parting rail process flow). This arrangement allows each machine to work independently when needed for a single operation or as a complete line to make a fully machined part.

will result in a close-coupled process. Manufacturing problems will surface and be corrected earlier, and the reduced inventory will make it easier to locate parts and less likely that they will be damaged in transit and storage. Simplifying and streamlining the manufacturing process will eliminate much of the rework, repair, and replacement. Interrupting jobs to generate replacement parts required in assembly will become the exception rather than the rule. Quality improvement will greatly reduce manufacturing costs and increase throughput. The philosophy of Modern Manufacturing Methods will support “make one and make it right.” (Note: Because the emphasis is on short production lines and work-in-process inventory reduction, equipment reliability is critical. Consequently, preventive maintenance will be a requirement for success.)

6—*Lot Sizes Small But Profitable.* The modern manufacturing factory will produce a customized, high-end product. The high average value of each unit will not require large daily volumes to support profitable manufacturing. The operation will be streamlined with a flat management structure, more efficient engineering, standardization of parts and panels, increased manufacturing flexibility, reduced rework and repair, and elimination of finished goods inventory. These efficiencies will allow manufacturers to produce a limited, customized product in much smaller lot sizes.

7—*Cycle Orders in Two Weeks.* In addition to offering a customized product, one of the major marketing

strategies will be to produce orders in two weeks or less (Figure 2). This will be accomplished by flowing products quickly through the factory and by flowing information quickly, as well. The design process will be quick, will be linked to the manufacturing process, and be facilitated by the use of pre-engineered designs that allow fast processing through design and engineering. In addition, stock panels of plywood and solid lumber will eliminate delays associated with placing purchase orders and delivering raw materials, and these materials will require minimal processing. Orders will be scheduled for processing and shipment within two weeks of receipt. The manufacturer will organize so that products can be produced at the same pace as incoming orders.

8—*Eliminate Most Finished Goods Inventory.* The make-to-order manufacturing strategy eliminates all finished goods inventory except those products awaiting shipment at the loading dock. This offers an advantage over the manufacturers that have abundant inventory tied up in warehouses and container ships. The future furniture industry should initially focus on satisfying the market for customized products—a need the industry is currently not addressing. Because the future factory will streamline manufacturing and management costs, the customized product will be available—and affordable—to most buyers. Satisfying the demand for customized, quality furniture with rapid order completion strategies will create a new market for furniture.

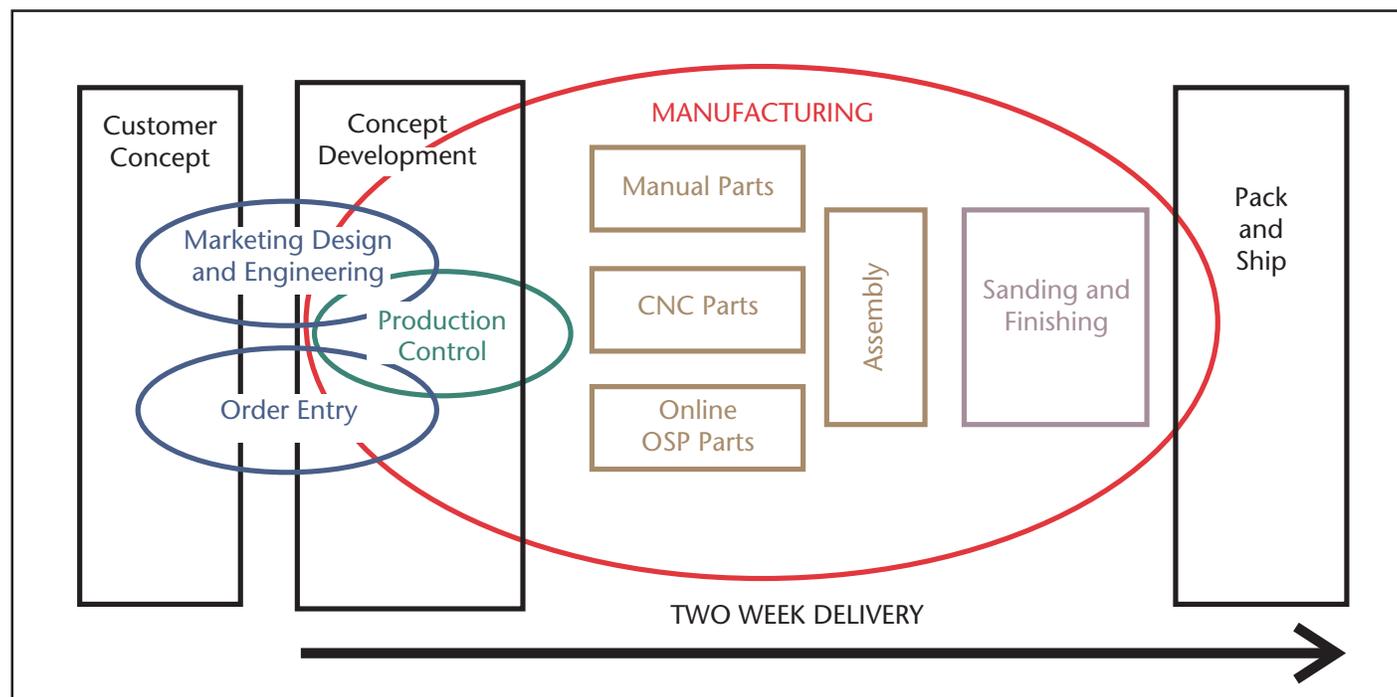


Figure 2. Overview of New Casegoods Furniture Manufacturing.

9—*Empowered Employees.* Effective, skilled employees will reduce labor costs. Though these factory floor employees will require greater compensation, they will have the responsibility and the information required to be self-directed. These fully supported employees will be supplied with schedules, directions, drawings, and training to make decisions immediately. High job satisfaction among employees will reduce turnover. Indirect labor will be reduced by the improved flow of materials, assemblies, and information, which will reduce the need for supervision, material handlers, office support, parts storage employees, and repair personnel. Improved designs that require fewer operations and smarter machining will reduce direct labor.

10—*Visual Shop Floor Management.* Think of a highway with signs that help visitors determine their location and reach their destination. Similarly, the visual shop floor will use visual indicators to quickly and effectively communicate the production status, inventory levels, materials placement, and order schedule and commitments. The goal is to create a workplace where problems are immediately obvious and which employees can quickly correct.

Applying Modern Manufacturing Methods to casegoods manufacturing can allow a new breed of domestic U.S. manufacturers to successfully compete domestically and globally. Modern Manufacturing Methods can eliminate most of the facility, equipment, and inventory costs borne by the former large-factory casegoods industry and create a new casegoods industry offering high quality, high labor productivity, quick delivery, low capital and inventory investment, and high profitability. The next sections will examine alternative business models, profit management, and marketing.

III—The Design/Build Furniture Manufacturing Concept

What is Design/Build? It is the process by which customers design the custom (or semi-custom) casegood furniture they want, either alone or with the help of a designer or marketer, using design software. Design/Build establishes a streamlined connection between the customer and the manufacturer and helps the manufacturer complete orders quickly. Customers benefit by receiving a product that more closely meets their specific needs.

The Design/Build process will help the domestic manufacturer to provide fast delivery of a product that includes many options, such as adding different

finishes or sizes to stock items. This business strategy serves those wanting lower prices, immediate delivery, and some customization, as well as those who want more choices. In addition, the Design/Build software can create a Web-based customer interface that allows mass customization.

The market for a Design/Build manufacturer is not limited to only the individual end users, but to many market niches such as interior designers, contract sales, and retailers.

Software will illustrate the customer's design and automatically pass the information to the design engineering department for review before being scheduled for manufacture. In essence, the process defines the customer's needs and then manufactures a product that meets those needs.

The key for the Design/Build manufacturer is the ability to quickly design, build, and deliver a custom product. Some of the components of the Design/Build concept include: 1) design software; 2) stock materials program; 3) common design platform; 4) parts standardization; and 5) limited service area.

Design Software

Design software development has been driven by the automotive, aerospace, and other high-capital industries. Engines, transmissions, airplanes, and other high-value products require software that can handle a high degree of detail. Although learning all the capabilities of this software takes time, furniture can be successfully designed using relatively little of the software's overall power. Alternatively, software is available that targets the value added wood products industry. It is generally simpler to learn and produce designs quickly. The ability to design quickly has value. The software package employed should bolster the Design/Build business concept by using simple, quick techniques to design furniture and provide support to the manufacturing floor.

Design software cannot replace salespeople or designers, but it can help them do their jobs by presenting an image of the customer's selected options. A visual 3-D representation of the furniture (Figure 3) placed in a virtual room similar to that found in the customer's home could help sell the item. The design software presents the customer with a seed catalog or library of furniture cases. The parametric or rules-based software will design the total case, unlike many CAD programs where each part must be specified. Changes can be made quickly by the customer, sales representative, or designer. Customization or configuration options might include the type of legs, mouldings, doors and door styles, drawers and drawer styles, shelves, partitions, and hardware design, all selected

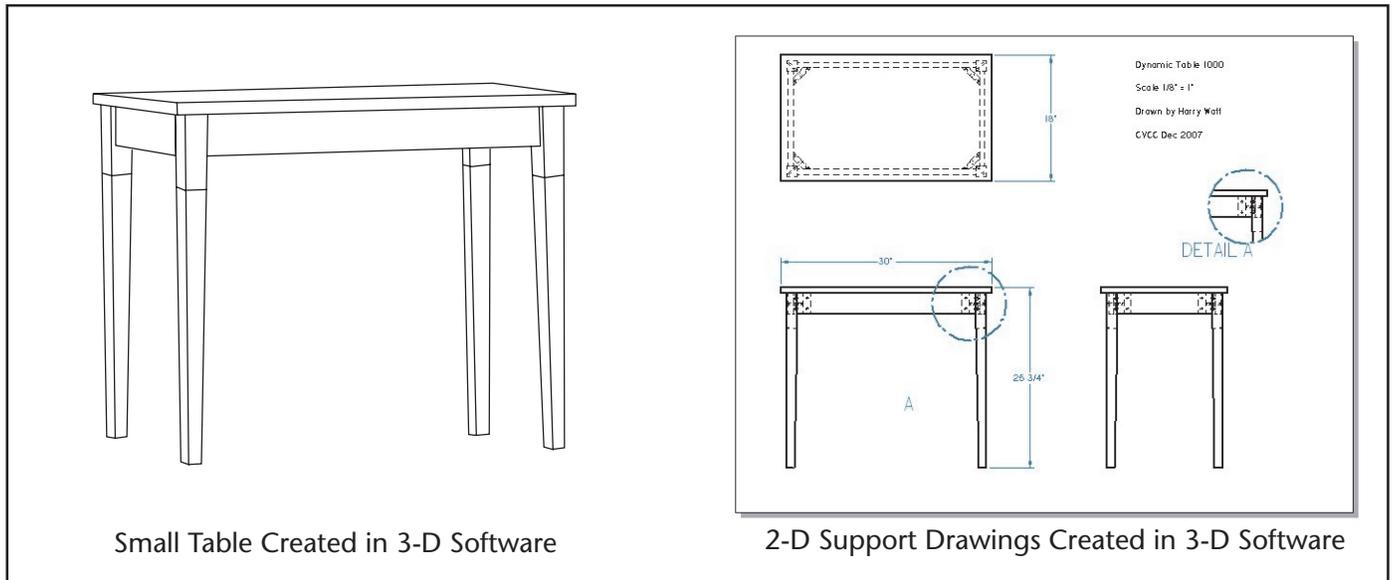


Figure 3. Software can present a 3-D picture of the finished design to the customer and provide support drawings to the manufacturer.

by the customer. Once the customer's design information is captured, the software will perform other tasks such as ordering parts or hardware selected from an Internet supplier library, or generating a cutlist, buylist, 2-D support drawings, sales proposal, and CNC code if required.

Correct CNC machining can help the Design/Build manufacturer flow parts and components through the plant as quickly as possible, and efficiently flow and translate information from the order entry process into instructions on the floor. The accuracy achieved with Design/Build, used in conjunction with CNC machining, will speed assembly because the parts fit together precisely. It is essential, however, that the manufacturer have well-trained employees who understand the software and hardware capabilities, and that these employees be supported by supervisors who understand the new business strategy.

In those situations where CNC machining is part of the process, four guidelines are recommended for successful implementation: 1) Combine operations and minimize set-ups by performing as many operations at the CNC as possible. This must be carefully balanced because the CNC could become a production bottleneck. The goal is to make CNC technology as flexible as possible; 2) To use CNC time effectively, workplace design should allow for rapid loading and unloading of parts, dust, and scrap. Pre-positioning jobs and job kits may require a planning coordinator to help the operator with scheduling, materials, tooling, and programming. CNC operators can develop and use flexible fixturing techniques to minimize set-up time, and should consider using laser projection to pre-position

stock. They will also use quality control in front of the CNC operation to eliminate defective parts before they waste CNC time; 3) Design and engineer the parts so that all machining takes place on one side without flipping the part on the table when possible; 4) Purchase and use the appropriate software, taking time to learn how to set up the software to match your machine configuration and avoid repeated programming errors that must be corrected at the CNC.

Stock Materials Program

The Design/Build strategy requires that parts and material be available quickly. This can be accomplished by implementing a stock materials program. Narrowing the number of product lines will reduce and simplify raw material inventory throughout the plant. For example, the company may keep a limited number of wood species in stock. When offering products containing solid lumber or straight-grain panels, a limited stock panel program can be established in which one size of stock panel serves multiple products and allows for the fast processing of orders. Or a plywood component supplier might lay up faces on previously made core stock only when the furniture manufacturer orders the finished panels. Similarly, the most popular hardware designs can be kept in stock, and customers can use a menu to make their selections. A set number of finishes will be available, or the manufacturer may offer a wider variety using some of the automated mixing systems available to create custom stain finishes.

Key to the success of the Design/Build manufacturer is a focus on profitable and frequently requested prod-

ucts. The Design/Build manufacturer needs to reduce the number of product lines offered by imposing self-limits that define its operating parameters. This is, in effect, implementing the familiar 80/20 rule, which focuses on the 20 percent of product lines that generate 80 percent of sales. Typically, companies will add products to but never remove any from their offerings. Using the 80/20 rule will target and eliminate products that have a low sales volume, a high overhead because they are difficult to manufacture, and offer little future potential. Some business will undoubtedly be lost, but by carefully selecting a limited number of product lines, the manufacturer can focus on those that are most profitable and excel in manufacturing them.

Common Design Platform

As discussed, customers may be presented an initial case from which they can launch their design ideas. This gives them a springboard to get started, and it also provides pre-engineered designs to guide the design process. The software will offer design flexibility and constraints, so the manufacturing process is not hampered. Although the manufacturer may limit his product line to a certain style of furniture and a limited

choice of species, customization options are available within these constraints.

An example will help clarify the purpose of a common design platform. The customer of the Design/Build furniture manufacturer can purchase a chest, cabinet, table, chair, or whatever is being manufactured and marketed. The customer can specify width, height, and depth, and change the configuration of shelves, partitions, mouldings, doors, and drawers. The manufacturer will have previously established a fixed set of parameters that control how the piece is manufactured: material, joinery, insets, standard drawer construction, available mouldings and trim, size limits, four finishes, and so on. The process is similar to purchasing a Dell computer online, where you can select specifications from a limited number of options.

Depending on the product and the market, the process may be even simpler. A menu of pre-engineered designs from which customers can choose the item's size could enhance the furniture-buying experience. Today's furniture showrooms, filled with imported furniture of similar appearance, are depressing consumer interest and, as a result, discretionary money that could be spent on furniture is being spent on more exciting purchases.

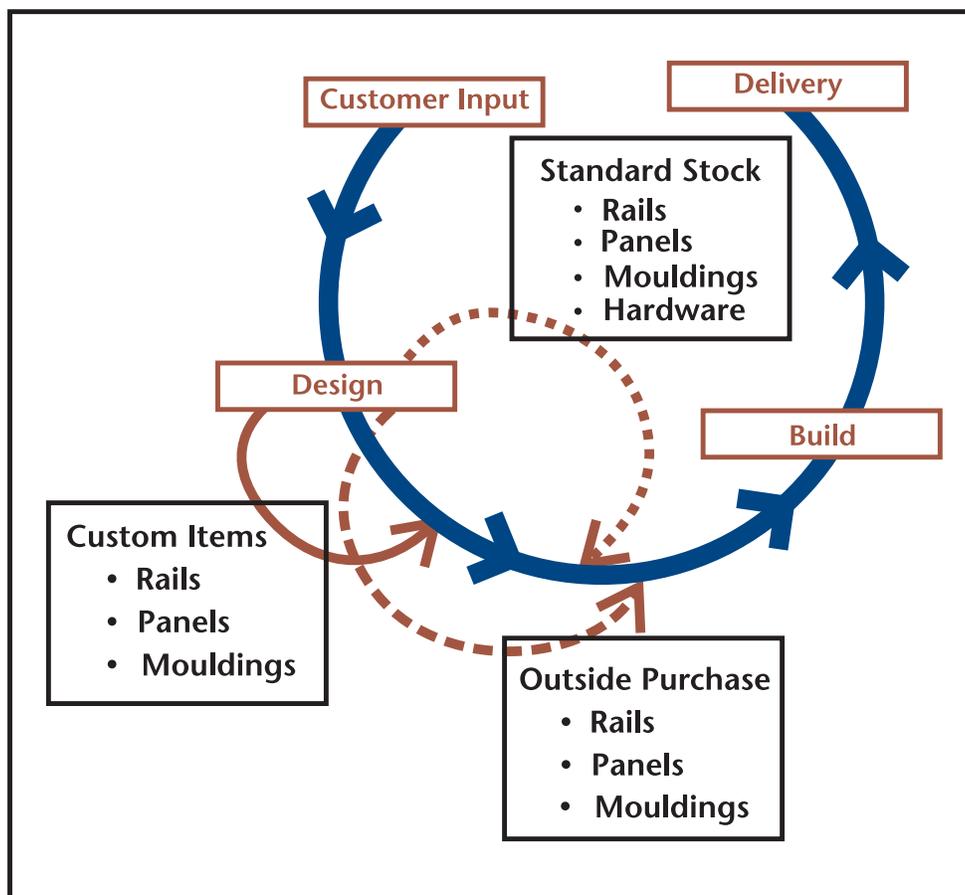


Figure 4. The Design/Build Interaction Between the Customer, Design, and Manufacturing.

Standardization of Parts

Standardization of parts will begin during the design process. Every designer that serves a company will agree to use common sizes on some components to lower manufacturing costs. Standard sizes will be offered for units and components so the product can be manufactured in a timely fashion using fewer inventory dollars. A standard-sized rail width will accommodate very different products such as tables, face frames, and chairs. Similarly, a standard selection of moulding will provide limited variety that can be inventoried. Designers will need to understand that standardization is driven by the need to service the customer quickly. However, nothing precludes designs that require non-standard items, but the customer should understand that extra cost and time might be incurred.

Standardization of parts and panels should help establish processing centers that manufacture these common items quickly. Manufacturers should develop cooperative relationships with suppliers to lower costs and delivery times. A simple flow schematic for the Design/Build strategy is shown in Figure 4.

Servicing a Limited Area for Greater Profitability

Instead of trying to cover a national market, the Design/Build operation can service an area that meets its business goals. It can avoid many of the expenses that former large furniture manufacturers carried, including expensive market showrooms, independent sales representative commissions, and large inventories for raw materials, work-in-process, and finished goods. The lowest marketing and distribution costs will be incurred by focusing on a limited, local service region, and the product can be sold at the full retail price.

A 100-mile service area radius in a medium-density population area in the eastern U.S. should be more than sufficient to support the typical Design/Build business. Two factors should help determine the exact size of the service area. First, the business should identify an area that will generate significant volumes of orders. Second, that area should be easily accessible for deliveries and parts replacement or repair.

In summary, the objective of the Design/Build process is to flow information throughout the manufacturing, purchasing, and assembly process to provide the customer with a high-quality, customized piece of furniture quickly and at a competitive price. A successful streamlined operation requires that information be entered once and that the resulting cutlists, buylists, and CNC code be generated without error.

IV—Using Factory Focused Management Techniques

Does your plant operate according to a schedule? Is it a good schedule? Do you know if your factory will be profitable this month? If you cannot answer “yes” to these questions, you should learn about Profit Scheduling.

The previous three sections have discussed strategies and methods that the new domestic furniture industry will employ. This section will focus on Factory Focused Management, a strategy that embraces three key concepts:

- 1) Using production scheduling to manage profit;
- 2) Balancing manufacturing, engineering, and sales;
- 3) Superior factory floor management.

Using Production Scheduling to Manage Profit

A proactive approach to profit management can increase the bottom line of a wood products operation significantly compared to the company that waits until the end of the month to determine profit or loss. Profit management uses budgeted factors for weekly labor and overhead costs, and job material costs to estimate weekly expenses based on a production schedule. The schedule provides an estimate for sales revenues based on product prices and sales quantities. These estimates for revenues and expenses can help calculate weekly profitability.

Profit management systems can work well in a wide variety of wood products operations where there are clear beginning and ending dates for jobs. This system can be started with the following information:

1. Revenues—average daily revenue figures can be obtained by dividing the job’s total revenue dollars by the number of schedule days the job requires.
2. Material costs—the average daily materials cost per job can be obtained by dividing the total materials cost for the job by the number of schedule days the job requires.
3. Direct labor costs—the budgeted direct labor dollars per week or the projected payroll dollars can be used to find direct labor dollars per week. For most wood products operations, the weekly direct labor expense should fluctuate little if the schedule is consistently full.
4. Overhead costs—the budgeted annual overhead cost divided by the number of weeks per year will provide a weekly overhead dollar cost. Total overhead costs for the factory and the office should be used, although they can be split into separate expense categories.

Example Profit Management				\$10,000 Per Week Job Capability					Company With Expense Control and Scheduled Profitability					
	Job Revenue	Material \$	% Materials	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Totals
Job 110	\$ 14,000	\$ 6,720	0.48	\$ 10,000	\$ 4,000									\$ 14,000
Job 111	\$ 9,000	\$ 3,780	0.42		\$ 6,000	\$ 3,000								\$ 9,000
Job 112	\$ 17,000	\$ 8,670	0.51			\$ 7,000	\$ 10,000							\$ 17,000
Job 113	\$ 5,000	\$ 2,300	0.46					\$ 5,000						\$ 5,000
Job 114	\$ 13,000	\$ 6,760	0.52					\$ 5,000	\$ 8,000					\$ 13,000
Job 115	\$ 6,000	\$ 2,880	0.48						\$ 2,000	\$ 4,000				\$ 6,000
Job 116	\$ 22,000	\$ 9,460	0.43							\$ 6,000	\$ 10,000	\$ 6,000		\$ 22,000
Job 117	\$ 32,000	\$ 14,400	0.45									\$ 4,000	\$ 10,000	\$ 14,000
Revenue	\$ 118,000	\$ 54,970		\$ 10,000	\$ 10,000	\$ 10,000	\$ 10,000	\$ 10,000	\$ 10,000	\$ 10,000	\$ 10,000	\$ 10,000	\$ 10,000	\$ 100,000
Expenses														
	Materials			\$ 4,800	\$ 4,440	\$ 4,830	\$ 5,100	\$ 4,900	\$ 5,120	\$ 4,500	\$ 4,300	\$ 4,380	\$ 4,500	\$ 46,870
	Direct Labor			\$ 1,900	\$ 1,900	\$ 1,900	\$ 1,900	\$ 1,900	\$ 1,900	\$ 1,900	\$ 1,900	\$ 1,900	\$ 1,900	\$ 19,000
	Overhead			\$ 3,000	\$ 3,000	\$ 3,000	\$ 3,000	\$ 3,000	\$ 3,000	\$ 3,000	\$ 3,000	\$ 3,000	\$ 3,000	\$ 30,000
Total Expenses				\$ 9,700	\$ 9,340	\$ 9,730	\$ 10,000	\$ 9,800	\$ 10,020	\$ 9,400	\$ 9,200	\$ 9,280	\$ 9,400	\$ 95,870
Profit				\$300	\$660	\$270	\$0	\$200	-\$20	\$600	\$800	\$720	\$600	\$4,130
% Profit				3.00%	6.60%	2.70%	0.00%	2.00%	-0.20%	6.00%	8.00%	7.20%	6.00%	4.13%

Table 2. Scheduling of Job Revenue and Expenses to Project Profit Management.

Profit Management System—An Example: A case-goods and millwork company projects the next 10 weeks of orders. The top half of Table 2 lists the jobs by scheduled completion during the 10-week period. The projected revenue based on accepted bids is shown mid-table, and in the lower half of Table 2 budget information is used to estimate the weekly expenses for materials, labor, and overhead. Direct labor is shown as a constant dollar amount per week based on recent payrolls, and overhead costs are based on the company's budget. These expenses could be adjusted up or down based on knowledge of actual expenses.

Together, the revenues and costs are used to project a weekly profit.

This example illustrates a company that is controlling expenses and is modestly profitable. In the second example in Table 3, poor management has allowed materials costs to increase by 2 percent on each job, and direct labor and overhead expenses each increased by \$100 per week. The result was a significant erosion of profitability so that now the company is operating at near-zero profit.

A profit schedule can be customized to fit any manufacturing situation. Companies do not necessar-

Example Profit Management				\$10,000 Per Week Job Capability					Company With Profitability Problems					
	Job Revenue	Material \$	% Materials	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Totals
Job 110	\$ 14,000	\$ 7,000	0.50	\$ 10,000	\$ 4,000									\$ 14,000
Job 111	\$ 9,000	\$ 4,000	0.44		\$ 6,000	\$ 3,000								\$ 9,000
Job 112	\$ 17,000	\$ 9,000	0.53			\$ 7,000	\$ 10,000							\$ 17,000
Job 113	\$ 5,000	\$ 2,400	0.48					\$ 5,000						\$ 5,000
Job 114	\$ 13,000	\$ 7,000	0.54					\$ 5,000	\$ 8,000					\$ 13,000
Job 115	\$ 6,000	\$ 3,000	0.50						\$ 2,000	\$ 4,000				\$ 6,000
Job 116	\$ 22,000	\$ 10,000	0.45							\$ 6,000	\$ 10,000	\$ 6,000		\$ 22,000
Job 117	\$ 32,000	\$ 15,000	0.47									\$ 4,000	\$ 10,000	\$ 14,000
Revenue	\$ 118,000	\$ 57,400		\$ 10,000	\$ 10,000	\$ 10,000	\$ 10,000	\$ 10,000	\$ 10,000	\$ 10,000	\$ 10,000	\$ 10,000	\$ 10,000	\$ 100,000
Expenses														
	Materials			\$ 5,000	\$ 4,667	\$ 5,039	\$ 5,294	\$ 5,092	\$ 5,308	\$ 4,727	\$ 4,545	\$ 4,602	\$ 4,688	\$ 48,963
	Direct Labor			\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 20,000
	Overhead			\$ 3,100	\$ 3,100	\$ 3,100	\$ 3,100	\$ 3,100	\$ 3,100	\$ 3,100	\$ 3,100	\$ 3,100	\$ 3,100	\$ 31,000
Total Expenses				\$ 10,100	\$ 9,767	\$ 10,139	\$ 10,394	\$ 10,192	\$ 10,408	\$ 9,827	\$ 9,645	\$ 9,702	\$ 9,788	\$ 99,963
Profit				-\$100.00	\$233.33	-\$139.22	-\$394.12	-\$192.31	-\$407.69	\$172.73	\$354.55	\$297.73	\$212.50	\$37.50
% Profit				-1.00%	2.33%	-1.39%	-3.94%	-1.92%	-4.08%	1.73%	3.55%	2.98%	2.13%	0.04%

Table 3. Poor Control of Materials, Labor and Overhead Expenses Erodes This Company's Profitability.

Bid Projection Scheduling a 5 day Completion Time				Actual Number of Days to Complete the Job			
		Job Bid \$	Avg \$/ Day	4 days	5 days	6 days	7 days
Revenue		\$ 12,500	\$ 2,500	\$ 12,500	\$ 12,500	\$ 12,500	\$ 12,500
Expenses							
	Materials	\$ 5,000	\$ 1,000	\$ 5,000	\$ 5,000	\$ 5,000	\$ 5,000
	Direct Labor	\$ 2,813	\$ 563	\$ 2,250	\$ 2,813	\$ 3,375	\$ 3,938
	Overhead	\$ 4,063	\$ 813	\$ 3,250	\$ 4,063	\$ 4,875	\$ 5,688
Total Expenses		\$ 11,875	\$ 2,375	\$ 10,500	\$ 11,875	\$ 13,250	\$ 14,625
Job Bid Profit		\$ 625	\$ 125	\$ 2,000	\$ 625	-\$750	-\$2,125
% Profit		5.0%		16.0%	5.0%	-6.0%	-17.0%

Table 4. Bid Projections Based on Allotted 5 Day Completion Time Compared to Actual Number of Days to Complete the Job.

ily have to use a constant dollar amount per week for expenses. They can use amounts that range up and down based on expectations of expenses associated with specific jobs. Given the ease and availability of computer spreadsheets, managers and owners should be projecting their profitability and communicating the bottom line to sales and manufacturing.

The profit scheduling method can be adapted by companies that are accustomed to short order times. The following example illustrates the importance of using job information to set production schedules in advance and vividly points out that profitability depends upon completing jobs on time.

In the example shown in Table 4, a shop bids a \$12,500 job, estimating that it will take 5 days to complete. This shop has 5 employees and annual average sales of \$600,000. The manufacturing expenses for this job include \$5,000 for materials, \$2,813 for labor, and \$4,063 for overhead. The job is bid with a 5 percent profit. Table 4 also shows that the job's profitability depends upon the shop's ability to finish on time or early. The right side of Table 4 shows a large difference in profitability between finishing one day early (16 percent profit) and finishing one day late (6 percent loss). The penalty for running beyond the scheduled completion date is \$1,375 per day, consisting of \$563 in direct labor and \$813 in overhead. Thus, there is a reward for finishing early and a penalty for finishing later, or for letting the schedule have gaps.

Balancing Sales, Engineering, and Manufacturing

Casework and millwork companies often fail to send the job to the manufacturing floor in time to meet the delivery date. Even when a company wins a bid a year in advance, the shop typically must rush to complete the order on time! Why is this so? The cause varies among companies and may have roots in either sales,

engineering, or on the manufacturing floor.

Once a bid has been awarded, huge amounts of time may be lost because the architects or job owners are slow to select materials and colors. They mistakenly believe that because the job is not due for months, they have plenty of time to decide.

The engineering department of the casegoods manufacturing company must push to obtain the required information from the buyer or architect to avoid rush jobs in the shop and additional manufacturing costs and disruptions. When the bid is won, a qualified engineer should go through the job and make a list of needed information such as material selection, field dimension, color, and hardware, and send this list weekly to the buyer with its current status. A bold, large-type disclaimer on the cover status sheet should state "THIS JOB HAS NOT RECEIVED COMPLETE, REQUIRED INFORMATION AND IS NOT ON TRACK FOR ON TIME DELIVERY." When job information is not in the hands of the shop, the job is stalled, and the responsibility for delaying progress should go back to the buyer or architect.

On the manufacturing floor, preplanning should estimate time by work center. This allows the manager to move the crew as required and avoids what should be a part-time job from becoming a full-time job. There should be a pre-job meeting with the crew to review the schedule so they can discuss any issues that would prevent on-time completion. Floor employees should have access to the schedule and be asked to contribute ideas that will help the shop stay ahead of schedule.

The modern factory has examined flow of product through their operations and made adjustments to minimize material handling and set-up time. Many companies benefit by adding gravity (non-powered) roller conveyors that bring discipline to the manufacturing floor so that the oldest orders are processed first

and lost parts are minimized. New or retrofitted equipment provides flexibility from job to job and helps minimize bottleneck impacts.

Traditionally, engineering has been a consistent bottleneck in the casegoods industry. After the sales department generates orders, manufacturing operations must wait because the job has been delayed in the engineering department. Recent advances in computer design software and databases have improved engineering productivity, but unless enough skilled engineers are provided, delays will continue. As technology simplifies manufacturing, more resources should be allocated to the engineering department to input design information into the design software for manufacturing support. It is critically important that the engineering function be properly staffed and managed to achieve the needed productivity and also to create a balance between sales, engineering, and manufacturing.

After understanding the power of profit scheduling and the impact that early or late job completion can have on profitability, how do you determine which jobs to bid on? The sales function plays a key role in determining whether profitable jobs are sent to the factory floor.

Bids can be evaluated based on sales productivity. In the following example, two jobs are bid with the fewest number of shop days projected. The number of shop days estimated is considered accurate and reflects the amount of work needed to complete the job properly. An analysis of both jobs shows a large difference in productivity per employee. Although Job 2 will keep the shop busier for a longer period of time, Job 1 is a higher quality job in that it generates higher annual sales revenue if sustained. The focus is on cost control and running jobs as quickly as possible. By keeping the job pipeline full of high-quality jobs, an excessive percent profit is not required, which in turn will help win bids. This is a key business leverage point for the small job shop. Gaps and overloads in the schedule should be controlled as much as possible by the sales department, who in turn should be controlled by management.

Breakdown	Job 1	Job 2
Job Bid \$	\$ 87,000	\$ 92,000
# Company Employees	10	10
# Shop Days	12	18
Avg. \$/Shop Day	\$ 7,250	\$ 5,111
Annual \$ Sales/Year	\$ 1,740,000	\$ 1,226,640
Labor Productivity/Employee	\$ 174,000	\$ 122,664

Table 5. Evaluating Bids Using Per Employee Productivity Measurements.

Superior Factory Floor Management

The modern manufacturing factory, in addition to production scheduling and balanced manufacturing techniques, will also employ superior factory floor management strategies. Two important concepts are to 1) eliminate unnecessary layers of management and 2) eliminate unnecessary paperwork. The old factory model often had excessive middle management layers that added costs to overhead from unneeded support. Eliminating some of these layers results in a much flatter management structure and requires hiring highly qualified, self-directed people and compensating them with a rewarding and attractive work environment and competitive wages, all of which will benefit the company in the long run. Paperwork on the factory floor can be eliminated with multiple computer stations that contain the company's production schedule. This simple information system is not supposed to be an MRP (Material Requirements Planning) or ERP (Enterprise Resource Planning) information system that tracks every material move and labor unit. Instead, it is simply a replacement for the existing paper system that all plant leaders use. By sharing the leaders' information, the company benefits and information is transferred much more efficiently. All employees will have the current schedule, drawings, and instructions from the production scheduler and management.

V—Linking Manufacturing and Marketing

As noted in the first section, domestic manufacturers have the advantage of being located in a large and affluent market. The new furniture industry will likely consist of relatively small companies that have more direct contact with their customers than today's big box furniture stores or even yesterday's domestic, but now defunct, large manufacturers.

Just as the modern manufacturer will operate the factory differently than in the past, marketing will be different. The new manufacturing process will be more closely connected to the customer, essentially with the market pulling the product out of the factory. For furniture manufacturing, this represents a revolution, not just an innovation. Small companies who cannot afford the high overhead of a High Point showroom will be able to address the individual product and service needs of their customers much more readily.

The following are marketing advantages the new furniture manufacturers can use, based on their customer knowledge, regional presence, sales force development, and service capability.

Customer Knowledge. New furniture manufacturers will devote more attention and support to their

marketing program. Domestic furniture manufacturers will commit significantly more resources to developing products that meet the needs of their customers. Instead of copying the innovators at the last market, the new furniture manufacturers will make new products that were not available at last market and meet the demand for high quality, fast delivery, and competitive pricing. The manufacturer will offer a wide variety by using flexible designs from which the customer will select readily available options that allow choices in dimensions, finishes in stain or paint, hardware, moulding styles, and carvings. The well-run factory will not only provide a high-quality product with competitive pricing, but good management controls will allow lead personnel to conduct external market research to improve product engineering and manufacturing. This is a tremendous advantage over companies that moved offshore and disconnected their manufacturers from product and manufacturing innovations.

Market research can uncover large niche markets seeking a different look from that of imported furniture. For example, imported casegoods tend to have lots of mouldings, carvings, and distressing that give an antique look—and also hide shipping damages. To many American customers, much of the imported furniture looks “busy” and is not what they prefer. Domestic manufacturers could pursue a simpler look. Another opportunity lies in the growing interest in sustainable woods. Furniture manufactured overseas might contain a high percentage of endangered tropical woods. There will be a niche market for furniture that is marketed as containing woods from the sustainable, temperate hardwood forests in North America.

North Carolina’s long history of making furniture and cabinets began with simple adaptations of furniture from Europe. The stories associated with such utilitarian yet beautiful pieces offer a branding opportunity. Furniture could be readily modified to accommodate today’s modern lifestyles.

Regional Presence. Domestic casegoods manufacturers need strong regional sales to be profitable. Manufacturers will need to devote marketing resources to generate a strong retail network in nearby states and move product onto showroom floors. A consistent, long-term effort will be required to regain floor space and consequently maintain and increase market share.

Manufacturers might need to develop nontraditional ways to market their casegoods. Marketing directly to interior designers would be one approach. Using the Internet as an advertising tool is a must in today’s world. At the other extreme is an Internet site where the customer “self designs” within limitations specified by the manufacturer. Internet sales are certainly possible, but companies need a local agent to handle

delivery and service. The manufacturer may want to own retail stores in growing metro areas (such as Charlotte and Raleigh in North Carolina). This would help develop brand recognition and could effectively eliminate the high markups of high-priced imported furniture retailers and provide a more competitively priced product.

Sales Force Development. Though it is common for a furniture company to use both company and commission sales representatives, the modern manufacturer must be proactive in the marketing process. The manufacturer must fully support any commission representatives that the company hires and ensure that the commission sales representatives actively support the company’s goals. If sales are insufficient, then prompt action is required.

Servicing the Market. Obtaining repair parts quickly presents a serious problem for imported furniture retailers. Domestic casegoods retailers who solve the parts problem will realize a huge market advantage. If a domestic manufacturer claimed to be able to ship out repair parts in a week, the entire retail furniture network would notice.

It will not be a surprise, therefore, that the first innovation is to cultivate a “yes” attitude toward customers and retailers. Marketing innovation focuses on understanding the market, developing a strong service relationship with the retailer, and having a strong, proactive marketing effort and presence in the region.

In summary, today an opportunity exists for energetic entrepreneurs or existing casegoods manufacturers to produce high-quality, customized casegoods in the United States that will offer strong bottom-line profitability at high sales levels. Two-week turnaround from receipt of orders can be achieved by streamlining management, manufacturing, and marketing and will provide customer service and company profitability.

VI—New Growth Opportunity for Furniture Manufacturers

At the April 2008 High Point Furniture Market, N.C. State University’s Wood Products Extension operated a booth to promote less-used (lower valued) U.S. eastern hardwood lumber for furniture manufacture. The booth displayed a dozen furniture items made of these eastern hardwood species: beech, sycamore, blackgum, sweetgum, tupelo, wormy red maple, and hackberry. The project’s goals included promoting these lower-priced U.S. hardwoods, as well as looking for the next business opportunities for furniture manufacturers. Extension specialists found an interesting growth opportunity when several importing retailers and

distributors asked them to find U.S. contract furniture manufacturers to replace current Asian manufacturers because of excessive inventory dollar investments, late delivery, lack of repair parts, and quality issues.

For one distributor of imported furniture, specialists located a U.S. manufacturer capable of providing the same products using domestic wood species. The importer reported that the U.S. manufacturer offered comparable pricing, lower order quantities, and shorter delivery times.

U.S. contract furniture manufacturers have an excellent opportunity to increase sales and profitability by targeting retailers and furniture distributors to replace imported furniture with domestically produced products. It is reported that at the April 2008 High Point Market, there were approximately 2,500 exhibitors showing wares that consisted mainly of imported furniture and furniture accessories. A contract furniture manufacturer follows a focused business strategy that includes design, engineering, and manufacturing, but not distribution or retail sales. The contract furniture manufacturer can avoid the high marketing costs associated with selling directly to retailers, instead selling to distributors, and thus operate with less investment dollars and resources than the traditional furniture manufacturer.

Focused Strategies

Many remaining U.S. furniture manufacturers have downsized operations and no longer make all the products they once produced. Some companies have lost plant and equipment resources, while others are losing experienced employees. In the future, furniture

manufacturers should devote significant resources to help employees acquire furniture-making skills, including design and engineering, equipment operation and maintenance, wood products, business and management, and employee relations. U.S. furniture manufacturers should reduce the range of their operations to decrease the financial resources needed for facilities, equipment, and inventory. Having a strategy that is focused on a limited number of furniture supply chain activities will result in lower operating costs than participating in many furniture supply chain roles.

Defining Business Strategies for New Furniture Businesses

The many tasks required to build furniture products include: creating a furniture design, converting that design through an engineering process, making components and assembled furniture, acting as a furniture distributor, and selling retail furniture to consumers. The traditional, vertically integrated large manufacturer is being replaced by many profitable niche players. These are summarized in Table 6 in terms of past, current, and future models. These supply chain segment players include:

1. The independent furniture designer who creates innovative furniture designs and sells these designs to others.
2. The support engineering firm that translates the designer’s ideas into a language that manufacturers of components and furniture can use to process parts.
3. The component manufacturer who buys raw

Activity	Past Large U.S. Furniture Manufacturer	Today’s U.S. Furniture “Manufacturer” (in name only)	Future U.S. Furniture Model (as proposed by authors)
Furniture Design	U.S.	US	U.S. Independent Designers and Distributors
Furniture Engineering	U.S.	US or Offshore	U.S. Component and Independent Contract Furniture Manufacturer
Wood Components Mfgers	U.S.	Offshore	U.S. Independent Component Manufacturers
Furniture Manufacturing	U.S.	Offshore	US Independent Contract Furniture Manufacturers
Furniture Distribution	U.S.	U.S.	U.S.
Furniture Retailing	U.S. Independent Retailers	US Independent Retailers	US Independent Retailers

Table 6. Furniture supply chain activities and their location in past, current, and future business models.

materials and produces blanks and parts ready for assembly.

4. The furniture manufacturer who processes raw materials and purchased components into assembled furniture items.
5. The distributor who buys furniture from manufacturers and distributes to retailers. The furniture distributor often performs the design functions for the manufacturers.
6. The furniture retailer who has the storefront and supporting outlets such as the Internet to sell furniture to the buying public, as well as to contract furniture buyers.

These six roles in the furniture supply chain can be combined into many variations to meet the needs of the market. The following are typical business models:

1. The independent designer who receives either a flat fee or a commission based on sales.
2. The design-build company that combines a design office where customers can meet with designers, with a small shop manufacturing operation to make the furniture on site.
3. The component manufacturer who converts raw materials into blanks and finished parts ready for assembly.
4. The contract furniture manufacturer that can create its own designs to sell to contract buyers, distributors, and retailers, or cooperate with

designers to meet the specific needs of high-volume customers. The contract furniture manufacturer makes products to fill purchase orders and normally would not stock finished goods as inventory. Thus, the contract furniture manufacturer would typically operate in a make-to-order model.

5. The furniture manufacturer that can create its own designs or use those of an independent designer or those of a customer, distributor, or retailer. The furniture manufacturer in the future is much more likely to buy components instead of having the plant and equipment resources to process the raw materials into parts for assembly. The furniture manufacturer can focus on mass-market products that create some volume and economy in pricing. Furniture manufacturers could stock a small amount of inventory as finished goods ready for immediate shipment. Perhaps the best business model for a furniture manufacturer is to abandon the functions that distributors and retailers better serve and focus more on running the manufacturing operations.

In the future, the strongest business models in terms of profitability will not be the traditional vertically integrated furniture manufacturer but one of the previously discussed models that are more focused and require far less investment in plant, equipment, and inventory resources.



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