OPTIMIZED PLANNING WITH EXISTING RESOURCES CAN ENHANCE BOTTOM LINE

BY STEPHEN GRIFFITH

Many companies in the forest products industry utilize some form of planning process. The "business planning" tends to fall into two camps: financial planning (budgeting) and log mix/product mix planning. This article focuses on the latter. The only way to truly maximize value from the planning process is to employ linear programming-based "optimization" models. This technology, when implemented properly, can bring millions of additional profit dollars to the bottom line of your company by using existing resources more effectively.

Optimized production planning and scheduling assures that the manufacturing resources are used to their full potential. Optimization systems can provide insights as to where to reduce manufacturing costs and target opportunities to improve efficiencies and reduce costs. Managers looking to improve business processes should not ignore the importance of planning to cost control and profitability.

Optimization modeling can provide practical insights as to the impact of log mix on the operation of a mill. Wood is almost always the largest cost item on the income statement. The value that is liberated from a given log can vary tremendously by manufacturing facility. Processing rates can also vary substantially by facility. The total cash impact is a combination of log cost, product value and productivity.

Optimized product mix assures that the market resources are used to their full potential and matched with manufacturing capabilities. This area is often fertile ground for profit improvements. A quality linear-programming based optimization system can be an invaluable aid in determining which mix of products are best for your operations. State-of-the-art modeling systems allow businesses to understand the complex interactions of raw material, value-added activity, costs, machine capacities, fall-down rates and alternate product formulations.

The term "linear programming" (abbreviated LP) refers to two related concepts: linear equations and the structured approach to solving them. The name is somewhat confusing and certainly sounds very technical. Optimization modeling is a much more descriptive term and gives a better feel for what the technology is all about.

Optimization modeling is conceptually similar to a flight simulator. A flight simulator models the behavior of an aircraft. It is used by pilots to hone their piloting skills and to prepare them for potential emergency situations. In a sense it is a laboratory for evaluating actions and reactions. Flight simulators can model weather conditions, mechanical processes, foreign aircraft and other factors. A pilot can experience situations in the simulator within the course of a few hours that he/she might not experience in many years of flying experience. The cost of the simulator is relatively low compared to the cost of an airplane, not to mention the risk to life and limb associated with some training exercises.

You can also think of an optimization modeling system as a vehicle—a vehicle that can help your company make more money by helping determine the best use of all your resources including: raw material supplies, machinery, capital, labor and markets. To take the analogy of a vehicle a bit further, you can think of an optimization system as a formula one race car that is fueled by data, has an optimizing model for an engine, and a graphical user interface as a dashboard. The fuel tank is a relational database with the potential capability to "tap" into data from a variety of sources. No race was ever won by a car alone. The driver (model user) is a critical element. The driver communicates his/her needs to the vehicle through the various controls at his/her command.

TIMBER HARVEST

For one of our major Southern clients, the harvest planning process is extremely complex. At one level, foresters view the forests as a fiber-growing factory. Like farmers they can employ tools such as weed control and fertilizer to influence the growth of timber. Although much of the land is plantation forest, the age classes and stocking levels vary significantly. Some tracts are located in the river bottoms and are difficult to harvest in wet weather. Soil types and rainfall can vary from site to site within the forest. The company must honor environmental laws and policies. There are other considerations such as road access and available harvest equipment.

The planning process begins at the strategic level with the many considerations listed above. The forester's goal is to balance forecasted fiber supply and forecasted fiber demand. The product of the strategic planning process is a list of stands representing over a year of harvest potential including company lands and various harvest contracts.

In one region the client company operates sawmills and veneer plants. The mills are geographically dispersed within a 50 mile radius. Timberlands are sometimes located more than 100 miles from a mill site. Each mill has different manufacturing capabilities that yield different values from the logs. One sawmill has curve-sawing capabilities that allow it to better process certain log types than other sawmills in the area. Another facility is capable of merchan-

dising logs to be used in the local large sawmill, small mill or veneer mill.

The company faces a complex decision environment in the sourcing of logs for manufacturing. Planners must consider profit-sensitive questions related to manufacturing efficiencies and costs, outsourcing options, log inventory constraints and transportation costs. Literally thousands of variables are in play within this business environment.

Progressive companies understand that a comprehensive modeling tool will allow a business to make much better decisions than simply cranking options through a spreadsheet. The client employed an optimized planning system designed to maximize profit with consideration of the business constraints, process flows, revenues and costs. The central technology that drives the system is a powerful linear-programming-based optimizer.

The client uses the system for both strategic and tactical uses. Strategic runs are often made early in the year to assess "big-picture" issues. Tactical runs are made on a weekly routine. Many people are involved in the process. In some cases, intranet interfaces have been employed to facilitate data passage to the system. Individual foresters are responsible for communicating harvest availability by timber tract. It is their insights that play a key role in the quality of the solution implementation.

The optimized solution is not driven from the top down; rather, it is driven from the bottom up. Ultimately, the solution is presented in an easy-to-understand format that can be given directly to logging contractors. The solution tells the logger where to haul the different logs derived from the timber tract.

Profit optimization technology allows companies to treat dispersed operations as a single entity and to capture synergies across the business unit. The tool provides our clients with much greater insight about their businesses and the impact of product mix and log sourcing on operations. The results lead to an improved planning process and higher profits.

PLYWOOD PLANNING

A Western plywood manufacturing company that I have consulted with was struggling with a number of difficult issues. Competitive pressures forced the company to seek a change in traditional strategy. The bankers were getting impatient and losing confidence in the venture. Management realized that they must take action and pursue a more profitable product mix.

The plywood mill was originally built in the late 1950s. The mill was equipped with a green end, dryers, patching stations, a layup line, presses, saw line and sander as well as some specialty equipment. The mill was capable of making overlay products as well as long and wide panels.

Anyone who has worked in the plywood business knows that there is a great deal of inherent complexity. One can't look at product mix without considering veneer options and grade balancing issues. On the other hand, you can't select veneers without considering the impact on the key veneer bottleneck, which is typically the dryers.

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To chart a new course it was necessary to find a compass trained to detect profitability. Although management felt that they knew the general trend to follow, they also knew that the "devil is in the details." The all-important question that they desired to answer was: "How can we make more money?" It was clear to the group that they needed more than a spreadsheet.

After consulting with an LP expert, the management team was convinced that linear programming was the best technology to handle the complexities of their decision environment. They hired a firm that specializes in profit optimization. The firm helped the plywood company focus on the key profit sensitive areas of veneer procurement, veneer drying, panel layup, panel yields, as well as manufacturing rates and costs.

A plan was developed to collect all of the necessary data. The data was loaded into a preprogrammed LP system with easy-to-use data interfaces. Data from a previous accounting month was plugged into the system to ensure that the system gave comparable results. The LP system was then put through a series of rigorous tests to ensure that the model properly represented the mill.

Within a few months the system was giving valuable direction as to what mix of veneers should be purchased and which products are most profitable to manufacture. The sales team made a determined effort to seek buyers for the new products. Initial results showed a dramatic financial improvement. Red ink turned to black as the LP model acted like a compass pinpointing out hidden profits. Profit improvements exceeded $400,000 per month.

OPTIMIZATION

With the power and functionality of today's hardware and software, optimization modeling is within reach of virtually every forest products business. Quality solutions can involve a significant investment. However, the financial benefits are usually so large that the system payback is usually measured in weeks. It is not unusual to see profit improvement opportunities in the range of 1-5% of revenues, a result which could exceed $1 million per year for many wood products operations. The insights available through this technology are unique and cannot be derived by any other means.

With so much at stake it really pays to select a software solution provider that has extensive "hands on" business experience within the wood products industry as well as substantial modeling skills and a proven track record. Today's systems are much more than interesting toys; rather they are sophisticated decision support tools that can be as integral as the income statement. The trend is toward "turnkey" solutions complete with data development and implementation consulting. State-of-the-art systems include relational database capabilities and are often integrated with existing information systems.

In the forest products industry we sometimes forget that making money should be our priority rather than making lumber or plywood. Many companies will spend millions to design and build a new mill but sometimes fail to adequately invest in decision support systems. Optimization modeling is a valuable tool in managing your business for maximum profit. **PW**

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