For many plant managers, optimal utilization of production capacity remains a dream. In today’s economic climate, however, it should be a must—and with the right investment and the right tools for production scheduling, the dream can become reality. The goal of efficient production logistics is to organize production so that material flows are not hindered in any way, and all the available resources are taken into account. If a new plant is being designed or an existing one expanded, the production resources and processes must be set up to provide the required capacity. This means identifying and eliminating bottlenecks.

Avoiding capital expenditure can be a good thing, because it forces engineers and planners to adapt their production to the limited resources available. This requires a good production schedule, as measured by the ability to meet deadlines, reduce the effort needed to clean the plant and cut inventory levels.

To address both conceptual and operational problems we need a model of the logistical flows. This needs to include not just production equipment such as reactors, filters and dryers, but also resources such as storage areas, manpower, shift patterns and utilities. Processes are represented by recipes divided into stages, with individual operations within each stage. In the context of logistics, the duration of an operation, the materials and utilities required and the technological restrictions governing which operation can be carried out in which equipment are all important. For production orders, important variables include the order size, the process to be used, and of course the deadline.

Get rid of superfluous investment

When a long-term increase in demand is expected, the knee-jerk reaction is often to spend money on capital equipment. A case study from a specialty chemicals company reveals that this is often not a good idea. This company operated a formulation and packaging plant in which the space available to store intermediate materials was very restricted, and was already used to capacity. Even small increases in production were believed to be impossible without extending the storage area.

To check this theory, various demand scenarios were analyzed from the point of view of production logistics. The material flows were modeled using the Simbax simulator. For each scenario, the bottleneck’s were identified using detailed Gantt charts and the necessary equipment and manpower were calculated precisely.

The results turned out to be surprising. The simulations showed that production could be increased by up to 98% using the existing storage area. Some changes were certainly needed: improved priority stra-

The author is General Manager at Aicos Technologies, Basel/Switzerland.
tategies, a few additional piece of equipment and workers, and changes to some work schedules. But nobody talked about extending the storage area any more.

**Computerize your planning board**

Production scheduling is very time-consuming, because it is extremely complex if finite capacity restrictions are taken into account. If the schedule is drawn up manually, whether on paper, on a Lego board on the wall or by coloring cells in Excel, the process is often little better than a juggling act. Planners have to rely on experience and memory as much as logic, and they do not always get it right.

No better is a schedule created using ERP software with no graphical representation of the schedule, an insufficiently precise production model or, in the worst case, the assumption of infinite capacity. Again, the planner is likely to be stressed, the schedule will often be of poor quality, and production deadlines may be missed.

Planners can only take optimal decisions if they can compare various schedules easily. This requires a user-friendly visualization of the schedule, and the automatic detection of constraint violations. Software tools with these features exist for different applications and different budgets. For instance, QuickGantt is a visualization tool that enables planners to transform production order data from an Excel spreadsheet into a Gantt chart. The scheduling itself is then carried out graphically: the planner uses the mouse to move orders around, and the system displays a message every time a constraint is violated. For more advanced decision support, such as automatic insertion of orders into the schedule, quick checks on the feasibility of additional production orders (capable-to-promise, CTP), or access to the inventory level expected for each material at each moment (available-to-promise, ATP), sophisticated integrated scheduling packages are recommended. These are often designed as add-ons to common ERPs, such as SAP R/3 and J.D. Edwards, with which they exchange data regularly so as to be sure of meeting the due dates specified by the ERP. The high level of integration of add-ons such as Schedule++ even makes it possible to work with a single production model and without adding any autonomous IT infrastructure. Investment in scheduling software generally shows quick returns. Typically, more deadlines are met, capacity utilization improves, inventory levels fall and the time needed for scheduling is considerably shortened.

In conclusion, production logistics abounds with complex problems that are hard to solve by the power of thought alone. Yet despite the fact that in many cases appropriate planning software can make a huge difference, too many companies carry on with manual techniques for both designing new plants and scheduling production in existing ones.