

# Brown Fintube Theory of Constraints Drum Buffer Rope Initiative gets dramatic results in just 90 days

By John Rosso and Ernest McAnally

This article is a frank account of a recent [theory of constraints](#) implementation at Brown Fintube (now Koch Heat Transfer) in Houston that began reaping benefits within just 90 days. President John Rosso and VP of Operations, Ernest McAnally disclose the problems that prompted Brown Fintube to seek change, discuss how a solution was chosen, how it was implemented, and what the results were.

There was no doubt that improvements were needed at Brown Fintube. No systematic method of planning or scheduling was in place and jobs were accepted without regard to capacity or loading.

Consequently, we were not able to accurately predict shipment dates for contracts and never knew when a job was going to be late until it was late. Our on-time delivery performance to meet original promise dates was dismal (in the low 40% range). Designs and drawings were too often late getting to the shop because we were unable to provide Mechanical Engineering and Drafting with meaningful due dates. There was confusion on the shop floor about how to prioritize jobs. In order to compensate for problems and still attempt to meet ship dates, overtime and intense expediting was necessary. Each month began from scratch. By the end of the month, the floor was clean and there was no new work in progress.



## Results from time of initial planning through implementation of ToC Scheduling Initiative:

- 35% sales growth
- Inventory turns up from 2 to 10
- Productivity improvement of \$72,000/employee
- 20% reduction in overtime
- Consistent 95% or better on-time delivery

Because we couldn't accurately anticipate or account for variation in the process, we were unable to correctly predict revenue or forecast late shipment of jobs for any current month. We were able to meet customer needs, but only through last minute, heroic efforts by the organization. We realized that, like so many long-time manufacturers, our order fulfillment process was out of sync. In order to bring our system under control, planning and execution needed improvement. The operations group proposed implementation of a formal

scheduling system using drum-buffer-rope (DBR), a Theory of Constraints (ToC) solution.

We were aware of the Theory of Constraints and thought it held promise, but realized there much was much to do before we could harness it successfully. We decided to cultivate a clear understanding of the Theory of Constraints among Brown Fintube personnel and develop an effective methodology for applying it.

We were still uncertain on how to apply the Theory of Constraints to our business because most texts on the subject addressed machine shops and our business consists of fabrication and welding with some assembly. The difference is not trivial; capacity at most machine shops is based on machine availability and our capacity is based on labor skill availability. We researched whether or not Theory of Constraints — based scheduling software could help our business by discussing it with others who had implemented it. Each of them confirmed our original thinking — they advised us not to implement the software without first establishing a thorough organizational understanding of the Theory of Constraints. They also strongly advised us to use DBR manually before moving to the software phase. Pinnacle Manufacturing Consulting (now Pinnacle Strategies) was recommended to us as a capable and well-respected implementer of the Theory of Constraints. We met with Pinnacle's president, Mark Woepfel, and together, we devised a plan for implementation of Drum Buffer Rope scheduling for our shop.

Our implementation was not intended to be just a "shop" solution; it was intended to be a complete turnaround for all of Brown Fintube. The goals of the implementation were to improve on-time delivery to a sustainable level of

performance greater than 95%, improve our ability to accurately predict monthly revenue amounts, and provide a method to predict man-hour loading and capacity requirements.

## The Plan

Pinnacle Strategies set the implementation in motion immediately, focusing the first group of changes where the greatest impact could be achieved. The idea behind the implementation was to gain control of operations in increments of time. First, a few days were controlled, then a week, then a month. Finally, an implementation of a medium-range sales and operations planning process that would manage the next several months after that, was established.

First, they trained Brown Fintube employees in Theory of Constraints concepts. Every shop floor employee was given an introduction, as were engineers, project managers, and key support people. Once training was complete, our shop supervisors were excited and dedicated to making the implementation a success.



The most significant step towards bringing production under control came with the introduction of a full time scheduler. The scheduler has responsibility for generating the production schedule, handling day-to-day reconciliation of demand to capacity, promising deliveries and overseeing the components (released and unreleased manufacturing orders) of schedule execution. Although controversial at the time, by giving responsibility and accountability to a single person, premature release of materials into the shop was prevented, halting misallocation of capacity and preventing late arrival of components to the constraint.

We selected a drum (constraint) resource and created a workable, daily schedule. This step was significant because the decision making processes for the entire company would now center on this resource. No capacity, sales, or order delivery decisions would be made, from this point forward, without considering their impact on this resource. To formalize the decision, procedures and policies were written and people were trained how to apply them. One of the tools created was the “lead time report.” This report from the scheduler gave Sales a tool to accurately promise customer deliveries.

We then separated normal process variation from unnecessary variation (that had been introduced by lack of plant synchronization). Unwanted fluctuations were compensated for through the addition of an effective planning and execution management process that included time buffers.



Daily “buffer management” meetings were initiated to synchronize the different departments; paying sharp attention to the constraint and to what orders were shipping – two of the most important factors in operations. This process ensured that the constraint resource always had at least a one-day queue of parts from which to work, thereby eliminating month end spikes in shipments and leveling our shipping rates. It also served to smooth out the flow of work in the plant by reducing spikes in capacity load.

On-time delivery started improving immediately. Within 90 days, Brown Fintube improved on-time delivery performance from 40% to more than 90%, and since February 2002, we have consistently performed on time at or above 95%. We felt we were better organized as a result of systematically planning business activity.

Our first two goals were fully accomplished and proved to be an unqualified success. Our accuracy in predicting monthly revenue is now very high. Our accuracy in the area of “available to promise” is close to 100%. Revenue has increased while the number of direct labor employees has declined (through attrition) and it has been unnecessary to replace them. Over the last 18 months, our average annual revenue per shop employee has increased \$72,000.

Benefits realized inside Brown Fintube include a more responsive shop and shorter lead times. The process analysis, policy and procedure development, and execution management means that all steps taken now work together to culminate in process improvement. For example, Brown Fintube is now able to determine which orders to pursue based, not on which will cost the least per unit to make, but on which will yield the greatest profit per minute.

## Results

Rather than fighting fires, Brown Fintube is now able to focus on anticipating and preventing tomorrow’s problems as well as planning future growth. Due to our vastly improved reliability in predicting delivery times, we have also been able to increase the amount of premium-priced business for which we are able to provide “rush” turnaround.

Dramatic results achieved from the time of initial planning through implementation of Brown Fintube's Theory of Constraints scheduling initiative include:

- Sales growth of 35% (\$1.7mm per month to \$2.3mm)
- Inventory turns have increased from two to 10
- Productivity improvement of \$72,000 per employee
- 20% reduction in overtime
- Consistent 95% or better on-time delivery

We are convinced that our reliability on ship dates gives us a definite competitive edge. As customers become more and more accustomed to our vastly improved service, we easily win business over competition that is still merely promising.

For more information about Brown Fintube's innovative heat transfer solutions, call 713-466-3535, write the company at 12602 FM 529, Houston, TX or visit <http://brownfintube.com>.