**Theory of Constraints – Part 3**

As stated in the two previous articles, constraint management is another improvement method that was originally introduced by Eli Goldratt in the book “The Goal” in the mid 1980s. Constraints are key leverage points in a process that control the entire process flow, generally because they have more demand placed on the resource (usually a skill set or a machine) that that resource can *currently* provide.

Constraints can be (and probably should be) divided into two areas of the company. The incoming information flow (customer service/sales through pre-press) and the printing, cutting, gluing, kitting part of the company. It is perfectly acceptable to have one in each part of the company. But not more than one.

**Scheduling Method for Constraint Management**

In another book, The Race, a production scheduling method is described that incorporates some of the concepts from previous articles in this series. The concept from The Race is called “Drum-Buffer-Rope”, or “DBR”. Reliability factors, buffers, reducing overproduction, and subordinating the other production processes to the constraint. Each of these will be described below.

**Drum**

The “drum” in an orchestra sets a cadence or pace. It is one of the reliability factors advocated by DBR. Just like a drum in a band or orchestra, the “drum” in production scheduling sets the pace or cadence for all of the production in the shop. Usually, the drum will be an expensive printing press (or types of presses), so let’s go with that assumption. If a press can do 1000 sheets and hour, with 8 up per sheet, that is 8000 impressions per hour and 1000 sheets per hour. So that is the cadence that needs to be supported after the press and downstream, like in die cutting, kitting, etc. Your system needs to be designed to support that.

The cadence is also like a heartbeat. We do not want that stopping for a long period of time. The cadence needs to be a reliable quantity of product in a set timeframe. Once that cadence is understood, the buffer can be set.

**Buffer**

This is set up to protect the cadence in the drum. So, if you have an eight-hour buffer, two of the components in that buffer will be the plates and print media. If there is one job that will cover the eight hours, you will need the plates or screens, etc. and the total print media, so at least 8,000 sheets. These are ready for use in production 8 hours before they will actually be used. This protects the drum from not being able to produce because of a failure preceding the drum. If there are two jobs that cover the 8 hours, you will need two sets of plates and the require media. The buffer protects the reliability of the cadence and should protect against overproduction as the items available to the press only allow for production of the chosen quantity.

**Rope**

The term used here is from the book, it is a bit strange, but essentially think of this concept as tying in the rest of the production process to the cadence or output of the constraint. Many printers won’t have this issue as the produce to order, but others produce to inventory, so they sometimes overproduce.

Using the example above, the die cut capacity should equal the press capacity or pace within a given time frame, typically not more than one day. So, if the press can do 8000 sheets in a day, die cutting should be able to do the same. This supports the “subordination” step (#3) from the five steps in The Goal.

One thing I have frequently seen in printing companies is adoration of the new super-fast press, but the other operations cannot support the cadence or output of the presses. Design *the entire system* so it works well as a team, not with phenomenal printing capabilities, but sub-par die cutting. Don’t make a $2M press a slave to a $100,000 die cutting machine.

**Setting it Up**

Most ERP system production scheduling modules seemingly do not have the capability to do DBR, but I will tell you now that almost all of them do. However, there are other ways to schedule as well. I have set up production scheduling using Excel in quite a few different printing companies (each had about 20 presses, die cutting, kitting, etc.).

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**About the Author:** Bob Krausert is the owner of STRATE***X***, a Twin Cities based firm that works nationwide. Bob is the author of the book, ***Extreme Lean***, published in 2018. Bob has worked with over 60 printing companies, mostly mid-sized companies, but also with larger companies like Jostens and Banta, now part of RR Donnelly. During his career, Bob has trained over 12,000 people at both public and private events. Bob has been working with PIM since 2010, periodically providing educational seminars for its members. Bob can be reached at stratexlean20@gmail.com or by phone at 612-743-8706. If you would like to have a specific question or topic covered in one of the articles, feel free to make the suggestion!