2-Card Kanban System Calculations

Overview

We’re going to learn how to calculate the quantity of kanban cards needed for the 2 card kanban system to function properly. By the end of this module you’ll know the different parameters used to calculate the number of kanban needed and you will learn how to use the kanban calculator we’re providing in the resources section to quickly do these calculations.

Let’s get things started by discussing the different kanban system variables. It’s important to realize what these calculations determine for us. Done correctly, this kanban calculation determines how many parts are needed in the system as well as the number of production and withdrawal kanban cards we’ll have in the loop. We’ll also be able to determine when replenishment will happen since our kanban cards will trigger all make and move production activity.

There are 4 key variables used in this particular calculation. They are: the Average Daily Demand, the Replenishment Lead Time, the Safety Factor, and the Container Quantity.

Average Daily Demand Variable

The Average Daily Demand, abbreviated as AD, assumes production smoothing, or heijunka, has been done with averaged mix and volumes across a set period of time such as a month or a week. In other words, the averaging applies to a period of time with reliable demand volume and mix thanks to averaging.

Additionally, the Average Daily Demand may allow for up to 10% buffer stock in the number based on the variation within your demand figures. If your demand variation is much larger than this you’ll need to focus on smoothing it before attempting to implement a kanban system.

Replenishment Lead Time Variable

The replenishment time, or RT, is the time lapse from the order signal to the replenishment of material. It’s important to realize that the replenishment time is not the same as lead time.

Replenishment time may include things such as Kanban card collection time, Kanban card delivery time, picking time from finished goods supermarket, processing time, waiting time, transport time between plants, time to receive and process parts, conveyance time within
plants, and the time to place parts at point of use. In other words, it is the total elapsed time between point A and point B in the kanban loop.

**Safety Factor Variable**

The Safety Factor, also known as SF, helps us take into account failure factors such as downtime, quality losses, transportation delays, weather delays, and any other stoppages. When we calculate the safety factor we express it as a percentage of total demand.

For example, let’s say we know, based on historical performance, we’ve experienced 5% downtime, 3% defects, and 2% of delivery delays. When we sum this up we arrive at a 10% safety factor. Obviously, this is pure waste and our goal should be to reduce all of these issues.

When first starting a kanban system we recommend you err on the conservative side of things, which means you should begin with more than enough for material outages. Also, the safety factor may be arbitrary at first if good data is not available, but accuracy must continuously improve and we must continuously improve these failure factors in order to reduce the safety factors since they most definitely inflate inventory levels.

**Calculating the Number of Withdrawal and Production Kanban Within the 2-Card System**

Here is the formula used to calculate the number of cards needed.

\[
\text{# of Kanban Cards} = \frac{AD \times (RT) \times (1 + SF)}{\text{Container Quantity (CQ)}}
\]

We're providing a free kanban calculator in the resources column or on the DVD.