Sizing the campaigns of production in supply chain

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In a context of increasing competition, industry is lead to reduce their supply chain cost while increasing their ability to face the variability of the demand. In most cases, these two goals cannot be reach simultaneously and lead to an arbitrage. Here, we deal with this arbitrage in a tactical horizon.
We consider a factory having "flexible" production lines, that is lines that can make several products. Each product is made by lot (ten, hundred, thousand...) in order to reduce the number of changes in the production lines. The aim is to determine the size of these lots for each product while taking into account the costs of the produced stocks and the maximal number of changes for each line.
Since we are interested in an optimization in a tactical horizon, there are no scheduling constraints in our model. Moreover, the demand is known and constant and the cost of the stock is proportional to its size. If the factory has only one production line, the problem can be simplified and solved analytically using the Karush-Kuhn-Tucker optimality conditions. In the general case when lines are linked (a product can be made on several lines, a product needs the intervention of several lines to be made, etc.), the problem is not convex anymore and its resolution needs more work.
The work presented here are the first models proposed during the beginning of this PhD and the tested and considered approaches to solve it.