Make-to-Stock vs. Make-to-Order
in the Glass Manufacturing Industry

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Abstract

We address the problem of computing the optimal parameters for production control policies in the glass manufacturing industry and provide a framework of analysis related with the structure of the production policies. Three different production strategies are discussed: *Make-to-Order*, *Make-to-Stock*, and *Delayed Differenciation*. We use real data from a glass manufacturing company to evaluate the relative performance of these strategies.

1 Synopsis

This paper proposes a framework to study the glass manufacturing production process. It considers three different production strategies – make-to-stock (MTS), make-to-order (MTO), and delayed differentiation (DD). We analyze their impact on several performance measures, such as average total cost, in-house costs, and lead-time.

The process is modeled as a discret time, capacitated, multi-stage, multi-product, production-inventory system, with random yield, operating under multi-echelon base-stock policies. A simulation-based optimization was the tool used to analyze the glass production system, given the cmplexity of an analytical approach for those types of systems. A set of computational experiments is presented in order to get some insights about the impact of the different production strategies on the performance measures.

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One of the motivations to undertake this work was to try to understand why the majority of the Portuguese hand-made glass companies made a major strategic shift from production to stock to production to order, specially taking into account the low yield values associated with this particular manufacturing process. The numerical results clearly show that a make-to-order strategy incurs less in-house costs than all the other strategies, while having the highest average total cost and the worst lead-times. Therefore, it looks like the strategic shift took only tangible costs into account and did not care for lead-times and intangible costs associated with satisfying demand.

Under the actual business context. where strong competition is a factor, and time and customer service level are critical issues, it sounds logical to pursue other strategies than MTO. Despite the uncertainty associated with intangible costs estimation, management policies tending to valorize service level measures could be more profitable in the medium/long term horizon. Moreover, given the high uncertainty induced by the random yield, an MTO strategy seems inappropriate given that lead times are higher than they would be on more reliable processes, where MTO could make more sense.

The paper will present a summary of experimental results where the three strategies can be compared against each other to determine what should be the right one, depending on the business context. The framework of analysis described in the paper provides means to measure the impact of a strategic change, helping managemente to understand the exact trade-offs involved.