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Mini Review

Safer Foods, Lower Costs, Quicker Response

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ABSTRACT

In this mini-review I offer a few pertinent details from my full research article, "Packaged food industry wake up, your complex costly equipment extends lead times and hides pathogens" [1]. The article, and this review of it, point to serious deficiencies in how manufacturers of packaged foods configure and operate their factories. That sector ranges from the bottling and canning of soft drinks and beer to the forming and wrapping of candy bars to the grinding and packaging of spices. Market demand is generally very high, which seems to beg for a manufacturing model of high-speed production lines. At the same time, the make-up of those high volumes is diverse: high mixes of product flavors, package types and sizes, and customers from bulk wholesales to store-level consumers. In other words, the sector must be able to produce in outsized volumes but with high flexibility to cope with capacious variety. With few exceptions, producers have chosen unwisely to emulate a manufacturing mode prominent in some other sectors notably, automotive, that of high-volume flexible automation.

A known and proven alternative to that production mode deeply embedded in packaged foods is a set of methodologies that rely on segmentation of production into multiple product families, each dedicated to a narrow product family, greatly simplifying operations. This mode, attractively called flow manufacturing, also concurrent production, minimizes or eliminates causes of stoppages, lowers both fixed and variable costs, and reduces outbound inventories thus quickening customer responsiveness affording early discovery of serious quality issues and their causes, and forestalling product recall. Most of the sectors leading these flow/concurrent-production efforts have products for which product safety is important, but without the overriding concerns extant with products meant for ingestion into a living body. Thus, the flow manufacturing mode must be seen as of greater import in packaged foods than in the other industries for which the methodology is well tested and implemented.

In this article, I review key details of the flow/concurrent production, and its high applicability to packaged foods, with the hope that exposure to this information will help stimulate foods manufacturers to learn and press forward toward implementation.

Keywords: Packaged foods; Pathogens; Sources of contamination; Simplicity based manufacturing

INTRODUCTION

Packaged-food companies invest massive sums in ever speedier and more complex and breakdown-prone production equipment. Each factory typically includes very few production lines (example- 4, 3, 2, or even just one) for turning out hundreds, sometimes thousands of combinations of flavors and package sizes and types (example-paper, foil, plastic, and aluminum). The usually lengthy, many-step production lines are in a perpetual state of changing the equipment to accommodate those hundreds or thousands but with the impossibility of the vast quantities and product-mix schedules to be closely linked with final customer demand. To cope, companies continually "upgrade" the equipment for faster line speeds, with the unfortunate consequences of (a) increasing difficulties in executing product changeovers and (b) increasing breakdown incidence and severity. The risk of contamination is exacerbated

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in that each production stoppage uncovers and exposes the food items to the risk of contamination.

In packaged foods, where concerns over sources of contamination should be paramount, the industry clings to a mode that excessively relegates food safety to after the fact investigation. In this mini-review, I contrast that entrenched but badly flawed production mode with a superior manufacturing methodology whose early origins date back to developments among leading-edge Japanese manufacturers circa, late 1960s to 1980s [2-5]. Now well established globally and in various sectors, the mode, descriptively referred to as "concurrent production," does not feature high-velocity automation or robotics, but rather a simplicity in the form of multiples of simple, low-cost equipment, each dedicated to its own small family of product types [6-8].

COPING

The dominant mode of producing packaged foods known pejoratively as "batch-and-queue" production needs a viable alternative. There is no need to look far because of the existence of a proven methodology widespread in other sectors, though hardly at all in foods. This concurrent production mode [9], also known as flow or lean or just-in-time production, calls for an equipment configuration nearly opposite to that practiced by most food manufacturers. Its basis is multiple production units (example-10,15,20) each dedicated to its own narrow family of products such as, in bottling, one line dedicated to diet cola, six 16.9 fl. oz. bottles to a pack; another to the same drink but in 500 ml plastic bottles; and so on. Each employs simple, low-cost, comparatively low-speed equipment [10] configured as a small-scale production line or "cell" (example- a mini-factory) that runs at a non-rapid pace, close to the end-product sales for its product family.

The beauty of this formula-since each line/cell is dedicated to its own product family, there are few sources of variation and things to go wrong: Through repetition and experimentation the operator-"owners" of the entity, with manufacturing engineering support, can elevate the process to a state of high-quality control with a low incidence of stoppages and maintenance [11]; moreover, "When machines are devoted to one part or similar kinds of parts, changeover between parts is eliminated or is reduced to trivial steps" [12] thus allowing scant opportunities for admission of pathogens. For a product type with especially high market demand, one or more of the lines/cells within a product family may be "super-dedicated," to the degree that it never undergoes changeovers. In that special case, in a period of maximal customer demand (example-busiest period or season) it may operate 24/7, and when low the line/cell operates in fewer shifts/hours. In that the equipment is small-scale and low-cost, there's no pressure to keep the equipment in a constant state of operation. This ease of adjusting production rates to changeable market rates called market mediation [13] avoids inventory build-ups [14] so that any product recall is that much less widespread and deep. Moreover, the shortened time lag between discoveries of a product quality/safety issue engenders a fertile audit trail. Oppositely, most food producers with their complex usually highly automated, and expensive equipment press for high rates of equipment utilization, which results in outsized finished goods in distribution warehouses and beyond. All this magnifies costs and of critical import in foods, food-borne quality, and safety issues.

SCOPE AND IMPLICATIONS

While these points are couched in the context of packaged foods, they apply as well to pharmaceuticals which, to its general discredit stay fixedly with the flawed batch-and-queue mode. On the other hand, the personal-care product sector, inclusive of cosmetics, deodorants, dental care, shavers has been coaxed, in small but increasing numbers of companies, to adopt concurrent production, with multiple product-family-dedicated cells/lines. As an excellent example- Amorepacific (small cosmetics packets): Suwon, Korea [15] replaced a single long fill-and-pack line with some-30 compact cells, each dedicated to its product model reducing delivery lead-time to five days, and eliminating all sales reps/agents "because they distort demand!" The cells are small and scattered about a modest-sized packaging area, some operated by just one or two production associates, who are cross-trained to move from one cell to another as downstream customer demands wax and wane; rather than running to always fallacious demand forecasts, the cells' schedules as based on frequent daily sales data electronically conveyed from department stores and other sales outlets. [This author was able to observe all this from the vantage point of a mezzanine that overlooked the packaging floor].

Indeed, consumer packaged goods of all kinds have been top candidates for concurrent production [16]. Still, it is clear: Atop the list of most beneficial applications of this mode are sectors in which human health and risk of pathogens and disease are an issue: foods, pharmaceuticals, personal health care. I hope that this short review article will help spread the word that these sectors are in critical need of abandoning production practices and equipment that favor reckless speed, and instead follow the enlightened march toward that of dedicated simplicity.

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