

Please read the case study and answer the following questions.

- 1) What was the problem of this organization? (Problem statement) – 2.5 marks
- 2) What was the belief of the management? – 2.5 marks
- 3) What was the biggest hurdle in creating the levelled flow in the factory? – 2.5 marks
- 4) What was the solution which provided the leveled flow? – 5 marks
- 5) How would you improve their productivity? Give your recommendations and justify why and how these suggestions will improve – 7.5 marks

Case Study

Custom Cabinet Shop

The workload required at various operations in this company fluctuated greatly, depending on the product, which caused many problems, including poor quality (workers were frequently rushed), line stoppage, and unpredictable production schedules. Because of the custom nature of the product, it was assumed that standardized work for the processes was not possible.

When dealing with a situation of this nature, the apparent complexity can be overwhelming. There were many interconnected and interrelated issues resulting from the ripple effect of the workload (imagine the snake that eats the rat, and the bulge proceeds down the length of its body). As is often the case, the company had attempted to address the outlying issues (where the “problem” was realized), creating elaborate schemes to shift labor to the bulge, but the problem originated at the core. Intuitively, they understood this, but believed it was impossible to change because every item produced was different and the size of each order and the mix of components (cabinets, doors, drawers) varied significantly. They assumed that customers dictated the schedule and there was nothing they could do to level the workload.

The first step was to stop looking at the product as “part specific” or “job specific” and to look at it based on the work content and the effect that content had on the processes within the value stream. If you step back a bit, you can see commonalities either in the product itself or in the processing. In this case, we first identified that most “jobs” or orders had some common elements that affected the workload. The primary components were: cabinets, drawers, shelves, doors, miscellaneous parts, and trim. We also determined that there were a few characteristics common to all products that had an effect on the workload, primarily the type of finish. The finishes were in two categories: stains and solid colors. Further discussion revealed that within the two finish categories each had two additional separations. The stain colors had a burnished and unburnished option, and the solid colors were light and dark.

A review of the value stream revealed that the finishing line where product is stained or colored was the “pacesetter.” All products converged at the finish loading area and from that operation flowed on as a complete order. Leveling the workload at the pacesetter would serve to create a smooth workload to subsequent operations (including the finish operation) and provide leveled signals to all upstream feeder operations.

Again the question surfaced: How do you level the workload when the product is always different? By standing on the circle the answer was clear. The finish type, and the surface area to be finished, affected the workload. Workers confirmed that burnished stain jobs required

much more effort than unburnished ones, and that dark-colored solid jobs were much harder than light ones because the solid colors had a “polished” finish. We also saw that parts with larger surface area required more time, as did many small parts with less surface area. It was becoming clear that creating a sequenced pattern with leveled mix would be the answer. But, again the question: How do you do this when every job is different?

This group, and especially the supervisor who had struggled with the issue for years, was not easy to convince. What we needed was a variable standard; that is, we would develop a standard with an allowance for variation. The variation method would be defined so it was consistent (standardized variation).

Analysis of the production data revealed the ratio of finishes was 75 percent stained to 25 percent solid colors. The burnished jobs (the more difficult ones) accounted for approximately 25 percent of the total stain jobs. For solid colors, the split was nearly even, with slightly more light colored (easy) jobs. This allowed us to create a primary leveling factor for establishing mix based on the ratios of finish colors and types. Since the actual daily mix did not necessarily match the averages, there were secondary conditions added to the pattern. For example, the regular pattern was:

STU, STU, SOLL, STU, STU, STUB, STU, SOLD, STU, STU

Where STU = Stain, unburnished

STUB = Stain, burnished

SOLL = Solid, light color

SOLD = Solid, dark color

But because the workload for solid light color and unburnished stain was similar, they could be substituted on the pattern. The goal was to create as consistent a workload as possible, while processing the correct ratio of each type job.

The second layer of the pattern was the individual components. The team identified that the trim work should always be the first item of any job because of the special processing needed. The small parts went at the end of a job because they tended to have a low workload and provided a “spacer” between jobs to allow for color changes, etc. In addition, two empty racks were sent through between jobs to provide an empty zone to prevent overspray from job to job. A pattern was developed that adequately mixed the size and surface area combinations of each job. Like the color application, some of the categories were similar and could be substituted as defined (the standardized variation).

The pattern for components was: trim—cabinet—doors—cabinet— drawers—shelves—doors—cabinets—drawers/doors—repeat as needed—miscellaneous parts—space—space (next job)
trim . . .

Secondary rules were established based on the finish type (because of workload). For example, cabinets were placed two to a rack if small, and one if large (or one only of any size for burnished and dark finish). Doors were six to a rack for unburnished and light colors, four to a rack for burnished and dark colors. The same logic was applied to drawers and shelves.

In this case example, the production volume was difficult to define. The number of pieces, racks, and jobs all had variation. The company had a goal for 25 jobs per day, so we set that as the volume target, even though the total amount of work varied. This variation, however, was handled by slight adjustment of the total work time each day and did not affect the workload balance throughout the day. The mix included two layers—the primary mix based on finish, and the secondary mix of components. The primary determination based on finish provided the correct mix to meet customer orders and workload, and the secondary provided the correct mix for workload. Sequence of the orders by finish helped to balance the workload, as did sequencing the components.

These changes were the foundation for establishing standardized work and flow. Balancing the workload reduced the amount of line stoppage and smoothed flow throughout the rest of the operations. Future activities that connected operations reduced the “pile-ups” that frequently occurred.

In a custom environment, it's difficult to find an accurate measurement for performance. There is always an element of variation that will skew any measure. In this case, a longer view had to be developed, with the idea that over a wider time window (one month) the variation would be equalized. In other words, month over month we could begin to see improvement in performance as measured by total hours required versus total sales dollars. When performance was viewed over a six month period, the variation was equalized even further, and there was a noticeable mean shift.