

Estimating and Reducing Labor Costs

The objective of any process should be to create value (make profits), not to maximize the utilization of every resource involved in the process. In other words, we should not attempt to produce more than what is demanded from the market, or from the resource downstream in the process, just to increase the utilization measure. Yet, the underutilization of a resource, human labor or capital equipment alike, provides opportunities to improve the process. This improvement can take several forms, including

- If we can reduce the excess capacity at some process step, the overall process becomes more efficient (lower cost for the same output).
- If we can use capacity from underutilized process steps to increase the capacity at the bottleneck step, the overall process capacity increases. If the process is capacity-constrained, this leads to a higher flow rate.

In this chapter, we discuss how to achieve such process improvements. Specifically, we discuss the concept of line balancing, which strives to avoid mismatches between what is supplied by one process step and what is demanded from the following process step (referred to as the process step downstream). In this sense, line balancing attempts to match supply and demand within the process itself.

We use Novacruz Inc. to illustrate the concept of line balancing and to introduce a number of more general terms of process analysis. Novacruz is the producer of a high-end kick scooter, known as the Xootr (pronounced “zooter”), displayed in Figure 4.1.

4.1 Analyzing an Assembly Operation

With the increasing popularity of kick scooters in general, and the high-end market segment for kick scooters in particular, Novacruz faced a challenging situation in terms of organizing their production process. While the demand for their product was not much higher than 100 scooters per week in early March 2000, it grew dramatically, soon reaching 1,200 units per week in the fall of 2000. This demand trajectory is illustrated in Figure 4.2.

First consider March 2000, during which Novacruz faced a demand of 125 units per week. At this time, the assembly process was divided between three workers (resources) as illustrated by Figure 4.3.

The three workers performed the following activities. In the first activity, the first 30 of the overall 80 parts are assembled, including the fork, the steer support, and the t-handle.