Shift Work and its Effects on Productivity

The following paragraphs list factors that may affect productivity when work is done on a shift work basis. Most apply to “extra” shifts, although you should note that paragraph B and C also affect costs on a regular shift. All factors may not apply to a particular job.

Factors Affecting Shift Work Productivity

1. Additional Needs—Night versus Day. Since the extra shift will be performing at night, natural lighting will not be available and good quality artificial lighting may have to be provided. Even if the work is done inside a building, additional lighting in yards, storage areas, etc. would be required. It would also be expected that the temperature and weather conditions at night would be more severe than during the daytime period and additional heating would, therefore, be needed.

2. Since both shifts will be working on the same installation, there will be a certain inefficiency in the transition from one shift to the other. The new shift must go through a learning period to become familiar with the work done by the previous shift.

3. Since both shifts use the same tools and equipment, they will not be at the same place and in the same condition as a man leaves them when he completes his shift. Extra time will be spent reorganizing tools and equipment.

4. Night work will result in work force fatigue to a greater extent than daytime work.

5. Supervision will be diluted, since the normal supervisory employees of the company must be spread out over several shifts. Supervisory problems also include transferring information between shifts as to work completed, ordering of materials, deliveries, field orders, etc.

6. Additional welders may have to be qualified for second shift operations, resulting in increased manhours for testing, together with the cost of qualification tests.

7. The men required for ancillary services, such as laborers and operating engineers, whose time is normally distributed over a broader base of total pipefitter manpower, will add disproportionally to the smaller work forces normally used on additional shifts.

8. When only one trade is working shifts, they probably will not be “pushed” to complete certain work, as they may be during the regular shift.
9. If the shift works 7 1/2 hours in lieu of 8 hours, the percentage of work hours spent in starting, stopping, and coffee breaks becomes a greater proportion of the work shift.

10. The social aspects of the tradesmen may have to be considered, such as the disruptions on family life by working nighttime hours, and the effects on a man of having to change his schedule, such as sleeping during regular daytime hours.

The following is an index of additional factors which should be considered as direct costs when pricing bids for shift work operations.

**Additional Factors**

**Coordination Costs**

1. **Overtime Supervisory Personnel.** It may be necessary to overlap supervisory personnel by 1–2 hours per shift.

2. **Engineering Costs.** Additional engineering costs may be required for all shifts, at least in the initial stages of the project.

3. **Project Support and Communication.** A jobsite business office containing business machines, such as faxes, computers, etc., may be necessary due to the need for intense coordination, communication and information disbursement among shifts. The lack of available personnel in the home office after regular shift hours may require supervisory personnel from all shifts to meet on a regular basis for coordinating, planning and establishing relationships among shifts.

**Labor Costs**

1. **Hiring for Shift Work.** If it is necessary to hire additional personnel to man the shift, be aware that the productivity of “new hires” may not be the same as for the established crew. This may also depend on the employment levels and labor availability within your local jurisdiction.

2. **Shift Premium Differential.** Shift premium differential should be a part of the labor contract.

3. **Absenteeism.** Absenteeism can run as high as 30 percent during summer vacation months, particularly on Fridays and Sundays, and when holidays occur during shift schedules.

4. **Bodily Adjustment Period.** An adjustment period can be from 30 to 60 days, with a productivity loss of 15 percent to 25 percent during this time.

5. **Accident Rate.** An accident rate increase of up to 15 percent may be experienced, which would mean additional workers’ compensation costs.

6. **Efficiency Loss.** From 10:00 p.m. to midnight, there is up to a 25 percent loss of efficiency.

7. **Alcohol.** Often there is an increased consumption of alcohol before coming to work by shift workers.

8. **Attitudes.** Lack of productivity and quality workmanship can transfer from one shift to the next.

**Job Costs**

1. **Safety.** Safety requires more emphasis due to potential increase in the accident rate.
2. **Heat.** Heat in colder climates may be required to a greater extent on second and third shifts.

3. **Lighting.** Particularly when work is being performed outdoors, i.e., installation of rooftop units, additional lighting may be required.

4. **Rental of Equipment.** All shifts must have adequate tools and equipment available.

5. **Delivery Charges.** If they are required, delivery costs can be costly outside of regular hours.

6. **Material Availability.** A crucial scheduling consideration, depending on schedules and productivity, may be the requirement for accompanying shifts in the fabrication shop.

7. **Tool Availability.** Time required in searching for and/or replacing tools can be staggering. Most companies provide a set of tools for each work shift.

**Additional Resources**

When shift work is not the norm of the company, all of the items described above may apply. However, the company may also require additional resources to accommodate the shift project and other projects in progress could suffer drastically—a real hidden cost. Some of the added resources that should be considered for sporadic shift work:

1. Additional engineers for the other shifts and overlap with daytime engineers.

2. Additional project managers for other shifts for continuity and resolution of problems which surface on late shifts.

3. Additional supervisory personnel, foremen, etc.

**Conclusions**

After the contractor considers these items, he should then determine the effects on overall productivity and the cost of shift work based upon overall productivity. He may also want to consider that during the short-term, such as one through four weeks, the productivity of shift work will be different than during the long-term, such as three months or more.

In situations of a controlled environment, such as a fabrication shop, there may be some advantages (or perhaps less disadvantages) to shift work other than for those outlined above. These factors include using a plant twice, thus cutting the fixed overhead cost; fewer interruptions on the work force; and less supervisory problems. The latter is true since fabrication work tends to be production-type work and information is normally passed directly to the tradesman by fabrication drawings or fabrication tickets.

In some regions of the country, such as summertime in the Southwest, weather and temperature conditions may be such that it would be an advantage to work shifts. If so, this should be considered by the contractor. If the contractor is in the position of being able to make a decision as to whether to use shift work or overtime, he should determine a total productivity factor for shift work and compare this with the productivity factor for overtime work, as described in other Management Methods Bulletins. (See “Factors Affecting Labor Productivity” on page 77 and “How to Estimate the Impacts of Overtime on Labor Productivity” on page 105.) This information should be used in making the final decision.