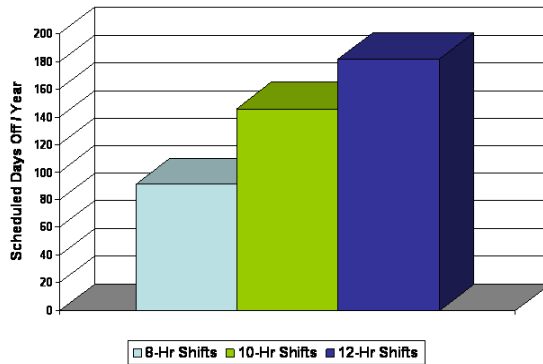


Schedule Design Consideration #2: Shift Length

If you're thinking about adopting a different shift length, there are five things you should be familiar with: (1) the impact on days off, (2) the impact on weekends off, (3) the staffing requirements, (4) the distribution of the workload, and (5) health and safety issues.

Days Off

Many workers prefer to work more hours each day in order to get more days off. They may hate working the longer shifts, but they love the extra days off. The graph below shows the annual scheduled days off associated with the three most common shift lengths:



Supporting information:

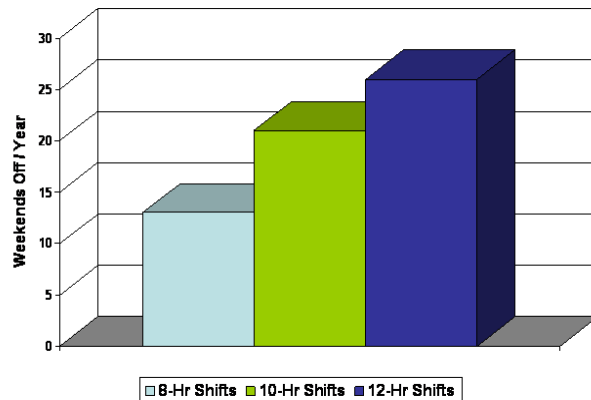
8-hour shifts: Days off are based on 4-crew schedules (91 days off/year).

10-hour shifts: Days off are based on 5-crew schedules (146 days off/year).

12-hour shifts: Days off are based on 4-crew schedules (182 days off/year)

Weekends Off

Increasing the number of weekends off is a common reason for adopting longer shifts, though there are other schedule features that also affect weekends off. The graph below shows the maximum possible number of weekends off per year with the three common shift lengths:



Supporting information:

8-hour shifts: Weekends off are based on 4 crews working 7 consecutive days (13 weekends off/year).

10-hour shifts: Weekends off are based on 5 crews working 3 and 4 days in a row (21 weekends off/year).

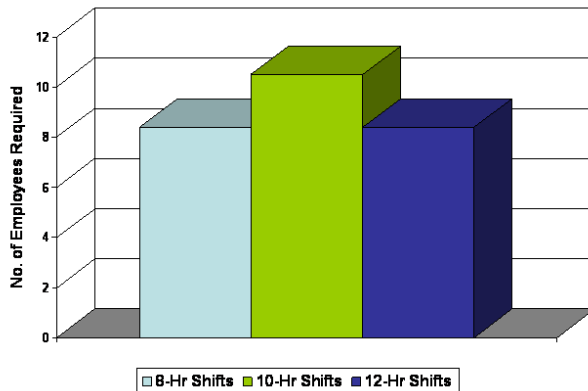
12-hour shifts: Weekends off are based on 4 crews under a variety of configurations (26 weekends off/year).

Notes on days and weekends off:

- (1) All schedules average 42 hours of work per week.
- (2) Figures are based on level coverage (the same number of employees working on every shift).
- (3) The actual number of weekends off depends on more than shift length. Other factors are the number of days worked in a row, the pattern of on-off work days, and the day the pay week begins.

Staffing Requirements

For 24/7 operations that require the same number of workers on every shift, 8-hour and 12-hour schedules have identical staffing requirements. Most 10-hour shift schedules require 25 percent more personnel because you are staffing for 30-hour days (three 10-hour shifts). The graph below shows the staffing requirements for one person working on every shift. If you need 5 people on each shift, you simply multiply these figures by 5.



Supporting calculations:

8-hour shifts: $1 \text{ employee} * 3 \text{ shifts} * 8 \text{ hours/shift} * 7 \text{ days/week} / 40 \text{ hours/week} = 4.2 \text{ total employees}$

10-hour shifts: $1 \text{ employee} * 3 \text{ shifts} * 10 \text{ hours/shift} * 7 \text{ days/week} / 40 \text{ hours/week} = 5.25 \text{ total employees}$

12-hour shifts: $1 \text{ employee} * 2 \text{ shifts} * 12 \text{ hours/shift} * 7 \text{ days/week} / 40 \text{ hours/week} = 4.2 \text{ total employees}$

Notes on staffing requirements:

Staffing requirements (e.g., the 4.2 people needed for 8-hour shifts) can be handled by either of the following:

- (1) 4 full-time employees plus an average of 2 hours of overtime per employee every week. The overtime is built into the schedule to ensure proper coverage at all times.
- (2) 5 full-time employees with no built-in overtime. The "extra" person would be used to eliminate overtime and to cover for absences such as vacations, illness, training, etc.

Workload Distribution

If your workload is relatively constant throughout the day, you need the same number of employees working at all times. A steady workload distribution like this is best suited for 8-hour or 12-hour shifts. 10-hour shifts would only work if you could get by working 20-hours a day (two 10-hour shifts). The 4-hour gap could be used for maintenance or down time. If you tried to cover the entire day with 10-hour shifts, you would have 6 hours of overlap. This means double coverage for 6 hours every day of the week and a 25% increase in your staffing requirements.

On the other hand, if your work volumes are not constant throughout the day, the best shift length depends on the magnitude and duration of your busy periods. Many organizations define the workload according to their current shift length. For example, "We need two people from 7 a.m. to 3 p.m., four people from 3 p.m. to 11 p.m., and one person from 11 p.m. to 7 a.m." A preferable approach is to look at the workload in one-hour increments to identify the actual duration of the busy and slow periods. It may turn out that a combination of different shift lengths is the best match with your workload.

Health and Safety Issues

Anyone who has spent time researching the impact of longer shifts on employee health and safety will surely be confused by the conflicting results. Some articles say that after 8 hours alertness and productivity start to decline. Others say that productivity increased after workers changed to 12-hour shifts.

The confusion stems from comparing dissimilar situations. Researchers may have compared one group on an 8-hour **fixed** shift schedule with another group on a 12-hour **rotating** shift schedule. They didn't factor in different schedule variables, such as the on-off work pattern, the amount of overtime, shift start times, and so on. They also did not consider worker characteristics or the work environment. Problems they attribute to working longer shifts may be the result of these other factors in combination with the shift length.

Based our experience with organizations that have adopted longer shifts, we have not found problems as long as the schedule is well designed, with sufficient time off and reasonable limits on the number of consecutive days worked. There are some jobs that are not suited to longer shifts (such as tedious detail inspections). Jobs with exposure to extreme heat, loud noises, toxins or heavy physical labor may simply be too much to endure for more than 8-hours.

While longer shifts are certainly popular nationwide, they are not the unanimous preference of all shiftworkers. Shiftworkers that are older, have childcare concerns, are going to school, have second jobs, or participate in other non-work activities on workdays often prefer 8-hour and 8&12-hour shift schedules. For your employees to make the right choice on shift length, they should be given a clear understanding of what they are getting into and what patterns are available. When employees are involved in the decision to adopt longer shifts, they are much more likely to support the change.

Here are a couple of research citations for those of you inclined to read these things:

Caruso CC (2006) Possible broad impacts of long work hours. *Industrial Health* 44 (4): 531-36.

Dembe AE, Erickson JB, Delbos RG, and Banks SM (2005) The impact of overtime and long work hours on occupational injuries and illness: new evidence from the United States. *Occupational Environmental Medicine* 62: 588-97.

Folkard S and Lombardi DA (2004) Modelling the impact of the components of long work hours on injuries and "accidents." Paper presented at conference on *Long Working Hours, Safety, and Health: Toward a National Research Agenda*, University of Maryland, Baltimore, Maryland.

Knauth P (2007) Extended work periods. *Industrial Health* 45 (1): 125-36.

Smith L, Folkard S, Tucker P, and Macdonald I (1998) Work shift duration: a review comparing either hour and 12 hour shift systems. *Occupational Environmental Medicine* 55: 217-29.

Tucker P (2006) Compressed working weeks. *Conditions of Work and Employment Series No. 12*. International Labour Office - Geneva.

Vila B (2006) Impact of long work hours on police officers and the communities they serve. *American Journal of Industrial Medicine* 49: 972-80.

Summary

The number of days off will vary in direct proportion to the length of the shift. 12-hour shifts will provide twice as many scheduled days off per year as 8-hour shifts.

The number of weekends off will also increase with longer shifts, though other factors such as the number of days worked in a row can have a larger impact.

For a given level of coverage, 8 and 12-hour shifts require the same number of personnel (unless you offer fixed shifts). 10-hour shifts usually take more personnel because you're scheduling for 30-hour days (three 10-hour shifts).

10-hour shifts are not advised for level coverage requirements. They are best suited for workloads that are higher for part of the day.

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