



PAPER MILL

# Challenge: Conversion from Eight-hour to Twelve-hour Shifts

Circadian helped to facilitate a change from 8-h to 12-h shifts in a paper mill located in a small mill town, employing approximately 200 shiftworkers. The evaluation involved a collaborated process with the employees and included providing scheduling education and soliciting employee input through a diagnostic survey which included questions about background, lifestyle, health, sleep, alertness, safety, social and family life, job evaluation and schedule feature preferences. CTI then analyzed the effects of the new schedule on sleep, health and general well-being, alertness, job attitude and safety. Data was collected before the scheduling change and six months after the implementation of the new schedule to obtain the comparative analysis.

For both schedules, a complete cycle comprised of 28 days. The 8-h schedule featured a weekly, backward rotation with shift changes at 7 a.m., 3 p.m. and 11 p.m., as follows:

N	N	N	N	N	N	N
-	-	A	A	A	A	A
A	A	-	M	M	M	M
M	M	M	-	-	-	-

The new schedule was a forward rotating 12-h schedule with shift changes at 6 a.m. and 6 p.m. Forward rotations are biocompatible because human biology runs clockwise.

D	D	D	-	-	-	N
N	-	-	D	D	D	D
-	-	-	N	N	N	-
-	N	N	-	-	-	-

(N = night, A = afternoon, M = morning, - = day off, D = day)

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Alertness levels while working were similar with both schedules, and the number of self-reported accidents decreased after the change. Regarding accidents or injuries at work, the percentage of employees who reported at least one accident decreased from 29% to 18% and those who reported near-accidents from 58% to 32%. The percentage of employees reporting near-accidents while driving decreased from 60% to 38%, while there was no difference in the reported number of accidents for 8 vs. 12-hour shifts.

The conversion to the 12-h schedule also had a positive effect on job performance and attitude. Overall, 73% of employees reported being satisfied/very satisfied with the new schedule. Approximately two thirds of employees agreed that team morale and attitude had improved (61%) and that absenteeism and turnover had decreased (57%) with the new schedule. The new schedule also had a positive impact on family/social life. The percentage of employees reporting difficulties maintaining quality of family/social life decreased from 61% to 13%.

Thus, the overall impact of the conversion to 12-h shifts was very positive. Several factors contributed to this result, and among them appears to be the type of schedules involved (previous vs. new schedule), the workload, and the process for determining and implementing the new schedule. In this case study, the change was from a weekly, backward rotating schedule to a forward rotating schedule. A large number of research studies have concluded that to minimize the disturbances of the circadian system, clockwise rotations are preferable (Knauth 1995). In addition, the 8-h schedule sometimes provided only 1 or 2 consecutive rest days between shifts, which is considered insufficient for full rest and recovery. The workload and type of task involved can also have an influence on the acceptability of 12-h shifts. In the paper mill, although there are periods of very high activity, the average workload is not excessive and employees can sometimes move around the plant and interact with each other. Other work stressors present in a paper mill, such as noise and heat, have been cited as factors that could aggravate the potential fatiguing effects of longer work periods, although they did not seem to have played a major role in this study.