

PANEL SESSION ON DESIGNING SHIFT WORK SYSTEMS
TO IMPROVE PERFORMANCE AND ALERTNESS:
WHAT DO WE KNOW AND WHAT DO WE NEED TO KNOW?

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Approximately 20% of the full-time non-farm workforce in the United States is employed on work systems using schedules other than a fixed day shift of 8 (or less) hours duration. Similar world-wide estimates have been made for industrialized countries by the International Labor Office. Work schedules grouped within these systems include permanent night shift work, rotating shift work, and regular work on shifts of greater than 8 hours duration. A number of factors encourage the use of these systems: many new industrial processes require continuous staffing; the number of industrialized countries is increasing; capital equipment costs can often be reduced by increasing or changing the hours of operation; many workers are interested in a workweek of less than five days; and, there has been a general increase in the demand for around-the-clock services.

Numerous studies of experienced shift workers conducted during the past ten years have shown that most night work schedules decrease sleep time, disrupt biological rhythms, and may increase fatigue. Decrements in performance and alertness associated with night work have been demonstrated in experienced workers. Recent data suggests that increased use of extended workshifts, under compressed workweeks, may exacerbate these decrements. Such decrements may be especially apparent at night when fatigue from longer hours can summate with circadian rhythm-related declines in alertness. Although definitive workplace data is difficult to obtain, it is reasonable to argue that many 'round-the-clock shift systems significantly decrease workplace productivity and compromise worker safety and health.

Despite potential productivity, health, and safety compromises,

there is little to suggest that shift workers or their management have discovered healthy and safe ways to adapt to, or cope with, their work schedules. That is, experienced shift workers still report inadequate rest and recovery, high stress, and gastrointestinal problems which are attributed to their work schedules. Presumably, optimal shift systems and individual coping methods can be devised which will minimize fatigue, promote adjustment, improve safety and health, and increase productivity. Shift system interventions are now being made with these objectives in mind. However, the appropriateness and merits of the various intervention techniques have not been publicly reviewed or discussed. This is the objective to the panel.

Each of the panel members has conducted research aimed at understanding how these intervention techniques interact with performance and recovery of function. The panelists will review what we currently know about potential shift work interventions, and attempt to identify what we need to learn if continued progress is to be made toward optimal shift system designs and effective personal coping strategies. The individual members, dimensions, and techniques to be reviewed and discussed are as follows:

Timothy H. Monk will review 'Manipulating sleepiness by varying chronobiological napping, schedule, and performance demands'. Dr. Monk conducts biological rhythm research at the Western Psychiatric Institute of the University of Pittsburgh. He is co-editor of the book Hours of Work, and co-author of the chapter on 'Work Schedules' in the Handbook of Human Factors.

Michael H. Bonnet will review 'Physical fitness, exercise, and environmental variables as factors

influencing adjustment to shiftwork'. Dr. Bonnet is Director of the Sleep Laboratory at the Loma Linda Veterans Administration Medical Center, and a former member of the Executive committee of the Sleep Research Society.

Charmane Eastman will review 'Exposure to light as an aid or deterrent in adjusting to shift work'. Dr. Eastman is a member of the faculty in the Department of Psychology at Rush University. She directs a research program examining how light exposure timing affects the ability of shift workers to adjust to changing hours of work.

Donald I. Tepas will review variables related to the question 'Do eating and drinking habits interact with work schedule variables?'. Dr. Tepas directs the Division of Industrial & Organizational Psychology at the University of Connecticut. He co-authored the handbook chapter on 'Work Schedules' with Dr. Monk.

Richard R. Bootzin will review a broad range of 'Behavioral techniques for changing alertness and performance' which could be used to train individuals to optimize workplace activity. Dr. Bootzin is a Professor of Psychology at the University of Arizona, and the author of many articles on changing sleep-wake behavior using behavioral techniques.

James K. Walsh will review the research and efficacy of 'Using psychopharmacological aids to improve performance while working nights'. Dr. Walsh is Director of the Sleep Disorders Center at Deaconess Hospital in St. Louis. He is a member of the Executive Committee of the Association of Professional Sleep Societies.

James C. Duchon is a Human Factors Engineer at the U.S. Bureau of Mines Twin cities Research Center. He will serve as a discussant and conclude the panel by providing a comprehensive summary. In doing this, he will explore how these divergent intervention techniques

might be used in a systems approach to shift design and workplace intervention.

Roger R. Rosa (chair) is a research psychologist with the Division of Biomedical and Behavioral Science of the National Institute for Occupational Safety and Health. He is currently directing a project examining changes in performance and alertness associated with 8-hour and 12-hour shifts, and a project on interventions for adapting to night and shift work.