UNCONVENTIONAL WORK MEASUREMENT TECHNIQUES

Tom H. Maze, Iowa State University

Conventional work measurement systems (i.e., stopwatch based time standards) were developed for production environments where the conditions from one job to the next are largely the same and workers conduct repetitive activities. Unlike a production environment, motor vehicle maintenance work tends to be non-repetitive and conditions vary from one job to the next. For example, even though maintenance problems may be diagnosed as needing the same type of repair, and the results of the maintenance activity are the same, the exact same method of repair can seldom be used. As an illustration when diagnosing the need for the replacement of a part, it is not known if the bolts that must be removed to disassemble the part are rusted tight, or if they will come off smoothly. Depending on the state of the bolts, a different repair method should be chosen. Further, mechanics are often required to do a very broad variety of different jobs. For example, a study at the Chicago Transit Authority estimated that their bus mechanics commonly conduct 1,800 different tasks. Thus, work conducted by maintenance workers tends to be diverse and non-repetitive, and work condition are varied. The attributes of motor vehicle maintenance work are quite different than those of production work environments.

Because of the non-repetitive nature of maintenance work, unconventional methods are more appropriate for measuring work and managing productivity. Further, easily implemented unconventional methods are more appropriate within small organizations, where maintenance management is unlikely to receive outside professional help in the development of time standards and other work measurement systems.

Two approaches are proposed for better management of labor time allocation. The first approach involves the use of work sampling to understand how mechanics within the maintenance shop allocate their time to direct and indirect activities. Typically, mechanics in governmental agencies spend only 50 percent or less of their time actually conducting mechanical work. Once management understands how time is being allocated, they can begin to engineer methods to reduce time wasting activities.

Work sampling involves randomly observing mechanics and recording the activity they are currently conducting at that given instant. When enough samples are taken, they may be pieced together to describe the mechanic's entire work day. The taking of samples is generally a rather uncomplicated task.

The second method uses time slotting to develop time standards for maintenance tasks. Time slotting recognizes that it is impractical and uneconomical to setup an accurate time standard for every maintenance job. Instead, each job is assigned to a time slot. For example, suppose that the time slots are 0.5 hours wide, where the first slot is 0.0 to 0.5 hours, the second slot is 0.5 to 1.0 hours, and so on. Every job that requires between 0.5 hours and 1.0 hours should be assigned to the second slot and given a time standard equal to the average time of the slot, 0.75 hours. Because the pluses and minuses will

eventually balance-out, the mean time will be sufficiently accurate for measuring maintenance work. For example, in studies of the use of time slotting in plant maintenance, overall time estimates were found to be within 5 percent of what actually occurred.

As jobs appear in the work flow, they can be added to a slot based on experience and judgement.