In nearly all of the 250 or so equipment-intensive plants and facilities I have visited, taught, and worked in over the past 30 years, I have observed the relationship between the skills of employees and the reliability of the equipment. These observations may provide helpful insights for plant and facility managers who are troubled with unreliable equipment and high maintenance costs.

Observation 1: There is a direct correlation between the way plant-floor people are treated and the reliability of the equipment for which they are responsible. Clean and reliable equipment usually means that employeesî needs are regularly addressed. The people are listened to. The same applies to the equipment--its needs are also regularly addressed, its needs are "listened to." Responding in a proactive manner to people typically results in proactive maintenance of the equipment. A work culture of "equipment ownership" develops.

Observation 2: The highest levels of equipment reliability exist where skilled maintenance people operate the equipment. Likewise, the lowest levels of equipment reliability exist where unskilled or semi-skilled people operate the equipment. There is a direct correlation between equipment reliability and the equipment-specific skills and knowledge of equipment operators.

The conclusions from these first two observations? Equipment-specific skills and knowledge improve equipment reliability. The positive attitudes of employees lead to more reliable equipment. So why don't all managers and supervisors, all levels of decision-makers and leaders in a business, emphasize the well being of their people and equipment alike? This is a real mystery to me.

Observation 3: In the United States we are firmly in an era where there is a shortage of skilled employees in manufacturing and maintenance. Fewer young people are being encouraged to undertake this kind of work. There is also a trend of having operators perform routine maintenance on their equipment. This trend makes sense, but only if handled properly--the right tasks, the right training, the right people, for the right reasons. However, overall productivity can suffer if downsizing maintenance results in more operator-performed maintenance that takes time away from their "operating" job roles and responsibilities. There must be a careful balance.

Observation 4: We are in another cyclical era of improving performance by cutting costs. Often, cost-cutting programs have a negative impact on employees' workloads and attitudes, which can be directly linked to more equipment reliability problems. This in turn increases costs and reduces operating efficiency, or throughput. It appears easier to look at overall cost reductions rather than finding ways to reduce the cost per unit produced by improving equipment reliability and work processes.

A vision of the future. Reliable equipment reduces overall operating costs by producing more first-pass quality production during the scheduled time available. People waiting for equipment to be fixed, people waiting for product at the next stages in the process, in-process inventory buffers, and customers waiting for orders add up to significant losses. These losses are exponentially higher than the cost of an emergency, reactive repair.

Unreliable equipment is not necessarily a positive motivator of people either. If left unchanged, unreliable equipment leads to more unreliable equipment and then the "escalating costs must be cut!" Remember that there is a direct correlation between the reliability of the equipment and the way the plant-floor people are treated.

Henry Ford said it best when describing the "Ford principles of management" in his 1926 book, *Today and* Tomorrow: "Put all machinery in the best possible condition, keep it that way, and insist on absolute cleanliness everywhere in order that a man may learn to respect his tools, his surroundings, and himself." This was one of the many concepts from Ford Motor Co. that led to the development of the Toyota Production System, Total Productive Maintenance, and Just-in-Time manufacturing from the early 1900s through the 1970s in Japan.

The future of equipment-intensive businesses will always depend on the people who operate and maintain the equipment, and their on-going dialogue with those who design, build, and manufacture the equipment. There is no way around it. People, the work processes they use, and the equipment they work on are the roots of productivity in the workplace of the 1920s --and the workplace of the future. **MT**