

# Leaning Toward

## Cells

*Many lean implementations in the US do not focus on the worker side of the equation.*

*Ruari McCallion says that may be why Japanese productivity levels are so much higher than ours.*

**R**esearch presented at the European Operations Management Association's annual conference in Copenhagen in June by Professor Nick Oliver of the University of Cambridge, England, had some startling findings. Between 1994 and 2000, productivity in Western car plants declined by 2%, despite massive investments in automation and cost cutting. In Japanese factories surveyed, productivity increased by 20%.

If American companies are to compete with the Far East, especially on labor costs, improvements are vital. Unfortunately, lean

implementations in the US often do not fully address worker productivity.

"Set up a CCTV system at a changeover point on a traditional assembly line, and you can see people disappearing to get something and come back," said Jeff Moore, manufacturing specialist at Wisconsin Manufacturing Extension Partnership in Madison.

Traditional long assembly lines are wasteful because necessary tools and equipment aren't at hand, problems stop workflow throughout the operation, time is wasted waiting for materials, and people are underutilized. Large batches need

large inventory, which means lots of work in progress (WIP), and total quality is almost impossible to achieve. Quality assurance addresses the symptom, not the disease. “People generally aren’t the problem, assuming they’ve been properly trained,” said Moore. “The driving force is to eliminate waste and get product to move through the process faster.”

Cellular manufacturing, sometimes called flowline manufacturing, is one way to improve the process. Layout considerations include minimizing body motion, avoiding unnatural postures and movements, and organizing the workplace so that movements are easier and lighter to perform, so operatives can concentrate on their work. To make the more flexible layout operate effectively, workers need to be multi-skilled and able to produce entire products or modules.

“The appeal of work cell manufacturing is that it helps organizations use their resources very effectively to meet customer demand,” said Bob Bailey, principal with Oliver Wight. “They’re designed so they can be staffed with more or fewer people, based on customer demand.” All the workers are in close proximity; the cells are shaped into a U pattern, with the people on the inside. In sharp contrast with the traditional factory layout, tools and activities are grouped together into product families, rather than traditional piece-by-piece progression. Communication is improved: if a worker down the line encounters a problem, a long assembly line inhibits communication. In a U-shaped layout, workers simply turn around and jointly resolve problems, which leads to shortened response time and improved quality.

“Staffing of the cell is determined by the total value-added time it takes to make the product and takt time,” Bailey explained. Takt is German for beat, and is the beat or rhythm of the line. Its formula is available work time divided by customer daily demand; the number of people required is calculated as value-added work content divided by takt. A product comes out of the cell with every beat of the takt.

The results can be dramatic. Thomas Schoaf, president of airbag inflator manufacturer Adapto, says his company’s plant at Goodyear, Indiana has achieved zero work in progress since moving to

cellular manufacturing. Examples from Oliver Wight include a power cord products manufacturer that cut cycle time from hours to 116 seconds, nearly doubled daily throughput, and cut defects from 6.7% to 0.3%. An electronics equipment company saved a contract with a major customer by achieving reductions in cycle time of 97% to 99%, productivity increases of 100% to 261%, reduction in batch sizes to single units, WIP down by between 50% and 93%, and 100% on-time delivery.

The time taken to deliver improvements can be startlingly short: the power cord and electronics manufacturers achieved their dramatic improvements in four to five days, and a capital equipment manufacturer cut its finished goods inventory by over 75% in three months. Depending on scope, a one-week engagement costs in the region of \$15,000 to \$30,000, according to Bailey, so ROI can be achieved amazingly quickly. However,

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successful introduction depends on how hard the company drives implementation and on its mindset.

“The Japanese believe quality is a process, not a destination. There’s a Western tendency to think: now I have Six-Sigma, Five-S, or whatever, I can stop,” said Don Reinertsen, a product development guru. There’s also a tendency to think how many people can I get rid of if I install this or to automate as much as possible, which freezes bad processes in place and costs a fortune to change.

“Before a cell is put in place, we put in a value-stream map. We look at where the waste is and organize the cell to minimize it,” said Moore. “The long-term objective is to get WIP time and value-added time to be the same. A company may have to redesign five to seven times before it gets really valuable.” Processes within the cell are kept simple: appropriate automation can be undertaken later, where it helps.

Cellular manufacturing isn’t a panacea: it’s an important part of a process of improvement. On its own, it won’t close the productivity gap between the US and the Far East, but it’s a giant step in the right direction. ●