Lean Manufacturing

Principles of Lean Process Improvement: Minimize Movement

Don Sears | Jun 18, 2018

Don't think the principles of lean manufacturing apply to your machine shop floor? Think again. Time is money. Movement takes up time. Tool, parts and MRO location and flow are important to minimizing machinists' time moving in your facility. Learn the benefits of cellular manufacturing, lean layout design and the organization of MRO parts.

Looking for tips on lean process improvement? Look no further than the employees on the shop or plant floor who may be ***wasting valuable production time*** searching for low-cost parts such as fasteners, bolts and nuts in a storeroom or workstation area. By designing the plant floor and immediate work areas to minimize employee movement and take advantage of cellular manufacturing, the productivity of machinists, operators and maintenance teams can be boosted, find lean manufacturing experts.

"Customers want products on time, with short lead times and first-time quality, so batch thinking and process-based departments are counterproductive to these goals," said Matt Zayko, a lean product and process development coach at the Lean Enterprise Institute, in an ***interview*** with Assembly magazine. "Lean layout designs need to support short, simple flows across facilities, from fabrication through final assembly."

What Is Lean Layout Design?

Simply put, lean layout design is a machine shop floor or production assembly line designed to maximize material part-making processes and eliminate as much process-time waste and spatial waste as possible—and movement is part of any process where a machinist, assembler or other production operator is in their workspace. The result? Better use of time and space by either the compression of time or the improvement of a process.

"Assume [an assembler walks 3 feet] per pace, with a one-second time frame per pace. In a three-shift operation at 400 units per shift, you would reduce walking by 12,000 paces a week," said Denis Groulx, then an associate at Lean Pathways Inc., in the Assembly ***article*** "Optimizing Parts Bin Layout." "That's 36,000 feet per week. [To put things in perspective], Mount Everest is just over 29,000 feet tall."

Lean Manufacturing Takes Root in Extrusion Screw Facility

Lean layout and minimized movement sounds great on paper, but does it actually help in the real world? The answer is yes, it can, with the right energy and participation from management and shop floor workers. Case in point: Wear Technology, an extrusion screw maker and refurbisher in McPherson, Kansas.

By going lean, the company realized key movement-reduction metrics that are netting out major lead-time and throughput improvements, as detailed by Modern Machine Shop in its profile of the company's efforts in the ***article*** "Lean Manufacturing Begins with Layout, Commitment."

Does 100-miles-per-year reduction in overall material handling distance sound good? It does when it leads to an average five-day-plus lead-time reduction in pre-inspection. Similarly, the company improved polishing throughput by nearly 50 percent.

"People understand that a lot of this is really about making their jobs easier—that getting such and such data is how we're going to justify getting them a new crane, or whatever the issue may be," Sachin Varkey, an engineer at Wear Technology, told Modern Machine Shop.

Lean Process Improvement and Cellular Improvement: How Do They Relate?

Lean layout design principles can take root in machine shops and other environments including MRO storerooms when designed in a cellular manufacturing fashion—where cells of machines or maintenance and repair functions are grouped together based on the parts they make or fix—rather than simply putting all the same type of machines right next to each other, find experts.

"The idea is bring together the machines, tools and materials needed to manufacture a particular type of part," writes Bob Warfield in his ***blog***, CNC Cookbook. "These parts all share similarities in geometry, manufacturing processes or functions, so having a specially designed machine cell that is optimized for producing them provides many advantages."

These advantages include minimizing excess MRO and parts inventory, overproduction, overprocessing, defects, and motion. Warfield explains:

"The more spread out a process is, the more opportunity for wasted motion. Keeping a cell small and well organized for a more defined set of operations (due to the similarity of part families) helps reduce wasted motion."

Warfield also advises machine shops to follow the best practices, including:

- Choose a family of parts that can go together and minimize the variety.
- Use a value stream process map to help identify and group cell families.
- Use the mapping to help group the cell of machines and number of people needed to work in the cell.

Another benefit of a cellular approach is the ability to more easily track MRO flow and schedule work when you know the details of a cell's particular work type and output. It can be easier to get answers

when you know where to look based on knowing the function of a specific cell.

Is this all of this too theoretical for you? Take a look at what happens when a machinist's core skills are spent away from production work. Read "Stop Looking for That .10 Cent Part: Calculate Your True Shop Rate."

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Lean Layout Design Tip: Organize Parts in Bins At the Machine Cell or Nearby Storerooms

At its core, lean-layout design with a cellular manufacturing approach is really all about having the configuration of working elements—tools and labor—in proximity to each other. You wouldn't organize all the work processes next to each other and not keep the often-used parts—including low-cost fasteners, bolts, nuts—and others that might be part of routine machine maintenance.

If you're going all in on the machine cell approach, it follows that the parts needed for the machines should also be nearby. Part racks and bins can be positioned over, under or next to workstations, but when it comes to keeping lean, minimizing movement and maximizing productivity should be the goal. Some experts advise that parts that are used the most be placed in the most ergonomically available spots in a machine or work cell area—whereas heavier parts can go below—and slower-to-use parts can go above a workstation.

Unfortunately, material movement is often ignored. "It's often the last thing people think of when setting up a work cell or assembly line," said Rick Harris, president of Harris Lean Systems Inc., in an ***interview*** with Assembly magazine. "Sometimes, there is conflict between material engineers and manufacturing engineers. There are lots of personal opinions about the best way to position parts bins."

In assembly settings where a lot of low-cost parts and fasteners are used, experts advise parts bins be organized in what they dub the "two-handed reach zone," which is "ideally 325 millimeters in diameter from the front and center of the workstation," said Kurt Greissinger, then industry segment manager at Bosch Rexroth Corp., in the Assembly magazine ***article***. "This allows the parts to be within the field of view of the operator and allows for fine motor movements of fingers and hands."

Excessive movement can also be reduced by ensuring the correct parts are located in the right bin every time. "Mixing parts in the same bin, especially small ones, is a productivity killer," Erica Rice, then vice president of marketing at Production Basics, told Assembly. "Operators waste time digging through the bin for the right part and ultimately end up handling all the parts multiple times."

With the right design and organization techniques, movements can be engineered to be more efficient and help keep workers focused on doing their valuable work. But remember this: Whether or not you completely adopt lean manufacturing in your plant, you can always choose to take a lean approach to managing your parts inventory to help reduce excess movement and energy—and keep your MRO parts supply at the ready to help meet production deadlines.