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Universal Fixturing System Reduces "Downtime" in Your Inspection Process

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Quite often in manufacturing, an inspection department is treated primarily as a necessary overhead expense required to assure compliance to customer specifications. Sometimes an inspection department may also be treated as a profit center for compliance to a variety of test protocols dictated by external agencies, or perhaps internal procedures to demonstrate traceability to certain quality standards.

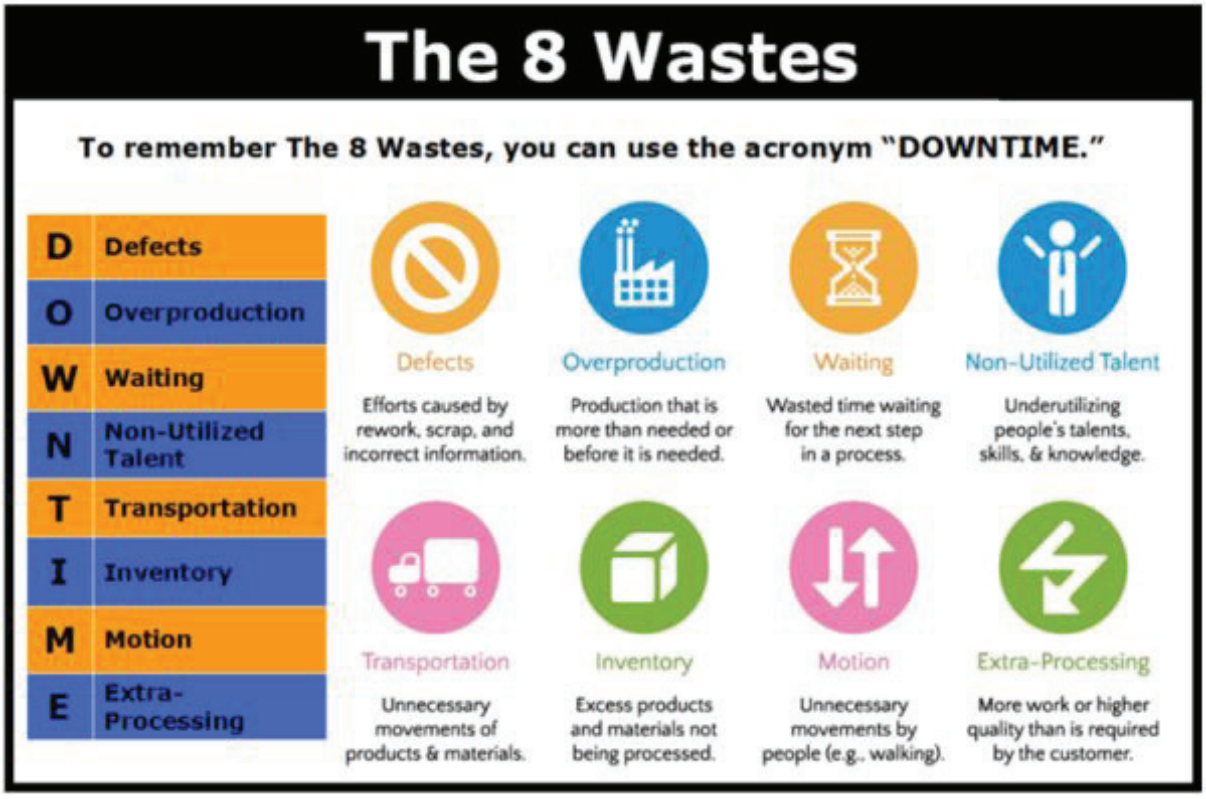
However, for those of us who are practitioners of Lean principles, we quite often discover rich sources of opportunities for reducing, if not eliminating, a variety of non-value activities in your inspection processes that ultimately not only improve customer satisfaction but also improve your company profitability by systematically identifying and addressing the eight (8) wastes often encountered.

Dwighd Delgado is the founder and owner of Strategic Operations Solutions, LLC, leveraging his talents and expertise by addressing opportunities in the critical relationships between Strategy, Best Practices, and Right People in the Client's business.

Having been in the trenches in many companies doing the work that I do, I realize that most manufacturing facilities don't really know how much profit is hidden in the inspection area of their company. Tasked with examining the processes for these "hidden in plain sight" opportunities, start by taking a closer look at the existing in-process and final inspection protocols being used, for things such as:

- Time it takes to verify a part or part family, and the spindle down-time
- Cost of producing bad parts while the operator waits
- Excessive movement of parts and personnel
- Time it takes to build and rebuild fixtures, repair or replace damage to probes

- Cost of machining simple fixtures internally, and the hourly rates for the lab and machine operators



But what if we mapped your inspection processes from beginning to end and systematically identified and addressed most of the eight (8) common wastes of Lean often encountered in the most critical steps in manufacturing? And what if the improvements identified enabled a rapid return on your investment by addressing many of these wastes while creating the opportunity for improved customer satisfaction and company profitability?

While there may be some awareness of the process improvement opportunities, a clear picture of the magnitude of the potential savings may elude us. This article should help to raise awareness with company owners, business and production managers, process and quality engineers, machine operators and inspectors alike.

Most solutions include the addition of new and more technologically advanced equipment. Whether placed in the metrology lab or in work cells on the shop floor, new machines offer faster and more accurate checking with easier and more robust software. Adding equipment in the lab, or on the shop floor at the spindle or a work cell certainly expands the inspection department, speeding part verification.

However, the addition of the equipment rarely includes effective fixturing. For example, many manufacturers that I visit forego fixturing due to the expense, lead times, or its functional limitations. In many cases, shops assume that they can make inspection fixtures for less money than purchasing a more readymade solution. This may not be the case in today's world.

A few years ago, I found a fixture system that I could recommend to resolve many of the eight (8) wastes of Lean typically found in inspection processes that are candidates for significant improvement. Let's examine how a unique fixture solution -- both effective and

affordable -- can improve customer satisfaction and profitability from spindle to inspection and back again.

The Inspection Arsenal™ System and the Eight (8) Wastes of Lean

Inspection Arsenal™ is the only, Lean, universal fixturing system that provides a complete line of tools simple enough to be used by both machine operators and inspectors anywhere in the manufacturing process.

Key features include multiple sized modular and magnetically interlocking quick-swap fixture plates and docking rails that adapt to your equipment and unique applications. Many of the unique non-marring work holding components have a trigger-action or air-assist feature for quick-swap of parts. Machine operators and inspectors can quickly and easily be trained to use this simplified fixturing system that can be used across all inspection equipment.

Waste is any step or action in a process that is not required to complete a process (called "non-value added") successfully. When waste is removed, only the steps that are required (called "value-added") to deliver a satisfactory product or service to the customer remain in the process. To remember the eight (8) wastes, use the acronym "DOWNTIME." The inspection step of the process is usually considered "non-value added" unless a company negotiates reimbursement. Therefore, it is an important area for improvement to save money on jobs running through your company.

Looking at waste generally, there are a number of benefits of a system like Inspection Arsenal™ that addresses most of the 8 wastes. This system offers the ability to adapt and reuse existing fixtures, is compatible with existing work holding, helps to create the redundancy of process for a short learning curve and start-up, and fixturing can be ordered a-la-carte (as simple as a rail and a plate to start) as required by the job.

Defects

Defects are reduced with faster inspection -- it's that simple. When parts are verified quickly, operators run parts with confidence. If a spindle is stopped waiting for verification, there is an additional incurred expense that needs to be factored.

Lincoln Tool & Machine, of Hudson, MA provides an example of how they reduce defects and optimize spindle-time. "We have a bottleneck in our QC department because our new Palletech machine produces parts faster than we can inspect -- even with our automated CMM's," says Scott Ferrecchia, President. "The action of these new clamps helps us inspect parts faster -- boosting productivity of both machines. We're able to verify the quality of more parts early in production."

Overproduction, Inventory, and Extra Processing

Faster inspection can also reduce the need to produce more parts than the customer order requires. Good parts being produced more consistently reduces piece count. Outdated 1-

piece grid plates require extra processing -- the setup and breakdown of multiple part setups throughout a shift.

Plates that can be swapped out quickly offer a new kind of flexibility for multiple setups and quickly exposes the granite to check large bulky parts or to use it as a datum. Companies who forgo fixturing altogether also face having to recreate time consuming setups with the use of rudimentary tools, such as blocks, tape, glue and putty. Customers do not want to pay for the extra non-value added processing time for inspection.

Even if CMM's are upgraded, or added, the Inspection Arsenal™ system can adapt. Simply add a locating rail on the new machines, and fixtures can be moved from one machine to another. Fixture plates and work holding also work on or in conjunction with existing plates.

"We do both first part and in process inspections. Our table has to be flexible enough to adapt to a variety of parts and to adjust to part changes on quick notice. Inspection Arsenal's interlocking system enables us to accomplish this goal. Because of its repeatability we have almost eliminated manual alignments after the initial setup. Its versatility has given us much greater latitude in our setups," says Don Beasley, Owner Southern Machine Work of Duncan Oklahoma.

Waiting

Manufacturers have perfected shop floor fixtures that reduce machining time. Now, similar fixturing practices can be accomplished easily in inspection. Implementing a system that includes off-the-shelf, ready-made plates offers the ability to create simple and low-cost dedicated fixtures.

Fixtures can be checked on any inspection equipment that is free. Inspectors or operators can move fixtures from one machine to another. Companies can employ CMM palletization features and set large part lots to run lights-out.

Linda Tool of New York makes use of inexpensive dedicated fixtures to swap setups quickly. "We create a simple fixture for each of our long-running jobs that we quickly swap in and out for a much faster inspection process. You'll see several of our fixtures here -- at least 35 unique fixtures -- that are marked per the job to make retrieval and setup fast," says Shlomo Mordechai, Quality Engineer. "We inspect the parts during the run. The machine operator will take the fixture, assemble the part and call the program up and inspect them. The learning curve was very fast, as well."

Non-Utilized Talent

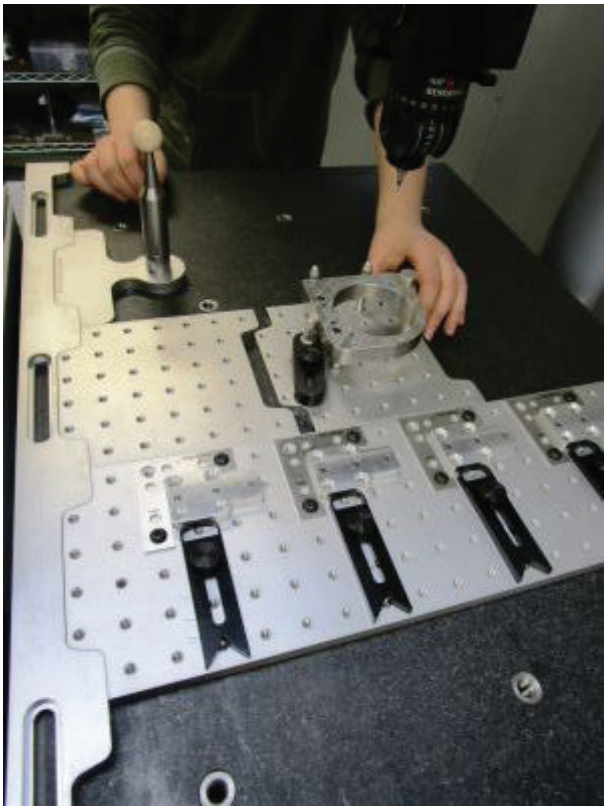
The simplicity of the system increases the number of employees who can inspect effectively, expanding the effectiveness of quality personnel. Operators can verify parts in the work cell on the shop floor. The number of parts inspected per shift increases dramatically.

Milwaukee Tool of Wisconsin is standardizing corporate-wide from the U.S. to China to reduce training time, increase the number of inspectors, and speed the overall process.

"Inspection Arsenal™" has revolutionized the modular fixturing for CMM's and Vision Systems. Due to the innovative Loc-N-Load™ system, they have been able to maximize their measuring volume of their machines.

Transportation and Motion

The Inspection Arsenal™ fixture system creates a standardized product/process across all inspection equipment, company-wide. For large part production, the same part can be fixtured on more than one plate so that two or more operators can inspect on multiple CMM's. Fixtures can be run simultaneously.



As a reseller and training facility, Methods Machine Tool Sales of Sudbury, MA saves time switching gears from training to test inspections for customers. Tom Oakes, Quality Applications Engineer, says, "We are constantly shuffling between CMM training classes, customer demos, and turnkey inspections. The quick-swap features of Loc-N-Load™ and Open Sight™ fixture systems from Inspection Arsenal™ make moving between these setups quite simple and efficient."

The above experiences provide real world examples of some of the opportunities that can be achieved through the use of a fixturing system when deployed with a conscious effort to mitigate, if not eliminate, the eight (8) wastes commonly found in today's more complex manufacturing environment, whether on the plant floor or in an inspection department.

Improved ROI for Increased Profits

Now that you know that the ability to deploy a Lean process in an inspection environment is readily available, there are some key factors that you must consider when determining your inspection costs. The following partial list can assist you in pinpointing that cost:

- Shop labor hourly rate
- Metrology Lab hourly labor rate
- Value of rejected product $ in-process
- Value of rejected product $ in final inspection
- Value of rework $ incurred throughout
- Annual warranty returns in $ or % of revenue
- Penalty $ for missed deadlines that could lead to a revoked contract $
- Value of your reputation if impacted by unsatisfied customers

- Annual Cost of Quality $ overall
- Make (design, material, labor, machine time, etc.) versus Buy (purchase) decisions for fixturing costs
- Value of standardized and modular fixturing equipment and processes that minimize personnel training

Not uncommon, let's use the example of Triangle Manufacturing and the savings they realized on one project -- using just a few of the considerations listed above. Applying a conservative $100/hour for their metrology lab rate, 100 percent inspection on 3,120 pieces of a complex medical device with a savings of 35 minutes per piece. The customer equates more than $125,000 of the total savings to the technique introduced by a quick-swap system.

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