

THE ROLE OF HIGH PAYOFF ACTIVITIES IN PRODUCTION EXCELLENCE

Small steps can yield big dividends in the never-ending quest for process improvement.

BY FOCUSING ON HIGH PAYOFF ACTIVITIES THAT MOVE THE PERFORMANCE NEEDLE, ORGANIZATIONS CAN ATTAIN A HIGHER STATE OF PRODUCTION EXCELLENCE.

For manufacturers in the electronics and PCB industries, consistently producing quality products is the baseline for success. But the measure of quality is a moving target. Product innovation, the introduction of new competition, or a change in demand patterns can all serve to raise the bar in terms of how the marketplace defines quality.

The pressure on manufacturers to stay ahead of the quality curve is exacerbated by persistent supply chain disruptions and labor scarcity. In the face of these stubborn headwinds, organizations need to focus on continuous improvement to remain competitive.

It is tempting to take big swings and attempt to transform a production line, facility, or even an entire organization overnight. But production excellence is not a leap achievable in a single bound. This journey requires a thousand carefully laid out steps up a continuous improvement mountain.

In this effort, manufacturers should challenge themselves by constantly seeking to make operations run better, increase profitability, and improve the customer experience. By focusing on high payoff activities that move the performance needle, organizations can attain a higher state of production excellence.



IDENTIFYING HIGH PAYOFF ACTIVITIES IN MANUFACTURING

Many of us are familiar with high payoff activities (HPAs) and the [Pareto Principle](#) that has been long used to define them. Commonly leveraged by managers and sales professionals, HPAs are often defined as the 20% of activities creating 80% of the results. For manufacturers, it is not that simple. Improvement, no matter how incremental, can improve quality in a meaningful way.

HPAS ARE ACTIVITIES THAT DIRECTLY IMPROVE PROCESSES, ENHANCE BEST PRACTICES, AND EVOLVE THE PRODUCTION FACILITY TO THE NEXT LEVEL OF PRODUCTION EXCELLENCE.

This reinforces the need to consider HPAs as steps towards production excellence. Improvement efforts should be continuous and always focused on increasing quality. HPAs are activities that directly improve processes, enhance best practices, and evolve the production facility to the next level of production excellence.

Manufacturing HPAs fall into five categories that serve as a five-step path to production excellence. They are:

- 1 Safety**
- 2 Quality**
- 3 On-time delivery**
- 4 Cost reduction/efficiency gain**
- 5 Continuous improvement (Repeat steps one through four repeatedly.)**

Step 5 demonstrates that HPAs are part of an ongoing iterative process that recognizes there is always room and need for improvement. The list is numbered because the HPAs are designed to be tackled in order. Focusing on efficiency gains like improved throughput does not make sense if there are multiple workplace accidents each week and a routinely high volume of quality-related chargebacks.

Beginning with safety, deployed iteratively and continuously, these five HPAs can improve production performance.

1 Safety

Investment in safety should be the highest priority for every PCB manufacturer. Protecting employees on the production floor is not only the right thing to do, but it is also a business investment that dependably yields high returns.



Employees are happier and more productive working in a safe workspace where there are fewer, if any, workplace accidents that create downtime, disrupt production schedules, and incur costly worker compensation claims. The consistent use and improvement of safe processes can be easily measured by collecting data on accident rates and near misses, then correlating trends with metrics focused on elements such as throughput and yield.

Engineering controls to error-proof ([Poka-Yoke](#)) safety standards can be utilized to attain a higher level of safety and decrease the probabilities of injuries. Common examples of error-proofing in manufacturing include:

- Installing interlock door switches on machine doors, so the machine will not run with the door open.
- Deploying light curtains that will stop the machine if an operator breaks the light plane.
- Using self-retractable box knives which automatically retracts the knife when not in use.
- Fixing uneven production floors to avoid slips, trips, and falls.
- Auto dosing chemicals so the operator does not need to be hands-on to dose into a line or tank.

ONGOING TRAINING OF BOTH NEW AND CURRENT EMPLOYEES IS PERHAPS THE MOST IMPORTANT ASPECT OF ENSURING SAFETY ON THE PRODUCTION FLOOR.

Chemical processes play a big role in PCB manufacturing and establishing exceptional standards for proper use of Personal Protective Equipment (PPEs) can improve the safety of a working environment. Goggles, face shields, aprons, gloves, and chemical boots are common forms of PPE used on the production floor. When choosing PPE equipment, manufacturers should make sure it is impermeable to the chemicals being used.

Ongoing training of both new and current employees is perhaps the most important aspect of ensuring safety on the production floor. Training should be diverse and comprehensive, covering everything from proper lifting techniques to electrical safety.

This sustained commitment to training will keep safety top of mind at all times, helping to ensure the well being of employees.

2 Quality

Quality is often measured by manufacturing yield—the percentage of good parts relative to the total produced. Though it is the goal, achieving 100% yield rates is extremely challenging. Many PCB manufacturers produce less than a 95% yield, eating the cost of discards and re-designs. It is possible to achieve higher yield rates by avoiding common issues such as using sub-par materials, cutting corners in the design phase, and not double checking the bill of materials against product specs.

But quality is about more than improving yield. It should be top of mind with respect to every aspect of production. Establishing a quality management system (QMS) helps ensure consistency and quality for both process and product. Improved data, generated through a QMS's consistent documentation, lays the groundwork for evidence-based decision making, providing an informed approach to achievable goals.

Evidence-based decision making requires manufacturers to scrutinize production output data in search of process variances. This will help to determine where in the manufacturing cycle process quality output meets or exceeds expectations.

There are several tools available to measure and control production quality. They include:

- **DMAIC (Define, Measure, Analyze, Improve, and Control)**, a five-step, data-driven improvement cycle aimed at improving, optimizing, and stabilizing operational processes.
- **SPC (Statistical Process Control)**, a quality control method used by manufacturers to maximize efficiency and minimize waste.
- **FMEA (Failure Mode and Effects Analysis)**, a method to create a known production quality output.

Quality does not begin and end with the production process. It should be embedded in the organization's culture and a priority for everything from the overall customer experience to individual elements of employee relations such as training or incentive programs. This helps fuel a comprehensive and continuous search for opportunities to increase efficiency, get rid of waste, and improve output.

Manufacturers should not settle for sub-95% yields. Better is always possible, and manufacturers who adopt the right principles and processes can always be improving the quality of their products and customer experiences.

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3 On Time Delivery

For manufacturers, the delivery is vital to a positive customer experience. If it arrives late, it is not a quality product. Delivering on time seems simple enough, but a thousand different production components can become constraints and are obstacles to punctuality.



The first thing customers ask during the quote process is usually, “When can I expect delivery?” PCB manufacturers are often among the most mission-critical supply chain components for producers of electronic products. This means manufacturers must understand with great accuracy every component of their production process before committing to a shipping due date.

To ensure on-time delivery, manufacturers should focus on the following:

- Process the order correctly the first time. Customers won't wait for a supplier to build an order twice.
- Know the capacity limitations of the facility. Correlate capacity level to the volume and timing of customer orders, paying particular attention to where the largest constraints are located in the production process.
- Continuously learn to overcome processing challenges using root cause analysis. This will make order processing less variable, more predictive, and less constrained.

When manufacturers put processes in place to better understand and resolve production constraints, they can meet customer expectations for on-time delivery without circumventing the quality requirements.

4 Cost Reduction / Efficiency Gain

Efficiency gains and cost reductions sound like the same thing, but they are more like two sides of the same coin.

- **Cost reduction** is measured by use of fewer consumables.
- **Efficiency gains** are the result of utilizing less labor.

To improve at both, manufacturers need meaningful, granular metrics in place to measure how much of each is being used.

The metrics for raw materials consumed during production should be in the purview of the accounting and finance team. They can set metrics for the volume of consumables used during production. How those materials are used on the production floor requires analysis of manufacturing processes. Once an organization has a clear vision of how and how much of a raw material is being used, then strategies and best practices for cost reduction can be put into place.

The process for making efficiency gains is similar to material cost reduction initiatives. It is essential to have a granular understanding of labor costs, including how process and technology impact operational efficiency down to the individual level. When a facility learns how to increase output at the per person level, the opportunities for improvement increase substantially.

5 Continuous Improvement

Focusing on continuous improvement is arguably the most important of the 5 HPAs.



THERE IS ALWAYS ONE MORE MOUNTAIN TO CLIMB.

NO MATTER HOW MUCH SAFETY, QUALITY, AND EFFICIENCY HAVE IMPROVED, THERE WILL ALWAYS BE OPPORTUNITIES TO DO MORE.

Because no matter how much safety, quality, and efficiency have improved, there will always be opportunities to do more. It is like climbing to the top of the mountain, marching back down, and then beginning the ascent again.

Repeatedly challenging the status quo with an eye towards improvement will keep production excellence at its highest possible level and help an organization remain competitive as customer expectations evolve. Manufacturers who adopt continuous improvement programs and implement QMS will realize improvement efforts across the production floor as long as they remain committed to quality.

Common elements of successful continuous improvement programs include:

- Utilize Lean Six Sigma, 5S, and 5-Why root cause analysis.
- Perform daily process walks, known as Gemba in the Lean Manufacturing philosophy. These provide daily observation of processes occurring in real time and can uncover resource gaps.
- Plan-Do-Check-Act (PCDA) is a method to both continually improve and measure results—setting the stage for solid countermeasures that will prevent reoccurrence of an observed weakness or gap in the process.

Putting the 5 HPA's into practice on a daily basis into any production process will help keep any production team laser focused on achieving production excellence through the continual improvement cycle.