

# **Practical Andon Applications**

Integrating Andon Systems with Effective  
Organizations to Achieve Excellence



***Leadership, LLC***

Lean Transformation  
Consulting • Coaching • Training

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## Introduction

Andons are simple, yet widely misunderstood and misapplied, devices. Andons serve as a communication method, but that certainly doesn't mean every communication method is an andon. Andons are generally large visual displays placed prominently in a work area, but that doesn't mean that any device displaying some type of information is an andon. Although andons are capable of tracking useful historic performance data, their main purpose is not to gather information for reviewing lagging performance indicators.

I've worked with andon systems for more than 20 years, ranging from them using them in my job on the shop floor to designing and implementing them in major plant projects in several countries for many clients. One thing that has been common in every andon application that I've worked with: The andon is a critical piece of the production system and a driver of organizational behavior. If you take away the andon, quality, productivity, and even employee morale will suffer.

By the way, for those who like a little historical perspective, the word *andon* is borrowed from Japanese and is a noun meaning 'paper lantern', like the kind you would see at some parties (maybe more in the '60's and '70's). They would have some artwork or kanji characters painted on them, so the original backlit plastic display boards looked quite similar to these paper lanterns. Andons were first applied by Toyota in their Kamigo Engine Plant in the 1960's.

## What an Andon Is and What It Does

First and foremost, an andon is a *countermeasure* to a problem. Toyota invented and has for years applied *jidoka* ('automation with a human touch') as a pillar of TPS. This means that when a process, be it manual or automatic, detects a problem, it will stop rather than producing defective materials or services. What happens then? Naturally, someone has to react to a process stoppage, as waste-free and immediate as safely possible. How does someone know a process has stopped? Seeing as it would epitomize the wastes of waiting and human potential to have someone stationed at a process just in case something goes wrong, some type of signal is necessary to let someone know that the process needs help. This is the problem an andon solves.

Andons provide a collective visualization on an easy-to-see display device (I'll use the term *andon board*), frequently coupled with audible signals. They show the status of individual processes in a work area, as opposed to individual indicators located at each process, such as stack lights. Collective displays mesh with the team-based organization - it's easy to see the status of the entire team's area - as well as providing single source of information for the andon's end user, making it very simple for him or her to see and quickly react to the indications on the andon board.

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*Fig. 1: A typical andon board*

Properly designed andon systems provide work instruction, that is, each signal on the andon board drives an activity such as reaction to a problem or an indication to perform some type of standardized work. There is very little additional information, and the additional information is limited to critical status information such as performance versus target and line stoppage due to outside influences, such as no signal to produce from the next process. Adding more information, which is easy and tempting to do, can quickly dilute the effectiveness of the system and turn it into some management information system as opposed to a useful tool used by the workplace teams to enhance quality and productivity.

A key concept that shouldn't be overlooked here is the ability and skill requirements of the workplace organization to effectively react to the indications on the andon. The andon is a local, direct communication method, and the people who work in that locale must be able to resolve most all of the issues that arise. If issues arise that the people in that location can't resolve, there must be additional communications methods in place to contact specialists when needed and have them respond quickly.

### **The Role of the Andon in Lean / TPS**

Andons are an integral piece in the Toyota Production System and its efforts to build in quality and work more waste-free. Effectively designed andon systems support important TPS mindset and methods as:

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- Elimination of Waiting Due to 'Machine Watching'
- Problem Solving Close to the Source in Space and Time
- Jidoka and Built-In Quality ('Never Pass Defects to the Following Process')
- Shop Floor Teams and Teamwork

Keep in mind that having an andon board conspicuously hanging in a work area does very little to improve performance in and of itself. It's also necessary to have the right methods, workplace organization structure, and skilled workers in place to operate within a well-defined operations system. Read on for a couple examples of how well-designed production systems apply their andons to drive world-class methods and results.

### Andon Application Example 1 - Assembly

The assembly andon is the most widely-used example, with its pull cords that activate a lamp and an audible signal, culminating in a response from a problem helper. Failing a timely response, the andon system will allow a moving assembly line to stop. This stoppage is not designed to be instantaneous; the system gives the problem helper some time to respond by employing a design tactic called *fixed position stop*. Fixed position stop allows a moving assembly line to continue running until the product reaches the end of the work area, referred to as the pitch, where the line will stop if the call has been reset. When this type of assembly system is combined with the right organizational support, motivated employees, and proper training, andon cord pulls are frequent but line stops are much rarer.

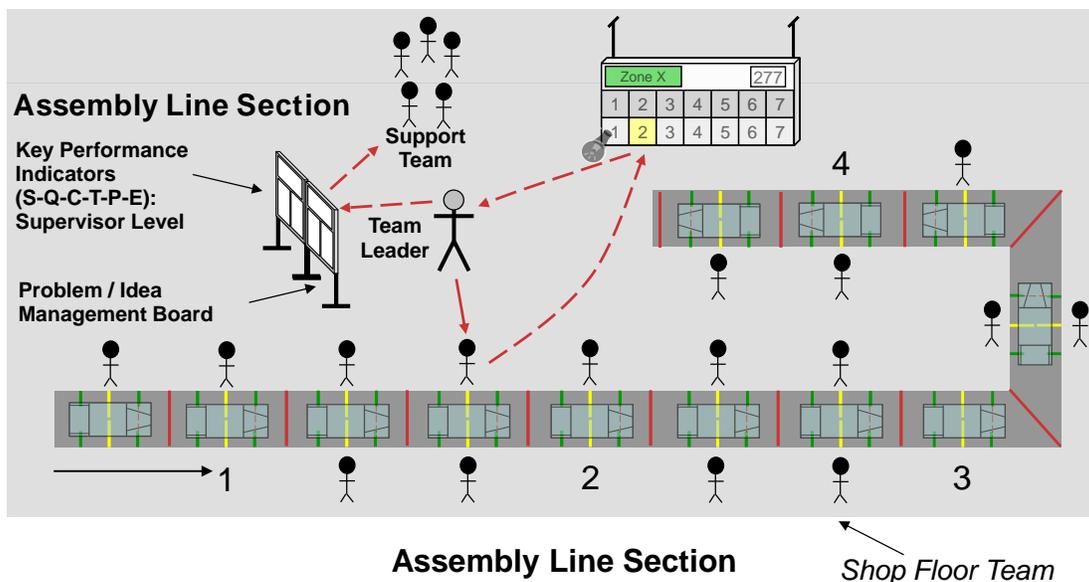


Fig. 2: Andon-based Assembly Production System

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As the problem helper, commonly known as a team leader, answers the calls, his or her foremost responsibility is to assure the product doesn't leave the work area or pitch without meeting quality standards. The team leader may perform small rework activities or complete a process if the worker in the pitch has fallen behind. The objective is clear: Maintain the flow of *good* products to the customer.

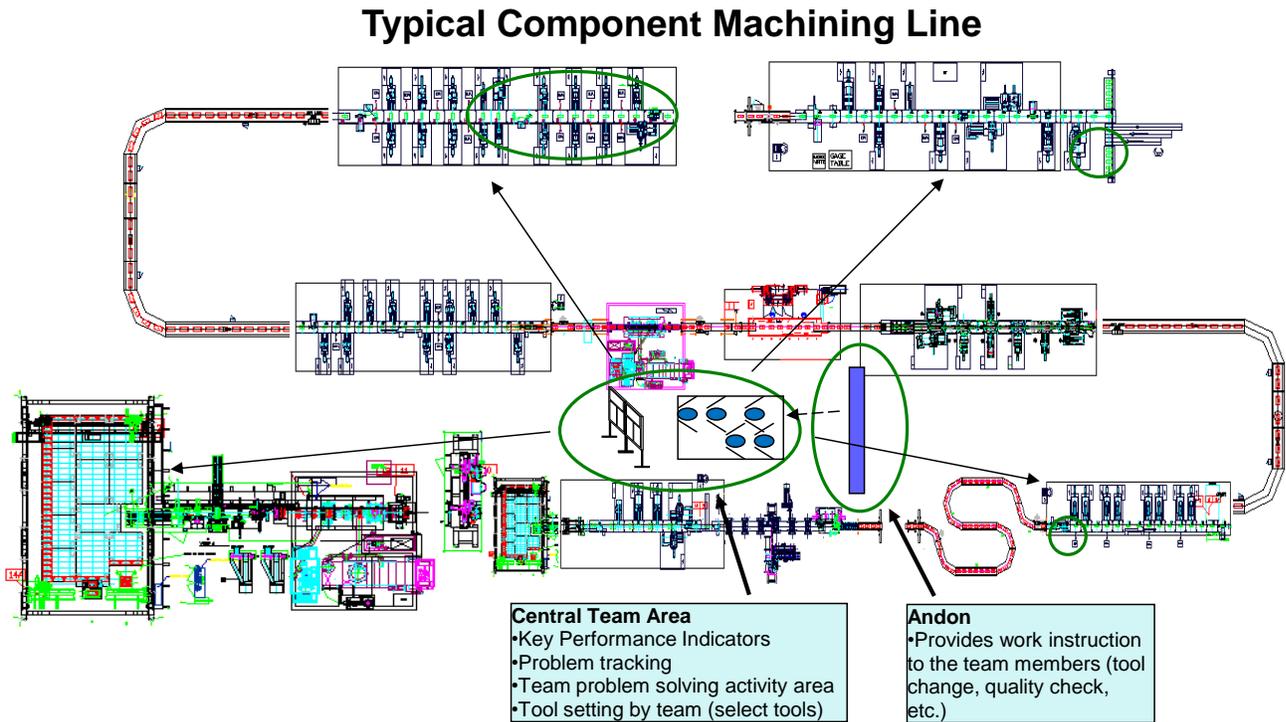
The job doesn't end there, however. The team leader is not just some traveling repairman; he or she is expected to track and understand why the andon cord is being pulled and to facilitate the team's efforts to eliminate the causes through collaborative root cause problem solving. When the team doesn't have the skills or resources to solve the problem themselves, a support organization is readily available and frequently present in the work area to help get the problems resolved quickly and permanently.

In the proper application, the assembly andon is more than a communication device; it's a central tool to drive root cause problem solving as close to the source in space and time as possible.

### Andon Application Example 2 - Automated Manufacturing

The andon application in an automated manufacturing line, automated component machining in this example, is a somewhat different application than in assembly. Certainly the machines, like the people on the assembly line, will call for assistance and stop if a problem is detected. This is the fundamental application of *jidoka*, or automation with a human touch, that dates back to the days of the automated loom. (As a side note, during my time in the Production Engineering Department at Toyota, we spent considerable time improving the *jidoka* ability on automatic processes. It was our goal for an automated process to stop when any condition that could create a defect occurred. It was far better to detect a condition *before* processing the product rather than detecting a defect on the product *after* processing). The andon in the machining line also provides *work instruction* to the team, that is, a simple signal that it's time to perform standardized work activities such as tool changes, quality checks, add materials, etc. These signals are forecast to give the workers time to respond, but will cause the machine to stop if not answered. With a properly applied automated machining line andon, any need for machine watching is eliminated. Workers visit machines only on demand, and that demand is nearly always communicated through the andon. This concept of a team-based shop-floor organization that responds to equipment needs on demand through an andon is known as *Central Machining*.

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*Fig. 3: Andon-based Automated Machining Line Production System ('Central Machining')*

It's not difficult to see huge opportunities to improve efficiency in the cast. First of all, waste of waiting can be virtually eliminated; there is no need to wait by a machine just in case something goes wrong, or even to walk by every now and then to check on it. More subtle but just as important is that the andon system using pre-defined counters and controls systems to signal when standardized work is to be done. As the teams develop the standardized work and eliminate waste through applying proven 5S and rapid tool change principles, the exact labor content of the automated machining line becomes more transparent and the right number of workers can be more easily determined.

The team leader in the automated machining line is, just as in assembly, expected to understand the problem landscape and to facilitate the collaborative problem solving activities of the team. He or she also has a support organization to help with problems outside their capabilities, again as in assembly. In these types of lines, it's also required that all workers be able to respond to all andon calls, that is, to perform all of the standardized work items and be able to perform minor troubleshooting. The responsibility to developing the skills of the workers in these areas falls within the responsibilities of the team leader.

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Again, the andon board is the center of the production system in this application. Without it, the workers don't know when a machine has stopped or when it's time to perform standardized work. If a properly designed andon system isn't in place, there is no choice but to add waste to the system by requiring the workers to wait by machines or to frequently check them just in case they have a problem.

### Summary

In my career, I've seen a lot of andons and, unfortunately, most of them hand in an area unused by the people who should rely in them most, the shop-floor teams. They provide information but don't drive actions, and the information is in many cases just regurgitated from some factory information system designed for supervisors. Sadly, I've had many workers tell me that they either don't use the boards in their areas or don't understand the displays. This is a huge contrast from the andon-based production systems described in the examples.

Andons are designed to solve problems, drive activities in the work area, and to eliminate waste. Your work area has its own problems to solve, activities to perform more efficiently, and waste that you'd like to eliminate. Your andon must be custom-designed for your work area to support how your organizations improves and eliminates waste, just as the andons in the examples were designed specifically for their applications.

OpEx Leadership is capable of providing andon system design, installation, and implementation services to your organization, whether you wish to install a new system or improve an existing one. We also specialize in the organization development, coaching, consulting, and training necessary to enable your people to use your andon system to achieve world-class results.

### About Mark Tussey

Mark Tussey, founder of OpEx Leadership, LLC, has more than 23 years experience in Lean Manufacturing and Operational Excellence. After spending 10 years with Toyota, the originators of lean, he has provided services to a number of organizations, helping them achieve substantial operational improvements and international recognition. He holds a BS in Mathematics and currently lives with his family in Greenville, South Carolina. You can contact Mark at 1 (864) 551-3602 or via email at [mark.tussey@opexleadership.com](mailto:mark.tussey@opexleadership.com).