The Case for Lean Culture

Sustain the gains from your lean conversion.

David Mann, Ph.D.

There’s a missing link in most descriptions of lean manufacturing. It’s lean culture, and a lean management system to go with it. Management practices for lean and the lean culture that grows from them are like many other aspects of lean: easy to grasp but difficult to consistently execute. This article provides a framework to understand three related topics: the nature of lean and mass production cultures, how lean management practices differ from those in mass production, and the nature of the task in changing from mass to lean culture.

"Culture" and "management system" are used interchangeably in this article. The lean management system consists of the discipline, daily practices, and tools needed to sustain and extend lean implementations. Lean culture grows from these practices when the practices become habitual, a way of thinking or mindset. So, don’t focus on "culture" as a target. Focus instead on behavior, on habits and practices, extinguishing the old and reinforcing the new.

As you prepare to do this, be aware that the task is formidable. The lion’s share of what it takes to make lean conversions long-running success stories is the change in management systems from mass to lean.

First, consider lean production. Lean manufacturing is an idea whose time has come. Manufacturers the world over have recognized the advantages in leadtime, productivity, quality, and cost enjoyed by lean competitors in industry after industry. One of the attractive features of lean is that it’s so easy to understand. Customer focus, value stream organization, standardized work, flow, pull, and continuous improvement are readily grasped.

Second, lean is typically not capital intensive; it relies on simple, single-purpose equipment with minimal automation. Lean scheduling systems are equally simple and inexpensive, rarely requiring much if anything in the way of incremental IT investment. Finally, lean layouts and material flows are relatively straightforward to design and implement whether through redesign of entire value streams or more narrowly-focused kaizen events.

Parallel Implementations

So, lean production confers many advantages. It is easily grasped, requires minimal capital for equipment and systems support, and is relatively straightforward to implement. Yet, the experience of many — indeed, most — companies that have attempted to convert to lean production has been failure and retreat. This is one of the paradoxes of lean. It seems so easy, yet success is so difficult!

What is it about lean that makes successful implementation so rare as to be
newsworthy? Something, some crucial ingredient, must be missing from the standard list of steps in lean conversions. The missing link is this: a parallel lean conversion effort, that is, one that converts management systems from mass production to lean.

**Changing from What, to What?**

The physical changes in a lean conversion are easy to see: Equipment gets rearranged, inventory is reduced and deployed in new ways, there are notable changes in material supply, production scheduling, and standardized methods. The change in management systems is not so obvious. An orienting question about the lean management system might be: Change from what, to what?

**From: Conventional Mass Production**

Think about management in a conventional mass production operation. First and foremost, the focus is on results, on hitting the numbers: Did we meet the schedule for this day or this week? How many defective units were caught by quality inspections? Did we hit our targets for material cost and production labor? Managers in conventional systems track key indicators like these through monitoring and analysis of reports that summarize the previous period’s (day, week, or month) data.

Managers attend many meetings to review production status and troubleshoot problems. These meetings typically revolve around computer-generated reports that line managers and support group specialists pore over in conference rooms. Disagreements are common about which departments' reports to believe. (These disagreements can sometimes be resolved only by doing actual cycle counts or other research on the production floor!) The focus is usually retrospective, looking at what happened last reporting period, determining who or what messed up, and deciding how to recover. With more sophisticated IT systems, these data are accessible more or less in “real” time. Looking at a computer monitor, managers can see a numerical or even graphic reflection of the state of their production process. This seems like an improvement, and often can be — provided one can sift through all the available data to identify the critical numbers to watch.

**From: Do Whatever It Takes!**

When problems arise that threaten schedule completion, the common practice is “do whatever it takes” to meet the schedule. Expedite internal parts, pressure suppliers, airfreight late materials, put on more people, pressure the inspectors, reorder missing parts with a fudge factor to make sure you get the few good ones you need, authorize overtime. Just meet the schedule! Tomorrow or next week, it’s a new day with a new schedule and new challenges. Things that went wrong yesterday are typically dropped in the press to meet today’s demands. After all, today’s schedule must be met!

In fact, most manufacturing managers have learned how to be successful in this kind of system. They know the workarounds and tricks to ensure success in an uncertain environment where the bottom might fall out in one of several areas on any given day. The tricks of the trade include "secret" stashes of extra material, people, and even equipment to be called on in time of need. Never mind that all this is costly in the long run. In the short run, results are what matter and the numbers don’t lie; you either met the schedule or you didn’t.

**To: Lean Production and Lean Management**

In lean systems the results certainly matter but the approach to achieving them differs sharply from conventional management methods. The difference in a lean management system is the addition of a focus on process as well as a focus on results. The premise is this: Start by designing a process to produce specific results. If you’ve done a good job of designing the process and you maintain it, you’ll get the specified results. In concept, this is simply a
matter of maintaining production at takt time. If you do, you meet demand. As you make improvements in the process, you should expect improved results.

**To: Lean Processes Need Lean Management**

A critical point is to think about the lean management system as an integral element of the lean process. Here’s why. If the process was a perfect system, it would always run as designed and always produce consistent results. A real-world system requires periodic maintenance and occasional intervention and repair to continue producing results. The more complex the system, especially the more automated it is, the more maintenance and repair it requires. It may not seem like this should be true, but it is. A more reliable and flexible solution usually is to rely less on automation and more on people and simpler equipment.

Relying on people brings its own set of issues. People require all sorts of "maintenance" and attention. Left to their own devices, people are prone to introduce all kinds of "mischief," that is, variation in the system that can take things far afield from the original design. If anything, lean production is more vulnerable to these effects than mass production because of the tight interdependence and reliance on precise execution in lean designs. That’s why discipline is such an important factor in lean processes. Without a high degree of discipline in a lean process, chaos ensues in short order. That’s where the lean management system comes in.

**To: Process Focus Produces Results**

Putting it plainly, if you want a process to produce the results it was designed for, you have to pay attention to it. One of the first rules of process focus in lean production is regularly seeing the process operating with your own eyes. The closer your position is to the production floor (value stream manager, department supervisor, team leader as opposed to plant manager, manufacturing director, or VP), the more time you should spend watching the process, verifying execution consistent with design, and intervening when you observe nonstandard or abnormal conditions. Production team leaders should spend virtually all of their time training operators in the process, monitoring the process, or improving it. Taking time to monitor the production process applies all the way up the chain of command, though with decreasing frequency and duration. That’s why lean manufacturing executives meet with their plant managers out on the production floor, to spot-verify that processes are defined, are visually documented and controlled, and are being followed. It also allows executives to verify plant managers know what’s going on with their lean processes. Meetings and discussion of reports in conference rooms become secondary activities in management reviews.

Another way of thinking about this, and another paradox in lean management, is that lean managers are so focused on results that they can’t afford to take their eyes off the process they rely on to produce their results. Looking at what happened yesterday is way too late to do anything about yesterday’s results. On the other hand, looking at what happened last hour, last pitch, or even better, last takt cycle gives the chance to recover from an abnormal or nonstandard condition. But that’s only true if trained eyes (like a team leader’s) are there to see the abnormality and the pertinent processes are well defined, clearly documented, operating in a stable environment, and resources are available to respond in real time. That is, someone is available to respond right now!

Further, this means focusing on the process as it operates from beginning to end, not only at the finished component or finished goods end. That’s why lean designs require so many team leaders, to spot problems in upstream intermediate or sub-process areas and to respond right away to prevent or minimize missing takt at the outlet end of the process. An integral part of the lean management system is having the appropriate number of team leaders on the floor to focus on the process. It requires a leap of faith not to scrimp on this
crucial part of the system; having enough leaders available to monitor the process, react to problems, and work toward root cause solutions is an investment that pays off in business results. But at first, and from a conventional perspective, team leaders just look like more overhead.

**To: Process Standards and Measures**

Unlike managing in a results-focused system, process focus implies frequent measurement against expected intermediate outcomes. As necessary, interventions can be started before the end results are affected. A corollary of frequent measurement at multiple intermediate steps in a lean process is that data are readily available to aid quick diagnosis of problems, spur immediate remedial action, and eventually eliminate root causes of problems. This is one aspect of continuous improvement. Rather than waiting for problems to develop, you’re constantly monitoring for early signs of developing troubles, and are primed to take quick action to eliminate the causes of problems. Contrast this approach with the conventional mass production culture in which most supervisors expect various unpredictable problems and have earned their spurs by being able to work around them to get out the day’s schedule.

A new management system is called for in lean conversions because lean processes are much more tightly interdependent than conventional systems and are designed not to have the extras stashed away to use in a pinch to bail out conventional systems. That’s why they require a specific management system to sustain them.

**What Is Lean Culture?**

For our purposes, we can define culture in a work organization as the sum of many individuals' habits related to the work in the organization. A related way to think of culture is that it’s the knowledge of how things are done that an adult needs to stay out of trouble as a member of a group. One of the interesting things about culture is that for group members, culture is invisible. It’s the things that are "given," or "the way we do things around here." It’s typical not to question this kind of thing, or even to realize there are alternatives to it. Yet, it’s easily possible to "see" work culture in a production environment by asking basic questions about common practices, such as these:

1. What are inventory practices around here?
2. How often does management look at the status of production here?
3. Who’s involved in process improvement activities in this area?

Asking these questions would reveal some of the distinctions between the cultures in conventional and lean production environments.

The examples in Figure 1 give a partial picture of the "everyday-ness" of culture. It’s made up of myriad habits and practices that make it possible for people to go through their work day without having constantly to think about who, what, where, when, how, and so on. Culture allows us to operate more or less on autopilot during the workday. By the same token, a distinct culture also makes it easy to identify counter-cultural behaviors, practices, or events.

**Cultural Inertia**

One implication of culture as a collection of habits and practices is that it has incredible inertia and momentum going for it. Cultural inertia is like a body in motion, tending to stay in motion in the same direction unless acted on by an external force.
### Visible Attributes of Culture in Mass and Lean Production

<table>
<thead>
<tr>
<th>Cultural Attribute</th>
<th>Mass Production Culture</th>
<th>Lean Production Culture</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Inventory practices:</strong></td>
<td>Managed by computer system</td>
<td>Managed visually</td>
</tr>
<tr>
<td></td>
<td>Ordered by forecast</td>
<td>Ordered based on actual use</td>
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<tr>
<td></td>
<td>Stored in warehouse areas or automated storage and retrieval facilities</td>
<td>Stored in flow racks or grids addressed by part number</td>
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<tr>
<td></td>
<td>Held in bulk containers</td>
<td>Held in point-of-use containers; container quantity + number of containers specified per address</td>
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<tr>
<td></td>
<td>Moved by lift truck</td>
<td>Deliveries by hand cart or tugger</td>
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<tr>
<td></td>
<td>Many hours’ worth or more per delivery</td>
<td>Precise quantities (often &lt; an hour’s worth) delivered to point of use</td>
</tr>
<tr>
<td></td>
<td>Delivered by the skid or tub by hi-lo</td>
<td>Deliveries by hand cart or tugger</td>
</tr>
<tr>
<td><strong>Production status</strong></td>
<td>Checked at end of shift, beginning of next shift, or end of week</td>
<td>Checked by team leaders several times an hour</td>
</tr>
<tr>
<td></td>
<td>Checked by supervisor, higher level managers</td>
<td>Checked by supervisors four or more times a shift</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Checked by superintendents once or twice during the shift</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Updated for all involved in a sequence of brief daily reviews of the previous day’s performance</td>
</tr>
<tr>
<td><strong>Process improvement</strong></td>
<td>Made by technical project teams</td>
<td>Can and routinely are initiated by anybody, including operators</td>
</tr>
<tr>
<td></td>
<td>Changes must be specifically &quot;chartered&quot;</td>
<td>Regular, structured vehicles encourage everyone from the floor on up to suggest improvements and perhaps get involved in implementation</td>
</tr>
<tr>
<td></td>
<td>No changes between &quot;official&quot; projects</td>
<td>Improvement goes on more or less all the time, continuously.</td>
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Conventional mass production systems include a culture. So do lean production systems. When you change the physical arrangements from mass to lean, however, the culture does not change from mass to lean unless specific action is taken to replace one management system with another. That’s the “parallel” lean implementation noted earlier, implementing the lean management system.

Conventional habits and practices live on even if the layout, material, and information flows have changed. For example, operators whose area switched from MRP (Material Requirements Planning) schedules to pull signals were quite inventive figuring out how to get access to a schedule they then followed regardless of the pull signals. In this example, the fabrication operators regularly produced according to the discarded schedule they retrieved every day from a trashcan near the dispatch office until they were found out and the schedule paperwork was shredded. Another common occurrence is for operators in newly-converted flow lines transformed from batch build to go right on building. When the line fills up, it’s typical to see the overproduction stacked on the floor or conveyors, overflowing containers, etc.

**New Settings, Old Habits**

Similarly, it’s typical to see supervisors and team leaders in a newly rearranged area rushing off here and there to chase parts or jump onto the line to run production. In some cases, it’s nearly impossible to convince supervisors or team leaders to make the hourly entries on production tracking charts because they’re “too busy” to get to this task. Then, once the tracking charts are actually filled out, it’s not unusual to see them simply pile up on (or under) a supervisor’s desk with no attention at all to the interruptions documented on the charts. If the schedule has been met, there’s no interest in what’s on that “paperwork.” And if the schedule hasn’t been met, there’s “real work” to be done; no time to waste with these records of interruption! That won’t get the schedule out today, and in the old — and ingrained — culture, that’s all that counts.

In conventional mass production, it’s seen as important to be busy doing something directly physically linked to production. Waiting for a production instruction card to arrive before starting to produce simply seems wrong. Standing and waiting for the next piece to come down a progressive build line is definitely counter-cultural in the mass production world. In such an environment, these interruptions in the rhythm of production are not considered to be valuable diagnostic information signaling an abnormal condition in the production system, that’s for sure! Relying on the reduced inventory of parts called for in a pull system seems sure to lead to stockouts down the line. There’s no perceived value in recording data that documents the operation of the process. Action is what counts, and if it’s based on gut feel and experience, it must be right because “that’s the way we get things done around here.”

These are only a few habits of thought, interpretation, and action that people absorb as part of the culture in a mass production environment. They are at clear variance with the kinds of habits and daily practices necessary for the precise and disciplined execution lean systems need in order to meet their promise for productivity, quality, and ongoing improvement. A few of the ways in which mass and lean cultures differ are shown in Figure 2. Many mass production cultural practices are strikingly tied to longstanding ways of relating to others at work while many lean practices are related to disciplined adherence to defined processes. (See the accompanying box, "A Note on Attitudes.")

**Changing Cultures: The Nature of the Task**

We usually refer to changing habits with the word “break,” as in, “That’s a hard habit to break.” Similarly, many talk about “kicking” habits. In each case, these words imply that changing habits is an event, a discontinuous step-change from one state to another which, once accomplished is a
one-time event that's over and done with, and no going back.

Many habits that come to mind are personal and physical in nature. Smoking, nail biting, various forms of fidgeting — jingling pocket change, fiddling with an ID badge, a pen, or glasses, etc. At some level, each habit provides some form of comfort. We don't think of our work habits so much because many of them are part of the particular culture at work, and that’s effectively invisible. Nevertheless, these habits arise because they bring some form of comfort, too. In a conversion to lean production, some of these habits will be a hindrance and some will be a help.

Here are some examples of management habits in conventional mass production operations:

- Keep a quantity of extra material stashed away at all times; you might need it.
- Take time to listen to what people want to tell you.
- Always maintain a minimum ten percent surplus labor and plenty of WIP; something could go wrong.
- Speak to everybody in the department every day.
- Jump onto the line or expedite parts when things slow down, or throw in more people; meet the schedule!
- Always reorder more than the actual need when handling shortages just to be sure you get enough.
- Use an informal gauge of queue size; always keep the line full in case something goes "flooey."

A Note on Attitudes

Many lean conversions include a change management program focused on employees' attitudes toward the change. That's because leaders anticipate substantial resistance to the new, leaner ways of working and seek to minimize pushback through programs of various types to soften up employees' attitudes about the upcoming conversion.

Our approach at Steelcase to managing change has been different (see "Communicating During Change: Be Interactive, Be Participative!" Target, First Quarter 2001, pp. 30-33 and the AQP article noted at the end of the box). We provide information about conversion, more frequently in areas that will be most directly affected. Beyond that, we've focused on preparing those in shop floor leadership positions to respond effectively to peoples' questions about the lean conversion, to share briefly the pertinent information about lean, and to solicit further questions from employees. Think of this as a "pull" approach to managing change in which employees' questions and concerns largely establish the agenda and topics.

As the changes in the production system begin to be implemented, we follow the principle that technical change must come before and drive cultural change. So, we focus on clearly communicating the expectations associated with the newly-changed production process. And, we continue to encourage and respond to "pull" signals from employees for more information as the new processes affect their work.

Throughout the lean conversion process, our emphasis on change management has been to prepare shop floor leaders to lead the conversion to lean in their own words (but based on shared understanding of lean principles) largely prompted by employee questions. In units with strong, effective, responsive leadership employee resistance simply has not been an issue. In units with less effective leadership, resistance has been problematic. And, in units where we've changed leaders, employee attitudes toward lean and the change to it have followed suit.

A second crucial influence on employees' attitudes is the degree to which management follows through on the lean principle calling for experiments to be carried out at the lowest possible level in the organization under the guidance of a leader/teacher (see Spear and Bowen's excellent article on the rules of the Toyota Production System). When leaders provide avenues to implement employees' suggestions for process changes and improvements, the effect on attitudes is powerfully positive, far beyond what any "attitude" or "morale" program could hope to produce.

To sum up, attitude is a lot like culture. Both arise from the habits and practices in the management system. In fully-implemented lean management systems, most employees will feel able to be heard when they want to be, and most will believe they have a bona fide opportunity to influence the production processes in which they work. When you establish these two conditions, employee attitude will take care of itself.

**Differences in Habits and Practices Between Mass Production and Lean Production Cultures**

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>Independent</td>
<td>Interdependent, closely linked</td>
</tr>
<tr>
<td>Self-paced work and breaks</td>
<td>Paced by process, time as a discipline</td>
</tr>
<tr>
<td>Leave me alone</td>
<td>I work as part of a team</td>
</tr>
<tr>
<td>I get my own parts and supplies</td>
<td>In- and out-cycle work are separated and standardized</td>
</tr>
<tr>
<td>We do whatever it takes to get the job done</td>
<td>There's a defined process for pretty much everything; follow the process</td>
</tr>
<tr>
<td>I define my own methods</td>
<td>Methods are standardized</td>
</tr>
<tr>
<td>Results are the focus; do whatever it takes</td>
<td>Process focus is the path to consistent results</td>
</tr>
<tr>
<td>Improvement is someone else's job; it's not my responsibility</td>
<td>Improvement is the job of everyone</td>
</tr>
<tr>
<td>Maintenance takes care of the equipment when it breaks; it's not my responsibility</td>
<td>Taking care of the equipment to minimize unplanned downtime is routine</td>
</tr>
<tr>
<td>Managed by the pay or bonus system</td>
<td>Managed by performance to expectations.</td>
</tr>
</tbody>
</table>

*Figure 2.*

- Approach people who are standing idle and ask them to get back to work.

You can think of many more once you start to see work habits and practices as ... well, as habitual. There's nothing wrong with habits and habitual practices as such. We need them to make the workday more efficient. What's important to remember is that work-related habits are just as difficult to change as personal habits!

**Extinguishing Versus Breaking Habits**

It's helpful to think in terms of the technical language from behavioral science used in connection with changing habits. The term is not "break." Instead, psychologists use the term "extinguish" when talking about changing habits. Extinguish implies a process, something that occurs gradually over time rather than an event producing a suddenly-changed state. Because of that, extinguish also implies a change that can be reversed under certain conditions. Think of Smokey the Bear's rules: Douse a campfire with water, stir the coals and turn them over, then douse it again. If you don't follow these rules, you run the risk that the campfire can rekindle itself from the live embers you failed to extinguish.

And so with habits. They linger, waiting for the right conditions to assert themselves again. We've seen this kind of thing mere days or weeks following implementation of new lean layouts. Here are some actual examples of old habits reasserting themselves in areas newly-converted to
lean layouts: Build up some inventory; allow longer or extra breaks; send people off a balanced line to chase parts or do rework; work around the problem today and let tomorrow take care of itself; leave improvement to "the experts" rather than wasting time on employee suggestions; leave the tracking charts untended and out of date; and so on.

To sum it up, you don't need a different management system for lean because lean is so complex compared to what you've done before. You need it because lean is so different from what you've done before. Many of the habits in your organization as well as your own are likely incompatible with an effectively-functioning lean production environment. You have a conventional mass production management system and culture. You need a lean management system and culture. How do you go about making that change?

We've identified four broad elements that taken together lead to a transformation in culture from mass to lean. They are:

1. Establish standards and accountability for following them
2. Closely monitor the production process and its supporting activities
3. Insist on data-based understanding of variations in process performance

**Conclusions: Culture Sustains the Gains**

Because lean production is a system, it doesn't matter where implementation starts, as James Womack recently observed. Eventually you'll get to all of the elements. But, sequence does matter when implementing the technical elements and the management, or cultural, practices.

We've learned that technical change must precede cultural change. Technical changes create the need for changed management practices. More than that, lean management doesn't stand on its own. Without the physical changes in flow and pull and the takt-based predictability they permit, production will continue to operate in an environment of daily crisis. How to track flow interrupters when there's no takt-balanced standardized work, no flow? How to assess material replenishment performance without standard lot sizes or resupply times?

**Ask These Questions**

So, start with the physical technical changes, but don't implement them by themselves. Just as cultural changes don't stand well by themselves, neither do technical changes. Every technical change requires cultural changes — the support of new management practices — in order to maintain its integrity over time. If that's not a law of nature, it's darn close to it! Each time an element of the lean production system is implemented, the elements of the management system to sustain it should also be implemented.

As a check, each time a technical or physical element of lean is put in place, ask these questions: What's the process to sustain this? What lean management practices must accompany this element to sustain its effectiveness? These questions apply to the full range of changes that come with implementing lean. Figure 3 lists a few examples to illustrate the point:

The three questions from the Toyota Production System that guide any gemba (in Japanese, gemba is where the action is; in manufacturing, gemba is the shop floor) walk are:

1. What is the process here?
2. How can you tell if it's working normally?
3. What are you doing to improve it?

Until we establish the habits of disciplined adherence to process, we would do well to adopt the following additions to these questions:

1. What is the process here? *What is the process to monitor and sustain it?*
2. How can you tell if it's working normally? *How is normal operation monitored and verified?*
3. What are you doing to improve the process? *What process will sustain the improvement?*
To recap, it may be that the failure most lean conversions eventually experience has to do with being unaware of the conversion in management systems and culture required for sustained success in lean. That’s not a surprise. Lean production emerged from the engineering orientations of Henry Ford and then Taiichi Ohno at Toyota. In both cases, circumstances were such that disciplined lean management practices could be imposed, at least through the 1920s at Ford. In contemporary lean conversions, the recipe for sustained success has to include planned implementation of a new, disciplined lean management system to support the physical conversion to lean. With new management practices to sustain the technical lean implementation, a new culture will arise to support, nourish, and extend the gains.

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Footnote
1. Veteran production supervisors are extremely versatile, able to do the work of engineering, maintenance, quality, production control, sourcing, and local trucking when necessary to meet the schedule.
2. Is there an instinct for inventory? That is, was there something coded into our genes in the distant past before humans learned to cultivate food crops? It seems possible that those who gathered and stored more food supplies than they and their families needed were more likely to have survived to pass this trait down through time to the present day. In any case, the comfort derived from excess inventory seems to be widespread.