

*There are more and more lean blogs on the internet and this month I have extracted an article on factory layout from one of them. It is by a guy called Jamie Flinchbaugh whose latest book we also review. The Canadian conference promises to be the event of the year and if you get a chance to attend you are in for an interesting few days. Also we have some advanced news about our UK Conference. I have also attached an article about Lean and Six Sigma – I, personally, think that it is a worrying trend that some companies in the UK are going along the six-sigma path without doing some of the basic lean stuff, first. – your views would be welcome.*

## **Lean and six sigma: The same or different?**

Lean and six sigma are both planned change initiatives with objectives to reduce or eliminate waste, but there the similarity ends.

Both are often referred to as programs, but that is not accurate. Six sigma may be a program but lean is a philosophy. As a program, six sigma uses a methodology called DMAIC (determine, measure, analyze, implement, and control) to identify and eliminate waste. As a philosophy, lean is all about continuous improvement through the elimination of waste.

### **People**

Six sigma is about exclusion. A six sigma team is identified for a specific area or project. The team may include several Green Belts led by either a Black Belt or Master Black Belt. The team may disappear for several days of extensive training in DMAIC, team building, communication, and so forth, before it starts plotting and gathering data for the "six sigma" project. Because of the complexity of six sigma, it does not make business sense to train everyone, or assign all employees to projects.

There is great excitement within the six sigma project team: learning, participating, and contributing. But everyone else becomes a bystander, waiting for change that may or may not have included his or her participation.

Countless stories tell of huge successes and cost savings from six sigma projects. Testimonials abound as trade publications provide articles on six sigma. I have even witnessed and led some of these successes in accounting, material management, and manufacturing.

However, in most of those cases, only the manufacturing people know about the manufacturing projects; only the accounting staff knows about the accounting projects; and only the materials group is aware of the materials management project. There is little or no participation beyond the project team. While organizations realize huge cost reductions, there is no effect on the culture or the organization as a whole.

What happens at the end of the project? Unfortunately, some six sigma projects become personality driven. When the team leader goes on to another project, the team members fade away. Once in the spotlight, getting attention and recognition, they now may feel no one remembers them. Has there been a permanent behaviour change? When the project loses visibility, will improvement be sustained?

Lean is inclusive. Lean teaches us that success is achieved when the entire value stream improves, not when one discrete element of it does. In a successful lean implementation, the entire organization may be involved in improving the value stream. All systems must be aligned. Purchasing, scheduling, manufacturing, engineering, accounting, and human resources must all be active believers and participants in the lean journey.

Without 100% inclusion, the effort will stall when it reaches the excluded part of the organization. The lean organization educates, engages, and empowers the entire workforce to identify and eliminate waste throughout the value stream.

### **Approach to change**

Transformational change and change management are two approaches to effective implementation of planned changes. As change management, six sigma tends to focus on cost, quality, and schedule. This

narrow focus is apparent even in the names of project teams: inventory reduction team, accounts receivable cycle time team, manufacturing scrap reduction team, etc.

Lean is a transformational change, one that moves the organization to a planned state. It involves the business strategy, organizational design, structure, culture, and processes of the entire value stream. It creates and reinforces the concept of continual change through the elimination of waste, improving the entire value stream's effectiveness. A lean change transfers knowledge and creates a learning organization.

### Improvement philosophy

Six sigma is aimed at specific targets in the value stream. The objective is to realize a level of improvement using the structured approach offered by DMAIC. The project teams keep the group focused on specific goals and objectives.

The teams work hard to identify root causes, test hypotheses, validate their analysis, implement their recommendations, and monitor them to ensure expected results are attained. When the projects are complete, the group celebrates, disbands, and the individuals return to their previous jobs. At best, they leave metrics or control charts to prevent roll-back.

Control charts, however, only encourage maintaining the status quo. Now before the statisticians get alarmed, remember that for a process to be in control there should be an expected deviation around the average. Processes that show a number of points above or below the centre line are considered "out-of-control." Unfortunately, even if the trend is positive, indicating continuous improvement, statistical thinking will still consider it out of control. The negative implication can make the typical human being flinch after having made a large investment in time and energy in a six sigma project.

Lean is all about continuous improvement. The philosophy says there will always be waste to be extracted from the value stream. Lean is an ongoing celebration of waste removal, a never-ending process. In the transformed learning organization, members

are continually building skills and improving, making lean a daily part of their lives.

### Summary

The differences between lean and six sigma are greater than the similarities. When the differences are recognized, returns can be maximized by knowing when lean or six sigma is the right choice.

### About the author

Douglas Ferguson, president of [Ferguson and Associates](#), has more than 30 years experience in manufacturing and distribution, and has promoted improvements through people and technology, including the use of lean and six sigma. Doug can be reached via e-mail at [fergd@comcast.net](mailto:fergd@comcast.net).

Thanks to the Society of Manufacturing Engineers Customer Services for allowing us to reproduce the article.

### Important Date for Your Diary

In conjunction with Findlay Publications, the AME-UK will be holding a conference on

**Tuesday 11<sup>th</sup> July.**

The programme is being finalised and all the details will be available soon. But, please reserve space in your diary, now!

### EU and US hit out at Chinese taffifs on car parts

Source : [TheManufacturer.com](#)  
Published : 31 Mar 2006

**The EU and the US became rare trade allies today, ganging up on China over tariffs on imported car parts.**

The two western blocs, which have more often clashed over issues such as the support each allegedly provides to competing giants like Boeing and Airbus, have requested consultations with China at the World Trade Organisation, concerning China's decision last year to impose tariffs on car parts based on the overall value of imports in a complete vehicle.

China said it regretted the decision by the EU and US to file the joint complaint and said it was "earnestly studying the ... request for consultations".

US trade representative Rob Portman said the complaint had been filed because tariffs based on the overall value of imports in a complete vehicle favoured China's domestic industry, forcing US companies to relocate to China "to get out from under these illegal taxes."

For the EU, Trade Commissioner Peter Mandelson said it remained his "strong preference and intention to seek an amicable solution."

## The Canadian Conference

Some inside information from Dave Hogg who is helping organise the event

**The 2006 Canadian Regional Conference is a practitioner-led conference that's all about competing and winning in the global marketplace.**

### About this Conference

Competition is no longer **company vs. company** - it is **infrastructure vs. infrastructure**. And that **begins where you live**.

The 2006 Canadian Regional Conference is a **practitioner-led** conference that's all about **competing and winning in the global marketplace**.

With almost **80 available learning experiences** including 9 International Keynote Speakers, 36 Practitioner-Led Presentations, 15 Workshops, 16 On-site Plant Tours, and new this year - 4 all-day "Accelerated Learning Experiences" ... Success in manufacturing begins in Kitchener-Waterloo this June 2006. [↓](#)

**Kitchener-Waterloo, Ontario, Canada**

**12<sup>th</sup> June 2006**

Just a simple FYI – our Lean conference is about to fill up as we are sitting at 400

registered and we have only room for 500 in this small community. But it will be fun.

A copy of the program is available from [www.ame.org](http://www.ame.org) which has some excellent folks from your world including 10 delegates from the University of Cardiff in Wales led by our good friend John Bicheno, plus 12 folks from Inside UK who will be at the conference for a day and then touring area manufacturing plants. So the UK will be well represented in Canada in June but we also welcome more!

During the conference we are looking forward to an update on what is happening in the UK via a panel of four folks from the two groups above whose topic is "Trends in Lean Deployment in Europe – *Practical Competitive Insights from UK Practitioners*". Moderating the Panel will be Tony Laraia, author of *Kaizen Blitz*, and the Chair of AME and the Plant Manager for Wiremold's Connecticut facility.

## Dan Jones Latest Email

I breathed a huge sigh of relief the other day. We found a bookkeeper to manage the accounts for our rapidly growing business! Lizzie, my Operations Director, and I concluded that we were temperamentally unsuited to the task. Now she can spend all her time managing our busy schedules, workshops and conferences. I can do more useful things between assignments.

It is amazing how we let our lives get sidetracked from the things we know we ought to be doing, by numbers that tell us to do the opposite. Yet we often feel powerless to change the root cause of this conflict so we can get on doing the right things. Here is my initial list of common curses – I am sure you can think of more.

First come forecasts – which are always wrong, including my own! In this day of electronic point of sale and the ability to transmit real sales data upstream almost instantly, why are we still using forecasts? I so often find that delays in the information flows back upstream are longer than the physical flows. If only we could see how information gets hopelessly distorted the more hands it passes through and the older it

gets. Would we act this way if information began to rot like a dead fish?

The answer is not as simple as saying we are only going to react to sales data as they happen. We need to take account of changes in trends and to cover a degree of anticipated fluctuation in real demand. In most cases real end-customer demand is actually very stable and the degree of variation for our high volume products and services is actually quite small. So we ought to at least be able to modify our production plans based on rapid feedback from real sales data as they happen. Our model ought to be picking exact quantities of fresh vegetables in the field today for sale in the store tomorrow, based on the weekly pattern of sales and today's sales data.

Second is the curse of Economic Order Quantities. This algorithm is the second source of noise in our information flows. Yet the more we learn about managing lean supply chains the more we see that big batches create extra costs elsewhere in the value stream and lead to chronic instability – which in turn causes fire-fighting, expediting and chasing. The world of perfect information and everything always going according to plan simply does not exist. Batching activities separately across a value stream simply makes things worse as their impact is amplified.

Aligning batch sizes for volume products to daily or at least weekly demand makes flow possible and creates the stability for ongoing continuous improvement. Make low volume products to order separately. The same is true in distribution – picking up and delivering small batches of more products from more suppliers on milk rounds turn out to be cheaper than waiting for each supplier to fill a truck with their own products. How much noise do your systems create for your suppliers?

This leads us to the third curse, chimney costing within a department or function. This assumes that by keeping every activity busy by ensuring there is always work waiting to be done, we optimise the utilisation of every asset, department, piece of equipment or truck.

Simply calculating the OEE (Original Equipment Effectiveness) reveals that it

actually results in much poorer utilisation. By concentrating on all the causes of interruption in order to synchronise one step with another and create a flow, we end up with much higher utilisation. We are also beginning to optimise the end-to-end flow of value creation and not optimising each activity in isolation.

This leads to the fourth curse, standard costing. Just looking at the costs of direct labour and slow freight has led to many mistaken location decisions and much longer supply chains than we needed. If we look at all the costs associated with the end-to-end value stream, including all the costs of managing variation, we would take very different decisions and have much more effective supply chains. And we would not be wasting so much of the world's energy resources and causing so much pollution!

Challenging these familiar but mistaken rules of thumb will help us do the right things for our customers, our supply chains and our organisations.

Yours sincerely

**Daniel T Jones**

## The 85% rule

Thanks again to the Society of Manufacturing Engineers [www.sme.org](http://www.sme.org) for their permission to use this article

You are behind the times if you don't know how long it takes to build your product. Some companies feel time studies are, in essence, a waste of time. Collecting this data, they say, is time-consuming, soaks up valuable engineering resources, and can put added pressure on the operators being observed.

But collecting good data is a critical step to setting up an assembly line. Time study data, collected accurately, can help improve your company's productivity and quality as it helps you make better decisions. Although you must apply knowledge, experience and a "sanity" check, good solid data can never fail you.

Collecting time and motion data from your assembly processes is only half the game, however. Line balancing is equally important. Work content at each workstation must be as close to the same cycle time as possible.

### **Capture work content in sequential order**

Don't worry about how the work content is organized and sequenced in its current state. Without timing, capture and document everything that happens through the whole process from start to finish, identifying value-added and non-value-added work as it is performed.

### **Do the time studies**

Now that you can see all the work content for the whole assembly process, return to the line and start timing. By documenting the work content first, you can time any work element regardless of its location on the line. You can go from part of the line to another, timing what you can. Just make sure you time and account for all the work content.

Much has been said about resistance from operators. Spending some time with them before doing time observations can ease their fears. One to two weeks before the exercise is to begin, chat with the operators and show them you respect their knowledge and experience. Try to put things on a friendly basis.

A couple of days before the observations, gather the operators and line leads together. Let them know the reason for the time studies is to make improvements to the area. If one of the operators can be released to help with the time studies, that's even better.

### **Remove the waste**

A good rule of thumb when analyzing time and motion studies is to look at the time associated with obvious things like walking and retrieving parts, and un-packaging parts from suppliers. Remove these non-value-added steps from your line-balancing analysis and list them separately. You don't want to design them into your newly balanced line. Part of your implementation plan will be to address this list of newly identified waste and come up with improvement ideas.

### **Line balancing**

Based on demand, calculate the takt time. That is the amount of time available in the shift divided by the number of assemblies to be built each day. Takt time sets the pace for flow through the factory.

Do not make the mistake of overworking operators. Use the 85% rule for calculating work content. If takt time is three minutes, do NOT load your workstations to three minutes. This will force operators to move at a pace that cannot be sustained, and will result in lost volume, lower productivity, and poor quality.

Take those three minutes and multiply by 85%. Now load your workstations to 2 minutes and 30 seconds. Yes, it will create more workstations. But it will also establish a more productive and safer assembly process. The 15% allowance is for personal factors, fatigue and delay. Manufacturing is never perfect, so you allow for minor mishaps that may occur on the line.

### **Line balancing rules**

#### **Balance by time**

Review the time study data and draw lines at roughly 2-minutes, 30-seconds' worth of work content. You may be over or under, but this gives you a good starting point.

#### **Balance by work content**

Some workstations will be balanced perfectly and can be left alone. Work content at others will need to be shifted around or taken out of its original sequence. New ways of working will be created to make the line flow properly. Balancing by work content must use the knowledge of operators and engineers.

Can certain work elements be moved farther downstream to help the balance effort? Work content at the end of a workstation's steps can often be moved to the start of the next workstation. Can part installation be broken into individual steps? Five wires for a wire harness, for instance, might be installed in two or three workstations. Just keep part protection in mind.

## Balance by material

When looking at the individual work elements, pay attention to outsized parts that require larger workstations. Although in the ideal state, operators should stay in their workstations without having to leave for any reason, it may be necessary to allow time for lifting parts or a little walking to retrieve them from bins. Small bits of waste like these will remain in the process for awhile.

## Balance by inventory

While excessive inventory is waste, having some inventory can help in line balancing. To balance by inventory, you create space in a workstation to allow an operator to work on more than one unit.

If the cycle time for testing, for example, exceeds the 2-minute, 30-second takt time, you can make space for two units to be tested. While the testing machine's "internal" work takes place, the operator performs the "external" work to prepare the next unit in queue.

When balancing by inventory, make sure the total cycle time does not exceed takt time x the number of units in queue. If the workstation is designed to accommodate two units with a takt time of 2 minutes and 30 seconds, the cycle time for each unit cannot exceed 5 minutes.

Time studies and line balancing are the foundation of any assembly process. Line balancing has been around for a long time, and is not usually mentioned as a lean principle, but it is essential for single-piece flow. Knowing how to use time is invaluable to an organization and it is a good first step in creating a lean assembly process.

## About the author

Chris Ortiz is the president of Kaizen Assembly in Winston Salem, NC. He has taught hundreds of engineers and managers the importance of collecting time and motion data and the proper techniques for obtaining this information. Chris is the author of the upcoming book, "Kaizen Assembly: Designing, Constructing, and Managing a Lean Assembly Line." He can be contacted at [www.kaizenassembly.com](http://www.kaizenassembly.com) or [chrisortiz@kaizenassembly.com](mailto:chrisortiz@kaizenassembly.com).

## Laying Out the Factory

Taken from <http://kanban.blogspot.com/> Lean Blog

I did some of my long-ago masters thesis work on factory design. I've had the opportunity to design factory layouts ranging from a \$1B investment down to a company with \$4M in revenues. Factories were designed a long time ago to take advantage both of gravity, and the fact that you have to run belts off a main drive shaft, and so you used multiple floors and had material generally work their ways down to the bottom.

Once factories could be run on electricity, new factory designs didn't change to accommodate the changes in production processes for almost 40 years. Now that lean has been affecting production processes for a couple decades, how far has factory layout/design come? In my experience, not very. I just worked on another factory layout this week, and thought it was a good opportunity to share some of the common mistakes and problems with factory layout that people aren't considering in their approach. Instead of writing another thesis, I will post a few comments throughout the week in smaller bite-sized chunks.

### 1. Learning

We design factories as if that we the best we could, and will, do. If we know of future business, or are growing, we might put in some room for some known factors. But we don't design in a generic sense that tomorrow's business will be different than today, and our factory must change. It will change because of changes in the business.

It will change because of continuous improvement. It will change because of technology improvements. It will change. Don't try to have the best design that will only be the best for one day. Try to have the best design that is flexible to adapt and change with your journey.

### 2. Human / People Infrastructure

We leave to brute force the fact that people must manage this factory. How many factory

designs incorporate team meeting areas near their work areas? Or allow a supervisor to have line-of-sight with all of the people they support? Or plan for management and engineers and other resources to be within close distance to where they are needed? We leave this as an afterthought, versus a primary criteria of design. A good example of this is maintenance. In far too many places, maintenance is a corner off away from where their customers are. Why not have satellite maintenance areas close to each production area, with the needed parts, tools and depending on your overall resources, people?

### **3. Secondary Flows**

We place our primary material flow of raw material into WIP into finished goods on a pedestal and all other flows must be subservient to that. This is the way it should be, to a point. But there are a lot of resources, time, material and other problems with the material flows of dunnage, offal, waste streams, containers and so on.

In one factory, their offal from a large blow molded product was almost 40% of material usage, but in volume was equal to the material coming in. This wasn't considered, and they dedicated as much resources to taking care of this waste stream as they did the value added work.

### **4. Right Angles**

This one kills me, especially as an engineer. Even if we're not obsessive compulsive, we feel compelled to put everything, equipment, racks, aisles, at right angles.

People don't move at right angles. Forktrucks don't either. Everything naturally flows in arcs. Why do we insist on putting 3 pieces of equipment in a straight row, then turn right 90 degrees, then two more pieces of equipment?

Why do aisles have to be straight? Yes, there are some real constraints and they start with the outside walls, but just because Autocad automatically snaps our elements to a grid, doesn't mean we have to do it in real life.

### **5. The Design Process**

How groups go about their factory design is perhaps the most troubling aspect. We come up with some objectives, far too often driven

by a myopic objective such as a single piece of new business, hand it off to an engineer to sit in front of Autocad and come up with a design.

This is followed by a million criticisms which put the engineer into a box in which no happy solution exists. There are several flaws with this from an approach standpoint including (a) all designs are only iterations from the first one which is the 'anchor' design, (b) only a small subset of factors are considered, the rest are forced later, and (c) only a small fraction of those who live with the outcome understand how the solution was determined.

While I could write a whole chapter on this, I will only provide a simple template for a design. First, understand your current state. Map your material, information and people flows, waste streams, options for expansion and so on. Understand what you like and don't like. Then, work carefully to develop a full-set of design criteria, or critical success factors.

These criteria are important as you will use them to evaluate your design. It is unlikely that one design will be superior in all criteria, because you will have to make tradeoffs. Then you start to develop alternative layouts. In your first round, include as many people as possible in separate teams and develop many alternatives simultaneously. This is the only way to get a wide range of options. Leave no constraints on the teams. They should focus on what is possible, what is ideal.

But do these designs with paper, scissors and tape spread out on a table. This is the 'paper doll' method. DO NOT do this on a computer, even if you have a great laptop, incredible CAD software and a great projection system (hey fellow engineers, please heed this advice). Despite advances in software, it is much easier to collaborate and think out of the box huddled around paper than pointing at a screen while you wait for someone to turn a machine 90 degrees.

Evaluate these designs and go at it again, taking what people like and don't like and another set of clean sheets of paper. Do this as many times as possible given your resources and time. Eventually you will begin to converge on a handful of solutions at which point, it is helpful to get broader

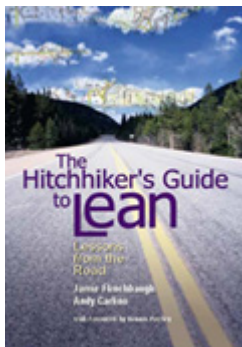
involvement, allowing people to see, think about and give input. You will also need to do more detailed analysis, as paper and scissors can't tell you if you just stuck a 18 inch conveyor through a 17" opening.

As last points of advice on the processes, make sure you have cross-functional involvement. Also, make sure those cross-functional people don't 'represent' their department, but are focused on the overall performance of the factory. This isn't a negotiation or a land-grab, this is to fix the process. Use current reality to help you solve problems.

Do your work close to the floor or if possible, carve out an empty spot on the floor and set up some tables and do it there. And lastly, don't try to be perfect. Focus on making progress and assume that whatever you do will be wrong the day it's out there. Factory design is only a step forward, not a replacement for daily continuous improvement.

By Jamie Flinchbaugh, [Lean Learning Center](http://www.leanlearningcenter.com/)  
<http://www.leanlearningcenter.com/>

## A Book Review



### The Hitchhiker's Guide to Lean

ISBN: 0872638316  
Jamie Flinchbaugh and Andy Carlino with  
Foreword by Dennis Pawley

Hitchhikers do not travel a fixed path. They intentionally wander so they can learn and grow along the way. Embarking on the lean journey is similar, there are many roads on which to wander and no single one is right for all.

"The Hitchhiker's Guide to Lean: Lessons from the Road" reveals the most critical lessons learned over the authors' combined 30-plus years of exploring the lean highways.

One of the book's lessons from the road is you need to pay attention to where you are and where you are going, just as you do when driving a car. Lean leaders add value by changing things, moving them forward, and producing different results than the day before.

To lead, you must go beyond creating a vision. You must develop the vehicle that will deliver it. "The Hitchhiker's Guide to Lean" is the vehicle that will help you move beyond the tools and take lean to a self-sustaining and continuously improving level.

The book's 10 chapters cover lean principles and thinking, lean leadership moves, the roadmap for lean transformation, common pitfalls of lean journeys, building an operating system, lean accounting, lean material management, lean in service organizations, and how individuals can apply lean to improve themselves.

The book concludes with interviews of lean practitioners on the front lines of change at Chrysler, Ross Controls, DTE Energy, RSR Corporation, and Nemak.

It is not yet at Amazon.co.uk, but can be purchased from [amazon.com](http://amazon.com)