Tool Up...Win the Race
With the Lean Experience

The Lean Toolbox ©

Poke-Yoke  One-Piece Flow  Takt Time
SMED  POUS  TPM
Quality at the Source  Pull Systems Kanban  Teams
Visual Systems  Plant Layout  6S

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A New Perspectives Production
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Foreword

This work was originally presented as a companion to the interactive workshop *The Lean Experience* by New Perspectives. It is intended to be easy to read, with very little prose, and many bullet points which serve as reminders of the topics covered. The appendix should be considered as bonus material. We have also included a reading list of both online articles and printed books. Since this booklet is printed on demand, to avoid piles of inventory, please notify us if links are dead, or books are out of print at:
wes@theleantoolbox.com

*We hope you enjoyed The Lean Experience and will use your new gained knowledge to improve the quality of your life both inside and outside the workplace.*

What Lean Seeks to Accomplish

![Diagram of Business before Lean and Business after Lean]

V = Value added activity, those things your customer is willing to pay for.
N = Non-value added activities, those things of which your customer may not even be aware.
P = Planning
What does “lean” mean?
*Identify and Eliminate Waste*

9 Types of Waste are…

<table>
<thead>
<tr>
<th>Injuries</th>
<th>Transportation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inventory</td>
<td>Inspection</td>
</tr>
<tr>
<td>Overproduction</td>
<td>Motion</td>
</tr>
<tr>
<td>Time</td>
<td>Defects</td>
</tr>
<tr>
<td>Unused Creativity</td>
<td></td>
</tr>
</tbody>
</table>

Standardized Work

*Pick the one best way to accomplish the task. Document the best way. Maintain willingness to change the method once proven or disproved.*

<table>
<thead>
<tr>
<th>Means Effective use of resources:</th>
<th>Are standards...</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mankind</td>
<td>In existence</td>
</tr>
<tr>
<td>Machine</td>
<td>Enforced</td>
</tr>
<tr>
<td>Methods</td>
<td>In need of revision?</td>
</tr>
<tr>
<td>Materials.</td>
<td></td>
</tr>
</tbody>
</table>

Plant Layout

Is it logical based on present needs?
Is transportation equipment necessary?
Why were machines placed in their locations?
Is vehicle traffic mixed with pedestrian traffic?
What obstacles impede speed?
What distance do the products travel?
Workplace Organization

Use neat, clean, logical arrangement
Place everything necessary within reach
Place tools in the proper place according to best use
Work toward the 30 second rule: *Can I get anything I need within 30 seconds?*
Place consumables in clear view of everybody.
Make scrap clearly visible (make it ugly)

6S

*Develop and maintain a safe, neat and usable workspace by following the discipline of 6S.*

<table>
<thead>
<tr>
<th>Safety</th>
<th>Exits marked, fire safety, procedures in place</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sort</td>
<td>Keep only what is needed</td>
</tr>
<tr>
<td>Straighten</td>
<td>Organize, label, compartmentalize</td>
</tr>
<tr>
<td>Scrub</td>
<td>Clean workplace, paint machinery/surroundings</td>
</tr>
<tr>
<td>Standardize</td>
<td>Develop habits to maintain</td>
</tr>
<tr>
<td>Sustain</td>
<td>Enforce rules to maintain</td>
</tr>
</tbody>
</table>

Quality at the Source

*Refuse to pass on poor quality or non-conformance. Endow everyone involved with the freedom to stop the process if there is a problem.*

| Source inspection based on visual standards that are clearly visible by the operator. | Give each operator the authority to make decisions based on clear standards. If adjustments are necessary, give operator the ability to do so based on clear visual guidelines. |
| Don’t pass it on. Use samples and or visual references such as photos.                  |                                                                                                                                       |
| Use Go-No-Go Gages.                                                                       |                                                                                                                                       |
Push vs. Pull

‘Push’ is typical of mass production systems. Mass production does not allow for flexibility. Pull systems base production on ‘filling a specific need.’

<table>
<thead>
<tr>
<th>Push (results in waste)</th>
<th>Pull (results in flow)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resources are allocated according to forecasts.</td>
<td>Resources are controlled according to consumption, and customer demand.</td>
</tr>
<tr>
<td>Production is paced according to machine speed.</td>
<td>Replace only that which is consumed.</td>
</tr>
<tr>
<td>Causes WIP and increases wait times.</td>
<td></td>
</tr>
</tbody>
</table>

Kanban

Kanban is a: signal, box, bin or defined area indicating action.
Literally means “sign board” from Japanese.
Tips for implementation: simple, simple, simple.
Avoid the use of computers to accomplish this.

Teams

Develop specific cross-training within cells to develop multi-skilled employees.
Rotate jobs and use participatory decision making.
Internal customer concept – keep your customer first!

SMED (Quick Changeover)

Single digit Minutes Exchange of Dies
Less than ten minutes to change form last good product to first-next good product.
Makes smaller lots possible without an associated increase in cost
Consistent quality is achievable
Inventory is minimized
Lead times are reduced
Frustration is reduced and possibly eliminated

Point of Use Storage

Consumables stored at consumption point
Tools stored where needed
Tips: Vendor relationships important, Simplifies inventory
Total Preventive Maintenance (TPM)
System effectiveness more important than point efficiencies
Tie maintenance intervals to something you already measure
Maintenance is more important with deeper Lean Implementation

Poke-Yoke
*If it can happen it will happen. Fix it so it can’t happen.*
Make it impossible to do it wrong by designing out the possibility of making an error.
Examples are: keyed parts, torque limiters, fixtures, tabs, markings, product design etc.

One-Piece Flow
*Make one, take one.*
Best lot quantity is one. Benefits are: lower lead time, lower WIP, faster cycle time, better quality.

Takt Time
*Takt time is the rate at which the customer demands (or consumes) your product.*
*From the German word “Takt” meaning phase. Think: “tik tock, tik toc.”*
Tempo, pace, “drum beat”

Calculation of Minimum Operations Requirement
*Calculated Takt Time-Available work time divided by units required*
Ex: 8 hours = 480 minutes
80 minutes — 30 minutes for breaks = 450 minutes
44 units per day required by customer demand
Therefore takt time = 10 minutes

*Determine Value added time*
Perform sample time studies; time only value added activities.
*Value added time divided by Takt time = the number if operational segments required.*

Work Balancing
It is essential to balance all activities under the Takt Time. Allow a 20% buffer under takt time for reasonable human fluctuations.
It is permissible to reassign tasks to achieve balance. *No prima donnas* allowed.
FAQ

Q: Isn’t it true that the goal of Lean is to eliminate people?
A: Absolutely not. The intent is to improve productivity by eliminating wasteful activities that are always part of rapid growth or new markets. Waste can also be a result of mass production or technology that outpaces demand.

Q: I remember JIT (Just in Time) isn’t Lean the same thing?
A: No. JIT was a half-hearted attempt at true Lean in the 1980s. JIT failed because it considered only the supply side of the productivity equation and produced a false economy. Companies realized the problems with JIT because they spent massive amounts of time waiting on their suppliers to be “just in time.”

Q: I have heard of six sigma. Isn’t this the same thing?
A: No. Six sigma is a statistical method of tracking the variations in the value added part of the process. By contrast, Lean focuses almost entirely on the non-value added activities and seeks to eliminate them. If elimination is not possible with known technology, Lean works on ways to greatly reduce the impact the non-value added activity has on the overall process thereby reducing overall cost.

Q: We have done this stuff before. I need to get back to work. How long will we be going through this training?
A: A true Lean implementation becomes a way of life for a company. The goal of all Lean implementation is perfection. Since demand, people, and technology are always changing, we can never achieve perfection, so we keep working toward it. If we fail to keep improving in a changing market, it is certain our competition will capture our customers and ultimately our livelihood.
Online reading list:

Please report dead links or out of print books to: info@theleantoolbox.com

www.lean.org
Lean Enterprise Institute- an organization dedicated to providing training materials and services to both manufacturing and service industry. Free membership required provides periodic updates and forum memberships. LEI is a good source for training materials, and information.

http://www.lean.org/WhatsLean/Principles.cfm#pull
As above but more specific information on Lean Principles like this...

Specify value from the standpoint of the end customer by product family.

Identify all the steps in the value stream for each product family, eliminating every step and every action and every practice that does not create value.

Make the remaining value-creating steps occur in a tight and integrated sequence so the product will flow smoothly toward the customer.

As flow is introduced, let customers pull value from the next upstream activity.

As these steps lead to greater transparency, enabling managers and teams to eliminate further waste, pursue perfection through continuous improvement.