



Companion
by Minitab®

Continuous Improvement Toolkit: 10 Critical Lean Tools



Introduction to Lean Tools

“Lean” focuses on maximising customer value by removing waste and eliminating defects. Lean is a mindset that everyone in an organisation should be able to spot waste and bring it up to Management to be addressed.

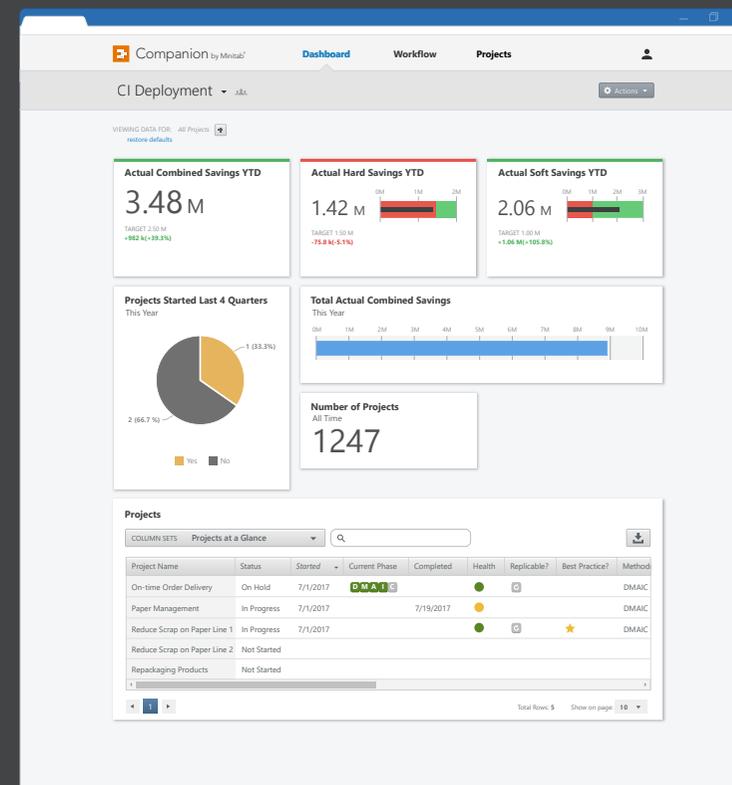
Although Lean uses data, its tools are not as analytical or data-rich as those used in Six Sigma in manufacturing. For example, Lean tools are more about understanding the process, looking for waste, preventing mistakes, and documenting what you did. Lean seeks to make it easy to do things the right way and hard to do things the wrong way.

There are many examples of the positive impact of Lean implementation in just about every industry and type of organization. Dramatic cost savings, lead time and inventory reductions as well as many other improvements have been cited by businesses around the world. Familiarising yourself with Lean tools is a great way to get started in implementing Lean.

In this toolkit, we briefly explain the key Lean tools used in process improvement, what they do, and why they’re important. The tools we selected for this toolkit are straightforward, but they are incredibly powerful when it comes to identifying and eliminating waste and defects.

How can you use and apply these Lean tools yourself? One approach is to use Companion by Minitab, the software we’ve developed to manage Continuous Improvement projects end-to-end. Companion combines a desktop toolkit of Lean and quality tools for executing your projects with a web-based dashboard for visualising benefits and project information. Using a workflow, the software will manage the flow of ideas to projects to completion, effortlessly streamlining phase reviews and approvals.

Learning to use Lean tools is a must for any continuous improvement practitioner. If you want to try them for yourself and you haven’t looked at the Companion software yet, we encourage you to download a free 30-day trial.

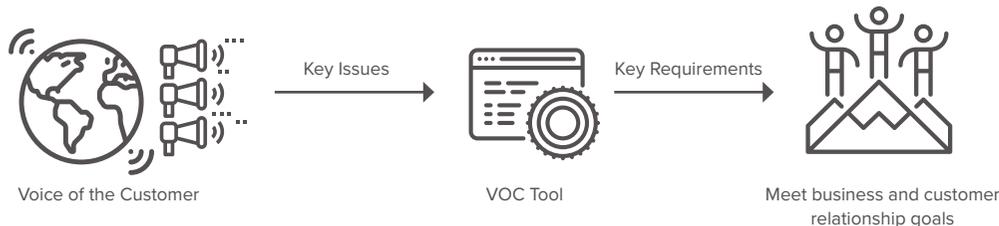


Now let's explore ten critical Lean tools used in process improvements, what they do, and why they're important. To start leveraging these tools and other continuous improvement methods in your business, remember to try them out in Companion by Minitab. These tools are even more powerful if you can share and collaborate with your team, so we encourage you to try Companion's online dashboard reporting capabilities as well.

Lean Tool #1. Voice of the Customer (VOC) Summary

Why it matters: A basic tenet of Lean is to understand the customer needs and design the process to fully meet or exceed customer expectations. When implementing Lean, it is fundamental to capture the voice, expectations, preferences and comments of the customer regarding your product or service. The Voice of the Customer (VOC) forms the foundation against which all improvements are judged.

How to use it: The VOC Summary tool provides a way to capture this vital data. Using the VOC Summary tool will help you understand the key customer issues, convert them into critical customer requirements, and meet key business and customer relationship goals.



Example

Here is the VOC Summary tool in Companion, which is held as an integral part of a Continuous Improvement project or programme and used to guide decisions.

Project Name: Buy More Books

Prepared By: Bonnie Stone **Prepared Date:** 12/6/2017

Participants: Bonnie, Jose, Susie, Don

Customer	Voice of Customer	Key Customer Issue(s)	Customer Requirements
Who is the customer?	Actual customer statements or comments.	The real customer concerns, values, or expectations.	What are the specific and measurable customer requirements?
Anyone who wants to purchase a book from our company.	Every time I place an order with your company, a customer service rep calls me to get additional information. This is getting annoying and delays the shipment.	I want to be able to place the order and have it processed by your company the first time.	All the necessary information should be captured on the order form.
Anyone who wants to purchase a book from our company.	Every time I place an order with your company, a customer service rep calls me to get additional information. This is getting annoying and delays the shipment.	I want my order shipped to me without delays and to be delivered as soon as possible.	No phone calls by the Customer Service Rep to collect additional information to process a book order.

Conclusion: Need to kick off a Lean project to identify the root cause of problems with the "Order Books" process and improve this process.

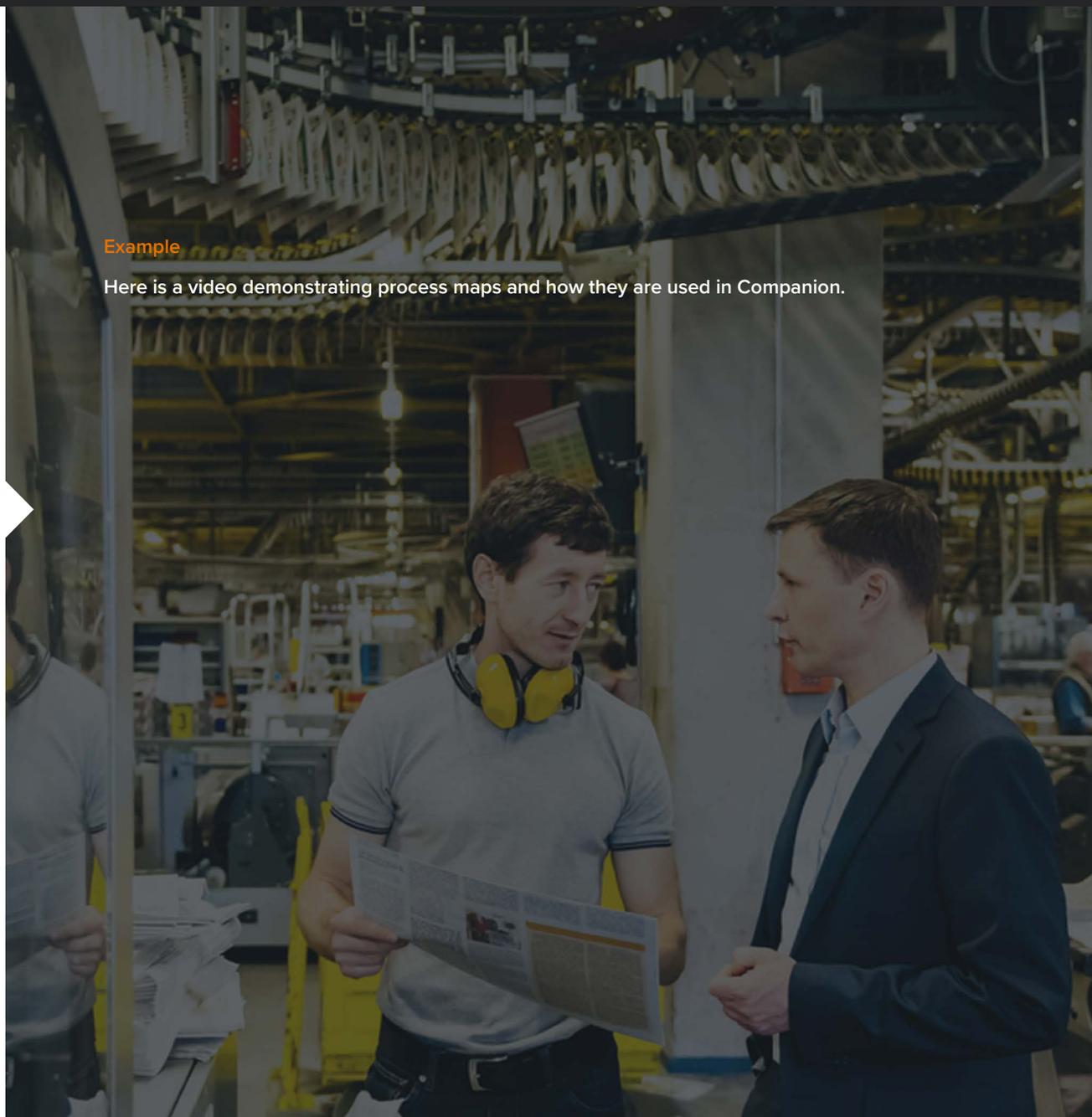
Lean Tool #2. Process Flow

Why it matters: To improve a process, you must be able to understand and communicate the activities, or steps, in a process. You also need to see the relationship between inputs and outputs, identify key decision points and uncover backtracking, duplication or rework.

How to use it: Process flows, also known as process maps, make it easy to visualise a process. It is best to build process maps with the team working in the process. The creation of a process flow makes waste visible – e.g. bottlenecks, delays, storage, rework - and shows you the best opportunities for improvement.

Example

Here is a video demonstrating process maps and how they are used in Companion.



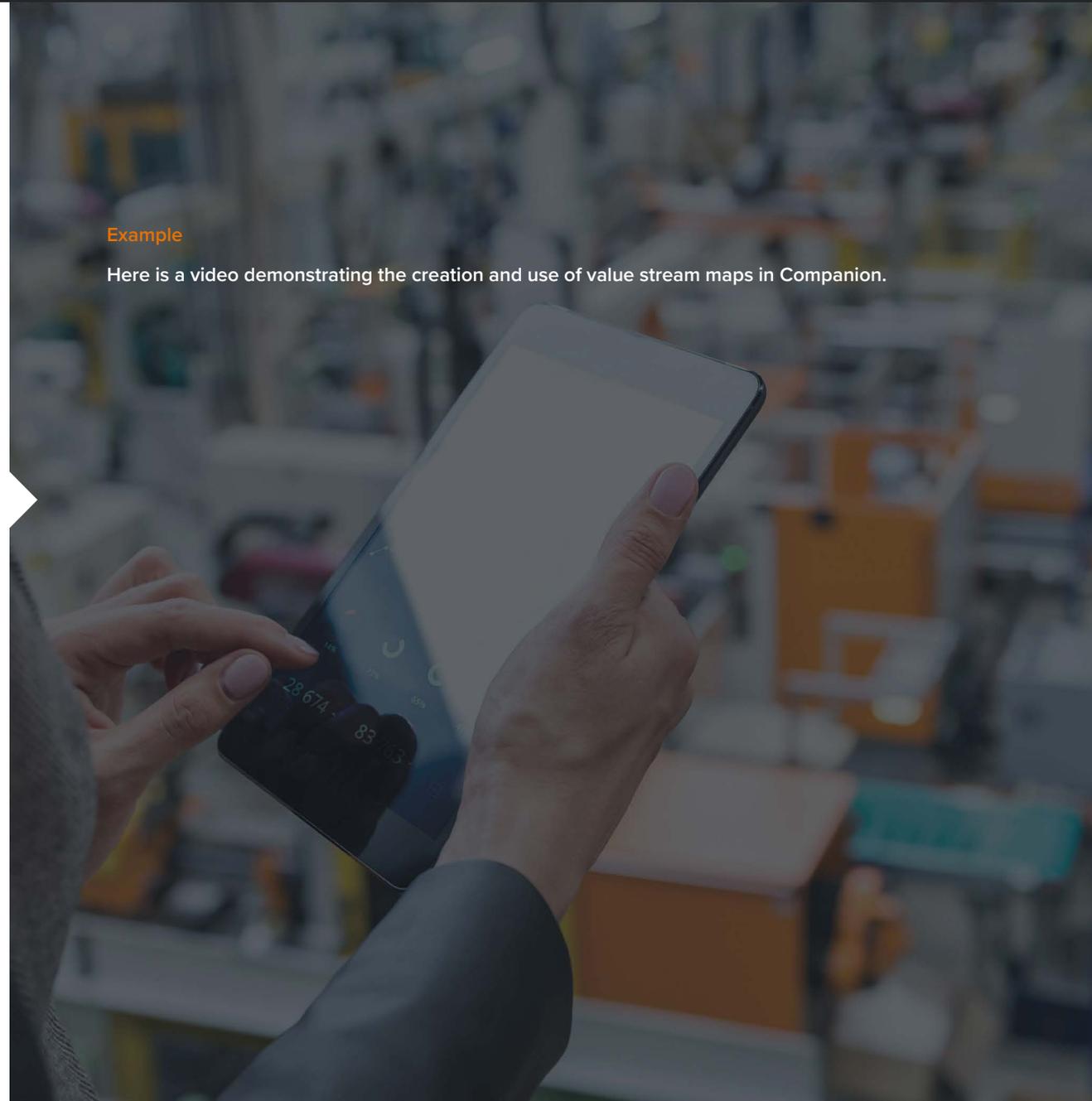
Lean Tool #3. Value Stream Maps (VSM)

Why it matters: The next step after process mapping is to understand where value is created or lost. Value is defined by the customer based on their perception of the usefulness and necessity of a product or service. In other words, value is what the customer is buying.

How to use it: A value stream map is a collection of all the activities, both value-added and non-value added, that take a product or service from its beginning through to the customer. You can include material and information flow, operating parameters, or defect rates, lead times, and so on. This enables you to analyse the current state and design a future state for the end-to-end activities that generate your product or service to meet customer needs.

Example

Here is a video demonstrating the creation and use of value stream maps in Companion.



Example

Here is the Five Whys tool in use in Companion, which provides a framework to link the project to the root cause of a problem.

Five Whys

Project Name: Buy More Books

Prepared By: Bonnie Stone Prepared Date: 12/6/2017

Clearly State the Problem:
The book order could not be entered into the database.

Why did this occur?
Some necessary information was missing. Is this a root cause? Yes No

If no, why did this occur?
The customer did not provide the necessary information. Is this a root cause? Yes No

If no, why did this occur?
The order form the customer used did not ask for this information. Is this a root cause? Yes No

If no, why did this occur?
The order form is missing these fields, so the customer did not get prompted to provide this information. Is this a root cause? Yes No

If no, why did this occur?
 Is this a root cause? Yes No

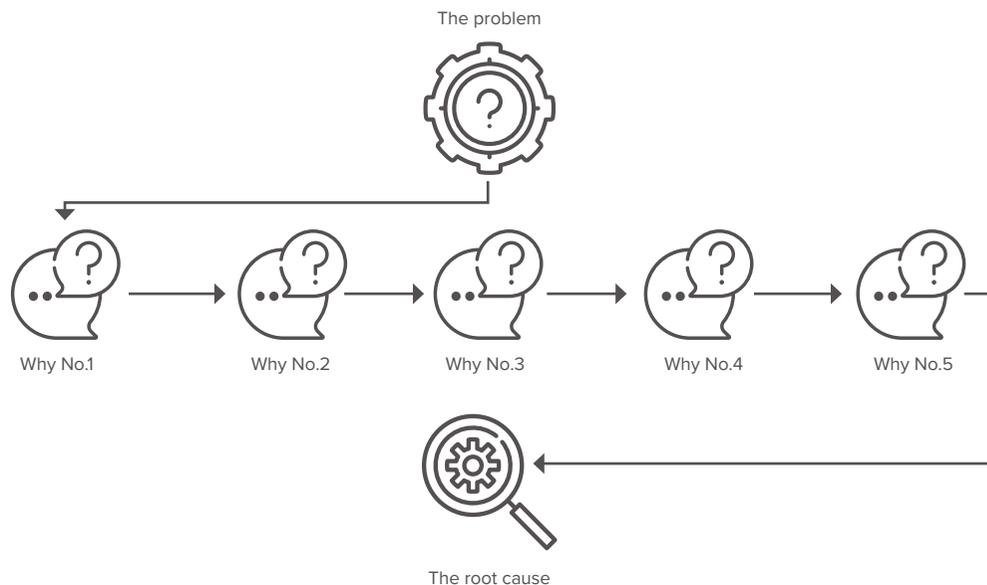
Root Cause (Ensure this is within your control):
The order form is missing key information fields.

Possible Solutions:
Edit the form to add the fields to capture this information when the customer places an order.

Lean Tool #4. Five Whys

Why it matters: Lean is about understanding why things are done the way they are. Often, things are done improperly, at the wrong time, or skipped altogether resulting in process problems. *The challenge is to identify the root cause:* most of the time it is the process that fails, not the people.

How to use it: The Five Whys tool helps you to drill down and determine the root cause of a problem. As the name implies, you repeat the question “Why?” five times. This helps you to uncover the problem’s root cause, the relationships between different root causes, and identify steps to prevent the problem from happening again. The real root cause typically points to a process that does not work well or does not exist.



Example

Here is 5S Audit tool in Companion which provides a consistent framework for sustaining the 5S gains. This tool also feeds the online dashboard reporting to ensure everyone's progress is clear, visible and shareable.

0	1	2	3	4
Very Unacceptable	Unacceptable	Average	Good	Perfect

No.	Checking Item	Evaluation Criteria	Score
1	Parts and Materials	Are all stock items and work in progress necessary?	0 1 2 3 4
2	Machines and Equipment	Are all machine and pieces of equipment used regularly?	0 1 2 3 4
3	Jigs, Tools and Molds	Are all jigs, tools, molds, cutting tools, and fittings used regularly?	0 1 2 3 4
4	Visual Control	Can all unnecessary items be distinguished at a glance?	0 1 2 3 4
5	Documentation	Are all obsolete documents purged routinely?	0 1 2 3 4

Summary	
Subtotal	0
Maximum Possible	20
Percent	0.0 %

No.	Checking Item	Evaluation Criteria	Score
6	Location Indicators	Are shelves and storage areas marked with location indicators?	0 1 2 3 4

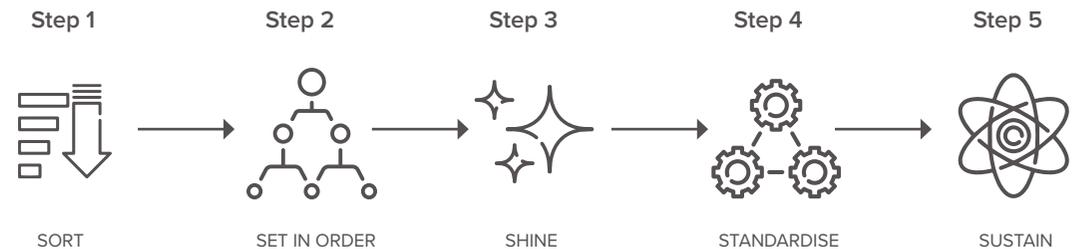
Lean Tool #5.

5S Audit: Sort, Set in Order, Shine, Standardise and Sustain

Why it matters: A clean, well-organized workplace improves efficiency and eliminates waste. With a method to organise, audit and maintain your workplaces and systems, you encourage productivity and ensure consistency across the business.

How to use it: 5S is a team-based set of tools that systematically and methodically organise the workplace. It comprises five steps to follow: Sort, Set in Order, Shine, Standardise and Sustain. With the first step, Sort, you remove the unwanted and unnecessary. With Set in Order, you arrange items to be easy to use. With Shine, you clean and inspect the workplace regularly. With Standardise, you establish procedures and schedules to ensure the first 3 steps are consistently performed across your organisation.

The fifth and final step, Sustain, is one of the hardest steps to accomplish. It's akin to losing the weight and keeping it off. Sustaining requires maintaining the gains of process improvements on a regular basis. Without it, old habits resurface, and the workplace falls into disarray. To support this, it's important that the benefits are visible and shared so everyone is encouraged to keep it up.



Lean Tool #6. Kaizen

Why it matters: Kaizen is a method for accelerating the pace of process improvement projects. While originally developed for manufacturing, Kaizen is used extensively in a variety of industries and is a valuable technique for the process improvement practitioner. Kaizen is most effective when used to eliminate waste and non-value-added activities.

How to use it: Kaizen is a focused 3-5 day dedicated event to drive process improvements. Project objectives are well-defined and appropriately scoped going in to the Kaizen event. Employees are pulled from their daily duties to participate. Typically, there is a mid-week review and a final presentation. Solutions are implemented immediately.

Example

To help leaders plan and implement a Kaizen event, Companion provides a Roadmap™ to aid effective analysis, implementation, and enable reporting of results.

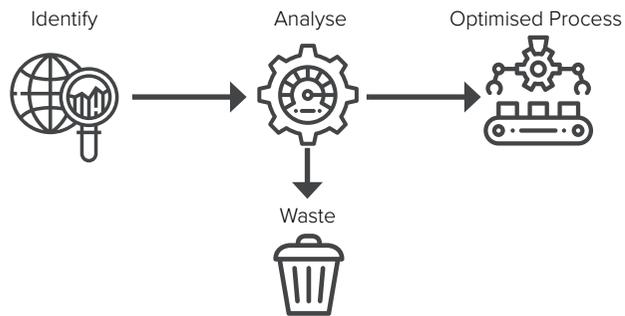
The screenshot displays the Companion software interface for a Kaizen event. The main window is titled 'Project Today' and shows the following details:

- Project Name:** Improve Drill Bit Manufacturing Process
- Project Leader:** Bonnie Stone
- Sponsor:** (blank)
- Methodology:** Kaizen Event
- Project Status & Progress:** Status: In Progress, Start Date: 9/11/2017, Due Date: 9/15/2017
- Project Health:** Green
- Current Phase:** Kaizen - Day 3 (with progress indicators 1, 2, 3, 4, 5, 6, 7)
- Ready for Phase Gate Review:** Yes (Ready)
- Phase Data Table:**

Order	Phase Name	Start Date	Phase Gate Review Date	Duration (days)
1	Preparation Phase	8/28/2017	9/1/2017	4
2	Day 1 - Measure	9/11/2017	9/12/2017	1
3	Day 2 - Data and Analyze	9/12/2017	9/13/2017	1
4	Day 3 - Analyze and Implement	9/13/2017	9/14/2017	1
5	Day 4 - Finish Implementation	9/14/2017	9/15/2017	1
6	Day 5 - Pilot and Present	9/15/2017	9/18/2017	3
7	Event Closure and Follow Up	9/22/2017	9/29/2017	7

Lean Tool #7. Waste Analysis

Why it matters: In Lean, waste is anything in a process that is unnecessary and does not add value from the customer's perspective. The purpose of Lean is to identify, analyse, and eliminate all sources of waste, such as defects or excessive inventory.



How to use it: Performing a Waste Analysis by Operation documents the types of waste at each process step, to quantify and colour-code the degree of the waste. “No observed” waste is a zero or a blank, while a 9 indicates “total waste”, i.e. no value added. The Waste Analysis activity is most effective when performed by multiple observers, both within and outside of the process being examined.

Example

Here is the Waste Analysis by Operation tool in Companion, providing a clear view of areas to address.

Waste Analysis by Operation

Project Name:

Prepared By: Prepared Date:

Operations that exist on a process map

Open/close table

Operation/Process Step	WASTES							Comments	
	Overproduction	Waiting	Transportation	Overprocessing	Excess Inventory	Unnecessary Movement	Defects		Waste of Human Capital
Order Entry (Work Order)		4				3	6	2	Excessive order entry mistakes
Schedule WO		5	6			4			WO and raw materials are incorrectly delivered
Prep for manufacturing		6	4		7				Excessive WIP
Mill Flute	2						5		Excessive rework
Package		3	2					7	Machinist packages

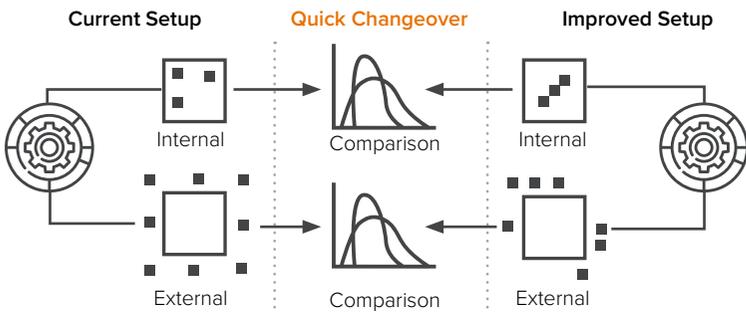
Lean Tool #8. Quick Changeover

Why it matters: Substantial Lean gains can be achieved when you reduce the time, skill or materials needed for setup, particularly for workflows or transactions that require a quick reset. Opportunities exist in every sector: whether changing tools in manufacturing, preparing operating rooms or hospital beds, or loading/unloading airline passengers, for example.

How to use it: Quick Changeover is a tool to analyse your current processes and compare them with future states. It involves identifying the process steps and assigning them into one of two categories:

- *Internal* - must be done while the process is stopped
- *External* - can be done while the process is running, either before or after performing the setup

This enables you to compare the internal and external components of process changeover, or setup, for both current and improved states. By implementing Quick Changeover, organisations can reduce internal setup time. This reduces the amount of non-productive process time and enables more setups, smaller run batches, and improved flow. The secondary benefit is to free up labour, through reduced total setup time.



Quick Changeover (QCO-SMED)

Project Name: _____
Make Drill Bits: _____

Prepared By: Bonnie Stone Prepared Date: 9/19/2017

Workstation Details

Workstation or Equipment: CNC grinding wheels

Referenced Workstation Instructions or Procedures: Grinding wheel replacement

Changeover Information

Number of Distinct Parts Using the Workstation: 45

Number of Current Changeovers: 10 Frequency: Per Day

Run Size

Minimum	Average	Maximum
1	250	1000

Run Length

Minimum	Average	Maximum
5	8.2	18

Quick Changeover Analysis

Initial State

Work Element	Activity Description	Elapsed Time	Type
1	Stop and safe CNC	30 sec	Internal
2	Read WO and select grinding wheels	3 min	Internal
3	Remove grinding wheels	4 min	Internal
4	Replace grinding wheels	6 min	Internal
5	Adjust grinding wheels	8 min	Internal
6	Practice run	5 min	Internal
7	Inspect trial drill bit	45 sec	Internal
8	Adjust grinding wheels if needed	8 min	Internal
9	Restart CNC	20 sec	Internal
Total Time:		35.6 min	
Baseline Internal Setup Times:		35.6 min	
Baseline External Setup Times:		0.0 sec	

Example

Here is a comparison in Companion of the initial state and an improved state. The Improved State shows a 24 minute reduction in internal set up.

Improved State

Work Element	Activity Description	Elapsed Time	Type
1	Read WO and select grinding wheels	3 min	External
2	Stop and safe CNC	30 sec	Internal
3	Remove grinding wheels	2 min	Internal
4	Replace grinding wheels	3 min	Internal
5	Adjust grinding wheels	2 min	Internal
6	Practice run	3 min	Internal
7	Inspect trial drill bit	45 sec	Internal
8	Adjust grinding wheels if needed	2 sec	Internal
9	Restart CNC	20 sec	Internal
Total Time:		14.6 min	
Improved Internal Setup Times:		11.6 min	
Improved External Setup Times:		3.0 min	

Net Reduction of Setup Time

Total Setup Time Reduction	21 min
Total Internal Setup Time Reduction	24 min

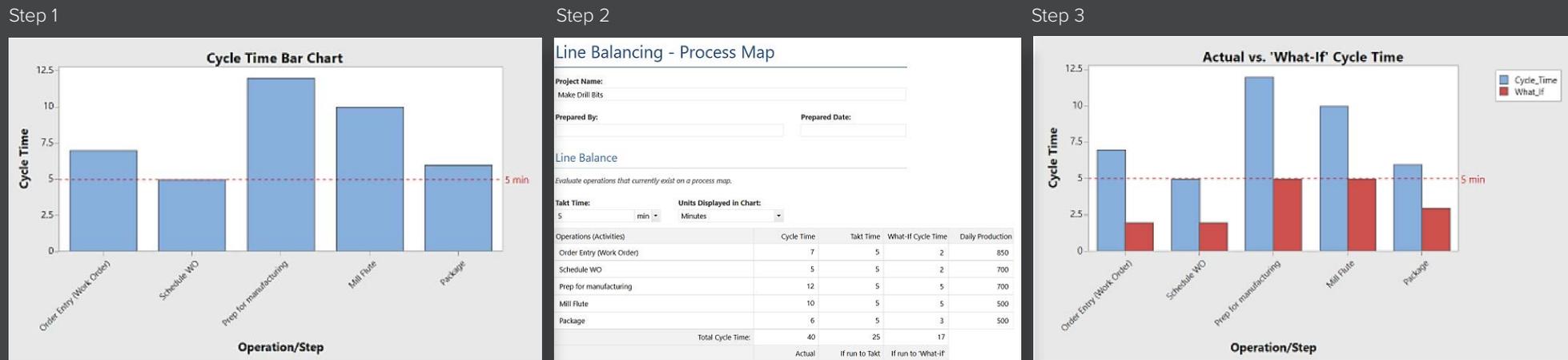
Lean Tool #9. Line Balancing

Why it matters: All steps in a process should meet the rate of customer demand. When process steps are not balanced, some resources may be idle while others are overworked. The solution is to eliminate non-value-added tasks in a process, combine tasks and closely balance the remaining steps.

How to use it: Line balancing is a technique for achieving these goals, through “equalising” a set of process steps to smooth the time required to accomplish them. To highlight the waste of waiting, you compare the time required to meet customer demand, known as ‘takt time’, with the cycle time for multiple operations on a process map or value stream map. This analysis highlights the discrepancies and is useful for you to balance either a work cell or a sequential series of process steps.

Example

Here Companion compares a ‘What If’ cycle time with the current cycle time to visualise the improvements.



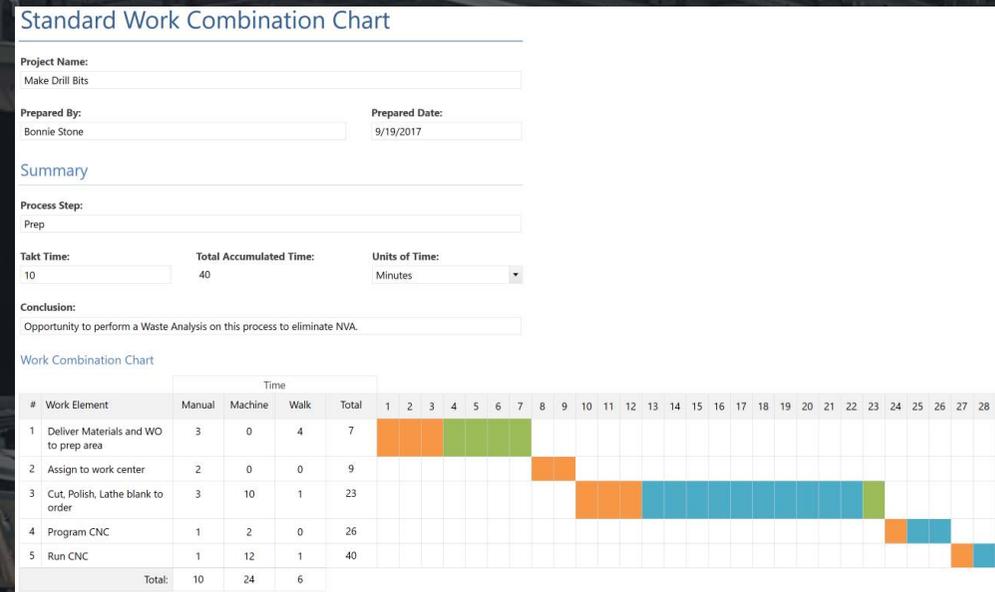
Lean Tool #10. Standard Work

Why it matters: For each element of work, the time used by a machine or operator should follow the best current practice. By documenting a detailed definition of the most effective and reliable methods and sequences for processes, you create a powerful Lean tool. This definition of 'standard work' clarifies the process, ensures consistency, expedites employee training, and provides a baseline for further improvement.

How to use it: After documenting the elements of work, categorise them as manual (shown in orange), machine (shown in blue), or walk (shown in green) to show the work visually. Aided by graphs and colour coding, you can quickly pinpoint wasteful activities and waiting.

Example

Here in Companion, a Standard Work Combination Chart graphically displays the cumulative time as manual (operator controlled) time, machine time and walk time. Looking at the combined data helps to identify excesses within a process.



Start using these critical Lean tools now

Companion enables you to streamline and standardise your Continuous Improvement (CI) program. It is the only solution to blend customisable CI management tools, centralised data retention and maintenance with real-time dashboarding.

Whether it is to enhance process improvement through increased visibility, oversight and governance, or to optimise products and services through the use of best-in-class tools, Companion provides everything you need to make your Continuous Improvement projects more visible, effective and profitable.

[Download a free trial of Companion by Minitab now](#)



“Spreadsheets required more than 120 man-hours each month to collate, analyse and prepare. With Companion all of this effort basically disappears.”

Hermann Miskelly, Vice President for Quality