

Doing time observations

Time observations (also called a time study) are especially important for accurately measuring the work load at the area or machine that is the focus of the kaizen. A time observation captures all the steps that were recorded on the current state chart and the cycle time for each task separately.

In this section we will observe Kim while she processes a batch of 20 invoices.

Because time observations take place where and while the work is happening, they are also useful to verify the sequence of events and make adjustments to the team's documentation of the current state.

Figure 8 shows a sample blank time observation sheet that CCI uses.

There are many instances when it's not practical to do a time observation for one unit, in this case "one invoice." Kim rarely processes just one invoice at a time. She instead groups them for processing, because to process invoices one at a time from start to finish would not be practical.

Time Observation Sheet														
Project Area / Machine											Date			
NO.	Component Task	1	2	3	4	5	6	7	8	9	10	Component Task time	Points Observed	
1														
2														
3														
4														
5														
6														
7														
8														
9														
11														
12														
10														
13														
14														
TIME FOR 1 CYCLE														

Figure 8 - Blank Time Observation Sheet

For this part of the process, generally it's best to go to the place where the actual work is performed, which is Kim's work area. This visit can be planned in advance to give the person time to prepare.

Ask the clerk to perform the functions of the job that were documented earlier in the event. As she performs the steps, one or more of the team members should be writing down each step of the task in detail.

Then transfer each step of the process you observed during observation into the column labeled "component task" of the Time Observation Sheet.

As you do this take some time to think about the approximate time it might take for each step. Estimating this can be tricky. You want to write down tasks that can actually be measured; it's a balancing act. The team wants achieve a detailed understanding of the process. But too much minute detail will be very difficult to capture. For example, don't try to time a step such as "Press enter on the key board." Look for opportunities to describe the activities so they include just enough detail.

Next, select three team members to perform the time study.

When everyone's ready, ask the A/P clerk to take the team to her work area.

Materials and equipment needed:

- A stop watch
- Clip boards
- The Time Observation Sheet
- Relevant Diagram/Floor Plan (for recording movement)
- Paper and Pencils

The observation group

Make-up of the Time Observation Group

Time Keeper	Time Recorder	Map Recorder
<ul style="list-style-type: none"> Operates the stop watch 	<ul style="list-style-type: none"> Records the observed times 	<ul style="list-style-type: none"> Creates the standard work sheet

Figure 9 Observation Group Roles

Time keeper duties: using the stop watch

You'll notice columns on the Time Observation Sheet marked 1 through 13. Each numbered column represents a separate time observation. Observed times are recorded down the sheet.

The Team Leader can make a judgment call depending on the variability in the process whether it's necessary to record many observations. High variability requires more time observations in order to capture a good average. You should time low variability processes at least twice.



Know your stopwatch! All great chefs know their tools. They will never stop in the middle of baking a cake to go find and read the instructions for how to use the oven.

Each stop watch is different, so be sure to read the instructions before you begin making observations. If it's complicated, you might want to practice.

When using the stop watch it's easier to call out the total elapsed time as you reach each new step, rather than resetting the stop watch to zero after each step, then going back later and calculating the individual time for each step.

If you are using the method we think works best, don't hesitate to pause (temporarily stop the watch) and stop the person doing the work (in our case Kim) if you think you didn't capture the

time correctly at any point. You will be focusing not only on the tasks actively done, but also the time between tasks.

Time recorder duties: writing the time for each process element

On the 'Time Observation Sheet' there are two boxes in each column, one on top of the other. The top box is where the time for each step is written, and the bottom box is for the total elapsed time.

The Time Keeper will be calling out the total (cumulative) elapsed time as the clerk performs each step. It's easiest and accurate to record the total elapsed time in the bottom box. You can go back afterwards and do the math to calculate the individual time for each process element.

When you're finished, the Time Observation will look something like Figure 10.

Time Observation Sheet													
Project Area / Machine Batch of 20 invoices										Date			
NO.	Component Task	1	2	3	4	5	6	7	8	9	10	Component Task time	Points Observed
1	Go get mail from inbox	60	65	63	59	61	61	60	63	62	60	61	Note: front desk clerk already separated raw material from expense invoices
2	Open Mail & review information on invoice.	835	870	820	845	845	850	840	875	790	796	837	This step is combined with step one on the current state map.
3	Look in file to find appropriate packing slips/PO's	180	305	191	201	512	413	181	195	212	218	261	The receiving clerk attaches the PO to the packing slip.
4	Match packing slips/PO's with invoices - mark those that don't.	1540	1596	1510	1533	1575	1450	1600	1450	1602	1540	1540	This step is combined with step 3 above on the current state map.
5	Is the PO# on the invoice?	410	420	421	411	415	416	415	411	412	400	413	
6	If a PO # is missing, physically find buyer for PO#.	3025	3256	3005	3049	3408	3190	3096	2994	3078	3014	1387	Kim does not wait for the missing PO#. She will track down any of the buyers or purchasing mgr.
7	If invoice does not match the pkg slip quantity received, contact receiving and/or supplier.	2850	690	3800	0	0	1910	420	0	4200	0	231	Kim generally contacts receiving to double check what was received, and then contacts the supplier if receiving was correct.
8	Wait for Receiving to confirm or correct.	5875	10497	6805	3049	3408	12310	3516	2994	7278	3014	1146	
9	If invoice price does not match the PO price, contact the buyer.	725	0	1202	1110	0	750	1060	905	0	950	670	This step is combined with step 7 on the current state map.
10	Wait for Buyer to correct invoice	8350	0	8300	16900	0	6600	5200	7450	0	7750	6055	
11	Process for payment	14950	10497	16307	21059	3408	19660	9776	11349	7278	11714	2700	
12		2650	2720	2710	2715	2690	2692	2702	2705	2705	2706		
13		17600	13217	19017	23774	6098	22352	12478	14054	9983	14420		
TIME FOR 1 CYCLE in minutes		293.3	220.3	316.95	396.23	102	372.53	208	234.2	166	240.3	255	In Minutes

Figure 10 CCI's Recorded Time Observations

Map recorder duties: creating the standard work sheet (spaghetti diagram)

Use the relevant floor plan/diagram to create the 'standard work sheet.' You will draw (record) the travel distance for each step performed away from the immediate work area. Make multiple arrows, to indicate how many trips are made. The arrows indicate the direction of travel.

In our example, the Map Recorder draws an arrow on the floor plan for each time Kim steps away from her work area. There may be valid and varied reasons for stepping away from the

Wasted Motion is one of Lean's Seven Types of Deadly Waste.

Wasted motion impedes flow and adds no value to the process.

(See *Non-Stock Production*, by Shigeo Shingo, Productivity Press, Cambridge, MA 1988)

work area. Some examples may be to get the mail, investigate an issue or to file.

It's important to get this right. Analyzing the Standard Work Sheet reveals whether the work area is right-located, meaning located closest to other areas most relevant to the overall process. It also provides invaluable information about the Current State that informs the kaizen team's work toward the Future State.

CCI's team Map Recorder created what you see in Figure 11.

What we're after is accuracy. It's not an artistic competition. In fact, the worse this drawing looks, the more waste is revealed. This creates an opportunity to make even more improvements!

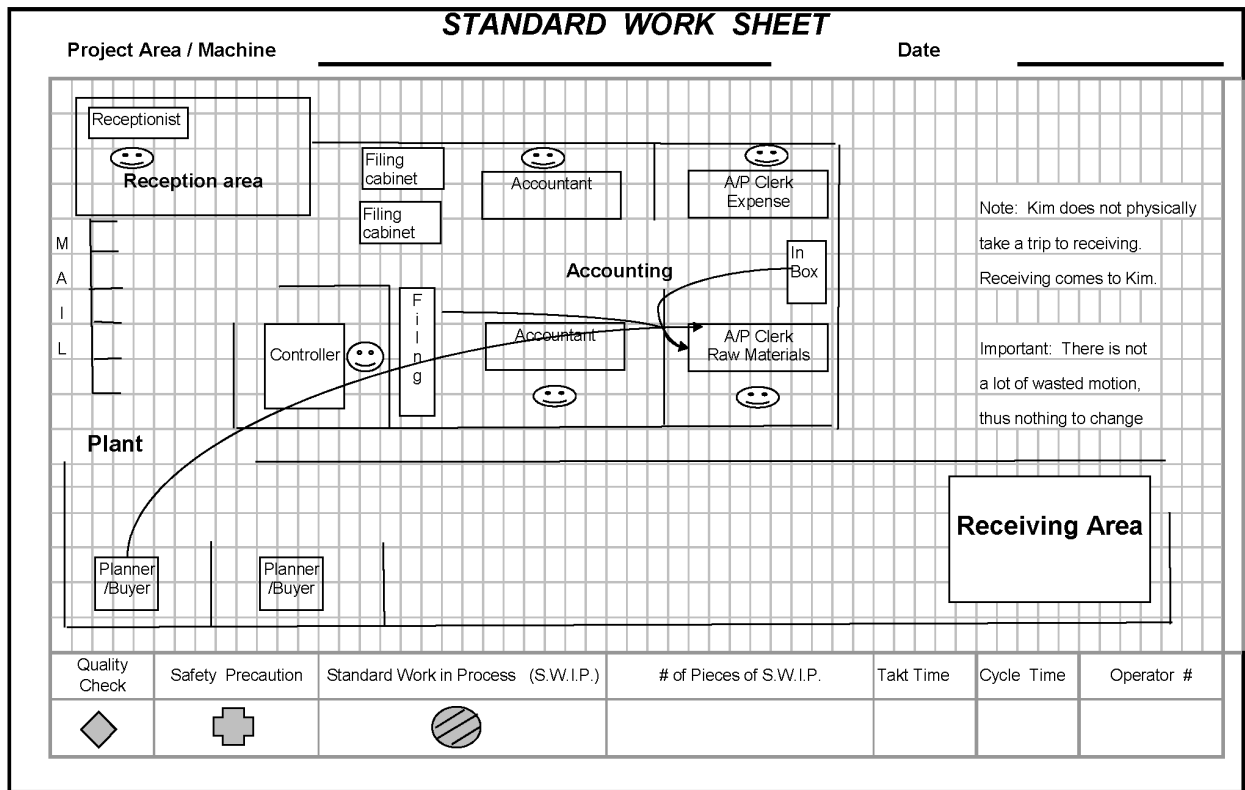


Figure 11 Results of CCI's Travel Observations

Create the time line

Even a great chef sometimes gets it wrong. She looks at a recipe disaster, understands what went wrong, and works to make improvements.

Similarly, after the CCI team finished its time observations, they found out their original assumptions were off the mark.

Knowing this will get them ready to begin working out improvements. They will be working from real information.

Next, based on actual observations, the team prepares a time line and adds it to the bottom of the current state map. This is the cycle time of the process.



**Cycle time =
Time to
complete the
process. Do not
include wait time**

Each step is separated and the time to process each step is written below the line. Write processing time below the line and wait time above.

This is a standard way to do this. You may have your own method. No matter how, use a method that separates processing time from wait time.

Be sure to label the batch size on the current state map.

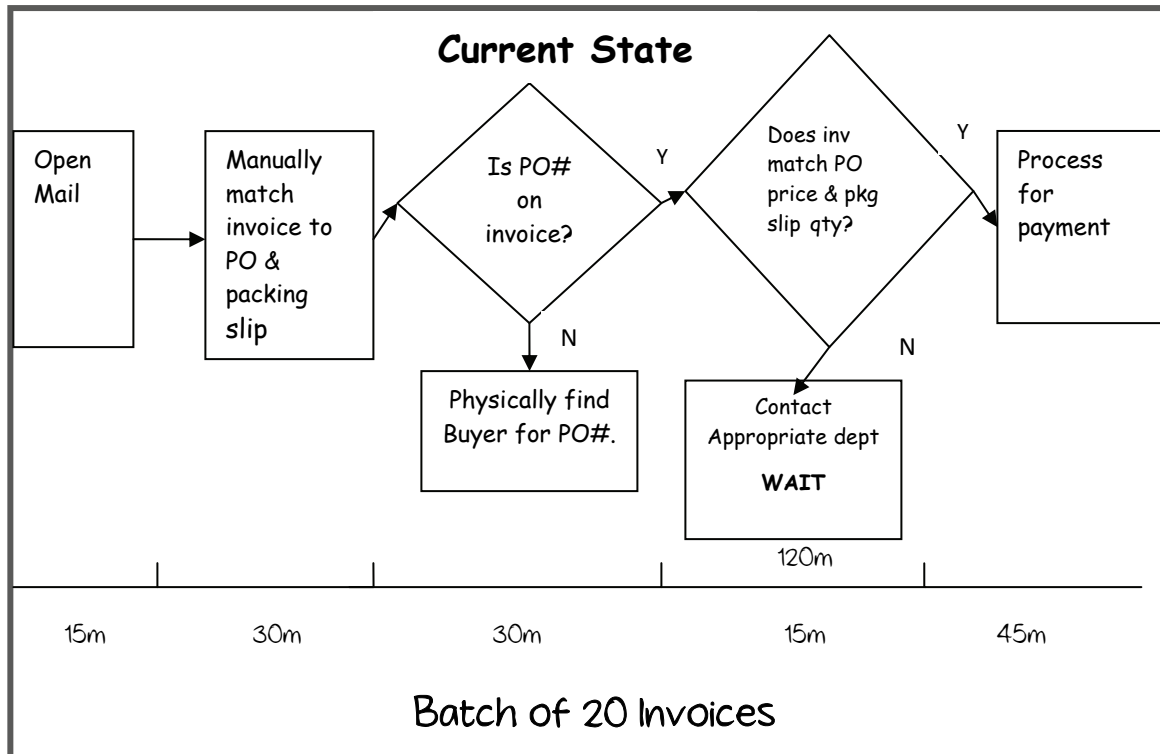


Figure 12 CCI Current State Map with Time Line

The results of the time study were **eye-opening** for the team.

So what do the results (Figure 12) mean?

First off, they found out their initial ideas about processing cycle time were far off the mark.

When the kaizen team created the A3 “Initial State” (see Figure 5), they believed the cycle time to process an invoice was approximately 3 minutes. As a result of their time observations, they learned the process really takes a bit under 7 minutes per invoice or (135 minutes for a batch of 20.)

They also saw clearly how much waste was bogging the process down. They now had a good basis for figuring out what to do to improve it.

The team learned clearly how time observations provide a way to calculate waste. One way to calculate waste is to compare the wasted time observed to the average number of invoices processed in a specific time period. In this example, let’s assume the unit of measure is one day.

CCI’s Current State cycle time
was thought to be 3 minutes.
It’s actually 6.75 minutes!

Takt time

What is takt time? Takt time is the rate of demand coming into a process. This is a concept that's very familiar to lean operations people. They work all the time to synchronize operations to the rate of customer demand.

Support people sometimes need help understanding what their "customer" demand is.

$$\text{Takt time} = \frac{\text{Net available Working minutes}}{\div \text{required output}}$$

The CCI team has to figure out how well Kim was keeping up with A/P demand. She has to process an average of 500 invoices/week with a normal work week being 35 hours, taking into consideration breaks and lunches.

If you convert 35 hours into minutes, you have a 2100-minute work week.

This means an invoice needs to be processed every 4.2 minutes (2100/500) in order to meet customer demand.

The kaizen team next analyzed the time line to determine if the A/P process could meet customer demand in the current state. They calculated Kim was actually processing an invoice every 6.75 minutes. That's a problem!

Something has to give.

The company needs either to add an additional A/P clerk, or the kaizen team needs to figure out how to remove some time from the process. That means getting rid of waste.



Day 2

The task today is to design the Ideal process. The team will answer this question: what would the process look like if everything was perfect?

Document the ideal state

This is the best part of any kaizen, and also the toughest!

When the team is developing the ideal state, be clear to the team that an "ideal state" is most likely something that will not be achieved through this single event.

Now that they see the problems, they will be impatient to start fixing. This is a good time to review the Diagnostic. It's an opportunity to show the team the bigger picture. Take time to review the continuum from traditional through necessary intermediate and advances stages, to complete lean management. It's an incremental process, and any given kaizen is one increment.

This may be a challenge to the team at CCI. They are starting from a manual process, thus this one kaizen most likely will not lead the team to Lean Management. They need to realize this kaizen the start of a journey.



Think about it this way. When the kaizen succeeds, improvements will happen. That's the point! The team will rightly be proud of what they've done.

But the team needs a clear picture of the road ahead, so improvements can continue.

Jane helped the team understand that “continuous improvement is a way of life.” She used the Diagnostic as a way to show how mature Lean Management will look.

Ok....so it’s not likely this kaizen team will create the ideal state. In fact, we would not recommend leaping ahead too far anyway, unless robust lean controls are in place and working well. We cannot lose control of the business.

Future events, where we build success upon success, will get us closer and closer.

CCI’s team was less likely to get frustrated when only a small improvement is achieved, because Jane showed them the big picture.

Time to get out the Post-it® notes!

To create the Ideal State Map, Jane took the kaizen team through a similar process used for the current state map.

Jane started in a good spot: she asked the team to look at the current state and eliminate all the rework or non-value added steps.

This was a difficult concept for CCI’s people. They needed to be educated about what rework or non-value-added means applied to their work. Kim argued that some current state work, such as “is the PO# or requestor name on the invoice” is normal, not “rework.”

Jane challenged the group by reminding them that we’re not trying to come up with a solution at this point. In an ideal situation, why wouldn’t the PO# be on the invoice?

Give the team ample time to develop the new process. Here’s what they came up with.

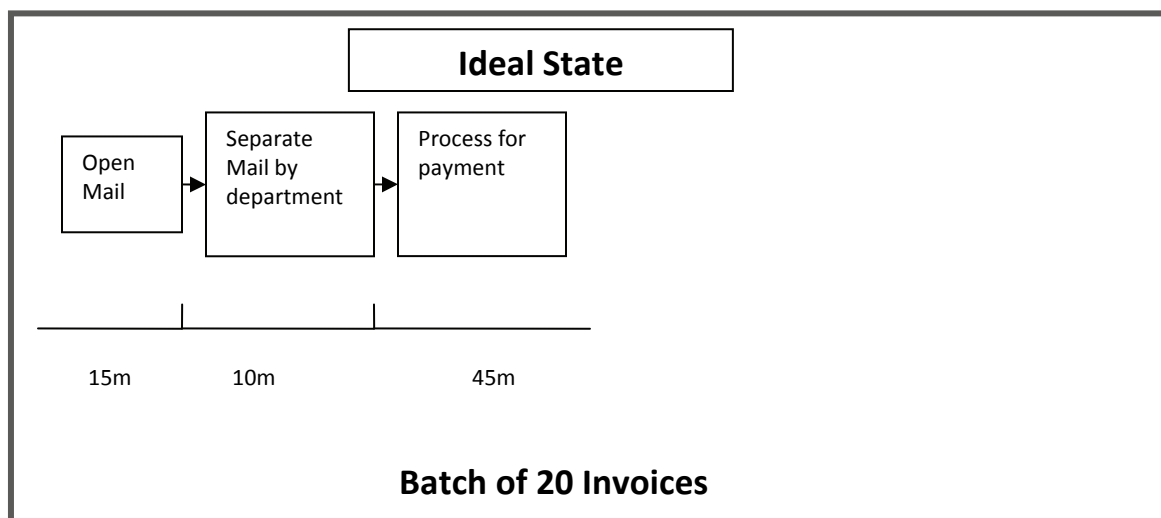


Figure 13 CCI's "Ideal State" Map

Notice that the parts of the process that represented waste in the current state were removed from the ideal state. Also notice the cycle time difference between the current and ideal state.

Current State 6.75 minutes	Ideal State 3.5 minutes
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