

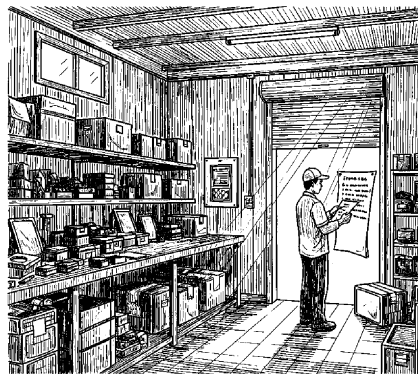
NICHE-SEARCH

WORKSHEET 5 OF 9

# Takt Time Recalibration Worksheet

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*Run this when order volume changes by more than 20% in either direction, when a new product line is added, or when staffing levels shift. Takt time is available production time divided by customer demand per period.*



Complementary worksheet for  
*Lean Operations Principles*  
by Ibrahim Anwar

## What This Is For

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A targeted recalculation that answers one question before any capacity decision is made: does the current system have enough effective time at the bottleneck to meet the new demand rate, without adding resources? Takt time is the pace the system must sustain — one unit of output per X minutes of available time — and it changes every time demand or available time changes. Most operators update headcount and equipment in response to demand shifts without first recalculating whether the bottleneck can absorb the change through offloading non-bottleneck work.

This worksheet exists because the sequence matters. The correct sequence is: recalculate takt time, identify whether the bottleneck cycle time still fits within takt time, offload non-bottleneck work from the bottleneck person if needed, then decide whether to add resources. Skipping the first three steps and going directly to resource addition produces the result documented in the book: two new employees hired at the North Sumatra distributor without changing throughput, because the bottleneck was in approval and data entry, not in the packing area that was adding staff.

# Benefits

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What you get when you actually run this worksheet on a real situation:

- Prevents premature resource addition by calculating whether offloading non-bottleneck work from the bottleneck can close the gap before any hiring or equipment decision.
- Produces a specific, posted takt time number that process designers and area supervisors can work against.
- Documents the demand and capacity assumptions behind any resource decision, making future reviews possible.
- Identifies whether the bottleneck cycle time gap is structural (requiring investment) or operational (resolvable by work redistribution).
- Sets a clear standard for what 'sufficient capacity' means at the bottleneck, replacing gut feel with a calculated number.

## Framework To Use

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### — Takt Time Gap Analysis

*Three numbers, one decision. Available time ÷ demand = takt. Bottleneck cycle time vs. takt = the gap. Gap minus offloadable work = actual gap.*

BEFORE	AFTER
{'label': 'Before Recalibration', 'items': ['Demand changes — operator adds staff by intuition', 'New cycle time at bottleneck: unknown', 'Non-bottleneck work at bottleneck: uncounted', 'Result: capacity added at wrong point, or insufficient']}	{'label': 'After Recalibration', 'items': ['New takt time calculated from actual demand figures', 'Bottleneck cycle time measured against new takt', 'Non-bottleneck work offloaded first, gap recalculated', 'Resource decision made from a verified number']}

# How To Use

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Follow these steps in order. Each one builds on the previous.

- 1** Fill in available working time per day in minutes. Use actual scheduled hours, not posted hours – account for breaks and planned downtime.
- 2** Subtract planned downtime (shift changes, cleaning, scheduled maintenance) to get net available time.
- 3** Enter current average orders per day, taken from actual data over the past four weeks. Do not use a target or projection.
- 4** Calculate new takt time:  $\text{net available time} \div \text{orders per day}$ . This is how many minutes are available per order if all available time is used productively.
- 5** Identify the current cycle time at the bottleneck stage: how many minutes does it actually take to complete one unit of work at the stage with the queue in front of it.
- 6** Calculate the gap:  $\text{bottleneck cycle time} - \text{takt time}$ . A positive gap means the bottleneck cannot keep pace with demand. A negative gap means the system can absorb the new demand rate.
- 7** If the gap is positive: list all non-bottleneck work currently done by the bottleneck person. Estimate minutes freed per day if that work is offloaded. Recalculate the gap after offloading. If the gap closes, hold the resource decision.
- 8** Post the new takt time in the bottleneck work area. It should be visible without searching.

## Example Use

*An online order fulfillment operation has signed a new wholesale account that will add 35 orders per day to the current 65-order average. The owner runs the takt time recalibration before deciding whether to hire a new packer.*

Current parameters: available working time 480 minutes per day, planned downtime 30 minutes (cleaning and shift handover). Net available time: 450 minutes.

Current demand: 65 orders per day. New demand: 100 orders per day.

Current takt time:  $450 \div 65 = 6.9$  minutes per order.

New takt time:  $450 \div 100 = 4.5$  minutes per order.

Bottleneck stage: packing. Current cycle time at packing: 5.2 minutes per order.

Gap at new demand: 5.2 minus 4.5 = 0.7 minutes per order. Positive — bottleneck cannot sustain new demand at current cycle time.

Before hiring: the owner lists non-bottleneck work currently done by the packer. The packer also restocks packaging materials twice per day (estimated 25 minutes total per day) and handles all incoming courier returns (estimated 18 minutes per day). Total offloadable: 43 minutes per day.

After offloading: effective cycle time at packing becomes 5.2 minus  $(43 \div 100 \text{ orders}) = 5.2$  minus 0.43 = 4.77 minutes per order. Still above new takt time of 4.5 minutes.

Remaining gap: 4.77 minus 4.5 = 0.27 minutes per order. At 100 orders per day, that is 27 minutes of unmet capacity. The operator decides: route the material restocking and returns handling to the admin role, then reassess after two weeks of actual data at new volume. Hiring decision deferred by 14 days, saving approximately \$280 in premature fixed cost.

# The Worksheet

Tear this out, copy it onto a fresh sheet, or fill it in directly.

## Takt Time Recalibration Worksheet

Run this when order volume changes by more than 20% in either direction, when a new product line is added, or when staffing levels shift. Takt time is available production time divided by customer demand per period.

PARAMETER	CURRENT VALUE	NEW VALUE (AFTER CHANGE)	SOURCE / NOTE
Available working time per day (minutes)			
Planned downtime per day (minutes)			
Net available time per day (minutes)			
Customer orders per day (average, past 4 weeks)			
Takt time = net available time ÷ orders per day			
Current cycle time at bottleneck stage (minutes)			
Gap: cycle time minus takt time			
Planned staffing at bottleneck stage			

## Reflection Prompts

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*After filling in the worksheet on the previous page, work through these.*

1. If cycle time at the bottleneck exceeds takt time: list the non-bottleneck work currently done by the bottleneck person that could be moved to another position. Estimate the minutes freed per day.
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2. If takt time decreased (demand rose): before adding a resource, calculate effective capacity at the bottleneck after removing non-bottleneck work. Does it close the gap without recruitment?
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3. Write the new takt time and post it in the bottleneck work area. It should be visible without searching for it.
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# Tips and Traps

## TIPS

- Use four-week average demand figures, not this week's peak. Takt time calculated from a peak week produces a system calibrated for exceptional conditions, which then operates with excess capacity during normal periods.
- Measure bottleneck cycle time by direct observation, not by asking the bottleneck person how long it takes. Self-reported times are almost always lower than observed times.
- After offloading non-bottleneck work, give the change two weeks before deciding whether the gap is closed. The first week of redistribution typically runs slower as people adjust.
- Update the posted takt time whenever demand changes by more than 15%. A takt time posted six months ago for a demand that has shifted is not a useful reference.

## TRAPS

- Using installed capacity rather than effective capacity in the calculation. If the bottleneck stage has 60 minutes of available time but 15 of those minutes are spent on non-bottleneck work, effective capacity is 45 minutes, not 60.
- Calculating takt time for the whole system rather than at the bottleneck. System-level takt time masks which specific stage is the constraint.
- Making the resource decision the day the gap is discovered. Two weeks of observation after offloading non-bottleneck work almost always produces a different picture than the initial calculation.

# Appendixes

## Appendix A – Takt Time Formula and Worked Calculation

Formula:

$$\text{Takt time} = \text{Net available time per period} \div \text{Customer demand per period}$$

Net available time:

$$\begin{aligned} \text{Total scheduled hours per day (minutes)} &= \text{___} \\ \text{Minus planned breaks (minutes)} &= \text{___} \\ \text{Minus planned maintenance (minutes)} &= \text{___} \\ \text{Net available time} &= \text{___} \end{aligned}$$

Customer demand:

$$\text{Orders per day (4-week average from delivery records)} = \text{___}$$

Takt time:

$$\text{Net available time} \div \text{orders per day} = \text{___ minutes per order}$$

Interpretation:

- Takt time > bottleneck cycle time : System can absorb current demand.  
Check non-bottleneck stages for waste.
- Takt time = bottleneck cycle time : System running at limit. Any demand increase will cause queuing.
- Takt time < bottleneck cycle time : Bottleneck cannot sustain demand rate.  
Offload non-bottleneck work first.  
Then recalculate before hiring.

## Appendix B – Non-Bottleneck Work Offloading Log

List all activities currently done by the bottleneck person or stage.  
For each activity not directly tied to the bottleneck function, estimate time per day and identify where it could move.

Activity	Time/day (min)	Can move to	Transition cost
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Total offloadable minutes per day: \_\_\_

Recalculated effective cycle time at bottleneck:

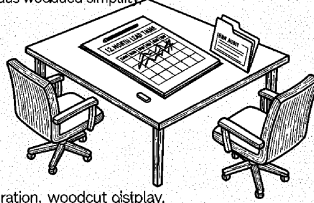
$$\begin{aligned} &\text{Current cycle time (___) minus (offloadable minutes} \div \text{daily orders)} \\ &= \text{___ minutes per order (recalculated)} \end{aligned}$$

Compare recalculated cycle time against new takt time.

If recalculated cycle time <= new takt time: hold hiring decision.

Implement offloading and measure for 2 weeks.

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WHERE THIS WORKSHEET COMES FROM

# Lean Operations Principles

*Eliminate Waste Before Adding Capacity*

by Ibrahim Anwar

This worksheet is one of nine in the *Lean Operations Principles* companion worksheet pack. The full pack is grouped into three categories: high-volume worksheets you can run weekly, niche-search worksheets for rare but high-value situations, and specific-case worksheets that walk you through a single concrete scenario.

Every framework, decision filter, and figure used in these worksheets is drawn from the chapters of the source book. The book sets the diagnosis, the worksheets give you the form to act on it.

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