TRUELEAN™ LEARNING CENTRE

FLOW & CAPACITY

OBSERVATION & ASSESSMENT WORKBOOK

A practical Gemba resource for understanding demand, capacity, flow, constraints, WIP, batching, and improvement opportunities

Organization / Site:	
Value Stream / Product Family:	
Observer(s):	
Date / Shift:	
Document Version:	

USE & DISCLAIMER

This workbook is provided by TrueLean Solutions as a practical learning and process-improvement resource. Data captured reflects observed conditions at a point in time and should be validated before decisions are made and re-validated after process changes.

Purpose & How to Use This Workbook

This workbook guides a structured Gemba ("the real place") observation of demand, capacity, and flow. It exists to replace opinion and anecdote with **direct observation and representative data**, so that improvement decisions rest on what is actually happening on the floor rather than on what the schedule, the ERP system, or memory suggests is happening.

How to use this workbook:

- Observe the process where the work occurs — not from a report, dashboard, or standard sheet alone.
- Record actual conditions and clearly separate them from assumptions; mark assumptions as such.
- Use several representative cycles rather than a single best- or worst-case observation.
- Work through the sections in order — each section builds on the data captured in the one before it.
- Re-observe after any countermeasure is implemented to confirm the expected result was achieved.

SAFETY AND QUALITY FIRST

Do not change staffing levels, machine settings, WIP limits, batch sizes, or work methods in a way that compromises required safety, quality, regulatory, or technical controls. Observation should never itself alter the conditions being observed.

Key formulas & definitions

Term	Definition
Takt time	Available production time ÷ customer demand. The pace required to meet demand exactly — a planning reference, not a target to beat.
Cycle time (CT)	The actual time to complete one cycle of a task, measured directly at the process.
Changeover (C/O)	Elapsed time from last good unit of the previous run to first good unit of the next run.
First-pass yield (FPY)	Good units produced without rework or scrap, on the first attempt, ÷ total units started.
WIP	Work-in-process: units that have started but not finished the observed process boundary.
Theoretical capacity	The mathematical upper limit of output under stated assumptions (available time ÷ nominal cycle time).
Demonstrated capacity	The best output actually achieved under real operating conditions.
Sustainable capacity	Output that is reasonably repeatable while maintaining normal safety, quality, staffing, and maintenance requirements.
Little's Law	Average lead time = average WIP ÷ average throughput. Holds only over consistent boundaries and long-run averages.
Bottleneck / constraint	The step whose capacity limits the output of the entire value stream — identifiable by WIP that accumulates before it and starvation after it.

1 · Process & Demand Profile

Establish what the customer actually requires before observing how the process delivers it. Every downstream section is judged against this baseline.

Item	Current Condition / Data Basis / Source Notes
Customer demand (units/day)	
Available production time (min/shift)	
Number of shifts / day	
Planned breaks / meetings	
Staffing by shift	
Primary product family / mix	
Takt time = available time ÷ demand	
Required good output / day	

Process boundary — Start: _____

Process boundary — End: _____

Primary customer requirement / service expectation: _____

2 · Process Observation Chart

Walk the process step by step. Record actual observed conditions — not standard or design values. Use a consistent measurement convention and note the product mix if cycle times vary. The shaded row is a worked example; delete or overwrite it.

Step	Process / Resource	CT	Proc. Time	C/O	Avail.	Uptime	Operators	WIP Before	WIP After	Queue / Wait	FPY	Good Output	Observed Issues
EX	*CNC Milling – Station 3*	*42 sec*	*38 sec*	*18 min*	*460 min*	*91%*	*1*	*40 pcs*	*12 pcs*	*~25 min*	*97%*	*580/shift*	*Intermittent tool-wear alarms; operator clears chips mid-cycle.*
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2													
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CT = cycle time | C/O = changeover | FPY = first-pass yield.

3 · Capacity Analysis

Translate the observation chart into a capacity picture: what is mathematically possible, what has actually been achieved, and what can be sustained day after day.

Process	Available Time	Nominal CT	Theoretical Capacity	Best Demonstrated Output	Sustainable Capacity	Demand	Gap vs Demand	Key Capacity Losses / Assumptions
CNC Milling – Station 3	*460 min*	*42 sec*	*657 pcs*	*610 pcs*	*580 pcs*	*540 pcs/day*	*+40 pcs (7% cushion)*	*Excludes changeover; assumes 91% uptime; single operator.*

Theoretical = mathematical upper limit under stated assumptions. **Demonstrated** = output actually achieved under real conditions. **Sustainable** = output reasonably repeatable while maintaining normal safety, quality, staffing, and maintenance requirements.

4 · Flow & Constraint Analysis

Identify where flow actually breaks down. A true bottleneck shows a consistent, observable signature: WIP accumulates ahead of it and starvation follows it.

Observation	Evidence / Data	Impact on Flow	Action / Question
Apparent bottleneck / physical constraint	*Station 3 has the longest queue and is never starved.*	*Sets the pace for the entire line; upstream stations wait intermittently.*	*Confirm with a time study; investigate tool-wear alarm root cause.*
Where WIP accumulates			
Where starvation occurs			
Where blocking occurs			
Constraint waiting for material / information			
Constraint quality / rework losses			
Constraint changeover / minor-stop losses			
Scheduling / priority conflicts			
Material handling / travel losses			
Other policy, labor, market, or information constraint			

5 · Constraint Lost-Time Log

Log every stoppage or slowdown at the constraint in real time. Patterns across shifts — not a single incident — reveal the true improvement priority.

Time	Duration	Category	What Happened?	Cause / Evidence	Immediate Response	Recurring?
9:14 AM	*6 min*	*Minor stop*	*Tool alarm; operator cleared chips.*	*Operator note + downtime log*	*Manual clear, restart*	*Yes – 3rd time this shift*

6 · Batch & Changeover Review

Batch sizes are often historical rather than deliberate. Test whether each one still serves a real technical, quality, or economic purpose.

Process / Product	Process Batch	Transfer Batch	Changeover Time	Why This Batch Exists	Constraint Type	Smaller Batch Feasible?	Experiment / Countermeasure
CNC Milling – Part A/B family	*50 pcs*	*10 pcs*	*18 min*	*Historical scheduling convention*	*Scheduling / policy*	*Yes – pending trial*	*Trial transfer batch of 5 pcs for one week*

Constraint types to consider: technical • economic • quality/traceability • safety • curing/processing • transportation • minimum/maximum process load • scheduling/policy.

Lean question: *Why does this batch exist, and what is the smallest practical batch that supports safe, reliable, high-quality, and economically responsible flow?*

7 · Flow Performance Summary

Roll the detailed observations up into a single scorecard the whole team can read at a glance.

Measure	Current	Target / Requirement	Gap	Notes / Assumptions
Customer demand / day	*540 units*	*540 units*	*0*	*Based on 3-shift average; excludes short Friday shift.*
Takt time				
Throughput / day				
Total WIP				
Average flow / lead time				
Little's Law check: WIP ÷ throughput				
Constraint sustainable capacity				
Largest queue / WIP point				
Longest changeover				
Schedule attainment / OTIF / OTD				

Little's Law caution: *use consistent boundaries and long-run averages. Lower WIP does not guarantee preserved throughput if instability, starvation, blocking, or shortages are left unaddressed.*

8 · Takt vs. Cycle-Time Review

Compare every station's observed pace to takt. Stations meaningfully under takt hold rebalancing potential; stations over takt need attention before they become the new constraint.

Process / Station	Takt	Observed CT	CT – Takt	Meets Required Pace?	Workload / Method Observation	Potential Rebalance
Station 3	*51 sec*	*42 sec*	*-9 sec (under takt)*	*Yes*	*Operator has idle time; capacity to absorb additional work.*	*Shift deburr step from Station 4 to Station 3.*

9 · Improvement Opportunity Prioritization

Convert observations into a ranked, ownable backlog. Prioritize by customer/flow impact and ease of implementation, not by visibility or convenience.

#	Problem / Opportunity	Evidence	Customer / Flow Impact	Likely Cause	Countermeasure / Experiment	Owner	Priority	Expected Result
1	*Recurring tool-wear alarms at Station 3*	*3 stops/shift, avg. 6 min each*	*Reduces effective capacity ~5%*	*Tool-change interval too long for current material*	*Reduce tool-change interval; trial for 2 weeks*	*Cell Lead*	*High*	*Cut minor stops by 50%*
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10 · 30-Day Flow & Capacity Action Plan

Sequence the top opportunities through a disciplined improvement cycle. Re-observe (Section 2 onward) after each stage to confirm the expected result before moving on.

ASSESS → PLAN → IMPLEMENT → IMPROVE → SUSTAIN

Stage	Action	Owner	Due Date	Measure / Baseline	Expected Result	Actual Result / Learning	Next Step
ASSESS	*Complete Sections 1–8 gemba observations for the value stream.*	*Cell Lead*	___	*Baseline: none on file*	*Validated current-state data set*		
PLAN							
IMPLEMENT							
IMPROVE							
SUSTAIN							

FINAL REFLECTION

What prevents this value stream from delivering the required customer output safely, reliably, with the right quality, and with less unnecessary delay and inventory?

Notes: _____

_____

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Glossary of Terms

Term	Meaning in this Workbook
CT	Cycle time — the actual, observed time to complete one cycle of work.
C/O	Changeover time — from last good unit of one run to first good unit of the next.
FPY	First-pass yield — good units produced without rework or scrap on the first attempt.
WIP	Work-in-process — units that have entered but not exited the observed process boundary.
OTIF / OTD	On-Time-In-Full / On-Time-Delivery — schedule and completeness attainment against the customer requirement.
Process batch	The quantity processed together at one step before changeover to a different item.
Transfer batch	The quantity moved to the next step before the full process batch is complete.