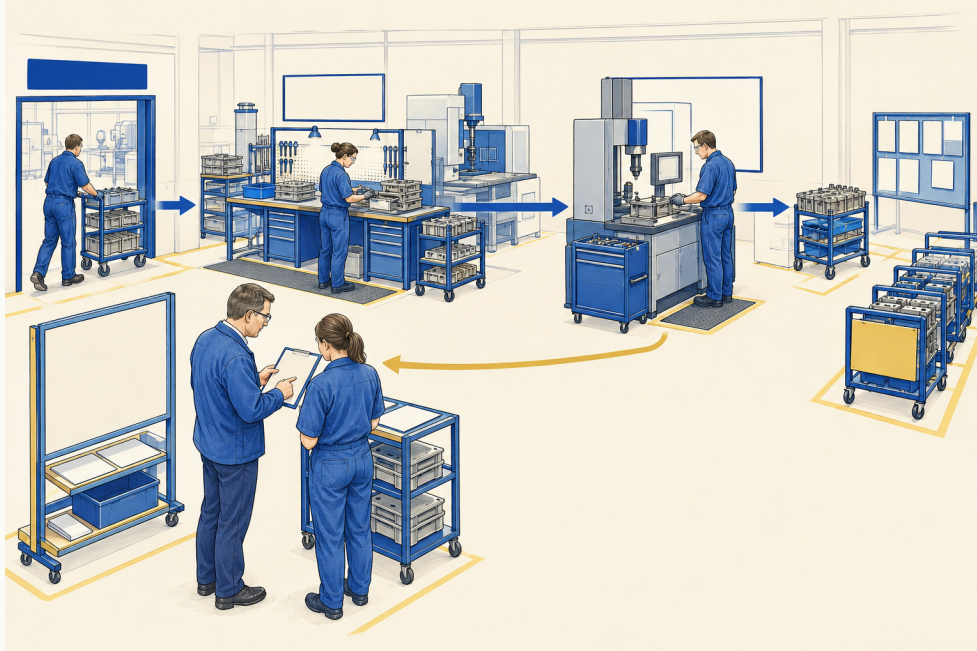


Drum-buffer-rope: schedule, protect, release

Derive controlled release times from a supplied constraint schedule and protective lead, respond to a threatened job, and avoid early release that adds congestion without protecting throughput.



Release for the constraint's need

Fictional job-shop exercise: a specialist test station is the validated constraint for the current product mix. Planner Arun has scheduled jobs J41, J42 and J43 there. Upstream preparation is faster but has variable interruptions. Releasing all jobs at 08:00 fills the aisle and obscures which one the test station needs next.

Your role and the reference condition

Planner coordinating upstream preparation, material movement and the constraint operator.

Normal: The release gate follows the approved constraint schedule and protects timely arrival of the required, quality-ready work.

Gap: The upstream supervisor wants to release the whole day's work immediately to keep every local station busy.

Work within these conditions

1. Constraint validity is supplied for the exercise; real use requires demand, capacity, routing and loss evidence.
2. The illustrative 90-minute release-to-drum lead includes 30 minutes of nominal preparation/travel plus 60 minutes of protective allowance. It is not an additional 90-minute queue.

Fictional teaching case. Supplied observations support the exercise; proposed actions are not verified customer results.

See how the method works

Releasing work early can create congestion without bringing completion forward. Drum-buffer-rope links release to the schedule of a verified constraint. The drum sets the relevant pace, the buffer protects it from disruption, and the rope communicates when upstream work should enter. Draw the control signal separately from the movement of work. Choose protection from the process conditions rather than copying an arbitrary quantity. Monitor starvation, missed commitments and excess work while trialing the rule. This is a constraint-based release mechanism; it should not be presented as identical to a supermarket replenishment loop or a customer takt calculation.



Connected method map: Release gate, Upstream work, Protective buffer, Constraint schedule, Complete to customer. Every authored connection is shown with a numbered arrow and named legend.

Follow the evidence and decisions

Inspect the supplied case inputs

Job / rule	Supplied schedule
J41 drum start	10:00
J42 drum start	10:30
J43 drum start	11:00
Nominal upstream time	30 min per job under stated conditions
Protective allowance	60 min
Release-to-drum lead	90 min total; start time minus 90 min
Quality condition	Only verified ready work may feed the drum

01 / Anchor to the system constraint

Arun confirms the three drum appointments and relevant routing. He keeps the supplied constraint assumption visible and checks that release is tied to these jobs, not an upstream utilization target.

Why: The rope is an information rule anchored to the system's limiting schedule. Keeping an unconstrained resource busy can produce work the drum cannot yet use.

Evidence / check: J41/J42/J43 have explicit 10:00 / 10:30 / 11:00 drum starts.

02 / Define protection without double counting

He records 30 minutes nominal upstream time and 60 minutes protective allowance, totaling 90 minutes from release to scheduled drum start.

Why: Ambiguous use of buffer can accidentally add the allowance twice or assume that inventory quantity alone provides protection.

Evidence / check: The teaching schedule states exactly what the 90 minutes includes; actual protection must be tuned from operating evidence.

03 / Calculate each release appointment

Subtract 90 minutes from each drum start: J41 at 08:30, J42 at 09:00 and J43 at 09:30. Communicate these controlled appointments to the upstream gate.

Why: A release appointment lets required work enter with planned protection while avoiding admission hours earlier merely because capacity is free.

Evidence / check: Each job keeps a stable identity and a release-to-drum connection; no physical rope is implied.

04 / Monitor readiness and intervene on the threatened job

The team compares expected ready time with the scheduled drum appointment. If a needed job is delayed, it identifies the blocking step and uses the agreed escalation to protect the appointment.

Why: The protective allowance is consumed by disruption. The response should address the threatened job, not flood the route with unrelated work.

Evidence / check: The readiness record names estimated arrival, remaining time, blocking condition and owner.

05 / Learn from the response

After the trial, Arun reviews drum starvation, missed commitments, excess released work and causes of protective-time consumption. Changes to release lead or schedule follow that evidence.

Why: A copied buffer size or a perfect-looking release table is not proof that the operating system is protected.

Evidence / check: Keep actual timestamps and system outcomes distinct from the planned schedule; revise the rule through its owner.

Completed planned release record - not observed performance

Job	Drum start	Release / nominal ready	Decision
J41	10:00	08:30 /09:00	90 min lead; 60 min allowance
J42	10:30	09:00 /09:30	90 min lead; 60 min allowance
J43	11:00	09:30 /10:00	90 min lead; 60 min allowance
08:00 bulk proposal	All jobs early	Not schedule-linked	Decline; protect required work

J42 may miss the drum

At 09:50 the upstream owner estimates J42 will be verified ready at 10:40, ten minutes after its 10:30 drum appointment. J43 is not a technically interchangeable substitute.

Decision

Escalate J42's specific blocking condition and review the drum schedule through its owner. Do not feed unverified work, silently swap incompatible jobs or release every later order.

Reasoning

The protective allowance is exhausted for this prediction. More unrelated WIP does not recover the threatened appointment.

What would change the decision?

The record names the ten-minute predicted miss, blocker, recovery estimate and authorized schedule decision; a recovery outcome is not invented.

Practise with a changed case

A different release lead and delayed start

New fictional schedule: K11 is due at the validated constraint at 13:00 and K12 at 13:40. The release-to-drum lead is 100 minutes, including 40 minutes nominal preparation/travel and 60 minutes protection. K11 actually starts upstream at 11:50 rather than its planned release.

Input	Value
K11 drum start	13:00
K12 drum start	13:40
Total release lead	100 min =40 nominal +60 protection
K11 actual upstream start	11:50
New K11 ready estimate	13:10, after another disruption

Your task

1. Calculate planned releases and nominal ready times for both jobs.
2. At 11:50, calculate K11's remaining protection if nominal 40-minute preparation holds.
3. Assess the later 13:10 estimate and record the response without releasing unrelated work.

Use the next page to record your reasoning before reading the answer.

Your practice worksheet

A different release lead and delayed start

Job / drum appointment

Release-time calculation

Nominal ready time and protective allowance

Changed estimate / threatened gap

Blocking owner and authorized schedule response

Complete your reasoning before turning to the answer. Use the separate learner workbook for group practice.

Check your reasoning and transfer it

1. K11 release is 11:20 and nominal ready time 12:00. K12 release is 12:00 and nominal ready time 12:40. Each initially has 60 minutes protective allowance.
2. Starting K11 at 11:50 with 40 minutes preparation predicts 12:30 readiness, leaving 30 minutes to 13:00. The 30-minute late start consumes half the original 60-minute allowance.
3. A later 13:10 ready estimate predicts a 10-minute miss. Escalate the actual blocker and seek an authorized recovery/schedule decision; record whether the forecast or outcome changes.

Suggested completed record

Job / condition	Time calculation	Protection / response
K11 planned	11:20 release	12:00 nominal ready; 60 min protection
K12 planned	12:00 release	12:40 nominal ready; 60 min protection
K11 starts 11:50	12:30 nominal ready	30 min remaining
K11 estimate 13:10	10 min after drum	Escalate blocker; schedule owner decides

Plausible wrong turns

1. The rope is information controlling release, not the material path.
2. Protective lead is not permission for unlimited WIP or a promise of achieved throughput.

Evidence of a sound answer

1. Use the stated total lead once, without double counting.
2. Calculate remaining protection and predicted lateness separately.
3. Name a job-specific response and retain quality readiness.

Take the learning back to work

Commitment	Agreed follow-through
Owner	Constraint schedule owner with upstream and material-flow leaders
Record	Job release/readiness log linked to the drum schedule
Review	At release/readiness checks and after representative operating cycles
Verification evidence	Actual release/arrival, readiness, starvation, missed commitments and excess WIP
If unresolved	Reassess blocker, protective lead and constraint assumptions; approve schedule/rule changes deliberately rather than bypassing release discipline.

Help someone else apply the method

Prepare

1. Clock timeline and three job tokens
2. Blank release/readiness record
3. Delayed-job card; calculator optional

Minutes	Activity and coaching prompt
5	Clarify the scheduling reference Which resource's need governs release here?
7	Demonstrate subtraction and protection What is included in 90 minutes?
10	Complete the changed-lead practice How much protection remains after the late start?
6	Debrief the threatened appointment Would more unrelated work help J42 arrive?

Debrief

1. If a learner subtracts another 60 minutes, revisit the stated total lead.
2. If the response is expedite everything, identify the single threatened job and its blocker.

Individual or remote practice

Draw planned and revised timestamps on one timeline, then explain the information return from drum to release.

Connect the method and check its boundaries

Before application

1. Validated constraint
2. Routings and timing information

Outside this lesson

1. Buffer is protection, not unlimited WIP
2. Rope is information control, not physical transport

Goldratt Japan: Drum Buffer Rope

Goldratt Japan: Drum Buffer Rope

Constraint schedule, protection and release control; English synthesis from Japanese primary text

Method reference; original OPEX scenario and diagram are synthetic teaching content, not source case results.

[Open this lesson and its visual aids](#)