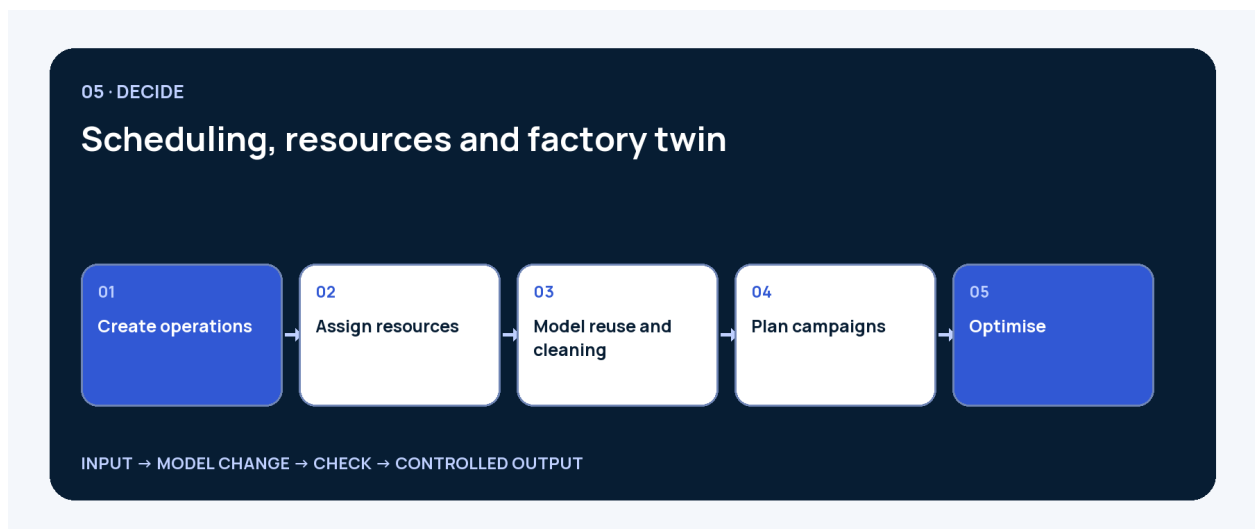




Axion

Scheduling, resources and factory twin

Plan batches, cleaning, rooms, personnel and shared equipment at finite capacity



EDITION 2.6 · 19 AUGUST 2026 · MODULE MANUAL · 05 · DECIDE

Axion · Bioprocess engineering software

At a glance

Engineering decision	Path in Axion
What production is achievable with the real resources, cleaning and release times?	Decide → Factory twin / Scheduling

Primary users	Permitted maturity
MSAT, Manufacturing, Capacity Planning, Project Engineering	Screening with default times; Calibrated with batch/MES data; Validated with an approved operating calendar

DECISION RULE

Scheduling converts the process graph into resource occupancy. Equipment can be reused only when transfer, cleaning, setup, maintenance, rooms, personnel and utilities are conflict-free.

The screenshot displays the Axion Process OS interface. On the left is a dark sidebar with a navigation menu. The main content area is light blue and shows the 'Plant Overview' for 'Cultured Meat · Perfusion'. It features five key metrics: Annual product (4.88 t), Campaign duration (272 h), Direct cost (\$52,456/kg), Utilities (1,840.2 MWh), and Plant utilization (59%). Below these is a 'PROCESS ENGINEERING REVIEW' section for the 'Cultured Meat production model', which includes a description of the industrial screening workspace and an 'Open Process Builder' button. At the bottom, a 'CURRENT MODEL STATUS' section shows the 'Screening model' is 29% complete, with a progress bar indicating the status of various design steps.

Relevant Axion workspace for this module manual.



Prepare the model

Input	Why it is required	Ready when
Operation durations	Defines occupancy and takt.	Min/typ/max or a distribution exists per operation.
Equipment pools	Defines alternatives and shared resources.	Capacity, calendar and changeover rules are set.
CIP/SIP	Prevents unrealistic immediate reuse.	Recipe, duration, dirty/clean hold and release are modelled.
Rooms and personnel	Represents non-equipment constraints.	Shift calendar, qualification and room state exist.
Utilities	Limits simultaneous steam, cooling, WFI and gas demand.	Capacity profiles and peak limits are set.
Release and holds	Links QC, release and storage to process state.	Sampling, test duration, hold limit and batch state are defined.

Preflight check

- Confirm the correct project, branch and controlled version
- Verify units, provenance and permissions
- Save a restore point before a decision-relevant change
- Keep blocking gaps visible

APPLICABILITY LIMIT

A schedule is only as reliable as duration distributions, calendars, cleaning, release and failure data.



Workflow

1. Create operations

1. Translate flowsheet units into tasks with duration, precedence and batch.

VISIBLE RESULT

Each relevant unit has an executable task.

2. Assign resources

2. Attach equipment, room, personnel, utility and QC as finite resources.

VISIBLE RESULT

Each task shows all simultaneous requirements.

3. Model reuse and cleaning

3. Insert transfer, CIP/SIP, setup and release after production.

VISIBLE RESULT

The equipment state machine moves through dirty, cleaning, ready and running.

4. Plan campaigns

4. Schedule starts, parallel trains, product switches and maintenance.

VISIBLE RESULT

Gantt and WIP show a conflict-free sequence.

5. Optimise

5. Choose throughput, tardiness, WIP or cost and lock constraints.

VISIBLE RESULT

The plan improves the objective without hard violations.

6. Test robustness

6. Simulate duration, failure and release scenarios.

VISIBLE RESULT

Buffers, bottleneck and service level remain visible.



Review the result

Review criterion	Pass condition	If it fails
Scope and structure	The documented criterion is satisfied and supported by traceable evidence.	Correct the model or keep the output Not decision-ready.
Units and balances	The documented criterion is satisfied and supported by traceable evidence.	Correct the model or keep the output Not decision-ready.
Evidence and uncertainty	The documented criterion is satisfied and supported by traceable evidence.	Correct the model or keep the output Not decision-ready.
Reproducibility	The documented criterion is satisfied and supported by traceable evidence.	Correct the model or keep the output Not decision-ready.
Review state	The documented criterion is satisfied and supported by traceable evidence.	Correct the model or keep the output Not decision-ready.

DECISION RULE

A schedule is only as reliable as duration distributions, calendars, cleaning, release and failure data.



Troubleshooting

Observation	Likely cause	Correction
The result looks plausible but cannot be explained	Inputs, units, model version or evidence are missing.	Open the relevant register, restore traceability and rerun.
A change affects unexpected outputs	Dependencies or imported mappings were not reviewed.	Inspect the change plan and before/after diff; undo if required.
The module appears complete but readiness is low	Required industrial evidence is still missing.	Assign the visible gaps and keep maturity at Screening or Not decision-ready.



Handover and next steps

Artifact	Recipient	Must contain
Module result package	Engineering reviewer	Inputs, calculations, results, units, intervals, maturity
Readiness register	Model owner	Gap, required work, owner, due date, intended use
Controlled version	Project team	Branch, version, change note, reviewer and restore point

Completion check

- The active project, branch, version and intended use are visible.
- All inputs have units, provenance, review state and uncertainty where relevant.
- Blocking model, physical, numerical and evidence gaps are closed or assigned.
- The result maturity matches the available evidence.
- A controlled output package opens correctly and includes limitations.

[Open Axion](#) [Book technical onboarding](#)