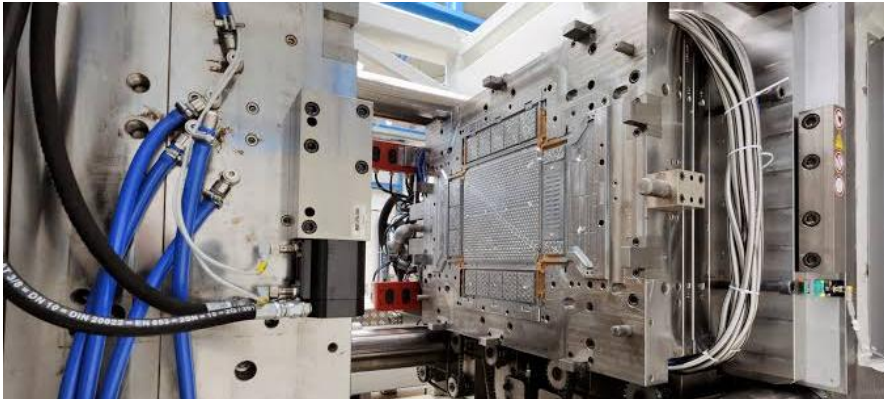


PRECISION MOLD MANUFACTURING

Injection Molding Monitoring: Case Study

Making hidden capacity losses visible from a reported 31.13% productivity improvement.



Opened injection-molding qualification machine.

40

Monitored machines

+31.13%

Reported productivity improvement

2003–2017

Machine age group

THE CHALLENGE

Where was productive time being lost?

Only part of a reserved day became productive molding. Setup, engineering work, waiting and interruptions had to be separated.

THE SOLUTION

One view of the qualification timeline

Novo AI's external sensor approach provides a common machine-state and cycle view to combine machine behavior with mold and project context.

RESULTS AT A GLANCE

+622.6 h

Additional productive capacity

Per machine/year in model

–55.56%

Less idle time

Relative reduction

–30.0%

Less mold-change/setup time

Changeover model

Quality and qualification acceptance remained the constraint. More productive molding counted only when the technical qualification still met its requirements.

THE PRODUCTION CHALLENGE

A qualification machine can still hide lost capacity

A qualification machine can be reserved for a full day while only part of that time becomes productive molding. Setup, engineering work, waiting and technical interruptions all occupy machine time differently.

50.000%

Productive molding share

Illustrative baseline

65.565%

After improvement

Modeled from +31.13%

+622.6 h

Extra productive time

Per machine/year, 2-shift model

Illustrative schedule in this case-study model: two 8-hour shifts across 250 days = 4,000 scheduled hours per machine per year. The model holds quality and productive cycle rate constant and isolates recovered time.

What became visible

Production question	Before monitoring	With WatchMen
Is the machine molding?	Existing observation and local logs	Validated machine-state timeline
How much of the reservation became productive molding?	Reservation time only	Productive, setup, idle, downtime and engineering categories
How long did mold changes take?	Hard to compare consistently	Defined changeover duration across events
What about short interruptions?	Mostly undocumented	Continuous visibility and event history
Why did a qualification take longer?	Project context separated from machine data	Machine timeline plus mold/project context
When should the team react?	No common trigger or alert logic	Deviation reviews and configurable alerts

Separate technical work from loss

Not every non-cycling interval is waste. Engineering, inspection and validation work must stay separate from avoidable idle time.

Measure the qualification assumption

When the productivity result is defined, translate it into machine-state categories before valuing capacity or lead-time effects.

Read the model correctly: the 31.13% productivity result was supplied by the user. The productive-share and capacity tables translate that result into an internally consistent machine-time scenario.

IMPLEMENTATION

One monitoring layer across qualification machines

Novo AI's external sensor approach is intended to capture machine behavior without PLC access. WatchMen can combine the resulting states and cycles with mold or project context.



Novo AI retrofit sensor.

Approx. 15 min

Generic installation claim

Advertised for Novo AI's injection-molding offering. Project-specific installation time, connected assets and integration scope were not supplied.

01

Sense

External sensors capture physical machine behavior.

02

Interpret

Edge processing and validation support cycle and state detection.

03

Add context

WatchMen links machine states with mold, project and reason data.

From installation to operational use

Stage	Project milestone
Day 0	Install sensors on selected machines across the 40-machine scope.
Days 1–3	Collect signals and validate productive cycles.
Weeks 1–2	Validate states, setup events and baseline definitions.
Months 1–2	Review idle time, changeovers and recurring microstops.
Month 3	Evaluate against the reported productivity improvement.

The generic product claim and the customer-specific onboarding status are not the same thing. Public scope information and the actual connected-machine list must be kept separate.

40 monitored machines

The monitored fleet in this case spans machine build years from 2003 through 2017.

FINDINGS AND ACTIONS

Turn the timeline into a qualification response

Monitoring makes machine occupation visible. The team can then separate technical work from avoidable loss and act on the largest recurring categories.

01 Quantify hidden idle time

Model idle time falls from 18% to 8%, releasing 400 hours per machine/year.

Response: Investigate long waits around material, decisions and machine readiness, then verify equivalent runs.

02 Shorten mold-change and setup duration

Illustrative setup time falls from 1.2000 to 0.8400 hours within a 10-hour reservation.

Response: Prepare tools, parameters and utilities before the machine becomes available.

03 Make recurring microstops actionable

Modeled downtime, microstops and other waiting fall from 1.0000 to 0.8035 hours within the 10-hour example.

Response: Review repeated short interruptions against material, handling and maintenance context.

04 Protect necessary engineering time

The model keeps necessary engineering and inspection at 1.0000 hour in both states. That time is not automatically waste.

Response: Label planned engineering and validation steps separately from avoidable idle time.

Use comparable qualification conditions

Compare runs only with mold complexity, material, trial stage and acceptance requirements in view. More cycles alone do not equal qualification success.

A REPEATABLE IMPROVEMENT CYCLE

1 Measure

Record machine states.

2 Investigate

Review events and causes.

3 Act

Change the relevant process.

4 Verify

Compare the same metrics.

RESULTS

More booked time became productive

+622.6 h

Additional productive capacity per machine/year

Illustrative two-shift model

The model translates the reported +31.13% productivity result into productive molding utilization rising from 50.000% to 65.565%. This is a capacity scenario, not a full year of directly observed output.

Measure	Baseline	After improvement	Change
Reported productivity index	100.00	131.13	+31.13%
Productive molding share	50.000%	65.565%	+15.565 pp
Idle time	720.0 h	320.0 h	-55.56%
Mold-change/setup	480.0 h	336.0 h	-30.00%

Necessary engineering and inspection remain 400 hours per machine per year in both periods. Productive share and recovered hours are modeled values under the stated assumptions.

What the same 10-hour reservation can mean after improvement

ILLUSTRATIVE CAPACITY EXAMPLE / SAME SCHEDULED RESERVATION

For a ten-hour reserved qualification window, the table shows how more of the same booked time becomes productive molding.

Scenario	Productive molding	Scheduled reservation
Before improvement	5.000 h	10.000 h
After improvement	6.5565 h	10.000 h
Additional productive time	+1.5565 h	No extra reservation

Calculation: 10 h × productive share. Necessary engineering time is modeled separately and kept constant.

Keep the measures distinct

Productive share, reported productivity, changeover duration and project lead time describe different things. More productive machine time does not by itself prove more accepted qualifications.

pp = percentage points. Scenario assumptions and evidence limits are summarized on page 6.

APPLYING THE FINDINGS

What to review in your own qualification center

To validate the opportunity, review machine behavior together with mold, project and quality context. These inputs make the pilot practical and comparable.

Bring to a pilot review	Why it matters
Machine groups and compatible molds	Compare like for like before interpreting utilization differences.
Productive-state definition	Agree what counts as productive molding, setup, engineering, idle and downtime.
Changeover definition	Use consistent start/end points for mold-change measurement.
Project and quality context	Link mold/project IDs, inspection steps and accepted output to the machine timeline.
Schedule and excluded periods	Document shifts, planned maintenance and unassigned time before annualizing capacity.

What the sensor can tell you

When physical machine behavior changed, when productive molding stopped and whether a pattern recurred.

What needs context

Why the event happened. Mold, material, operator and project records provide the organizational cause.

A useful daily review

Start with the largest recurring losses. Check readiness, investigate the longest waits, label planned engineering work and compare equivalent runs after each change.

MEASUREMENT AND INTERPRETATION

Project inputs: 40 machines, build years 2003–2017, and a customer-reported **31.13% productivity increase**. **Operating model:** $2 \times 8\text{-hour shifts} \times 250\text{ days} = 4,000\text{ scheduled hours per machine, or }160,000\text{ fleet hours}$. A 50.0% productive baseline $\times 1.3113$ gives 65.565% after improvement. The annual gain is $160,000 \times 15.565\% = 24,904\text{ hours}$.

Annual hours and individual loss reductions are illustrative model outputs. OEE, productive-time share and qualification output are separate KPIs. Capacity gains and reduced losses represent the same released machine time.

See what your injection molding machines actually deliver

Discuss your qualification machines, recurring losses and a suitable pilot with Novo AI.

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