PLASTIC HOSE MANUFACTURING

Extrusion Machine Monitoring in Plastic Hose Manufacturing: Case Study

Making productive hose extrusion and hidden losses visible within a 103-machine production environment.



Plastic-hose extrusion equipment in continuous production.

103

Production machines

3 shifts

Modeled operating schedule

2015–2023

Machine generations

THE CHALLENGE

Where was productive hose-extrusion time being lost?

Scheduled machine time could include setup, material changes, winding/coiling, stabilization, idle periods, short interruptions and downtime.

THE SOLUTION

One view of the existing extrusion process

Novo AI external retrofit sensors create a common machine-state view. WatchMen makes productive extrusion and hidden losses comparable over time.

RESULTS AT A GLANCE

+857.4 h

Additional productive capacity

Approximate annual monitored-line estimate

+28.58%

Productivity improvement

Customer-reported result

-40.63%

Less idle time

Modeled relative reduction

Quality remained the acceptance criterion. More productive extrusion counted as an improvement only when specification-compliant hose was produced.

Figures combine the customer-reported +28.58% productivity result with clearly labeled model calculations. pp = percentage points.

THE PRODUCTION CHALLENGE

Continuous hose extrusion still loses time around the run

Hose extrusion is continuous, but material changes, winding and coiling, process stabilization, short interruptions and downtime can still consume scheduled machine time. Hose construction, material and process settings also change the production context.

57.6 min

Idle time per line / shift

Modeled baseline

45.6 min

Winding / coiling time per shift

Modeled baseline

52.8 min

Setup / material-change time per shift

Modeled baseline

The case-study model uses three 8-hour shifts across 250 production days: 6,000 scheduled hours on the monitored extrusion line.

What became visible

Production question	Before monitoring	With WatchMen
Is the extrusion line productively running?	Local observation / existing machine status	Validated machine-state timeline
Where did scheduled time go?	Losses reconstructed later	Productive, setup, idle and downtime periods
How much time went to material changes and winding?	Difficult to compare consistently	Comparable event durations and trends
What about short interruptions?	Microstops were easy to miss	Continuous visibility and history
Why did an order take longer?	Order context without physical timeline	Order context plus machine behavior
When should the team react?	Retrospective review	Configurable deviation alerts

Improve the process

When the target is realistic, investigate idle time, setup, winding/coiling, stabilization, microstops and machine behavior.

Check the planning assumption

When hose construction, material, quality or process stability limits performance, review the target and production master data.

Read the figures correctly: the +28.58% productivity improvement is the supplied project result. The page-2 operating figures are modeled from the case-study loss categories; no separate line-speed uplift is added.

IMPLEMENTATION

One monitoring layer for the extrusion process

External Novo AI sensors create a common machine-state layer without PLC access. Edge processing and WatchMen make productive extrusion, idle periods and recurring interruptions visible on existing equipment.



Novo AI retrofit sensor on existing production equipment.

<15 min

Installation benchmark per machine

No PLC or machine-control intervention.

01
Sense

External sensors capture physical machine behavior.

02
Interpret

Edge processing and validation support state detection.

03
Add context

WatchMen links machine states with order and production context.

From installation to operational use

Stage	Project milestone
Day 0	Sensor installed on the monitored extrusion line.
Days 1–3	Signal collection and initial classification.
Weeks 1–2	State and process validation; baseline definitions.
Months 1–2	Loss reviews, improvement routines and onboarding.
Month 3	Evaluate results against the project baseline.

The sequence below illustrates the implementation path. The retrofit benchmark is under 15 minutes per machine; signal validation establishes the usable production baseline.

103-machine production environment

The project record covers 103 production machines and a 3-machine pilot. The detailed extrusion capacity model uses the monitored extrusion line; machine build years span 2015–2023.

FINDINGS AND ACTIONS

Turn the timeline into a production response

Monitoring supplies the machine evidence. The production team can then focus on the largest recurring losses and verify whether process changes release usable hose-extrusion capacity.

01 Reduce hidden idle time

Modeled idle time falls from 720.0 to 427.5 hours per line/year, releasing 292.5 hours.

Response: Improve next-order readiness, material staging and response to extended waiting.

02 Shorten setup and material changes

Modeled setup/material-change time falls from 660 to 510 hours per line/year, a 22.73% reduction.

Response: Stage compounds, tooling and changeover tasks before the line becomes available.

03 Improve winding and coiling readiness

Modeled winding/coiling loss falls from 570 to 405 hours per line/year, a 28.95% reduction.

Response: Prepare winding/coiling equipment and downstream handling earlier in the workflow.

04 Reduce downtime and microstops

Downtime falls from 360 to 285 hours and microstops from 240 to 195 hours per line/year in the model.

Response: Investigate recurring short interruptions and longer faults, then verify the same metrics after action.

Use comparable production conditions

Compare lines and orders with thermoplastic material, hose geometry, diameter, reinforcement, tooling, winding format and quality requirements in view. More runtime alone does not establish better production.

A REPEATABLE IMPROVEMENT CYCLE

1 Measure	2 Investigate	3 Act	4 Verify
Record machine states.	Review events and causes.	Change the relevant process.	Compare the same metrics.

RESULTS

More scheduled time became productive

+857.4 h

Productive hose-extrusion capacity per year

Approximate annual monitored-line estimate

The model annualizes additional productive hose-extrusion capacity on the monitored line within the same scheduled time.

Loss category	Before	After	Time released
Idle / waiting	720.0 h	427.5 h	**292.5 h**
Winding / coiling	570.0 h	405.0 h	**165.0 h**
Setup / material change	660.0 h	510.0 h	**150.0 h**
Downtime	360.0 h	285.0 h	**75.0 h**
Microstops + support losses	690.0 h	515.1 h	**174.9 h**
Total capacity released			**857.4 h**

The +857.4 h annual gain is the same released machine time shown in the loss categories below.

Where the additional productive capacity comes from

MODELED ANNUAL LOSS REDUCTION / MONITORED EXTRUSION LINE

Per line / 8-hour shift	Before	After
Idle time	57.6 min	**34.2 min**
Winding / coiling	45.6 min	**32.4 min**
Setup / material change	52.8 min	**40.8 min**
Microstop time	19.2 min	**15.6 min**

Released loss hours and additional productive capacity describe the same time.

Keep the measures distinct

Productivity, utilization, OEE, line speed and hose output are separate KPIs. Capacity gains and loss reductions describe the same released time.

APPLYING THE FINDINGS

What to review in your own hose extrusion production

Repeated losses become actionable when machine behavior, order expectations and production context are reviewed together. Prepare these inputs for a practical pilot review.

Bring to a pilot review	Why it matters
Line and hose-product groups	Compare technically similar hose families before interpreting performance.
Product-specific speed targets	Check what line speed is realistic for each hose, material and quality requirement.
Quality acceptance criteria	Define dimensions, wall thickness, reinforcement and other requirements that productivity improvements must respect.
Order / material context	Connect planned line, material, tooling, order duration and expected production context.
Shift and stop-reason context	Separate waiting, changeover, stabilization, winding/coiling, maintenance and faults when investigating a loss.

What the sensor can tell you

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

What needs context

Why the event happened. Order data, material/tooling context, operator input and investigation provide the organizational cause.

A useful daily review

Start with the largest recurring losses. Check the affected order, material, winding and process context, agree an action, then compare the same indicators after the change.

CALCULATION BASIS AND KPI INTERPRETATION

Project inputs: 103 total production machines, a 3-machine pilot, machine build years 2015–2023 and a customer-reported 28.58% productivity increase. The detailed extrusion model is normalized to the monitored extrusion line. Operating model: 3 × 8-hour shifts × 250 days = 6,000 scheduled hours per monitored line. A 50.00% productive baseline × 1.2858 gives 64.29% after improvement. The annual gain is 6,000 × 14.29% = 857.4 hours per monitored extrusion line.

Annual hours and individual loss reductions are illustrative model outputs. The 103-machine figure describes the production environment and is not used as a multiplier for extrusion-line capacity because a 103-line monitored extrusion scope is not established. OEE, productive-time share, line speed, hose output and order duration are separate KPIs.

See what your hose extrusion process actually delivers

Discuss your extrusion process, recurring losses and a suitable pilot with Novo AI.

Request a WatchMen demo →