MARSE

INJECTION MOLDING · CASE STUDY · 01/08

CONSISTENT PARTS, EVERY CYCLE.

Temperature variation shows up silently — in warped parts, extended cycle times, and scrap you can't recover. Precise mold temperature control eliminates the root cause.

−11%
CYCLE TIME
Cooling phase optimisation

−28%
SCRAP RATE
Warpage & dimensional failures

±0.1°C
ACCURACY
Held continuously across mold

01

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INDUSTRY CONTEXT

THE TEMPERATURE CONTROLS THE PART.

In injection molding, mold temperature is the single most influential variable on part quality and process efficiency. It governs cooling uniformity, surface finish, dimensional stability, and the duration of the cooling phase — which accounts for 60–80% of total cycle time.

Even a ±2–3°C deviation from the target causes warpage, sink marks, or differential shrinkage in semi-crystalline polymers. Standard facility cooling circuits offer no thermal regulation — leaving the process permanently exposed to drift.

60–80%

of total cycle time is cooling phase

THE CHALLENGE

RUNNING ON UNCONTROLLED COOLING.

REPRESENTATIVE SCENARIO

Mid-size plastics manufacturer — 24 injection molding cells. Automotive & consumer electronics components, Central Europe. PA66, ABS, POM, glass-filled PP. ~4.2M parts/year.

01

Scrap rates of 8–10%

Warpage, sink marks, and dimensional failures across multiple cavities during shift changeovers and peak ambient temperatures.

02

Extended cooling phases

Safety margins added to dwell times to prevent ejection defects, inflating cycle times beyond the theoretical optimum.

03

Accelerated mold fatigue

Thermal shock at startup and uncontrolled cycling was reducing mold service life and increasing polishing frequency.

04

Batch-to-batch inconsistency

Dimensional drift triggered 100% manual inspection on critical components, consuming operator time and delaying shipments.

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THE MARSE SOLUTION

STABLE MOLD.
PERFECT
PART.

MARSE **SMART Series TCUs** were deployed across all 24 production cells in a dedicated closed loop, fully decoupled from the facility cooling ring. Each unit configured for its specific mold geometry, material, and target cycle time.

01 **Closed-loop PID at ±0.1°C**

Maintains the mold within tolerance across all conditions, including seasonal ambient swings exceeding 25°C.

02 **Constant-flow architecture**

Ensures homogeneous temperature distribution, eliminating gradients responsible for asymmetric cooling and shrinkage.

03 **Industry 4.0 ready**

Profinet / Modbus TCP enables cycle-synchronised control, responding in real time to injection machine events.

04 **Rapid startup ramp**

Brings the mold to setpoint before the first shot, eliminating the startup scrap period entirely.

TECHNICAL SPECIFICATIONS

TEMPERATURE RANGE **25–180°C** Water-based TCU	PRECISION **±0.1°C** Continuous across mold
HEATING CAPACITY **Up to 16 kW** Per unit	CONNECTIVITY **Profinet / Modbus** Industry 4.0 ready
UNITS DEPLOYED **24 TCUs** Full production floor	INSTALLATION **<1 shift** Minimal downtime

WHAT PRECISION DELIVERS

EVERY CYCLE COUNTS.

−11%

Cycle time reduction

Cooling safety margins eliminated through structured optimisation during commissioning.

Benchmark: 8–15%

−28%

Scrap rate reduction

From ~9% to ~6.5% average across all 24 cells at 90 days post-deployment.

From ~9% → ~6.5%

+20%

Mold service intervals

Controlled thermal ramp extended polishing intervals and pushed major maintenance timelines back significantly.

Tooling OPEX: significant

−9%

Energy per part

Shorter cycles and faster startup reduced total energy per unit output at cell level.

All 24 units measured

The startup scrap problem alone covered the first three units within months.

The cycle time gains were the long-term win.

Process Engineering Manager
European plastics manufacturer

READY TO OPTIMIZE YOUR PROCESS?

Request a consultation →

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