

DYNAMICO™ by Frigel

# The First “Mould Profit Booster” “AI-Assisted” Dynamic Mould Thermal Control”

A Paradigm Shift in Injection Moulding



# Introduction

## Redefining Profitability in Injection Moulding Business.

Frigel, a global leader in temperature control for injection moulding with over 30 years of experience in the industry, presents DYNAMICO™, an AI-Assisted Dynamic Mould Temperature Control Technology, that introduces a paradigm shift in cooling time management: the true untapped lever for increasing productivity, reducing energy costs per part and improving margins.

As an immediate replacement for any conventional temperature controllers, in most applications and without any modification to the mould, DYNAMICO offers a payback on the investment within few months and the results are guaranteed by Frigel.

“DYNAMICO is already generating important success stories in various sectors such as Automotive, Medical, Packaging and in all specific moulding applications for Technical Parts”.

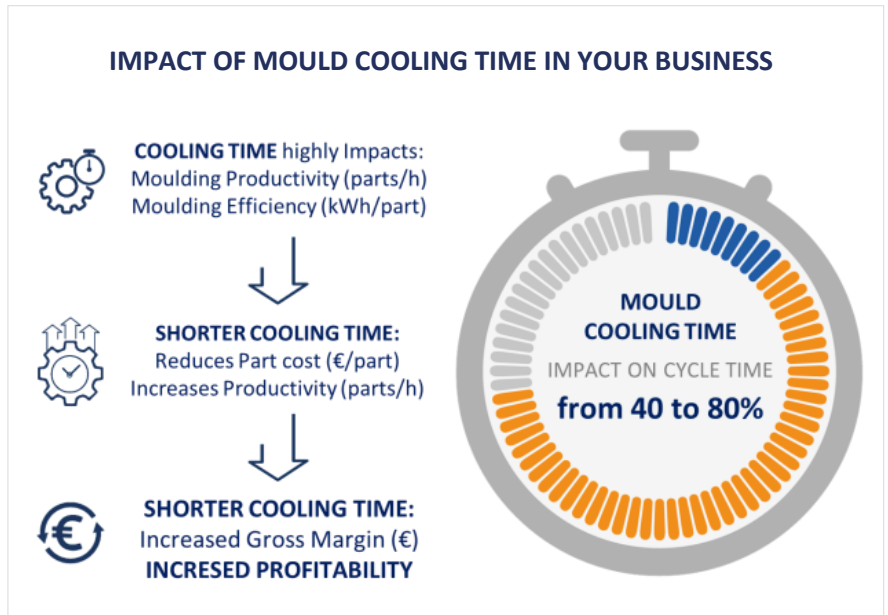
## The Context: Increasing profitability margins

### Time is Money!

In the injection moulding industry, reducing wasted time is money. Cycle times define the productivity per machine, cost and energy consumption per part.

In a competitive economic environment, reducing cycle times with DYNAMICO means:

- Increase productivity
- Reduce cost per part
- Increase margins
- Increase competitiveness



Cooling time management: the true untapped lever for improving margins

→ Avoid costly structural investments

“Reducing cycle times unequivocally increases the gross profit margin. Until now, reducing cycle times has required costly interventions on moulds, expensive automation devices or the purchase of more modern, higher-performance presses”.

Going forward, thanks to the new DYNAMICO Frigel technology, reducing cycle times will be very easy, thus achieving previously unimagined profitability.



# The Hidden Challenge of Cooling Time

Cooling time is an essential part of the injection moulding cycle: it has a significant impact on the product, as it is not only important for part quality, but is also the most time-consuming portion of a cycle.

**“Cooling time accounts for between 40% and 80% of the total cycle, depending on the application. Yet, it is normally a neglected parameter”.**

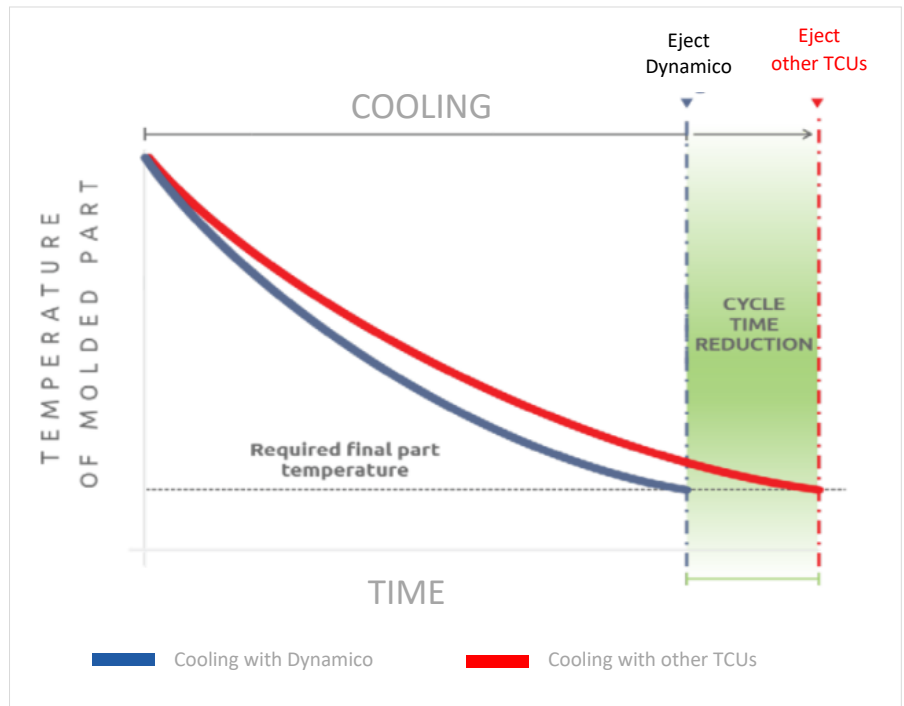
In fact, the cooling time of each mould is strongly determined by the performance of current temperature controllers (TCUs), which are not specifically designed to optimise it.

Most of today's injection moulding cycles run with cooling times that can be significantly improved, but only if you have the right technology, designed for this precise purpose.

**“It is clear that reducing cooling time in injection moulding cycles represents a unique opportunity to increase profit margins, which has so far been totally unforeseen”.**

## How can Cooling Time be optimised?

A part can be considered “cooled” when it retains its rigid shape and can be safely removed from the mould. The part must then meet the established post-moulding quality controls. Any further cooling within the mould is ineffective and will consequently increase the cycle time.



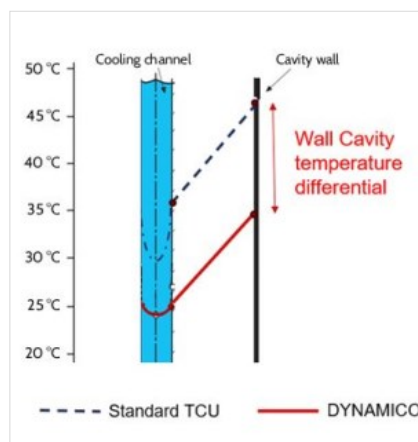
Cooling time optimisation by replacing the conventional TCU with Dynamico

The shortest cooling time that can be achieved will be determined by how quickly heat is transferred to the cooling water, and this only happens after the plastic has completely filled the cavity (post-pressure).

In an existing mould, the only method to accelerate the conduction of heat to the water circulating in the mould channels is to reduce the cavity wall temperature during the cooling phase of the cycle.

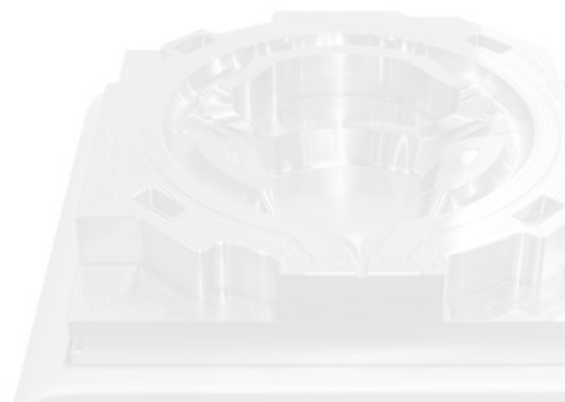
water and the plastic inside the cavity.

Therefore, optimisation of the cooling time can only be achieved with a device that allows the flow of water inside the mould to vary and, at the same time, vary its temperature according to the requirements of each process.



Cavity wall temperature comparison

There are two main variables that directly influence cavity temperature: on the one hand, the heat transfer coefficient between the water and the mould steel - which is highly dependent on the water flow rate through the mould - and on the other hand, the temperature differential between the



# The DYNAMICO™ Innovation The “MOULD PROFIT BOOSTER”

**The first device for active Moulding Cooling Time Optimisation through Digital intelligence.**

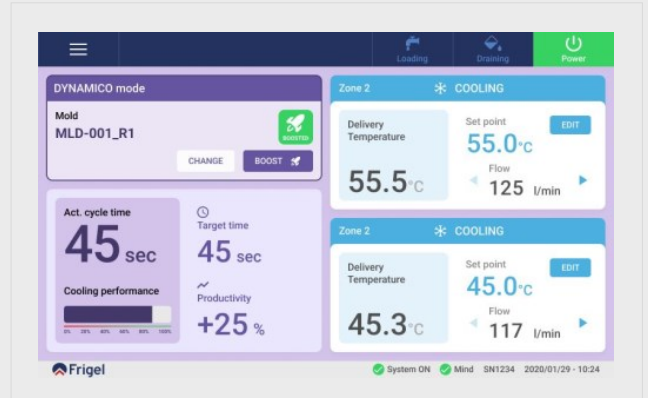
DYNAMICO™ is a new device that directly replaces conventional temperature controllers in any existing mould. Using advanced algorithms, it guides the operator step by step in reducing cooling time to the shortest possible duration but still ensures final product quality.

“Thanks to this new technology, a considerable reduction in cycle time of any current mould can be achieved immediately, easily and economically, without the need for any modifications to the mould”.

Basically, with this paradigm shift, the mould temperature control unit is transformed into a cycle time optimisation device. In fact, the "control variable" (SET POINT) of the DYNAMICO is no longer the water temperature going to the mould, but "THE CYCLE TIME".

**Main advantages:**

- No changes required to the mould
- Active and dynamic control of temperature and water flow
- Immediate integration into the existing line
- Recipe Database ready to use for each mould optimised



Dynamico User Interface - Cycle Time is the new Set Point



# How DYNAMICO™ Works

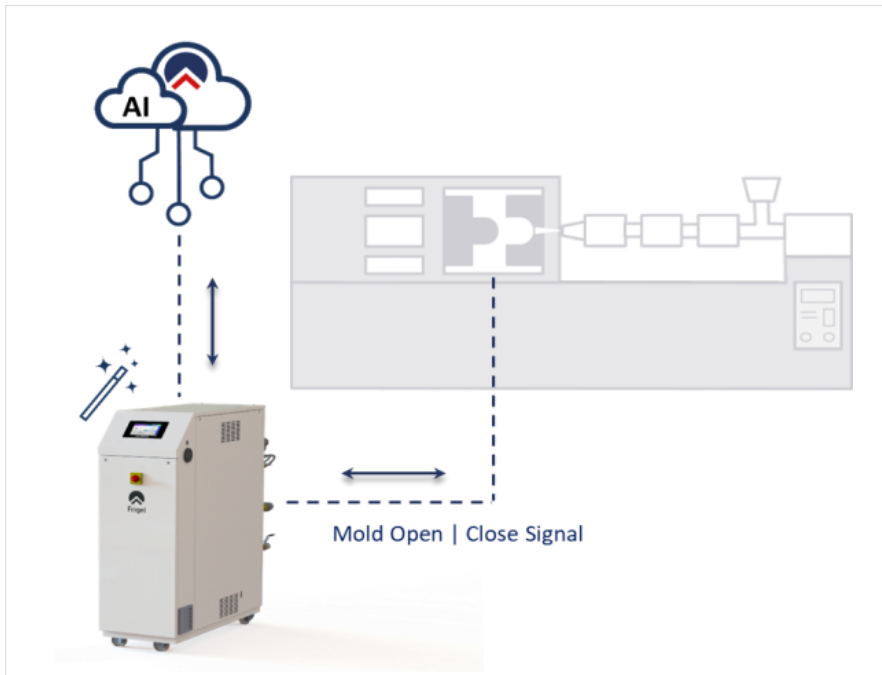
Unlike traditional temperature controllers based on fixed, constant and stable temperature control, the new technology is based on a radically opposite concept: 'Dynamic Mould Temperature Control'.

DYNAMICO can automatically and programmatically adjust mould water temperatures in each step of the cooling time optimisation process - and in some cases, even regulate flow through each half of the mould using powerful inverter-driven booster pumps.

The booster pumps on board the DYNAMICO range are designed to deliver up to for 500% more flow rate than conventional temperature controllers, reaching very high turbulent flow in the water channels and maximum heat transfer rate with the mould cavities.

The DYNAMICO range covers any specific moulding requirement, from high temperature applications for technical parts – "DS" Series – to high performance molding with chilled water temperatures – "DP" Series.

The DYNAMICO range also includes the "DY" Series. A super compact unit with integrated chiller - as an evolution of the well-known Microgel range from Frigel. This outstanding feature allows temperature SET POINT to be dropped down to 10 °C. Consequently, no limitation of cooling time reduction is guaranteed independently from the central cooling system to which it is



Dynamico Digital Connectivity

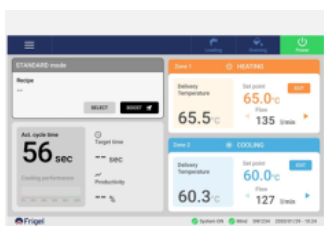
connected, which is especially useful for moulding applications of technical parts processing polyolefins with high resin throughputs up to 320kg/h.

In addition, each DYNAMICO is connected to the mould through a universal signal (suitable for every make and model of press) that allows the mould opening and closing times, and the cycle time, to be known.

Thanks to this unique synchronisation capabilities, all DYNAMICO units with inverter on pumps (optional feature) can deliver the high flow only during the cooling phase of the cycle, while reducing it during the rest of the cycle. This will avoid "mould freezing" during

the opening time allowing the use of lower water temperatures which furtherly increase the heat transfer rate - DYNAMICO SYNCRO MODE -

This is how DYNAMICO offers operators a tool, guided by a user-friendly interface, that allows them to reduce the cooling time of the current cycle, step by step, cutting second by second, varying the temperatures and, if necessary, the water flows sent to the mould.

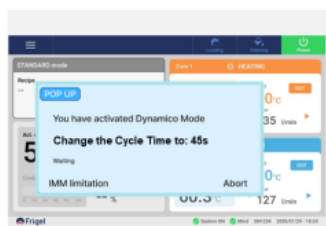


## PHASE 1 Set up process

**Installation of Dynamico in place of the current TCU.**

The user inputs manual data required.

Dynamico synchronizes with the molding process.



## PHASE 2 Automatic process

**The Wizard:**

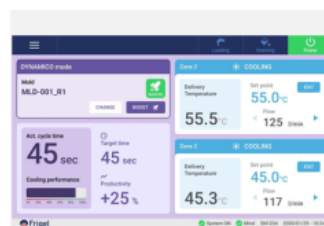
1. Analyzes process data
2. Changes cooling parameters (flow rate, temperature)
3. Delivers a new cycle time.



## PHASE 3 Manual process

**Quality Check.**

After a series of produced samples, the operator validates/accepts the quality of the products.



## PHASE 4 Manual process

**Validation.**

The operator can:

- A. Continue the cycle time optimization process (back to phase n.2)
- B. Validate and save the new recipe.

Main phases of Cooling Cycle Time optimisation

# The DYNAMICO WIZARD - Digital Intelligence & User Experience

The cooling time reduction, driven by innovative dynamic mould temperature control logics is suggested by “DYNAMICO WIZARD”, exclusive software developed by Frigel, based on AI-assisted Digital Intelligence. It uses advanced algorithms built on Frigel’s vast experience in the industry and historical data collection of more than 40,000 high performance mould temperature control units installed in all kinds of applications worldwide.

These algorithms are based on some specific data of the current moulding process, previously introduced by the operator, and on the mould signal obtained in real time.

Once the minimum possible cooling time that guarantees product quality has been achieved, the operator can save the “mould recipe” in DYNAMICO’s memory. This allows it to be easily reapplied whenever that mould is used again.

Moreover, the DYNAMICO range may also include full internet connectivity which would allow, through **AI-driven data tools**, the DYNAMICO WIZARD algorithms to continuously learn from the process data of all machines and moulds connected to the network, thus creating progressive improved performance and added value for every new mould.

Summarising, the New DYNAMICO™ Technology is based on two completely new concepts:

## ⇒ **Dynamic Mould Temperature Control**

- Unprecedented increased heat-transfer efficiency with the mould.
- Integration with the mould signal (opening/closing)
- Programmed variation of temperatures and water flow rates to the mould

- Use of inverter driven booster pumps for calibrated flows synchronised with the cycle.

## ⇒ **Cooling Time Optimisation with Digital Intelligence Assistance**

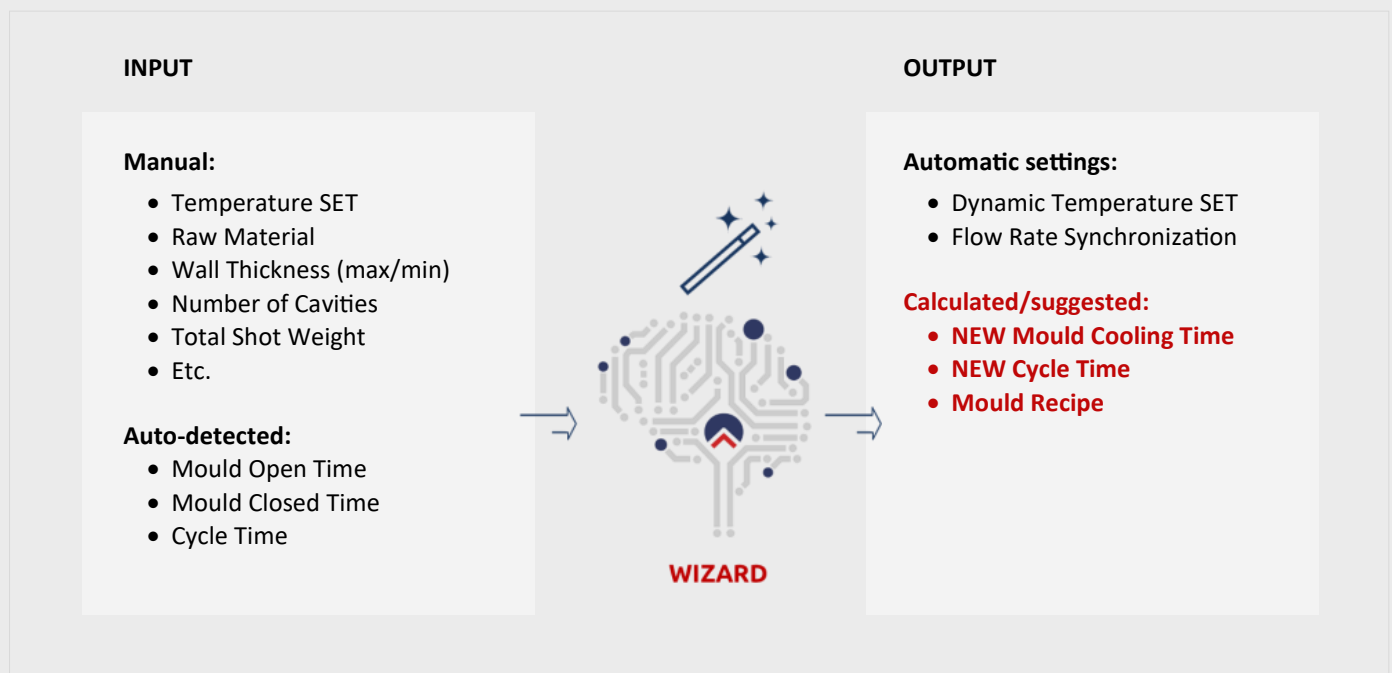
- DYNAMICO WIZARD algorithms step-by-step guidance.
- User friendly interface that proposes better cycle times
- Saves the mould recipe for later reuse
- Offers AI-assisted progressively improved future performance

## The result?

An intuitive interface designed for the operator that helps them turn cooling into an active, optimised process that creates profitability for the company.

In addition, thanks to the DYNAMICO WIZARD, the unit is very simple to manage. Any operator, who knows how to evaluate the quality of the output part, can easily operate the interface and save the moulding recipe for each type of product.

Even a newly arrived operator can recall the correct “recipe” with a single click and immediately begin production, entirely independently. They would find in the intelligent assistant a real digital tutor, capable of guiding them in understanding the impact of cooling time in the injection moulding process.



Dynamico Wizard Algorithms

# Real, proven results: measurable gains

The proven results are impressive. For most technical parts, simply replacing existing temperature controllers, the cooling time reduction obtained with DYNAMICO can lead to productivity increases of 20% to 50%. The cycle time reduction also increases the efficiency of the entire production cell thus achieving up to 15% in cost savings per unit of product.

DYNAMICO's results are easy to verify, thanks to an intuitive interface that allows the operator to fine-tune the moulding process in just a few cycles, visibly confirming the significant reduction in cycle time.



## Concrete Cooling Cycle Time Reduction

### Concrete benefits for your business:

- ⇒ **Productivity increase of 20-50%**
- ⇒ **Energy and cost saving per part produced** of up to 15%
- ⇒ **ROI achieved in just a few months**
- ⇒ **No mould modifications**
- ⇒ **No specific operator training** (the unit can be easily operated even by inexperienced operators).



## Performance Guaranteed by FRIGEL

Frigel provides DYNAMICO™ units on a “Results guaranteed” basis or will refund the investment. Units are chosen tailored to the specific moulding application, typically starting with the most strategic moulds for the business.

This allows companies to:

- ⇒ Assess the concrete impact in terms of productivity and cost savings
- ⇒ Demonstrate ROI quickly - or get immediate refund
- ⇒ Gradually extend technology adoption



**Performance guaranteed  
or get immediate refund**



# Conclusion: DYNAMICO™ and the new era of injection moulding

With DYNAMICO™, Frigel ushers in a new era for injection moulding.

“An affordable, scalable and high-impact technology that transforms a passive process (cooling time) into an active performance driver. Every optimised cycle is more profit for the company”.

DYNAMICO™ is more than just a temperature control unit. It is an accelerator (booster) of profit margins, a process optimiser, a strategic lever for your company's future.

The goal of DYNAMICO Technology:

"Maximise the profitability of your injection moulding business by ensuring that each individual mould runs with the shortest possible cooling time, producing quality parts, with maximum productivity".

For more information please contact: [syncro@frigel.com](mailto:syncro@frigel.com)

Dynamico is ready to transform the technical moulding, now it's your turn. **Summit Systems is Frigel's technology partner in the United Kingdom for high-performance mould temperature control solutions.**

