

ADVANCED FLOW MONITORING & TESTING

FOR INJECTION MOULDING



Contents

3

Introduction: Optimise your production and energy efficiency



7

The Flow Monitoring System: Monitoring of Production



16

The Cart: Mobile Plug & Play Monitoring

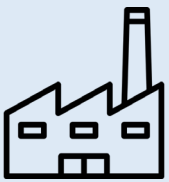


18

The Test-rig: Efficient Quality Assurance



Optimise your production quality and energy efficiency



Monitoring of
production



Constant quality
assurance



Cost-efficient
production



Energy
optimisation



Automated alarm
functions



No unexpected
downtime



Reduced
cycle-time



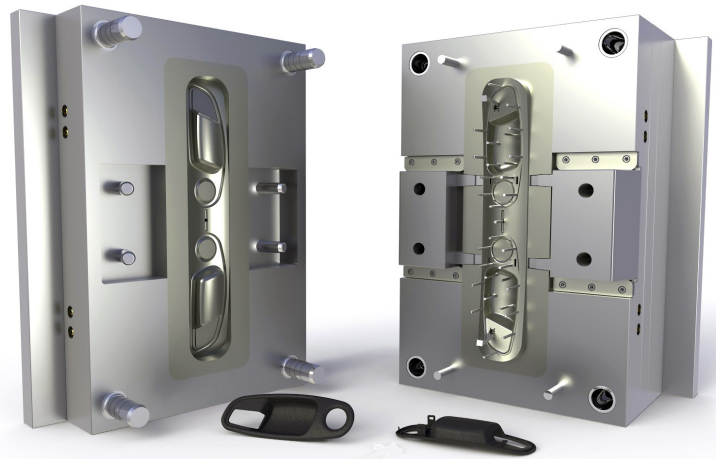
History and
traceability



Our expertise is production optimisation

Too often blocked waterways and incorrect machine settings result in the loss of **thousands of dollars** and **wasted resources** in the plastic industry. That is why manufacturers need a solution that gives them an **overview and control** of the parameters affecting their production.

Mouldflo offers the necessary technology to analyse and control what is happening **inside the moulds** of the entire production. Our solutions allow our customers to be **three steps ahead** of any maintenance issues or potential production **optimisations**.



Innovative and customised solutions for a cost-efficient and sustainable production



Take it from our customers...



”

We are happy to have implemented the Mouldflo functionalities into our work processes. It's easy to use the products and it helps a lot to maintain the quality during production.

Eagle Industry

Mouldflo helps us start our production faster, making the time it takes to change a mould more efficient by nearly 10 minutes. It saves us important time and it has improved our work flow considerably.

”



Varroc Lighting Systems



”

Just having the flow monitoring has been a huge troubleshooting advantage, as we have been able to compare flow through the three different molds that we have been sampling. We immediately found that one of the new tools had a blocked circuit and were able to fix it right away.

T E Connectivity

The Test-rig gives us the reports and technical data required to optimise a tool's cooling efficiency.

”



Aalbers Tool and Mould Inc.

Why monitoring matters

During the injection moulding process of plastic components, the cooling process constitutes up to 70% of the total cycle time. This makes the mould's cooling process one of the most important factors, when manufacturing high-quality parts.

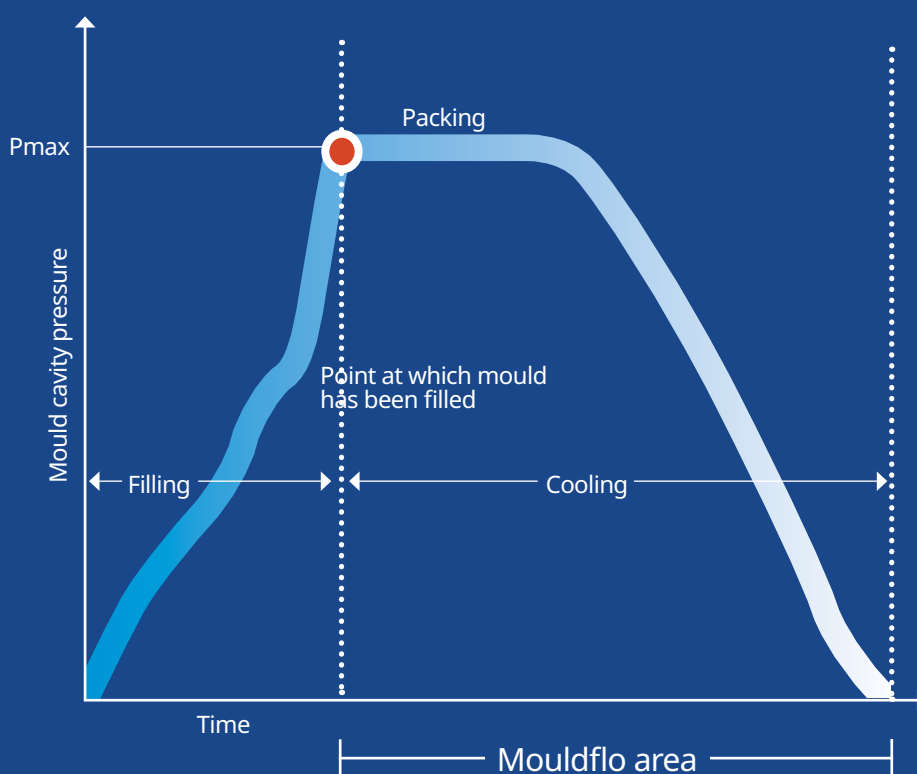
The flow, temperature and pressure of the cooling circuits is crucial to the final quality of the plastic components as well as to the total cycle time and energy consumption. By monitoring the mould's cooling circuits you get the necessary knowledge to optimise the cooling time, improve your production value and reduce materials wasted due to production issues.

Mouldflo offers high-quality solutions for monitoring, analysing, testing and diagnosing the cooling circuits on moulds.

As a manufacturer, mouldmaker or machine operator, you will gain unique and crucial insights into relevant data about your moulds.

The Mouldflo products measure flow, temperature and pressure, and ensures the quality of your production by automatically alerting you, if any issues arise. As a result, you will be able to optimise both your production and your work processes by making data-driven decisions.

The most important part of the moulding process



The cooling time is up to 70% of the total cycle time.

By monitoring the cooling circuit, you can optimise the energy efficiency, improve productivity and reduce scrap.

The Flow Monitoring System: Monitoring of Production



Optimise production value and energy efficiency



Monitor flow, pressure and temperature in the cooling circuits



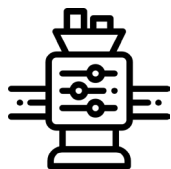
Protect your moulds and plan preventive maintenance



Set up automated alarm functions



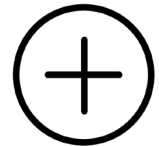
Get the complete overview in one screen



Mount directly on any injection moulding machine



Integrate with your central data system



Agile solution, tailored to your specific needs

Advanced monitoring system for injection moulding machines



Optimise your production and energy-efficiency

Monitor and control your mould's cooling circuits with The Flow Monitoring System. The system protects your moulds and improves the quality of your production, by quickly identifying and alerting you about cooling complications.

Make data-driven decisions

The Mouldflo System monitors temperature, pressure and flow in the cooling circuits within the mould, using intelligent manifolds, mounted directly on the machine.

This gives you vital information about how your production is performing as well as the knowledge you need to improve your production value, optimise your energy efficiency and protect your moulds.

The system is easy to install and it is compatible with almost any type of injection moulding machine.

Automated quality assurance

By using the system's alarm functionality, you will be automatically alerted, whenever an issue arises and when parameters differ from your preferred machine settings.

The system works as a watchdog of various common cooling circuit problems, such as:

- Blocked waterways
- Scale or rust build up
- Incorrect piping
- Lack of water flow from the mould heater

Agile and customised solution

The monitoring system is very agile and can be adjusted and expanded over time, as your production grows or changes.

Multiple manifolds can be electronically 'daisy-chained' together to accommodate the necessary number of cooling channels. The system will automatically identify new manifolds and display them on the screen.

The intelligent manifolds comes in a variety of sizes and installations. This means, that we can provide you with a solution tailored specifically for your requirements.

System Overview



Touch Panel or VNC

Touch Panel or VNC

The integrated VNC (Virtual Network Computing) feature allows for easy integration on the machine control, laptop or smartphone via Ethernet cable or WiFi router.

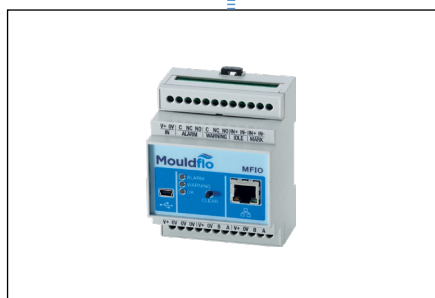
The Mouldflo Touch panel is industrial style and equipped with VESA standard mounts.



MF-Server Network ready

Server

The Server is a compact computer with Mouldflo software installed. The design makes the unit fit directly inside the electrical cabinet on the injection moulding machine and it is equipped with a standard DIN-rail mount.



MFIO interface (connects up to 8 manifolds)

Interface module

The Mouldflo system is equipped with a DIN-Rail mounted interface module – this is the hub of the system. It can be connected to alarm beacons and marker signals coming from the injection mould and via Ethernet to any network available on the factory floor.



Stainless steel manifold



Aluminium manifold

Manifolds (Stainless Steel and Aluminium)

We have developed a diverse range of manifolds, in order to accommodate any type of injection moulding production.

Learn more about the manifolds on page 14.

Software Interface



Mouldflo software

Using a remote mounted touch screen the system will monitor and display the flow and temperature for every circuit. The information can be displayed in either a graphical or text format. The data is stored in the internal memory, time and date stamped for ultimate traceability.

Data overview

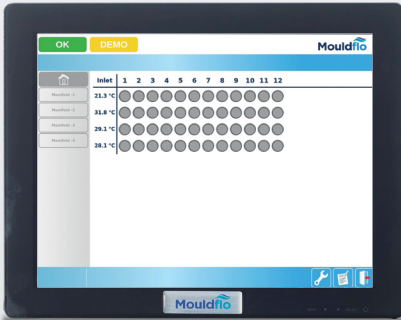
The interface gives a quick overview of the data, making it easy for the operator to spot any trend in deteriorating performance for any particular flow circuit. The data can be read over an Ethernet connection or downloaded onto a USB stick.

Warnings and alarms

Warning and alarm limits can be set for flow and temperature to all monitored zones individually. Should a zone deviate from those settings, then both an onscreen warning and a potential free alarm signal can be fed directly to an ancillary device – such as an alarm tower, hot runner controller or the injection moulding machine to warn that the flow has deviated outside of tolerance.

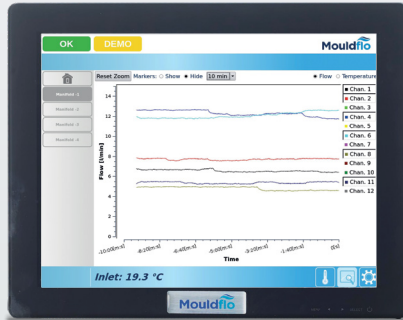
Store and load mould settings

The system is capable of storing multiple mould set-ups on the internal memory which can be quickly loaded when a mould is changed with all the correct set-points saved for any given mould.



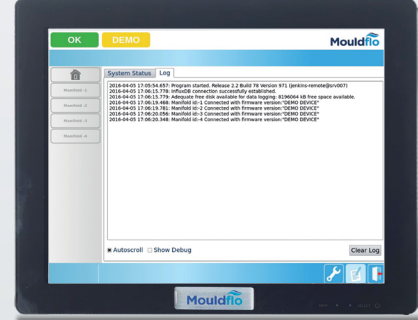
Simple overview

Get an immediate overview of cooling circuit status 'at a glance' on a single screen with instant display status and alarms if the flow / temperature goes outside of tolerance



Historical data

A performance log for each circuit and manifold is stored on the internal memory allowing the user to track the performance and easily identify problems



Event log

Alarm errors, warnings and operator changes are all stored with a time and date stamp and can be reviewed at any time



Connect to your preferred device

The VNC feature will allow you to monitor the flow and temperature remotely from any location directly from your preferred device.

You can integrate with the machine control or use the Mouldflo Touch Panel. This 15" Capacitive sensing touch panel will ensure a quick response and trouble free user interface.

Hardware

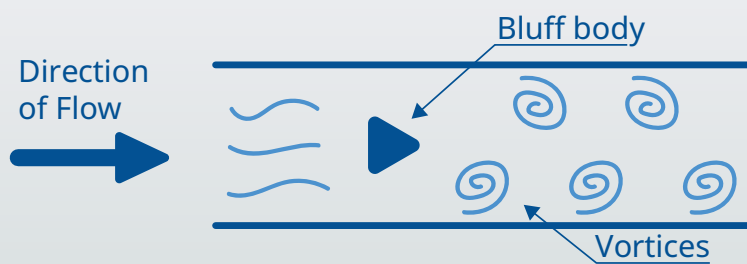
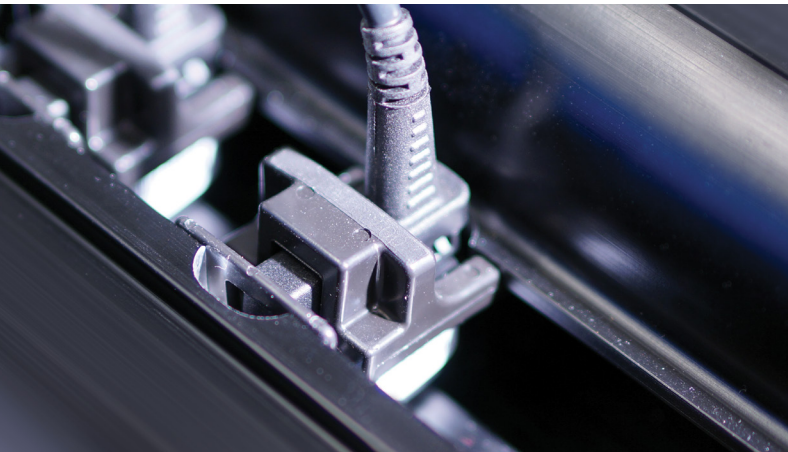


Figure 1: Vortex Flow Measurement



Sensors

Each manifold is equipped with compact sensors that are capable of reading both flow and temperature. The sensors are based upon the vortex flow measurement principle which uses a bluff body in the middle of the flow path to create small eddy currents or vortices (see Figure 1). The pressure of this current is measured to determine the flow through a given cross sectional area.

The sensors have no moving parts. This, combined with a large flow path, makes it ideally suited for mould cooling - even when using heavily contaminated water. The sensors are integrated directly into the manifold, keeping size to an absolute minimum.

Interface module

The interface module facilitates true plug and play, allowing multiple manifolds to be monitored and also enabling convenient and simple connection to the touch screen, power supply, alarm signals in/out and machine communications. The module is equipped with USB and Ethernet.

The data generated by the system can be fed into production monitoring systems or other ancillary devices such as hot runner controllers or the moulding machine control system using the onboard communication ports.



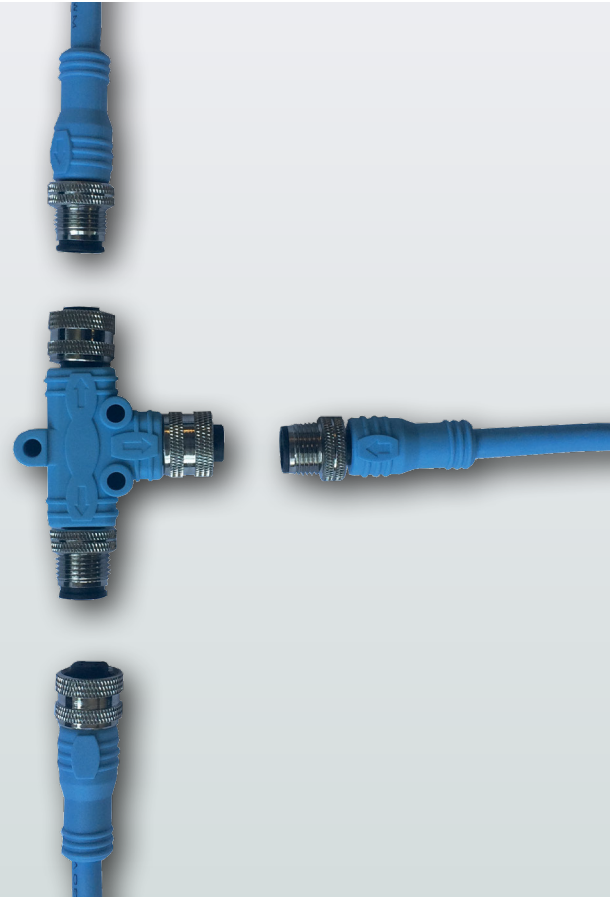
Optional Pressure Sensors

The correct pressure is critical in all flow circuits and with pressure sensors installed in the manifolds you will be able to monitor both the inlet and outlet pressure.

This feature allows the user to ensure that there is sufficient flow capacity and also identifies any deviation in the water supply.

The difference between inlet and outlet pressure illustrates the total pressure loss through the mould which is often caused by incorrect dimensioning of fittings and hoses.

The optional pressure sensors complete the installation and will ensure full knowledge of your flow circuit.



M12 connectors and cables

Mouldflo manifolds and the interfaces are equipped with M12 connectors and inputs.

Multiple manifolds can be electronically daisy chained together and connected to the interface, thereby ensuring perfect connections and trouble free operation.

This 'plug and play'-functionality of the connectors makes the system very agile and it is easy to expand the installation over time, to accommodate the necessary number of flow channels.

Manifolds



Customise your installation

We have developed a diverse range of manifolds, in order to accommodate any type of injection moulding production. The manifolds are available in aluminium or stainless steel and with a variety of specifications. We recommend that you use aluminium manifolds for aluminium moulds, and stainless steel manifolds for steel moulds.

Stainless Steel Manifolds

The stainless steel manifold is constructed from AISI 304 stainless steel with easily accessible mounting holes on two faces for simple installation. The compact and robust manifold resist corrosion well thanks to the property of stainless steel.

It is available with 4, 8 or 12 zones with 50 mm between each. It has two 1" BSPP flow inlets and outlets, which offers maximum flexibility when mounting and connecting to the water supply.

To match your specific requirements the stainless steel manifold is available in several different versions. You can customise your own manifold with a variety of different specifications to choose from:

- Flow range (1-20 L/min or 2-40 L/min)
- Number of zones (4, 8, 12)
- Thread standard (BSP or NPT)

Aluminium Manifolds

The aluminium manifold is extruded with integrated T-slots on two faces for flexible mounting. The manifold is robust and has a black anodised aluminium exterior to resist corrosion. The design is compact and integrated as it consists of very few separate parts.

It is available with 4, 8 or 12 zones with standard 50 mm between each. It has two 1,5" flow inlets and outlets, which offers maximum flexibility when mounting and connecting to the water supply. It is also available in a short pitch version with 35 mm between each cooling circuit port, resulting in a more compact design, that can fit into very small spaces.

You can customise your own manifold with a variety of different specifications to choose from:

- Flow range (1-15 L/min or 2-40 L/min)
- Number of zones (4, 8, 12)
- Pitch length (standard: 50mm or short pitch: 35mm)

Specifications

Stainless Steel Manifold

Manifold feed	1" BSPP
Manifold ports	3/8" BSPP female or 3/8" NPT male or 1/2" BSPT male or 1/2" NPT male
Number of zones	4/8/12 Standard
Flow sensor type	Vortex Flowsensor (VFS)
Pressure sensor type (add-on)	Relative Pressuresensor (RPS)
Range (Flow)	1-20 litres/min or 2-40 litres/min
Power supply	12 or 24 VDC
Operating temperature (max)	Standard: 0 - 95°C / High Temp: 0 -120 °C
Operating pressure (max)	10 bar
Temperature sensing	Per circuit (return)
Flow sensing	Per circuit (return)
Temperature sensor - main inlet	Yes
Accuracy (Flow)	1% fs
Accuracy (Temperature)	15 - 90°C: +/- 0,5 °C 0 - 120°C: +/- 1 °C
Resolution (Temperature)	0,5°C

No. of zones	Total length	Depth	Height	Distance between ports	Ports (flow range 1-20 l/min)	Ports (flow range 2-40 l/min)
4	240 mm	165 mm	115 mm	50 mm	3/8" BSPP female or 3/8" NPT male	1/2" BSPT male or 1/2" NPT male
8	440 mm	165 mm	115 mm	50 mm	3/8" BSPP female or 3/8" NPT male	1/2" BSPT male or 1/2" NPT male
12	640 mm	165 mm	115 mm	50 mm	3/8" BSPP female or 3/8" NPT male	1/2" BSPT male or 1/2" NPT male

Aluminium Manifold

Manifold feed	1½" BSPP
Manifold ports	1/2" BSPP female
Number of zones	4/8/12 Standard or 8/12 Short pitch
Flow sensor type	Vortex Flowsensor (VFS)
Pressure sensor type (add-on)	Relative Pressuresensor (RPS)
Range (Flow)	1-15 litres/min or 2-40 litres/min
Power supply	12 or 24 VDC
Operating temperature (max)	Standard: 0 - 95°C / High Temp: 0 -120 °C
Operating pressure (max)	10 bar
Temperature sensing	Per circuit (return)
Flow sensing	Per circuit (return)
Temperature sensor - main inlet	Yes
Accuracy (Flow)	1% fs
Accuracy (Temperature)	15 - 90°C: +/- 0,5 °C 0 - 120°C: +/- 1 °C
Resolution (Temperature)	0,5°C

No. of zones	Total length	Depth	Height	Distance between ports	Ports (flow range 1-15 and 2-40 l/min)
4	210 mm	180 mm	124 mm	50 mm	1/2" BSPP female
8	410 mm	180 mm	124 mm	50 mm	1/2" BSPP female
12	610 mm	180 mm	124 mm	50 mm	1/2" BSPP female
8 (Short pitch)	305 mm	180 mm	124 mm	35 mm	1/2" BSPP female
12 (Short pitch)	445 mm	180 mm	124 mm	35 mm	1/2" BSPP female

Introducing MouldLive:

IIoT Mould Monitoring & Cloud Solution

The new MouldLive solution allows you to take monitoring to the next level with complete remote surveillance and cloud storage.

As an add-on to the existing Mouldflo product line it is easy to implement into installations already in place.

Ready for Plastic Industry 4.0?
Get started with MouldLive!

Learn more at mouldflo.com/en/products/mouldlive



MouldLive
by Mouldflo

The Mouldflo Cart: Mobile Plug & Play Monitoring



The Mouldflo Cart gives you a temporary overview of the cooling systems in your production.

It offers the complete functionalities of the Flow Monitoring System, put neatly together in a standardised setup, attached to a moveable frame.

This makes the Cart a mobile and flexible plug & play solution, that can be used in rotation on several moulding machines in a production line.



Flexible plug & play solution



Monitor flow, pressure and temperature



Move around easily to the relevant machine



Quickly diagnose issues on any machine



Optimise production value and energy efficiency



Get the complete overview in one screen



Protect your moulds and plan preventive maintenance



Ensure efficient troubleshooting and minimal downtime



The Flow Monitoring System on wheels

The Mouldflo Cart can be customised with either one or two manifolds of your choice. It is available with our aluminium and stainless steel manifolds with 4, 8 or 12 zones, giving you the opportunity to monitor up to 24 cooling channels at once (for more information about the manifolds, see page 14).

As opposed to the Flow Monitoring System, this solution is not installed directly on the moulding machine but on a frame, that you can easily move around and plug into the relevant mould. This gives you a flexible solution that can be used on different machines, depending on how your production changes or when an issue arises.

With this mobile plug & play solution you can get a quick and temporary overview of all relevant machines in turn.

Specifications

The Mouldflo Cart	
Dimensions	60 x 60 x 140
Display	15" touch screen
Control	Microprocessor based / computer based
Communication ports	Ethernet / USB
Storage (log and settings)	Internal / USB (optional)
Display units (flow)	Litres / gallons switchable
Display units (temperature)	°C / °F switchable
Warning limits	Customisable
Number of manifolds possible	Up to 2
Number of zones pr. manifold	4/8/12 Standard
Flow sensor type	Vortex Flowsensor (VFS)
Pressure sensor type (add-on)	Relative Pressuresensor (RPS)
Range (Flow)	1-15, 1-20 or 2-40 litres/min
Power supply	12 or 24 VDC
Operating temperature (max)	Standard: 0 - 95°C / High Temp: 0 - 120 °C
Operating pressure (max)	10 bar
Temperature sensing	Per circuit (return)
Flow sensing	Per circuit (return)
Temperature sensor - main inlet	Yes
Accuracy (Flow)	1% fs
Accuracy (Temperature)	15 - 90°C: +/- 0,5 °C 0 - 120°C: +/- 1 °C
Resolution (Temperature)	0,5°C

The Mouldflo Test-rig: Efficient Quality Assurance



The Test-rig offers you a unique way to simulate a production setup and ensure the quality of your moulds.

Equipped with its own water tank, pump, manifold and a full software setup, it allows you to document, validate and maintain your moulds by testing them in a practical all-in-one tool.



Irreplaceable for efficient quality assurance



Get complete traceability and documentation



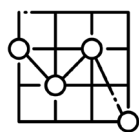
Simulate production setup and test your mould before use



Measure and optimise your energy efficiency



Ensure efficient troubleshooting and minimal downtime



Document and benchmark new moulds



Inspect and maintain older moulds



Easy wireless or wired connection to office network

Simulate a production setup for testing



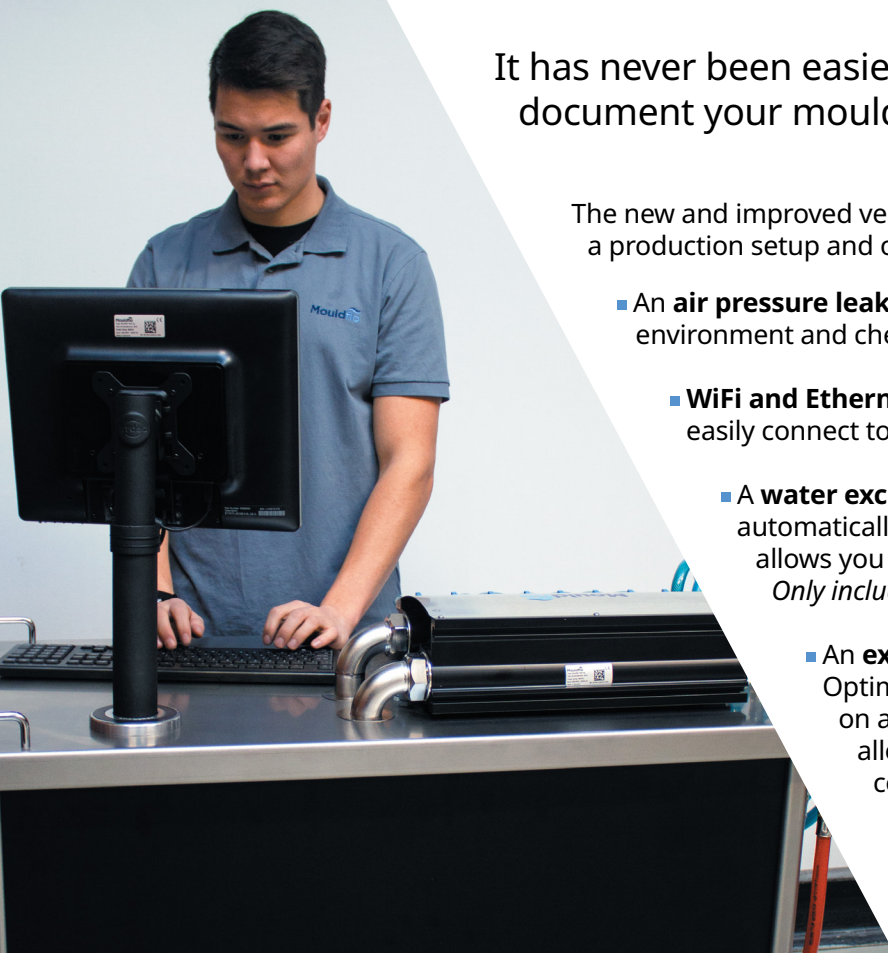
The New Generation - Test-rig 2.0

NEW

It has never been easier to test, maintain and document your moulds!

The new and improved version of the Test-rig, makes it even easier to simulate a production setup and optimise your production. The new features include:

- An **air pressure leak test** - a safe and easy way to ensure a clean-room environment and check for leakages without overflowing water.
- **WiFi and Ethernet connection** through the Test-rig, allowing you to easily connect to your office network and to share the test results.
- A **water exchange system**, that makes it possible for you to automatically fill and purge water through the software. This allows you to ensure clean water for the testing at all times (NB! Only included in the Test-rig Standard & Premium Solution).
- An **extended software solution**, that includes an Optimisation Analysis of how to get the maximum flow on a mould with the minimal pressure possible, thereby allowing you to significantly optimise your energy consumption (NB! Only included in the Test-rig Premium Solution).



Document, validate and maintain



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The Test-rig gives us the reports and technical data required to optimise a tool's cooling efficiency.

Aalbers Tool and Mould Inc.

Why mould makers (also) benefit from the Test-rig

The Test-rig is an innovative solution that is both convenient, time-saving and precise. It enables mould makers to ensure that their customers' moulds are always running in top condition with optimal cycle times.

It ensures efficient work processes as well as flawless injection moulded parts.

By implementing the test-rig in your work process, your team will be using the newest technology, that makes it possible for your customers to get shorter cycle times, high quality parts and complete documentation.

The Test-rig enables mould makers to:

- Test, analyse and certify a newly build mould to make sure that it is in optimal condition with documented results.
- Generate crucial data to share with their customers
- Store the data in case any issues arises later in the life of the tool. This provides a time-saving process to identify, where a problem is lurking and it minimizes the downtime for customers.

An optimisation of any injection moulding production

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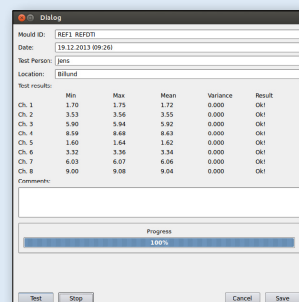
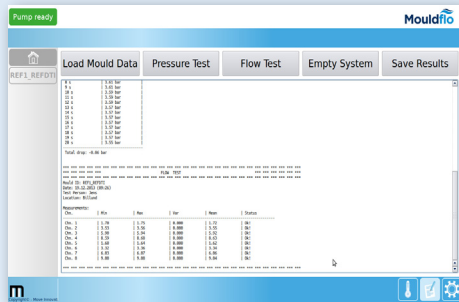
The Test-rig allows the user to get vital information, that they will benefit from, all through the life cycle of a mould. By validating a new mould before it is put into production, the factory gets benchmarking measurements, that they will need for all future performance analyses – replacing an unreliable estimate with exact data.

Through the years we have learned that the Test-rig data can improve practically all work processes related to a mould - saving man hours, shortening downtime and optimising troubleshooting and maintenance.



*Murali Rajendran
Software Architect, Mouldflo*

Features



Flow, temperature and pressure test

With the Test-rig, the cooling channels can be analysed and tested.

The flow and pressure can be controlled exactly to simulate the production setup.

All details displayed on the screen:

- Flow
- Pressure inlet
- Pressure outlet



Advanced Pump Technology

The Test-rig is equipped with a high-tech pump, which allows you to control flow volume and inlet pressure and to mimic the production environment. Everything is controlled on the touch panel. The integrated water tank will provide water for flow and pressure tests.

After testing and analysing the mould, a convenient feature allows you to air purge water out of the system, simply by using the "empty" function.

Test Reports

The software is designed to give a simple and quick overview. From the monitor all functions can be controlled and reports can be saved and exported as validation for a maintenance or as documentation for a newly developed mould.

Following data can be logged and saved as reports:

- Flow volume/capacity
- Pressure loss through the mould
- Optimisation analysis

Specifications

Test-rig Solutions		Included Features	
Basic Solution		Flow and Pressure Test, Air Pressure Leak Test, WiFi and Ethernet Connection	
Standard Solution		Flow and Pressure Test, Air Pressure Leak Test, WiFi and Ethernet Connection, Water Exchange System	
Premium Solution		Flow and Pressure Test, Air Pressure Leak Test, WiFi and Ethernet Connection, Water Exchange System, Extended Software Solution	
Control			
Manifold type		Aluminium	
Display		15" touch screen	
Control		Microprocessor based / computer based	
Communication ports		Ethernet / USB	
Storage (log and settings)		Internal / USB (optional)	
Number of zones		8 Standard	
Display units (flow)		Litres / gallons switchable	
Display units (temperature)		°C / °F switchable	
Warning limits		Customisable	
Flow sensor		Pump and Tank	
Sensor type		Pump Capacity	Up to 160 litres/min
Range (Flow)		Pump Pressure	0-4 Bar
Accuracy (Temperature)		Power Supply	EU: 3-Phase (3L+N+PE), 230V/400V, 50Hz, 2.5 kW, 4.4 A US: 3-Phase (3L+PE), 3 x 480V, 60Hz, 2.5 kW, 4.4 A
Accuracy (Flow)		Tank Capacity	60 litres
Response time			
Resolution (Temperature)			

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