

M·POWERED

MILACRON'S SUITE OF IIOT APPLICATIONS

Monitors your machine, on-line, 24/7, to make sure it always runs at its best.



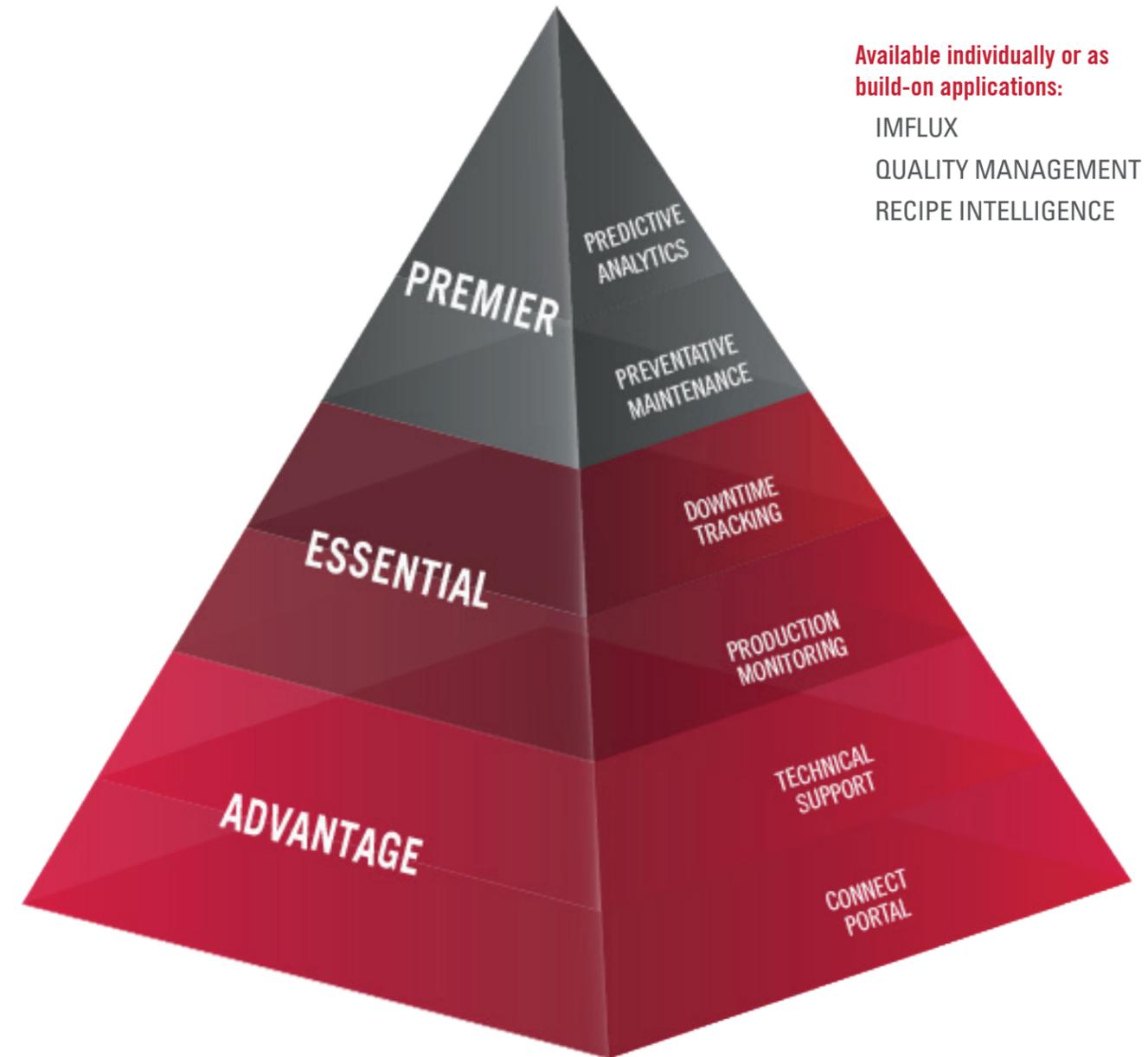
MILACRON[®]

APPLICATIONS

M-POWERED TIERS



Build on the power of IIoT to facilitate improvements in productivity and efficiency by utilizing M-Powered cloud computing and processing analytics.



Available individually or as build-on applications:

- IMFLUX
- QUALITY MANAGEMENT
- RECIPE INTELLIGENCE

BENEFITS

- Industry-leading suite of predictive algorithms
- Tools catered to assist with OEE improvement
- Machine utilization concierge to reduce operation costs
- 24/7 remote technical support
- Troubleshooting and quality escapes assistant
- Expert concierge based upon machine usage and performance
- Remote technical support (M-F 8-5 EST)
- Reports to center focus on cost drivers
- Automated fleet OEE overview
- Simplified access to data
- On-demand remote technical support (M-F 8-5 EST)

CONNECT PORTAL

DATA AT YOUR FINGERTIPS

The first step to improving your OEE is measuring and tracking the data. More importantly, the value must be dependable and consistent to help drive action. Using real-time machine data, OEE can be calculated at your fingertips, anytime and anywhere.

- 📌 **Automated OEE** data collection and reporting used to deliver a reliable truth system
- 📌 **Real-time tracking** of your operations
- 📌 **Secure** web and mobile applications for reviewing **key performance indicators**
- 📌 **Live processing information** directly from your assets

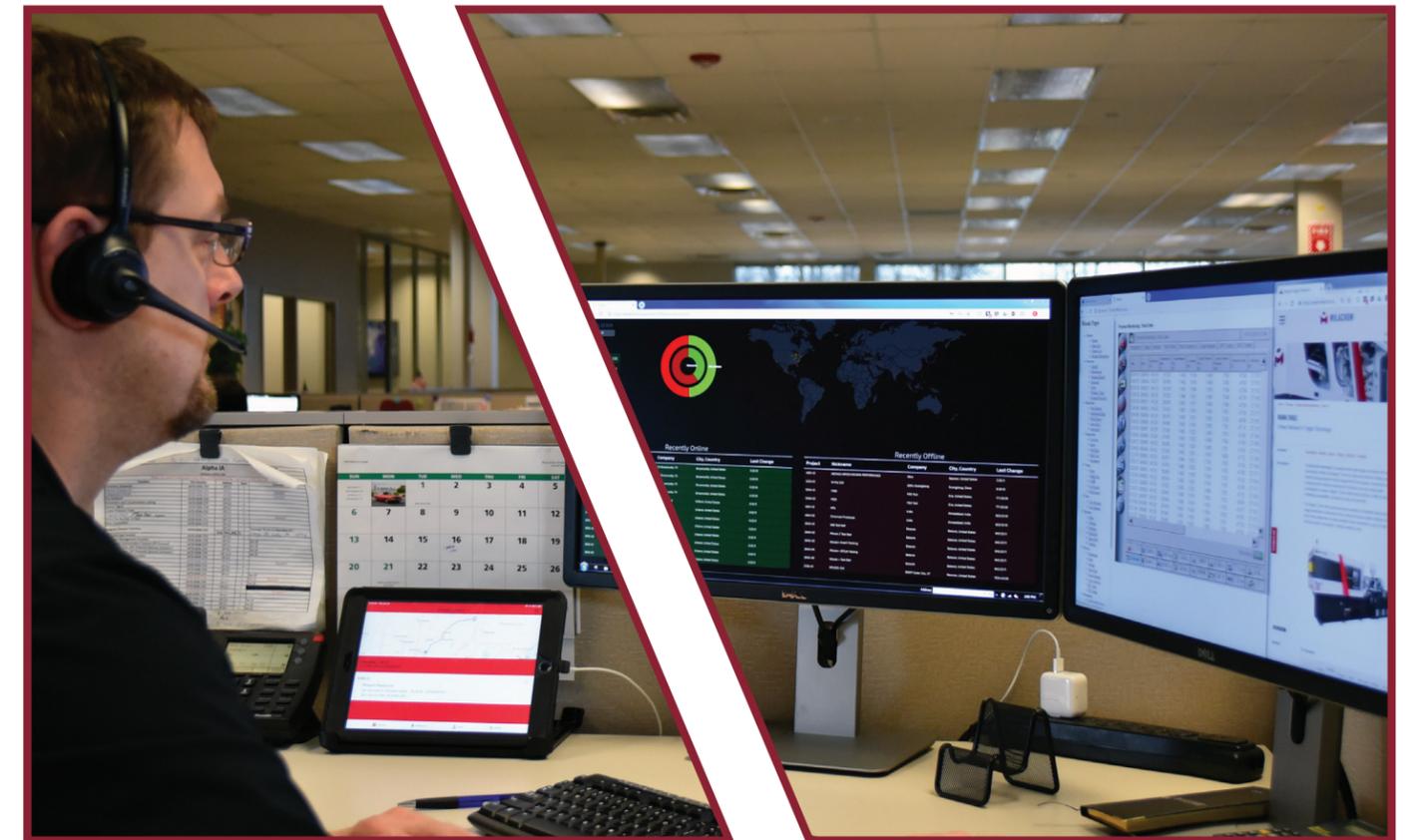


TECHNICAL SUPPORT

REDUCE OR ELIMINATE DOWNTIMES

It can be frustrating to spend hours on the phone troubleshooting and then be told that you need a technician on-site to perform additional troubleshooting steps. When this happens, you want to know that the best and brightest are assessing your situation and providing an accurate first-time fix.

- 📌 **Instant access to experienced Milacron technicians** to reduce time spent waiting for on-site support
- 📌 **1 in 5 issues** can be **resolved remotely**
- 📌 **Reduce downtime durations up to 50%** by utilizing the system's ability to gather vital reports
- 📌 **Secure remote access to operator screens** for advanced support



DOWNTIME TRACKING

UNDERSTANDING DOWNTIME TO DRIVE AVAILABILITY

How do you choose what to focus on to increase your availability? Utilize the downtime tracking application to understand what issues are causing setbacks, outages, and downtime and how they are impacting your OEE.



- 📌 **Low intervention, manual or automatic** downtime coding
- 📌 **Machine driven downtime generation** ensures accuracy of reporting
- 📌 **Built-in PARETO analysis** to understand frequency and lengths of downtime
- 📌 **Customizable library** of downtime category or codes with API integration
- 📌 **User-configurable automatic alerting** based upon downtime category or unique code

PRODUCTION MONITORING

MAINTAIN PERFORMANCE AND IMPROVE QUALITY

Wear is part of the normal life of a molding machine. Deterioration can display itself in many forms, but two of the leading offenders show up in performance loss or quality escapes. When problems are discovered, you may ask 'Was it a slip with the machine or the operator?' and 'could we have prevented it?' A data repository to help answer these questions is often required to determine root cause.

- 📌 **Intelligent productivity historian** offers quick access to machine data for analytics
- 📌 **RESTful-APIs** make dashboarding, reporting and external system integration effortless
- 📌 **Generate custom alerts** based upon built-in or customizable data
- 📌 **Escalate knowledge reports** available on a set schedule or on-demand

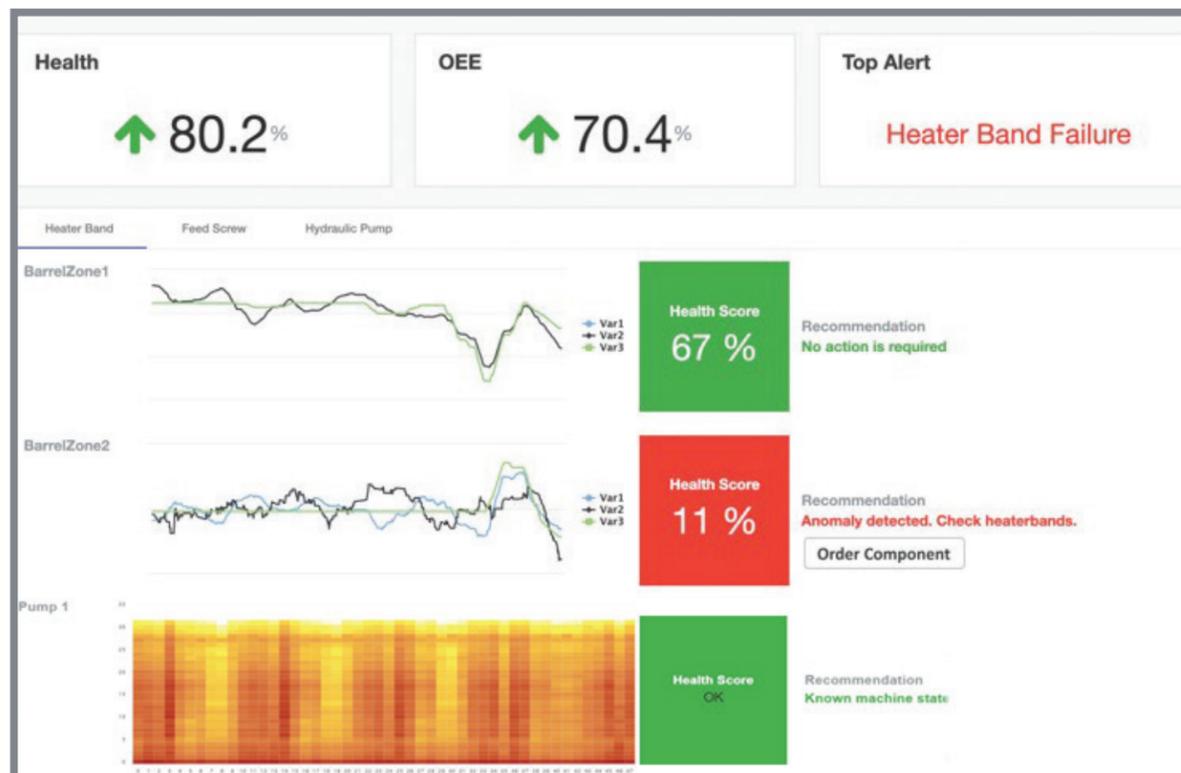


PREDICTIVE ANALYTICS

PREVENT DOWNTIME BY PREDICTING FAILURES

Downtime is a costly combination of people, parts, unnecessary maintenance operations and unmade product. Machine data tells a story of a drifting component and sequences that can identify unique signatures. Studying this on a large scale can be difficult, but when combined with thousands of machine years, machinery expertise and a team of data scientists, it is possible to prevent downtimes altogether.

- 📌 Predict costly downtimes due to failing heater bands or pumps and worn screws
- 📌 Predict quality escapes with remaining useful screw life scores
- 📌 Easy to digest machine health dashboard complete with recommendations for monitored components
- 📌 Reduce on-hand stock expense through pre-emptive part stocking programs or on-demand order before failures occur

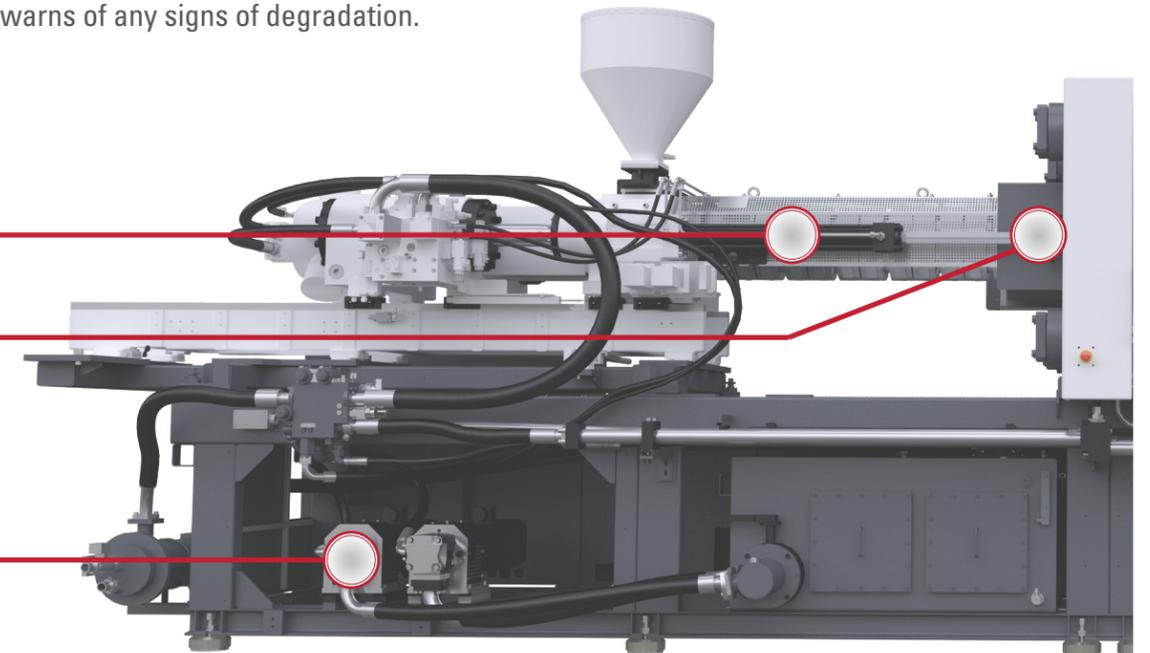


MILACRON PROPRIETARY PREDICTIVE COMPONENTS

Digitally track the health of a growing number of machine components. Should a replacement become necessary, the patent-pending application will provide warning ahead of any failure that creates unplanned downtime.

A worn plasticizing screw or screw tip are leading offenders for scrap. These components often require lengthy downtime to troubleshoot and measure, and then are items that often come with a significant lead time. Subjected to wear-and-tear, failures are gradual, but must be managed. M-Powered Predictive Maintenance uses a novel non-invasive method for monitoring performance, giving maintenance staff unrivalled insight into the operations of the injection-end components, helping them plan for the inevitable.

Heater band failures can cause increased scrap, mask processing issues and unnecessarily increase wear to your screw and barrel. Don't let issues with heat affect production. M-Powered Predictive Maintenance delivers real-time continuous performance monitoring of the heater bands and warns of any signs of degradation.

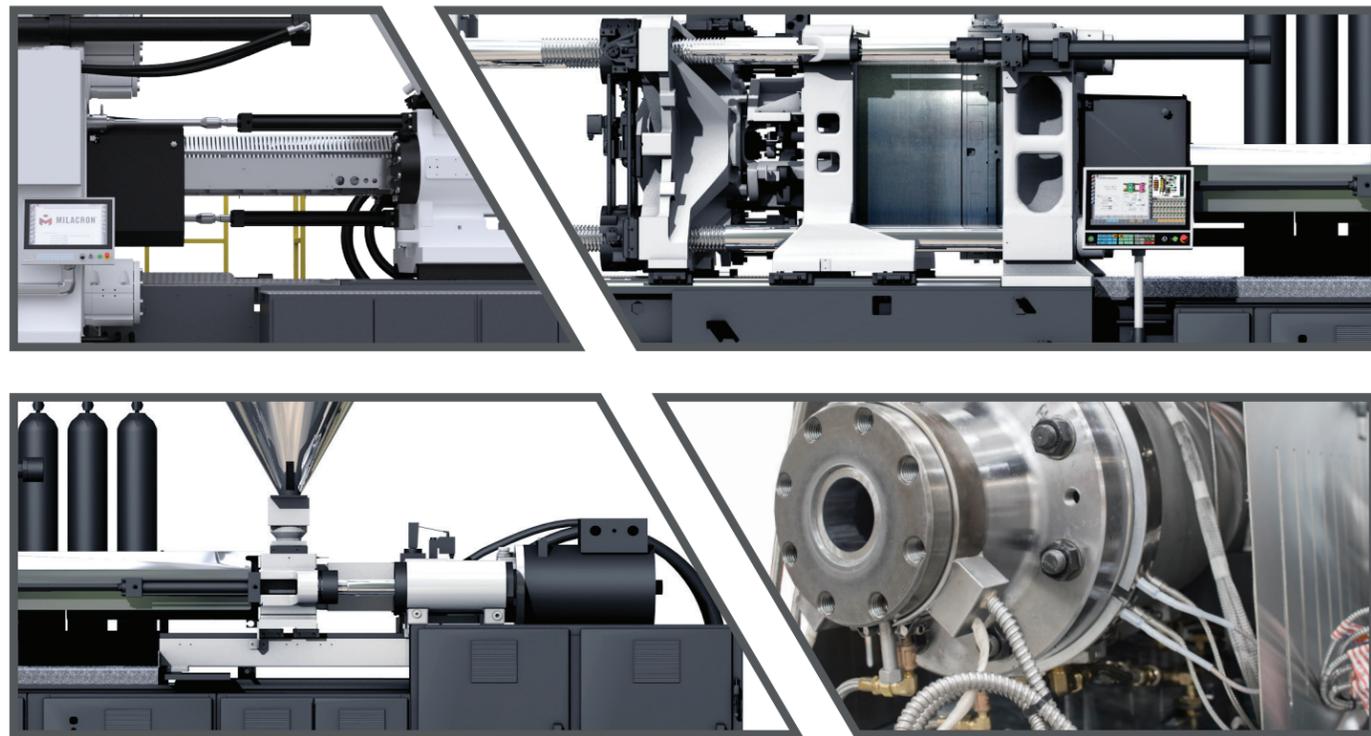


Hydraulic pumps are the heart of your molding machines, pushing oil throughout the system to deliver performance. Failures result in expensive and extended downtime to flush the system and could result in performance loss if any other components suffer residual effects. M-Powered Predictive Maintenance uses cutting-edge vibration and acoustic analysis to monitor your pumps 24/7. Machine learning algorithms track any unusual measurement and provide early warning to pump degradation.

PREVENTATIVE MAINTENANCE

USAGE DRIVEN MAINTENANCE

Proactive preventative maintenance (PM) generally requires dedicated personnel and parts; however it can be difficult to showcase ROI with the hope that it shows up in performance improvements and uptime. Aggregated real-time usage reports are the next step to ensure equipment is maintained properly and cost-efficient.



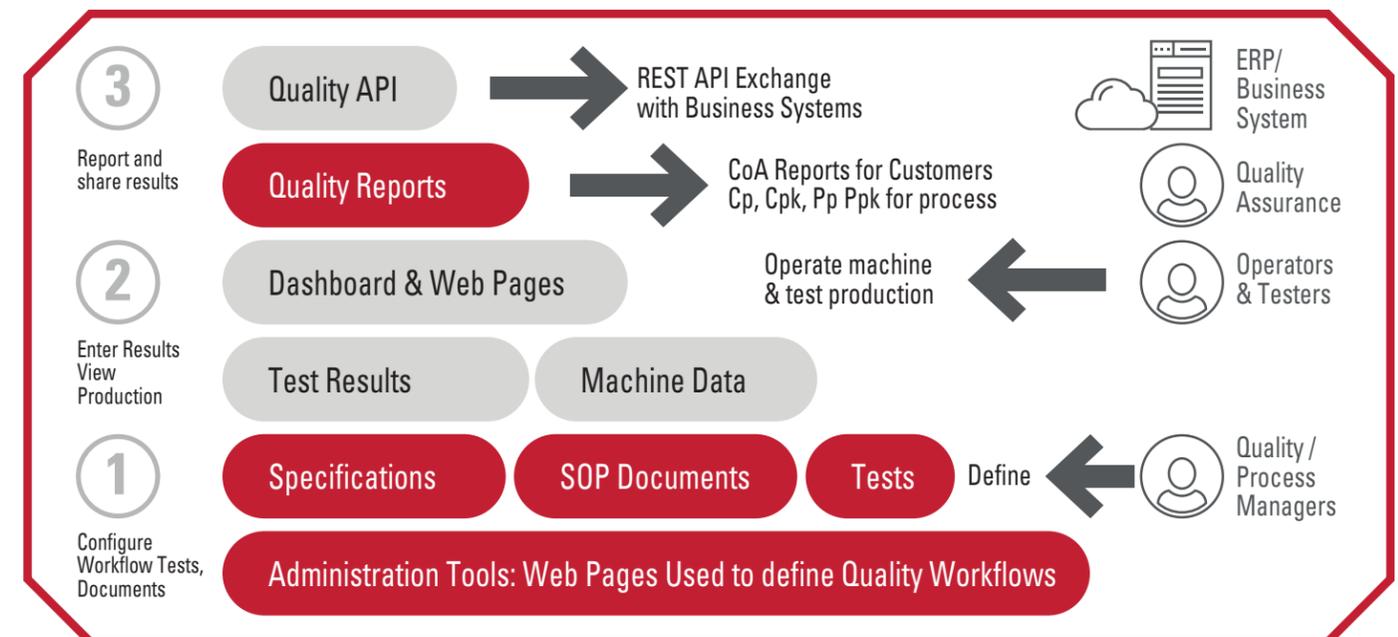
- 📌 **Boost machine performance** through smart maintenance calculations
- 📌 **Improve efficiency** using system generated scheduling
- 📌 **Extend life** of machine, mold, tooling and auxiliary components
- 📌 **Reduce costs** using intelligent stocking programs

QUALITY MANAGEMENT

TRUE QUALITY IS PRICELESS

Measuring quality accurately takes a coordinated effort from quality managers, six-sigma black belts, machine operators and other various personnel. When a quality escape happens, it can be tricky to assess and coordinate with processing data after the fact to determine root cause. Molders need answers quickly to understand the possible affected product, what could have caused the issue and in some cases, quickly eliminate potential root causes.

- 📌 **Increases quality** by combining manual and online test results in a single to use application to effectively determine quality trends
- 📌 **Set up proactive alerts** to potential quality escapes that could result from changes in process
- 📌 **Boost productivity** by removing the need for manual combination of work cell and quality measurements
- 📌 **Automatically generates CoA (Certificate of Analysis) reports** to assist with ISO 9000 compliance



iMFLUX

A wholly owned subsidiary of Procter & Gamble

REAL-TIME ADAPTIVE PROCESS

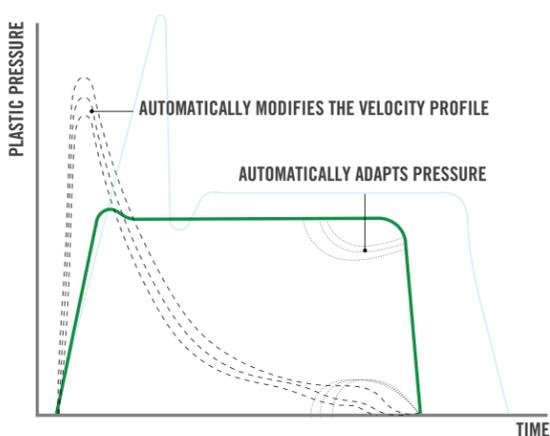
Cutting edge technology of adaptive processing control backed by years of processing exploration. Improve part quality while decreasing the energy required to produce it. This technology will allow for a number of real-time adjustments to mold and materials changes.

- Ⓜ Increase productivity by up to 50% on existing injection molding machines
- Ⓜ Intentional solutions to further assist your team in maximizing productivity
- Ⓜ Process is ideal for most molding applications
- Ⓜ Especially advantageous for wide specification materials, recycled materials, and bio-materials



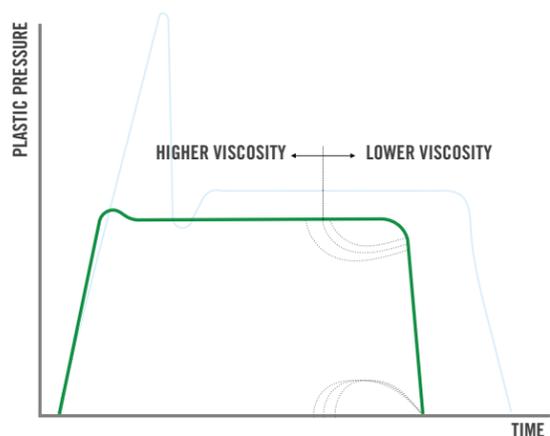
IMPROVES OEE

By reducing cycle and instantaneously adapting to the changing conditions inside of the mold, iMFLUX delivers improved process consistent, higher output, far less operator interactions while generating less scrap and rework.



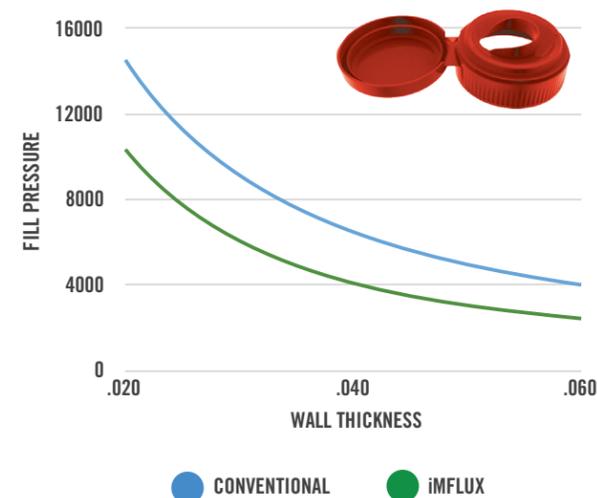
RESIN FLEXIBILITY

Molders can choose to 'reinvest' pressure savings to broaden material choices. Automatic adjustments made to process as viscosity changes allows for the use of wider spec resins and allowance in regrind percentage. Without requiring processor intervention, lower shear conditions permit the use of shear sensitive materials in more applications.



LIGHT WEIGHTING

Lower pressure also allow for higher flow length to thickness ratios (L/T), enables light-weighting, and reduces the need for flow leaders.



REDUCES TONNAGE

Lower pressure equals lower tonnage. Using less pressure and lower clamps opens up part and mold design freedoms unattainable conventionally. Common pressure and clamp force reduction range between 25 to 40%.

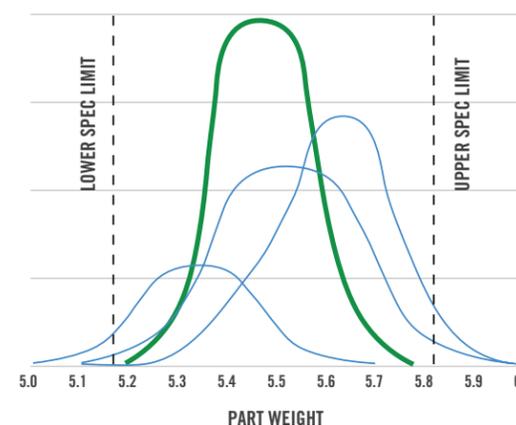
MOLD CAVITATION		
Conventional		iMFLUX
750T	Machine Size Limit	750T
23T	Tonnage per Cavity	15T
32	MAX CAVITIES POSSIBLE	48
MACHINE SIZING		
Conventional		iMFLUX
3.6	Clamp Force Factor	2.6
735	32 Cavity Requirement	480

50%
CAVITATION
INCREASE

35%
TONNAGE
REDUCTION

SUSTAINABILITY

Automatic compensation for batch to batch viscosity shifts enables for the used of broader ranges of renewable materials allowing the parts to maintain specification with little operator interventions.



AUTO VISCOSITY ADJUST

Recognizes any change in material viscosity and automatically adjusts pressure setting while maintaining identical flow rates throughout the mold filling and packing phases

AUTO PROCESS TUNING

Process optimizer tunes your process to the mold, material, and operational environment, to get the maximum possible performance, quality, and operational efficiency.

PROCESS NAVIGATOR

The system uses sensors in the machine, feed system, and mold to provide a complete understanding of critical molding parameters. This provides unsurpassed insights for how to maximize throughput, quality and overall performance of the molding system.

RECIPE INSIGHT

CRITICAL INTELLIGENCE TO OPTIMIZE POLYMER TO PART

Setting up a good process, validating and maintaining its integrity are critical to part quality and identifying changes in operation. Controls typically provide the ability to monitor set points and variation, but this can become difficult to manage and monitor on a machine by machine basis.

Name	Version	Loaded by	Modified	Target	Machine Speed	Notes	Alarms			
ACA-679	7	System Account	Yes	69.0 cycles/hour	Running at 68 cycles/hour					
Status	Priority	Type	Description	Category	Units	Low Limit	Target	High Limit	Current Value	Active Value
	1	Act	Injection 1 Fill Position Cushion	Injection 1	in	0.5	0.75	1.0	0.6989	0.4431
	1	Act	Injection 1 Fill Time	Injection 1	s	4.0	5.0	6.0	4.8816	6.936
	1	Act	Injection 1 Recovery Time	Injection 1	s	11.59	16.59	21.59	17.0436	23.9712
	1	Act	Cycle Time	Production	s	49.5	52.0	54.5	52.4796	57.1176
	1	Act	Injection 1 Max Inject Pressure	Injection 1	PSI	700.0	1000.0	1300.0	973.92	---
	1	Act	Injection 1 Transfer Pressure	Injection 1	PSI	600.0	900.0	1200.0	804.07	---
	1	Act	Injection 1 Barrel Zone 1 Act	Temp	degF	415.0	440.0	465.0	440.10	---
	2	Set	Injection 1 Barrel Zone 1 Set	Temp	degF	415.0	440.0	465.0	440.0	---

- Create, store and maintain recipes** via cloud interface
- Decrease scrap and part variation** by utilizing change and alarm logs to immediately alert plant staff to setpoint or process variation
- Work cell integration** allows for users to track auxiliary changes in conjunction with machine data
- Optimize your process** using built in tools to understand ideal settings to maintain the highest quality

M-POWERED COMPATIBILITY

	Connect Portal	Downtime Tracking	Production Monitoring	Technical Support	Predictive Analytics	Preventative Maintenance
MOSAIC +, II, I						
ENDURA TOUCH/ENDURA						
FANUC - Roboshot ¹				IN PROGRESS	IN PROGRESS	
B&R						
XTREEM			§ ²			
ALLEN BRADLEY						
SIEMENS						
NON-MILACRON			§ ³			
486, VSX, VSL, CAMAC						

¹ Roboshots require LINKi or Mold24i

§² Advanced Analytics have 50-60 data elements are each cycle

§³ Non-Milacron - M-Powered Standard hardware can be added to support Data & Alerts package if a standard communication protocol is readily available

AUXILIARY COMPATIBILITY

Auxiliary equipment managed by the M-Powered cloud has a direct effect on efficiency and safety benefits for the operator. It can extract process parameters from each auxiliary component and then monitor them, provide real time alerts and execute long-term analysis on your complete work cells. These can be converted to visual dashboards for anyone to see.

- Robot Part Handling
- Press Side & Central Granulators
- Conveyors or Conveyor Systems
- Magnetic Mold Clamps & Mold Changing Systems
- Dryers
- Water or Air-Cooled Chillers
- Blenders
- Hot Runner Controllers
- Mold Temperature Controllers
- Central Water Processing

