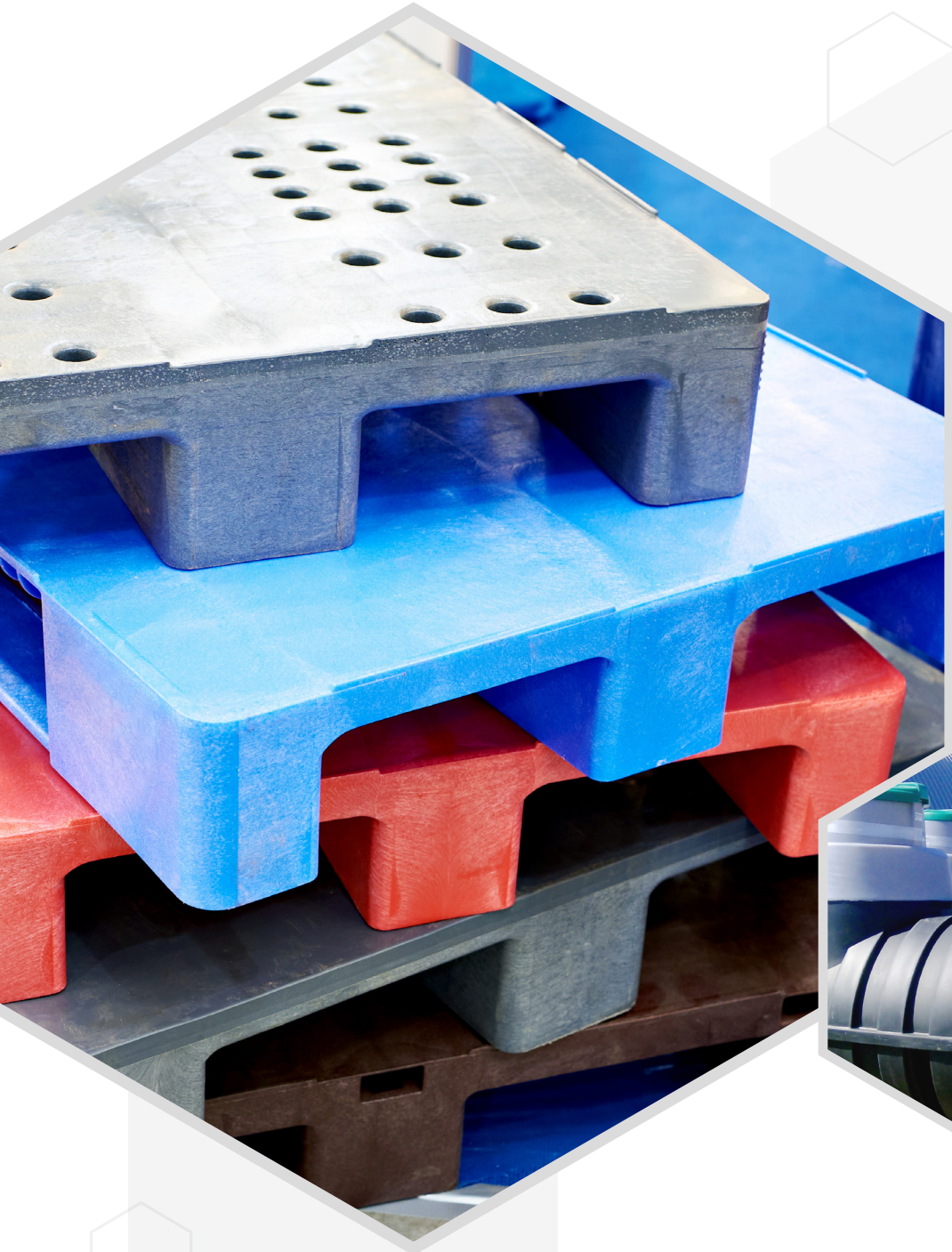
THE L-SERIES

MILACRON®



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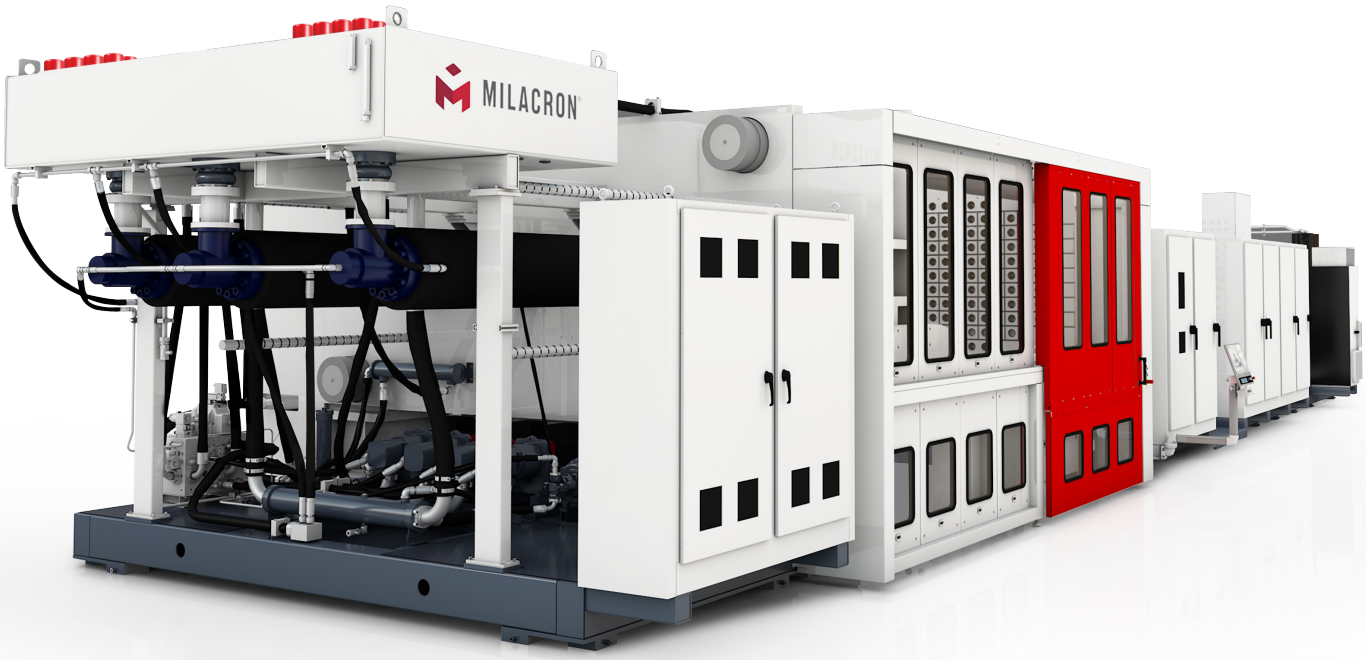
SERIES 500-2500

THE L-SERIES
(LOW-PRESSURE INJECTION MOLDING)

Milacron has set the standards, driven innovation and led the industry in multi-nozzle Low-Pressure Injection Molding technologies for more than four decades. These machines can be used for structural foam, structural web, gas assist, solid molding or combinations of these technologies depending on the application.



MILACRON OFFERS ADVANCED TECHNOLOGIES FOR STRUCTURAL FOAM AND STRUCTURAL WEB GAS ASSIST, ENABLING CUSTOMERS TO MOLD ULTRA-LARGE PLASTIC PARTS NOT POSSIBLE WITH OTHER MOLDING TECHNOLOGIES.

- Built with Milacron proven technologies used on our standard injection molding machines.
- Multi-nozzle machine with modular hot runner system (no in-mold hot runner necessary) lowers tooling investment on a project by project basis.
- Rugged clamp design with large platen sizes allow for multiple molds to be run simultaneously for higher productivity.
- Large selection injection/melt units for wide variety of applications and output capabilities.

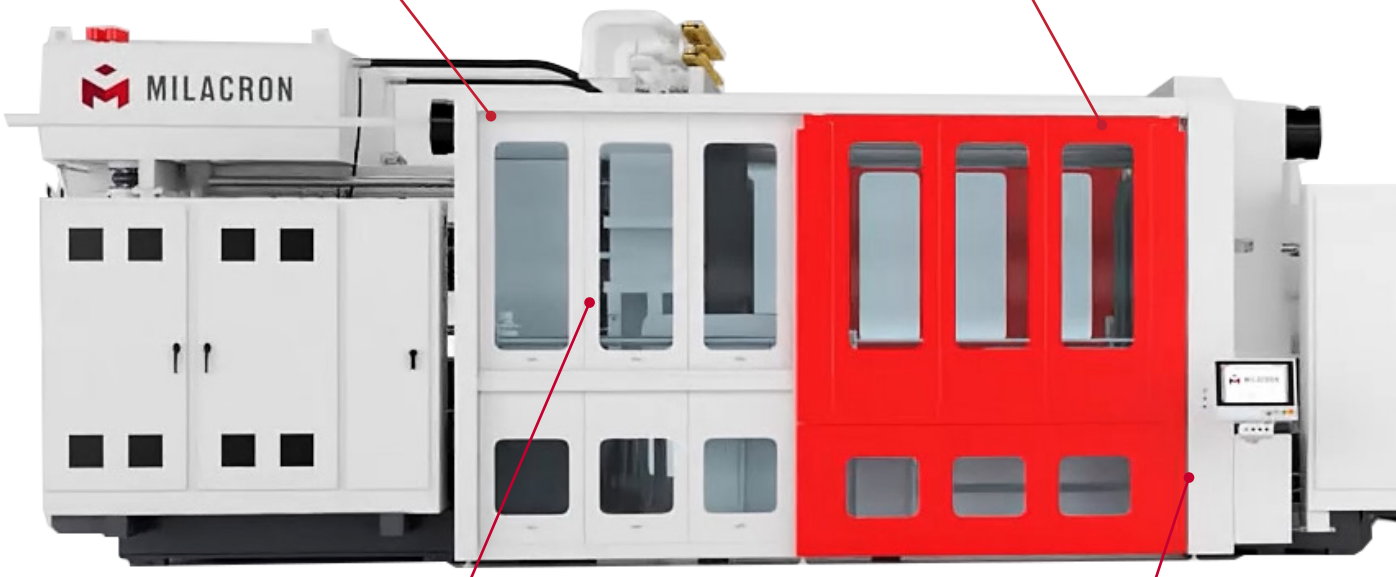
MULTI-NOZZLE LOW-PRESSURE INJECTION MOLDING – LARGE STRUCTURAL PLASTIC PARTS

CLAMP FEATURES

- Way support system for increased mold weights (standard)
- Extended daylight and stroke (optional)
- Semi-automatic tie bar puller (optional)

LARGE RIGID 3-PLATEN DESIGN

- Distributed tonnage cylinders for even clamp pressure across wide platens
- Stationary platen with modular hot runner for multiple molds
- Clamp speed performance and improved clamp dry cycle times



CLAMP FEATURES

- Enhanced hydraulic core/ejector valve package standard
- Hydraulic ejector plate (optional)

MOSAIC + CONTROL

- 21" multi-touch screen with configurable "PLUS" area
- Integrated auxiliary equipment screens
- Integrated remote camera interface provides an additional set of eyes monitoring the entire machine (optional)

PROVIDING THE HIGHEST PERFORMANCE, PRECISION AND FLEXIBILITY.

INTEGRATED ROBOTS (OPTIONAL)

- Ultimate in mounting flexibility
- Integrated robot control through machine HMI

INTEGRATED HOT RUNNER CONTROLLER (OPTIONAL)

- Seamless integration
- Reduced mold interface complexity
- Virtual Network Control (VNC) via the Mosaic+ control screen
- Widest selection of interchangeable control cards
- Superior control of external melt delivery system
- Ability to run molds with in-mold hot runners (optional)

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MILACRON M•POWERED

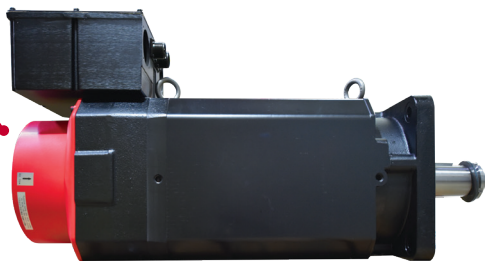
- Designed to fully utilize our M-Powered Suite of connectivity products
- Reduces failures, improves uptime and OEE

LARGE SELECTION OF MELT UNITS

- Single or dual extruder machines
- Extruder sizes from 3" to 7"
- Shot sizes from 75lbs to 400lbs
- Configurable to application

FANUC MOTOR AND DRIVE PACKAGE

- Servo driven machine performance and superior reliability
- Up to 25% energy savings
- Digital control of pressure and flow via servo system
- Closed-loop clamp and injection control
- Fixed gear pumps for improved reliability
- Quiet machine operation
- Offers fast acceleration rate and utilizes highly efficient and powerful permanent neodymium magnets



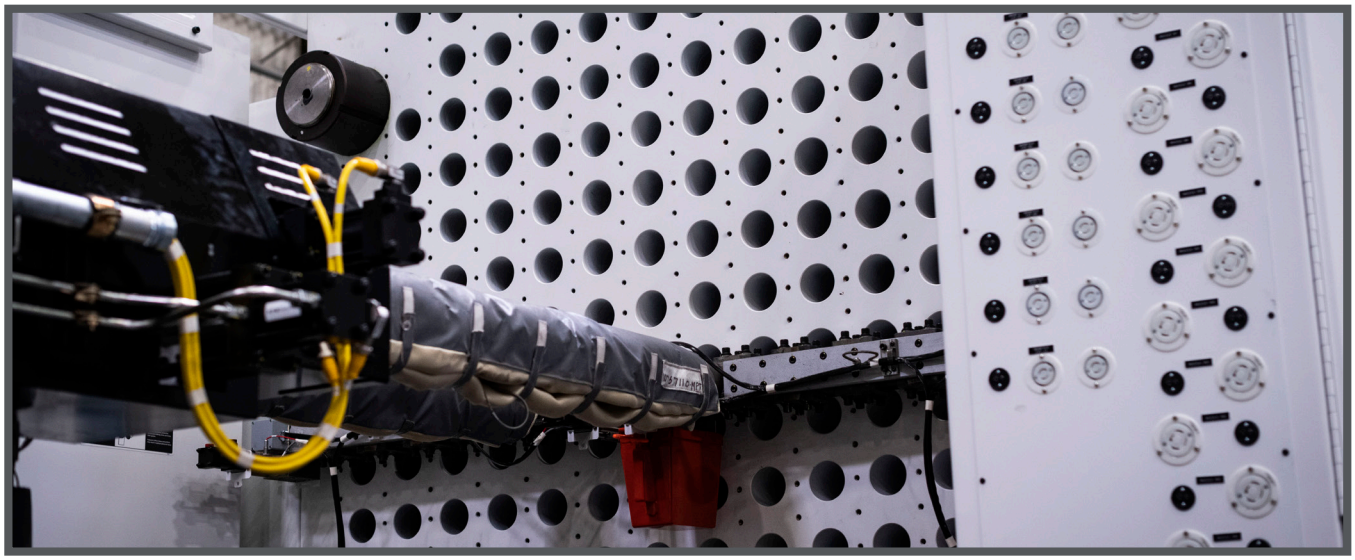
L-SERIES

Milacron's L-Series machines are designed for tremendous shot size capacity of either single or multiple cavities of large projected area parts, or families of smaller parts. Shot sizes are available up to 400 lbs (180 kg) and extruder throughputs of up to 6400 lbs per hour (2902 kg/hr). Clamp sizes are available from 500 US tons to 2500 US tons with platen sizes up to 110" x 200" (2800 x 5080mm)

MACHINE CONFIGURATIONS

MODEL	500S	750SWP	1000SWP	1000SSWP	1500SHP	2500HSWP
PLATEN SIZE (H X V) (IN AND MM)	89 x 98 2489 x 2261	167 x 86 2184 x 4241	167 x 103 2616 x 4241	186 x 103 2616 x 4724	161 x 107 2712 x 4089	200 x 110 2794 x 5080
MAXIMUM SHOT SIZE PS/HDPE LBS/KG	150/120 lbs 68/54 kg	200/160 lbs 91/73 kg	200/160 lbs 91/73 kg	200/160 lbs 91/73 kg	200/160 lbs 91/73 kg	300/240 lbs 136/108 kg
MAXIMUM THROUGHPUT LBS/HR KG/HR	2400 lbs/hr 1088 kg/hr	4800 lbs/hr 2176 kg/hr	4800 lbs/hr 2176 kg/hr	6400 lbs/hr 2902 kg/hr	6400 lbs/hr 2902 kg/hr	6400 lbs/hr 2902 kg/hr

Maximum Platen Configurations Shown, Consult Factory for Other Configurations



APPLICATIONS

Milacron L-Series machinery is recommended for injection molding large structural plastic products.

- *ATV/WATERCRAFT*
- *ELECTRICAL & TELECOMMUNICATIONS*
- *RECREATION*
- *BUILDING & CONSTRUCTION*
- *INDUSTRIAL STORAGE*
- *AGRICULTURAL & CONSTRUCTION*
- *RETURNABLE PACKAGING*
- *INSTITUTIONAL/COMMERCIAL*

STRUCTURAL FOAM PROCESS

A foaming agent (N_2 gas) is mixed with the melt and short-shot through a modular multiple nozzle system into a single or multiple mold(s). The injection pressure and expanding gas/polymer cellular mixture act to fill the mold cavity with no pack or hold pressure.

BENEFITS:

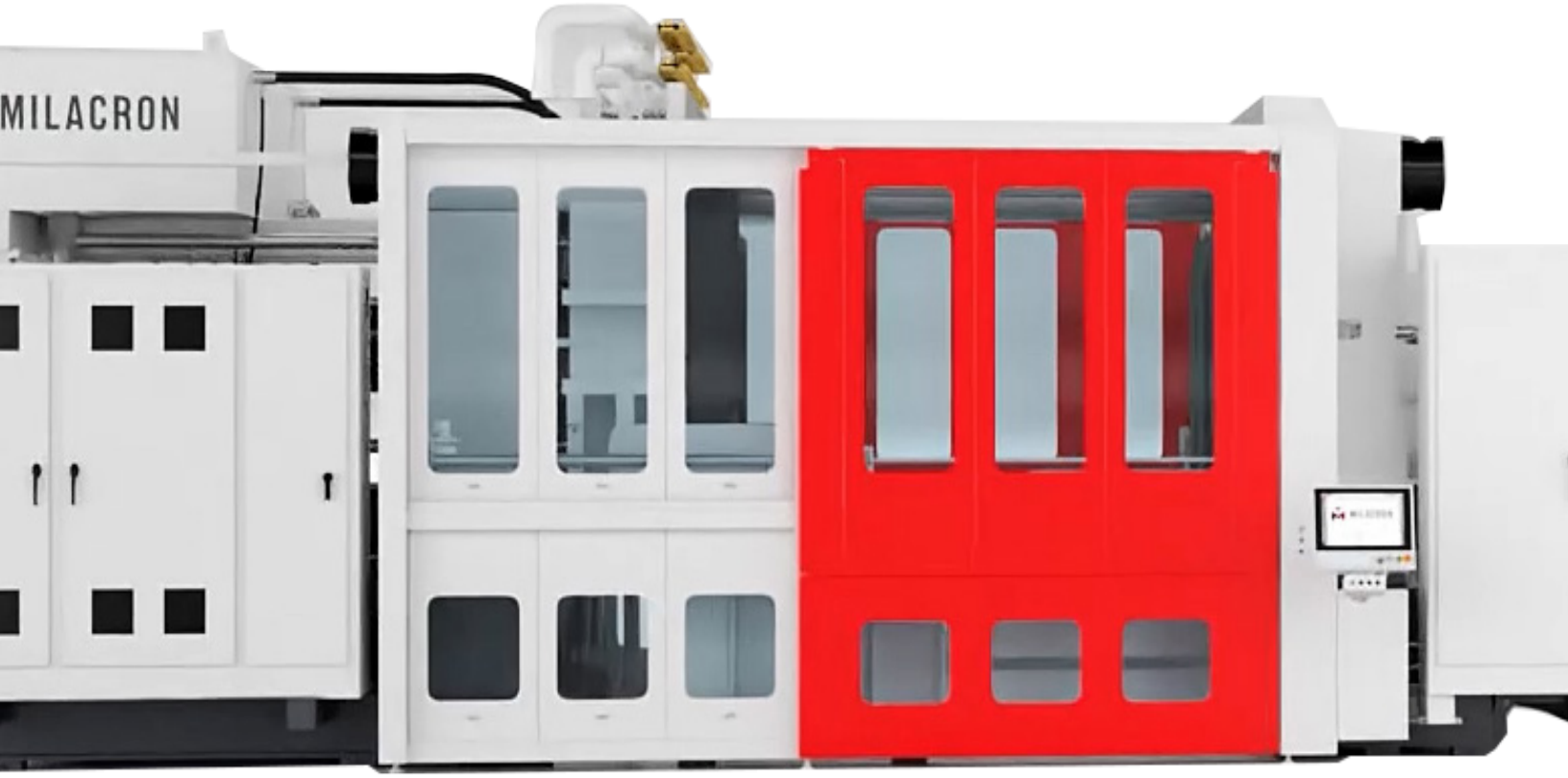
- Mold cavity pressures are 10-20x less than conventional injection molding
- 15-30% reduction in part weight
- Ability to mold large parts with a high rigidity
- Reduced part stress, warpage, and elimination of sink marks
- Multiple parts can be molded in a single cycle
- Low cavity pressure permits use of lower cost aluminum molds

STRUCTURAL WEB PROCESS

Structural web (SW) parts are solid with hollow channels and hollow thick sections packed out by internal injection of low pressure N_2 gas through the multiple nozzles. The SW process produces a smooth, sink-free finish with good color, uniformity and cosmetics.

BENEFITS:

- Smooth, uniform surface finish (no swirl marks)
- Reduced cycle times for very large parts
- 15-30% part weight reduction over solid parts
- Dual wall thickness with high stiffness-to-weight ratio
- Elimination of sink marks opposite of ribs and thick wall sections

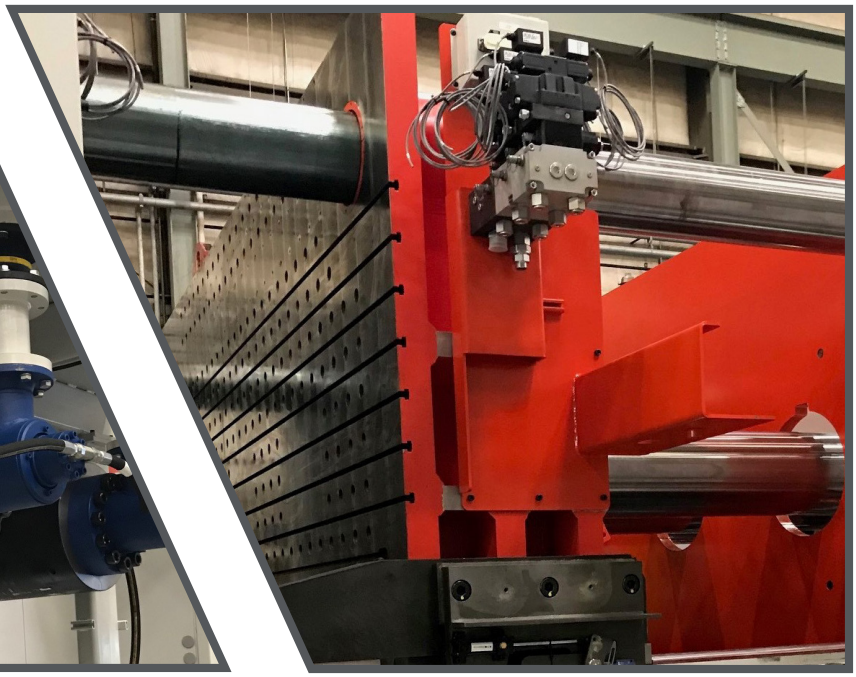


CLAMPING UNIT

- Heavy duty, fully-hydraulic clamp, infinitely adjustable tonnage.
- Three clamping cylinders for balanced force distribution. Center clamping cylinder has jack ram construction for fast energy efficient traverse.
- Linear transducer for clamp positioning.
- Proportional valve controls for clamp open/close speed, low-pressure close, clamp tonnage and decompression.
- Position-based braking closed loop clamp control.
- Recirculation filter (5-micron) and auto cooling system, with independent pump and heat exchanger.
- Overhead hydraulic reservoir with prefill valves for each cylinder.
- Manually operated front and powered gates (optional).
- Mechanical knock-out plate with position adjustment.
- Automatic central lubrication system.

3-Tonnage Cylinders

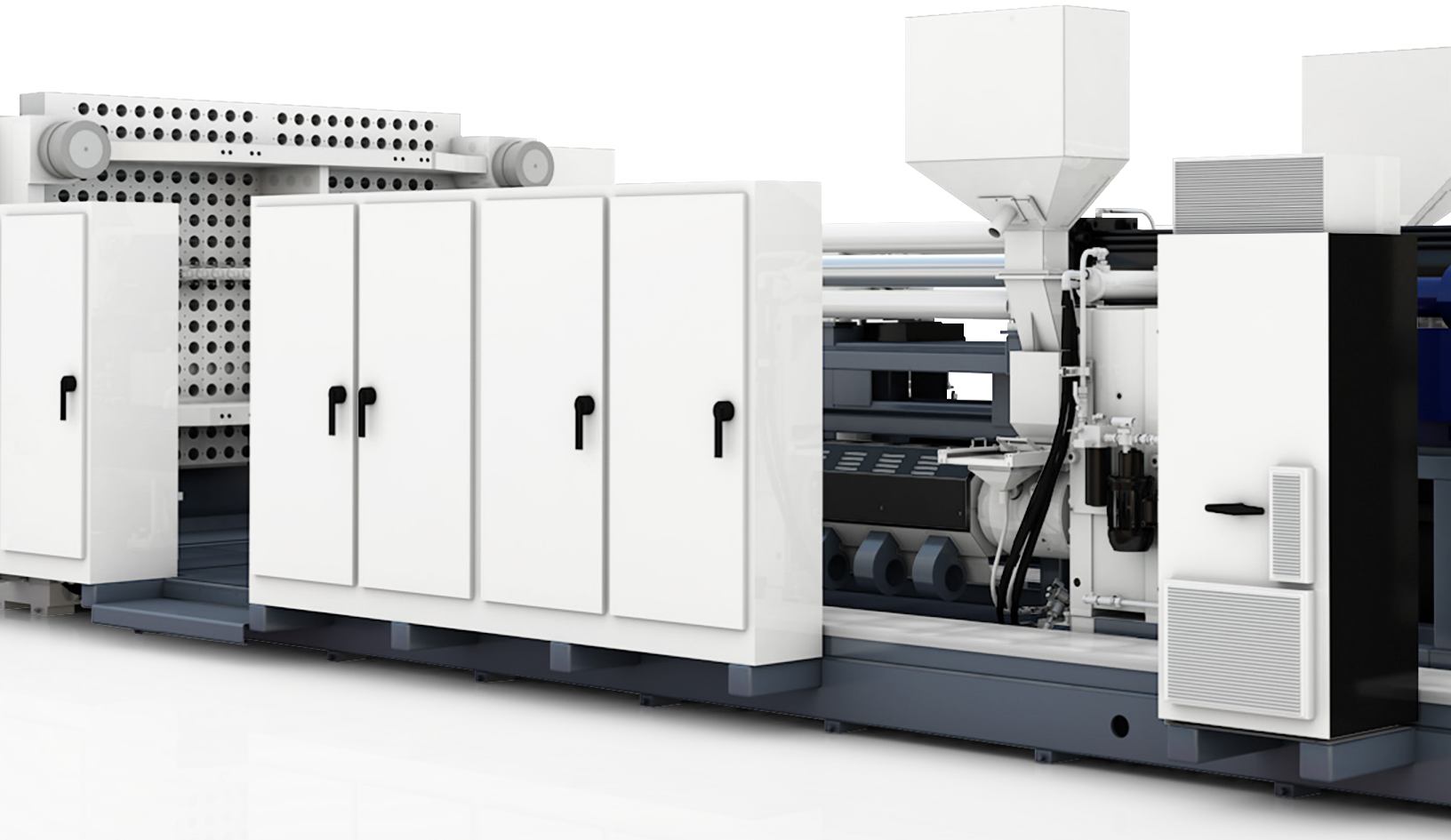
Way Support System &
Large Moving Platen Support



INJECTION UNIT

Milacron offers a wide selection of injection unit sizes, barrels and screws for the L-Series, increasing customer flexibility in processing.

- Closed-loop injection control
- Independent five-stage injection speed and pressure control
- 6000 PSI injection pressure per accumulator (10,000 PSI available as an option)
- Injection speeds infinitely adjustable
- Linear transducers built into injection cylinders for shot accuracy and protection from heat and mechanical damage
- Melt shut-off valve between accumulator and extruder for accurate shot-to-shot repeatability



- Nozzle hydraulic manifold with ball valves for positive, leak free operation
- Horizontal melt manifolds (supplied as part of machine)
- Xaloy 800 or equivalent melt accumulator barrel and plunger for abrasion resistance and long life with recycled materials
- Light weight tubular modular melt manifold extension blocks for ease of installation (supplied as standard machine equipment)
- Longer inlet tubes for improved work area access during nozzle set up
- Capability for eight discrete shot sizes per melt accumulator
- Controls & hardware for thirty-two independent nozzle sequences standard

In-line injection/extruder design for better maintenance access

Injection Piston accumulators for consistent injection velocity across complete shot size

MOSAIC+ CONTROLLER SYSTEM

It's easy to maximize the reliability and adaptability of Milacron machines with the ergonomic touch-screen control of MOSAIC+. Fast processing speeds power extensive data collection and report generation, as well as integration with automation controls to further simplify the whole process.

EXCEPTIONAL STANDARD FEATURES

- Multi-touch capable 21.5" HD touch screen
- Intuitive operator interface
- Configurable screen layout
- Remote mounted IP camera interface
- Windows based operating system
- Optional integrated hot runner control

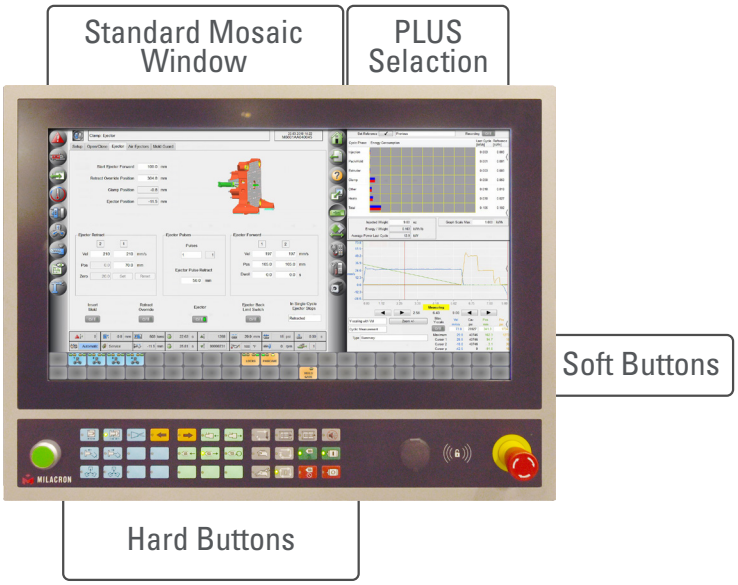
MOSAIC+ screen versatility gives the operator simultaneous views of multiple machine functions and related equipment, such as hot runner control and remote mounted IP cameras.

- Set point overview page for quick access – actual set points for each axis at the bottom of the page
- Display of 700 process monitor samples stored on control or virtually unlimited samples on USB stick or network drive via reports
- Graphic display of 33 integrated soft keys with LED's located below screen
- Process monitoring of over 50 possible parameters with graphically displayed min, max, and average
- 8 + 8 freely configurable I/O
- Self-diagnostic and fault-finding capability
- 8 SPC distribution, XBar, and R charts with over 50 possible parameters
- Data protection with 4 access levels for up to 30 machine operators
- Fully-configurable cores
- Save mold data and screen shots to USB keys
- Change log and alarm log are 700 events on the control, virtually unlimited on USB stick or network drive via reports

PLUS SCREEN TECHNOLOGY

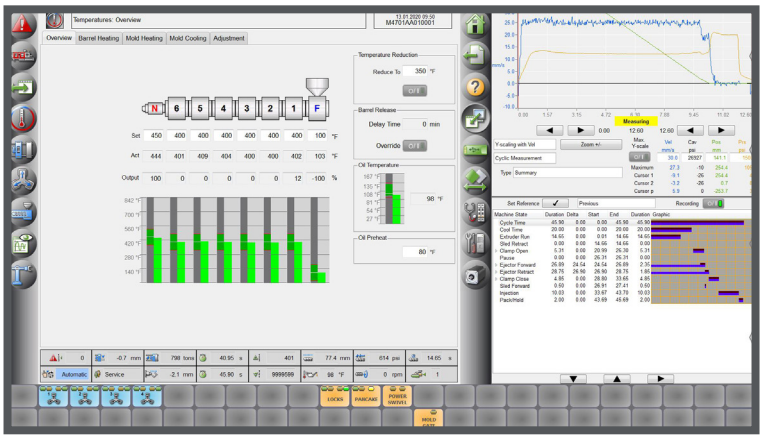
The PLUS section has four configurable window spaces.
In this section, the operator can choose to show:

- Four small windows
- One large and two small windows
- Two large windows



Content choices for the four windows include:

- Alarms log
- Energy overview
- Production run
- Injection graphics
- Trend data analysis
- Trend graphics
- Cycle analysis
- SPC charts
- Integrated robot, dryer and hot runner (optional)
- Status page
- Integrated camera with zoom capability (optional)



L-SERIES CAPACITY

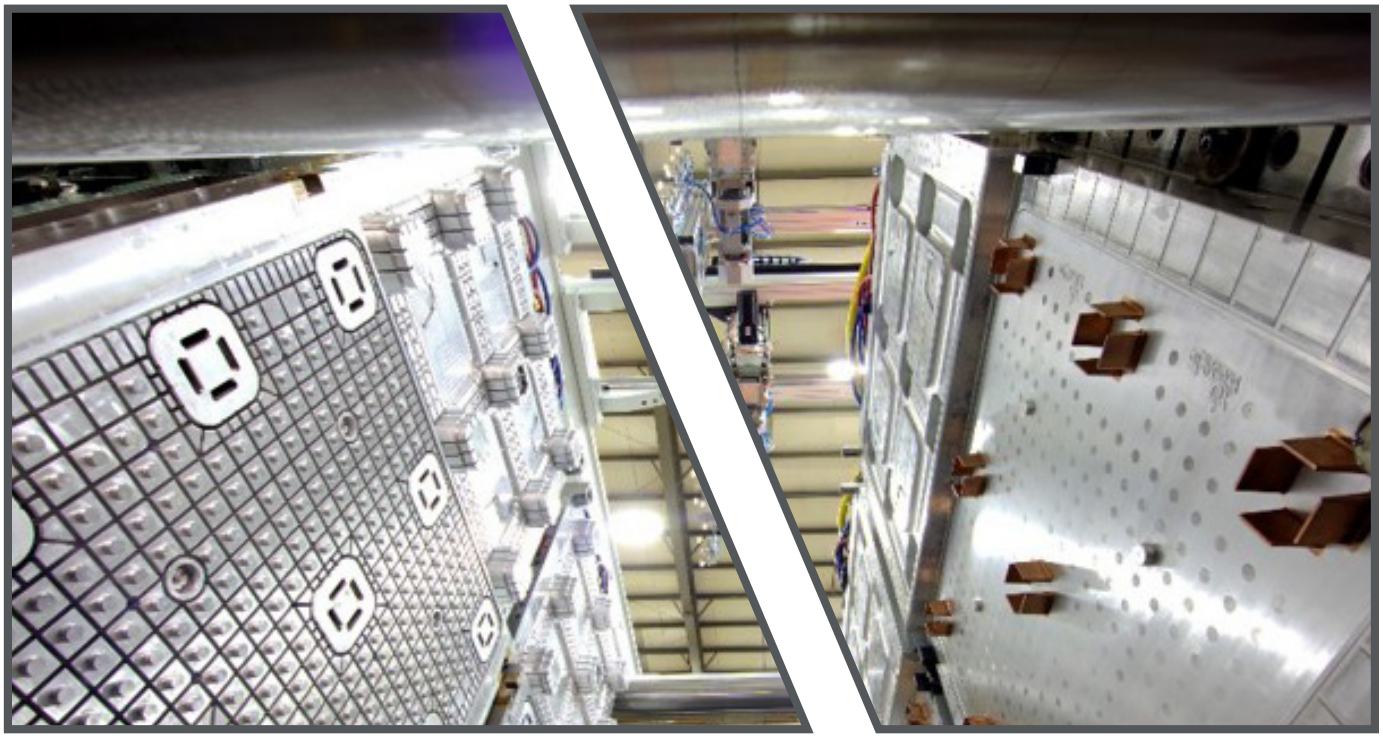
ULTIMATE LARGE PART MANUFACTURING FLEXIBILITY

Today's low pressure systems are capable of easily molding multi-part assemblies in a single cycle, or you can mold several of the same large part simultaneously. Either way, a Milacron L-Series machine can streamline your production operation.

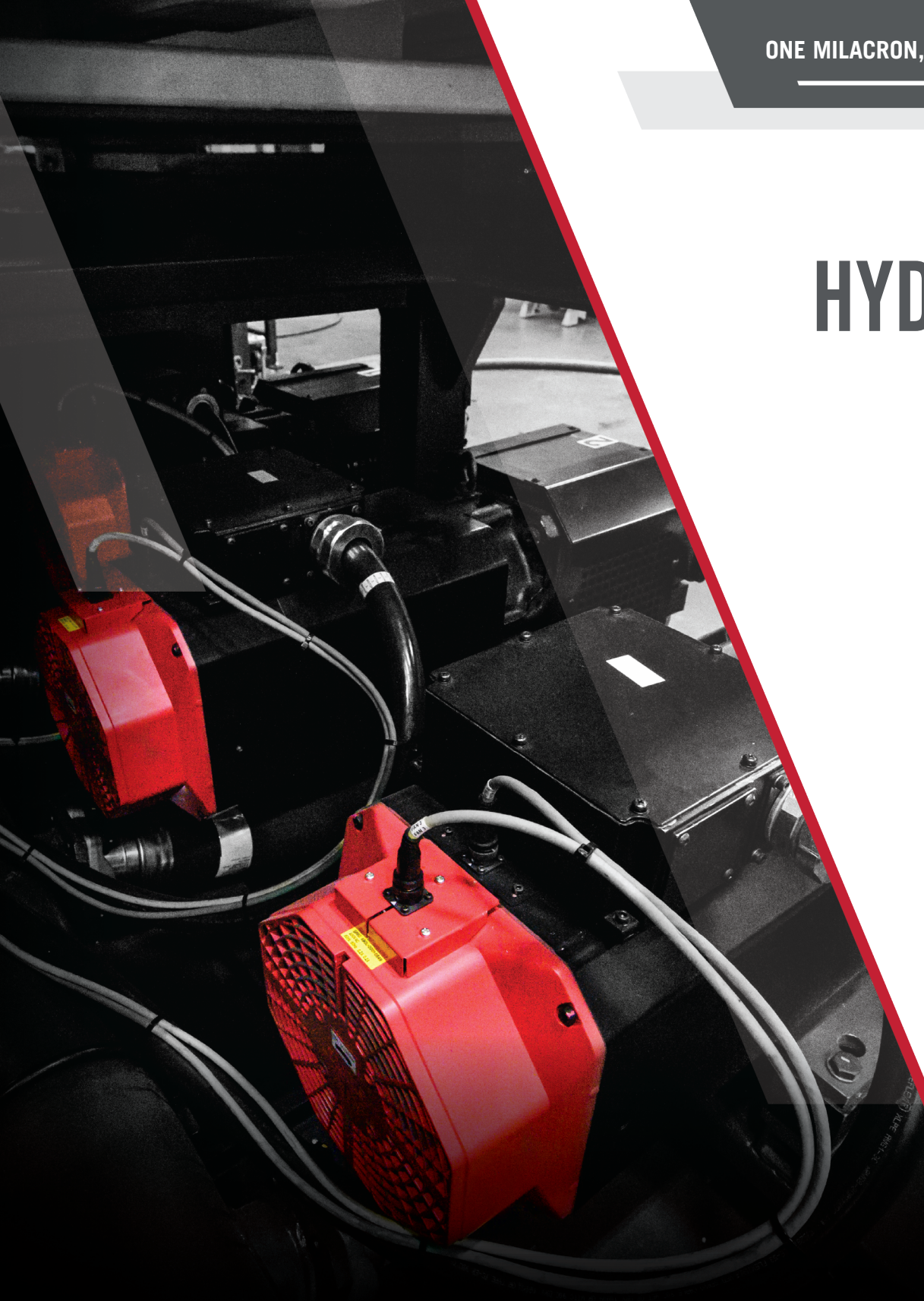
The L-Series is available with either single or twin extruders to meet your processing needs. Shot sizes up to 400 lbs (180 kg) enable high production throughput of up to 6400 lbs/hr (2902 kg/hr). Accumulators enable efficient energy use and materials availability when needed. Variable speed AC vector drives with heavy-duty gear reducer ensure energy-efficient operation.

L-Series systems feature a heavy-duty modular design and a very large platen to accommodate large parts, family molds and multi-part production. Platens up to 110" x 200" (2,800 x 5,080mm) are available with up to 280 injection nozzle locations. Clamping forces to 2,500 tons are available to meet the most rigorous demands.

- Machine range from 500 to 2500 US tons
- Shot sizes up to 400 lbs
- Extruder outputs up to 6400 lbs/hr
- Platen sizes up to 110" x 200"



SERVO-HYDRAULIC SYSTEM



The L-Series's enhanced machine specifications and performance are powered by proven FANUC servo-motor power packs for improved reliability, higher max mold weights, faster clamp speeds and added tonnage sizes. Utilizing a FANUC servo-system results in a longer machine component life while also increasing oil life. The motor/pump only delivers oil as needed which reduces heat generation and water consumption.

BENEFITS INCLUDE

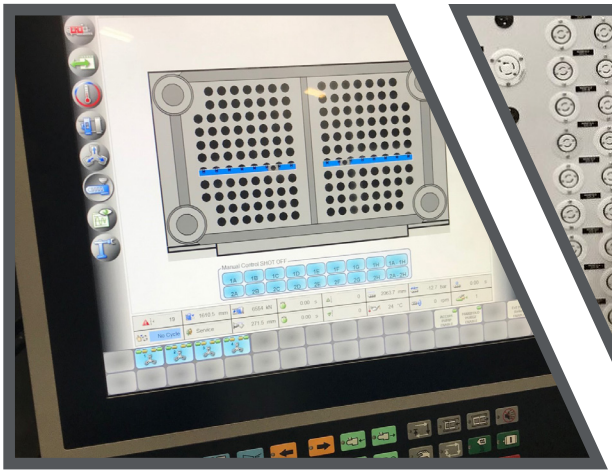
- Ability to remotely monitor for troubleshooting and analysis
- Improved cycle precision and repeatability – closed loop system
- Reduced energy consumption
- Increased accuracy and precision – rotational control to a fraction of a degree
- High response – low inertia
- Noise reduction – up to 80% quieter than conventional hydraulic machines
- Reduced sensitivity to contamination
- Increased reliability and lower maintenance costs
- Bi-directional pump for fast response in pressure control
- Pump is stopped intermittently during the cycle
- Servo-system designed for demanding and diverse applications

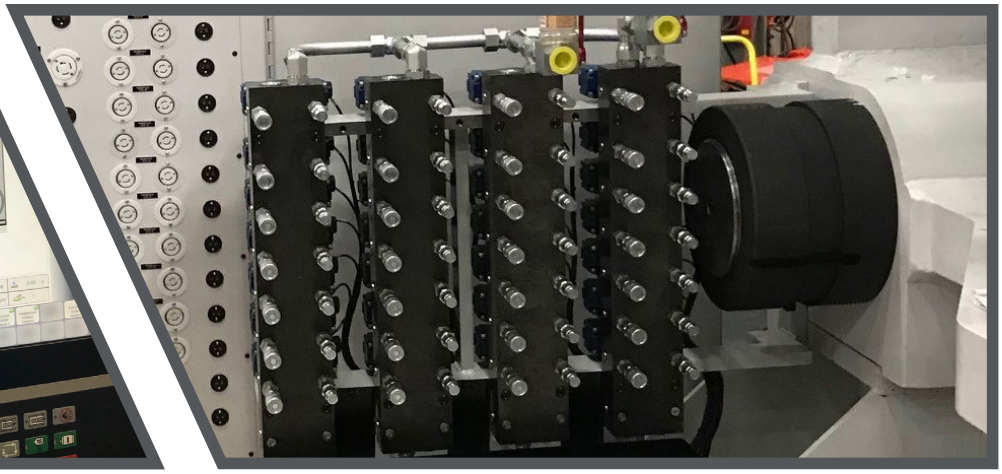
FANUC HIGH-PERFORMANCE, HIGH-EFFICIENCY SERVO-MOTORS

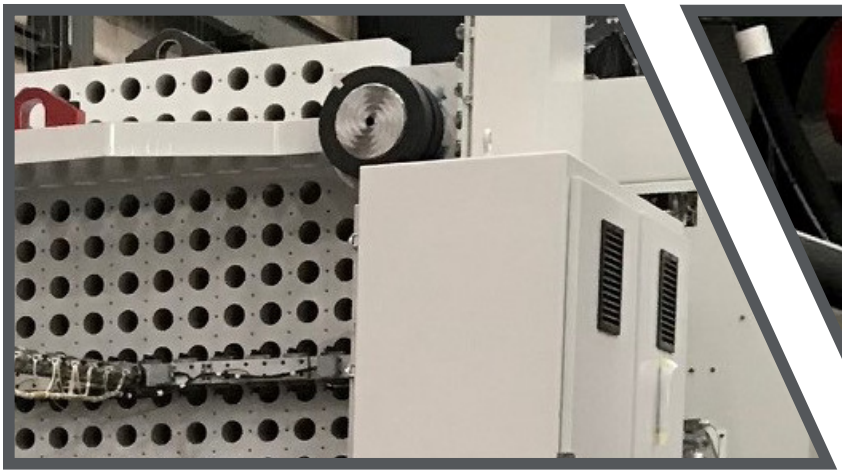
- 50 years mean time between failures (MTBF)
- High-efficiency servo-system uses power generated during deceleration of motors, excellent energy-saving performance
- Designed to meet global safety standards (ANSI and CE)
- FANUC motors use high-energy neodynium magnets, for superior cost and performance ratios

L-SERIES BREAKTHROUGHS FOR HIGHLY RECYCLED CONTENT

- Melt unit with a fixed single screw extruder and proprietary Milacron L-Series screw design allows for homogeneous melt with up to 100% regrind
- Melt delivery system designed with large melt channels to accommodate contaminants without clogging nozzles/gates
- Melt filtration options available
- Optional closed-loop nitrogen gas control system for varying viscosity when running regrind materials







STANDARD FEATURES

	Standard	Optional
GENERAL		
3-Platen clamp system with dual outboard clamping cylinders and central traversing cylinder for fast clamp speeds and balanced clamping force	●	
Power Pack driven by Fanuc AC servo-motor and drive package	●	
Direct control of pressure and flow via internal gear pumps	●	
Improved melt base extruder/gearbox layout for better maintenance accessibility	●	
Independent full-time kidney loop filtration and cooling (optional external filtration system)	●	
Filtration to 5-micron with clog detection and alarm	●	
High clamp base design for part removal and easy access to clamp area	●	
SPI-AN146/Euromap 67 robot interface	●	
Robot mounting holes on stationary platen		○
Powered operator's or non-operator's gates		○
Leveling pads	●	
Integrated gas assist controller		○
Stationary platen nozzle access platforms		○
Structural web interface (for external controller)	●	
Structural web controls and nitrogen gas unit		○
Mold water manifold package – stainless steel		○

	Standard	Optional
INJECTION		
Closed-loop injection control	●	
Independent five-stage injection speed and pressure control	●	
Eight (8) shot sizes per accumulator	●	
6000 PSI melt pressure per accumulator (10,000 psi optional)	●	○
Linear transducers built into shot cylinders for shot accuracy and protection from heat and mechanical damage	●	
Xaloy 800 or equivalent accumulator and plunger for abrasion resistance and long life with recycled materials	●	
20 manifold extension temperature control zones (30 or 40 optional)	●	○
32 nozzle temperature control zones (up to 96 optional)	●	○
32 independent sequential nozzle hydraulic controls (up to 96 optional)	●	○
Plunger pullback color change system		○
Dual melt manifolds (for applications with many nozzles)		○
Structural foam & structural web nozzles		○
Manifold extension blocks		○
Semi-automatic melt manifold purge system for faster color change		○

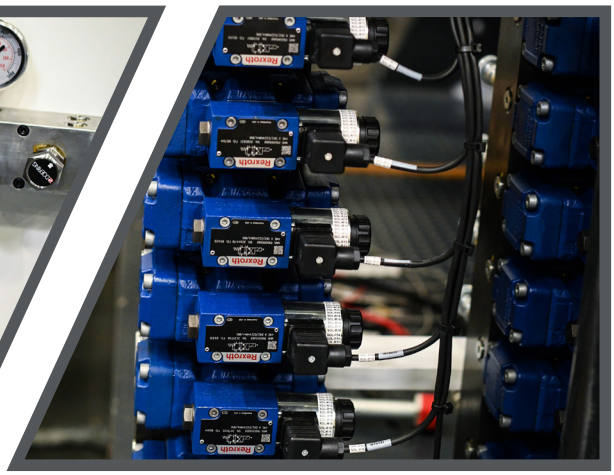
	Standard	Optional
CLAMP		
Way support system – parallel to lower tie bars with precision hardened way rails, adjustable bronze shoes and intermediate support for increased mold carrying capacity and reduced tie bar wear	●	
120" max daylight, 12" min daylight on all models (extended daylight/stroke optional)	●	○
Improved clamp speed (20"/sec) from prior models	●	
Mechanical knock-out plate with position adjustment (hydraulic ejector plate optional) with reduced daylight	●	○
Services cable track moved to non-operator's side from under clamp for easier access	●	
Automatic central lubrication system	●	
Proportional hydraulic core & ejector package (2 cores, 2 ejectors 500 ton)	●	
(4 cores, 2 ejectors >750 ton)	●	
Semi-automatic tie bar puller (operator side)		○
Mold air system and pneumatic core package		○

	Standard	Optional
EXTRUDER		
Electromechanical extruder variable speed drive with AC motor and heavy-duty gear reducer for high efficiency, long life and minimum maintenance	●	
Xaloy 101 or equivalent extruder barrel for corrosion and abrasion resistance (X800 or equivalent available for abrasive materials)	●	○
Special SF screw design with colmonoy 56 flights; two-stage; 32:1 L/D ratio for high output of HDPE (Colmonoy 83 flights optional)	●	
Nitrogen port and controls for introduction of gas into extruder barrel and decompression zone of screw	●	○
Dynamic mixing screw section for homogeneous dispersion of gas and melt	●	
High-efficiency closed-loop, extruder air barrel cooling system for long life and low maintenance	●	
Water cooled feed throat	●	
Relief valve for purging during shutdown or color change	●	
Large capacity relief valve purge pan with PFZ teflon non-stick coating	●	
Para-flex flexible coupling between AC drive motor and gear box	●	
Dynisco pressure transducers for head and gas port pressure measurements and alarms	●	
Material hopper and feed throat magnet with clean out is supplied with each extruder (dual drawer magnet optional)	●	○

OPTIONAL CONFIGURATIONS

The Milacron team knows the big picture of processing. That's why we deliver with cutting edge machine systems with auxiliary equipment & robots, exceptional aftermarket support, and the know-how to bring your ideas to life – quickly, profitably and with a global perspective.

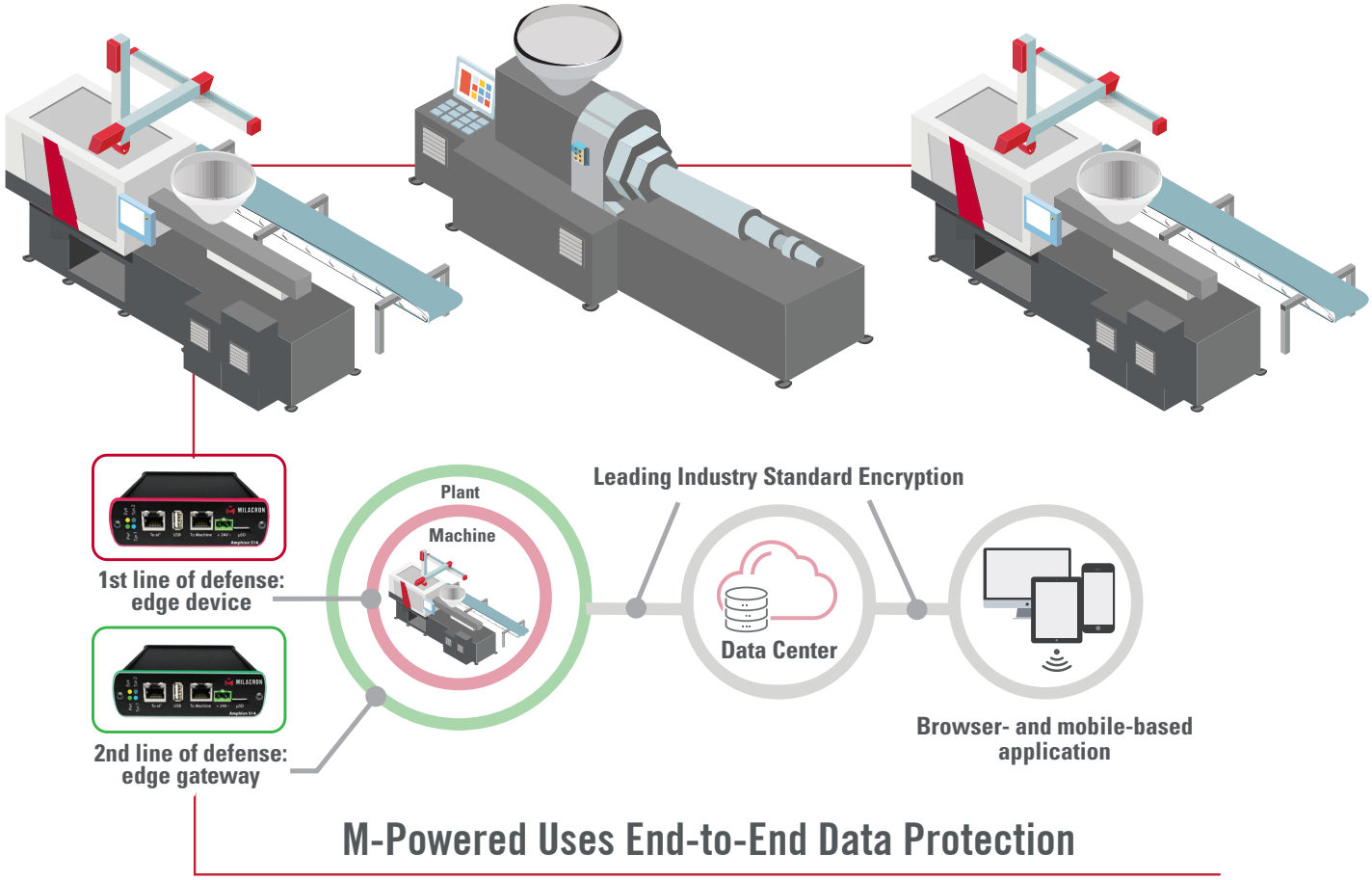
- Gas assist controllers
- Cavity pressure controls systems
- Hot runner controls systems
- Quick-mold change systems



M·POWERED

Leading The Plastics Industry In Digital Transformation

M-Powered is a portfolio of easy-to-use observational, analytical and support services that gives customers a competitive advantage. Leveraging Industrial Internet of Things (IIoT) technology, M-Powered runs sophisticated algorithms that utilize real-time machine learning to monitor machine operations and alert before potential issues.



M-Powered yields unique intelligence on:

- Current and future operations
- Manufacturing quality - reduce scrap
- Uptime and OEE
- Reduce power usage

The addition to your company's bottom line from implementing IIoT solutions are:

- Alert for scheduled maintenance
- Reduce unplanned outages
- Increase productivity

To learn more, contact SALES@MILACRON.COM or MPOWERED@MILACRON.COM.

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Connect with a Milacron representative:

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