

MAXIMA MG

TECHNOLOGY, EQUIPMENT, SERVICE AND SUPPORT



ROBOSHOT S2000-B High-Speed, High-Precision All-Electric Machines. 6 through 385 tons.



POWERLINE NT High-Value All-Electric Machines. 220 to 1125 ton clamp capacities.



MAGNA V Vertical Insert Machines. 30 to 300 tons. Horizontal, shuttle, rotary table models.



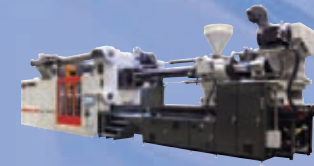
K-TEC High Speed Hydraulic Machines. 44 to 500 ton clamp capacities.



MAGNA MT9 Advanced Hydraulic Toggle Technology. 170 through 450 ton capacities.



MAXIMA MM Mid-Size 2-Platen Technology. 310 to 880 tons.



MAXIMA MG Advanced 2-Platen Technology. 1100 to industry's largest 6600 tons.

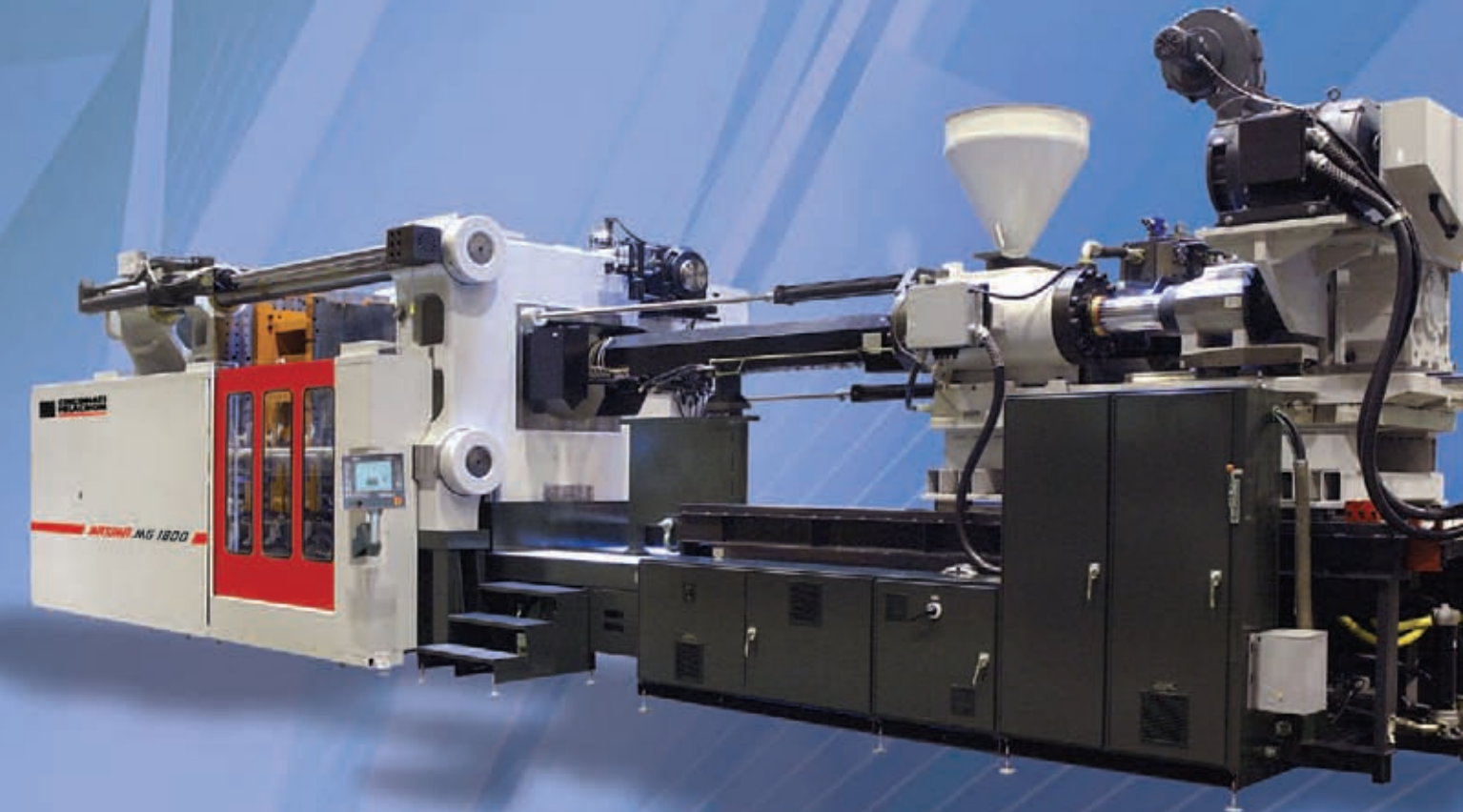


Full line of Auxiliary Equipment, from pellet to part handling.

No other injection molding technology supplier can offer what MILACRON can offer you. In experience, technology, longevity, products and services. We have the broadest product range, with the highest speeds, precision and largest

tonnage range in the industry. We're the global leader in all aspects of multi-component-material-color. We offer the best in after-sale technology. Maintenance and operator training. A full range of auxiliary equipment. MRO

products and supplies. Around-the-clock replacement parts, service and support. From injection end products to retrofitting and complete machinery remanufacturing. Your single source supplier in a total package.



Milacron Inc. Milacron Marketing Company
4165 Half Acre Road Batavia, Ohio 45103
T 513-536-2000 F 513-536-2624 www.milacron.com

THE **MAXIMA MG** SERIES INJECTION MOLDING MACHINES
2-PLATEN TECHNOLOGY FOR LARGE PARTS

FEATURES AND BENEFITS

1100 ■ 1300 ■ 1500 ■ 1800 ■ 2000 ■ 2300
2600 ■ 3000 ■ 3300 ■ 4000 ■ 4400



All specifications reflect average values based upon typical machine layouts. Actual figures will vary depending on final machine configuration. If you require more specific data, consult a certified installation print for your particular machine. Performance specifications are based upon theoretical data. Due to continual improvements, specifications are subject to change without notice.

© 2006 MILACRON Inc. MILACRON, CINCINNATI MILACRON, MAXIMA, MAGNA, MOSAIC, POWERLINE, K-TEC, SERVTEK, MELTSTAR, WEARSTAR, PVCSTAR, KLEARSTAR and the Globe Graphic are registered trademarks of MILACRON Inc. ROBOSHOT is a trademark of FANUC. VBET is a trademark of Barr. Printed in USA. 05/06 PM906



MAXIMIZE YOUR LARGE PART PRODUCTION AND PROFITS

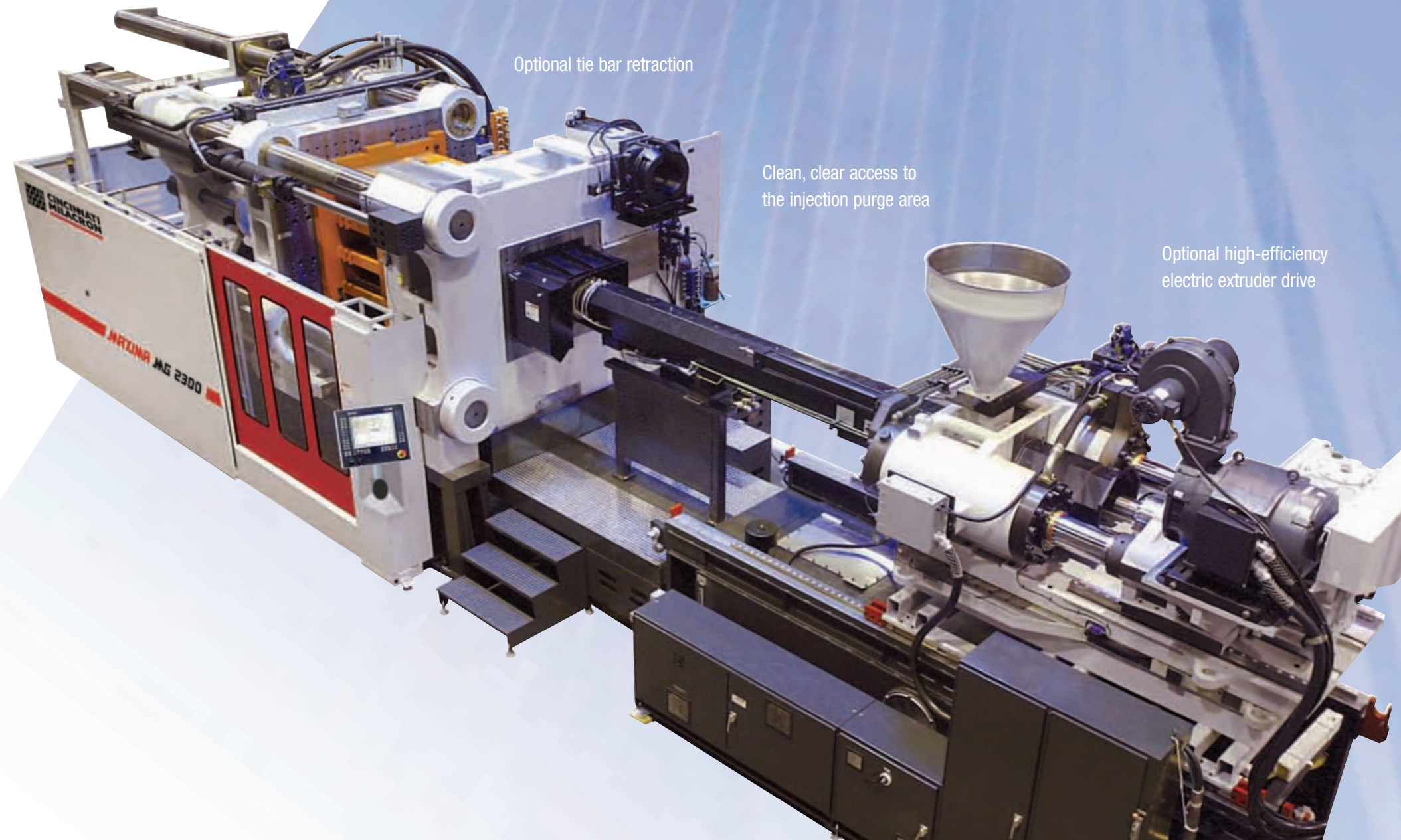
THE MAXIMA MG SERIES OF LARGE 2-PLATEN INJECTION MOLDING MACHINES.

Bringing a new era in large part injection molding machine performance with compact, versatile and adaptable production systems.

MAXIMA MG Series machines bring you production in a reduced footprint, using 10% to 20% less floor space than comparable machines. **MAXIMA MG's** efficient use of floor space brings more profit per square foot.

MAXIMA MG machines can be configured for various applications by combining a large range of clamp and injection units with a selection of optional pumping packages. Realize the benefits of configuring a machine that is perfectly suited to your production requirements. Optimize your process for highest part productivity, part quality and operational profitability.

Modularity and Flexibility: Configure your optimal **MAXIMA MG** Injection Molding Machine with these possible combinations of clamp units and injection units with available injection shot sizes.



Model	Clamp Force	Platen Size (h x v)	Tie Bar Spacing (h x v)	Maximum Daylight with ejector	Maximum Daylight without ejector
	US Tons	inches	inches	inches	inches
MG1100	1125	79.5 x 64.8	61.0 x 47.2	94.5	n.a.
MG1300	1292	86.6 x 70.0	65.7 x 52.4	110.2	n.a.
MG1500	1461	86.6 x 70.0	65.0 x 51.6	110.2	n.a.
MG1800	1820	94.5 x 77.5	72.2 x 55.3	129.9	155.3
MG2000	2025	94.5 x 77.5	71.6 x 54.7	129.5	155.3
MG2300	2330	106.3 x 88.6	79.3 x 63.6	145.6	174.4
MG2600	2585	106.3 x 88.6	78.7 x 63.0	145.6	174.4
MG3000	2990	115.0 x 96.5	84.0 x 66.9	145.6	174.4
MG3300	3315	115.0 x 96.5	83.5 x 66.3	145.6	174.4
MG4000	3950	122.0 x 106.3	90.5 x 74.8	165.4	195.1
MG4400	4385	122.0 x 106.3	89.8 x 74.0	165.4	195.1

Model	Injection Frames Sizes and Shot Sizes*						
	4880	6610	10100	16000	23000	34000	48000
MG1100	85/105	116/140	179/232	288/362			
MG1300		116/140	179/232	288/362	413/540		
MG1500		116/140	179/232	288/362	413/540		
MG1800			179/232	288/362	413/540		
MG2000			179/232	288/362	413/540		
MG2300				288/362	413/540	607/769	
MG2600				288/362	413/540	607/769	
MG3000				288/362	413/540	607/769	
MG3300				288/362	413/540	607/769	
MG4000					413/540	607/769	854/1054
MG4400					413/540	607/769	854/1054

*Shot sizes in oz. based on conversion factor of 0.95 g/cc polystyrene

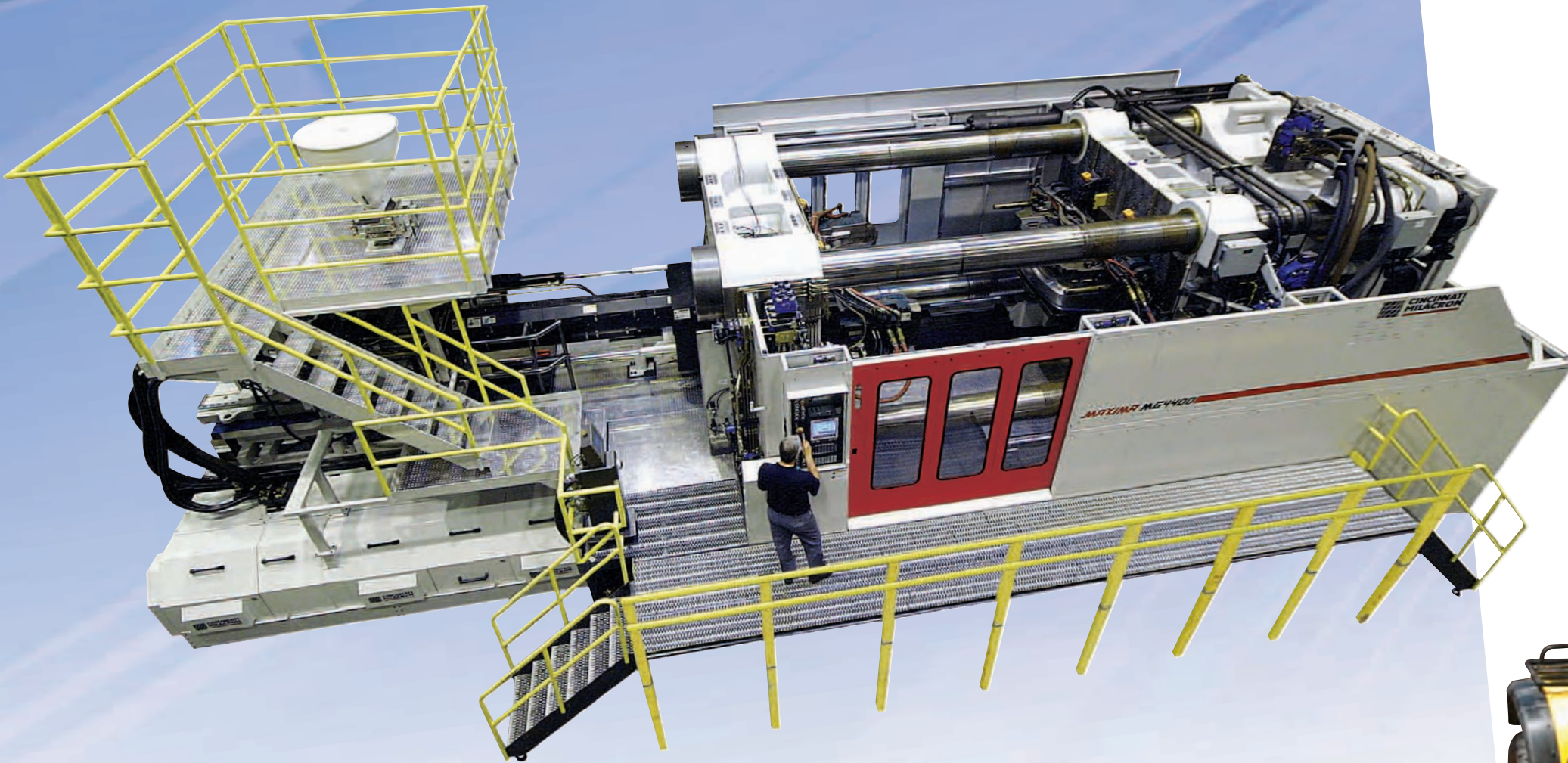
WIDE OPEN SPACES

With a long clamp stroke, large daylight and spacious tie bar clearance, there's plenty of room for over-sized molds and stack molds.

The **MAXIMA MG** Series is built to provide continued, repeatable performance throughout years of demanding production, while giving you the ability and versatility to respond quickly to changing market demands.

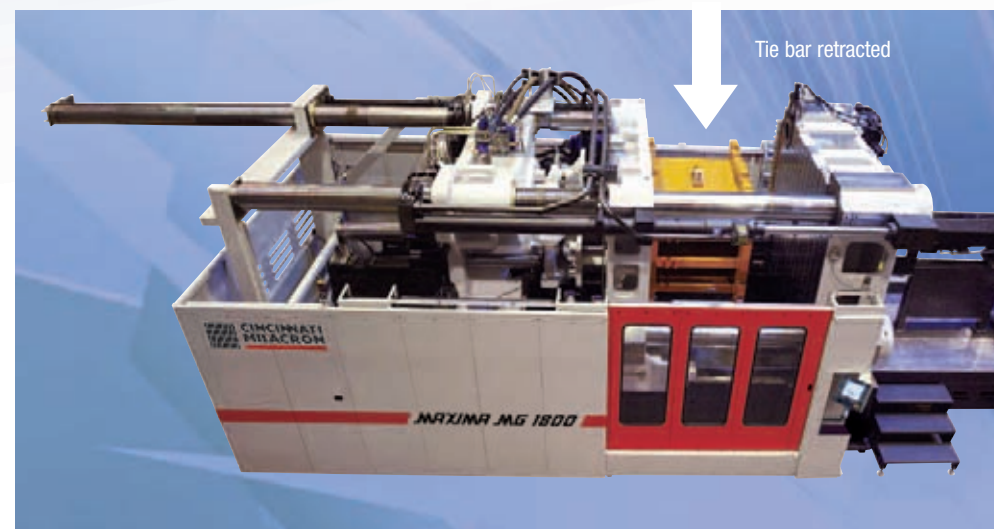
Whether it is generic products or technically challenging parts, the **MAXIMA MG** Series brings you the speed, precision, capacity and repeatability demanded by large injection molded parts for all major industry segments:

- Automotive
- Housewares and Appliance
- Storage and Transport Containers
- Furniture, Construction, Business and Industrial

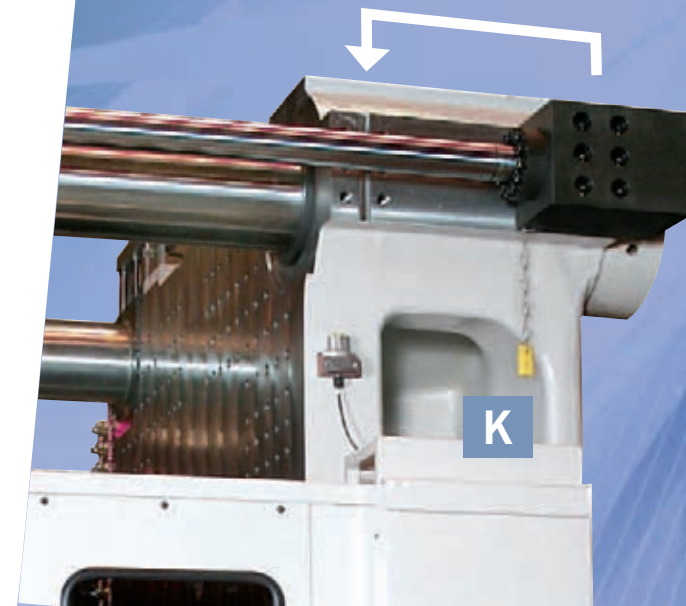
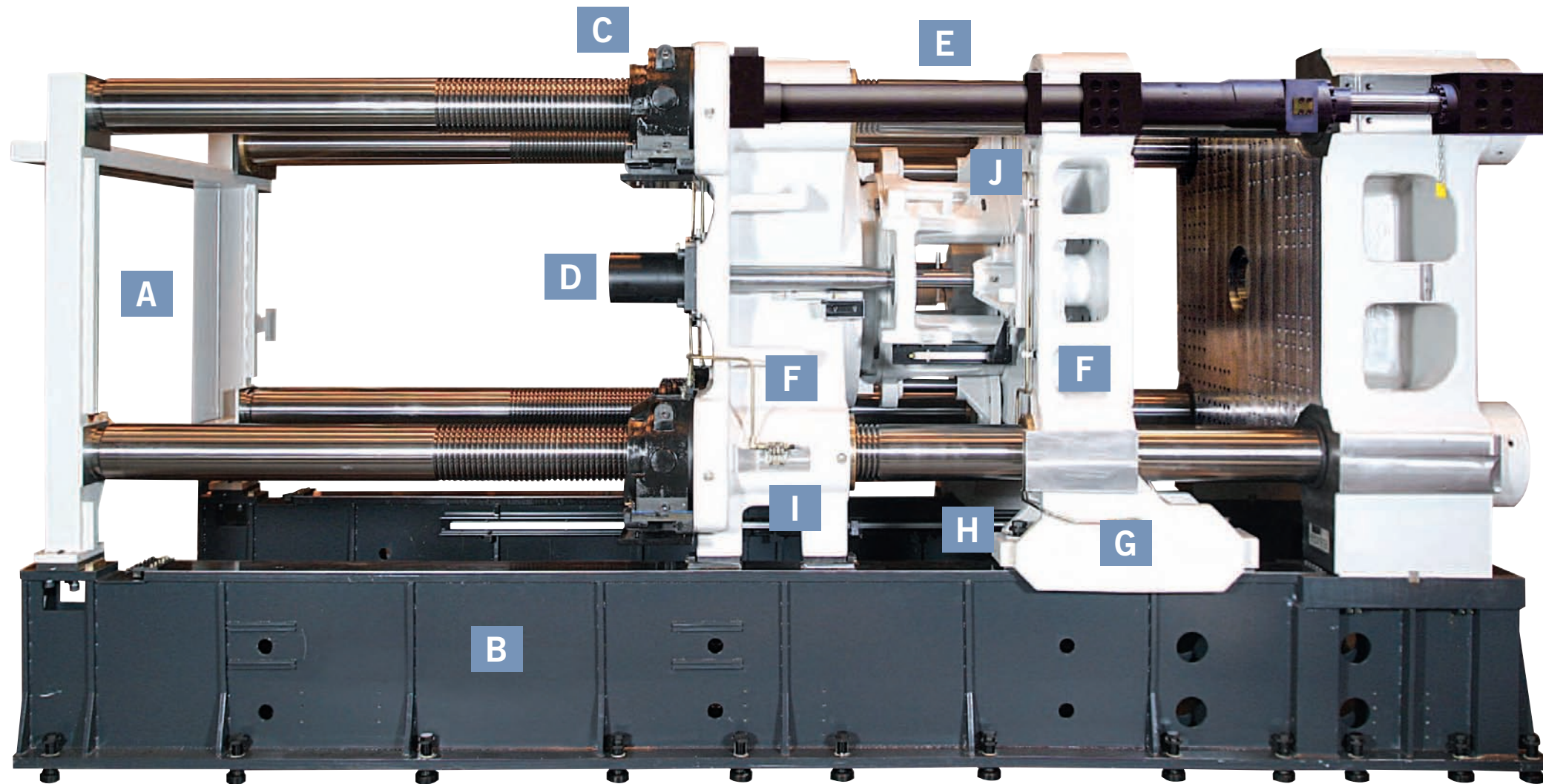


EASY MOLD LOADING ACCESS

Automatic tie bar retraction (optional) enables quick installation of bulky molds and low overhead crane situations. Reduces set-up to a fraction of the usual time.



STRONG AND RIGID CLAMP



EJECTOR/DAYLIGHT FLEXIBILITY

J The ejector mechanism is open and accessible for easy mold set-up. The ejector can be removed for even greater mold daylight on MG 1800 and larger models.

K To achieve the increased daylight with the ejector removed, the mounting block for the traversing cylinder is relocated to the adjacent mounting position. The yellow “position” plug is inserted into the receptacle to signify the correct daylight.

A The **MAXIMA MG** tie bars are fully supported end to end by a rigid frame structure. **Ensures:**

- Platen parallelism
- Long mold life
- Less scrap
- Clamp durability
- Reduced maintenance
- Increased productivity

B The **MAXIMA MG** also features a rigid I-beam and plate construction base. **Benefits:**

- Maximum strength, rigidity, durability
- Carries weight to floor
- Lower machine centerline
- Wide open clearance from clamp to machine end

C Split locking nuts on buttressed grooved tie bar threads ensure aligned clamp lock-up.

D Two small cylinders pre-position the clamp for tonnage build and assist with clamp decompression.

E Rapid traversing cylinders open and close the clamp.

F The moving platen and cylinder platen together form a deep box structure for minimal deflection and optimal support for the mold.

Benefits:

- **G** The large, wide platen skate design assures platen and mold half parallelism.
- The robust skate design

accommodates a 2/3 maximum mold weight to be mounted on either moving or stationary platen.

- Results in longer mold life, less scrap and reduced maintenance.
- **H** The moving platen adjustable skates ride on hardened steel ways, and can be precisely adjusted as needed. This enables you to protect your mold and

machine investment as wear occurs over time.

- Automatic lubrication of the moving platen skates assures continuous low friction.
- Bronze bushings and autolubrication **I** provide long life and precision guidance for superior parallelism.

FAST AND EASY ON THE MOLDS

MAXIMIZE CLAMP SPEEDS WHILE PROTECTING MOLDS

MAXIMA MG has the fastest clamp in the industry and provides the best mold protection.

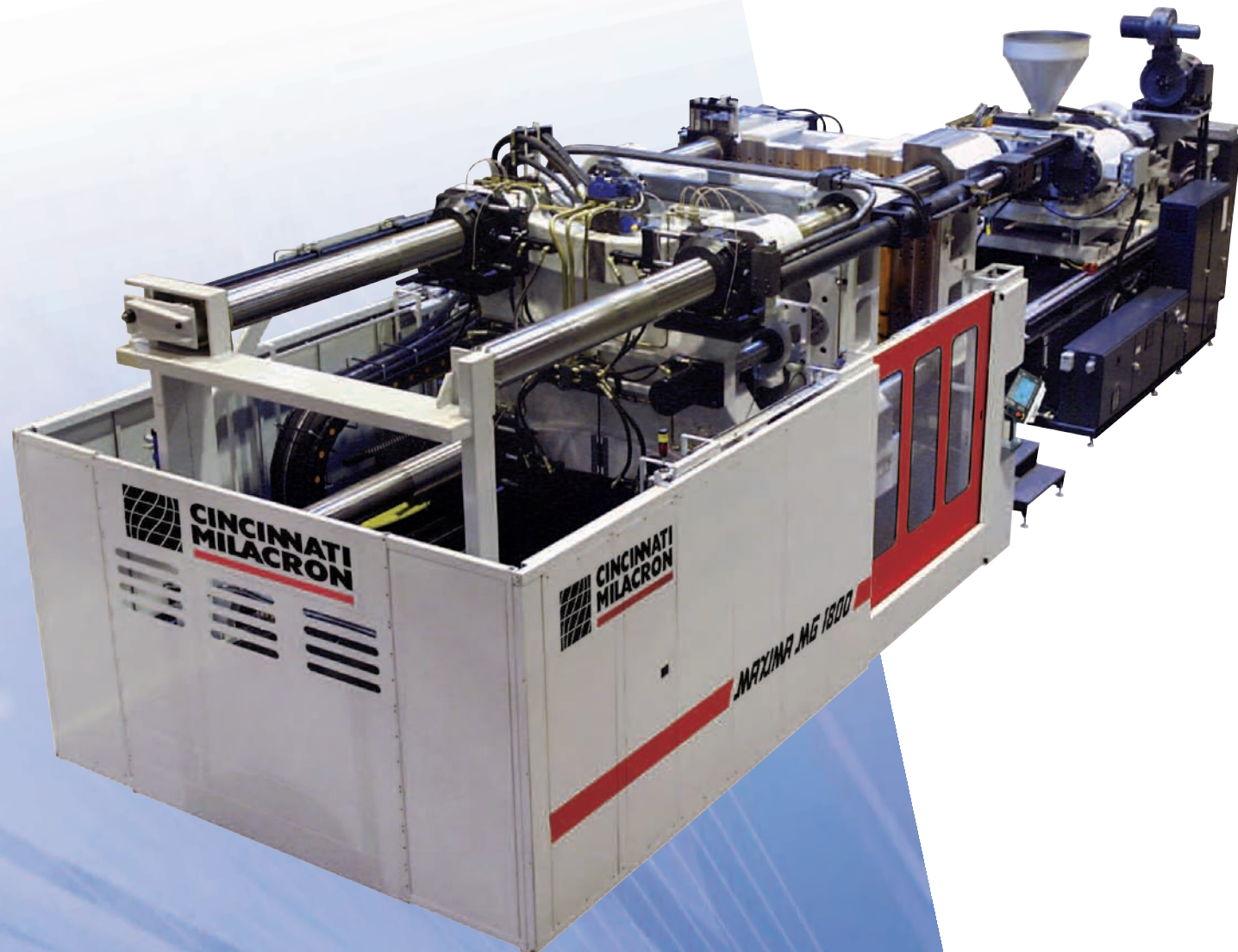
Benefits:

- Closed loop speed and pressure control ensure consistent cycles.
- Up to 3 clamp closing and 5 clamp opening speeds.
- Closed loop pressure differential mold protection is provided for True Force Control.

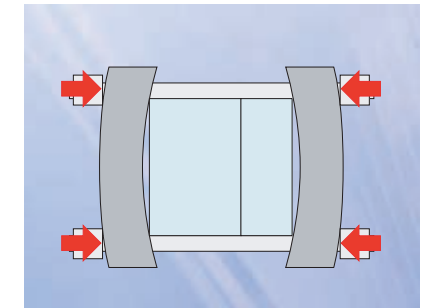
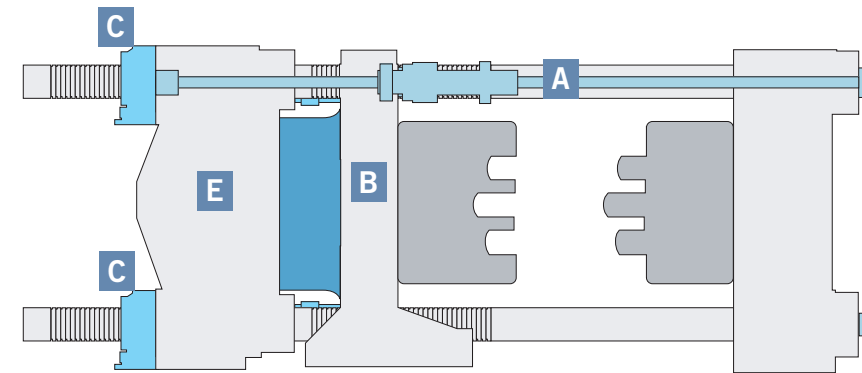
- Up to 3 mold protection stages are available.
- Closed loop tonnage control enables part consistency and quality.
- Clamp motions are easily configured for 3 plate molds and longer leader pins.

OPERATOR FRIENDLY

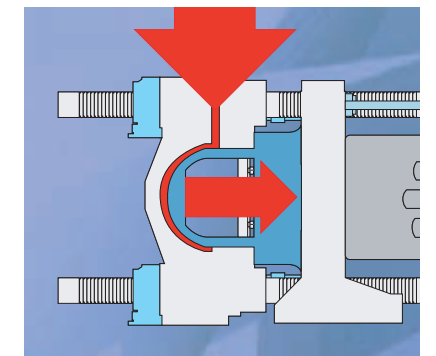
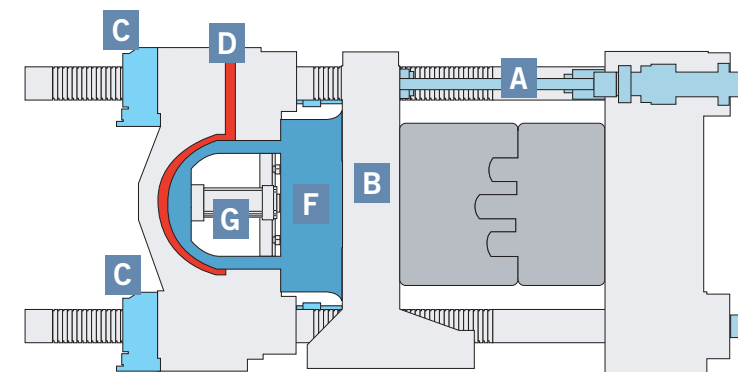
- Power operator gate allows convenient and safe access to the mold area.
- Full ANSI safety compliance protects your personnel.



DIRECT ACTING RAM



Typical 2 Platen deflection with tonnage cylinders at corners.



MAXIMA MG 2 Platen Direct Acting Ram with high pressure build up.

TONNAGE IS BUILT DIRECTLY BEHIND THE MOLD

Direct acting ram builds tonnage in the center, directly behind the mold.

CLAMP CLOSING: Rapid traverse cylinders **A** pull the moving platen **B** to close the mold.

CLAMP LOCKING: After mold close, the split locking nuts **C** close over the grooves on the tie bars.

TONNAGE BUILD: During tonnage build, high pressure hydraulic oil **D** in the cylinder platen **E** pushes the Direct Acting Ram **F** to build tonnage directly behind the mold.

INJECTION: After tonnage is built, the injection unit fills the mold.

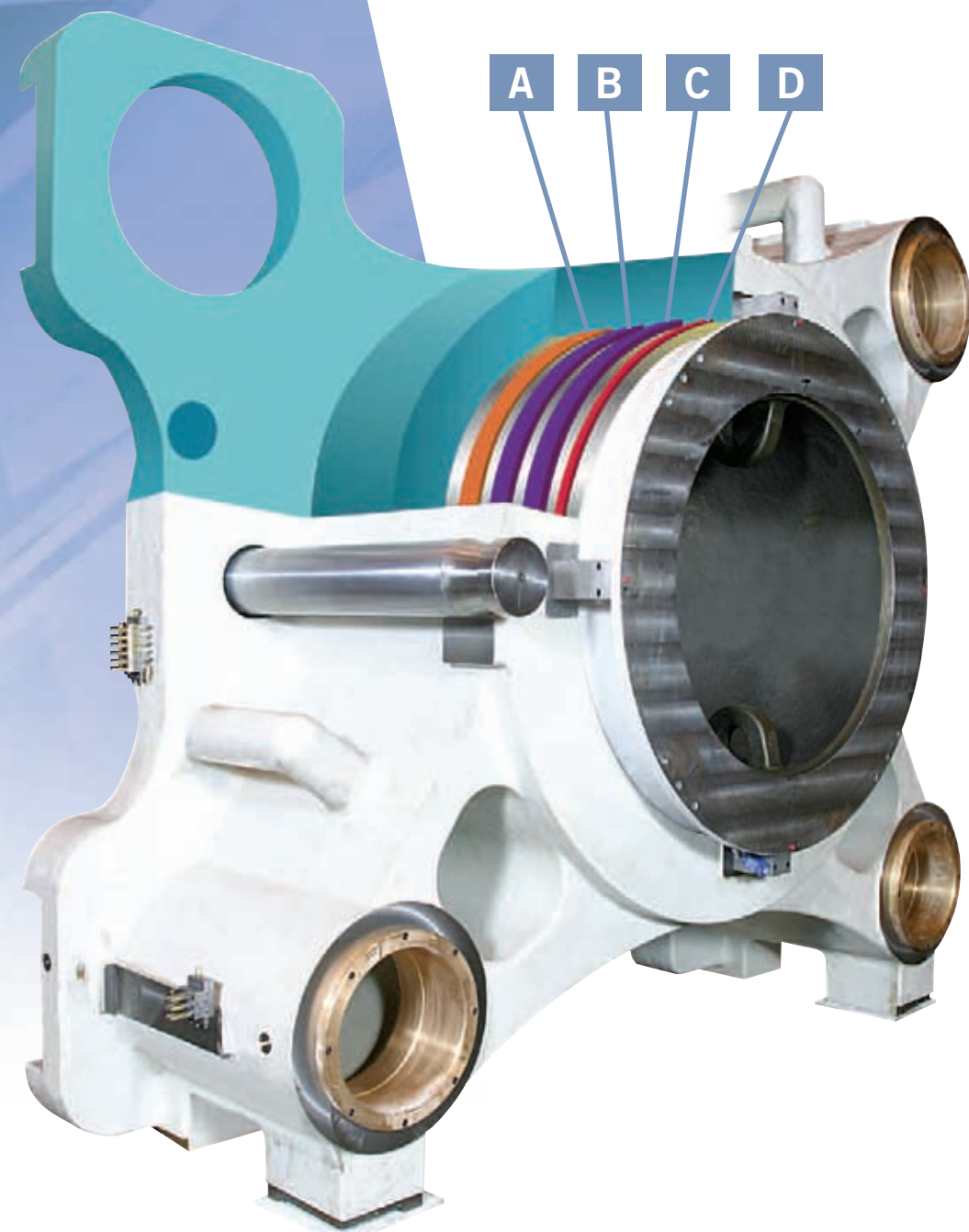
CLAMP UNLOCK-DECOMPRESS: Just prior to the cooling timer timing out, the clamp decompresses and is held closed by the rapid traverse cylinders and the split locking nuts **C** open.

CLAMP OPEN-EJECT: The rapid traverse cylinders move the platen back to open position. As the mold is opening, the SPI knockout bar, driven by the ejector cylinder **G** ejects the part.

BENEFITS:

- Short stroke tonnage build using a small volume of oil to compress results in faster tonnage build time.
- Reliable tonnage build. Only one piston to control, not four.
- Centrally actuated tonnage force directly behind the mold provides symmetrically distributed clamp forces across the mold area.
- Direct and even clamp force.
- Simple and proven design, resulting in improved uptime.
- Reliable and durable.
- Better alignment, assuring reduced mold wear.
- Better part quality and higher productivity.

FAST AND DURABLE CLAMP



FASTEST CLAMP SPEEDS IN THE INDUSTRY

MAXIMA MG clamps have fast and repeatable acceleration and deceleration, with dry cycle times one to two seconds faster than any comparable clamp in the industry. **A**

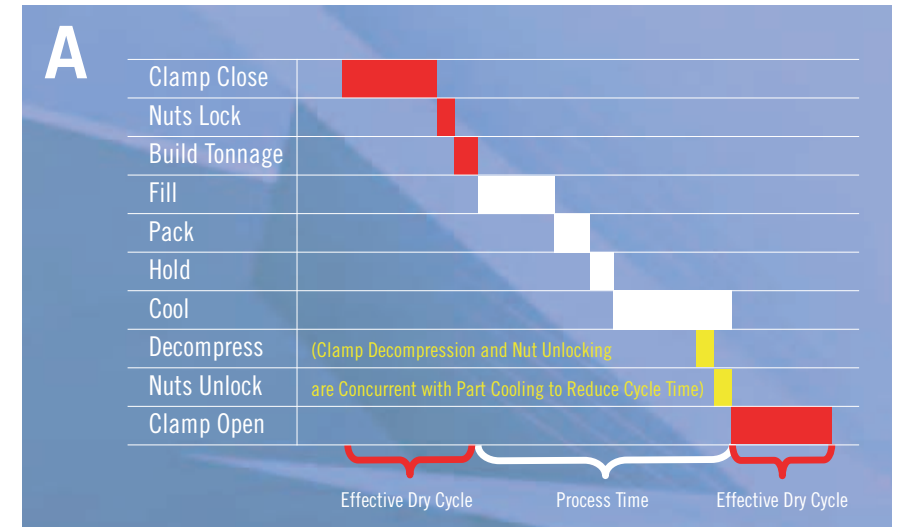
Clamp decompression and unlocking of nuts are concurrent with part cooling to reduce cycle time.

The MAXIMA MG4400 has an impressive clamp speed of 30 inches per second.

SPLIT LOCKING NUT TECHNOLOGY

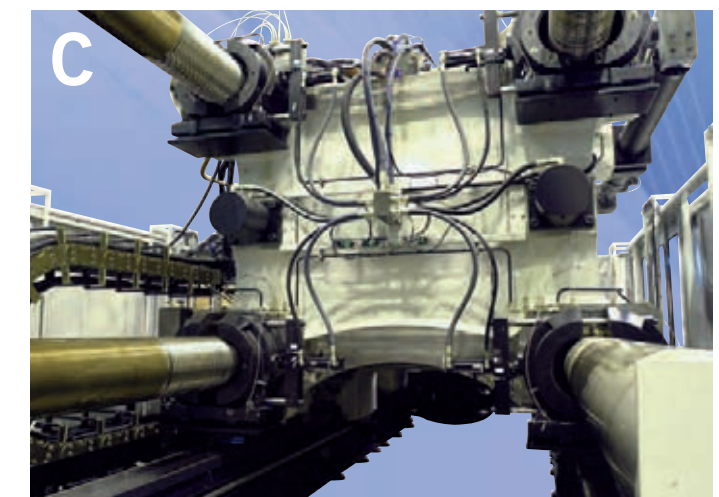
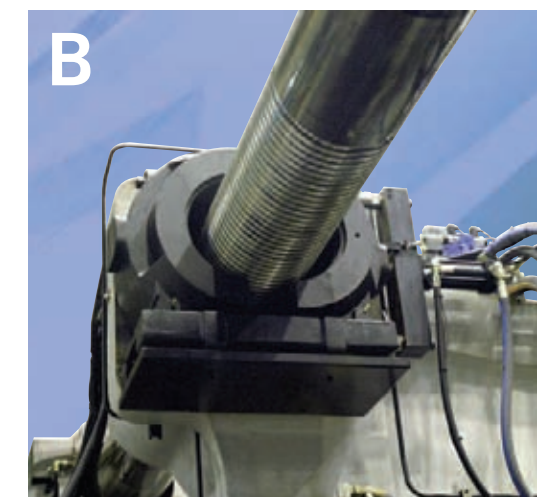
The MAXIMA MG features split locking nut technology **B** for increased precision and productivity:

- Reliable and durable technology. This design is proven by a decade of performance on our



hydraulic machines.

- Design distributes load across threads.
- Buttressed groove threads are angled to ensure precision lock-up.
- Compensates for out-of-square molds.
- Fast and accurate unlocking/locking
- Locking nuts are individually and accurately actuated, not relying on complex linkage.
- Clamp tonnage is built after all four lock nuts **C** are simultaneously fully engaged.
- Locking nut assemblies are equipped with automatic lubrication.
- Interlocked with limit switches.



ENERGIZED RAM SEAL SYSTEM

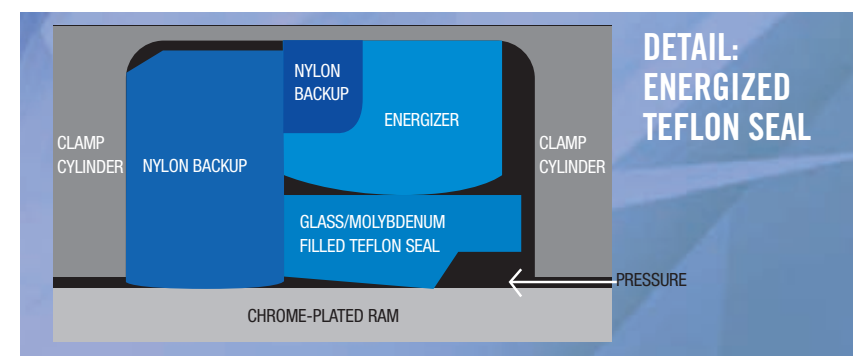
Proven and tested to provide long life with low friction, low wear, and no heat generated between the Energized Teflon Seals.

A RIDER RING The ultra high molecular weight polyethylene rider ring supports the ram and keeps it centered.

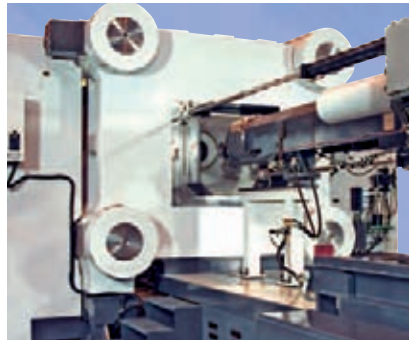
B C ENERGIZED TEFLON SEAL Two (2) glass/molybdenum-filled teflon seals provide a low friction ride

on the chrome-plated ram. The seals are energized with a rubber “O” ring that does not take a compression set.

D WIPER Keeps contamination out of the system.



PRECISION PROCESSING



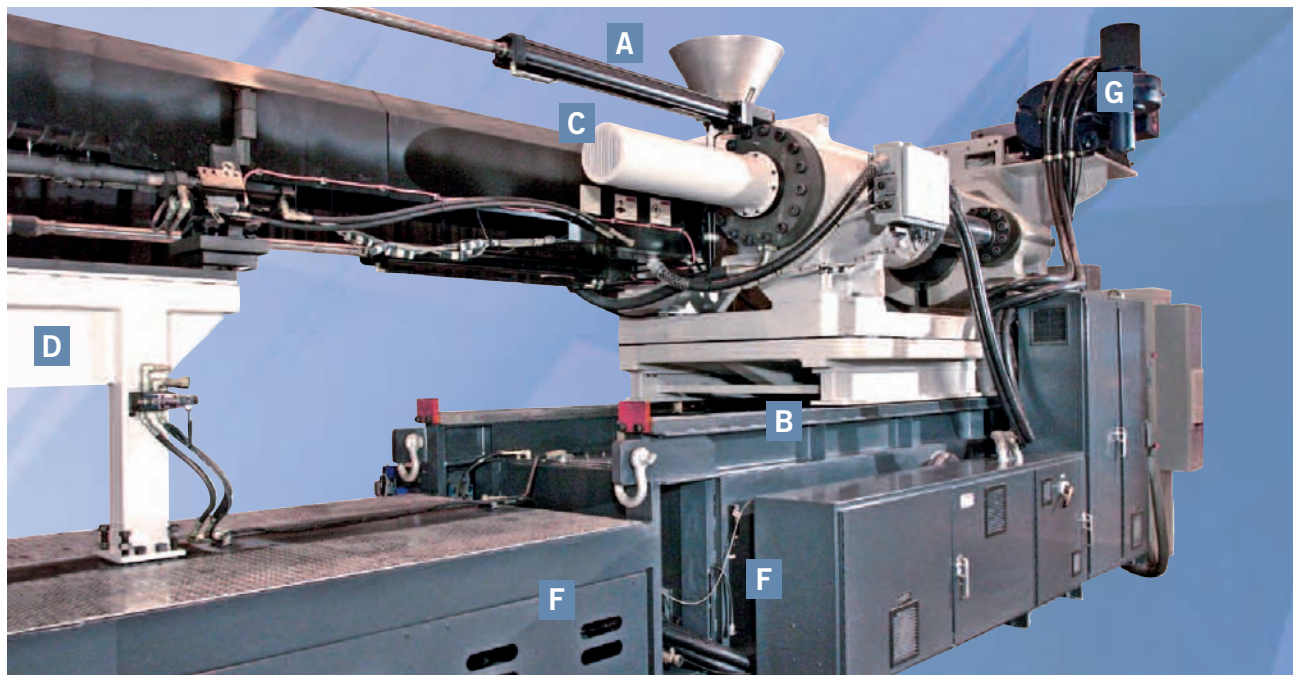
Clean and clear access to the purge area on operator and non-operator side of machine.



Powered injection unit swivel enables quick and easy access to maintain the screw tip or remove/install feed screws.



Larger tapered conical hole in the stationary platen provides excellent access to purgings and injection tip for removal.



INJECTION UNIT FEATURES

A Dual injection unit pull-in cylinders assure alignment and center-balanced force.

B Precision ways reduce misalignments affecting screw pick-up and cylinder leaks.

C Dual injection cylinders reduce machine footprint.

D Barrel support (optional) is provided to assure alignment of large injection units.

E Separate injection base and

transition base **F** facilitates shipping and installation.

G Optional high-efficiency AC electric extruder drive provides independent/parallel clamp and extruder operation for cycle time reduction and energy savings.

HIGH PERFORMANCE, APPLICATION SPECIFIC



The MAXIMA MG Series offers a wide selection of injection units and screw geometry. This means application specific solutions for every material formulation and plasticizing rate, including:

- High performance, high throughput
- Lower melt temperatures
- Better mixing and homogenization
- Wear resistant protection

BARR VBET

High Performance Variable Barrier Energy Transfer feedscrew increases conductive melting for higher rates with less energy.



High speed, high throughput, superior mixing without shear and without sacrificing recovery or cycle time.



Ultra high wear resistance package including super-alloy feedscrew plus super-wearing alloy barrel and screw tip.



Lubricity properties and corrosion resistance for optimal processing of polycarbonate without black specks.



Anti-corrosive package of feedscrew, smear-head tip and end cap eliminates all corrosive effects of PVC/CPVC processing.



INTUITIVE OPERATION OPERATOR PANEL
15 Inch touch screen framed by a Keyboard

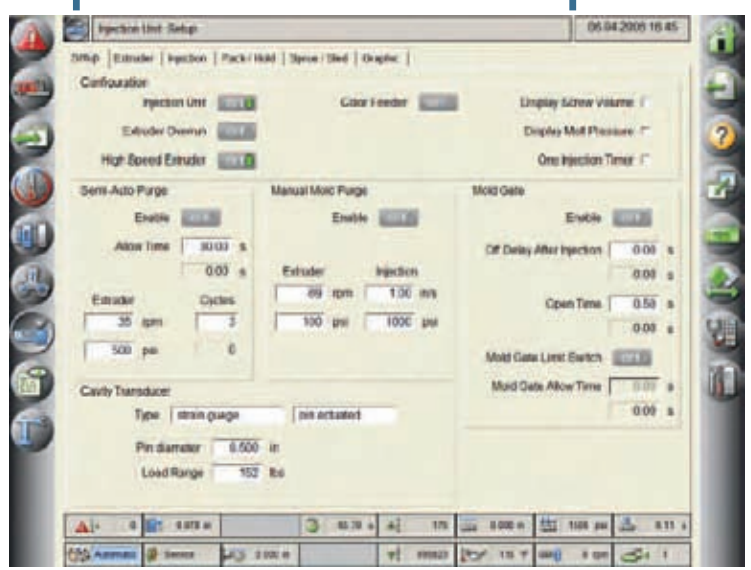
PRECISION CONTROL TECHNOLOGY FOR ALL APPLICATIONS

The MOSAIC Control is the high-performance control system that controls and communicates all **MAXIMA MG** machine functions and related parts producing processes. MOSAIC Control provides improved reliability, performance, and user-friendliness to keep your process in control. **A** Individual forward and retract manual movement keys for each axis. **B** Factory programmable buttons for added options. **C** Logical grouping and separation of the machine function and manual operator keys. **D** Swing-arm mount can be optimally positioned for each operator, allowing for an unobstructed view of the mold area.

INTUITIVE OPERATION TOUCH SCREEN

Message Bar: Displays the active alarm text or the current menu if no alarm exists

- Group Access Keys**
- Alarms
 - Overview
 - Mold Data
 - Temperatures
 - Clamp Unit
 - Cores
 - Injection
 - Production
 - Automation



- Special Function Keys**
- Home
 - Page Back
 - Help
 - Screen Export
 - Data Export
 - Foreground/Background Data
 - Diagnostics
 - System

Status Bar: The always visible Status Bar provides a quick glance at the current status of critical machine parameters, including actual feedback from sensors, current cycle count and current logged-in user.



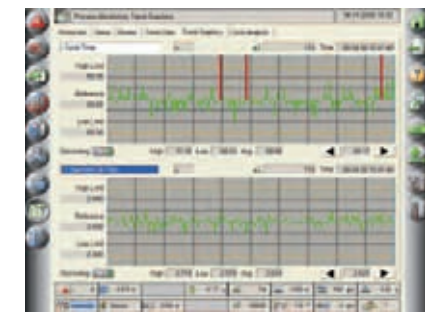
SET POINT OVERVIEW

- Single screen for setting clamp, ejector, injection and extruder
- Follows the configurations that are defined on the Primary Set Up tabs
- Great for quick setups and adjustments
- Improves operator setup efficiency



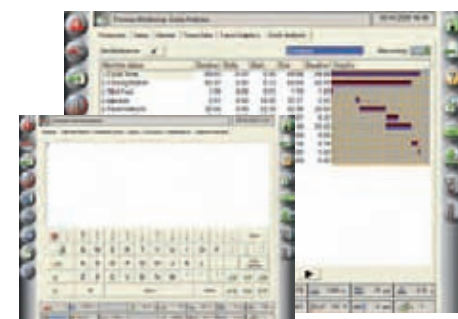
CONFIGURABLE I/O

- Ultimate flexibility for signal interfaces
- Eight 24 Volt DC Input or Output signals
- Signals are configured to machine to Machine Cycle Status
- 41 Output Cycle States and 14 Input Permissions
- Configurable Pulse Timers for inputs



PROCESS MONITORING TREND GRAPHICS

- Monitors trends on-line using trend graphics
- Select from any of the monitored variables (over 50 to select from)



PROCESS MONITORING

- Track your process for consistency
- High resolution timers and position feedback
- Selectable Alarm Bands
- Choose up to 16 parameters from a list of over 50



ENHANCED PROCESS GRAPHICS

- Ability to display one or two graphs
- Enables comparison to stored reference point
- Easy to use Cursor Control and Zoom Control
- Adjustable "Y" scaling



FLEXIBLE INJECTION SETUP

- Up to 10 segments of Injection Velocity
- Transfer each segment on Position, Volume, Pressure or Time
- Up to 10 Pack/Hold Pressure/Time/Velocisty steps
- Display either Hydraulic or Melt pressure
- Graphic display of Pressure and Velocity actual values

MOSAIC CONTROL

- 15 Inch Diagonal Screen
- TFT Flat Panel
- Touch Screen (Analog, Resistive)
- Dual Intel Processors
- Swing Arm Mount
- IP65 Protection (against dirt and contaminants)

MOSAIC FEATURES

- Two USB 2.0 Ports
- Ethernet port - TCP/IP and FTP protocols
- All -digital positions feedback for high accuracy

- Direct Menu Access
- Machine History Notepad
- Set Point Overview
- Enhanced Operator ID
- Alarm Log
- Change Log
- Process Monitor
- Statistical Process Control (SPC)
- Volume/Position/Pressure Injection Setpoints
- Melt or Hydraulic Pressure Transfer
- Freely Configurable I/O
- Enhanced Plotting Graphics with Cursors
- Built-in Web Server

MOSAIC OPERATOR SCREENS

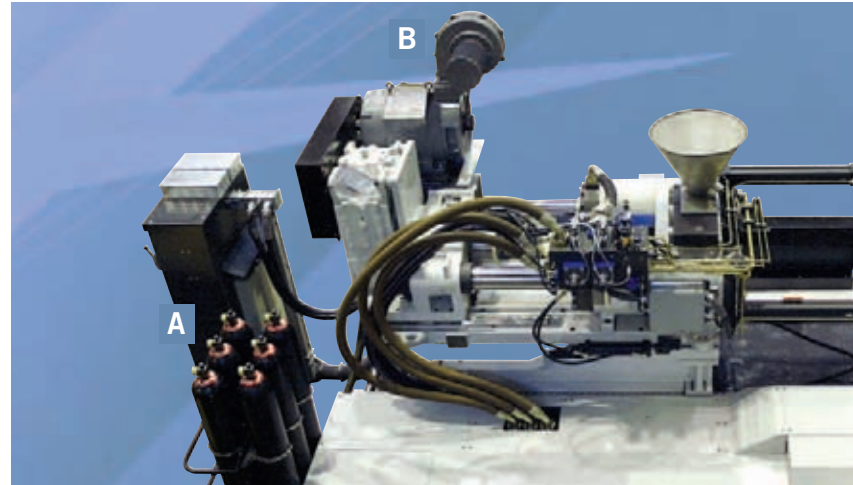
- Screen layouts are clear, concise and easy to understand.
- Direct Group Access Keys for quick machine setup.
- Pop-up keyboards for data and text entry.
- Drop down selection boxes for choosing items from a list.
- Lighted On/Off buttons.
- Choice of Language and Units of Measurement.

HIGH PERFORMANCE

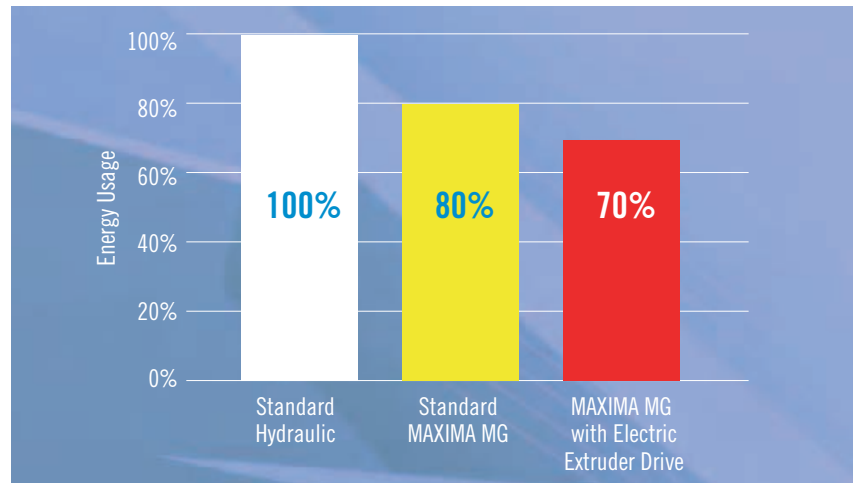
MAXIMA MG machines are available with higher performance injection options capable of substantially higher injection rates. High performance options include:

Accumulator assisted injection **A** for high speed injection rates.

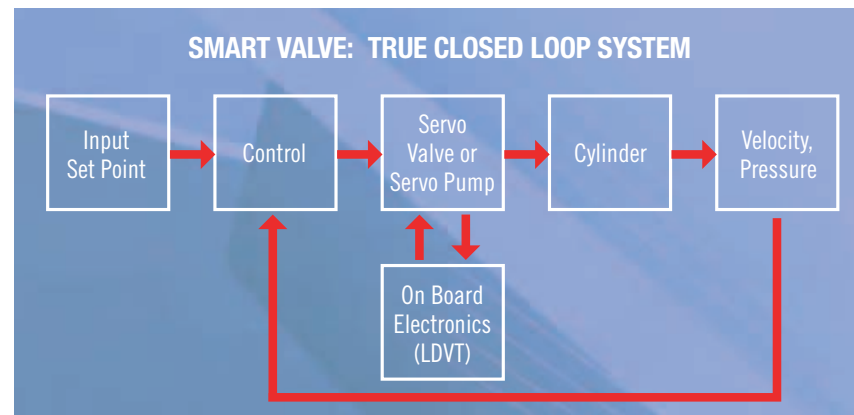
High efficiency AC electric extruder drive **B** provides independent and simultaneous clamp and extruder operation for reduced cycle time and greater energy savings.



The hydraulically powered rotary nozzle shut-off valve **C** prevents material from flowing into the mold runner system while the screw is rotating and the clamp is opening during independent operation.



This graph shows how the MAXIMA MG equipped with an electric screw drive saves energy with each cycle compared to both a standard MAXIMA MG and a standard hydraulic machine.



SMART VALVES

The MAXIMA MG Series uses “smart” proportional valves with internal control circuits. The valves have no LVDT’s to tune, and are less sensitive to contamination. Precision repeatability maintains your process values over long production runs, cycle to cycle.

RELIABLE AND SERVICE FRIENDLY

SERVO-CONTROLLED VARIABLE VOLUME PUMPS

Servo-controlled variable volume pumps **A** provide the highest level of hydraulic circuit control. The system uses only the oil you need when you need it. Utilizes proven and reliable A4 and A10 piston pumps for best performance and uptime.

MAINTENANCE-FRIENDLY POWER

Pumps and motors are located in easily accessible enclosures. **B**

Sound absorbing covers keep the components clean.

SETUP-FRIENDLY

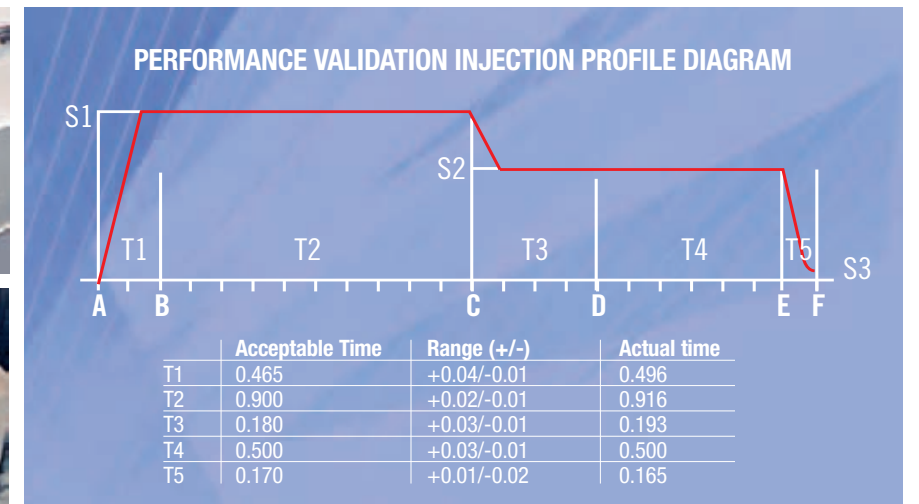
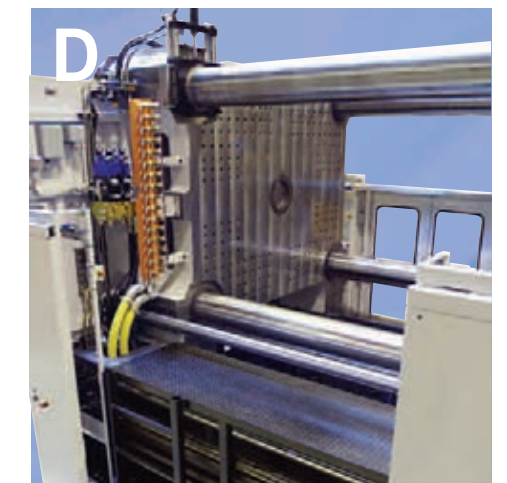
Extra space is provided in the cat track **C** to accommodate utility lines to the mold. Wide and spacious access is also provided for mold setup and utility connections. **D**

PERFORMANCE VALIDATION

Performance Validation Tool (PVT) software testing is run on all machines during the final phase of

manufacturing. PVT validates precision and accuracy for the following critical machine control functions:

- Injection Pressure
- Injection Velocity
- Eject Forward Velocity & Position
- Eject Retract Velocity & Position
- Clamp Forward Velocity & Position
- Clamp Retract Velocity & Position

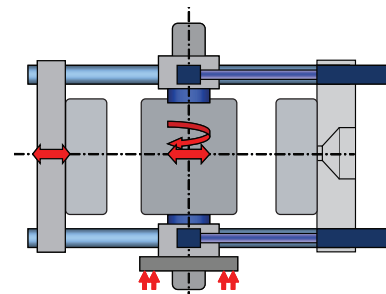


ADDING VALUE THROUGH MULTI-MATERIAL TECHNOLOGY

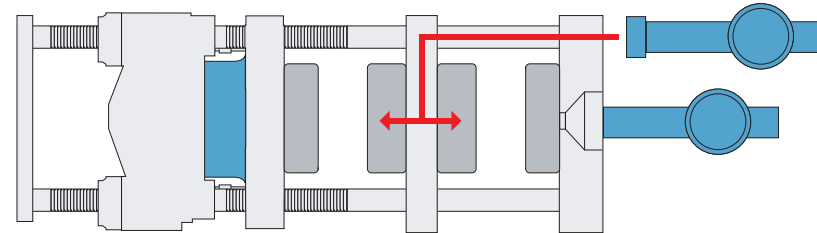
The **MAXIMA MG** product platform is designed to be easily adapted to support your application needs and handle next generation products. The MG Series machines are designed with modularity to readily equip you with multi-material process technology. Multi-component **MAXIMA MG** machines enable you to realize the added value from multi-material design flexibility, functional integration, parts consolidation, assembly reduction, increased productivity and reduced cost.

CO-INJECTION APPLICATIONS

- Foamed core for reduced weight and noise transmission
- Glass filled cores for improved physical properties
- Low cost core for cost savings
- High gloss skin material over structural core material for combination of aesthetic and structural properties
- Post consumer or industrial recycled material for environmentally friendly core



Stack Turning Technology



Stack Mold with Offset Injection Units

STACK-TURNING TECHNOLOGY

Advantages:

- Doubled number of cavities with the same clamp force.
- Vertical axis of rotation
- Center platen is guided by tie bars and supported by base
- Heavy molds are easy to handle
- No harmonic arm required

- In-line assembly is possible
- Vertical turning of 180 degrees in less than 3 seconds
- Melt delivery system for second component
- Part removal has no influence on cycle time
- Cost reduction for parts up to 25% possible

STACK MOLD TECHNOLOGY

The **MAXIMA MG**'s strong and rigid clamp with extensive daylight readily supports stack molds and can be configured quickly with offset injection units and melt delivery systems.

SYSTEMS AUTOMATION

Milacron's extensive experience in injection molding machines and processes enables us to provide you full system solutions for your complex molding production challenges. Our machinery and system services range from single cell injection molding machines with basic automation to complete plant systems. Our products and services extend from the planning phase through production start up.

- Material conveying, storage, drying and blending systems
- Integrated heat transfer systems
- Mold changing and mold clamping systems
- Robotics and conveyor systems
- Degating, assembly and other secondary operation systems



HEAT TRANSFER

Precise and efficient heat removal and proper mold cooling means productivity and profitability. Milacron integrated heat transfer systems offer you comprehensive and optimum temperature control through all process phases and supporting systems.

MATERIAL MANAGEMENT

From receiving to process, Milacron Material Management equipment and systems are precisely engineered for your specialized operations. Material conveying, storage, drying or blending, Milacron delivers advanced design and highest quality at the most competitive prices as part of our total support.

PART HANDLING

Part handling and secondary operations can add profitability. High speed automation is the tool which enhances productivity. Milacron provides a comprehensive line of robots and conveyor systems to handle degating, assembly and many other operations.