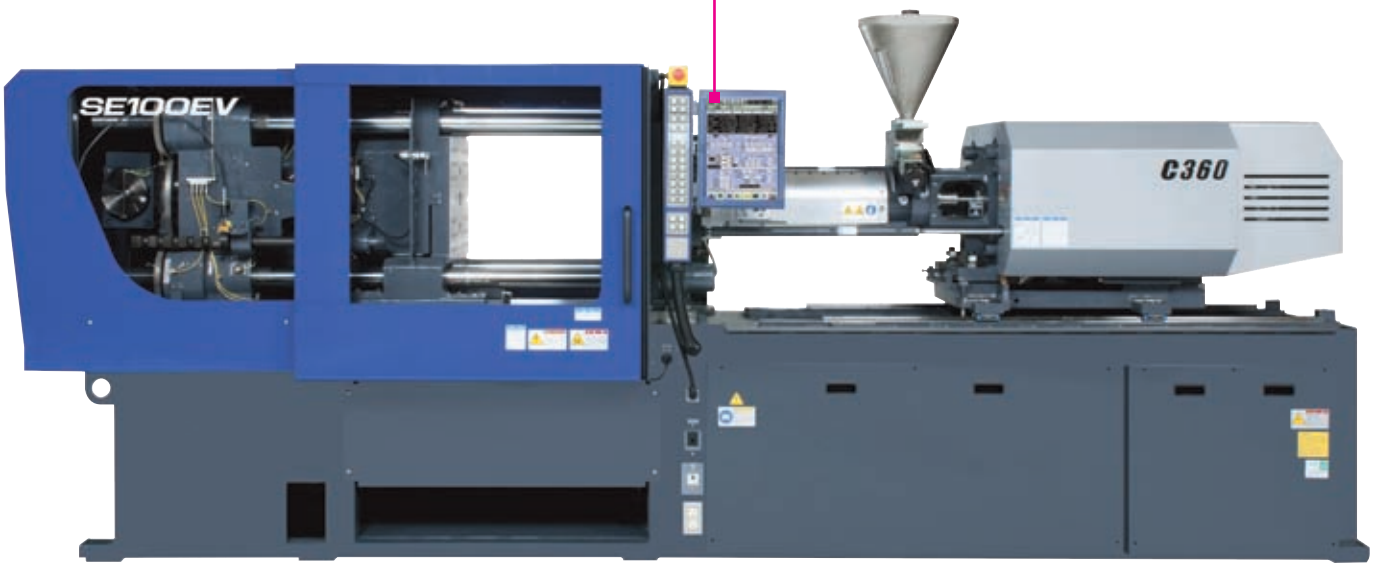
Sumitomo SHI DEMAG

SE-EV Advanced All-Electric Series

SE-EV Series Advanced All-Electrics

Model sizes: 56, 84, 112, 146 and 202 U.S. tons

New NC-10 control with Z-molding capabilities plus improved ease-of-use, processing speeds and configurability



The Sumitomo (SHI) Demag Difference

- Sumitomo's advanced motor technology and the company's ability to design and build specialized motors for injection molding machines, ensuring the best combination of motors for the machine type, function and size
- Over 20 years of R&D on all-electric injection molding machines
- A successful track record of breakthrough technologies that improve precision and production efficiency
- Z-molding capabilities which ensure ease of use, optimize machine performance and redefine precision
- A standard-setting warranty program and highly rated training, service, support and parts availability

Innovations and advanced technology can be seen from end-to-end on the new SE-EV Series all-electric injection molding machine. Building on the high-performance and field-proven SE-DUZ/HDZ platform, the SE-EV redefines molding stability and precision, easy operation and energy efficiency.

Throughout this brochure you'll see the many features and capabilities that are new and/or unique to Sumitomo (SHI) Demag. Our unique Z-molding capabilities, for example, provide exceptional molding precision with low-pressure filling and reduced clamp force, and are designed to help molders achieve zero-defect molding and optimum machine performance.

Sumitomo's advanced motor technology is another unique feature of our all-electric machines. For the SE-EV, the new 3rd generation direct-drive motors used for injection and plasticizing are low inertia/low friction servo motors that deliver exceptional control even at low speeds, improved injection speed response and molding stability.

Some added features to the SE-EV that were not found on the SE-DUZ include: a new linear guidance system and greaseless tie bars, high nozzle-contact force, a 4x16 vertical ejector pattern on the 202 U.S. ton model and the availability of the revolutionary SL Screw as a standard option.

As with all Sumitomo (SHI) Demag machines, the SE-EV is backed by a comprehensive Customer Satisfaction Program with our standard-setting warranty program, worry-free parts, responsive field service and financing availability — plus advantages such as expert processing assistance.

Unmatched Control

New on the SE-EV Series is the PC-based NC-10 Control that is both easy to use and helps prevent molding mistakes.

In addition to the advantages of the Simple Process Setting System described below, the NC-10 Control includes a wide range of helpful features and improvements:

- 15.1-inch full touchscreen panel
- Swivel screen
- Faster processor speeds
- Key-lock codes to manage access to molding conditions
- Operating system support for 15 languages to meet global production requirements
- Ability to customize content
- Improved configurability for cores and other sequences
- Improved graphing capabilities
- Multiple USB ports for storage and peripheral devices

New swivel-mounted NC-10 Control

Simple Process Setting System

Z-molding

Z-molding's Simple Process Setting (SPS) System allows easy setup and operation and helps the operator avoid oversights and mistakes.

With the SPS System, there are about half the settings of earlier systems. This frees operators from complicated setting operations and enables them to set stable conditions in a short amount of time.

Helpful screen layouts and pictograms make the touchscreen intuitive and easy to use. The basic settings area for each process is always shown on the screen. Detailed settings can be made on easy-to-locate sub menus that are selected by using tabs, eliminating the need to page up or down.

Operating keys are laid out to enhance operability when mounting molds and setting molding conditions and to help prevent accidents and mold damage caused by operator mistakes.

Key advantages of the SPS System include:

- Settings are arranged by process from operator's viewpoint
- One Process = One Screen
- Screen switching has been reduced for mold setup and purging
- By helping avoid operator errors, part quality problems, mold damage and scrap are reduced

SE-EV Injection Unit Features

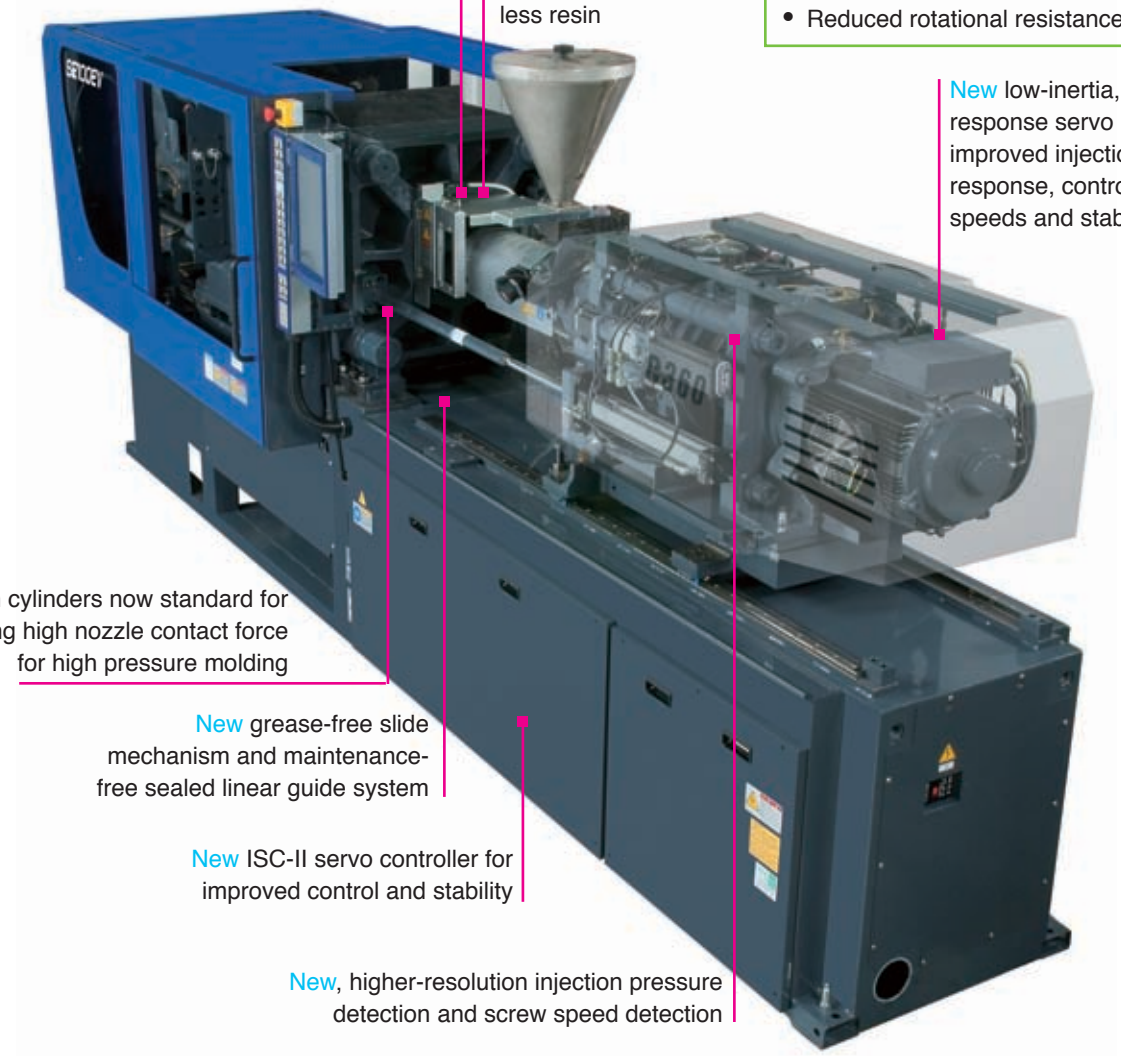
Injection speeds up to 550 mm/sec and an HP model with speeds up to 1000 mm/sec

New resin change purge mode reduces purge time by **50%** and uses less resin

Energy Saving Improvements

- Multi-layer, heat-retaining barrel cover
- Reduced motor friction
- Reduced rotational resistance

New low-inertia, high-response servo motors for improved injection speed response, control in low speeds and stability



Twin pull-in cylinders now standard for maintaining high nozzle contact force for high pressure molding

New grease-free slide mechanism and maintenance-free sealed linear guide system

New ISC-II servo controller for improved control and stability

New, higher-resolution injection pressure detection and screw speed detection

The SE-EV's wide choice of injection units combined with the new lower inertia/faster response design of the direct-drive motors provides:

- Higher injection power (torque) and velocity — with injection speeds up to 550 mm/sec, and injection pressures up to 2794 kgf/cm^2
- Unerring velocity control from .01 mm/sec to the maximum for improved precision on a wide range of applications
- Faster velocity response, unaffected by belt elasticity, for parts with extremely tight tolerances

The high torque of the screw drive motor is a major advantage for high-viscosity resins. And compared with hydraulic machines, the SE-EV requires fewer control devices because there are no proportional and directional valves.

Other SE-EV injection unit features include:

- Programmable switchover from velocity to hold selectable by position or pressure
- Hold pressure settable and accurate to 1kgf/cm^2 from 0 to 2794 kgf/cm^2 depending on machine size
- Flash speed mode that provides fast response control of velocity and pressure, before/after V/P switchover
- Synchro-plast control mode for resins with low viscosity or uneven pellet size. In this mode, control of screw position and back pressure are optimized.
- PID temperature control system that optimizes melt conditions with 2-second sampling and 0.1°C settable barrel zones

Additional temperature control features include: nozzle temperature control as standard, a double-shield barrel cover, heater burnout monitor, synchronized heat-up, and a water cooling jacket temperature control device.

Patent Pending
Flow Front Control System

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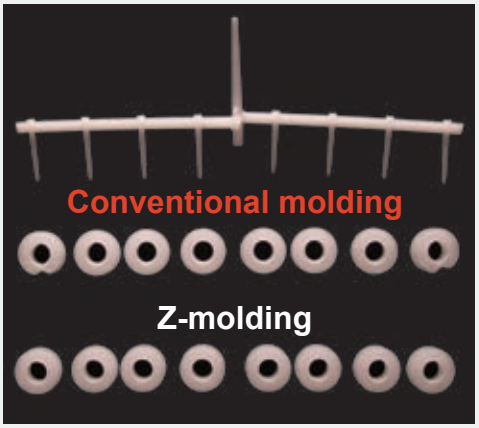
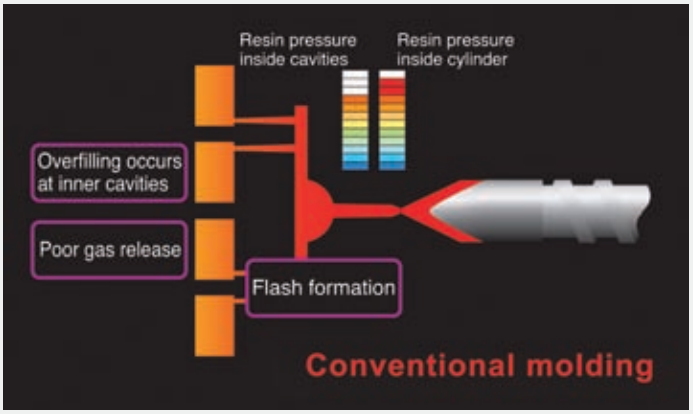
The FFC System, working together with the new ISC II (Intelligent Servo Control) and the direct-drive injection motor, optimizes the flow front and allows precision control of low internal pressures inside the cavities. Results for the SE-EV are further reduction in weight fluctuations between continuous shots and between cavities compared with the SE-DUZ. The FFC system:

- Takes advantage of the viscoelastic properties of the resin and allows complete filling without flash
- Provides precision control of screw position to ensure consistent filling
- Allows gases to be released to prevent short shots
- Ensures improved cavity balance (including by part weight) for multiple cavity molding applications

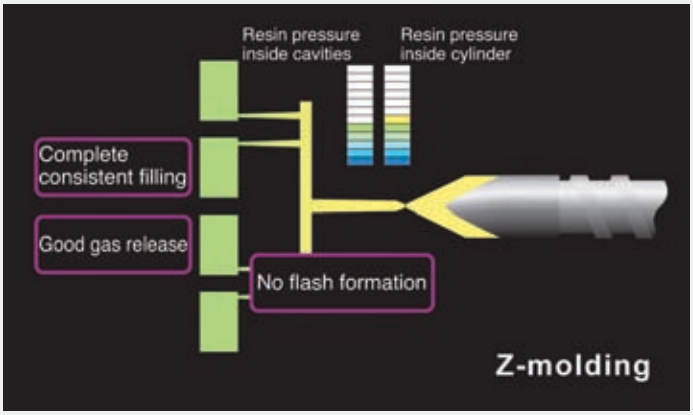


The FFC System achieves complete filling of the bobbin parts with no flash.

Z-molding



In conventional molding, by fully charging resin into the mold cavities, overfilling and compression occur at the inner cavities and gasses are trapped.



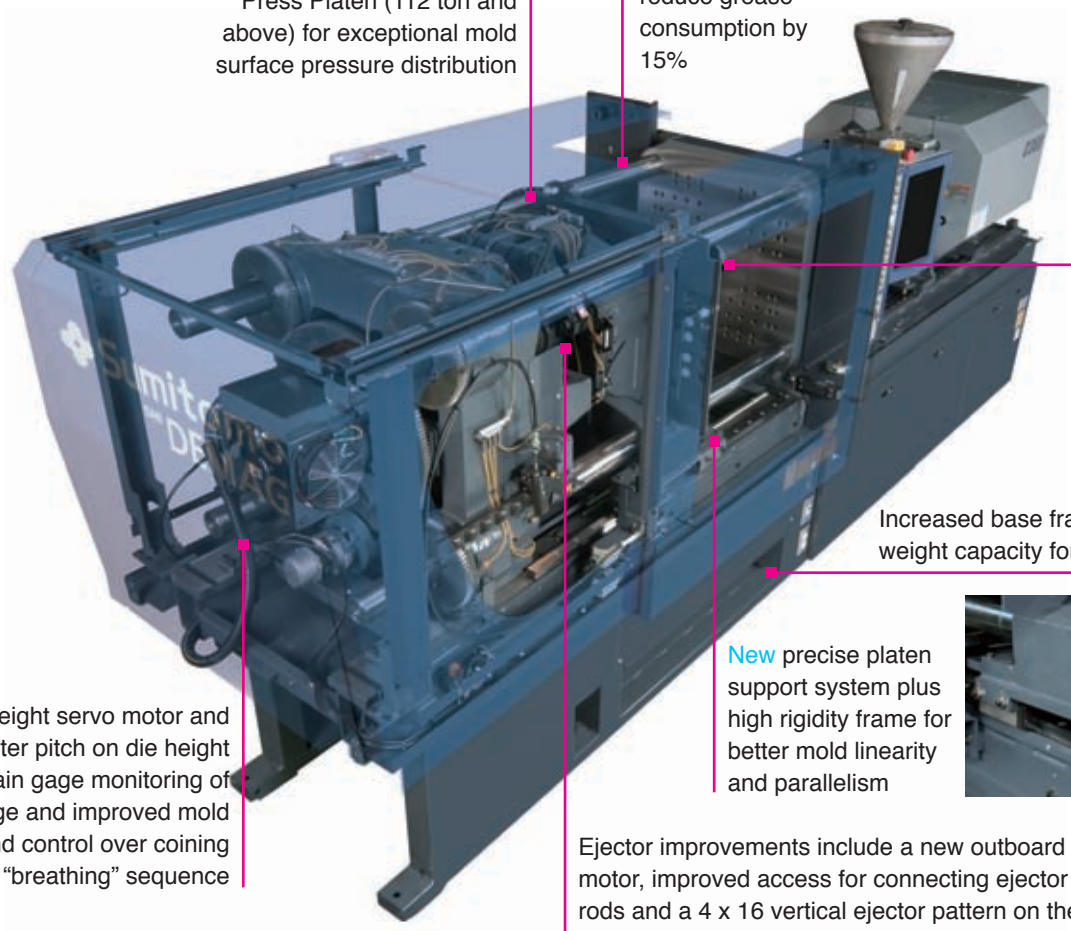
The FFC System restricts screw position to optimize the flow front. Problems associated with overfilling and trapped gases do not occur.

The field-proven SD screw (standard) is designed to ensure the stability of the melt, contributing to consistent quality and improved yield. Sumitomo (SHI) Demag also makes available screws of differing designs, materials and coatings that customers can match to resin properties/application requirements.

The new SL Screw Assembly is also available on the SE-EV Series as a standard option. See page 8 for details.

For high-speed, high-pressure applications, the SE-EV-HP offers injection speeds up to 1000 mm/sec.

SE-EV Clamping Unit Features



Optional Double Center Press Platen (112 ton and above) for exceptional mold surface pressure distribution

New plated, bush-less tie bars keep mold area grease-free and reduce grease consumption by 15%

New twin-cylinder high contact force (nozzle touch) system for high-precision control under high injection pressures

Increased base frame support & weight capacity for moving platen

New precise platen support system plus high rigidity frame for better mold linearity and parallelism

New die-height servo motor and encoder, tighter pitch on die height gears, strain gage monitoring of actual tonnage and improved mold protection and control over coining and “breathing” sequence

Ejector improvements include a new outboard servo motor, improved access for connecting ejector rods and a 4 x 16 vertical ejector pattern on the SE180EV as standard. Two new options are also available that increase ejector torque and increase ejector stroke without impacting clamp stroke.

In addition to the many features on these two pages, the SE-EV’s clamping unit is designed to meet a meet a wide range of application requirements. Features include:

- Clamp open/close speeds to 1200mm/sec
- Multi-stage mold open/close speed control
- Excellent clamp force linearity, from low to high tonnage
- Selectable auto-ramping modes that can be used to optimize clamp open/close profiles for fast cycling with shock-free movement

Machine vibrations are greatly dampened on the SE-EV even in high cycle molding. This is due to the improved direct drive system, high precision platen support, a high rigidity frame and a servo controller with a new algorithm.

Mold protection — an important factor for take-out robots and 3-plate molds — is ensured with monitoring by precise optical encoders and full closed-loop control.

Energy Efficiency and Grease Use Improvements

The SE-EV consumes 25% less power than the SE-DU and 15% less power than the energy-efficient SE-DUZ. Grease consumption is reduced by 50% too. Design features include:

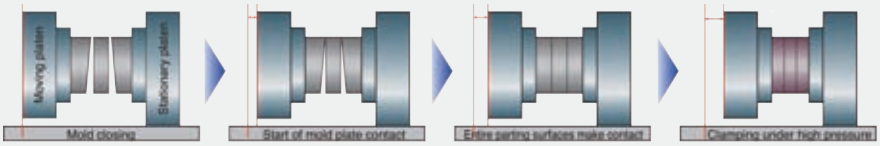
- Reduced motor friction and rotational resistance
- Reduced sliding friction for mold open/close via use of linear guides and bush-less tie bars for the clamp
- New toggle link design (lock-up design) that eliminates power consumption during clamp hold
- No grease on tie bars
- Self contained lubrication on linear rails
- Monitored distribution block that ensures proper amount of lubrication to each point

Minimum Clamping Molding System

Precision clamp force detection and the feedback control capabilities of the MCM System determine the minimum force required at mold touch. The MCM also works together with the Clamp Force Correcting System to compensate for the thermal expansion of the mold.

Benefits of the MCM System include:

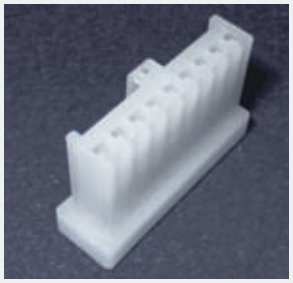
- Avoidance of burn spots and short shots
- Less trapped gases reduces mold maintenance
- Lower clamp force can also reduce power consumption, improve cycle time and in some cases allow molds to be run on lower tonnage machines



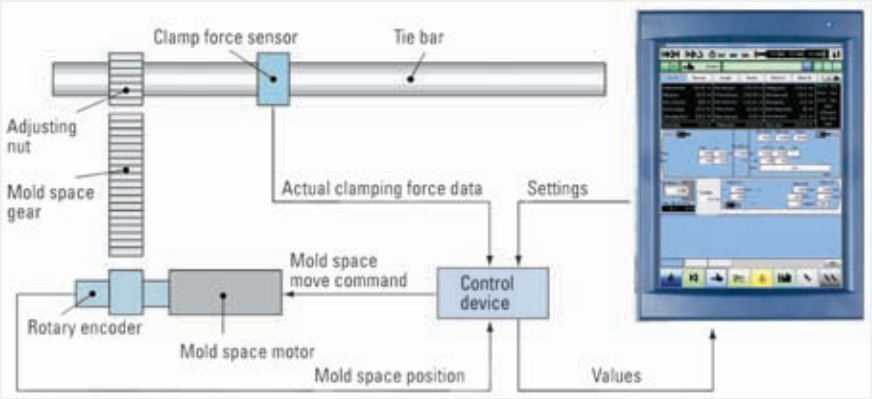
Clamp force detection at mold touch

Excessive clamp force deforms the mold

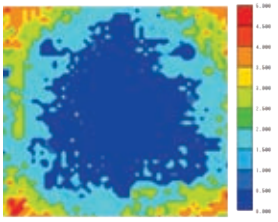
Z-molding



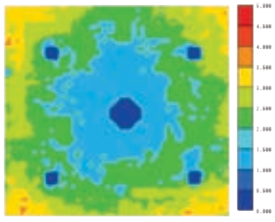
In testing on this connector application, Z-molding capabilities allowed pressure inside the cavities to be reduced by nearly 50% plus a significant reduction in the clamping force.



A new mold clamping mechanism on the SE-EV improves the accuracy of clamp force detection. The MCM System works together with the machine's Clamp Force Correcting System to compensate for the thermal expansion of the mold. Using a high precision rotary encoder and tie-bar-mounted strain gauge sensor, this feedback system keeps clamping force constantly stable, even at low clamp force settings.

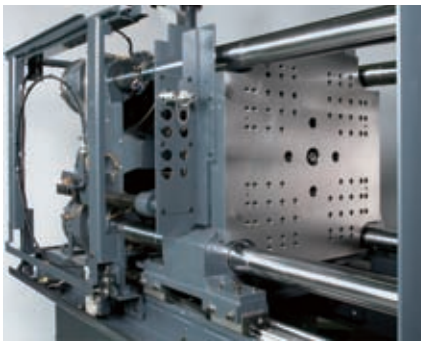


SE-DUZ Series



SE-EV Series

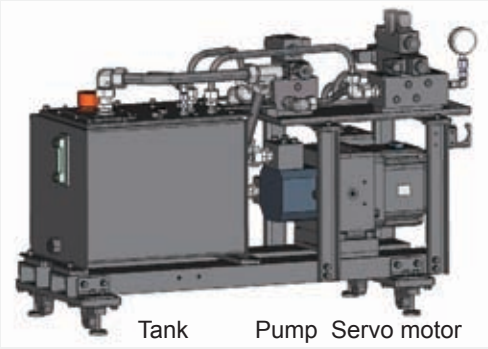
The SE-EV Series incorporates a linear guide support for the moving platen, a highly rigid frame and a high precision nozzle touch feature. Together, they improve precision and molding stability at low clamping force in terms of clamping accuracy, clamp force balance, platen parallelism and surface pressure. Shown above is the improved surface pressure balance achieved compared with the predecessor SE-DUZ Series.



All SE-EV model sizes were designed with extended tie bar space to accommodate larger side-entry molds.

Designed with progressive and quantitative valves, the SE-EV's new grease lubrication system reduces grease consumption and maintenance and improves reliability.

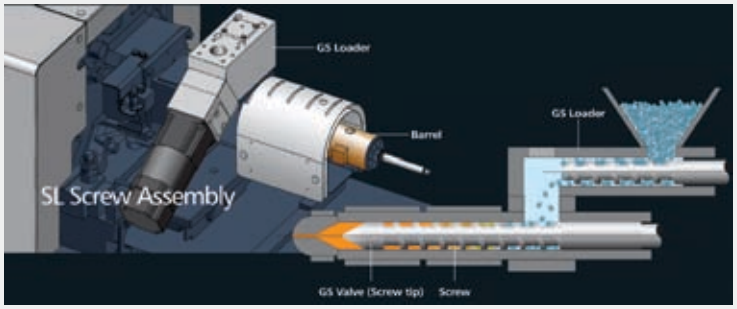
Optional ie Pump Unit



With core pull units, energy losses can be high because the pump used with conventional hydraulic units runs all the time. With the ie pump unit, the pump is driven by a servo motor, therefore the pump remains off when core mold operations are not being performed. This can reduce power consumption associated with core pull by up to 94%.

Optional SL Screw Assembly

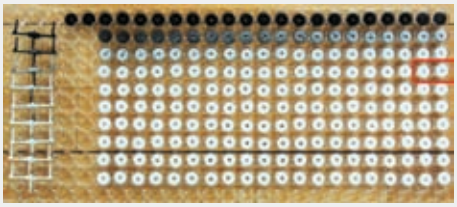
The revolutionary SL Screw Assembly is available as a standard option on the SE-EV Series.



In traditional molding, shear heat develops due to dragging resistance of the resin between the screw flights and the barrel. This causes fluctuation of the molten resin density and various other problems. The SL (Spiral Logic) Screw Assembly avoids these problems by eliminating shear heating instability.

Benefits:

- Uni-Layer Melting Model eliminates the compression zone of the screw and prevents burn spots and stagnation of the melt in the barrel
- Improves resin pressure stability and eliminates random short shots
- Significantly decreases screw and barrel wear caused by the formation of super critical water
- Eliminates product surface blistering due to incomplete material melting



The SL screw assembly also allows exceptionally fast color and/or resin change out. In this two-cavity mold example, the 40th shot shows complete changeover from black to white.

Sumitomo SHI DEMAG

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