X2F

E60Vi

A revolution in injection molding.

www.X2F.com

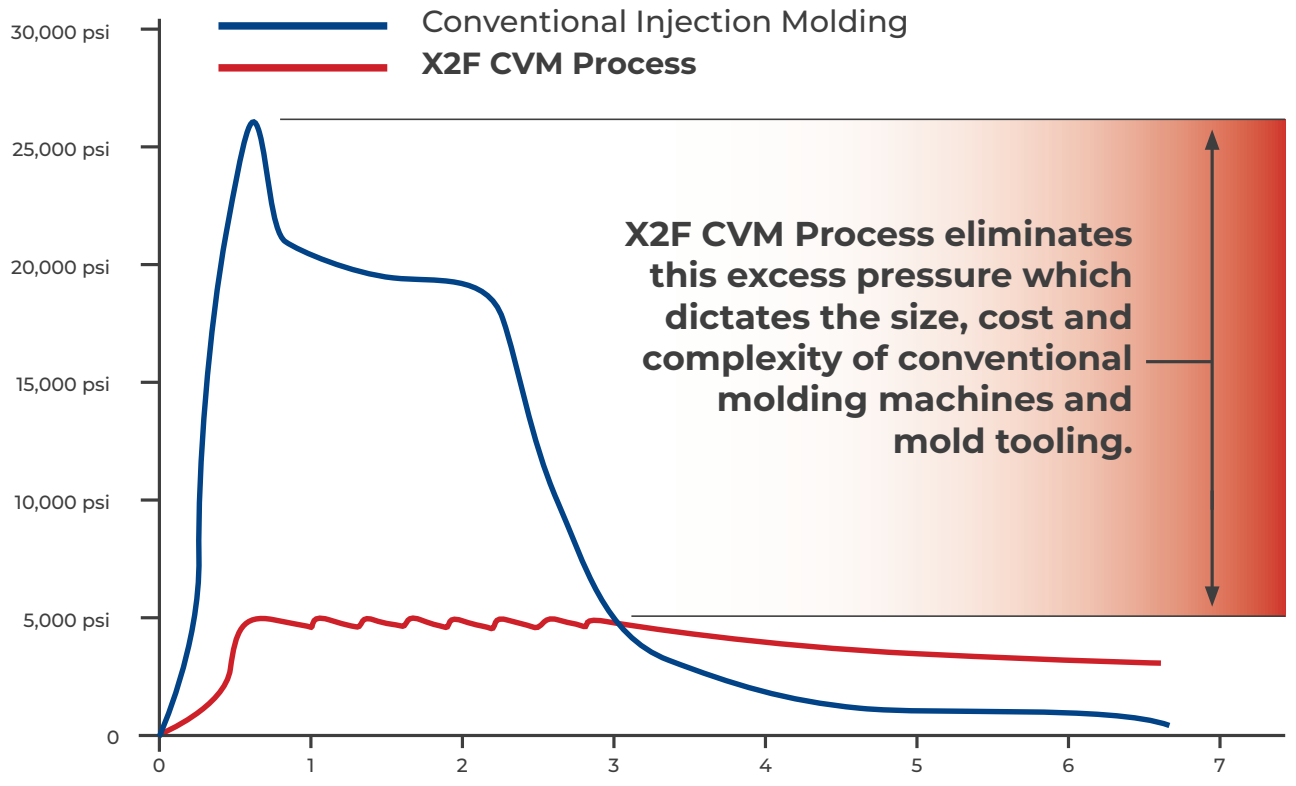
Introduction to X2F Technology

Conventional injection molding relies on extreme force to melt and inject the material, often **leading to defects** like warping and sink marks due to excessive heat and pressure that degrade polymer chains. Traditional Injection molding is a volumetric-based process that relies on dosing a defined shot volume to fill the cavity, then switching to pressure-controlled packing during the limited window before gate-freeze.

X2F's Controlled Viscosity Molding (CVM) uses screw extrusion and eliminates the check-ring, creating a more efficient and controlled process which monitors and responds to pressure changes through the cooling process.

CVM continuously melts and pumps material into the mold, while monitoring key parameters such as screw back pressure, cavity pressure, and torque.

Unlike traditional injection molding, **CVM is a pressure-based process with real-time control of viscosity and velocity**, optimizing material flow and ensuring **consistent results.**



System Highlights

- **Lower Pressure and Clamp Tonnage**
  The CVM process uses up to 70% less pressure than conventional methods, significantly reducing the required clamp tonnage and enabling lighter, less costly molds.
- **Pressure-Controlled Molding**
  CVM is pressure-controlled, preserving the polymer's natural characteristics and avoiding excessive pressure and shear that can degrade material properties.
- **Adjustable Gate-Freeze Time**
  CVM allows for flexible gate-freeze timing, which enhances control over filling speed and time. This reduces defects such as warpage, stress, and filler orientation issues.
- **Material Versatility**
  CVM can handle a wide variety of materials, from low- to high-viscosity substances, offering greater versatility compared to conventional injection molding.
- **Pulse Packing**
  The patented "Pulse Packing" method ensures smoother, more effective part packing, reducing internal stress and improving part quality.
- **Faster Cycle Times**
  By minimizing shear-induced heat, CVM achieves cycle times that are equal to or shorter than traditional injection molding.
- **Energy Efficiency**
  CVM uses less energy to melt and move materials, reducing overall energy consumption by up to 80% and the machine footprint by 50%.
- **Polymer and Filler Integrity**
  CVM maintains polymer and filler integrity by avoiding the extreme pressures and shear forces of traditional methods.

UL CE *

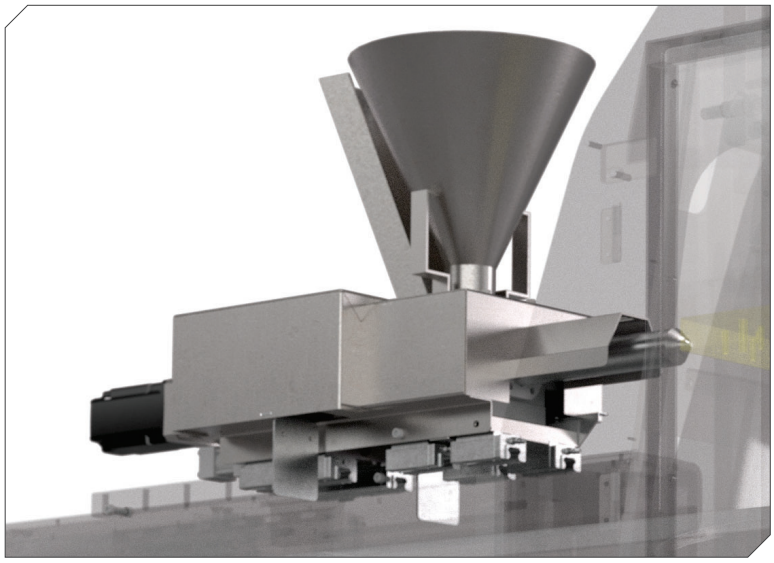
* compliant

Melt Processing Unit

A NEW PARADIGM: CVM – CONTROLLED VISCOSITY MOLDING

X2F replaces the traditional injection molding paradigm with a unique screw-based process we call Controlled Viscosity Molding (CVM). Instead of injecting a pre-metered shot using high-speed ramming and a check ring, CVM uses a continuously rotating screw to extrude melt directly into the mold. This single-stage, pressure-controlled approach provides continuous feedback through the filling and cooling cycles.

- **No Check Ring, No Interruption**
  Our system eliminates the check ring, reducing complexity, backflow, and maintenance while ensuring consistent flow.
- **Extrusion-Driven Filling**
  The melt fills the mold cavity by the screw rotation itself and eliminates the need for a plunger or secondary injection stage.
- **Ultra Flexible Shot Volume Possibility**
  The shot size is virtually unlimited because the cavity is filled by extrusion, from micro parts to significant single-shot components.
- **Pulse Packing**
  Patented pulse-packing capability enables ultra-consistent packing with less stress and greater dimensional accuracy.



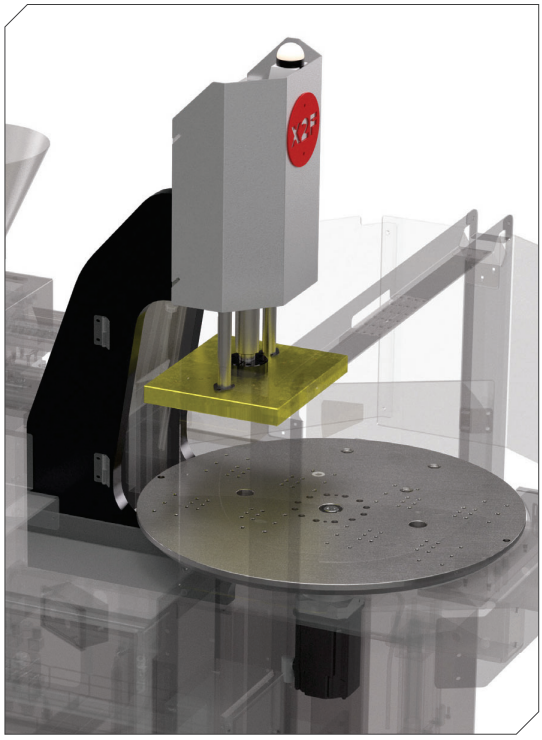
CVM: PROCESS BENEFITS UNIQUE TO X2F

- **Lower Shear Rates**
  The controlled, screw-based melt delivery reduces degradation, preserving polymer chains and additives.
- **Flexible Filling Profiles**
  Real-time extrusion control allows precise management of flow rates, pressures, and ramp profiles.
- **Real-Time Feedback**
  Embedded sensors monitor screw torque, cavity pressure, and fill resistance, enabling adaptive process tuning and closed-loop control.
- **Multi-Mode Control**
  The screw is servo-driven and can operate under time-based (volumetric) control or pressure-based control. Filling and packing can be triggered and terminated based on screw back pressure, nozzle pressure, or cavity pressure for ultimate process flexibility.
- **Applications From Micro to Macro**
  Whether you're molding micro-precision parts or large functional components, CVM scales effortlessly. The consistent, pressure-managed extrusion process ensures repeatable quality across the spectrum.

Clamp Unit

SERVO-HYDRAULIC C-FRAME CLAMPING

The X2F clamp system features a rugged servo-hydraulic-driven system housed in a compact C-frame structure. Designed for full mold access and precision control, this tie-bar-free layout delivers clean, unobstructed space for automation and mold handling.



- **Tie-Bar-Free Architecture**
  Full access for tooling, automation, and inspection - no limitations or obstructions.
- **Servo-Hydraulic Force Control**
  A high-efficiency servo-hydraulic system applies clamping force precisely and consistently with fast response times.
- **Balanced and Centered Loading**
  The C-frame design ensures symmetric force distribution and accurate mold alignment.

OPTIMIZED FOR CVM PROCESSING

- **Reduced Tonnage Requirements**
  CVM's low-pressure process drastically reduces the need for high clamp forces, improving energy efficiency and mold longevity.
- **Fast, Repeatable Cycles**
  Servo-hydraulic control supports fast open/close sequences, adaptable to each mold and shot profile.
- **Automation Compatibility**
  Engineered for seamless pairing with integrated rotary tables, robots, and peripheral equipment.

Fast Rotary Table

Built-In Fully Electric, High-Speed Servo-Driven Indexing Table
Every X2F molding cell includes a fully integrated rotary table system as standard. This high-performance platform supports two-station operation and enables simultaneous molding and part handling.

- **All-Electric Direct Drive**
  The rotary table features a powerful, backlash-free servo motor with high precision and repeatability.
- **+/- 180° Indexing**
  Rapid, bidirectional motion reduces idle time and improves throughput.
- **Built-In Integration**
  The table is mounted directly into the frame and aligned with the clamp for perfect synchronization.

Designed for Productivity and Flexibility

- Parallel mold actions: mold 1 closes while mold 2 ejects and resets.
- Compact design keeps machine footprint tight.
- Precise, programmable indexing cycles support complex mold layouts.

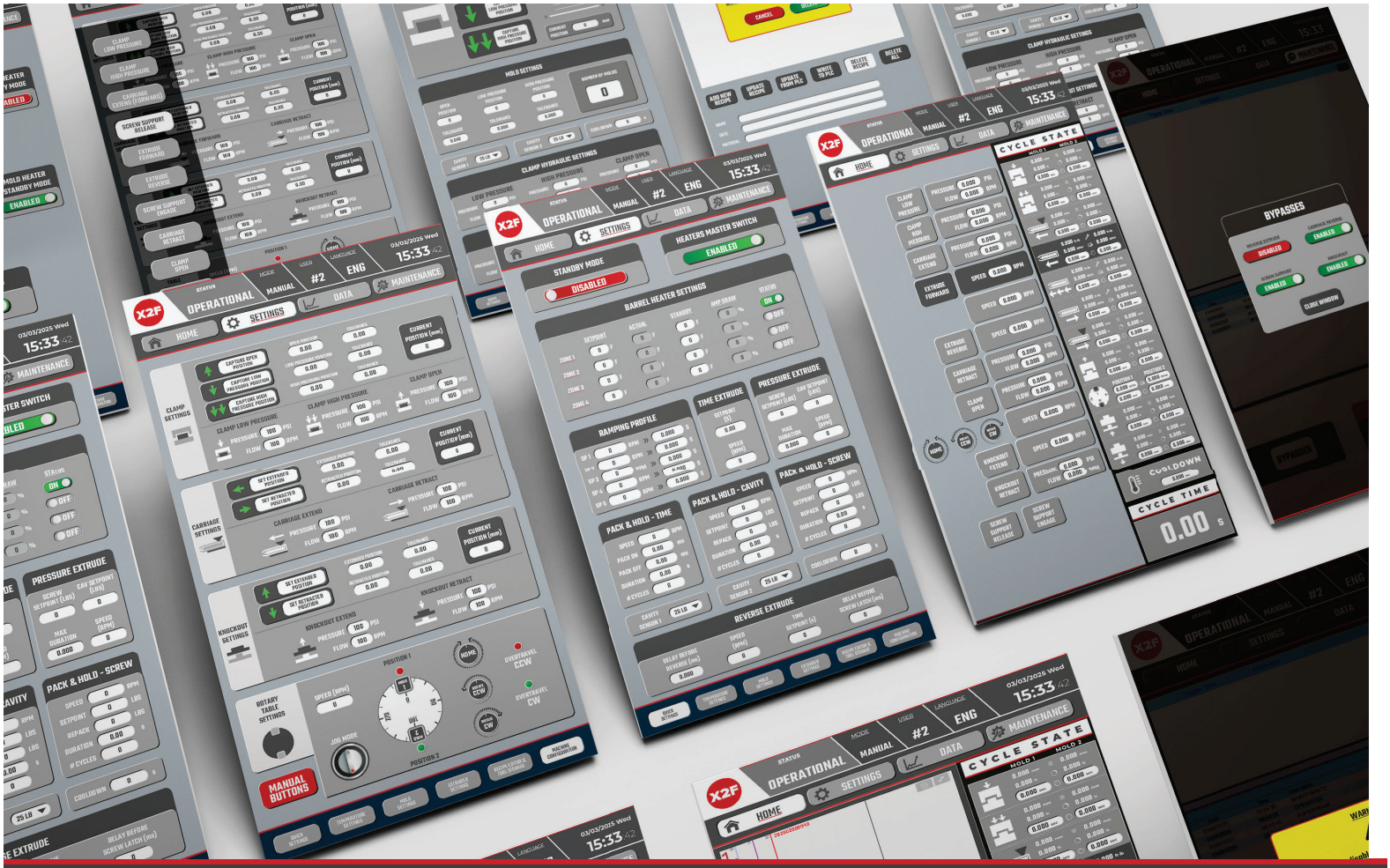
HMI and Controls – Smart, Simple, Powerful

TOUCHSCREEN CONTROL MADE EASY

X2F machines are equipped with an intuitive, high-resolution Human Machine Interface (HMI) touchscreen, built on Siemens PLC architecture for industrial-grade reliability and flexibility.

- **15,6” Full HD Touchscreen**
  Easy navigation with clear visualization of all machine parameters.
- **180° Swiveling Display**
  The HMI pivots for optimal visibility and ergonomic operation from any position.
- **User-Friendly Interface**
  Modern gesture controls like swiping and zooming streamline setup and operation.
- **Robust Siemens PLC Platform**
  Reliable and customizable control system for future expansion and integration.

Designed to maximize usability, efficiency, and precision,
the X2F control system puts full command of the molding process at your fingertips.



E60Vi Machine Specifications

CLAMP SECTION	UNITS	VALUE
CLAMPING	US TON (kN)	10 (98)
CLAMPING EQUIVALENCY	US TON (kN)	60 (588)
OPENING STROKE	IN (mm)	8.0 (203.2)
UPPPER PLATEN SIZE	IN (mm)	12 X 14 (355 × 305)
ROTARY PLATEN DIAMETER	IN (mm)	32 (813)
MIN. MOLD HEIGHT	IN (mm)	6 (152.4)
MAX DAYLIGHT	IN (mm)	14 (355.6)
EXTRUDER ELEVATION FROM THE TABLE	IN (mm)	4-10 (101.6 - 254)
EJECTION STROKE	IN (mm)	4 (101.6)
EJECTION FORCE	US TON (kN)	1.6 (16)
MOLD LOCATION - UPPER	IN (mm)	Ø4 (101.6)
EJECTION CONFIGURATION		1-CENTER

MACHINE FUNCTIONS	UNITS	VALUE
MAX EXTRUDER CAPACITY	CC/SEC (PS)	0-100
SYSTEM HYD PRESSURE	PSI / Bar	2400 - 165
POWER REQUIREMENTS	VOLTS / AMPS	208-240 - 3Phase / 50
SERVO HYD MOTOR	Kw	5
SCREW DRIVE SERVO	Kw	1
ROTARY TABLE SERVO	Kw	2
HEATER POWER	W	3300
NUMBER OF HEAT ZONES		8
MACHINE DIMENSIONS (LxWxH)	IN (cm)	93 x 45 x 79 (236 x 114 x 200)
MACHINE WEIGHT	LBS (kg)	2,900 (1300)
AUTOMATION INTEGRATION		Euromap 67

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