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HYDRAULIC INJECTION MOLDING MACHINE

Hydraulic Injection Molding Machine - ToronIMM™ H 20

ToronIMM™ H 20 laboratory hydraulic injection molding machine is a compact servo-hydraulic system designed for test specimen preparation, small-batch production, and polymer processing education. A 20mm single screw with a 20:1 L/D ratio delivers thorough plasticization across common engineering thermoplastics including PP, PE, PA, ABS, TPU, and PLA. The caster-mounted frame makes the machine highly mobile, installing without floor modifications. This combination of lab-scale footprint and production-derived architecture suits polymer researchers, instructors, and small-batch manufacturers.

The machine handles injection volumes up to 31cm³ at a settable rate of 0.24–20cm³/s, covering gram-scale laboratory shots through moderate small-batch outputs. Three independent barrel temperature zones reach 360°C with ±0.5°C steady-state accuracy, processing both commodity and engineering resins. A 137MPa injection force and 150kN clamping unit handle moderately viscous melts and standard mold geometries. Twelve storable process recipes allow quick changeovers between materials and mold configurations without manual parameter re-entry.

A PLC color touch screen provides one-touch operation for parameter setup and process monitoring. The automatic cleaning function purges the barrel between material changes, reducing downtime during compound switchovers. Three-stage settable injection and 0.1mm shot position resolution give operators fine control over fill and hold phases. These control features suit educational labs and research facilities running multiple material experiments per session.

APPLICATIONS

Hydraulic Injection Molding Machine - ToronIMM™ H 20 Applications

The ToronIMM™ H 20 hydraulic injection molding machine supports laboratory specimen production, materials education, and small-batch part manufacturing across a range of engineering polymer applications.

- Polymer Research and Development: producing trial molded specimens from experimental formulations, blends, and composites to evaluate processability and part properties under controlled conditions
- Test Specimen Fabrication: injection molding tensile bars, flexural beams, and impact bars for mechanical testing programs run under controlled laboratory processing parameters
- Polymer Processing Education: demonstrating injection molding principles, screw behavior, and process parameter relationships in undergraduate and postgraduate materials science and plastics engineering programs
- Engineering Plastics Evaluation: processing and comparing PP, PE, PA, ABS, TPU, PLA, and similar resin grades under controlled conditions to characterize processing windows and mechanical outputs
- Small-Batch Part Manufacturing: producing limited quantities of precision fittings and micro-parts where full-scale production tooling is not economically justified
- Prototype Development: fabricating functional molded prototypes for design and dimensional verification before committing to full production molds
- New Material Qualification Testing: processing experimental formulations and comparing processing behavior and molded part properties against established material benchmarks
- Quality Control Sample Production: generating consistent reference specimens from incoming resin lots for material testing and acceptance inspection

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FEATURES

Hydraulic Injection Molding Machine - ToronIMM™ H 20 Key Features

The ToronIMM™ H 20 combines servo-hydraulic actuation, a precision screw plasticizing unit, and a comprehensive digital control package to meet the demands of laboratory and educational injection molding.

- Servo-Hydraulic Drive System: motor-driven pump and servo valves distribute oil pressure precisely to clamping, injection, and ejection cylinders, delivering consistent, repeatable cycle control at lower noise and energy consumption than fixed-displacement hydraulic systems
- Low-Noise Operation: servo-controlled hydraulics and engineered drive components reduce operating noise to levels appropriate for classroom and shared laboratory environments
- Automatic Barrel Cleaning: built-in auto-cleaning function purges residual material from the screw and barrel between compound changes, minimizing material changeover time and cross-contamination risk
- Single Screw Plasticizing Unit: rotating screw geometry distributes heat and shear uniformly through the melt, producing more consistent plasticization than plunger-type injectors
- Three-Stage Settable Injection: programmable fill, hold, and transition stages give operators fine-grained control over each phase of the injection cycle for improved part consistency
- High-Resolution Shot Control (0.1mm): sub-millimeter injection position resolution allows precise shot volume adjustment, reducing material waste during setup and changeover
- PLC Color Touch Screen with One-Touch Operation: intuitive operator interface simplifies process parameter entry, monitoring, and recipe selection without requiring specialized training
- 12-Group Formula Storage: storable and callable process recipes allow rapid switching between materials or mold configurations, reducing setup time during multi-material research sessions
- Three Independent Barrel Temperature Zones (360°C max): independent thermal control across three barrel zones enables precise melt temperature profiling for each resin type; customizable to 450°C for high-temperature engineering plastics

- Temperature Control Accuracy (±0.5°C): tight steady-state temperature control maintains consistent melt conditions across repeated cycles, reducing batch-to-batch variation in specimen properties
- Dual Mechanical and Electronic Safety Protection: combined hardware interlocks and electronic monitoring protect operators and the machine across all operating modes
- Small-Format Mold Compatibility: compact mold architecture with a maximum mold size of 360×90×72mm (excl. mold plates) reduces tooling cost and simplifies mold fabrication for lab and educational settings
- Compact, Mobile Frame: at 1670×600×1260mm on casters, the machine repositions across laboratories and classrooms without fixed installation or civil works

THEORY & METHOD

Theory and Method

Injection molding converts polymer pellets into shaped parts through sequential plasticization and injection phases. During plasticization, the rotating screw conveys pellets along the heated barrel, melting them through a combination of barrel heat and shear energy generated between the screw flights and barrel wall. Molten polymer accumulates ahead of the screw tip, pushing the screw rearward until the programmed shot volume is ready at the nozzle.

Once shot volume is built, the screw advances as a plunger, forcing melt through the nozzle into the clamped mold cavity at the programmed rate and pressure. Hold pressure follows to compensate for material shrinkage as the part cools and solidifies. The hydraulic clamping unit then opens the mold and the ejection system removes the part. Cycle consistency depends on accurate, repeatable control of each phase.

The ToronIMM™ H 20 uses a servo-hydraulic drive where a motor-driven pump generates oil pressure and servo valves distribute it precisely to the clamping, injection, and ejection cylinders. The servo system improves energy efficiency and reduces operating noise compared to conventional fixed-displacement hydraulic machines. The single screw plasticizes more uniformly than a plunger injector, as the rotating flights actively distribute heat and shear through the melt before it enters the mold.

TECHNICAL SPECIFICATIONS

Hydraulic Injection Molding Machine - ToronIMM™ H 20 Technical Specifications

Parameter	Specification
Screw Diameter	Ø20 mm
L/D Ratio	20:1
Injection Rate	0.24–20 cm^3/s
Injection Volume Range	0–31 cm^3
Injection Volume Resolution	0.1 mm
Multi-Stage Injection	3 stages (settable)
Maximum Injection Capacity	28 cm^3
Maximum Injection Force	137 MPa
Feed Torque	220 N·m
Feed Speed	1–60 RPM
Hopper Capacity	0.2 L
Clamping Force	150 kN
Tie Bar Spacing	300 × 226 mm
Max Mold Size (excl. mold plates)	360 × 90 × 72 mm (L×W×H)
Opening Stroke	120 mm

Parameter	Specification
Fixed Platen Ring OD	Ø50 mm
Temperature Zones	3 (Zone 1/2/3)
Max Temperature	360°C (customizable to 450°C)
Temperature Control Accuracy	±0.5°C (steady state)
Formula Storage	12 groups (storable & callable)
Voltage	AC 380V±10%, 50/60Hz; 5.5kW
Overall Dimensions (L×W×H)	1670 × 600 × 1260 mm
Gross Weight	730 kg
Net Weight	680 kg
Compatible Materials	PP, PE, PA, ABS, TPU, PLA, and other engineering plastics

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