



INJECTION MOULDING MACHINE SELECTION GUIDE

TYPE · CLAMP · DRIVE · INJECTION UNIT



TECHNICAL SELECTION GUIDE · PRATISHNA ENGINEERS

A practical method for choosing the machine type, clamp system, drive and injection unit from part, material and mould data, with application signals, worked examples and the Pratishna machine range.

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WHO THIS GUIDE IS FOR

Plant owners, production and process engineers, project and purchase teams choosing a new machine, or deciding which existing machine a new mould should run on.

HOW TO USE IT

Work through Sections 01 to 05, check your application in Section 06 and shortlist from Section 07. Clamp force and shot size are worked out in the Clamping Force & Shot-Size Calculation Guide.

NEED A RECOMMENDATION?

Send the Section 09 checklist, part drawing and material grade to **sales@pratishnaengineers.com**. Our team will review the selection with you.

SECTION 01 · SELECTION SEQUENCE

WHERE MACHINE SELECTION STARTS

Which decisions settle the machine, and in what order?

A machine is chosen for a component and its mould, not for a tonnage figure. Two machines with the same clamp rating can differ in tie-bar spacing, opening stroke, shot capacity and drive, and any one of these can decide whether a mould runs well. Working through the decisions in a fixed order stops one early number, usually tonnage, from locking in the wrong machine.

THE SELECTION SEQUENCE

COMPONENT	MATERIAL	MOULD	PRODUCTION	MACHINE CONFIGURATION
drawing, wall, depth, inserts	grade and datasheet	cavities, runner, size	cycle, volume, moulds	type, clamp, drive, screw

SEVEN DECISIONS AND WHAT SETTLES THEM

DECISION	SETTLED MAINLY BY	COVERED IN
01 · Machine type: horizontal, vertical, two-platen, PET	Part shape, inserts, part size, material	Sections 02 and 06
02 · Clamp system: toggle or two-platen	Mould height, part depth and the opening needed to eject	Section 03
03 · Drive: servo-hydraulic, hybrid or all-electric	Shot repeatability, injection speed, hold time, mould functions, energy	Section 04
04 · Clamp force	Projected area × clamp factor × safety margin	Calculation Guide
05 · Injection unit and screw	Shot volume, injection pressure and rate, material	Section 05 and Calculation Guide
06 · Mould fit	Tie-bar spacing, mould thickness range, daylight, ejector	Sections 03 and 07
07 · Options and automation	Core pulls, valve gates, inserts, robot, hot runner zones	Sections 06 and 09

Calculation Guide: the separate Pratishna Clamping Force & Shot-Size Calculation Guide, which gives the full method for decisions 04 and 05.

WHAT TO HAVE READY

PART DATA	MATERIAL	MOULD	PRODUCTION
Drawing or 3D model, wall thickness, part depth, part weight and any inserts.	Exact grade and its datasheet, with drying and processing window.	Cavities, runner type, mould size, height and weight, cores and valve gates.	Annual volume, target cycle, shifts, and the other moulds the machine must run.

ONE MOULD OR A FAMILY OF MOULDS?

A machine bought for one mould is sized to that mould. A machine meant to run a family of moulds is sized to their envelope: the largest clamp need, the largest and the tallest mould, and the smallest and largest shot. List every mould before fixing the size, because the envelope is often set by a different mould for each limit.

ONE SIZE UP Buying a larger machine "for future moulds" has a running cost. A high base load can mean the machine is too large for the job^[1], and large machines making small products use energy inefficiently^[2]. Size for the moulds you have listed, then check the margin.

SECTION 02 · MACHINE TYPES

CHOOSING THE MACHINE TYPE

Horizontal, vertical, two-platen or PET: which layout suits the part?

Most injection moulded parts run on a general-purpose horizontal machine. The other layouts exist because inserts, part depth, material, cleanliness or fill speed make a horizontal toggle machine awkward or slow for some jobs.

MACHINE TYPE	HOW IT IS BUILT	USUALLY CHOSEN FOR	CHECK BEFORE CHOOSING
Horizontal, toggle clamp	Horizontal clamp and injection unit; mould opens sideways, parts drop or are picked	Housings, closures, containers, fittings, technical parts	Tie-bar spacing, mould thickness range, stroke
Horizontal, two-platen	Platen locked to the tie bars by split nuts, then short-stroke cylinders build tonnage ^[3]	Deep parts, tall moulds, crates, bins, buckets	Opening left at your mould height (Section 03)
Hybrid	Electric drive on injection or screw rotation, hydraulics elsewhere; the mix varies by builder ^[4]	Repeatable shots, thin walls, multi-cavity moulds	Which axes are electric, which hydraulic
Vertical clamp, vertical injection	Mould opens upwards; lower halves often on a shuttle or rotary table	Insert moulding and overmoulding	Table type, lower halves, insert loading time
Horizontal clamp, vertical injection	Vertical injection unit fills a horizontally clamped mould at the parting line	Parts gated on the parting line	Mould built for parting-line injection
PET preform	Injection unit, drying and residence time set up for PET	Bottle and jar preforms	Dryer, preform weight, cooling
Special specification	PVC screw and barrel, second injection unit, cleanroom build, thermoset feed	Rigid PVC, soft-grip parts, medical parts, BMC/DMC	Material-specific screw, barrel and options

WHAT THE APPLICATION DATA SHOWS

Pratishna's application research sheet records a usual machine type for 506 products across 34 industries. Two-thirds sit on a general horizontal machine.

MACHINE TYPE RECORDED	PRODUCTS	EXAMPLES
General horizontal	330	Sprinklers, valve bodies, housings, fittings, bowls
All-electric horizontal, incl. cleanroom builds	74	Modular switches, connectors, gears, syringe barrels
High-speed thin-wall and closure	27	Thin-wall containers, IML tubs, CSD caps, paint pails
Multi-material (two-shot)	23	Toothbrush handles, castor wheels, goggle frames
Large part: high-tonnage toggle or two-platen	23	Crates, chairs, washing-machine tubs, fridge liners
PVC specification	7	uPVC and CPVC fittings, ball valves, conduit fittings
Horizontal, cleanroom build	6	Device housings, specimen containers
Vertical insert moulding	4	Plug tops, connector backshells, needle hubs
LSR, thermoset, micro, PET and other	12	Teats, BMC insulators, micro-optics, preforms

Machine types as recorded in the sheet from published application research. They show the usual layout for a product, not the only one that can run it.

SECTION 03 · CLAMP SYSTEM

TOGGLE OR TWO-PLATEN CLAMP

How the clamp design changes opening stroke, mould height and machine length.

A toggle clamp multiplies the force of a hydraulic cylinder through a linkage that locks straight as the mould closes. A two-platen hydromechanical clamp moves the platen on fast cylinders, locks it to the tie bars with split nuts, and then builds tonnage with short-stroke cylinders^[3]. They differ in the opening left for the part and in how force reaches the mould.

POINT	TOGGLE CLAMP	TWO-PLATEN HYDROMECHANICAL
Opening stroke	Full stroke at every mould height in the machine's range ^[5]	Opening = maximum daylight minus mould height; full stroke only at minimum mould height ^[5]
Machine length	Linkage and rear platen add length	Most designs are shorter than toggle or fully hydraulic machines of the same force ^[3]
Force on the platen	Most toggles apply force at the platen corners, reported to raise platen deflection ^[3]	Direct hydraulic clamping is reported to give more uniform pressure and finer force control ^[3]
Mould height setting	Set mechanically; adjusting with the mould closed can over-clamp once the mould warms ^[3]	Wider die-height range reported ^[3]
Cited strengths	Reliability, simplicity and rigidity; one supplier claimed lock-up in 0.2 s against 0.5 s hydraulic ^[3]	Long opening without a long frame; tonnage set hydraulically

SAME TONNAGE CLASS, DIFFERENT MACHINES

MODEL	CLAMP	CLAMP TYPE	TIE BARS H × V	MOULD THICKNESS	STROKE	MAX DAYLIGHT	SHOT (PS)
E-165 / E-180	165 / 180 t	Toggle	460 × 421 / 480 × 424	200 to 525	375	900	249 to 315 g
C-180	180 t	Toggle	480 × 424	200 to 500	375	875	249 to 315 g
H-180	180 t	Toggle	510 × 498	200 to 575	450	1025	389 to 470 g
PHM-160	160 t	Two-platen	460 × 440	225 to 645	1000	1225	343 to 424 g

Dimensions in mm, from Pratishna series specification data. E-165 and E-180 share their locking values in the source data. Shot range covers the screw options of each model.

HOW MUCH OPENING IS LEFT FOR THE PART?

USABLE OPENING AND PART HEIGHT

Toggle: opening = clamp stroke, at any mould thickness in range

Two-platen: opening = maximum daylight – mould thickness

Part ejection check: opening ≥ 2.5 × part height

Starting rule from^[5]; part shape, runner drop and robot take-out change the real need.

MOULD 400 MM THICK	OPENING AVAILABLE	TALLEST PART AT 2.5 ×
E-165 / E-180 and C-180	375 mm stroke	150 mm
H-180	450 mm stroke	180 mm
PHM-160	1225 – 400 = 825 mm	330 mm

WHEN TWO-PLATEN PAYS Deep containers, buckets, bins and crates, and tall moulds with stripper plates or long cores. A 600 mm mould still leaves 625 mm on the PHM-160, beyond the mould range of the toggles above. Illustrative example. Actual requirements depend on the component, material, mould and production conditions.

SECTION 04 · DRIVE & ENERGY

CHOOSING THE DRIVE

Fixed pump, servo-hydraulic, hybrid or all-electric: where the differences lie.

The drive decides how much power the machine draws when it is not doing useful work, how repeatable injection is, and which mould functions it can run directly. Builders and moulders still disagree on one best drive. A 2007 survey of machine builders and moulders found the answer depends on the moulding, machine size, power cost and preference, and one builder said the three drive types perform about the same for roughly 95% of applications^[4].

DRIVE	HOW IT WORKS	WHERE IT FITS	POINTS TO CHECK
Fixed-pump hydraulic	Constant-speed motor drives the pump through the whole cycle ^[4]	Much of the installed base	Base load can be 75% or more of total energy ^[1] ; many such machines still run with very high energy demand ^[6]
Servo-hydraulic	Servo or variable-speed motor runs the pump only when oil is needed ^{[4][6]}	General moulding; moulds with hydraulic cores, ejectors and valve gates ^[4]	Pump flow and response for the injection speed the part needs
Hybrid	Electric drive on screw rotation or injection, hydraulics for clamp and auxiliaries ^[4]	Repeatable shot control, thin walls, multi-cavity moulds	Which axes are electric; ejector and core circuits
All-electric	Servo motors drive every axis; no oil ^[4]	Small precision parts, medical and clean-room work ^[4]	Thick parts with long hold, core pulls and valve gates often need hydraulic help ^[4]

WHERE THE ENERGY GOES

BASE LOAD Standard hydraulic machines can draw 75% or more of their energy as base load; all-electric and hybrid machines about 10 to 20%, mostly barrel heating ^[1] .	SCREW RECOVERY One supplier put screw recovery at about 66% of a hydraulic press's energy, injection under 21%, clamping 7%, ejection 5% ^[4] .	IDLING Machines left idling drew 52% to 97.5% of their full moulding energy in measured cases ^[2] .	OVER TEN YEARS Energy cost exceeds the purchase cost of the machine in almost every case ^[1] .
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COMPARING MACHINES ON ENERGY

SPECIFIC ENERGY CONSUMPTION SEC (kWh/kg) = average power (kW) ÷ good output (kg/h) Typical variable load is 0.9 to 1.6 kWh/kg ^[1] . A clamp-meter logger can measure a machine in as little as 30 minutes ^[2] . Compare machines on the same mould and cycle.
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ILLUSTRATIVE CASE	AVERAGE POWER	GOOD OUTPUT	SEC	OVER 6,000 H A YEAR
Machine A	27 kW	30 kg/h	0.90 kWh/kg	162,000 kWh
Machine B	18 kW	30 kg/h	0.60 kWh/kg	108,000 kWh
Difference	9 kW		0.30 kWh/kg	54,000 kWh

Illustrative example. Actual requirements depend on the component, material, mould and production conditions. Assumed power figures, not measured values for any machine.

KEEP ENERGY IN PROPORTION One machine supplier put resin at about 50% of moulding cost and electricity under 4% ^[4] . Scrap rate and cycle time usually weigh more than kWh in the payback, so choose the drive that holds the part in tolerance first.

SECTION 05 • INJECTION UNIT

SIZING THE INJECTION UNIT

Screw diameter, barrel capacity and material: what the injection side must deliver.

The mould fixes the clamp; the shot, the pressure the mould needs and the material fix the injection unit. Most clamp sizes are offered with two or three screw diameters on the same injection unit. A larger screw sweeps more volume but gives lower plastic pressure, in proportion to the square of the diameter.

ONE CLAMP, THREE SCREWS

SCREW OPTION	DIAMETER	SWEPT VOLUME	MAX SHOT (PS)	MAX INJECTION PRESSURE	RATE OF INJECTION	L/D
A	35 mm	207 cm ³	186 g	2645 kg/cm ²	83 cc/s	19:1
B	38 mm	244 cm ³	219 g	2244 kg/cm ²	98 cc/s	17.5:1
C	40 mm	270 cm ³	243 g	2025 kg/cm ²	108 cc/s	16.6:1

Pratishna E-150 (clamp force 140 t), from the series specification data. Screw B carries 1.18 times the volume of screw A and 0.85 times its pressure: $(38 \div 35)^2 = 1.18$.

PICKING THE SCREW FOR THE SHOT

SHOT WINDOW

Shot volume = shot weight $\div$ melt density $\times$ 1.1

Good working range = 25% to 65% of the screw's swept volume

The 10% covers check-valve leakage and melt uniformity. Below about 20% the melt stays too long and can degrade; above 65% melt quality falls^[7]. PP melt density is about 0.74 g/cm³^[7]. Full method: Calculation Guide, Sections 05 and 06.

90 G PP SHOT = $90 \div 0.74 \times 1.1 = 133.8 \text{ CM}^3$	SCREW A, 207 CM ³	SCREW B, 244 CM ³	SCREW C, 270 CM ³
Share of swept volume	65%, at the upper limit	55%	50%
Reading	Highest pressure, for thin walls and long flows	Middle ground	Lowest pressure, more room for a heavier part

Illustrative example. Actual requirements depend on the component, material, mould and production conditions.

MATERIAL CHANGES THE SPECIFICATION

MATERIAL OR JOB	WHAT TO SPECIFY	WHY
Rigid PVC	Low-compression screw around 2.2:1, bimetallic or corrosion-protected barrel, sliding check ring, nozzle with its own heater control; shot 50% to 80% of barrel ^[8]	PVC is heat and shear sensitive and degrades in dead spots ^[8]
PET preforms	Desiccant dryer that brings resin below 50 ppm water ^[9] ; extruder sized to the preform weight ^[10]	Moisture cuts IV; acetaldehyde rises with residence time and temperature ^[10]
Thin-wall PP and PE packaging	High injection pressure and speed, fill under 1 s; shot at least 40% of barrel ^[11]	Flow length 100 to 200 times the wall; often above 2,070 bar ^[11]
Engineering resins: PC, PA, PBT, POM	Maximum pressure at the chosen screw checked against the grade datasheet; dryer for moisture-sensitive grades	Pressure and drying limits differ by grade

SECOND BARREL If one machine must run both small and large shots, a second barrel and screw ordered with the machine can be a low-cost way to cover both^[7], instead of moving up a machine size.

SECTION 06 · APPLICATION FIT

MATCHING THE MACHINE TO THE APPLICATION

Which application signals point to a layout, a drive or a special specification?

The table groups common applications by the feature that most often decides the machine. Product examples come from Pratishna's application research sheet; the deciding features come from published moulding practice.

APPLICATION GROUP	EXAMPLE PRODUCTS	FEATURE THAT DECIDES	MACHINE DIRECTION
General technical and household parts	Sprinklers, valve bodies, housings, fittings, bowls	Clamp force, shot and mould fit	General-purpose horizontal toggle, servo-hydraulic
Thin-wall packaging	Thin-wall containers, IML tubs, disposable cups, sweet boxes	Fill in under a second at high pressure; fast clamp ^[11]	High-speed thin-wall machine with fast-response injection
Caps and closures	CSD caps, water bottle caps, flip-top caps	High cavitation, short cycle, repeatable shot	High-speed machine; unscrewing or stripping mould
Large and deep parts	Crates, bins, buckets, chairs, washing-machine tubs	Projected area and opening stroke	High-tonnage toggle, or two-platen for deep parts and tall moulds
Insert-moulded parts	Plug tops, connector backshells, needle hubs	Insert loading time and insert position	Vertical clamp with shuttle or rotary table ^{[12][13]}
Precision and medical parts	Connectors, gears, syringe barrels, luer fittings	Repeatability and cleanliness	All-electric or hybrid; cleanroom build where required ^[4]
Rigid PVC parts	uPVC and CPVC fittings, ball valves, conduit fittings	Heat and shear sensitive melt	PVC specification screw and barrel ^[8]
Two-material parts	Toothbrush handles, castor wheels, goggle frames	Two materials in one cycle	Two-shot machine with a second injection unit
PET preforms	Bottle and jar preforms	Drying, residence time, preform cooling	PET-specific injection unit and dryer ^[9]

SIX QUESTIONS THAT SETTLE THE LAYOUT

- | | |
|---|--|
| ☐ Inserts: are metal or plastic parts placed in the mould every cycle? | ☐ Mould functions: does the mould need hydraulic cores, unscrewing or valve gates ^[4] ? |
| ☐ Depth: is the part taller than 40% of the clamp stroke? At 2.5 × part height ^[5] , that is the toggle limit. | ☐ Cleanliness: is the part moulded for medical use or in a cleanroom? |
| ☐ Fill speed: must a thin wall fill in under a second ^[11] ? | ☐ Material: is it PVC, PET, LSR, a thermoset, or two materials in one part? |

CAVITIES, OUTPUT AND MACHINE SIZE

OUTPUT AGAINST MACHINE SIZE

Parts per hour = cavities × 3,600 ÷ cycle time (s) × good-part share

Doubling cavities doubles output, but also the cavity area and the shot. A cavity count that pushes the job one machine size up may cost more than it earns.

Example: a closure mould on a 12 s cycle at 98% good parts gives 2,352 parts/h with 8 cavities and 4,704 with 16. At 8.0 cm² per cavity on a hot runner and 5 US t/in² (0.703 t/cm²) × 1.1, the clamp need rises from 49.5 t to 99.0 t, so the 16-cavity mould moves the job from a 75 t class machine to a 100 t class.

Illustrative example. Actual requirements depend on the component, material, mould and production conditions. 5 US t/in² is a cautious factor for thin, fast-filling closures.

SECTION 07 • MACHINE RANGE

THE PRATISHNA MACHINE RANGE

Series, clamp forces and envelopes to shortlist from once the requirement is known.

Pratishna Engineers builds horizontal toggle machines in three series, two-platen and hybrid machines, PET and special-purpose machines, and vertical machines. The table gives the envelope of each series from Pratishna specification data. Use it to shortlist; the model specification sheet gives every value.

SERIES	TYPE AND DRIVE	CLAMP FORCE (T)	SHOT, PS (G)	TIE BARS H × V (MM)	MAX DAYLIGHT (MM)
E Series	Horizontal toggle, servo-driven pump	75, 100, 120, 140, 165 / 180	82 to 315	350 × 323 to 480 × 424	625 to 900
C Series	Horizontal toggle, servo-driven pump	125, 180, 200, 250, 320	151 to 821	405 × 340 to 600 × 594	750 to 1125
H Series	Horizontal toggle, servo-driven pump	120, 150, 180, 225, 250, 320	198 to 969	440 × 428 to 710 × 710	850 to 1185
PHM Series	Two-platen, hydromechanical locking, servo-driven pump	160, 200, 250, 350	343 to 1492	460 × 440 to 720 × 720	1225 to 1650
Hybrid (PH)	Horizontal, servo drive with ball screw for injection	120, 140	126 to 219	410 × 345, 440 × 420	750, 840

Model codes give the tonnage class. Use the clamp force on the specification sheet: E-125 is rated 120 t, E-150 140 t, C-140 125 t, C-220 200 t, C-260 250 t, H-220 225 t, H-260 250 t, H-350 320 t.

OTHER MACHINES	LAYOUT	TONNAGE CLASSES
PET injection moulding machines	Horizontal, set up for PET preforms	75, 100, 125, 150, 180, 220, 260 t
Special purpose machines	Built around a specific application	75, 100, 120 t
PV Series	Horizontal clamp, vertical injection	40, 55 t
PVDL Series	Vertical clamp, vertical injection	40, 60, 80 t

Specification data for these machines is given on request. A 425 t PHM model is also listed in the product range.

SHORTLISTING A MODEL

1 • CLAMP rated force at or above the calculated force	2 • MOULD FIT inside the tie bars, at least 70% of their spacing ^[14]	3 • SHOT 25% to 65% of one screw's swept volume	4 • OPENING stroke or daylight for part ejection	5 • DRIVE & OPTIONS cores, ejector, robot, hot runner
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HOW THE SERIES DIFFER

E SERIES From 75 t with an 82 g PS shot up to 165 / 180 t: small parts, small moulds and multi-screw choice at each size.	C SERIES 125 to 320 t with up to three screws per model, for example 45, 50 and 55 mm on the C-220.	H SERIES Wider tie bars and longer stroke at the same force: H-180 has 510 × 498 mm and 450 mm, C-180 480 × 424 mm and 375 mm.	PHM SERIES Strokes of 1000 to 1350 mm and daylight to 1650 mm, for deep parts and tall moulds.
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MOULD SMALLER THAN THE PLATEN A mould covering less than about 70% of the tie-bar spacing lets the platens bow under clamp and can flash the mould centre^[14]. If a small mould is planned for a large machine, check the minimum mould size first.

SECTION 08 · WORKED EXAMPLES

WORKED SELECTION EXAMPLES

Three parts, three different deciding factors.

Engineering illustrations with assumed inputs, not customer case studies. Clamp and shot follow the Calculation Guide; the point is which check decides the machine. Illustrative example. Actual requirements depend on the component, material, mould and production conditions.

A · PP CONTAINER LID, 1 CAVITY, HOT RUNNER		ENGINEERING ILLUSTRATION · ASSUMED INPUTS
INPUTS	260 × 170 mm lid, 25 mm deep, 120 g; mould 450 × 400 mm, 380 mm thick (assumed)	
CLAMP FORCE	$442 \text{ cm}^2 \times K$ of 2 to 3 US t/in ² for PP ^[15] × 1.1 → 137 to 205 t	
SHOT	$120 \div 0.74 \times 1.1 = 178.4 \text{ cm}^3 \rightarrow$ swept volume 274 to 714 cm ³	
SHORTLIST	C-220 (200 t) holds the lid up to $K \approx 2.9$ US t/in ² ; H-220 (225 t) up to $K \approx 3.3$. Tie bars 540 × 517 and 580 × 560 mm both take the 450 × 400 mm mould above 70% cover. C-220 screw B (471 cm ³) runs at 38%	
EVALUATE	Wall thickness and flow length from the centre gate set K. Above about 2.9 the 225 t machine is the safer choice; opening stroke is not a constraint for a 25 mm deep lid.	
STILL NEEDED	Wall thickness, grade MFI, gate design, target cycle.	

B · PP BUCKET, 1 CAVITY, HOT RUNNER		ENGINEERING ILLUSTRATION · ASSUMED INPUTS
INPUTS	Ø300 mm rim, 330 mm tall, 700 g; mould 590 mm thick (assumed)	
CLAMP FORCE	$706.9 \text{ cm}^2 \times K$ of 2 to 3 US t/in ² ^[15] × 1.1 → 219 to 328 t	
OPENING	$2.5 \times 330 = 825 \text{ mm}$ needed ^[5] . A 320 t toggle (H-350, 560 mm stroke) falls short; PHM-350 gives 1650 – 590 = 1060 mm	
SHOT	$700 \div 0.74 \times 1.1 = 1040.5 \text{ cm}^3$. PHM-350 screw A (1457 cm ³) would run at 71%; screw B (1658 cm ³) at 63%	
EVALUATE	Opening stroke ruled out the toggle before tonnage did. Screw B keeps the shot inside the 65% limit.	
STILL NEEDED	Real mould height and ejection method, wall thickness, handle and lid moulds for the same machine.	

C · PA66 TERMINAL BLOCK, 2 CAVITIES, 6 BRASS INSERTS EACH		ENGINEERING ILLUSTRATION · ASSUMED INPUTS
CLAMP FORCE	$2 \times 12 \text{ cm}^2 + 3 \text{ cm}^2$ runner = 27 cm ² ; 400 bar guide ^[15] × 1.1 → 12.1 t; cautious 5 US t/in ² → 20.9 t	
CYCLE	12 inserts × 2 s + 6 s removal = 30 s loading; 25 s mould closed (assumed)	
FIXED MOULD	$25 + 30 = 55 \text{ s} \rightarrow 2 \times 3,600 \div 55 \times 0.98 = 128$ parts/h	
SHUTTLE TABLE	Two lower halves ^[12] : 30 s + 3 s table move = 33 s → 214 parts/h	
EVALUATE	Every clamp offered is large enough; insert loading sets the cycle and the table layout sets output. A 40 t vertical-clamp machine, such as the PVDL Series, would be evaluated.	
STILL NEEDED	Insert drawing and tolerance, hand or robot loading, insert-seating check before injection.	

WHAT DECIDED THE MACHINE IN EACH EXAMPLE

EXAMPLE	CALCULATED CLAMP	DECIDING FACTOR	DIRECTION
A · PP lid	137 to 205 t	Clamp factor and tie-bar fit	Horizontal toggle, 200 to 225 t
B · PP bucket	219 to 328 t	Opening stroke	Two-platen, 350 t
C · Terminal block	12 to 21 t	Insert loading time	Vertical, 40 t, shuttle table

SECTION 09 · CHECKLIST

SELECTION CHECKLIST & COMMON MISTAKES

What to confirm before a machine is specified, and the errors that cost most.

Confirm each item before asking for a quotation. Items left open become assumptions in the machine specification.

COMPONENT	MOULD	PRODUCTION	PLANT
☐ Drawing or 3D model ☐ Material grade and datasheet ☐ Part weight and wall ☐ Part depth ☐ Inserts per part ☐ Tolerance and cosmetic standard	☐ Cavities and runner type ☐ Mould size, thickness, weight ☐ Locating ring and ejector pattern ☐ Cores, unscrewing, valve gates ☐ Hot runner zones ☐ Water circuits	☐ Annual volume ☐ Target cycle time ☐ Shifts per day ☐ Other moulds for this machine ☐ Robot or manual take-out ☐ Mould changes per week	☐ Supply and connected load ☐ Floor space and crane height ☐ Cooling water and chiller ☐ Compressed air ☐ Dryer and conveying ☐ Operator and maintenance skills

COMMON SELECTION MISTAKES

MISTAKE	EFFECT	BETTER APPROACH
Choosing by tonnage alone	Mould does not fit between the tie bars, or the part cannot be ejected	Check tie bars, mould thickness range and opening (Sections 03 and 07)
Buying one size up for future moulds	High base load ^[1] ; a small mould at full clamp can crush vents and crack mould blocks ^[16]	Size for the listed moulds and set clamp to the calculated need
Small mould on a large platen	Platens bow and the mould flashes in the centre ^[14]	Keep mould cover at about 70% of tie-bar spacing or more
Largest screw on offer	Lower plastic pressure and long residence time ^[7]	Keep the shot within 25% to 65% of swept volume (Section 05)
General-purpose screw for rigid PVC	Degradation and streaking; corrosion of screw and barrel ^[8]	PVC specification screw, barrel and check ring
Drive chosen before listing mould functions	Cores, valve gates or long hold times may need hydraulics the drive lacks ^[4]	List every mould function, then choose the drive
Ignoring idle and base load	Idling machines can draw 52% to 97.5% of moulding energy ^[2]	Compare kWh/kg on the same job; switch off for long stops
PET machine without a matched dryer	IV loss and higher acetaldehyde in preforms ^{[9][10]}	Size dryer, residence time and extruder with the machine

BEFORE SENDING AN ENQUIRY

Attach the part drawing or model, grade and datasheet, cavities and runner type, mould drawing if it exists, annual volume and target cycle, and the completed Calculation Guide worksheet.

WHEN TO ASK FOR A TRIAL

New materials, thin walls, insert moulding and high-cavity moulds justify a mould trial or flow study before the machine configuration is frozen.

SECTION 10 • TECHNICAL CONSULTATION

TECHNICAL CONSULTATION

Have the selection reviewed before the machine is specified.

Pratishna Engineers is a Mumbai-based injection moulding machine manufacturer with 35+ years of experience, 9,000+ machines supplied and 1,000+ customers in India and international markets. Design, manufacturing, assembly, testing and service are done in-house, with applications across automotive, packaging, electrical & electronics, medical, consumer, agriculture and industrial sectors.

35+

YEARS

9,000+

MACHINES

1,000+

CUSTOMERS

In-house

DESIGN TO
SERVICE

OUR TECHNICAL APPROACH

COMPONENT part drawing	MATERIAL grade & data	MOULD cavities, runner, size	PRODUCTION cycle, volume	MACHINE CONFIGURATION type, clamp, drive, screw
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SEND YOUR COMPONENT & PRODUCTION REQUIREMENTS

Share the Section 09 checklist, part drawing and material grade for a review of the machine selection.

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