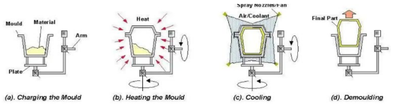
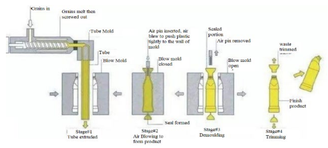
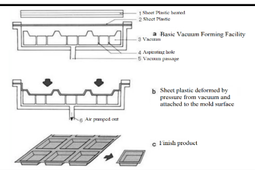
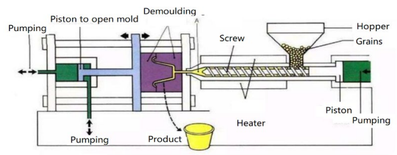
Comparison of rotomolding, blow molding,vacuum forming, and injection process

Manufacturing process	Process Image	Application	Material	Stress	Thickness	Size precsion	Demoulding	Production Efficiency	Cost
Rotomolding		Medium to large hollow parts	Powder, mainly Polyethelyne, then Polypropylyne, some using Nylon, very few using ABS, PC etc.	Almost free stress except late demolding or fixture used during cooling process	Almost even and very consistent, thickness adjustable after mold built, corner even slightly thicker	Rough, tolerance usually around +/-1% of nominal size	By hand mainly, any direction	Low, cycle time is tens of minutes	Low tooling cost, high unit cost
Blow Molding		Small to medium hollow parts	Grains, plastics with good ductility, relativey wide material option like PET, PVC, PE, PP, PC..	Stress accumulated in air stretching and cooling stage	Always thin at corner and stretching/expansion area	External size variation quite close to regular injection, roughtly around two grades less than injection	By machine/cylinder, limited demoulding direction	Cycle time at seconds to minutes depending on parts and machine	Medium tooling cost, medium unit price
Vacuum Forming		Small to medium single wall parts	Sheet material with good ductility, quite wide option as long as good quality of sheet material available, mainly PET/PVC for thin parts, ABS for thick parts	Stress accumulated in sheet plastic deforming by vacuum pressure	Always thin at corner and stretching area	Molds can be adjusted to achieve better tolerance, around +/-1mm for small parts, large parts varies per nominal size	By machine, only one direction	Cycle time at seconds to minutes depending on parts and machine	Low tooling cost, medium to high unit cost depending on thickness of sheet plastic mainly
Injection		Small to medium single wall parts	Grains, quite wide option, most of plastic material can be injected	Stress from material injection and flow in the mold & cooling stage	Different thickness at different surface achievable, thickness not adjustable after mold built	Usually +/-0.06mm for small parts, and +/-5‰ for big part	By machine and tool sliders, limited demoulding direction	High, cycle time is seconds to minutes	Extreme high tooling cost, low unit cost

Note,
For one product able to make by all the four processes,
1) Tooling price, injection>blow molding>rotational molding>vacuum forming
2) Unit price, Vacuum forming>Rotational Molding>Blow molding>Injection
3) Shape flexibility, Rotational Molding>Injection>Blow molding>Vacuum Forming
4) Structure complexity, Injection>Rotational molding>Blow molding>Vacuum forming

Key tips, better to decide which process before the design start, so can utilize the most avantages of that process and avoid issues caused by its disadvantages, otherwise, the process change after design will cause lot of changes and drag lead time much longer.