

MAGNESIUM THIXOMOLDING MACHINETM

High speed injection molding of semi-solid thixotropic alloys



Magnesium, the Earth-Friendly Material
In all kinds of shapes,
in all kinds of industries,
for all kinds of people

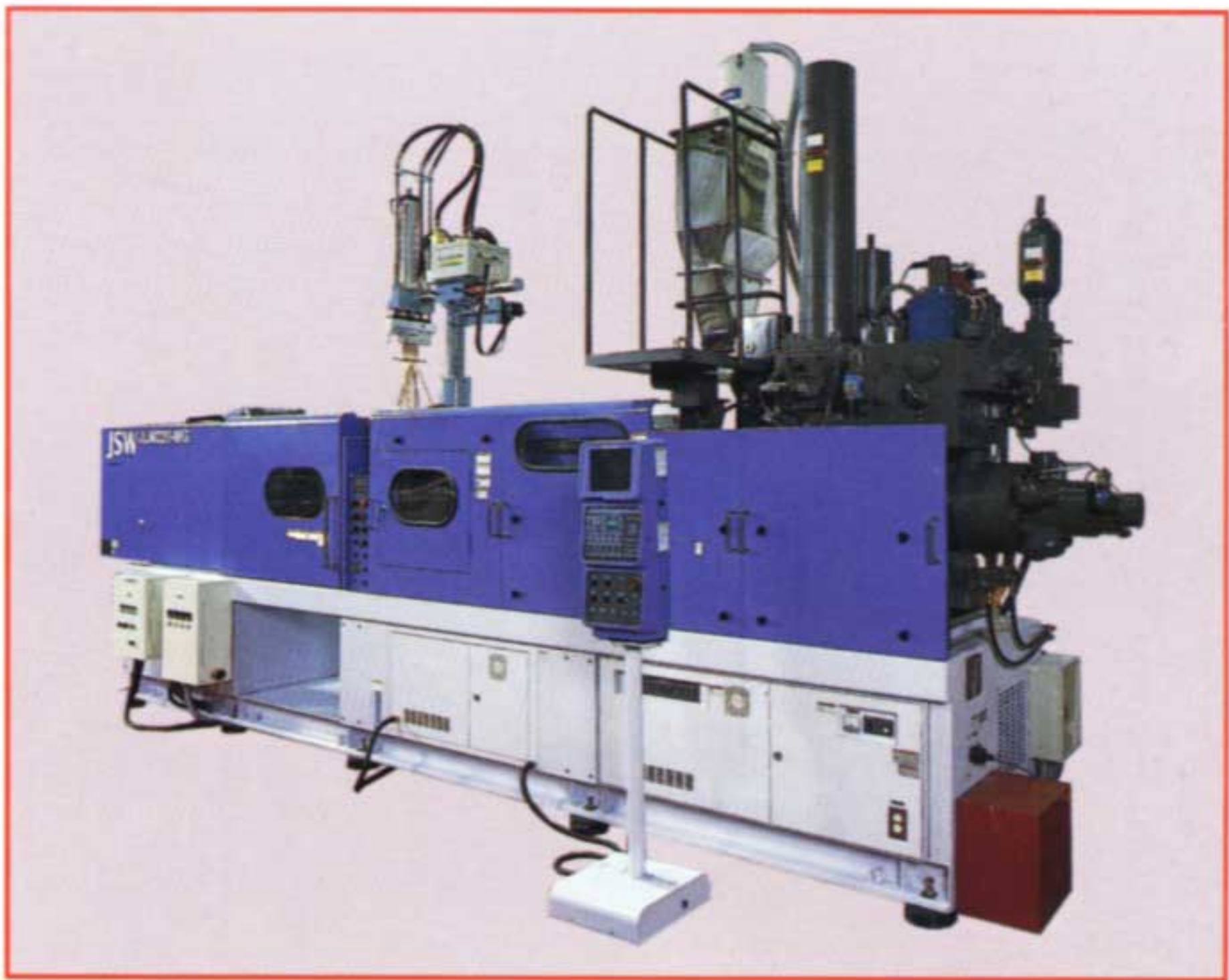
JSW

Now--the emergence of an attractive magnet

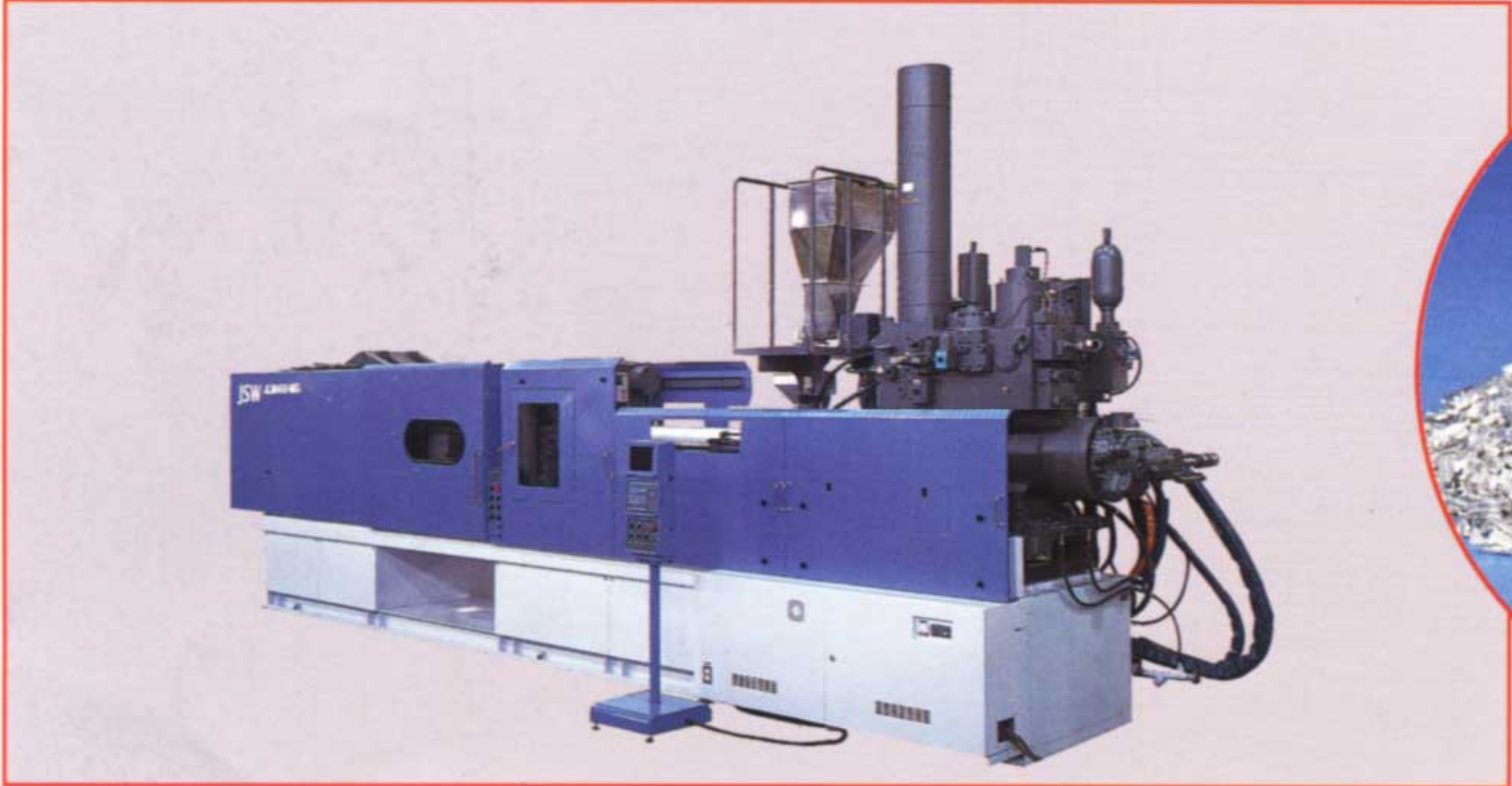
The variety of JSW Thixomolding™ machine



JLM75MG



JLM220MG



JLM450MG



Magnesium chips

JLM850MG



* JLM150MG & JLM650MG are also available to supply.

Magnesium injection molding machine, preparing the

The Characteristic of Magnesium (Mg)

Attraction as a resource

- Mg is the eighth most abundant element in the earth's crust, and is contained in seawater, in magnesite and in dolomite. It is distributed widely around the world, and is in virtually limitless supply.

Recyclability

- In terms of recycling processes as well, Mg can be easily recovered from waste materials. Mg can be recycled at an energy cost of only about 4% of the cost incurred in refining the virgin metal.

Comparison of physical properties

Material		Density (g/cm ³)	Melting Point (°C)	Thermal Conductivity (W/mK)	Tensile Strength (MPa)	Yield Strength (MPa)	Elongation (%)	Strength-to-Weight Ratio	Young's Modulus (GPa)
Magnesium alloy (injection-molded)	AZ91	1.82	596	72	280	160	8	187	45
	AM60	1.79	615	62	270	140	15	180	45
Aluminum alloy (die-cast)	380	2.70	595	100	315	160	3	106	71
Steel	Carbon steel	7.86	1520	42	517	400	22	80	200
Plastics	ABS	1.03	90 (T _g)	0.2	35	*	40	41	2.1
	PC	1.23	160 (T _g)	0.2	104	*	3	102	6.7

T_g : Glass transition point

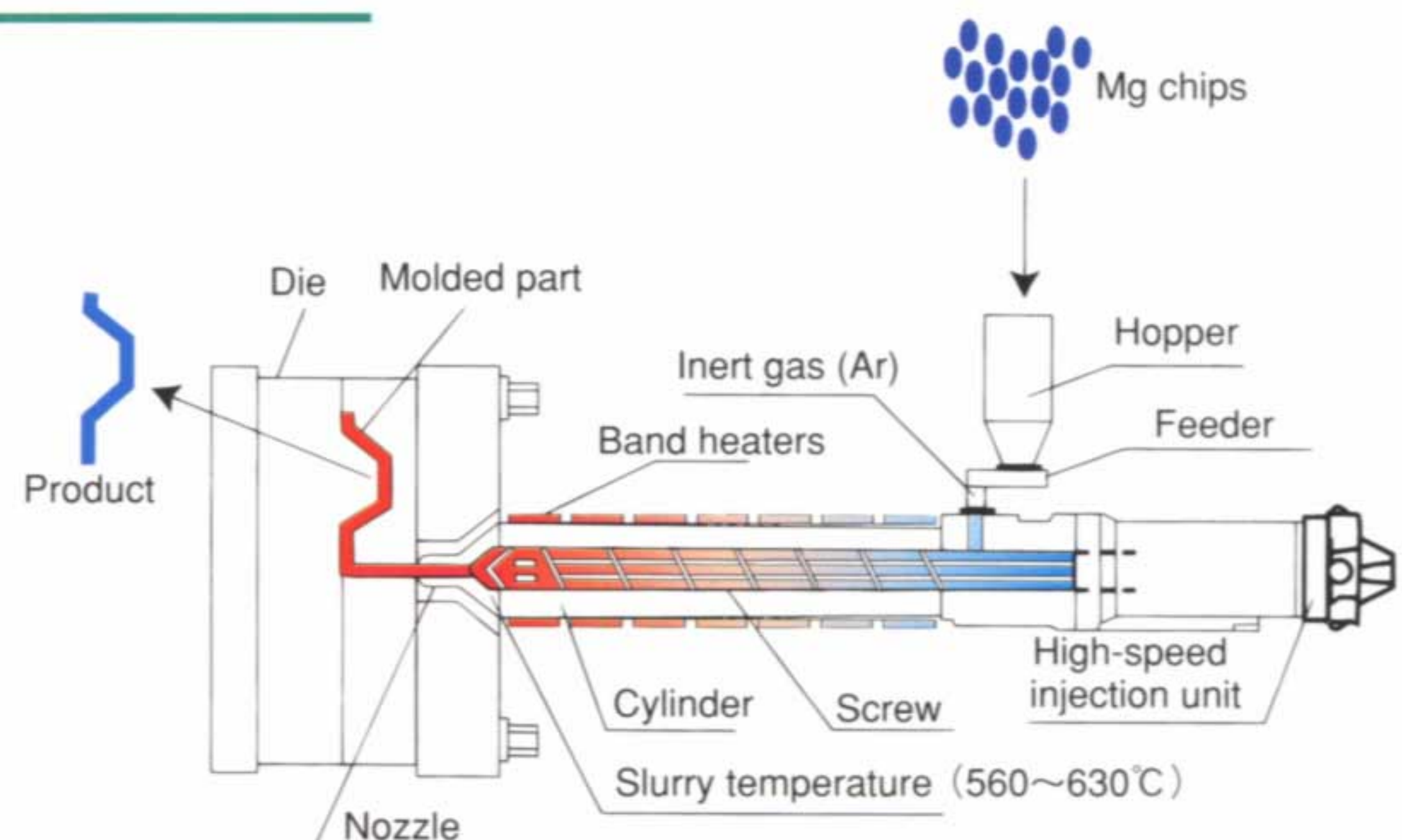
Advantages of Mg

vs. plastics : Greater strength and rigidity, better heat resistance, better heat dissipation, electromagnetic shielding, recyclability, higher perceived quality

vs. aluminum alloys and steel : Lighter weight, greater toughness, better attenuation performance, capacity for precision molding

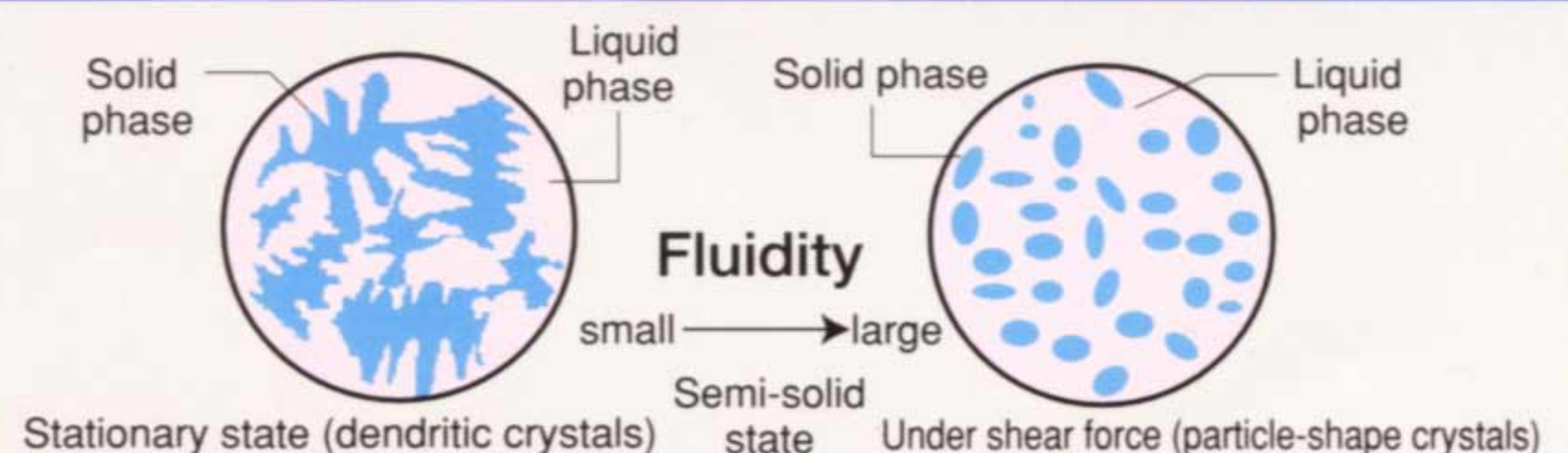
Features of the Injection Molding

Mg alloy, supplied in chip form, is heated in the cylinder of the injection molding machine, transforming it into a fluid semi-solid slurry (thixotropic state) without coming into contact with the air. In this state it is injection-molded in the die. This process is called Thixomolding™.



What is Thixotropy?

By applying a shear force to an alloy in a semi-solid state, to divide the solid phase into particles, the viscosity is reduced and fluidity increased.



The way for the future of injection molding

Advantages over Conventional (Die-cast) Methods

(1) Environmentally-friendly process

- Safe-- There is no need for melting or holding furnaces, no use of SF6 gas or flux which has adverse effects on the global environment.
- Simple--The process affords excellent control and is easily automated.
- Sanitary--The working environment can be kept clean, with no occurrence of dross, sludge or other industrial waste.

(2) Improved product quality

- Reduced frequency of gas defects, microshrinkage, surface defects
- Improved mechanical performance
- Improved dimensional precision

(3) Molding with thin wall possible (minimum wall thickness)

- MD case: 0.6 mm
- PC case: 0.7 (A5) to 1.0 (A4) mm

(4) Reduced energy costs

In this way, the Thixomolding™ process enables molding of the metal magnesium in a manner similar to plastic injection molding. It can thus answer the need for plastic product replacements.

Examples of Product Applications

Manufacturing Area	Products	Required Properties									
		Light weight	Strength	Toughness	Vibration damping	Heat resistance	Heat dissipation	EMI shielding	Dimensional precision	Thin-wall molding	Recyclability
Automobiles	Seat frames	●	●	●	●				●	●	●
	Steering wheels	●	●	●	●				●		●
	Wheels	●	●	●					●		●
	Oil pumps	●	●						●		●
	Key lock housing	●	●						●		●
	Transmission parts	●	●		●				●	●	●
	Navigation System parts		●			●		●	●	●	●
Electronics Office equipment, Communications	Cameras	●	●						●	●	●
	Camcorders	●	●				●	●	●	●	●
	Digital cameras	●	●					●	●	●	●
	Minidisc players	●	●					●	●	●	●
	PDA's	●	●				●	●	●	●	●
	Notebook computers	●	●				●	●	●	●	●
	Mobile phones	●	●				●	●	●	●	●
	Hard disk drives	●	●					●	●		●
	CD-ROM drives	●	●					●	●		●
	Optical pickups	●	●			●	●		●		●
	TVs	●	●			●	●	●	●	●	●
	Plasma displays	●	●				●	●	●	●	●
	LCD projectors	●	●			●	●	●	●	●	●
	Heat sinks	●				●	●				●
Others	Power tools	●	●		●		●				●
	Bicycle wheels	●	●	●					●		●
	Fishing gear	●	●								●
	Briefcases	●	●	●					●		●

Magnesium injection molding business

■ Injection molding subsidiary: MG Precision Co., Ltd.



■ Molding examples

