



POWDER INJECTION MOLDING

PIM VINA

2024.08

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About PIM Group

[Head Office in Daegu]



[Vietnam]



[Kyung-san Plant]



[Sales office in Germany]



Location	Branch		Production Process	Land size	People
KOREA	PIM KOREA	Head Office	Machining / Assembly	10,560m ²	90
		Kyungsan Plant	MIM (Metal Injection Molding)	16,000m ²	
	DAE MYOUNG	Incheon	Mold & Plastic Injection	1,996m ²	35
	Office	Frankfurt	Sales office in Germany		
Vietnam	PIM VINA	Vietnam Plant	MIM Machining for MIM parts Plastic Injection & Mold	29,700m ²	386
Total				58,256m ²	511

[DAE MYOUNG in Incheon]



Sales reference

-  | Factory and Office
-  | Customer



✓ Overseas

- USA
- Mexico
- France
- Germany
- Japan
- China
- Indonesia
- Vietnam
- Thailand
- India
- Hungry
- Poland
- Slovakia
- Czech

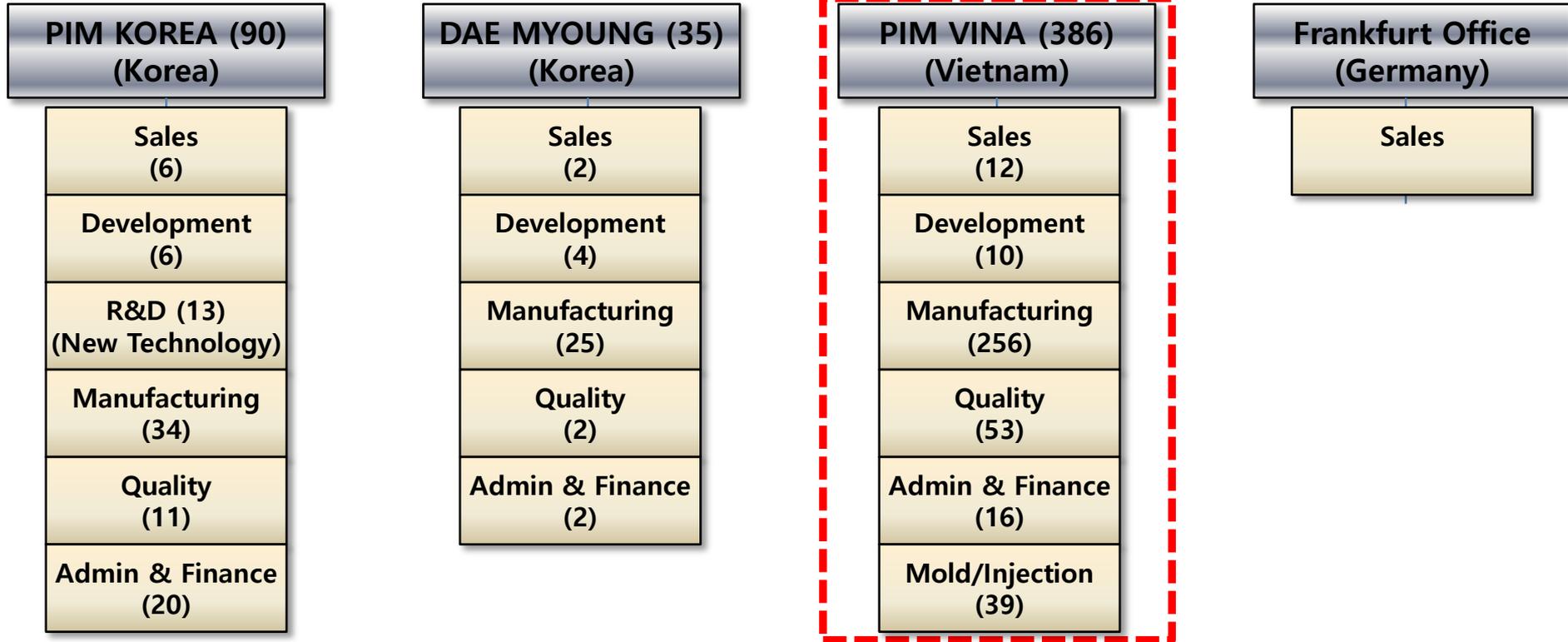


Brief history

- 2001 May PIM Korea Co., Ltd established in Kyung-San City, Korea.
- 2004 May ISO 9001, ISO 14001 Certified
- 2005 May R&D Center (No. 20051741) founded
- 2006 Dec IATF 16949 Certified
- 2010 Nov Centrifugal Casting Plant established
- 2011 Jun SQ Certification as C.C Supplier (HMC / KMC Supplier Quality system)
- 2012 Sep Frankfurt Office/ Germany opened
- 2015 May New HQ established in Daegu City, Korea
- 2017 Feb PIM VINA Co.,Ltd. established in Nam dinh city, Vietnam
- 2018 Jan Awarded as an Excellent technical supplier from HKMC
- 2019 Feb Certified SQ as MIM Supplier (HMC / KMC Supplier Quality system)
- 2019 Feb PIM VINA Co.,Ltd. MIM Plant established
- 2020 Feb PIM VINA Co.,Ltd. ISO 14001 / IATF 16949 Certified
- 2020 Aug PIM VINA Co.,Ltd. Operation Machining Plant & Centrifugal Casting Plant
- 2021 Sep Merged DMK(DaeMyung Korea) Global in Korea
- 2022 Jul PIM VINA merged DMK VINA in Vietnam (Mold & Plastic injection)
- 2023 Aug PIM Korea Co., Ltd was listed on the KONEX stock market in Korea



Organization chart

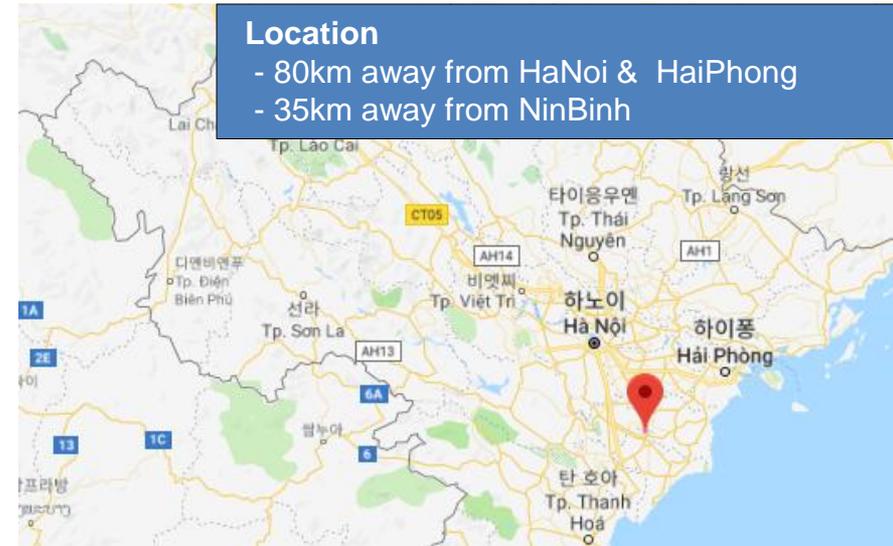


[number of people, As of the end of December 2023]

Location	Division	Total	Sales	Development	Manufacturing	Quality	Admin & Finance	Mold/Injection
PIM VINA	Korean	7	1	1	1	1	2	2
	Vietnamese Management	32	2	1	18	7	2	2
	Vietnamese Staff	347	9	8	237	45	13	35
	Total	386	12	10	256	53	16	39

Introduction PIM VINA Co., Ltd

- **PIM VINA Co.,Ltd.**
- **Establishment: 2017, Feb**
- **Location: Namdinh city of Vietnam**
- **Employee: 386**
- **Land : 29,700m²**
- **Building : 14,000 m²**



- **Production Process**
 - MIM
 - Machining for parts
 - Mold / Plastic injection
- **Production Item**
 - Automotive Parts
 - Mobile & Electronic parts



Mold manufacturing and additional expansion plan



2022 Aug (About 2,200m² for Mold)

- 2022 Aug Construction completed
- Mold manufacturing Capa : 30sets/month
- Employee plan : 60

◆ Future expansion plan

- Capacity : 70 injection machines
- Employee : 300



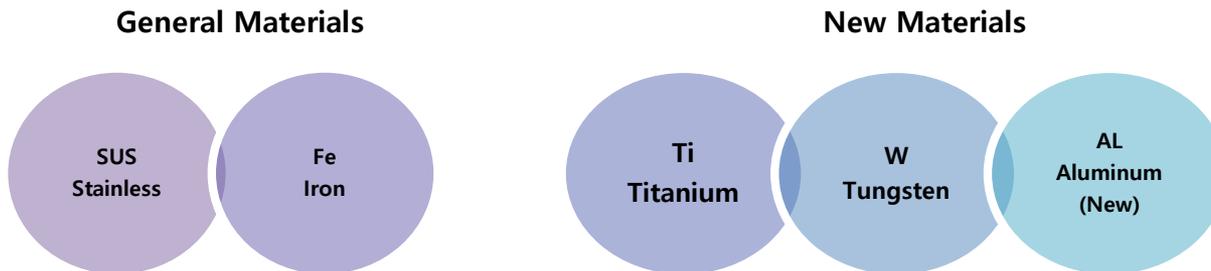
About 8,250m² for new plant

MIM Technology

➤ What is MIM (Metal Injection Molding)



➤ MIM Material



▪ General Material

- 1) SUS, Fe : These materials have been used since the beginning of MIM business for many industries including automotive, mobile, medical, defense etc.

▪ New Material

- 1) Ti : Mass production with Ti in Korea plant for medical application.
Development now in progress for mobile phone frame.
- 2) W : Already developed the counter weight with using Tungsten powder for mobile phone.
- 3) AL : Development now in progress. MIM aluminum requires advanced technology.

MIM Materials

➤ Typical Material and its properties

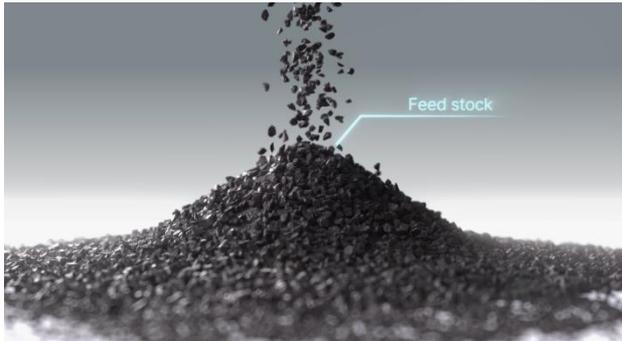
Material	Composition	Density (%)	Y.S (MPa)	T.S (MPa)	Elongation (%)	Hardness (Rockwell)	Hardness (Vickers)
Magnetic							
17-4PH (S)	Fe-17Cr-4Ni-4Cu	97	700	850	8	25HRC	250HV
17-4PH (H)	Fe-17Cr-4Ni-4Cu	97	1000	1200	12	35HRC	340HV
SUS440C (H)	Fe-17Cr-1.5Nb-0.75Mn-1C	97	1150	1310	4	60HRC	700HV
SUS420J2 (H)	Fe-13Cr-1Mn-1Si-0.55C	97	1200	1380	3	47HRC	470HV
AISI4140 (S)	Fe-1Cr-1Mn0.2Mo-0.4C	97	410	620	10	90HRB	185HV
AISI4140 (H)	Fe-1Cr-1Mn0.2Mo-0.4C	97	1240	1650	5	46HRC	460HV
2%Ni-Fe (S)	Fe-2Ni-0.5C	97	200	400	10	67HRB	120HV
2%Ni-Fe (H)	Fe-2Ni-0.5C	97	1300	1450	1	48HRC	480HV
Non-Magnetic							
Ti	Grade 4	97	500~700	650~750	8~12	26HRC	270HV
Ti-6Al-4V	Ti-6Al-4V	97	650~850	800~950	5~10	32HRC	320HV
IN713C	Ni-13Cr-6Al-4Mo-1Fe	97	800	1300	25	39HRC	385HV
A286	Fe-15Cr-25Ni-2Ti-0.35Al	97	300	800	40	86HRB	170HV
F75 (H)	Co-28Cr-6Mo	97	600	1000	6	35HRC	350HV
GHS-4	Fe-12Cr-40Ni-6Mo	97	560	800	2	33HRC	330HV
HK-30	Fe-25Cr-21Ni-1.3Nb	97	350	700	18	89HRB	180HV
DIN 1.4957	Fe-21Cr-20Ni-19Co-3Mo	97	250	650	15	97HRB	220HV
DIN 1.4091	Fe-35Cr-14Ni-3Mo	97	550	750	8	31HRC	310HV
SUS304L	Fe-18Cr-8Ni	97	175	520	45	67HRB	120HV
SUS316L	Fe-17Cr-12Ni-2Mo-2Mn	97	175	520	55	67HRB	120HV



MIM

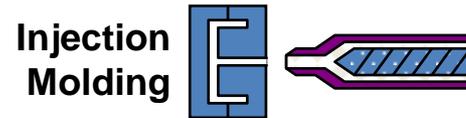
Manufacturing process (MIM)

1. Kneading



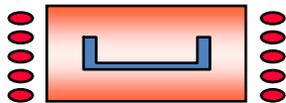
Metal powder + Binder

2. Injection



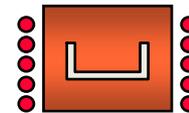
Shape made by injection

3. Debinding



To remove binder

4. Sintering



Mechanical property

Production equipment (MIM)

➤ Equipment for MIM

No	Process	Description	Q'TY	Picture
01	MIM Injection machine	30 ton	2	
		50 ton	13	
		80 ton	3	
		100 ton	1	
		130 ton	2	
		180 ton	4	
Sub-Total			25	
02	Supercritical degeneration debinding furnace	380 Bar	1	
	Sub-Total		1	
03	Debinding furnace	Batch type	12	
	Acid Debinding furnace	Batch type	2	
	Sub-Total		14	
04	Sintering furnace	Batch type	7	 
		High pressure furnace	2	
		Continuous furnace	3	
	Sub-Total		12	

Production equipment (MIM)

➤ Equipment for MIM

No	Process	Description	Q'TY	Picture
05	Heat treatment furnace	Q&T batch type	1	
	Sub-Total		1	
06	Induction hardening machine	Induction hardening	2	
	Sub-Total		2	
07	Sizing press	press	18	
	Sub-Total		18	
08	Machining	CNC	149	
		MCT	28	
	Sub-Total		177	
09	Barreling / Sandblasting	Barrel Machine	3	
		Sandblast	4	
	Sub-Total		7	

Inspection equipment (MIM)

Description	Q'TY
X-Ray C/T	2
CMM	1
Microscope	1
Hardness Tester	2
Roughness Tester	1
SMM (Shape Measuring Machine)	1
KEYENCE	1
3D Scan measurement	1
C/S Analyser	1
Salt Spray Tester	1



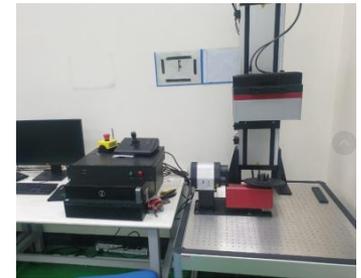
X-ray C/T



CMM
(Coordinate Measuring Machine)



KEYENCE
(3D shape measuring machine)



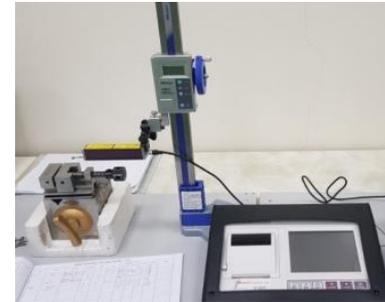
3D scan measurement



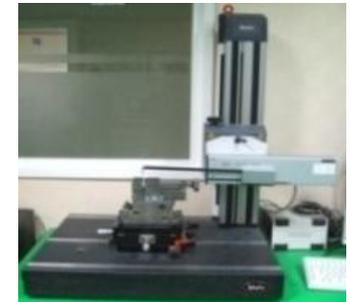
Microscope



Hardness Tester
(Vickers)



Roughness Tester



SMM
(Shape Measuring Machine)

Inspection room layout (MIM)

Measuring room



Inspection room



Automatic dimensional inspection



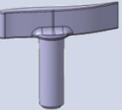
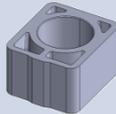
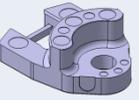
PIM KOREA

MIM APPLICATION

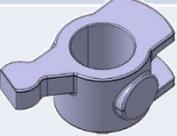
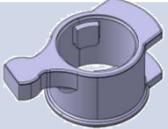
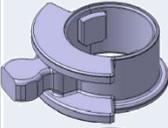
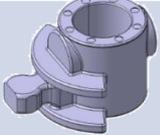
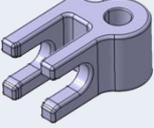
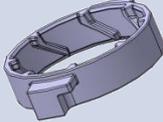
MIM is the new generation technology in metal component production, which combines conventional powder metallurgy technology and injection molding technology for production of high precision & high strength components.



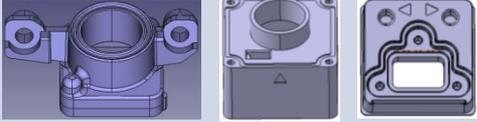
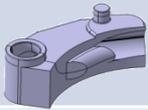
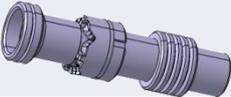
Turbo Charger

Image	Item	Material	Process	Image	Item	Material	Process
	VANE	HK30	MIM+ Machining		ADJUSTMENT RING	GHS4 & DIN1.4091	MIM+ Machining
	ARM	HK30	MIM		VANE	HK30	MIM+ Machining
	ARM	HK30	MIM		DRIVE SLIDE JOINT	HK30	MIM+ Machining
	STEERING ROD	HK30	MIM+ Maching + Ni Pl.+HT		NOZZLE LINK PLATE	HK30	MIM+ Machining
	CRANK	SUS304L	MIM		DRIVE LINK PLATE	HK30	MIM+ Machining
	VANE LEVER	HK30	MIM+ Machining		Guide Piece	HK30	MIM + HT + Machining

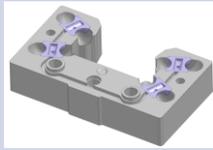
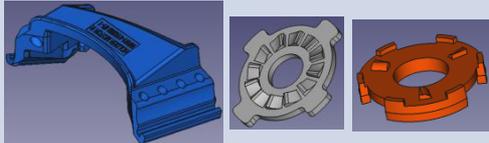
Transmission

Classification	Image	Model	Items	Material	Process
DCT G/A		•Gen1 7DCT •5 AMT	BODY NUT SCREW	Fe2%Ni	MIM+Machining
		•Gen1 7DCT •Gen2 7DCT •5 AMT	FINGER SHIFT,ODD	Fe2%Ni	MIM+Machining
		•Gen1 7DCT	FINGER SHIFT,EVEN	Fe2%Ni	MIM+Correction
		•Gen1 7DCT	FINGER CONTROL,EVEN	Fe2%Ni	MIM+Correction
		•Gen1 7DCT •Gen2 7DCT •5 AMT	FINGER CONTROL, ODD	Fe2%Ni	MIM+Machining
		•Gen2 7DCT	HEAD SOLENOID	Fe2%Ni	MIM+Machining
DCT C/A		•Gen1 7DCT •Gen2 7DCT •HEV	WAD RING	AISI4140	MIM+HT

Other parts for automobile

Classification	Image	Items	Material	Process
Camera Module		Lens Holer & Front Body & Rea Body	SUS316	MIM+Machining
EV Parking Brake		Bolt	100Cr	MIM+HT
EV Parking Brake	CONFIDENTIAL	Sector Gear	CONFIDENTIAL	MIM+Machining
Temperature & Pressure Sensor	CONFIDENTIAL	Body Socket	SUS316L	MIM
Integrated M**** Electronic Brake (iMEB)		Spline	Fe2%Ni	MIM+HT+Machining
Electronic Parking Brake (EPB)		Pinion Gear	Fe2%Ni	MIM
Steering (REPS)		End Cap	Fe2%Ni	MIM
Suspension		Spool	Fe2%Ni	MIM+HT+ Machining

Other parts

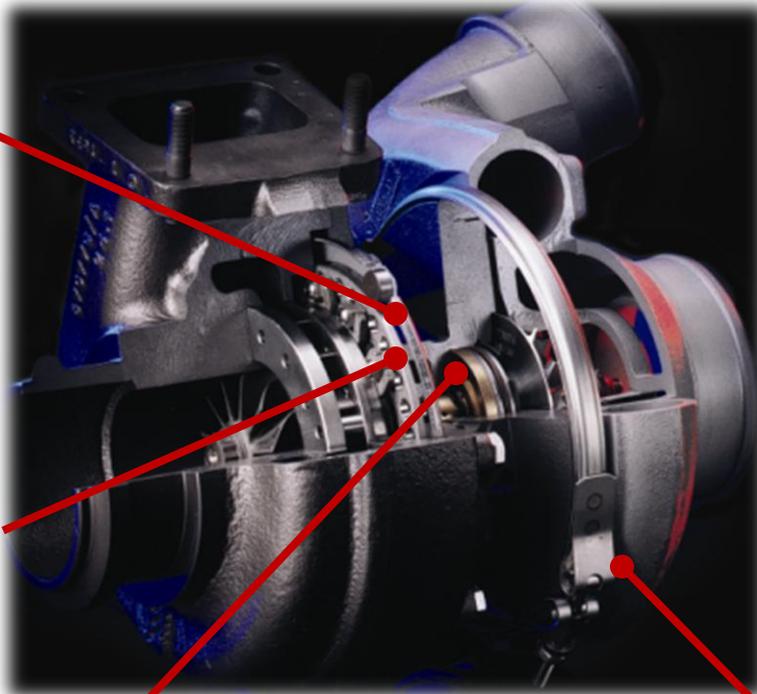
Classification	Image	Items	Material	Process
Guide Busing (Medical)		Guide Bushing	Titanium	MIM
Hand Piece (Medical)		Handle & Head	SUS316L	MIM
LM Guide (Automation)		End Plate	SUS304L	MIM
Smart Watch (Wearable)		TOP PLATE	SUS420J2	MIM
Robot (Wearable)		Motor Holder & Cap Button Plate & Push Plate	SUS630	MIM

Turbocharger Parts (MIM)

Metal Injection Molding



Adjustment Ring



Vane



Bushing (WGT parts)



Arm Cast (WGT parts)



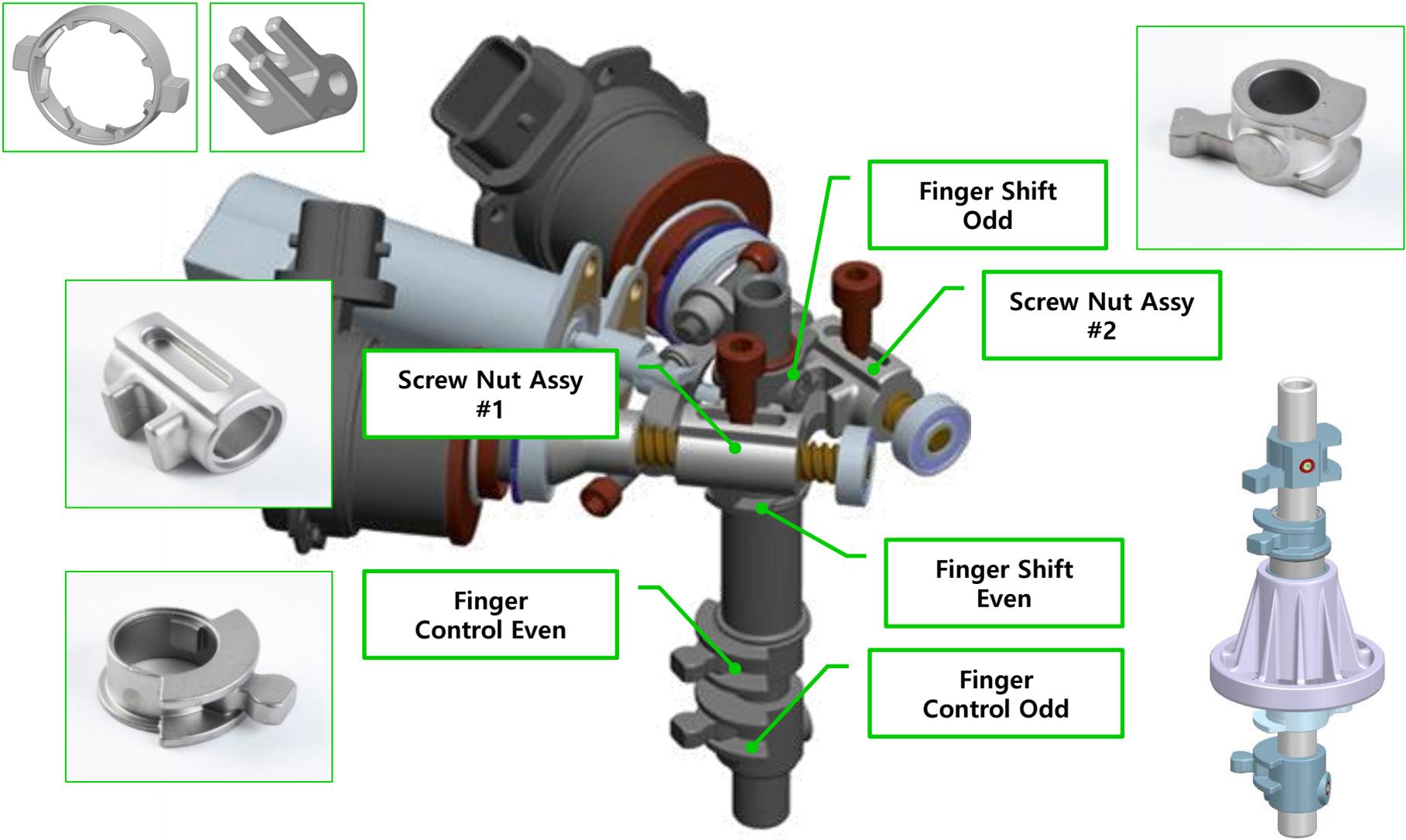
Vane Lever & Small Block



Steering Rod

DCT Gear Actuator (MIM)

Metal Injection Molding



Certification

IATF 16949 / ISO 14001



Certificate of Registration

QUALITY MANAGEMENT SYSTEM - IATF 16949:2016

This is to certify that:

PIM VINA CO., LTD
 Lot E, My Trung Industrial Zone,
 My Trung Commune,
 My Loc District,
 Nam Dinh Province,
 420000
 Vietnam

USI: LWMSN6

operates a Quality Management System which complies with the requirements of IATF 16949:2016 for the following scope:

The manufacture of metal and plastic injection molding parts.

Permitted exclusions: Product design.

For and on behalf of BSI:

Michael Lam - Managing Director Assurance, APAC

BSI Certificate Number: 744750

IATF Number: 0528771



Certification Date: 2024-07-05

Page: 1 of 2

...making excellence a habit.™

Latest Issue: 2024-07-05

Expiry Date: 2027-07-04

This certificate was issued electronically and remains the property of BSI and is bound by the conditions of contract.
 An electronic certificate can be authenticated [online](https://www.bsi-global.com/ClientDirectory). Printed copies can be validated at www.bsi-global.com/ClientDirectory or telephone +84 (8) 3820 0066.
 Further clarifications regarding the scope of this certificate and the applicability of IATF 16949:2016 requirements may be obtained by consulting the organization.
 This certificate is valid only if provided original copies are in complete set.

IATF Contracted Office: BSI Assurance UK Limited, registered in England under number 7805321 at 389 Chiswick High Road, London W4 4AL, UK.
 BSI Vietnam Headquarters, 15 Floor APC Tower, 518B Dien Bien Phu Street, Ward 21, Binh Thanh District, Ho Chi Minh City, Vietnam. Telephone: +84 (28) 38 200 066.
 A Member of the BSI Group of Companies.



CERTIFICATE

This is to certify that

PIM VINA COMPANY LIMITED

Lot E, My Trung Industrial Zone, My Trung Commune, My Loc District
 07208 Nam Dinh Province
 Vietnam

has implemented and maintains an **Environmental Management System**.

Scope:

Manufacture of Powder metal injection molding, centrifugal casting.
 Manufacture mold & plastic products.

Through an audit, documented in a report, it was verified that the management system fulfills the requirements of the following standard:

ISO 14001 : 2015

Certificate registration no.	50650289 UM15
Valid from	2023-02-19
Valid until	2026-02-18
Date of certification	2023-02-19



DQS GmbH

Markus Bleher
 Managing Director

Accredited Body: DQS GmbH, August-Schanz-Straße 21, 60433 Frankfurt am Main, Germany
 Administrative Office: DQS Holding GmbH, Konrad-Adenauer-Allee 9-10, 61118 Bad Vilbel, Germany
 The validity of this certificate can only be verified by the QR-code.

▲ IATF 16949

▲ ISO 14001



12 patents

- 10-0796150番
- 10-0948414番
- 10-0963887番
- 10-1121779番
- 10-1128502番
- 10-1143417番
- 10-1197141番
- 10-1202462番
- 10-1107596番
- 10-1223750番
- 10-1374828番
- 10-1374831番
- 6 other patents currently in progress



MOLD / PLASTIC INJECTION

Production Equipment (Mold)

No	Process	Description	Q'TY	Picture
01	MILLING M/C	HWACHEON HMT-1100N	2	  <p>Milling M/C HIGH SPEED M/C</p>
		HYUNDAI MCT	1	
	Sub-Total		3	
02	GRINDING M/C	HYUN CHUN JHG-520M	5	  <p>Wire cutting M/C Electric discharge M/C</p>
		Sub-Total		
03	HIGHT SPEED M/C	HWACHEON SIRIUS-UM(20R)	3	 <p>Electric discharge M/C</p>
		Sub-Total		
04	WIRE CUTTING M/C	SODICK AG400L	1	 <p>Electric discharge M/C</p>
		SODICK SL600G	2	
	Sub-Total		3	
05	ELECTRIC DISCHARGE M/C	SODICK AG40L+LN2	3	 <p>Electric discharge M/C</p>
		CHMER DM434C	1	
	Sub-Total		4	

Production Equipment Layout (Mold)



Machining Room



Measuring Room



Assembly Room



Grinding Room

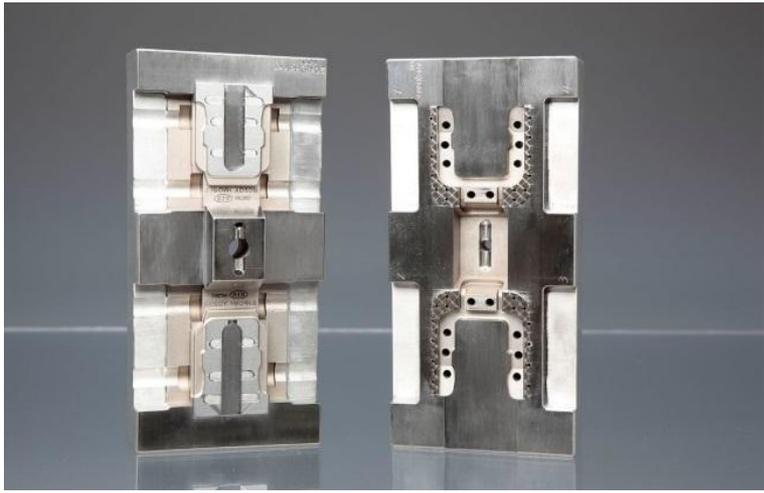
Main Products (Mold)



Insert Core



Slide Core



Main Core



Completed Mold

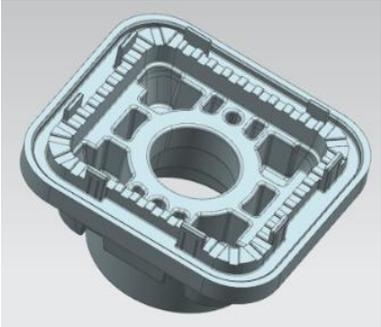
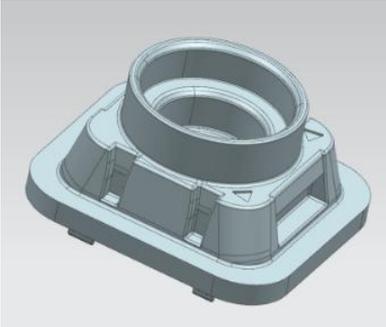
Production Equipment (Plastic Injection)

Injection Machines (Total 9unit)

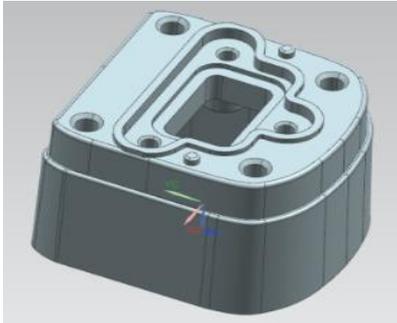
80ton 6 sets , 100ton 1 set , 110ton 2 sets



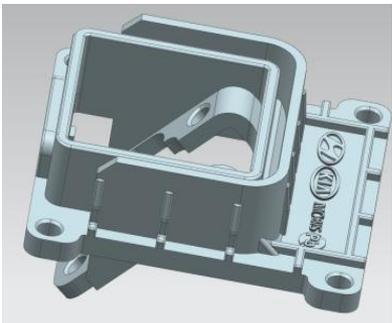
Main Products (Plastic Injection)



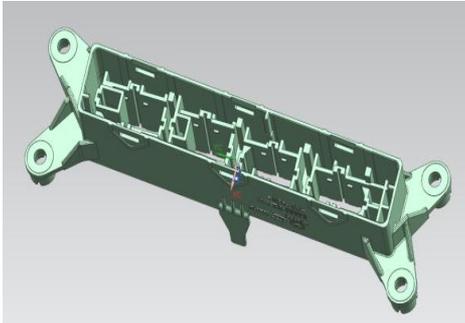
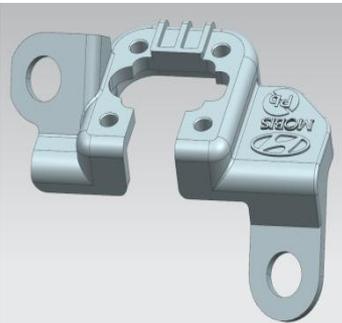
FRONT BODY for lens assembly
(Material for laser welding)



REAR BODY



BRACKET for the camera module



HOUSING

New products & new technologies

1. Titanium (Ti) product

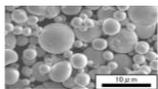
Development of titanium products using the precision casting ,MIM, GPM (Cost down 30%, Lightweight 50%)

■ Applied parts and applied construction method

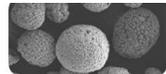
	Medical	Mobile Phone Frame		Wheel Compressor	
Our method	MIM	MIM	PVD Coating	Machining + ASS'Y	MIM
Picture					

■ process

- Select MIM or GPM method according to part shape

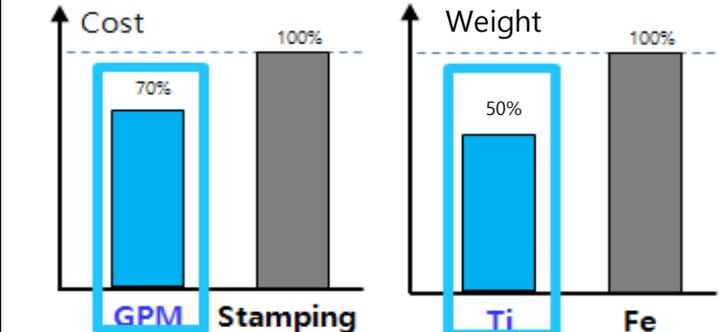


MIM powder



GPM powder

■ Effect analysis

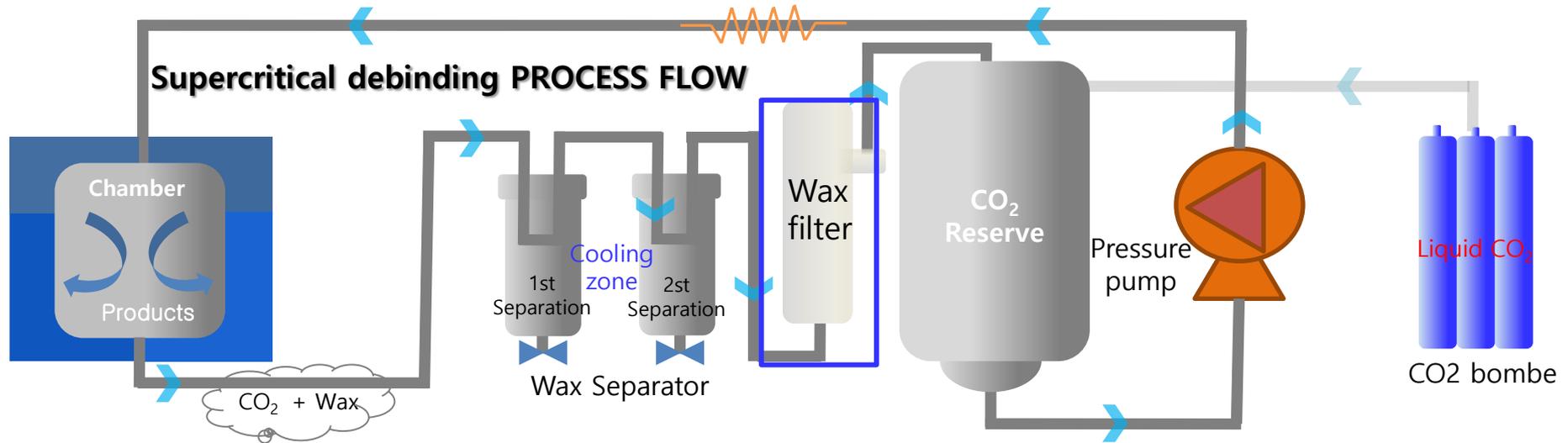


30% cost down compared to stamping

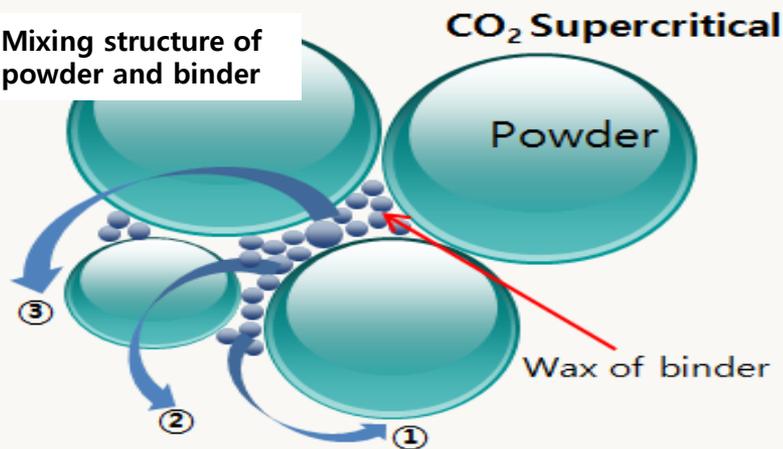
Lightweight 40% compared to iron-based materials

2. Supercritical debinding technique

Self-developed Supercritical debinding technique (Large products can be produced at low cost)



Mixing structure of powder and binder

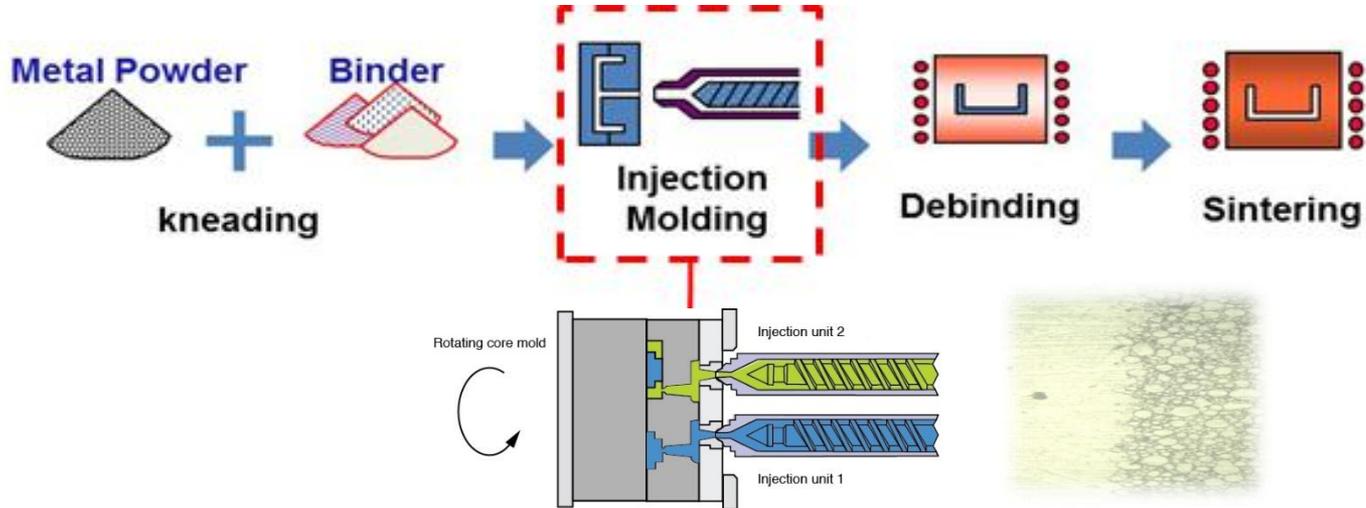


■ Effect analysis

1. High weight (100g or more, thickness 30mm or more) parts can be manufactured
2. More than 50% reduced lead time of degreasing process
3. Process temperature 75°C : energy cost reduction
4. Minimization of degreasing deformation

3. Dual material injection technique

Co-injection of different materials (magnetic/non-magnetic, etc.)



Application 1

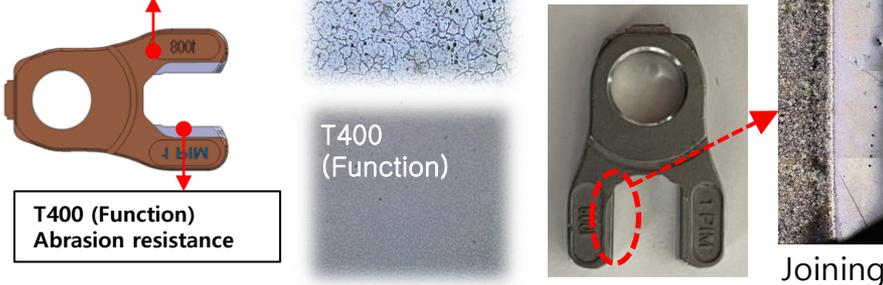
→ High-temp. corrosion resistance / Abrasion resistance

HK30 (Basic)
corrosion resistance ↑

HK30 (Base)

T400
(Function)

T400 (Function)
Abrasion resistance



Joining

Application 2

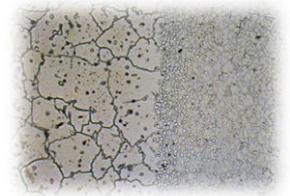
→ Abrasion resistance / Weldability improvement

Stellite1016
Abrasion resistance

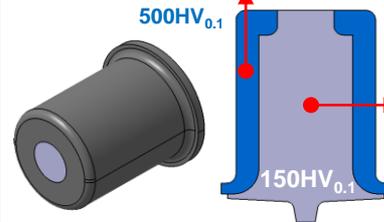
500HV_{0.1}

SUS316L
Weldability
improvement

150HV_{0.1}



Joining



Stellite1016: Excellent abrasion resistance → Welding difficulty
SUS316L: Non-functional site → Good weldability



Thank You