

The Power of  
**Positive Thinking and People**

*Challenge the Future!*





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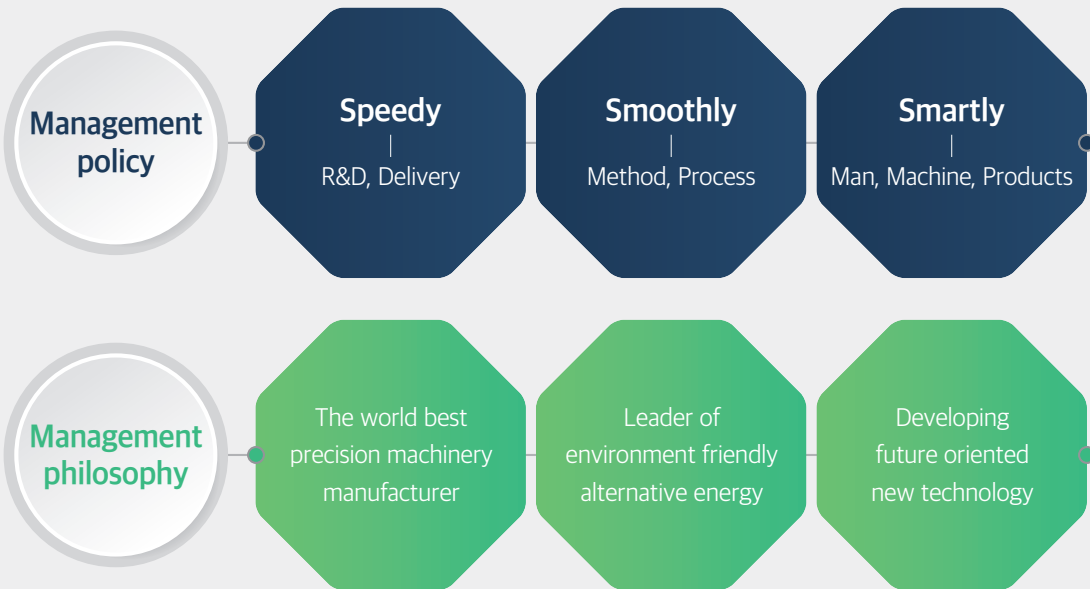


# About EM Korea

## Continuous growth engine of EM Korea is “The Power of Positive Thinking and People”

EM Korea Co., Ltd. established in 1987, is renowned for its implementation of the most progressive manufacturing techniques, namely precision machining. Listed on the KOSDAQ in 2007, EM Korea set off to initiate new business operations acquiring both domestic and international patents and certificates. The company now enjoys a strong reputation for proven results and has become successfully accomplished in 5 business fields, including Machine Tools, Defense/Aerospace, Power Generation/ITER, Tunnel Boring Machine, and H2 Energy/Environment. In September 2020, EM Korea completed construction of its maintenance facilities dedicated to the aircraft landing gear and has become the first in Korea to perform maintenance on the B737NG aircraft landing gear. EM Korea remains committed to quality improvement and technological development to meet customers' demands while fulfilling corporate social responsibilities. EM Korea strives to bolster public confidence and trust for a better future

## EM Korea is making the Future of Technology





## Brief History

- 1987.**
  - Established DONGWOO Precision
- 2000.**
  - ISO 9001 certified
- 2003.**
  - Established EM Korea Co., Ltd.
  - R&D center opened
- 2005.**
  - The Merger of DONGWOO Precision and EM KOREA Co., Ltd.
- 2006.**
  - ISO 14001 Certified
  - Awarded the Premier's Letter of Commendation in 3rd Korea regional innovation Convention & Exposition
  - Awarded the tower of ten million dollar export
- 2007.**
  - Listed in KOSDAQ (Korea Securities Dealer's Automated Quotations)
- 2010.**
  - Produced 10,000sets of CNC Lathes
- 2011.**
  - Awarded Silver Tower order of Industrial Service Merit
  - Constructed Hydrogen station for Hydrogen fuel-cell car in Jeju, Korea (Hyundai motors)
- 2012.**
  - AS9100 certified
  - Developed Hydraulic Reservoir for T-50
- 2013.**
  - Defense Quality Management System certified

## Responsibility, Honesty, Challenge

- 2014.**
  - First shipment of localized TBM
- 2015.**
  - Development of Hydraulic Distributor for LCH/LAH
- 2016.**
  - Physical Division to EM Korea Co., Ltd. and EM Solution Co., Ltd.
  - Development of Hydraulic reservoir for KFX
- 2017.**
  - OBIGGS for marine - ABS, certified
  - Obtained the order of Shield Blanket for ITER (International Thermonuclear Experimental Reactor) project
  - Developed OBIGGS for KUH
  - Awarded of Defense Quality Management System
- 2018.**
  - Designated as developer of the MRO Technology for B737/A320 Landing Gear System
- 2019.**
  - MRO&U contract with LM in hydraulic systems
- 2020.**
  - Aviation maintenance business registration certificated by Ministry of Land, Infrastructure and Transport)
  - AS9110 certified
  - Approved Maintenance Organization Certificate (Aviation)
- 2021.**
  - Designated as Hydrogen Company (H2 Station)

# Future-Oriented Global Business Creator

## Business Division

EM Korea continues to innovate the technology on a solid foundation

With the belief that human values are corporate values, EM Korea will strive to create a beautiful corporate culture with "responsibility" that puts customer satisfaction first, "honesty" for fair distribution, and "challenge" that drives new growth engines with innovation.



**New Leader, EM Korea**





# Business Division

## ■ Introducing business portfolio



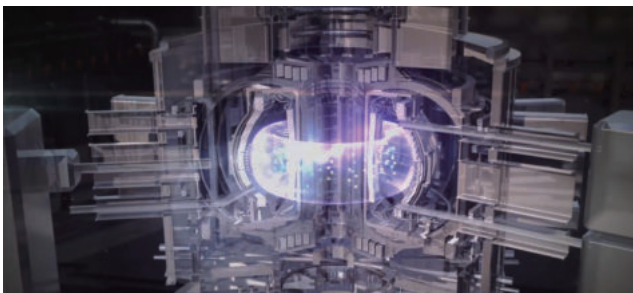
### Machine Tool Business

Starting from the manufacturing of parts for machine tools in 1987, EM Korea now manufactures components of CNC lathes, as well as thirty six CNC lathe models



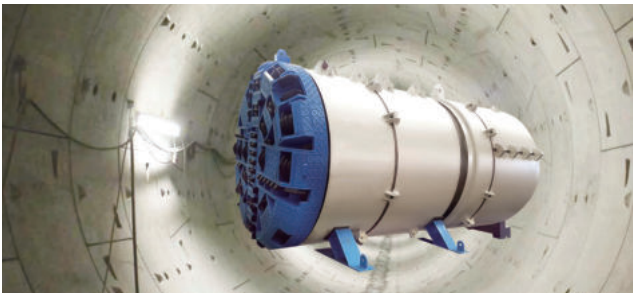
### Defense/Aviation Industries

Defense and aviation production include door actuator parts for the T-50 in 2006 and landing gear parts for A340/A380 in 2008. Since 2012, EM Korea has been designing and manufacturing of a hydraulic reservoir



### Power Generation (ITER) Business

EM Korea has been developing and manufacturing main assemblies for nuclear and fossil power plants, parts for large capacity and high efficiency power generation equipment, and super critical class power generation equipment since 2000



### TBM Business

EM Korea established the nation's first TBM production system in 2013 by purchasing patents and licenses Japan's Taiko Techs, an internationally recognized as a specialist in semi shield manufacturing



### Environment/Energy Business

Since 2000, EM Korea has been investing in development of hydrogen energy and now leads the nation's electrolysis hydrogen manufacturing technology. EM Korea is currently developing solar energy generation linked to an electrolysis hydrogen manufacturing device



### MRO

In September 2020, through MOLIT and KAIA's support for the national R&D project, EM Korea completed construction of its maintenance facilities dedicated to the aircraft landing gear. And since its certification as an AMO by MOLIT in December 2020, EM Korea has become the first in Korea to perform maintenance on the B737NG aircraft landing gear.





# Aerospace Business

Through continuous technology development, we will lead localization of main components for aircraft.

EM Korea strives to grow as an MRO company by acquiring maintenance technologies for a diversified profile of aircraft and components, and establishing dedicated facilities and equipment.

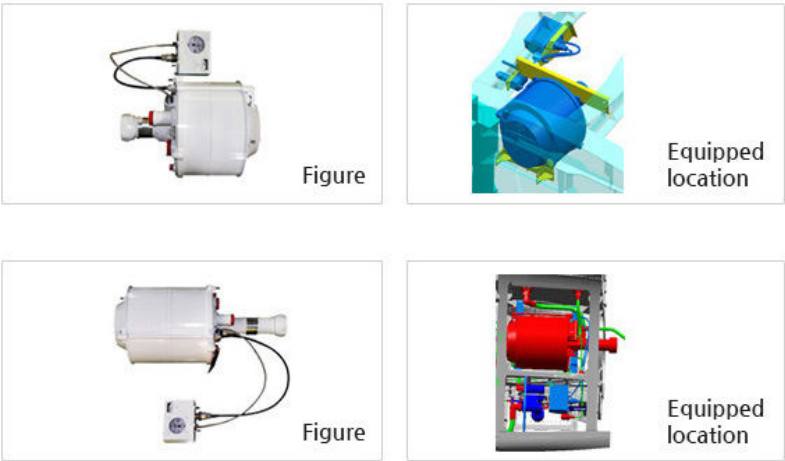
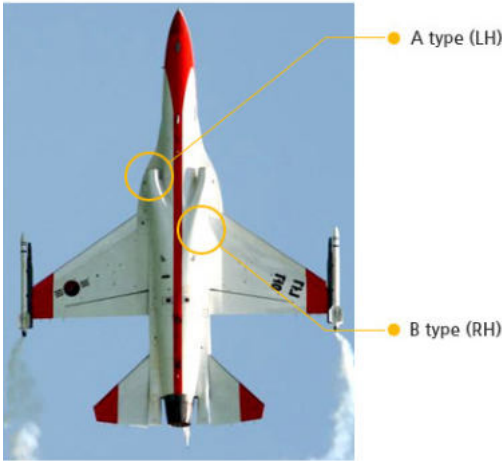




# Korean Jet T50/TA50/FA50

## Hydraulic reservoir

EM Korea manufactures the Hydraulic Reservoir, which is a core component for Korean supersonic advanced trainer T-50. It has secured technology that covers the entire process from designing, manufacturing to assembly and testing. EM Korea recently delivered 16 sets of Hydraulic Reservoirs for T-50 to Indonesia.



## Work scope

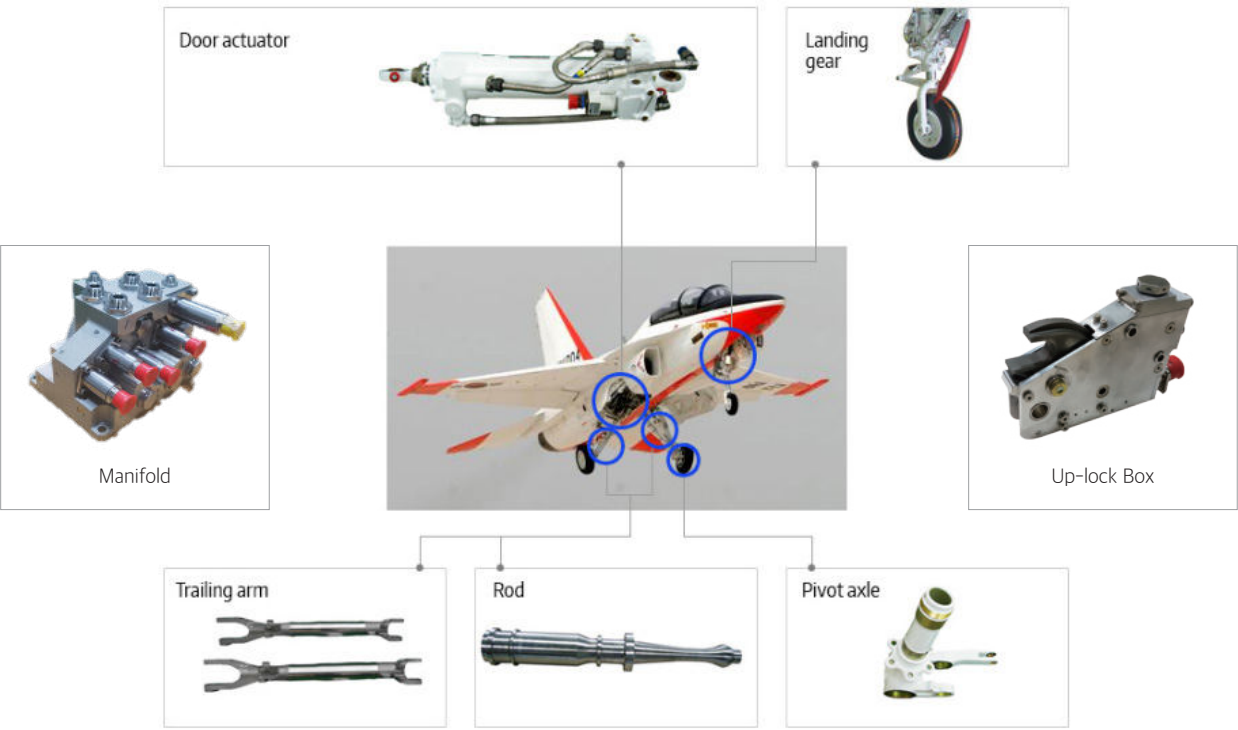
Manufacturing completed  
product by design itself  
Development and initial delivery : 2012

## Design concept

Bootstrap-type reservoir to offset hydraulic inside of aircraft such as components and schematics  
Displayed temperature range : -40 °F ~ +160 °F / Displayed flow rate range : 0% to 100%  
Equipped relief valve to protect reservoir against internal high pressure

## Landing Gear Components / Manifold / Up-lock Box

Since the first delivery in 2008, EM Korea has continued to manufacture and deliver the Trailing Arm, Pivot Axle, and 28 kinds of Cam A340/380 landing gear components. Based on precision processing technology, EM Korea manufactures and assembles 54 kinds of essential components for the landing gear door actuator.



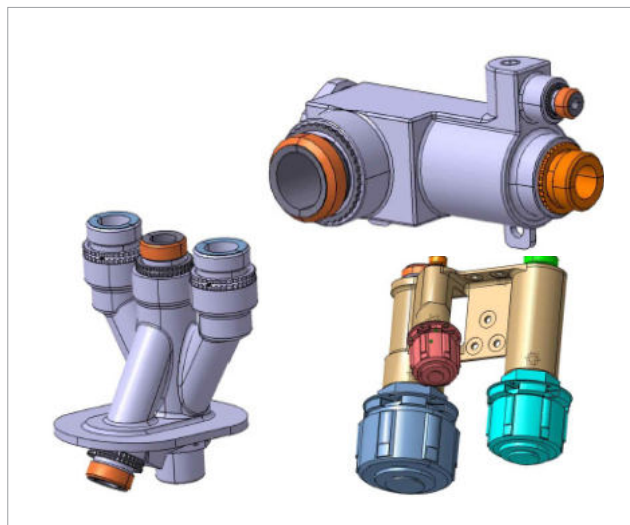




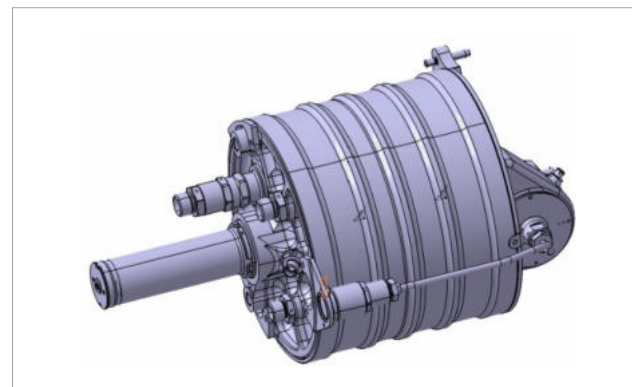
# Korean Fighter KF-21

## ■ KF-21 Main Components

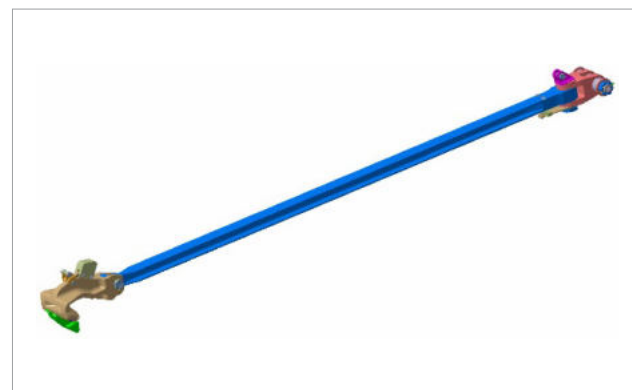
- Development schedule : 2017 ~
- Item - Hydraulic Reservoir
  - Manifolds & Gun flow limiter
  - Arrest hook



Manifolds & Gun flow limiter



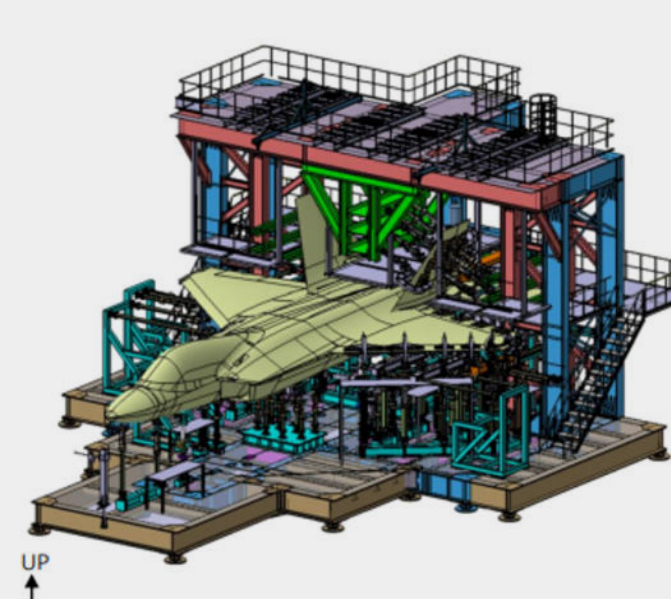
Hydraulic Reservoir



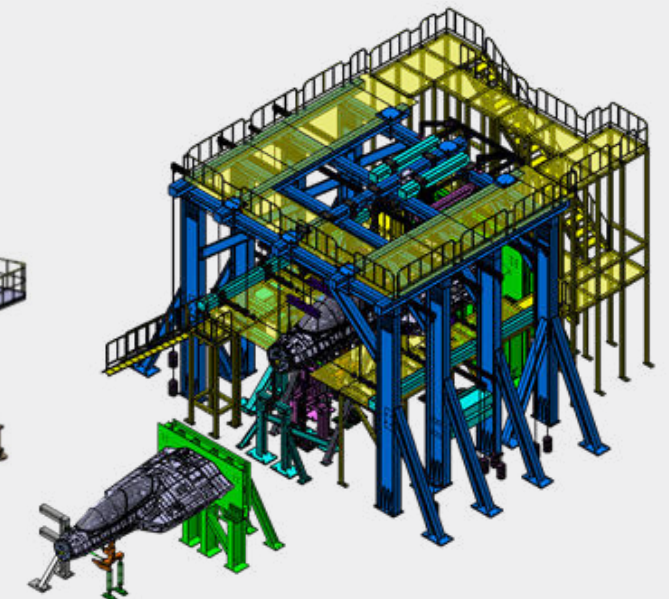
Arrest hook

## ■ KF-21 Test Stand Structure

EMK's Scope of Work: Design, Manufacturing, Installation and Test Support



KF-21 Load Calibration Test Stand



KF-21 Front Fuselage Structural Test Stand



# Korean Helicopter

## Korea Utility Helicopter



- Manufacturing the completed OBIGGS system based on EMK drawing
- Development and First shipment: 2017
- Buyer / Final purchaser : KAI
- Completed system per ship set

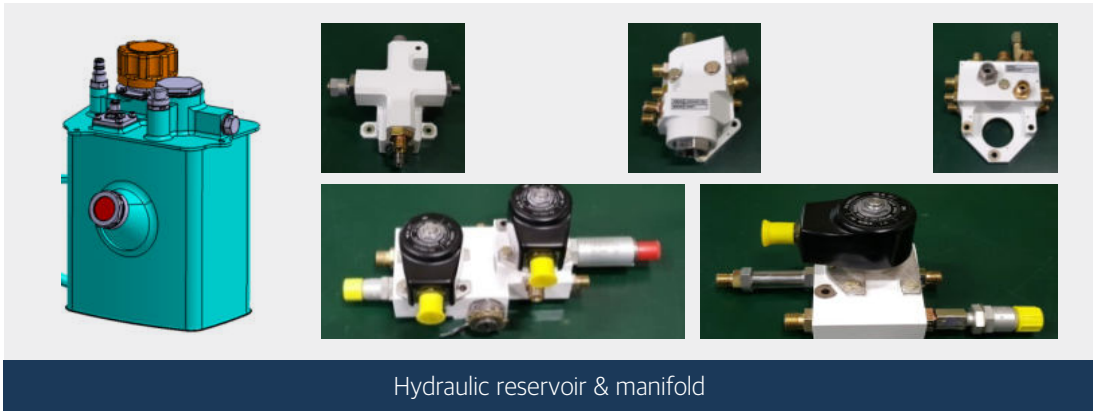


OBIGGS - On Board Inert Gas Generating System

Project	Material	Size(mm)
Korea Utility Helicopter OBIGGS	7075-T651 6061-T651 SUS 316	600 x 300 x 150

## Light Civil Helicopter/Light Armed Helicopter

- Development schedule : 2015~2021
- Item - Hydraulic reservoir & manifold / Accumulator / Lever assembly & Rotor brake components / Turret gun



Hydraulic reservoir & manifold



Accumulator



Rotor brake



Turret gun







# Civil Aircraft

## A340/A350/A380/B787 Landing Gear Parts



## New supplier and strategic partner for Collins Aerospace

- EMK has been selected to be a new supplier and strategic partner for Collins Aerospace.  
Awarded Collins Power and Controls Manufacturing Contract:
- Product Summary:

Part Name	Aircraft Type
Lock Piston	A330 / 340 / 350 A220 / 787
Piston Rod	ARJ21 EMB-E2 ERJ170 / 190 Global Express MRJ RRJ Global 7000/8000
Shaft, Variable Coax	E-JET 190 E2
Shaft Coupling	A321 / 340-500 / 340-600
Shaft Assembly, Splined, Insep	A220 MC-21

- EMK is also working on proposals to support other Collins business units including Landing Gear Systems and Actuators.
- EMK will continue to invest in skilled people and machinery to make EMK a world class manufacturing facility to support all Aerospace businesses.



# MRO Maintenance, Repair and Overhaul

## ■ EMK's MRO Organization

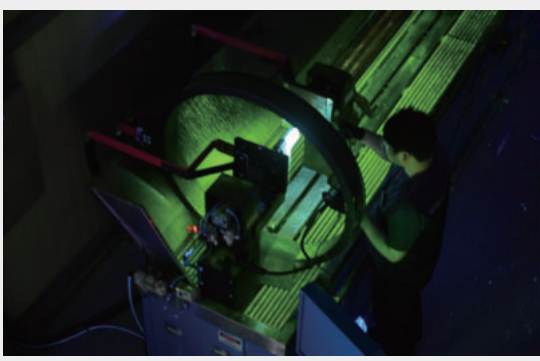
EM Korea became the first to be certificated as an Approved Maintenance Organization for the landing gear by MOLIT in December 2020.

In addition to the domestic certification, it also plans to acquire certification as a Part 145 Repair Station from the FAA by early 2022. Currently, EMK is marketing its landing gear MRO to domestic airlines, with goals to kick-off the MRO business for B737 NG landing gears by late 2022.

EM Korea's business core business strategies for growth as a maintenance organization include 'acquiring MRO technologies parts/components for diverse range of aircraft types', 'establishing dedicated facilities and equipment', 'fostering high-skill technical personnel', and 'establishing a specialized SCM and electronic system for MRO'.

## ■ Strengths of EMK's MRO Organization

- The first and only maintenance organization to be certificated by MOLIT for the landing gear.
- Located at Changwon National Industrial Complex, within 4.5 hours from key domestic airports (reduced transit time)
  - Incheon Intl. Airport: less than 4.5 hours
  - Gimhae Intl. Airport: less than 40 minutes
- Holds C14 (ATA 32) and D1 ratings
  - C14 landing gear: B737-600/700/800/900
  - Additional ratings for the landing gear (C5, C12, C20) and non-destructive testing: FPI and MPI
- Holds certificates as maintenance organization and for aerospace
  - Approved Maintenance Organization Certificate (MOLIT)
  - AS9110 Rev. C / AS9100 Rev. D







# MRO Ability

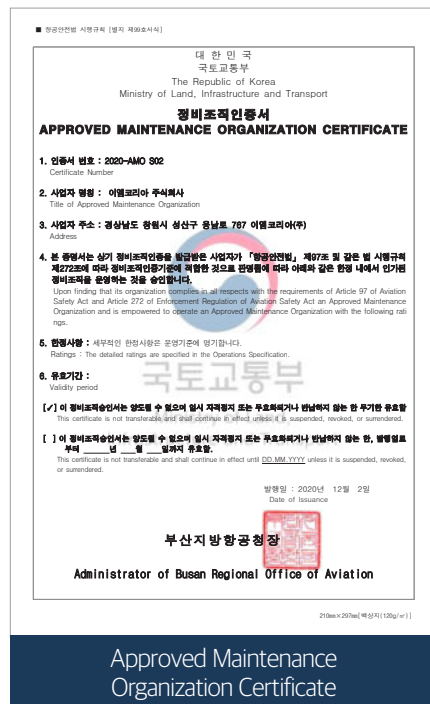
## Capabilities of EM Korea's Maintenance Organization



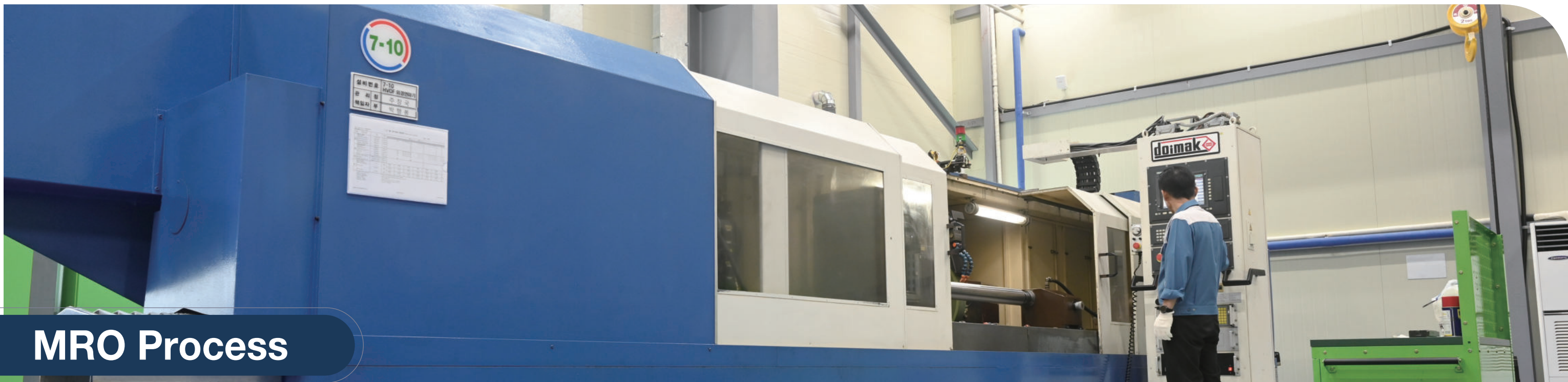
- Holds capability for the entire B737NG landing gear:
  - Components/parts rating: 4 components, 23 parts
  - Specialized service rating: 2 items

## B737NG Capability List

Class	Ratings	No.	Document No.	Description
Components /parts	C14 (ATA 32: Landing Gear)	1	32-11-12	MLG COMPONENT INS
		2	32-11-16	MLG END ITEM
		3	32-21-12	NLG COMPONENT INS
		4	32-21-16	NLG END ITEM
		5	32-11-09	MAIN LANDING GEAR INSTALLATION COMPONENTS
		6	32-11-13	MAIN LANDING GEAR SIDE STRUT ASSEMBLY
		7	32-11-17	MAIN LANDING GEAR WHEEL AND TIRE INSTALLATION COMPONENTS
		8	32-21-07	NOSE LANDING GEAR INSTALLATION COMPONENTS
		9	32-21-17	NOSE LANDING GEAR WHEEL AND TIRE INSTALLATION COMPONENTS
		10	32-21-22	NOSE LANDING GEAR DRAG STRUT ASSEMBLY
		11	32-30-62	MAIN GEAR SHIMMY DAMPER ASSEMBLY
		12	32-32-27	MAIN LANDING GEAR WALKING BEAM COMPONENTS
		13	32-32-34	MAIN LANDING GEAR UPLOCK ASSEMBLY
		14	32-32-37	MAIN LANDING GEAR RETRACT ACTUATOR ASSEMBLY
		15	32-32-42	MAIN LANDING GEAR UPLOCK ACTUATOR ASSEMBLY
		16	32-32-52	MAIN LANDING GEAR DOWNLOCK ACTUATOR ASSEMBLY
		17	32-33-12	NOSE LANDING GEAR RETRACT ACTUATOR
		18	32-33-22	NOSE LANDING GEAR LOCK ACTUATOR ASSEMBLY
		19	32-51-52	NOSE LANDING GEAR STEERING ACTUATOR ASSEMBLY
		20	32-50-17	STEERING VALVE ASSEMBLY
	C12 (ATA29: Hydraulic)	21	29-09-21	HYDRAULIC SWIVEL ASSEMBLY
	C5 (ATA33: Lights)	22	33-41-72	NOSE LANDING GEAR TAXI-LIGHT ASSEMBLY
	C20 (ATA57: Wings)	23	57-15-01	MAIN LANDING GEAR BEAM INSTALLATION COMPONENTS
Specialized Service	D1 (NDT)	24	ASTM-E1444	MAGNETIC PATICLE INSPECTION
		25	ASTM-E1417	FLUORESCENT PENETRANT INSPECTION







# MRO Process

## ■ Key processes, facilities and features



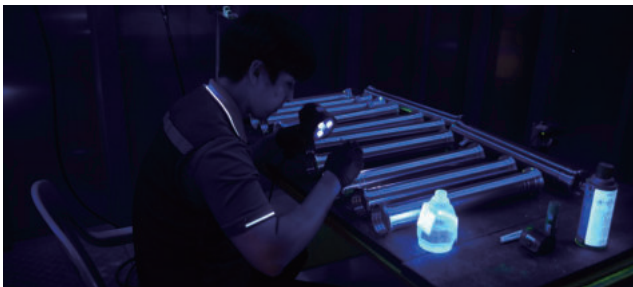
### Disassembly

- 3 dedicated lines for disassembly
- Concurrent maintenance capacity for 3 landing gears (for B737 L/G)



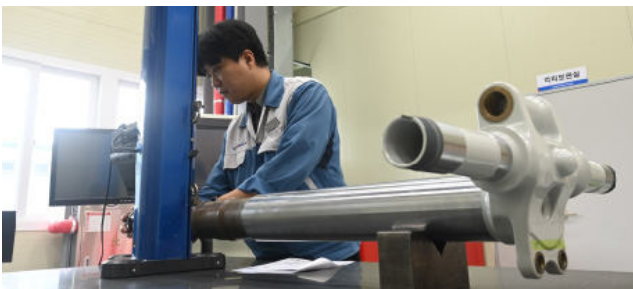
### Cleaning

- Vapor degreasing and blasting
- Chemical solvent cleaning and paint removal per Boeing specifications



### Non-Destructive Testing (NDT)

- FPI capacity (max. part size): 2,000 x 600 x 2,000 mm
- MPI capacity (max. part size): 100 to 3,000 mm, Φ900 mm



### Inspection

- Dedicated inspection area and segregation area
- Specialized measuring equipment and independent cranes



### Shot Peening and Blast

- Cast Steel Hard Shot (AMS 2431/2, HRC 55-65)
- Capability for B737 and A320 series landing gears
- Automatic shot peen system



### Machining

- Machining capability for B737 and A320 series landing gears
- Manufacturing capability for A350, A380, and B787 landing gears
- Grinding boring machine for internal and external diameters





# MRO Process

# Customer Satisfaction

## ■ Key processes, facilities and features



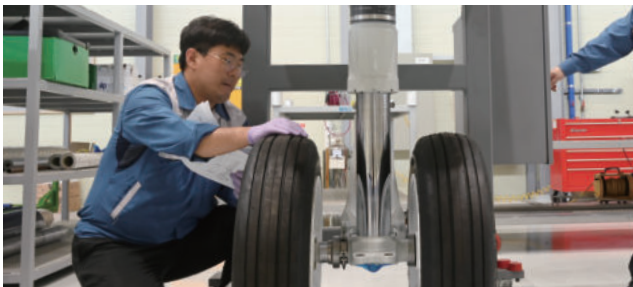
### Nital Etching and Baking Oven

- Assurance against material property changes in high-strength steel landing gear parts during processing
- Nital Etching capacity (max. part size): 2,000 x 600 x 2,000 mm
- Baking Oven capacity (oven interior size): 2,000 x 2000 x 2,000 mm



### Final Component Inspection

- Pre-assembly verification of components and related documents (according to verification requirements in CMM)
- Final inspection of components and completed assemblies
- Maintenance history review and return-to-service approval



### Assembly and Testing

- Final verification and recording of P/N, S/N, SB, LLP and applicable aircraft types
- Special testing area and equipment (including hydraulic, load, and steering tests)
- Specialized tooling produced to CMM requirements
- Testing of assemblies and back-to-birth determination

## ■ Customer Satisfaction Plan

### Competitiveness in Timely Delivery

- Provide a competitive TAT (Turn-Around Time)
  - Establish a dedicated SCM for the timely procurement of parts and materials
  - Acquire technology for identifying replacement parts (bushings and 100% replacement parts)
  - Establish a dedicated logistics system (shipping and customs clearance) for incoming and outgoing parts/components
  - Utilize ERP developed by EMK specifically for MRO (ELVIN)

### Competitiveness in Price

- Pricing strategy that is more competitive than foreign MROs
  - Optimized purchasing costs for raw materials and parts through independent supply chain
  - Establish an independent logistics system or adopting a specialized logistics system to reduce logistics costs
  - Optimized labor costs through timely commitment of labor for each maintenance process and through youth employment

### Competitiveness in Quality

- Quality Assurance through technical assistance agreements with independent overseas MROs and OEMs
  - Promote a Joint Venture agreement with foreign MROs or landing gear OEMs to maximize sales capacity
  - Securing sufficient competitiveness by establishing a cooperation system between for advanced maintenance technologies





## Computerized system **ELVIN**

### EMK LANDING GEAR VERSATILE INFORMATION NETWORK

In 2020, EM Korea launched its new brand 'Elvin (EMK Landing Gear Versatile Information Network)'.  
EMK Landing Gear Versatile Information Network will make the aviation division's work smarter.

## Main Facility

### ■ Main Facility

- Processing facility : Changwon plant (28 types of 80 items) / Haman plant (12 types of 28 items)
- Test and evaluation facilities : Changwon Plant (1,995 items) / Haman Plant (798 items)

#### Manufacturing facility

##### 5 Axis Machine



**DMG DMU125FD**  
(1,250×1,250×1,000)

##### 5 Axis Machine



**SNK RB-250F**  
(3,800×2,500×2,600×3,800)

##### 5 Axis Machine



**PAMA SPEEDMAT HP6**  
(5,250×2,900×600×850)

##### JIG Boring Machine



**DIXI 350TPA**  
(1,000×1,000×1,000)

##### Plano Miller



**Hankook PME-40ES100**  
(10,300×5,000×2800×1800)

##### Vertical Turning Center



**Hankook VTC-30/40E**  
(Ø4,000-Max Swing)

##### Boring Machine



**Mitsubishi MAF-RS150C**  
(12,000×4,500×1,100)

##### Plow Forming



**WF MACHINENBAU STR 300**  
(D300×4,000L)

#### Test evaluation facility

##### 3D Measurement



##### Projector



##### Shape Measuring Instrument



##### Laser tracker



##### Pollution level analyzer



##### System thermal Deflection Measuring Instrument



##### Noise & Vibration Measuring instrument



##### Oil Pressure Tester



##### Environment Tester







Headquarter of EM Korea



Haman factory of EM Korea



**ENERGY & MACHINERY KOREA CO., LTD**

767 Ungnam-ro, Seongsan-gu, Changwon City,  
Gyeongnam Province, Korea (Namsan-dong)

**Tel.** +82-55-211-9600    **Fax.** +82-55-211-9640