Company Introduction 2018

KOWEL

Special Wire

Welding Electrode

Automobile Parts

Plant Industry

Contents

1. General Introduction

1.1 Company Profile

Name	KOWEL Co., Ltd.
President	MR. CHANG-WON SUNG
Establishment	08th OCT. 1982
Employee	90
Business Divisions	Special & Alloy Steel/Welding Material Automotive Exhaust Parts Fabrication for Nuclear Power Plant

1. General Introduction

1.2 History

1980's	**1982.10**	**Established as KOWEL Special Steel Wire Co., Ltd.**
1990's	1996.12	Acquired ISO9002
	1998.02	Export bright prospect business company (Small and Medium Business ministration)
2000's	**2002.01**	**Take up Mr. Chang Won. Sung as the President**
	2003.02	KSA9001/ISO9001 Renewal
	2006.12	Acquired Certificate of Innovation business company recognize (INNO-BIZ : Small and Medium Business Administration)
	2008.05	Developed Automotive Springs applicable for Passive Valve of Exhaust System(XD/GH/XG)
	2009.05	**Start of development for Automotive Exhaust Passive Valves (KIA SL)**
2010's	2010.03	Registered on SKN #3,4 (Shin-Kori Nuclear Power Plant) Qualified Supplier List (Application of KEPIC manual production system)
	2011.08	Acquired ISO/TS16949:2009 certificate (DQS KOREA)
	2012.04	**Acquired S.Q (SUPPLIER QUALITY) certificate from Hyundai - Kia Motors**
	2013.07	Registered on KHNP's Approved Spare Part Vender List (Korea Hydro & Nuclear Power Co., Ltd.)
	2013.09	**KEPIC Certificate (Korea Electric Power Industry Code)**
	2014.02	Acquired approval for material supplier to Shin-Hanul Nuclear Power plant
	2014.07	Acquired approval for material supplier to U.A.E. BNPP Nuclear Power plant
2015's	**2015.06**	**Acquired ASME (American Society of Mechanical Engineers) certificates (NPT.NS.NA)**
	2015.10	**Registration as supplier for national Aero-Space company, KAI (Korea Aerospace Ind. Ltd.)**
2016's	2015.11	Awarded Presidential Citation
	2016.01	Registration as Q class partner of KEPCO Plant Service & Engineering Co., Ltd.)
2017's	**2017.02**	**Moved the 2nd plant (Automotive Exhaust Passive Valve Part) to new facility**

1.3 Head Office & Production Plants

Division	Address	Plottage (㎡)	Facility (㎡)	Property	Business Division (Product Group)
Head Office & 1st Plant	5, Sanmakgongdanbuk 4-gil, Yangsan, Gyeongnam, Korea	7,495	3,761	Ownership	Material Division (Stainless, Nickel Alloy Wire & Welding Wire)
2nd Plant & R&D Institute	90, Sanmakgongdanbuk 5-gil, Yangsan, Gyeongnam, Korea	3,350	1,747	Ownership	Automotive Division (Exhaust Valve)
3rd Plant	298 Yongdeok-ro, Hallim-myeon Gimhae, Gyeongnam, Korea	5,544	1,600	Ownership	Plant Division (Fabrication & Pipe)

Head Office (1st Plant)

Stainless, Nickel Alloy Wire
Welding Wire

2nd Plant

Automobile Parts
(Exhaust Flexible Valve)

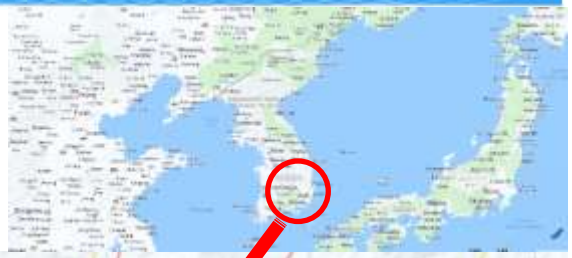
3rd Plant

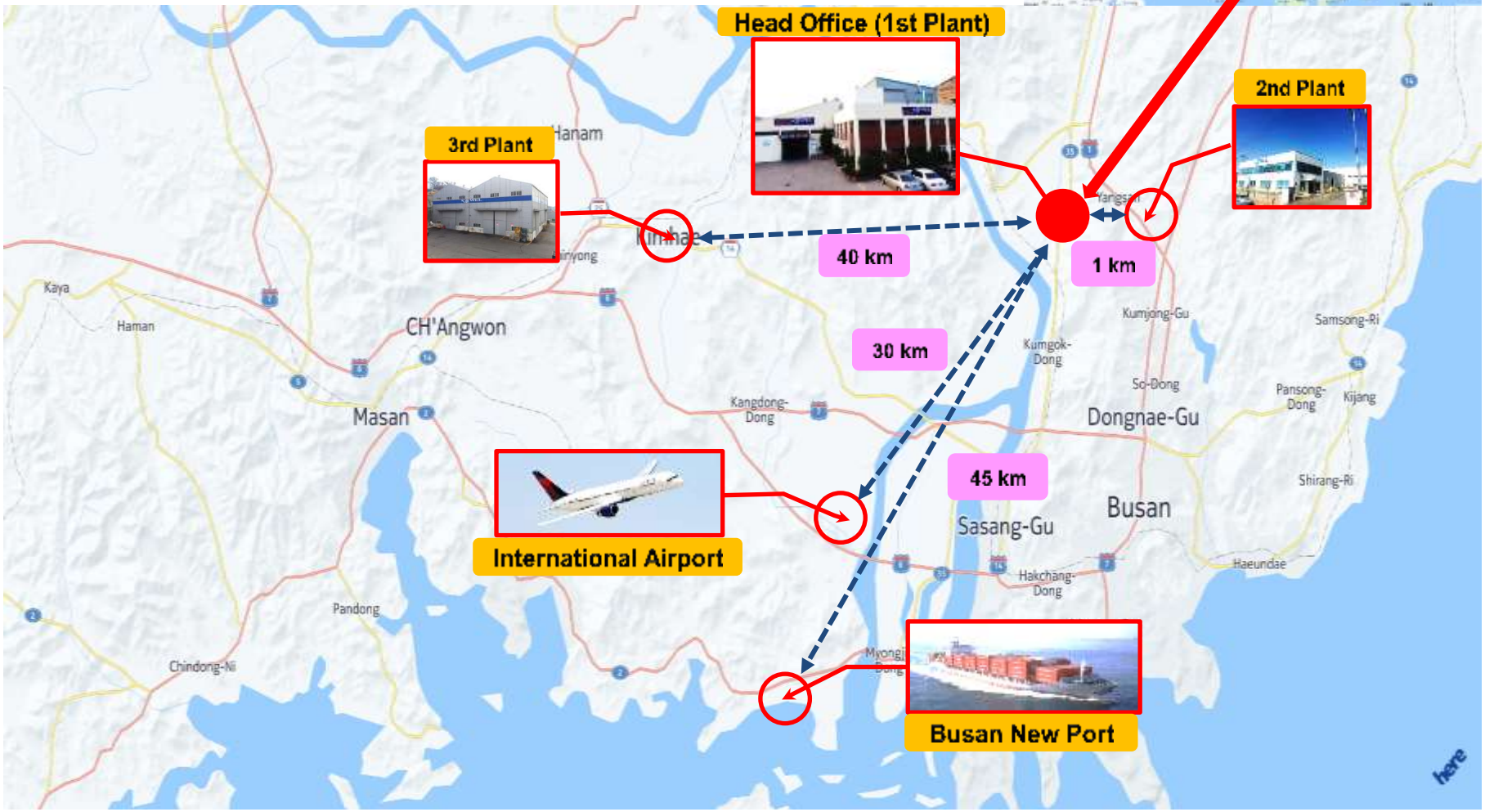
Plant Business
(Nuclear Power Plant)

1. General Introduction

1.4 Locations

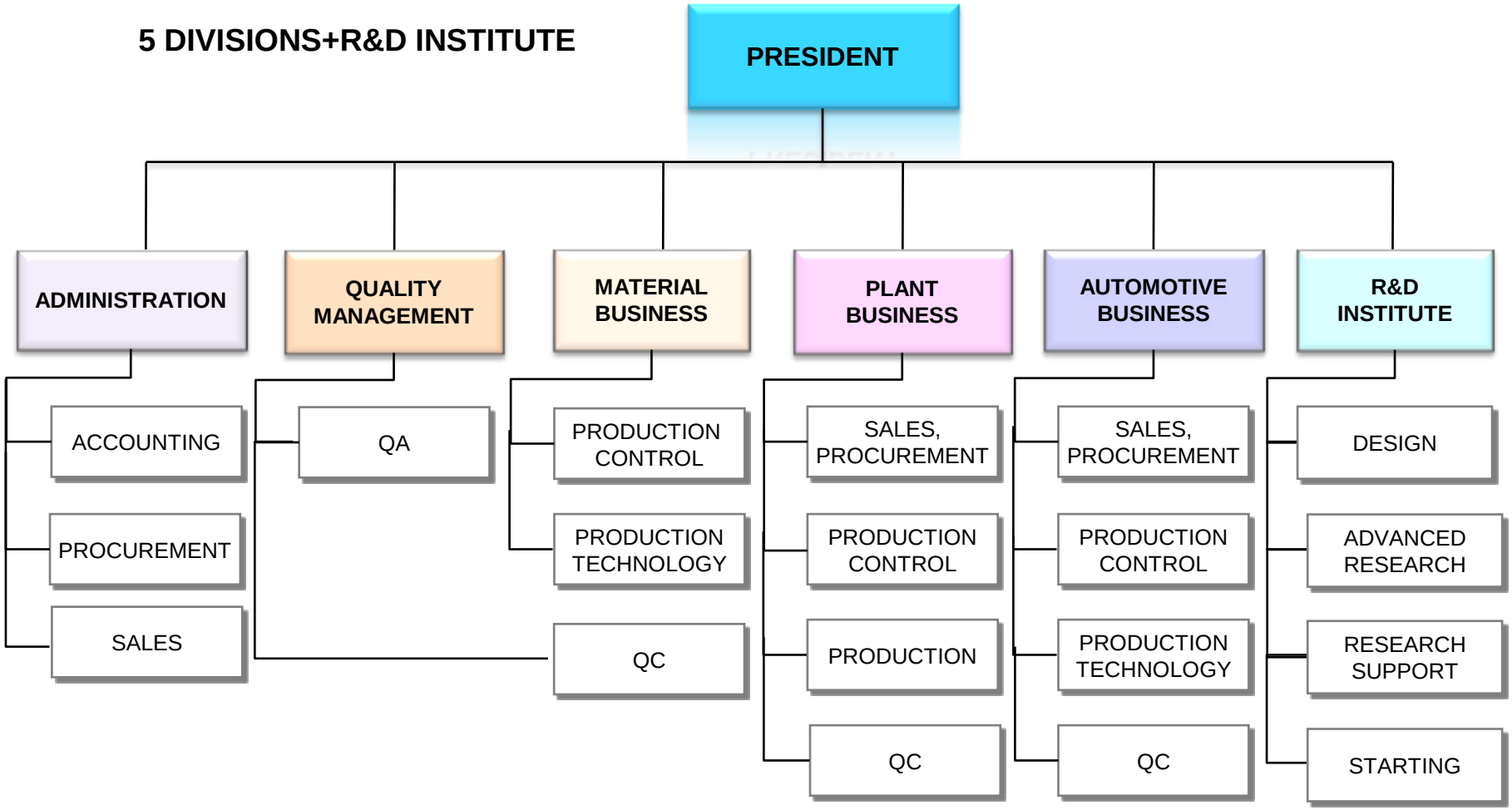
Ideal location for delivery & logistics
(Air/Ocean Shipment)





1.5 Organization

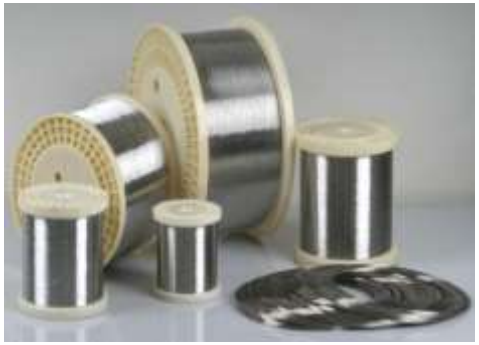
5 DIVISIONS+R&D INSTITUTE



1.6 Business Divisions

MATERIAL DIVISION

- Manufacturing Stainless Steel Wire and Nickel Alloy Wire
- Welding Consumable
- Application : Braiding, Knitting, Spring, Bolts, Nuts, Wire Mesh products, etc.



AUTOMOTIVE DIVISION

- Our main customers are Automotive Exhaust System companies
- Manufacturing & Supplying
  - Exhaust Valves
  - Automotive Spring
  - Wire Mesh Products

PLANT DIVISION

- Our main customers are related to Nuclear power plants.
- Manufacturing & Supplying
  - Piping materials
  - Welding materials
  - Bolting materials

2. Material Division

KOWEL

Material Division

2. Material Division

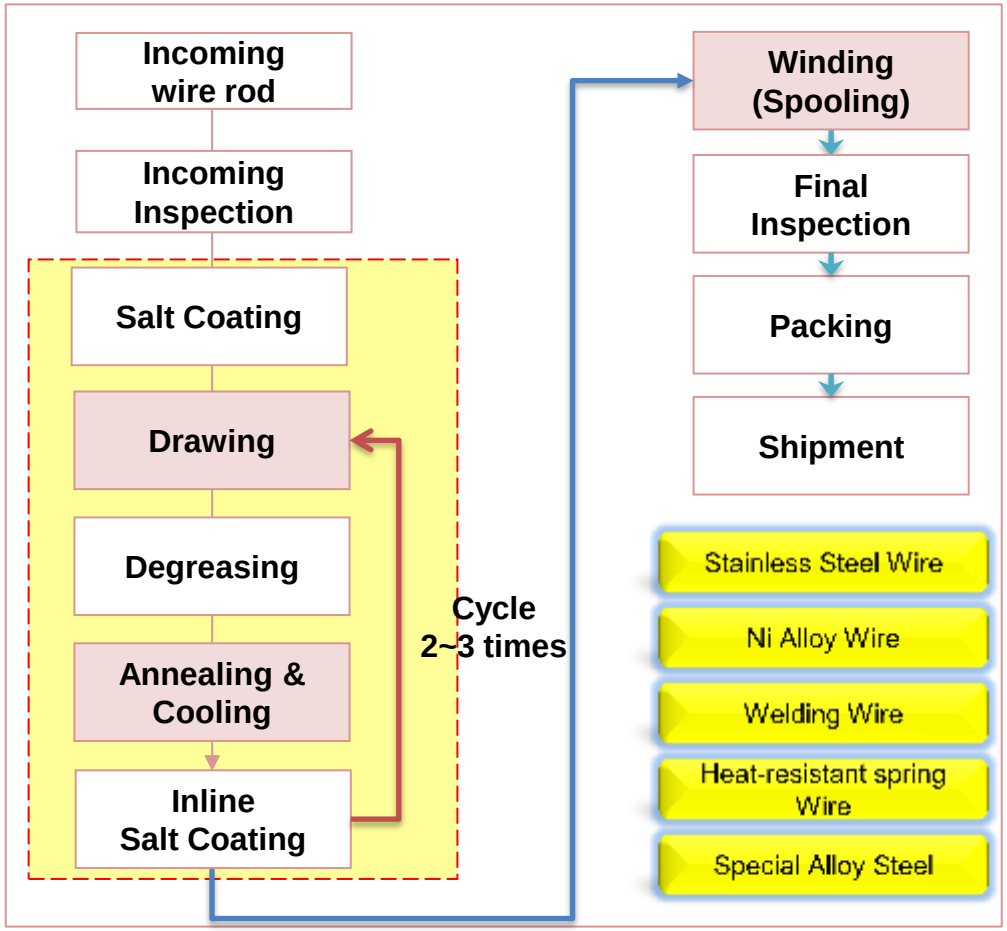
2.1 Production Capacity

Production Capacity :
3,600MT/Year
300MT/Month

- Stainless Steel Wire
- Special Nickel Alloy Wire
- SS & Special Welding Wire

2.2 Production Flow

Production Process of Wires



Main Equipment

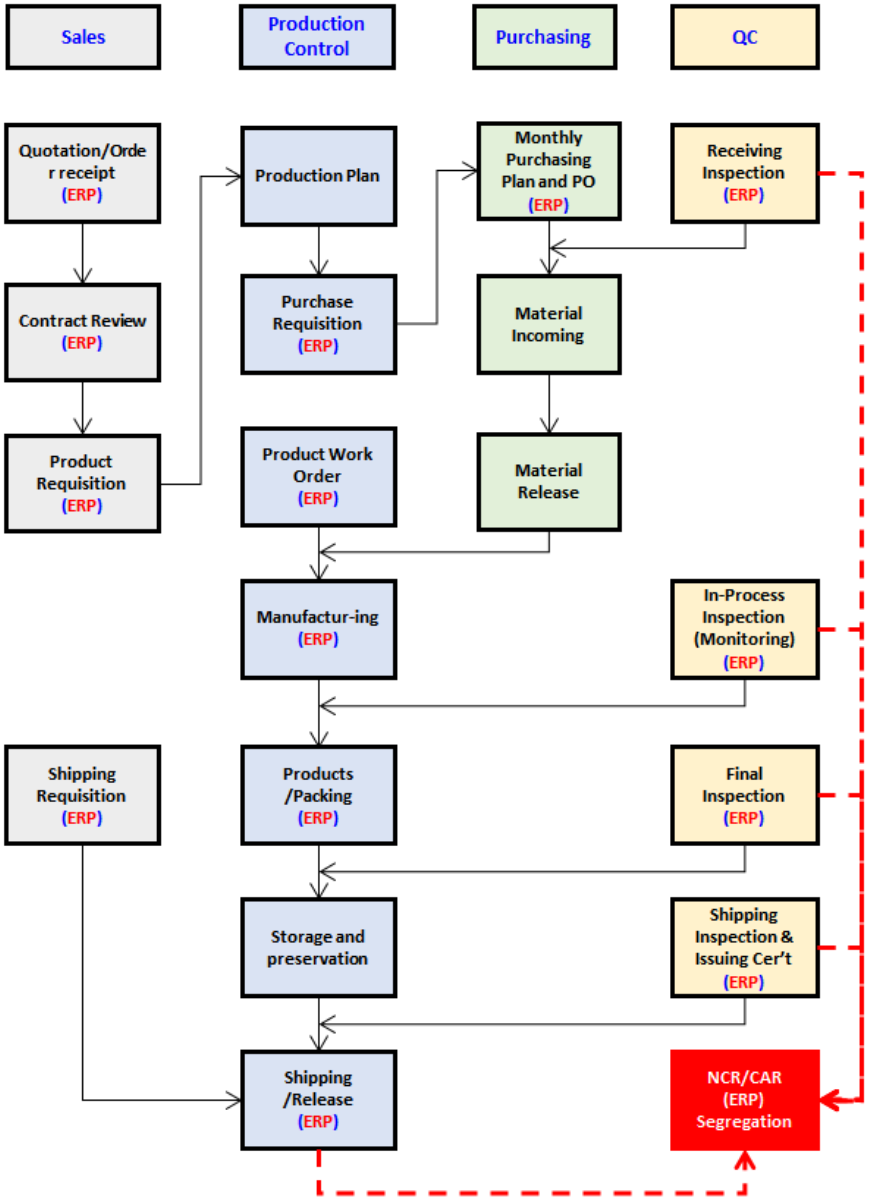
Drawing

Degreasing

Annealing

Inline Salt Coating

2.3 Production System (Internal ERP)



2.4 Inspection Flow – Incoming Raw Material (Wire Rod)

Incoming Raw Material

PMI Inspection

Checking Appearance

Checking
Wire Diameter

Analyzing
Chemical Composition

Testing
Mechanical Property

2.5 Inspection Flow – Production (Wire Drawing)


Wire Drawing


PMI Inspection


Checking Appearance


Checking Wire Diameter


Heat Treatment


PMI Inspection


Checking Appearance


Checking Wire Diameter

2.6 Inspection Flow – Final Products (SS / Nickel Alloy Wires)

PMI Inspection

Checking Appearance

Checking Wire Diameter

Testing Mechanical Property

2.7 Stainless Steel General Wires (Application & Grade)

▪ Classified SS Wires

☞ Various size and Steel grade
☞ Abt. 50 class of Stainless Steel Wire
☞ Soft Wire : Φ 0.1~6.3㎜
☞ Hard Wire : Φ 0.1~15.0㎜
☞ Application: Braiding, Knitting, Brush, Spring, Bolts, Nuts, Pins, etc.

Stainless Steel Material	
AISI 202M	AISI 316
AISI 204Cu	AISI 316L
AISI 302	AISI 316Ti
AISI 302HQ(XM-7)	AISI 321
AISI 303F	AISI 347
AISI 304	AISI 420J2
AISI 304L	AISI 430
AISI 304Cu	AISI 631
AISI 304J3	AISI 631J1
AISI 304J3(HC)	SUH 660
AISI 305	AISI 2205 (Duplex)
AISI 310	AISI 2304 (Duplex)
AISI 312	Etc.
AISI 314	

Packing





Application






2.8 Special (Nickel) Alloy Materials (Application & Grade)

☞ **Abt. 20 grades of Nickel Alloy**

☞ **Application:**

- **Facility of Ocean Plant**
- **Airplane/Aerospace Parts**
- **Automotive Spring**
- **Special Spring**
- **Heat Exchanger**
- **Chemical Plant Facility**
- **Boiler**

Special Alloy Material	
Alloy 82	Alloy 625
Alloy 60	Alloy 718
Alloy 80A	Alloy X-750
Alloy 182	Alloy 800
Alloy 134	Alloy 825
Alloy 200	Alloy C-276
Alloy 201	Waspaloy
Alloy 400	Ni 51
Alloy 485	Ni 52
Alloy 600	Alloy 520
KW 60 (DHN 2661)	Etc.

2.9 Welding Wires (Stainless Steel & Special Alloy) - Classification

AWS Classification	UNS Number	KOWEL Brand Name		
		MIG	TIG	SUB-ARC
ER 307Si		KWM-307Si	KWT-307Si	KWS-307Si
ER 308	S30880	KWM-308	KWT-308	KWS-308
ER 308L	S30883	KWM-308L	KWT-308L	KWS-308L
ER 308H	S30880	KWM-308H	KWT-308H	KWS-308H
ER 308LSi	S30888	KWM-308LSi	KWT-308LSi	KWS-308LSi
ER 309	S30980	KWM-309	KWT-309	KWS-309
ER 309L	S30983	KWM-309L	KWT-309L	KWS-309L
ER 309LSi	S30988	KWM-309LSi	KWT-309LSi	KWS-309LSi
ER 309LMo	S30986	KWM-309LMo	KWT-309LMo	KWS-309LMo
ER 310	S31080	KWM-310	KWT-310	KWS-310
ER 312	S31380	KWM-312	KWT-312	KWS-312
ER 316	S31680	KWM-316	KWT-316	KWS-316
ER 316L	S31683	KWM-316L	KWT-316L	KWS-316L
ER 316LSi	S31688	KWM-316LSi	KWT-316LSi	KWS-316LSi
ER 320	N08021	KWM-320	KWT-320	KWS-320
ER 317	S31780	KWM-317	KWT-317	KWS-317
ER317L	S31783	KWM-ER317L	KWT-ER317L	KWS-ER317L
ER 320LR	N08022	KWM-320LR	KWT-320LR	KWS-320LR
ER 321	S32180	KWM-321	KWT-321	KWS-321
ER 347	S34780	KWM-347	KWT-347	KWS-347
ER 347Si	S34788	KWM-347Si	KWT-347Si	KWS-347Si
ER 409	S40900	KWM-409	KWT-409	KWS-409
ER 410	S41080	KWM-410	KWT-410	KWS-410
ER 420J2		KWM-420J2	KWT-420J2	KWS-420J2
ER 409Ti		KWM-409Ti	KWT-409Ti	KWS-409Ti
ER 409LTi		KWM-409LTi	KWT-409LTi	KWS-409LTi
ER 430	S43080	KWM-430	KWT-430	KWS-430
430LNb		KWM-430LNb	KWT-430LNb	KWS-430LNb
ER 439	S43035	KWM-439	KWT-439	KWS-439
ER 2209	S39209	KWM-2209	KWT-2209	KWS-2209
ER 2553	S39553	KWM-2553	KWT-2553	KWS-2553
ERNi-1	N02061	KWM-Ni-1	KWT-Ni-1	KWS-Ni-1
ERNiCu-7	N04060	KWM-NiCu-7	KWT-NiCu-7	KWS-NiCu-7
ERNiCr-3	N06082	KWM-NiCr-3	KWT-NiCr-3	KWS-NiCr-3
ERNiCrFe-7	N06052	KWM-NiCrFe-7	KWT-NiCrFe-7	KWS-NiCrFe-7
ERNiCrFe-11	N06601	KWM-NiCrFe-11	KWT-NiCrFe-11	KWS-NiCrFe-11
ERNiFeCr-2	N07718	KWM-NiFeCr-2	KWT-NiFeCr-2	KWS-NiFeCr-2
ERNiCrMo-3	N06625	KWM-NiCrMo-3	KWT-NiCrMo-3	KWS-NiCrMo-3
ERNiCrMo-4	N10276	KWM-NiCrMo-4	KWT-NiCrMo-4	KWS-NiCrMo-4
53MD		KWM-53MD	KWT-53MD	KWS-53MD
WASPALOY		KWM-WASPALLOY	KWT-WASPALLOY	KWS-WASPALLOY

Packing

Application

2.9 Welding Wires (Stainless Steel & Special Alloy) – Size & Packing

Size (Ø)	Wire Type		
	MIG	TIG	SUB-ARC
0.8mm	●		
1.0mm	●		
1.2mm	●	●	
1.4mm	●	●	
1.6mm	●	●	●
2.0mm		●	●
2.4mm		●	●
2.6mm		●	●
3.0mm		●	●
3.2mm		●	●
3.5mm		●	●
3.6mm		●	●
4.0mm		●	●
4.2mm		●	●
4.5mm		●	●
5.0mm		●	●

Packing Unit	MIG/bobbin	MIG/pail	TIG/tube can	SUB-ARC
5.0 kg			●	
12.5 kg	●			
15.0 kg	●			
20.0 kg	●			●
21.0 kg	●			●
25.0 kg				●
100 kg		●		
150 kg		●		
200 kg		●		

2.10 Packing Unit

*** MIG 12.5kg & 15kg Spool**


Spool Winding


Unit Box Packing

Unit Box Packing


Pallet Packing

*** MIG Pail**


Pail Drum


Wire Coiling


Palletizing
(Domestic Delivery)


Palletizing
(Export Delivery)

*** TIG 5kg Tube**


TIG [Grade, Heat No.]
Stamping


TIG 5kg TUBE Packing
[900mm, 1,000mm]


Tube packing on Pallet


Pallet Packing

2. Material Division

2.10 Packing Unit

*** DIN Bobbin (Thin Wire)**

Wire Winding

DIN Bobbin on Pallet

Palletizing (Domestic Delivery)

OR

Palletizing (Export Delivery)

*** Nylon (Black) Bobbin (Thin Wire)**

Wire Winding

DIN Bobbin on Pallet

Palletizing (Domestic Delivery)

OR

Palletizing (Export Delivery)

*** Coiled Packing**

Wire Coil in Packing Machine

Wrapping Coil

Stacking Wrapped Coil

OR

Stacking Coil Bundle

2.11 Market & Customers

Stainless Steel Wire

JINHUNG | DONGYANG

TAEIL | Other dealers

HOL | HOL-ZIE

HOL-SPO

ST-UNI

PENFLEX

POLYHOSE

KITAHATA | DONGBANG

Welding Electrode

KEUMYONG | FRIEND

KSP | KOWEL

SAMSUNG E&C GROUP

DGENX | HYUNDAI E&C

KOREA HYDRO & NUCLEAR POWER CO., LTD.

MERKA

SHINKO | NIPPON WEL

3. Automotive Division

New Opportunities

Passionate Challenge

KOWEL

Automotive Division

Automotive Exhaust System

Muffler

Exhaust Passive Valve

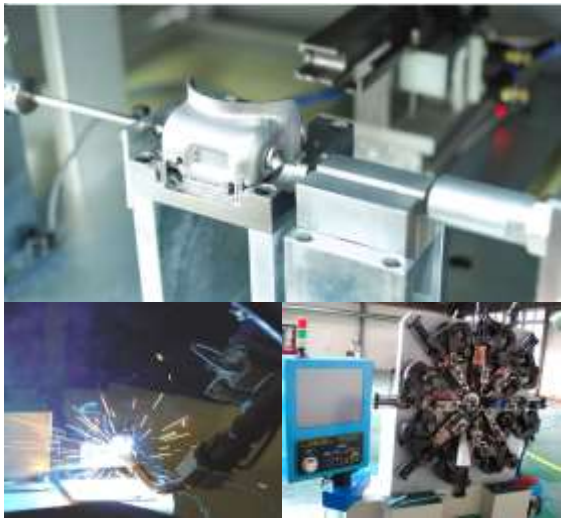
3. Automotive Division

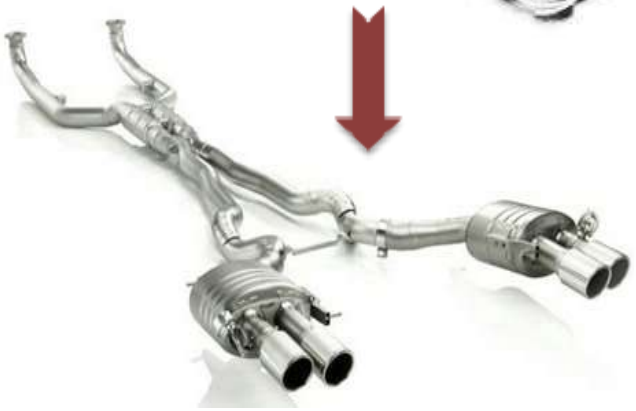
New Opportunities

Passionate Challenge

3.1 Production Capability

- **OEM based production & supply of Exhaust Passive Valve and its parts**
- **SPRING Forming : Minimum 4 million pcs/ year**
- **SPRING Heat-Treatment : Minimum 10 million / year**
- **WIRE MESH Knitting : Minimum 10 million / year**



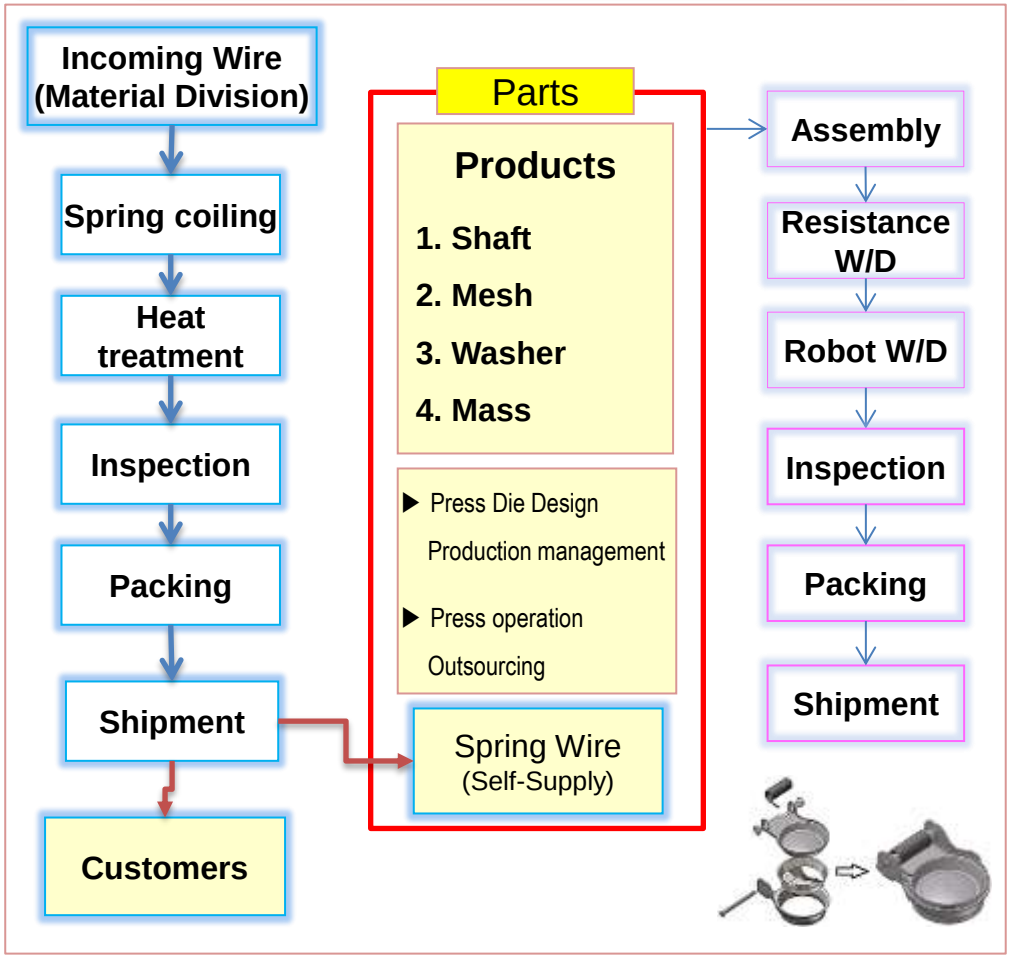


3. Automotive Division

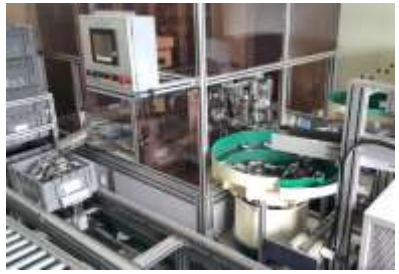
New Opportunities
Passionate Challenge

3.2 Production Flow (Passive Valve)

Production Process



Main Equipment

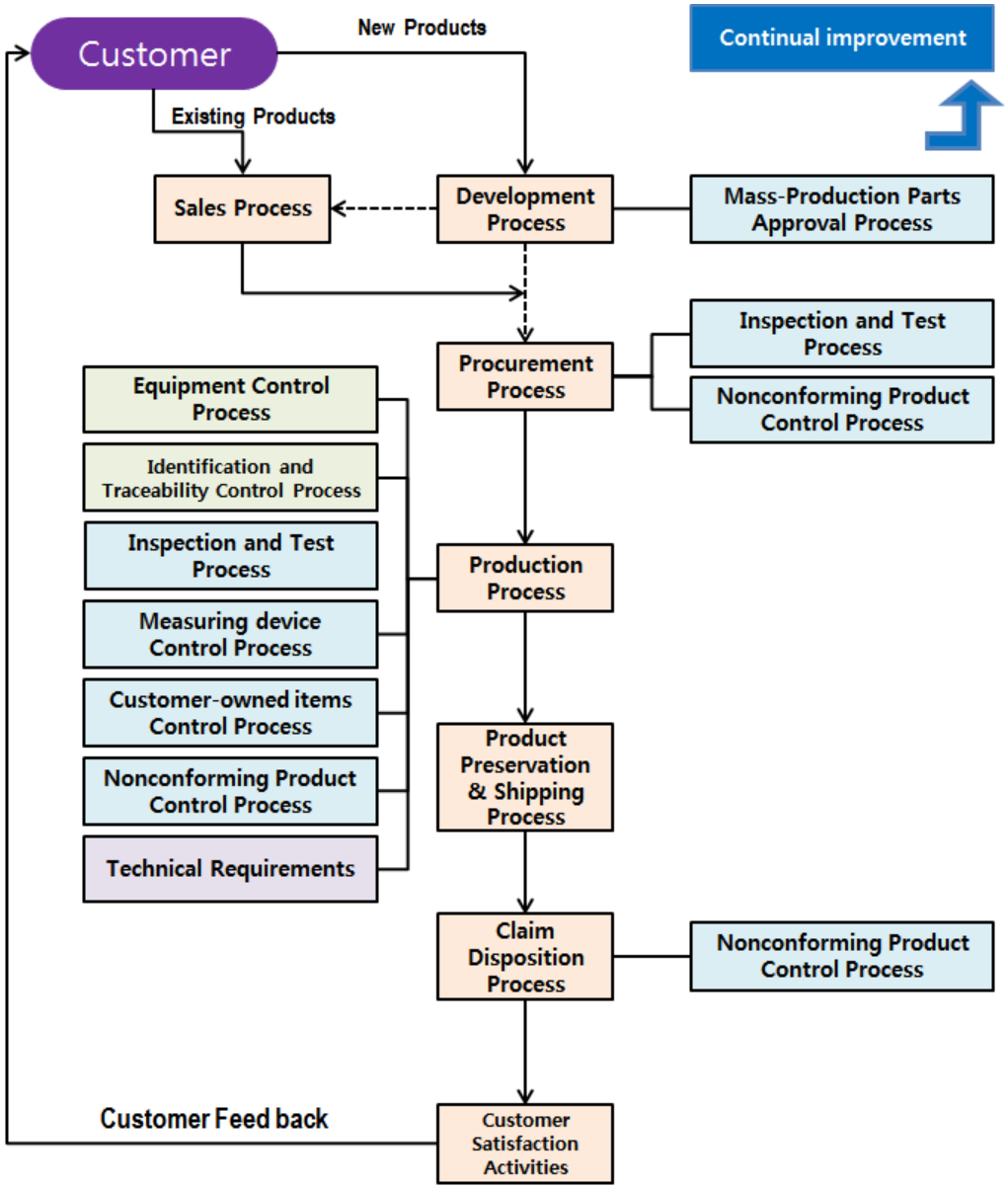
Spring-Coiling	Heat-Treatment
	
Resistance W/D	**Robot W/D**
	

3. Automotive Division

New Opportunities

Passionate Challenge

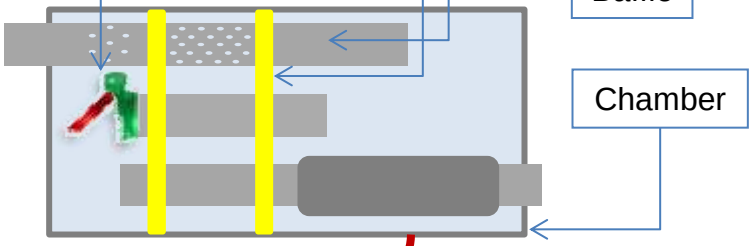
3.3 Quality System (ISO/TS 16949)

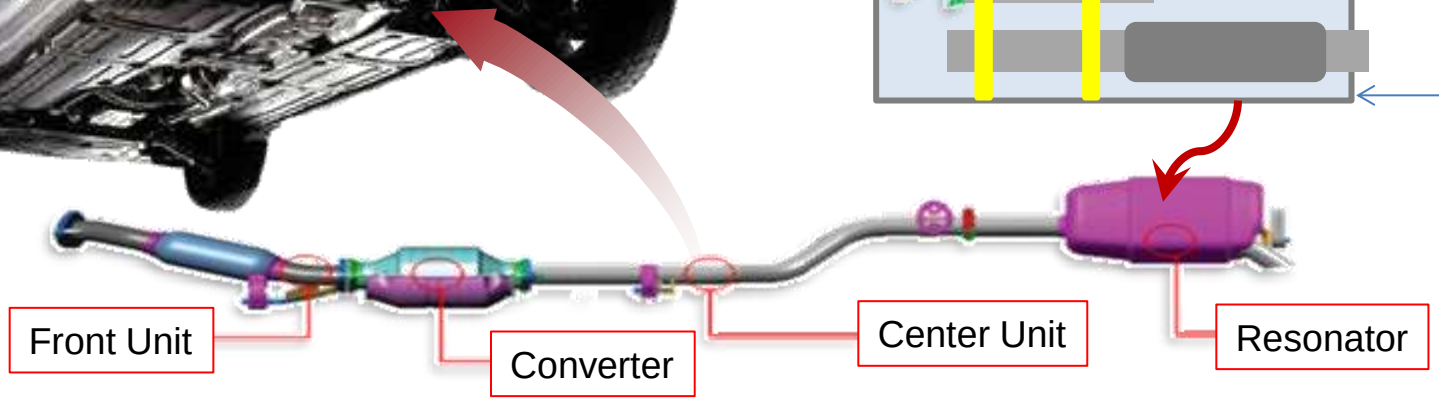


3.4 Technical Function of Exhaust Passive Valve

- Induce emission of exhaust gas accumulated from Engine
- Purify exhaust gas / reduce noise (Silencer: Resonator)

→ By using inner structure of silencer and functionality components, it reduces noise





3.5 Spring Production & Inspection Process

Incoming Inspection
(Spring Wire)

Spring Forming (Coiling)

C/F Setting Inspection
(Coil angle & length before H/T)

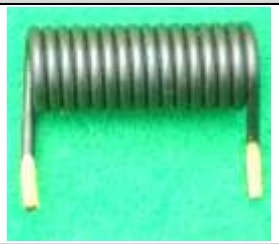
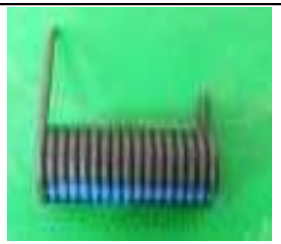
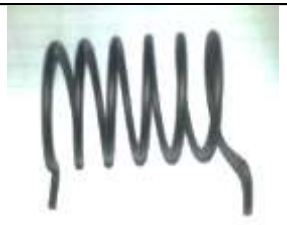
Spring Heat-Treatment
(Aging)

Hardness Test
(Over HV 350)

Measuring Torque
(Test Report)

Spring Reliability Test

3.6 Spring Products & Applied materials

Applied Spring Material	Vehicle Type	Design Type	Developed Spring Material	Design Type
INCONEL 718	XD/SL		UDIMET520	
	XG			
	GH			
	YF		WASPALOY	
	VG			
	HG			
KW 60	H45		ECEV_SPRING	
	TLC/QLC			
	UM			
	L43		EHRS_SPRING	

3.7 Passive Valve Assembly & Inspection Process

Incoming Inspection of Valve Sub-Parts

Base + Ring Mat (Auto Spot Welding)

Cover + Mass (MIG Welding)

Cover + Mat (Spot Welding)

Sub Ass'y + Shaft (TIG Welding & Torque Test)

Reliability Test (Periodic Inspection)

Shipment Inspection

Shipment

3.8 Passive Valve Product Type

Valve for Commercial Vehicle

Valve for Compact Car

Electric Valve [ECEV] Active Valve

H 45

LM/EL, Sle/TL

LF/JF

UM/UMA

PFC

XM/YD/PS

L43 BAFFLE SUB

3. Automotive Division

New Opportunities
Passionate Challenge

3.9 Wire Mesh (Bushing & Mat) Production Process

SS Wire incoming from 1st plant

Knitting

Cutting

Rolling & Folding

Pressing

Wire Mesh Products

3. Automotive Division

3.10 Wire Mesh Products

AISI 309
AISI 316
INCONEL 601
DIN EN 1.4828
Etc.











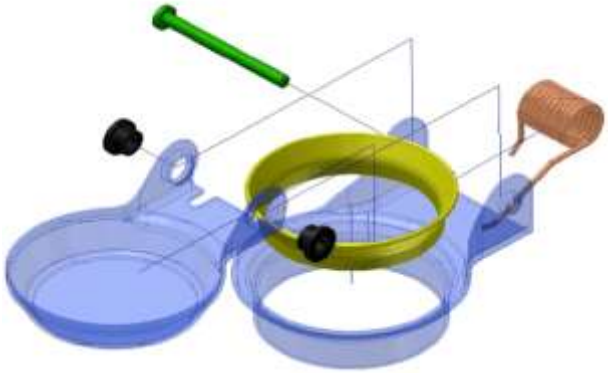

3.11 Supply Chain & Customers

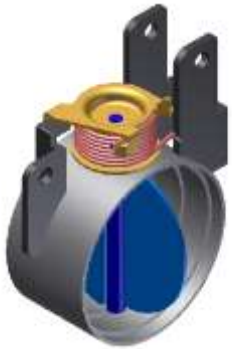
Exhaust System Company	Finished Car Company
SEJONG INDUSTRY, WOOSIN INDUSTRY, FAURECIA	HYUNDAI, KIA, KIA MOTORS
DGENX, FAURECIA	GM KOREA
CALSONIC KANSEI KOREA	
CALSONIC KANSEI North America	NISSAN
TENNECO	

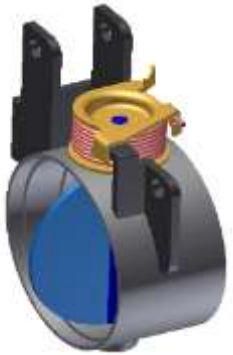
4. R&D Institute

KOWEL

R&D Institute





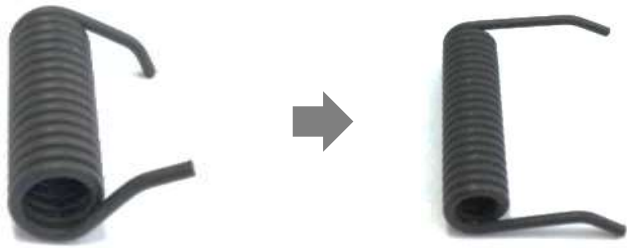


4. R&D Institute (Achievements)

New Opportunities & Passionate Challenge

4.1 R&D Achievements (Spring)

- Year 2008 : Developed Automotive SPRING for Active Valve (XD/GH/XG) – 20% Cost Saving
- Year 2008 : Developed Automotive SPRING for Active Valve (YF) – 50% Cost Saving
- Year 2012 : Quality Improvement of Material, KW70 2.3Ø(25g) → 1.8Ø(15.5g) (550 ℃)
- Year 2012 : Developed Automotive SPRING material KW60 (450℃)
- Year 2014 : Developed Automotive SPRING material High-Heat resistant, KW80 (650℃)
- Year 2014 : Developed Automotive SPRING material High-Heat resistant, KW90 (650℃)



< COST SAVING >

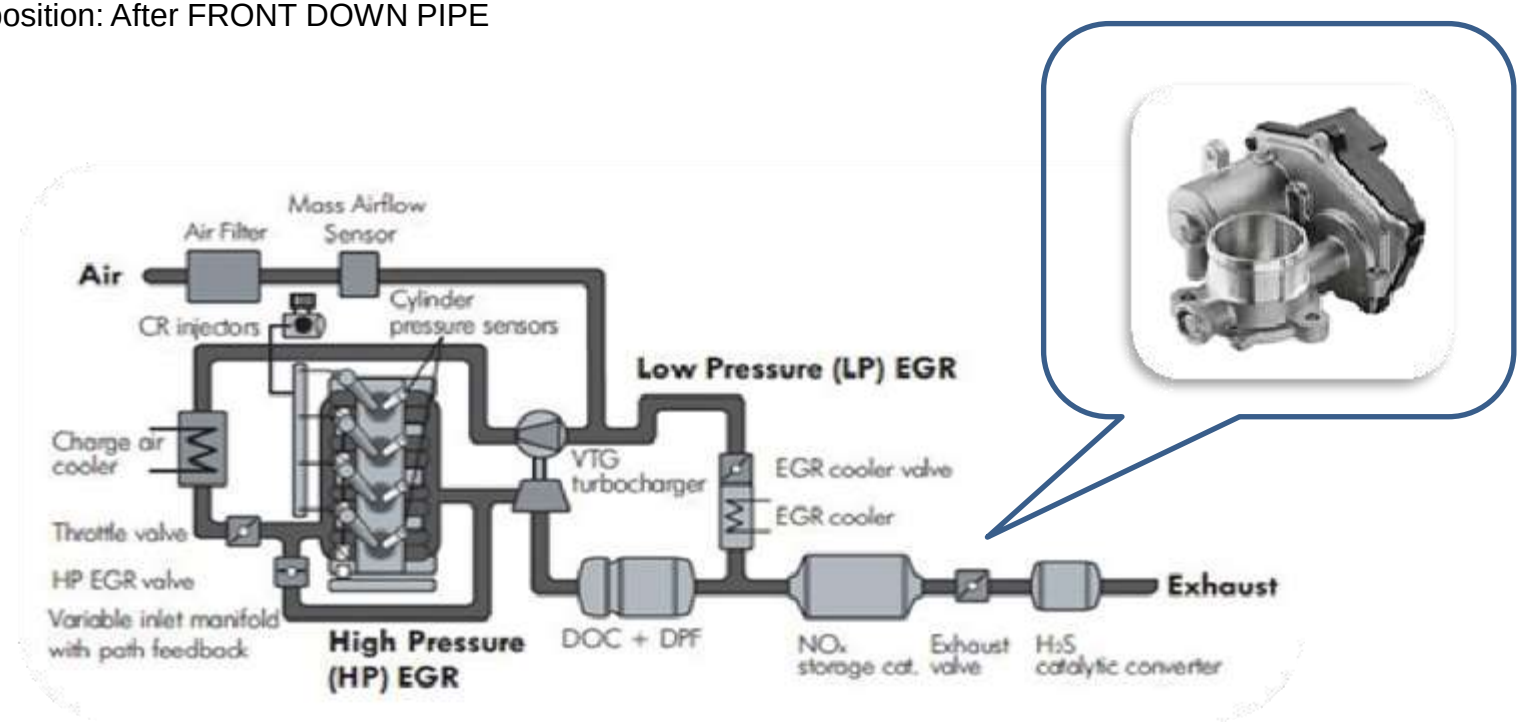
4.2 R&D Achievements (Passive Valve)

- Year 2009 : Start mass production of Passive Valve for SL typed automotive (Production traceability control system applied)
- Year 2010 : Developed & Start mass production of Active Valve for L43/L47 typed automotive
- Year 2011 : Localized & Start mass production of Passive Valve for H45 typed automotive - New material applied
- Year 2012 : Developed the 2nd generation Active Valve – LM/F/L application
- Year 2013 : Developed the 2nd generation Active Valve – LF/ LFA/ PFc
- Year 2013 : Developed Active Valve for Commercial vehicle – PSD development
- Year 2013 : Developed Active Valve for Compact Car – DV45/50
- Year 2013 : Active Valve – XM/YD/PS development & mass production
- Year 2014 : Developed LFc Active Valve [Tenneco China]
- Year 2014 : Developed the 2nd Active Valve - UM applied
- Year 2014 : Developed the 3rd Electronic Active) Valve – EAV development

4.3 EGR Flap (Exhaust Gas Recirculation Flap)

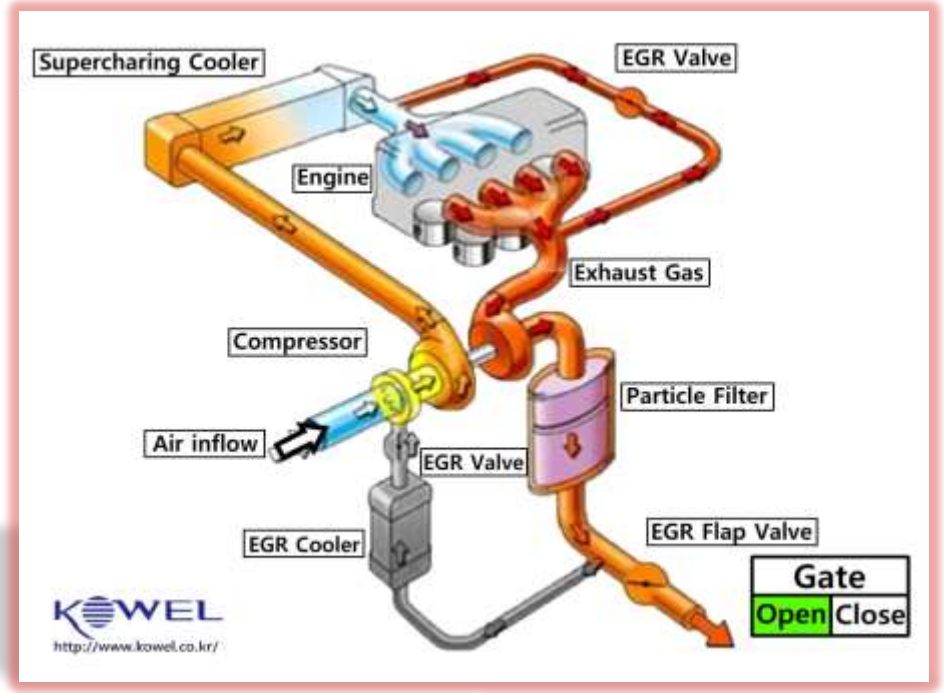
- Purpose: Complying to “EURO 6 Gas Emission Regulation” for Environmentally Friendly Automotive
  [Control of Nitrogen Oxide emission]
- Function: As an additional function to HP-EGR & LP-EGR, reduce the emission of Nox (Nitrogen-Oxide)
- Equipped position: After FRONT DOWN PIPE

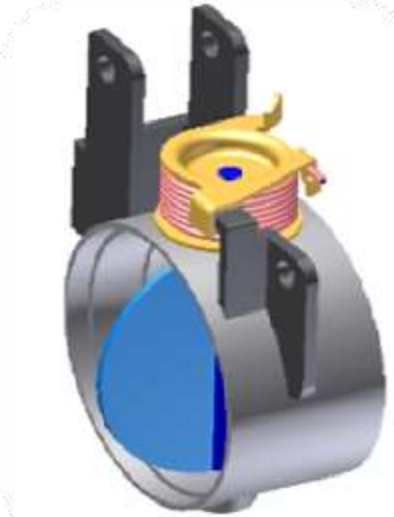
Application Type:
Diesel Engine

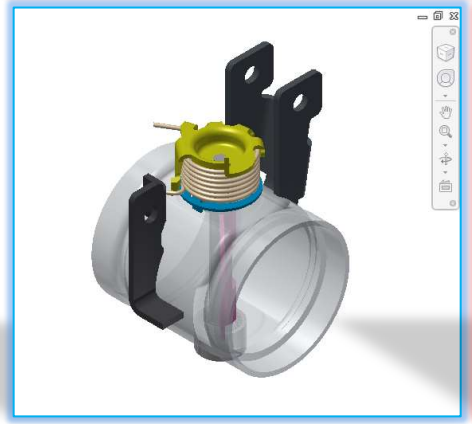


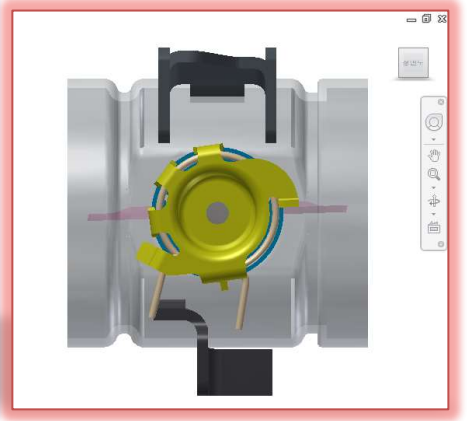
4. R&D Institute (EGR Flap)

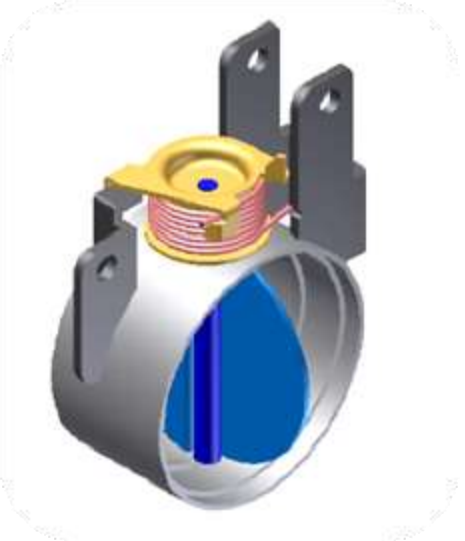
4.3 EGR Flap (Exhaust Gas Recirculation Flap)







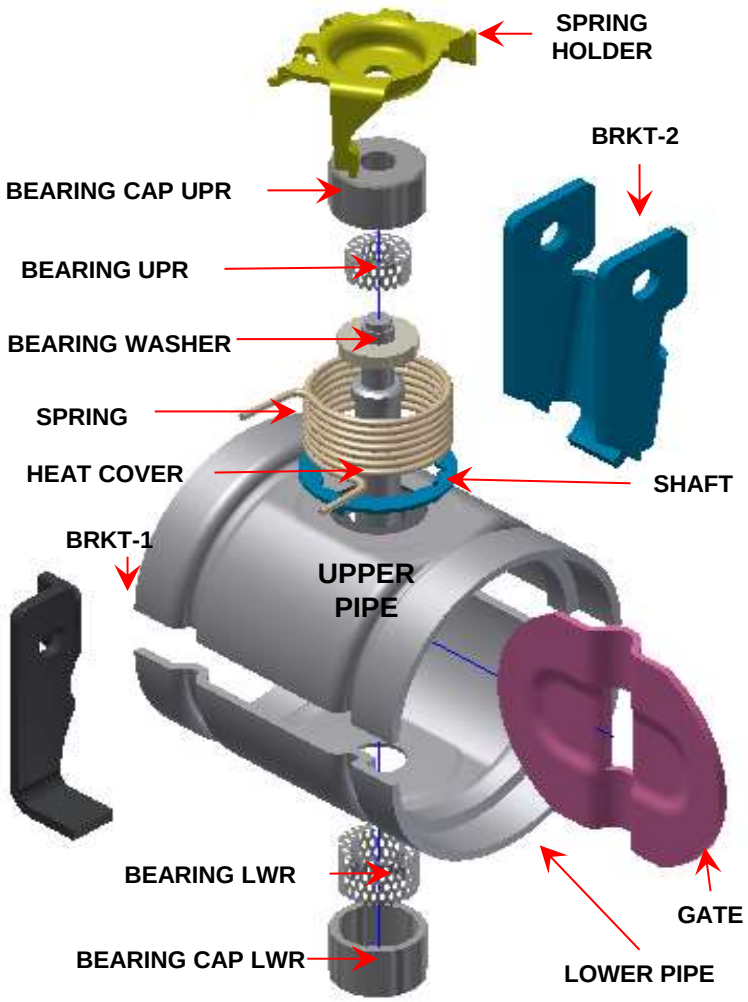




4. R&D Institute (EGR Flap)

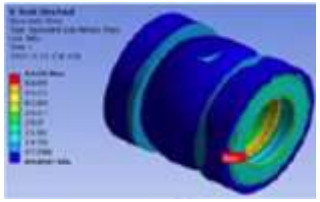
New Opportunities & Passionate Challenge

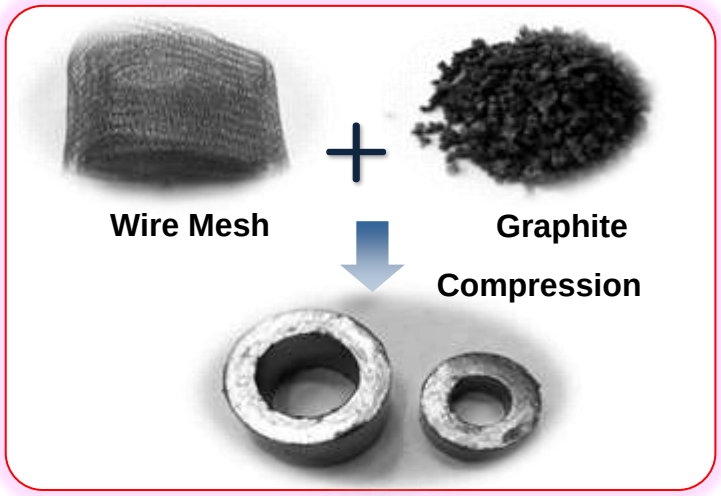
4.3 Structure of EGR Flap



KOWEL's Essential Technologies for EGR Flap

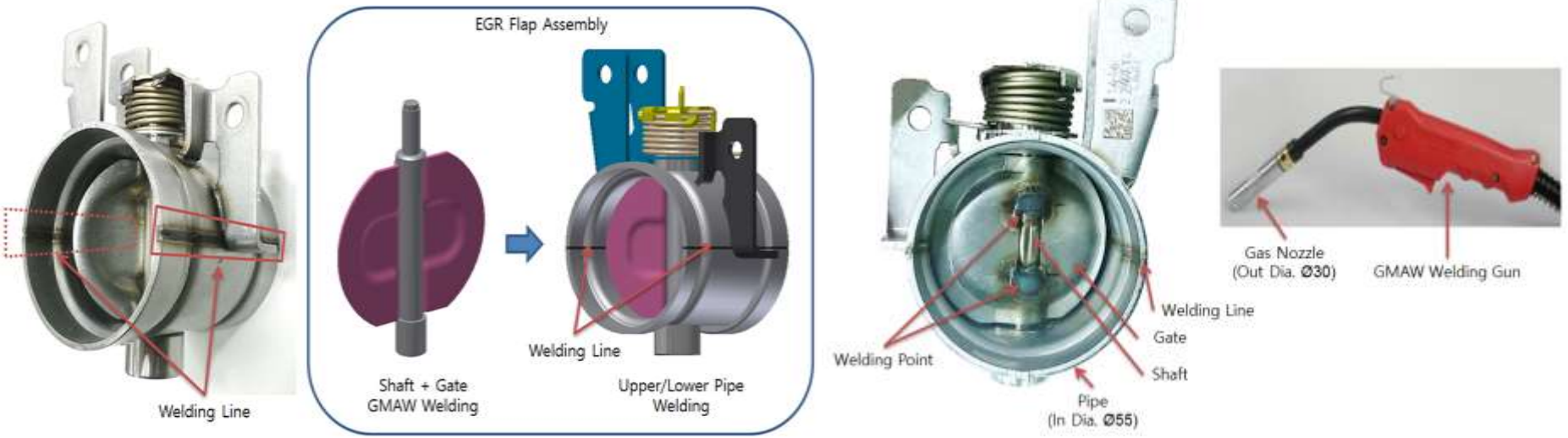
1. Unified Pipe Application Design
2. Heat Resisting Spring
3. Simulation
4. Welding Jig
5. Mold
6. Heat-Resistance Bearing





4.3 EGR Flap

Separated Pipe Application of -



[Source: - EGR Flap Housing]

- ▶ - assembly sequence
  : Shaft + Gate GMAW welding -> Assemble to Pipe
- ▶ Problem of upper and lower pipe welding
  : Increased Manufacturing Cost

- ▶ GMAW gun cannot enter into pipe

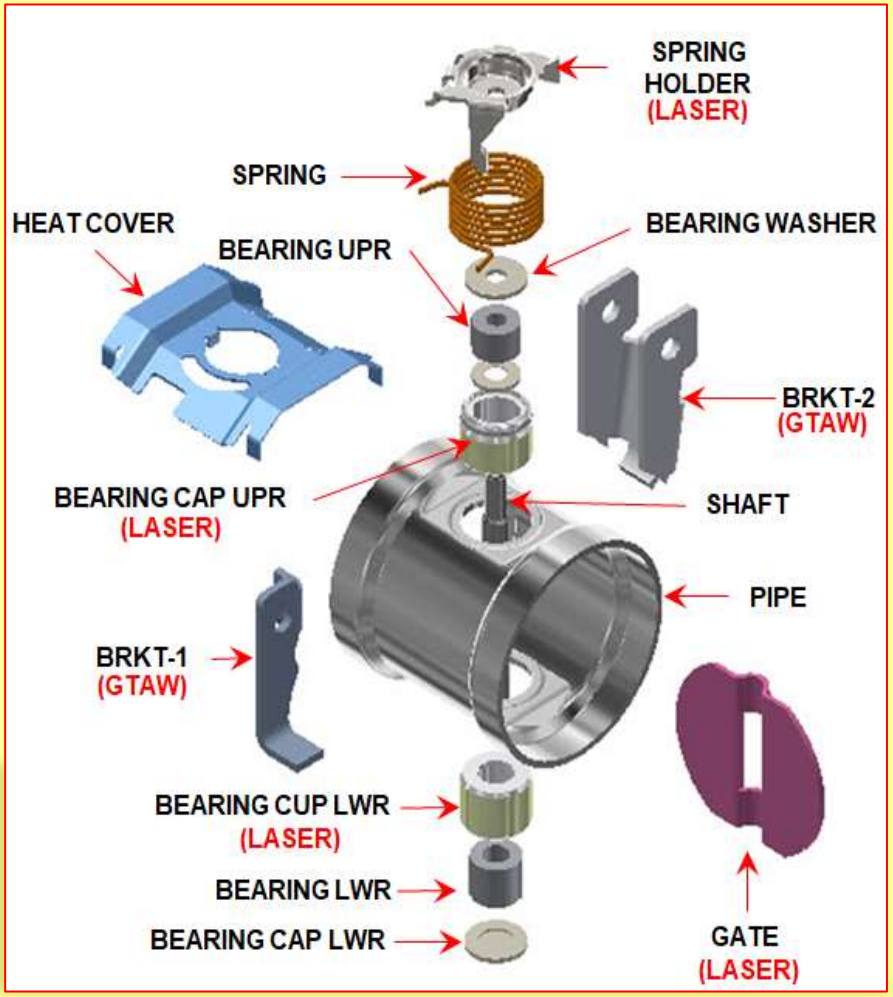
" We need application of unified pipe which is not separated "

4. R&D Institute (Active Valve, EGR Flap Valve)

New Opportunities & Passionate Challenge

4.3 EGR Flap

KOWEL's Unified Pipe Application for EGR Flap



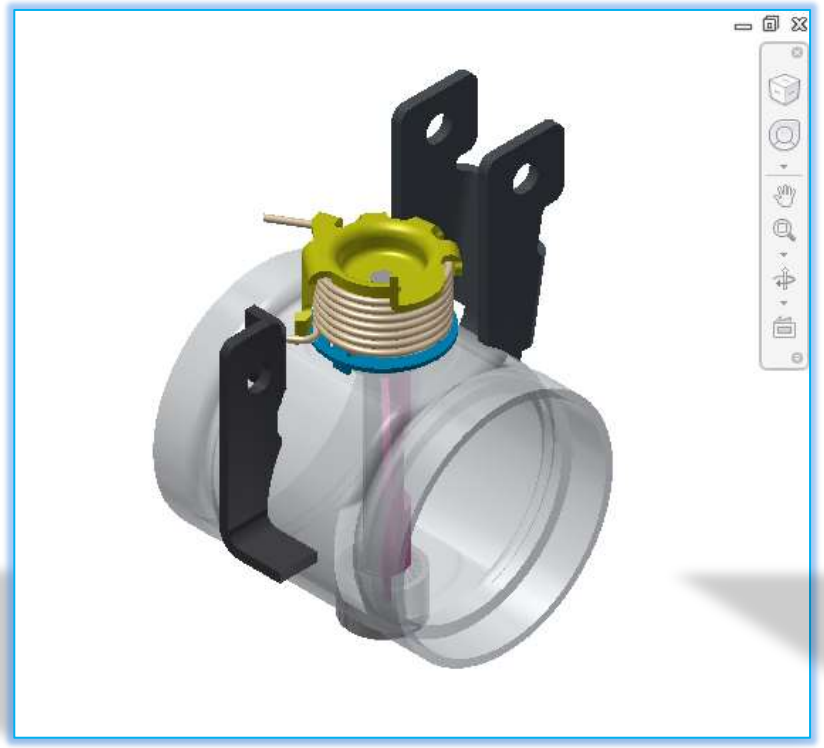
Patent-pending

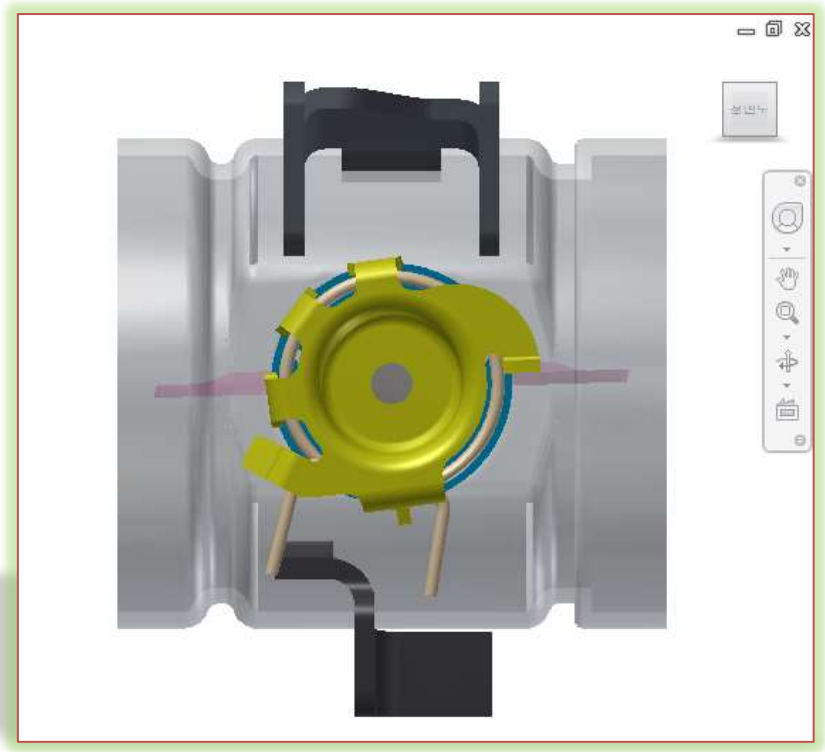
4. R&D Institute (Active Valve, EGR Flap Valve)

New Opportunities & Passionate Challenge

4.3 EGR Flap

KOWEL's Unified Pipe Application for EGR Flap



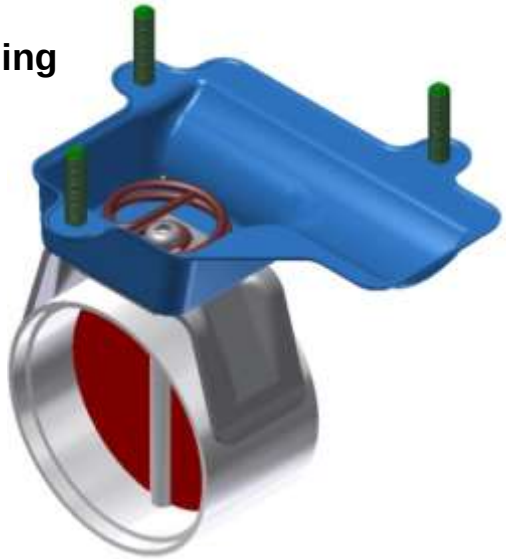


4.4 ECEV (Electric Control Exhaust Valve)

Actuator

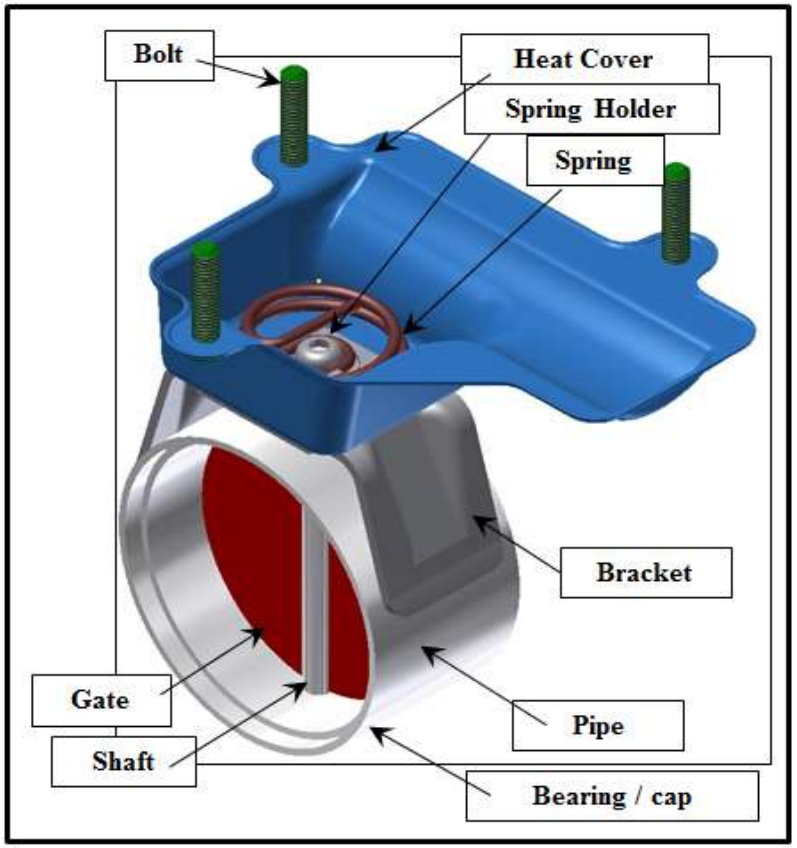
+

Housing



Assembly

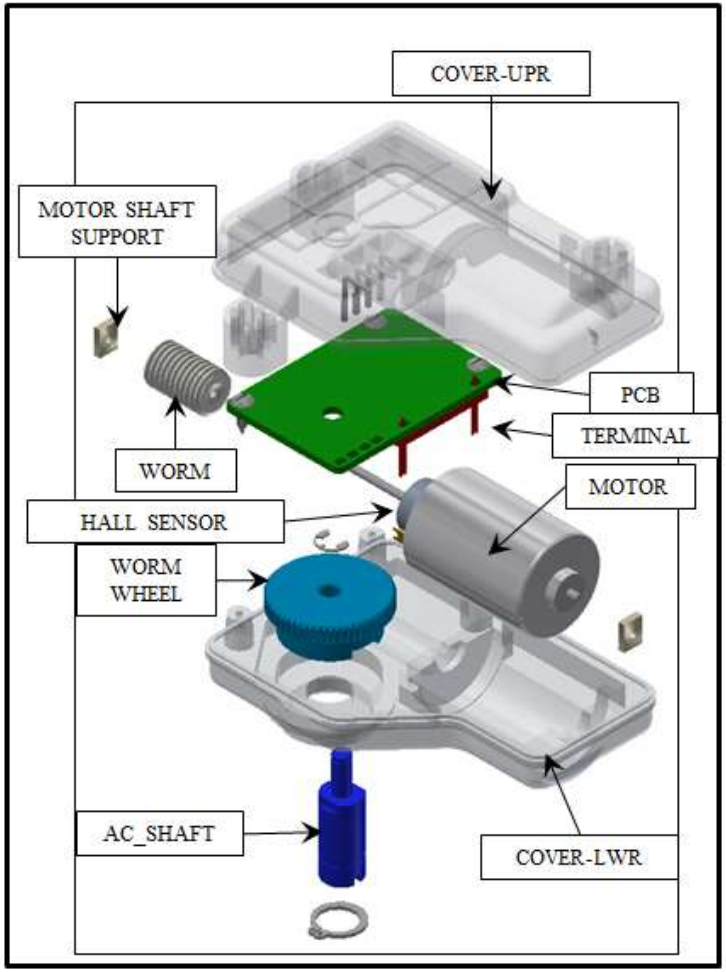
4.4 Housing Structure of ECEV



NO.	PART NAME	DRAWING	U/S	MATERIAL	PROCESS
SUB ASS'Y	Housing Ass'y				LASER W/D
1	HEAT COVER		1	SUS 304 1.0t	PRESS
2	BRACKET		1	SUS 304 2.0t	PRESS
3	PIPE		1	SUS 304 1.5t	PRESS
4	GATE		1	SUS 304 1.5t	PRESS
5	SHAFT		1	SUS 304	MACHINING
6	SPRING HOLDER_CAP		1	SUS 304	MACHINING
7	SPRING HOLDER PLATE		1	SUS 304 1.0t	PRESS
8	BEARING UPR		1	Gr. & SUS Wool	FORMING
9	BEARING CAP UPR		1	SUS 304	MACHINING
10	BEARING LWR		1	Gr. & SUS Wool	FORMING
11	BEARING CAP LWR		1	SUS 304	MACHINING
12	KW SPRING		1	KW60	FORMING
13	WELD BOLT		3	SUS 304	MACHINING
14	M5 NUT		3	SUS 304	STANDARDIZWED PRODUCTS

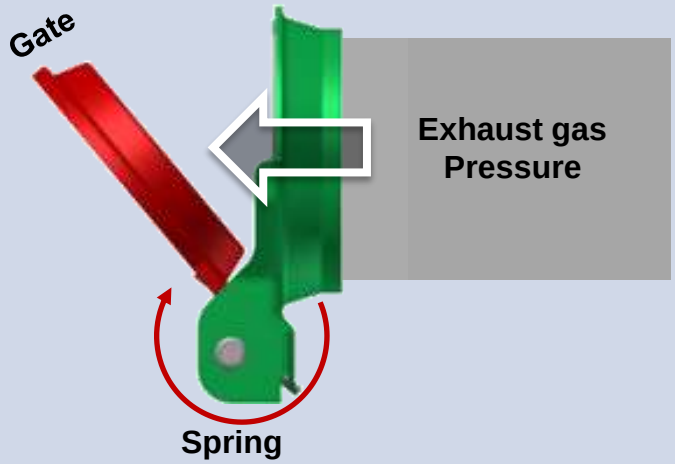
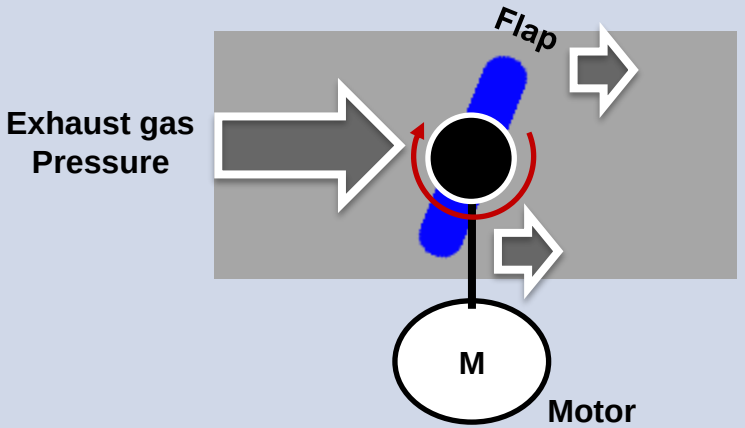
4. R&D Institute (ECEV)

4.4 Actuator Structure of ECEV



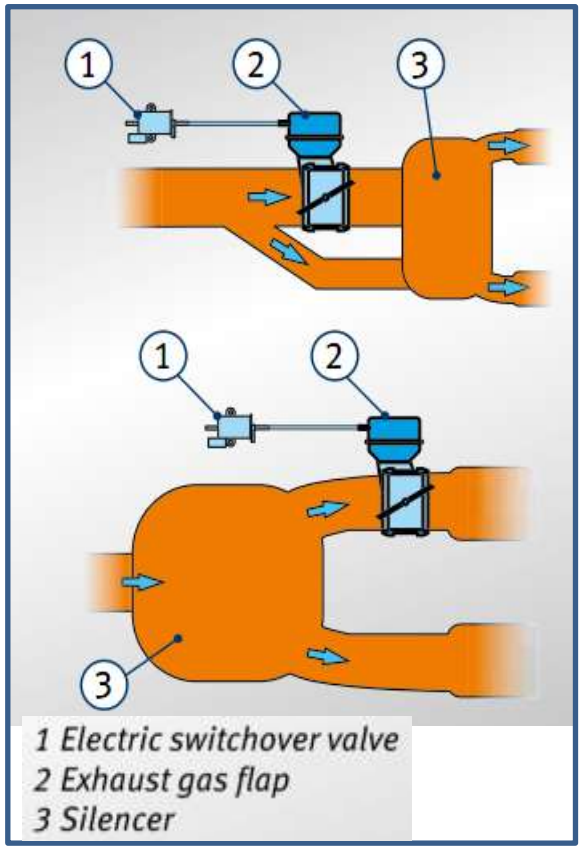
NO.	PART NAME	DRAWING	U/S	MATERIAL	PROCESS
ASS'Y	Ass'y				
1	COVER-UPR		1	PBT GF30	INJECTION MOULDINIG
2	COVER-LWR		1	PBT GF30	INJECTION MOULDINIG
3	WORM_WHEEL		1	PEEK	MACHINING
4	WORM		1	BRASS	MACHINING
5	PCB		1	-	-
6	BUSBAR		4	Cu	PRESS WORKING
7	TERMINAL		1	Cu	PRESS WORKING
8	MOTOR		1	-	-
9	MOTOR SHAFT SUPPORT		2	PEEK	MACHINING
10	MAGNT_SENSER		1	-	-
11	AC_SHAFT		1	SUS 304	MACHINING
12	C RING		1	-	-
13	SNAP RING		1	-	-
14	SCREW		3	-	-

4.4 ECEV (Electric Control Exhaust Valve)

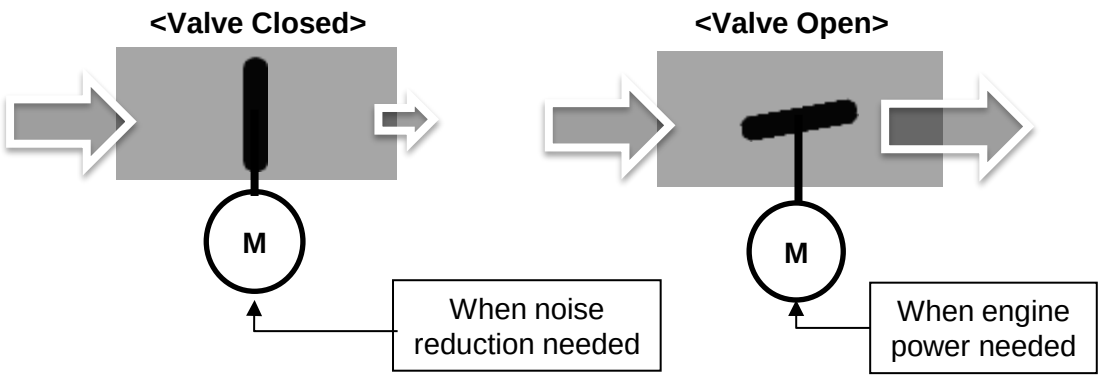
Passive Exhaust Valve (Current Valve)	Active Electric Exhaust Valve (Newly Developed)
	
- Valve gate opens between emission pressure and spring torque tension	- Electric motor adjust the angle of Flap according to the mechanism condition regardless of emission pressure

4.4 ECEV (Electric Control Exhaust Valve)

→ **The advantage of Active Electric Exhaust Valve**



Removal of Spring handicap	**Active operation according to mechanism condition**
Consecutive control of Valve open & close	**More precise control of emission pressure**
Respond to pure mechanism of Engine only with program modification	**Reduce the developing period of New Automobile**



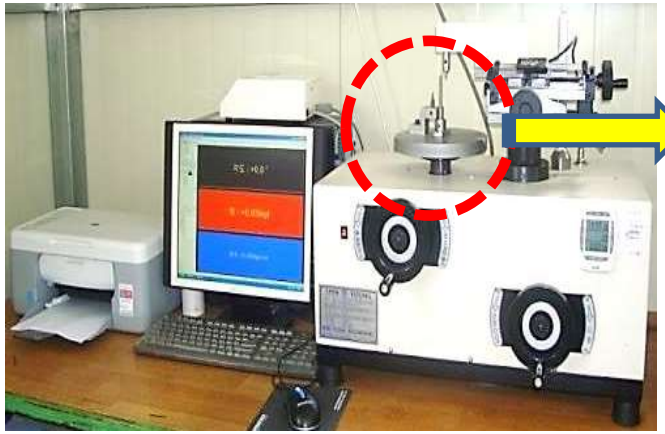
4. R&D Institute (Durability Test)

New Opportunities & Passionate Challenge

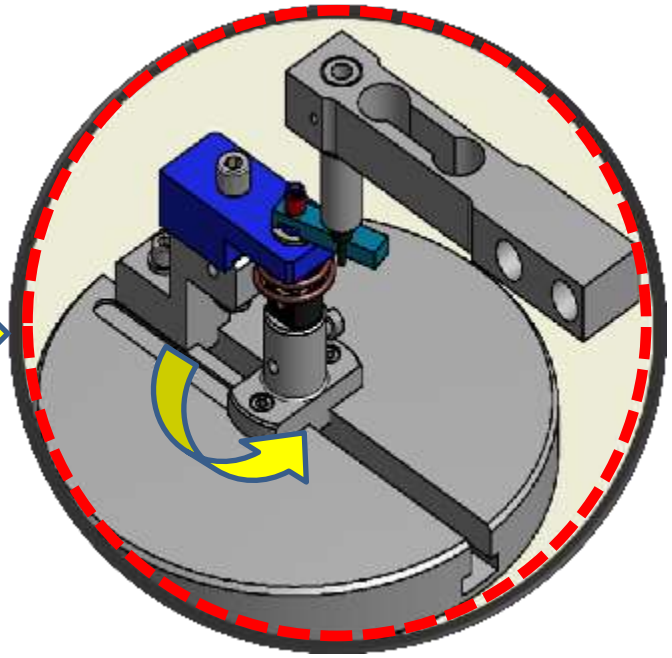
4.5 Exhaust Valve (ECEV) Durability Test

https://www.youtube.com/watch?v=dpuWIXNMnoo

Durability Test EQ



Spring Torque Measurer



Test condition		
	Durability Test In Room temperature	Durability Test In High temperature
Number of Repeat	1,000,000 Cycles	100,000 Cycles
Speed of Repeat	2 Hz	2 Hz
Temperature	Room Temperature	600℃

Sequence of Test
1. Before Spring Torque Measurement
2. Repeat Operation
3. After Spring Torque Measurement
4. Estimation (Compare the change rate of Spring torque)

These kind of test method can be modified through discussion with Customers

4. R&D Institute (Reliability Test)

4.6 Flow Resistivity Tester

Equipment	Specification
Flow resistivity tester	Gauging flow amount according to pressure

5. Plant Division

New Opportunities & Passionate Challenge

KOWEL

Plant Division

5. Plant Division

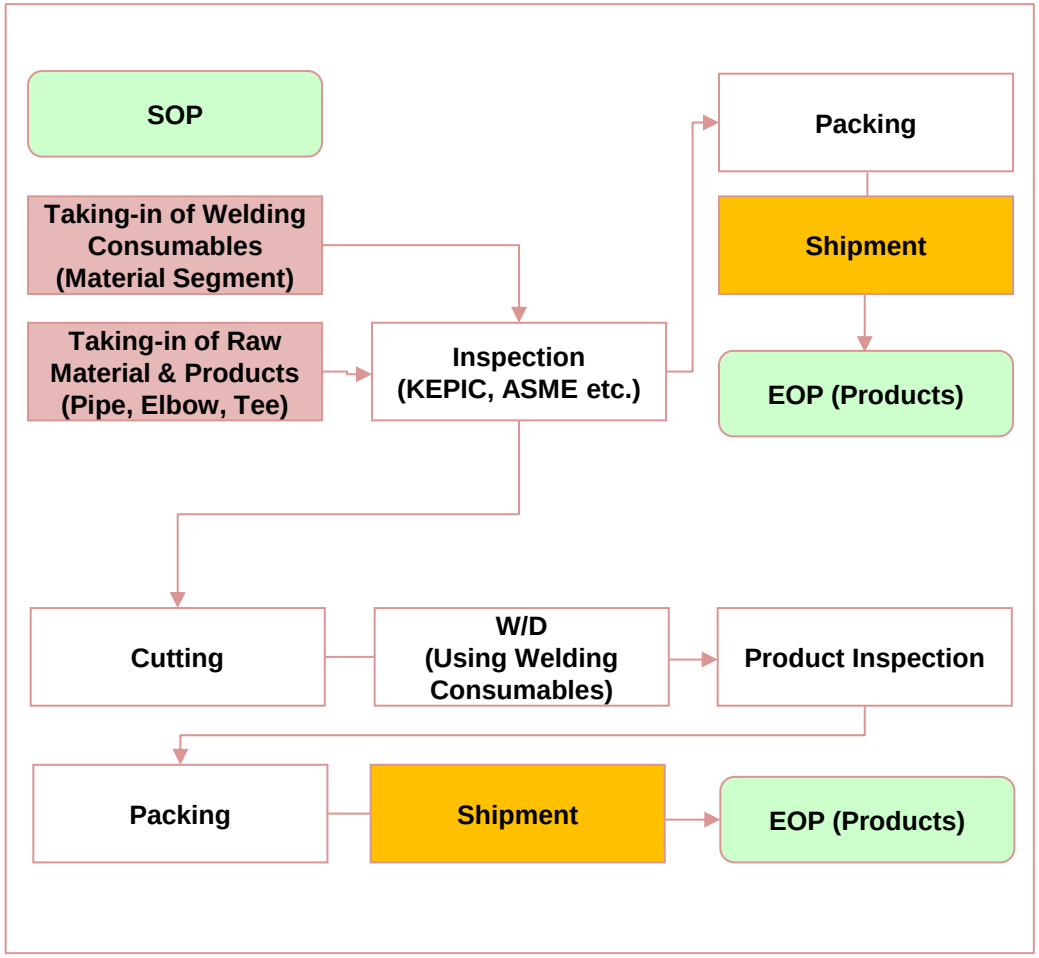
5.1 Production Capacity

Welded Pipe 700 ton/year, 75 EA/month
(20” S/STD Basis)
Lateral 600 EA/month (4”S/40 BW Basis)

- **ASTM / SA / MDF A358 Gr.304 CL.1**
- **ASTM / SA / MDF A403 WP304 –WX**
- **LATERAL**

5.2 Production Flow

Production Process



Main Equipment

Band Saw Machine	Hydraulic Pressure Steel Pipe Testing Machine
	
Auto-Welding Machine	**Coaster Machine**
	

5. Plant Division

5.3 Welded Fittings

WELDED PIPE (STAINLESS & CARBON)

ITEM	MATERIAL	SPEC. RANGE
WELDED PIPE	CARBON A672 Gr.60 CL.22	14″ ~ 36″
	STAINLESS A358 Gr.304 CL.1	14″ ~ 36″

ITEM	MATERIAL	SPEC. RANGE
WELDED FITTING	CARBON 234 WPB-W	14″ ~ 36″
	STAINLESS A403 WP304-WX	14″ ~ 36″

CARBON A672

STAINLESS A358

CARBON 234

STAINLESS A403

5.3 Welded Fittings

PIPING SUBASSEMBLY (STAINLESS & CARBON)

CONDENSATE POT (STAINLESS & CARBON)

ITEM	MATERIAL	RANGE
LATERAL	STAINLESS A403WP304 A403WP316L	3/4”~12”
	CARBON A234WPB	3/4”~12”
PIPING SPOOL	ALL	ALL

ITEM	MATERIAL	RANGE
CONDENSATE POT	STAINLESS A312 TP304 etc.	2”~4” S/40,80, 160,XXS
	CARBON A106-B	2”~4” S/40,80, 160,XXS

LATERAL

PIPING SPOOL

STAINLESS A312

CARBON A106-B

5.4 Forged Fittings

FORGED FITTINGS
& BARS
& BOLT, NUT, WASHER
(STAINLESS & CARBON)

SEAMLESS PIPE
& PLATE
(STAINLESS & CARBON)

FORGED FITTINGS

BARS

BOLT, NUT

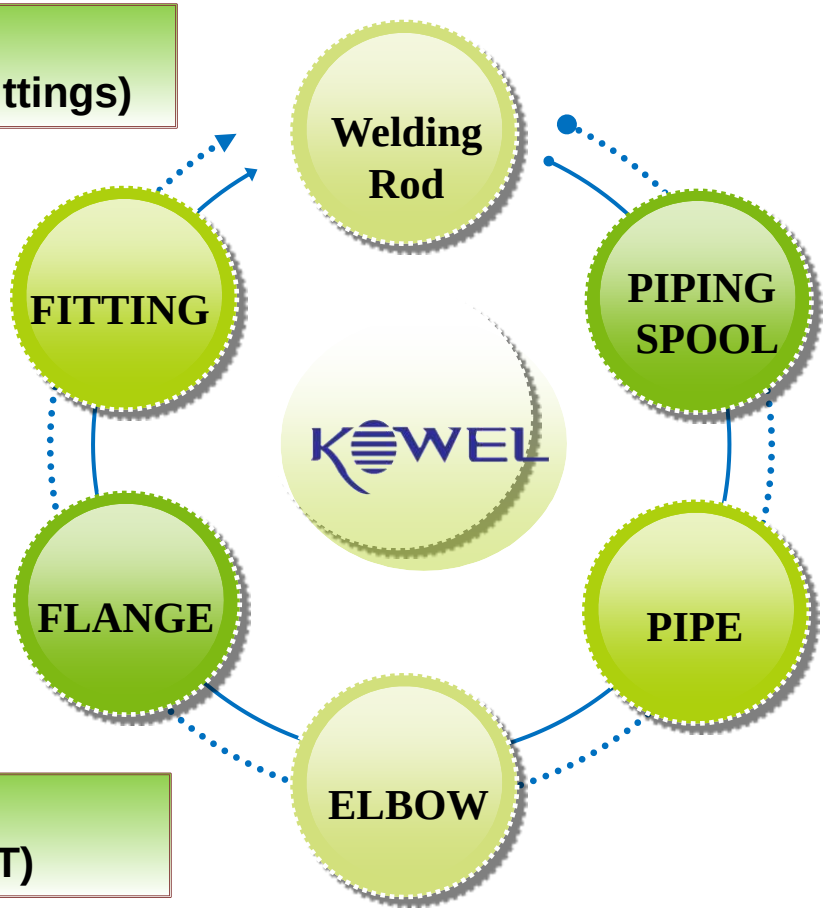
SEAMLESS PIPE
STAINLESS

SEAMLESS PIPE
CARBON

SEAMLESS PLATE

5.5 Quality Assurance

KEPIC
(Welding Rod, Fittings)



ASME
(NA, NS, NPT)

Current &Potential Customers

- Korea Hydro & Nuclear Power Co.,Ltd (Kori, Hanbit, Wolsong, etc.)
- EPC Company (Hyundai construction, Samsung heavy industry, etc.)
- Every Nuclear Plant Material Related Companies

5.5 Quality Assurance

WELDED FITTING

QUALITY PLAN

KEPIC MDF A403 WP304-WX / MNB
ASME SEC.III SA403 WP304-WX / NB

KWQAP-0901-04(R.0) KOWEL SPECIAL STEEL WIRE CO.,LTD A4(210X297)

WELDED PIPE

QUALITY PLAN

KEPIC MDF A358 Gr.304 CL.1 / MNB
ASME SEC.III SA358 Gr.304 CL.1 / NB

KWQAP-0901-04(R.0) KOWEL SPECIAL STEEL WIRE CO.,LTD A4(210X297)

PIPING SPOOLS

QUALITY PLAN

KEPIC MN / MNB ASME SEC.III / NB

KWQAP-0901-04(R.0) KOWEL SPECIAL STEEL WIRE CO.,LTD A4(210X297)

5.6 Supply Chain & Customers

- Hydro, Nuclear & Electric Power, and EPC Industry

Product Group from KOWEL

- SS & Alloy Welding materials
- Welded fittings
- Welded pipes
- Laterals
- Elbow
- Plates
- Etc.

KHNP

Korea Hydro & Nuclear Power Co., Ltd.

- Kori Nuclear Power Plant
- Hanbit Nuclear Power Plant
- Sinhannul Nuclear Power Plant
- Wolsung Nuclear Power Plant

EPC Companies

HYUNDAI ENGINEERING & CONSTRUCTION CO., LTD

한국전력공사 KOREA ELECTRIC POWER CORPORATION

DOOSAN Heavy Industries & Construction

SAMSUNG HEAVY INDUSTRIES

5. Plant Division

New Opportunities & Passionate Challenge

5.7 Supply Reference

Kori
Nuclear Power Plant

Hanbit
Nuclear Power Plant

Sinhannul
Nuclear Power Plant

Wolsung
Nuclear Power Plant

HYUNDAI ENGINEERING & CONSTRUCTION CO., LTD

한국전력공사

DOOSAN
Heavy Industries & Construction

SAMSUNG
SAMSUNG HEAVY INDUSTRIES

CUSTOMER	PROJECT	ITEM	TYPE	DATE	CLASS
Hyundai E&C	SKN 3,4	ER308L	GTAW	2010.07.08	Q
Hyundai E&C	SKN 3,4	ER320LR	GTAW	2010.08.09	Q
Hyundai E&C	BNPP 1,2	ER347	GTAW	2013.06.12	Q
Hyundai E&C	SHN 1,2	ER347	GTAW	2013.06.28	Q
Hyundai E&C	SHN 1,2	ERNiCrFe-7	GTAW	2014.08.09	Q
Hyundai E&C	BNPP 1,2	ERNiCrFe-7	GTAW	2014.11.20	Q
BMT	YEONG KWANG	ER316L	GTAW	2011.02.09	Q
Dongyeon Steel	SHN 1,2	ER308	SAW GTAW	2012.07.22	Q
Dongyeon Steel	SHN 1,2	ER308	SAW GTAW	2013.05.22	Q
Dongyeon Steel	BNPP 1,2	ER308	SAW GTAW	2013.05.30	Q

5. Plant Division

New Opportunities & Passionate Challenge

5.7 Supply Reference

Kori
Nuclear Power Plant

Hanbit
Nuclear Power Plant

Sinhannul
Nuclear Power Plant

Wolsung
Nuclear Power Plant

HYUNDAI ENGINEERING & CONSTRUCTION CO., LTD

한국전력공사

DOOSAN Heavy Industries & Construction

SAMSUNG HEAVY INDUSTRIES

CUSTOMER	PROJECT	ITEM	TYPE	DATE	CLASS
Dongyeon Steel	BNPP PROJECT	ER308	SAW GTAW	2015.01.19	Q
Dongyeon Steel	SHN 1,2	ER308	SAW GTAW	2015.01.19	Q
DONGBU	HANUL 4	ER308L ER309L	GTAW	2014.12.29	Q
Sungil SIM	SKN 3,4	ER316L	GTAW	2012.02.20	Q
Sungil SIM	BNPP 1,2	ER308L	GTAW	2013.09.06	Q
Sungil SIM	SHN 1,2	ER308L	GTAW	2013.09.06	Q
Sungil SIM	SHN 1,2	ER308L	GTAW	2013.09.12	Q
Sungil SIM	BNPP 1,2	ER308L	GTAW	2013.09.12	Q
Sungil SIM	BNPP 1,2	ER308L	GTAW	2014.04.28	Q
Sungil SIM	SHN 1,2	ER308L	GTAW	2014.04.28	Q

5. Plant Division

New Opportunities & Passionate Challenge

5.7 Supply Reference

Kori
Nuclear Power Plant

Hanbit
Nuclear Power Plant

Sinhannul
Nuclear Power Plant

Wolsung
Nuclear Power Plant

HYUNDAI ENGINEERING & CONSTRUCTION CO., LTD

한국전력공사

DOOSAN Heavy Industries & Construction

SAMSUNG HEAVY INDUSTRIES

CUSTOMER	PROJECT	ITEM	TYPE	DATE	CLASS
Sungil SIM	BNPP 1,2	ER308L	GTAW	2014.05.12	Q
Sungil SIM	SHN 1,2	ER308L	GTAW	2014.08.05	Q
Sungil SIM	BNPP 1,2	ER308L	GTAW	2014.08.05	Q
Sungil SIM	SHN 1,2	ER316L	GTAW	2014.09.01	Q
Sungil SIM	SHN 1,2	ER308L	GTAW	2015.02.02	Q
Sungil SIM	BNPP 3,4	ER308L	GTAW	2015.02.02	Q
Sungil SIM	SHN 1,2	ER316L	GTAW	2015.04.02	Q
Sungil SIM	BNPP 3,4	ER316L	GTAW	2015.04.02	Q
KHNP	HANBIT	ER309L	GTAW	2015.07.16	Q
Sungil SIM	BNPP 3,4	ER308L	GTAW	2015.09.15	Q

5. Plant Division

New Opportunities & Passionate Challenge

5.7 Supply Reference

Kori
Nuclear Power Plant

Hanbit
Nuclear Power Plant

Sinhannul
Nuclear Power Plant

Wolsung
Nuclear Power Plant

HYUNDAI ENGINEERING & CONSTRUCTION CO., LTD

한국전력공사

DOOSAN
Heavy Industries & Construction

SAMSUNG
SAMSUNG HEAVY INDUSTRIES

CUSTOMER	PROJECT	ITEM	TYPE	DATE	CLASS
KHNP	SKN 1	ER308L	GTAW	2015.10.14	Q
KHNP	SKN 1	ER309L	GTAW	2015.10.14	Q
KHNP	SKN 1	ER316L	GTAW	2015.10.14	Q
KHNP	HANBIT	ER-316L	GTAW	2015.10.30	A
KHNP	KORI	ER-70S, ER308L	GTAW	2015.11.03	Q
KHNP	HANUL	ER70S-6	GTAW	2015.11.30	Q
KEPCO KPS	HANBIT	ER410 NIMO	GTAW	2016.01.10	Q
KHNP	HANBIT	ER316L	GTAW	2016.01.11	Q

5. Plant Division

New Opportunities & Passionate Challenge

5.7 Supply Reference

Kori
Nuclear Power Plant

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Nuclear Power Plant

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Nuclear Power Plant

Wolsung
Nuclear Power Plant

HYUNDAI ENGINEERING & CONSTRUCTION CO., LTD

한국전력공사

DOOSAN
Heavy Industries & Construction

SAMSUNG
SAMSUNG HEAVY INDUSTRIES

CUSTOMER	PROJECT	ITEM	MATERIAL	DATE	CLASS
BMT	SHN 1,2	LATERAL	B462 UNS N080020 etc.	2013.02.25	T
BMT	BNPP 1,2	LATERAL	A 234 WPB etc.	2013.04.20	T
BMT	BNPP 1,2	LATERAL	A 403 WP304 etc.	2013.04.25	T
BMT	SHN 1,2	LATERAL	A 403 WP316L etc.	2013.06.30	T
BMT	BNPP 1,2	LATERAL	A 234 WPB etc.	2013.06.30	T
BMT	BNPP 1,2	LATERAL	A 403 WP304 etc.	2013.08.30	T
BMT	SHN 1,2	TEE, REDUCER	MDF A 403 WP304 WX 16" STD	2013.12.20	Q
BMT	BNPP 1,2	ELBOW	MDF A 403 WP304 WX 24" STD	2014.01.17	Q
BMT	BNPP 1,2	CAP	B366 WP20CB	2014.12.17	T
BMT	BNPP 1,2	PIPE, LATERAL	B165 UNS N04400 etc.	2015.02.17	T
BMT	BNPP 1,2	PIPE	B165 UNS N04400	2015.03.05	T
BMT	BNPP 1,2	Dissimilar Adapter	MDF A105 & A182 F316	2015.03.13	Q
BMT	BNPP 1,2	LATERAL	A 312 TP 304 etc.	2015.03.31	T
BMT	BNPP 1,2	CAP	B366 WP20CB	2015.04.17	T
BMT	BNPP 1,2	LATERAL	A403 WP 304 etc.	2015.07.31	T
BMT	BNPP 1,2	LATERAL	A403 WP304 8"*4" S10S BW etc.	2015.10.14	T

5. Plant Division

New Opportunities & Passionate Challenge

5.7 Supply Reference

Kori
Nuclear Power Plant

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Nuclear Power Plant

Sinhannul
Nuclear Power Plant

Wolsung
Nuclear Power Plant

HYUNDAI ENGINEERING & CONSTRUCTION CO., LTD

한국전력공사

DOOSAN Heavy Industries & Construction

SAMSUNG HEAVY INDUSTRIES

CUSTOMER	PROJECT	ITEM	MATERIAL	DATE	CLASS
BMT	BNPP 1,2	LATERAL	A403 WP304 8"*4" S10S BW etc.	2015.10.14	T
BMT	N/A	UNS PIPE	B165 UNS N04400	2015.11.04	T
DAEAENC CO.,LTD	SHN 1,2	CS PLATE	A36	2015.12.14	T
U-CHANG PLANT	SHN 1,2	Lagging Plate	A240 Type 304L	2015.12.14	T
BMT	BNPP 1,2	Hydro Test	SA106 Gr.B	2015.12.17	Q
BMT	BNPP 1,2	LATERAL	A403 WP304 6"*2" S40S BLE*PSE etc.	2015.12.23	T
DONG BU	HANUL	CS PIPE	SA106 Gr.B 14"S160	2016.01.06	Q
DUCKKANG METAL	BERGADING	Hydro Test	A336-6 1-1/2" S/XXS etc.	2016.01.07	A
BMT	BNPP 1,2	Hydro Test	MDF A106 Gr.B 2"S80	2016.01.14	Q
LHE	BNPP 3,4	H-BEAM	A36 390*300*10T*16T etc.	2016.01.22	T
LHE	BNPP 3,4	CS PLATE	MDF A516 Gr.70 etc.	2016.01.22	Q
BMT	BNPP 1,2	Copper Tube	B75 UNS C12200 3/8" etc.	2016.01.25	T
BMT	BNPP 1,2	Hydro Test	SA106 Gr.B 1-1/2" S80	2016.01.26	Q
BMT	SHN 1,2	MetalHood	SS304 etc.	2016.01.29	S
DAEAENC CO.,LTD	SHN 1,2	H-BEAM	A36 etc.	2016.02.18	T

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New Opportunities & Passionate Challenge

5.7 Supply Reference

Kori
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CUSTOMER	PROJECT	ITEM	MATERIAL	DATE	CLASS
SAMYOUNG FITTING	N/A	Hydro Test	MDF A106 Gr.B 6"S80	2016.02.18	Q
BMT	WOLSEONG	Hydro Test	MDF A312 TP304L 2"S80S	2016.02.24	Q
BMT	BNPP 1,2	Copper Tube	B75 UNS C12200 3/8" etc.	2016.02.25	T
BMT	BNPP 1,2	LATERAL	A403 WP304 10"*6" S10S BW etc.	2016.03.04	T
BMT	BNPP 1,2	Hydro Test	MDF A106 Gr.B 1-1/2" S80	2016.03.16	Q
IHSUNG CNI CO.,LTD	HANUL	CS PLATE	SA 516 Gr.70 10T x 315 x 215 x 395 etc.	2016-04-07	Q

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CUSTOMER	PROJECT	ITEM	MATERIAL	DATE	CLASS
Hyundai E&C	SHN 1,2	Dissimilar Adapter	MDF A105 & A182 F316	2014.08.22	Q,T
Hyundai E&C	SHN 1,2	ELBOW, TEE	B462 etc.	2014.10.17	T
Hyundai E&C	SHN 1,2	Flange	MDF A182 F316 etc.	2014.11.07	Q
Hyundai E&C	SHN 1,2	Elbow, CAP	MDF MDN B164 etc.	2014.11.21	Q
Hyundai E&C	SHN 1,2	Lateral	A182 F304 etc.	2014.12.05	T
Hyundai E&C	SHN 1,2	Flange	MDF A182 etc.	2015.01.13	Q,T
Hyundai E&C	SHN 1,2	ELBOW etc.	MDF A182 etc.	2015.01.13	Q
Hyundai E&C	SHN 1,2	FLAGNE	A105	2015.01.14	T
Hyundai E&C	SHN 1,2	LATERAL etc.	MDF A182 etc.	2015.01.23	Q,T
Hyundai E&C	SHN 1,2	LATERAL	A105 etc.	2015.01.26	T
Hyundai E&C	SHN 1,2	FLAGNE	A105	2015.02.05	T
Hyundai E&C	SHN 1,2	ELBOW etc.	MDF A182 etc.	2015.02.24	Q,T
Hyundai E&C	SHN 1,2	ELBOW etc.	MDF A105 etc.	2015.02.24	Q, T
Hyundai E&C	SHN 1,2	ELBOW etc.	MDF A234 etc.	2015.04.30	Q, T

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CUSTOMER	PROJECT	ITEM	MATERIAL	DATE	CLASS
Hyundai E&C	SHN 1,2	Machined Orifice	MDF A182	2015.05.18	Q
Hyundai E&C	SHN 1,2	DISS Adapter etc.	MDF A182 etc.	2015.05.18	Q
Hyundai E&C	SHN 1,2	CAP etc.	MDF A182 etc.	2015.05.18	Q
Hyundai E&C	SHN 1,2	FULL CPLG etc.	MDF A105 etc.	2015.05.18	Q
Hyundai E&C	SHN 1,2	BLIND FLANGE etc.	MDF A105 etc.	2015.05.18	Q
Hyundai E&C	SHN 1,2	FLANGE etc.	ASTM A105 etc.	2015.05.18	T
Hyundai E&C	SHN 1,2	FULL CPLG etc.	MDF A182 etc.	2015.05.22	Q
Hyundai E&C	SHN 1,2	Reducing Tee	MDF B164	2015.06.11	Q
Hyundai E&C	SHN 1,2	BLIND FLANGE etc.	MDF A182 etc.	2015.06.11	Q
Hyundai E&C	SHN 1,2	BLIND FLANGE etc.	ASTM A105 etc.	2015.06.11	T
Hyundai E&C	SHN 1,2	OVERFLOW CAP etc.	N/A	2015.06.11	S
Hyundai E&C	SHN 1,2	Adapter etc.	ASTM A182 etc.	2015.06.18	T
Hyundai E&C	SHN 1,2	PLATE	A387 Gr.22 CL.1	2015.08.18	T
Hyundai E&C	SHN 1,2	CAP etc.	MDF A182 Gr.F22 CL.3 etc.	2015.08.18	Q

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CUSTOMER	PROJECT	ITEM	MATERIAL	DATE	CLASS
Hyundai E&C	SHN 1,2	FULL CPLG etc.	MDF A105 3000# SW 1" etc.	2015.08.18	Q
Hyundai E&C	SHN 1,2	FLANGE	A105 150# RF SW etc.	2015.08.18	T
Hyundai E&C	BNPP	CAP	A234 Gr.WPB BW 1-1/2" S40 etc.	2015.08.12	S
Hyundai E&C	BNPP	90 ELBOW etc.	A234 Gr.WPB BW 1-1/2" S40 etc.	2015.09.03	S
Hyundai E&C	SHN 1,2	STUD BOLTetc.	A193 Gr.B7 1/2"Φ x 2-3/4"L etc.	2015.09.01	T
Hyundai E&C	SHN 1,2	INSERT	MDF A240 Gr.304L 10"THK ¼" etc.	2015.09.10	Q
Hyundai E&C	SHN 1,2	LATERAL	A403 WP304 4"S10S	2015.09.10	T
Hyundai E&C	SHN 1,2	BLIND FLANGE etc.	A182 Gr.F304 150# RF 1" etc.	2015.09.10	T
Hyundai E&C	SHN 1,2	FLANGE ect.	A105 150# RF SW ¾" S80 etc.	2015.10.23	T
Hyundai E&C	SHN 1,2	BLIND FLANGE etc.	MDF A182 Gr.F304 150# RF ¾" etc.	2015.10.23	Q
Hyundai E&C	BNPP	Spectacle Blind	A516 Gr.70 300# RF 2"	2015.10.26	T
Hyundai E&C	SHN 1,2	HALF CPLG etc.	MDF A105 3000# SW 3/4"etc.	2015.11.25	Q
Hyundai E&C	SHN 1,2	FULL CPLG etc.	MDF A105 3000 # Socket weld 1 etc.	2015.11.25	Q
Hyundai E&C	SHN 1,2	STUD BOLT etc.	A193 Gr.B8 ¾" 4"L etc.	2015.12.18	Q

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CUSTOMER	PROJECT	ITEM	MATERIAL	DATE	CLASS
Hyundai E&C	SHN 1,2	Union	A182 F316 COMP 0.25"	2015.12.18	T
Hyundai E&C	SHN 1,2	Emergency Overflow cap	6" etc.	2016.01.06	S
Hyundai E&C	SHN 1,2	U-BOLT etc.	A193 Gr.B7 3/8" etc.	2016.01.13	Q
Hyundai E&C	SHN 1,2	90 ELBOW	MDF A403 WP316-S BW ¾" S160	2016.02.23	Q
Hyundai E&C	SHN 1,2	SS LATERAL	A403 WP304-S 2" S40S	2016.03.22	Q
Hyundai E&C	SHN 1,2	FLANGE	A105 150# SWRF 1-1/2" S80 etc.	2016.03.22	T
Hyundai E&C	SHN 1,2	FLANGE	MDF A182 F304 150# SWRF ¾" S40S	2016.03.22	Q
Hyundai E&C	BNPP 3,4	90 ELBOW	A234 WPB 6"S40	2016.04.12	S

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CUSTOMER	PROJECT	ITEM	MATERIAL	DATE	CLASS
KHNP	HANUL 3	CAP	MDF A182 F304, A105	2014.09.30	Q
KHNP	WOLSONG	ELBOW, FLANGE	A105, A182 F304L	2014.12.01	A
KHNP	HANBIT	CHANNEL	A1011 Gr.36	2014.12.03	A
KHNP	HANUL 1	ELBOW	A234 WPB	2014.12.04	A
KHNP	WOLSONG	PIPE	A312 TP304	2014.12.05	A
KHNP	HANUL	ELBOW ect.	A234 WPB, A182	2015.01.19	A
KHNP	HANUL	PIPE	A106 Gr.B etc.	2015.01.20	A
KHNP	KORI 1	PIPE	A312 TP304 etc.	2015.02.11	A
KHNP	KORI 1	PIPE, CON	A106 Gr.B etc.	2015.03.05	A
KHNP	WOLSONG	PIPE	A106 Gr.B	2015.03.06	A
KHNP	HANBIT	TUBE, UNION	MDF A182 F316 etc.	2015.03.13	Q
KHNP	HANUL 1	4ELBOW etc.	A234 WPB etc.	2015.07.01	A
KHNP	HANBIT	WELDING ROD	ER309L SFA 5.9 etc.	2015.07.31	Q
KHNP	HANUL 1	U-BOLT etc.	A103 Gr.B7 etc.	2015.08.10	A
KHNP	KORI 1	18"SMLS PIPE etc.	A106 Gr.B etc.	2015.08.21	Q

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CUSTOMER	PROJECT	ITEM	MATERIAL	DATE	CLASS
KHNP	WOLSONG	SMLS PIPE	A106 Gr.B etc.	2015.08.28	T
KHNP	HANUL 3	CAP	MDF A182 F304, A105	2014.09.30	Q
KHNP	WOLSONG	ELBOW, FLANGE	A105, A182 F304L	2014.12.01	A
KHNP	HANBIT	CHANNEL	A1011 Gr.36	2014.12.03	A
KHNP	HANUL 1	ELBOW	A234 WPB	2014.12.04	A
KHNP	WOLSONG	PIPE	A312 TP304	2014.12.05	A
KHNP	HANUL	ELBOW etc.	A234 WPB, A182	2015.01.19	A
KHNP	HANUL	PIPE	A106 Gr.B etc.	2015.01.20	A
KHNP	KORI 1	PIPE	A312 TP304 etc.	2015.02.11	A
KHNP	KORI 1	PIPE, CON	A106 Gr.B etc.	2015.03.05	A
KHNP	WOLSONG	PIPE	A106 Gr.B	2015.03.06	A
KHNP	HANBIT	TUBE, UNION	MDF A182 F316 etc.	2015.03.13	Q
KHNP	HANUL	4ELBOW etc.	A234 WPB etc.	2015.07.01	A
KHNP	HANUL	WELDING ROD	ER309L SFA 5.9 etc.	2015.07.31	Q
KHNP	HANUL	U-BOLT etc.	A103 Gr.B7 etc.	2015.08.10	A

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CUSTOMER	PROJECT	ITEM	MATERIAL	DATE	CLASS
KHNP	KORI	18"SMLS PIPE etc.	A106 Gr.B etc.	2015.08.21	Q
KHNP	WOLSONG	SMLS PIPE	A106 Gr.B etc.	2015.08.28	T
KHNP	HANBIT	45 ELBOW etc.	A403 Gr.WP304 4" S40S etc.	2015.09.07	A
KEPCO KPS	WOLSONG	CON REDUCER etc.	SA403 Gr.WP304L 4"*2" S80*S120 etc.	2015.09.07	Q
KHNP	WOLSONG	CS PIPE etc.	A106 Gr.B 3"S40 etc.	2015.09.08	A
KHNP	KORI	SS PIPE	A403 WP304 4" S40	2015.09.16	A
KHNP	KORI	FLANGE etc.	A105 150# SO FF 12" etc.	2015.09.16	A
KHNP	HANUL	WELDING ROD	ER90S-B3 2.4MM(GTAW)	2015.09.30	Q
KHNP	KORI	90 ELBOW etc.	A234 Gr.WOB 3" STD BW etc.	2015.09.30	A
KHNP	WOLSONG	CS PIPE etc.	A106 Gr.B ¾" S80 외	2015.10.02	A
KHNP	WOLSONG	BLIND FLANGE	A105 150# 12"(BOLT/NUT 포함)	2015.10.02	A
KEPCO KPS	WOLSONG	CS PIPE etc.	A106 Gr.B 4"S160 etc.	2015.10.22	A
KEPCO KPS	HANUL	BEAM(ANGLE) etc.	A36 75*75*9MM etc.	2015.10.23	Q
KHNP	WOLSONG	SS PIPE etc.	SA312 TP304 ½" S160 etc.	2015.10.29	Q
KHNP	WOLSONG	WELDING ROD	ER-316L etc.	2015.10.30	A

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CUSTOMER	PROJECT	ITEM	MATERIAL	DATE	CLASS
KHNP	KORI	WELDING ROD	ER-70S, ER308L etc.	2015.11.03	Q
KEPCO KPS	HANUL	SS PIPE	SA312 TP316 ½" S80	2015.11.04	Q
KHNP	WOLSONG	CS PIPE etc.	A106 Gr.B etc.	2015.11.05	A
KHNP	WOLSONG	CS PIPE	A106 Gr.B	2015.11.19	A
KHNP	WOLSONG	2D Clamp etc.	SA479 GR.TP304 3/8" O.D. etc.	2015.11.20	Q
KHNP	HANUL	WELDING ROD	ER70S-6	2015.11.30	Q
KEPCO KPS	HANUL	ROUND BAR	A276 UNS21800	2015.12.01	A
KHNP	KORI	SS PIPE etc.	SA312 TP304 ¾" S40S etc.	2015.12.03	Q
KHNP	WOLSONG	FULL CPLG	SA182 F304L SW 3/8" 3000#	2015.12.07	Q
KHNP	WOLSONG	SS PIPE etc.	A312 TP316L 3"S40S etc.	2015.12.07	A
KEPCO KPS	HANBIT	WELDING ROD	ER410 NIMO	2016.01.10	Q
KHNP	HANBIT	WELDING ROD	ER316L etc.	2016.01.11	Q
KHNP	KORI	TUBE CAP etc.	B16 3/8" etc.	2016.01.27	A
KHNP	HANBIT	CS PIPE etc.	A106 Gr.B 6"S40 etc.	2016.02.12	A
KHNP	HANBIT	SS PIPE etc.	A312 TP316L 4"S40S etc.	2016.02.23	A

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CUSTOMER	PROJECT	ITEM	MATERIAL	DATE	CLASS
KHNP	KORI	SS SMLS PIPE	SA312 TP304 4" S40S	2016.03.09	Q
KHNP	HANBIT	SS SMLS PIPE	SA312 TP304 2"S40S	2016.03.11	Q
KHNP	HANBIT	SS SMLS PIPE	SA312 TP316L 219Φ 2020mm	2016.03.11	Q
KHNP	HANBIT	SS SMLS PIPE	SA312 TP304 4" S160	2016.03.25	Q
KHNP	HANBIT	SS SMLS PIPE	A312 TP304 ¾" S40S ect.	2016.04.06	A
KHNP	HANBIT	90 ELBOW ect.	A403 WP304 4"S40S ect.	2016.04.06	A
KHNP	WOLSONG	PLUG ect.	B16 3/8" ect.	2016.04.11	A
KEPCO KPS	HANUL	CAP	SB366 UNS N04400 ¾" 3000#	2016.04.26	A

6. Testing Equipment

6.1 Material Division (Raw Material & Wire Product)

Equipment	Capacity	Q'ty	Usage
Vickers Tester	-	1SET	Measuring Hardness
UTM (Universal Test Machine)	5TON, 1TON	2SET	Mechanical Property Test
Lab. Teat-Treatment Furnace	Max. 1,200℃	1SET	Heat-Treatment
PMI (Positive Material Identification)	-	1SET	Material Identification
Optical Emission Spectrometer	Carbon, SS, Nickel, Al.	1SET	Chemical Analysis

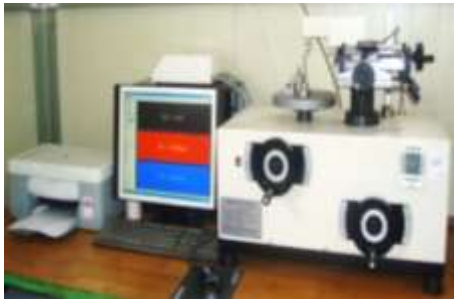




6. Testing Equipment

6.2 Automotive Division (Spring)

Equipment	Capacity	Q'ty	Usage
Non-Contact 2 Dimensional Measurer	Measuring scope : 1㎛	1SET	Measuring Part dimension
Spring Torque Tester	Measuring scope : 0.5g	1SET	Measuring Spring Torque
Torsion Spring Durability Tester in Room Temperature	Max 10 M Times	1SET	Spring Torsion Durability
Vickers Tester	-	1SET	Measuring Hardness after H/T
Digital Microscope	Max. X1,500 times	1SET	Analyzing Material Surface


6. Testing Equipment

6.3 Automotive Division (Passive Valve)

Equipment	Capacity	Q'ty	Usage
Torque Tester	Resolution : 0.5g	1 SET	Measuring Passive Valve Torque
Thermal Impact Cycle Tester	-65℃~200℃	1 SET	Testing Heat Impact and Cooling Resistance
High Temperature Durability Tester	Max. 1,000℃	1 SET	Testing high temperature resistance

6. Testing Equipment

6.4 Plant Division

Automatic
Specimen Grinder

Mounting Machine

Micro Vickers

Taper Thread Plug Gauge

Water Pressure Tester

Pitch Gauge

Taper Thread Ring Gauge

RT Room

7. Certificates & Approvals

New Opportunities & Passionate Challenge

■ Patent / Design certificates list of KOWEL

Patent No.10-1131141 [Wire Winding Device]	Patent No.10-1217592 [Optic Panel]	Patent No. 10-1436039 [Rotating Flexible Exhaust Valve for Automotive Muffler]	Patent No. 10-1463238 [Flexible Exhaust Valve for Automotive Muffler]	Patent No. 10-1542569 [Manufacturing method of high heat-resistance Steel Wire and hest-resistance Spring]	Patent No. 10-1549225 Manufacturing method of Super alloy wire with high strength and anti-corrosion
					

■ Patent / Design certificates list of KOWEL

Application No. 30-0801803 [Exhaust Valve for Automotive Muffler]	Application No. 30-0801804 [Exhaust Valve for Automotive Muffler]	Application No. 30-0801805 [Rotating Exhaust Valve for Automotive Muffler]	Application No. 30-0801805-1 [Rotating Exhaust Valve for Automotive Muffler]	Application No. 30-0801805-2 [Rotating Exhaust Valve for Automotive Muffler]	Utility Model No. 0328274 [Cleansing Nozzle for Wire Drawing]
					

■ Patent / Design certificates list of KOWEL

Application No. 10-1570872 [Heat-resistance Spring using high-heat resistance wire]	Under Patent Application 10-2014-0177853	Under Patant Application 10-2015-0093222			
	**Super Alloy Wire for High Strength & Anti-Corrosion**	**Manufacturing Method of Super Duplex Stainless with improved Anti-Corrosion**			

7. Certificates & Approvals

New Opportunities & Passionate Challenge

■ Certificates of KOWEL

Material Specialized Company	ISO/TS 16949:2009	ISO 9001 : 2008	R&D Institute	SQ Approval [Heat-Treatment]	SQ Approval [Welding]
					

■ Certificates of KOWEL

KEPIC Approval	Sinkori Nuclear 3,4 Power Plants Supply	Single PPM	KHNP's Supplier Approval (Q Class)	Sinhanul Nuclear 1,2 Power Plants Supply	UAE BNPP Material Supply
					

■ Certificates of KOWEL

ASME (NS)	ASME (NPT)	ASME (NA)	RSM SES Tier	Promising Export Company	Awarded presidential citation
					

Thank you for your kind attention

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