Engine, Drivetrain, and Chassis Components

Cold Forged and Cast Parts

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1. Cold Forging Process Line

Integrated and Systematized Production Lines

Cold Forging Process Flow Chart

1. Customer Request
   - Die Design
   - Die Structure Analysis
   - Working Stress Analysis

2. Material Order
   - R&D Center
     - DFMEA: Advanced forecast and solution
     - Design Failure Mode and Effects Analysis
     - Material Inspection

3. Cold Forging
   - Die Production
   - CNC Machining
   - Heat Treatment
   - Cleaning
   - PFMEA: Advanced forecast and solution
   - Process Failure Mode and Effects Analysis

4. Final Inspection
   - Delivery

- **ISO 14001, ISO/TS 16949-2009 certified** with extensive experience

- Remarkable technical R&D center
  - Holds multiple patents on manufacturing process
  - Die(Mold) design, Die structure and stress analysis
  - Die production and inspection, Full PPAP approval capabilities

- Advanced manufacturing facilities
  - Press machines for forging, CNC machining equipments
  - Grinding machines, Heat treatment machines, Washing machines
2. Cold Forged Components

1. Shafts and Bushings for Various Applications

- Reaction shaft, Suspension shaft
- Inner bushing, Axle bushing, etc.

◆ Suspension Shaft and Reaction Shaft

Steering and Transmission Components

Transmission Components

◆ Inner Bushings

Inner bushings assembled with rubber to isolate vehicle vibrations
2. Cold Forged Components

2. Mounting Pipe, Inner Rod and Fastener

- Mounting pipe, Inner rod, T-pins for chassis front arm
- Bolts, Rivets, etc.

◆ Mounting Pipe

Fastening Devices for Chassis and Frame

◆ Inner Rod

Chassis and Suspension Components
2. Cold Forged Components

3. Inner Sleeve and Special Forging Products

- Inner sleeve, Spindle, Clutch hub
- Joint, Pinion gear, Damper, etc.

◆ Inner Sleeve

◆ Special Forging Products
3. General Information

**General capabilities of metal stamping process**

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature</td>
<td>Room temperature</td>
<td>Parts Diameter</td>
<td>3 – 75 mm</td>
</tr>
<tr>
<td>Press Load</td>
<td>100 ton – 900 ton</td>
<td>Parts Length</td>
<td>10 – 250 mm</td>
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<tr>
<td>Max Capacity</td>
<td>30,000 ton/Year</td>
<td>Parts Weight</td>
<td>0.1 g – 2,000 g</td>
</tr>
<tr>
<td>Material Type</td>
<td>Wire and Cylinder shape type metal - Carbon Steel</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Global customers that we have supplied to**

- Hyundai-Kia
- General Motors
- Tokai Rubber (Poland)
- Multimatic (Canada) and others
Engine and Chassis Components
1. Engine & Chassis Components

<table>
<thead>
<tr>
<th>Cylinder Heads</th>
<th>Motorcycle Cylinder Heads</th>
</tr>
</thead>
<tbody>
<tr>
<td>Camshafts &amp; Camshaft Assembly (Passenger, Heavy-Duty, Agriculture)</td>
<td>Connecting Rods (Diesel and Gasoline)</td>
</tr>
<tr>
<td>Injector Clamp</td>
<td>Shaft Idler &amp; Shaft Idler Assembly</td>
</tr>
<tr>
<td>Relay Valves</td>
<td>Quick Release Valves</td>
</tr>
</tbody>
</table>

## 1. Transmission Components

<table>
<thead>
<tr>
<th>Bushing</th>
<th>C/S Bearing</th>
<th>Lug</th>
<th>Cup Planet Carrier</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1" alt="Bushing" /></td>
<td><img src="image2" alt="C/S Bearing" /></td>
<td><img src="image3" alt="Lug" /></td>
<td><img src="image4" alt="Cup Planet Carrier" /></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Oil Pump Assembly</th>
<th>Key</th>
<th>Piece Splitter</th>
<th>Forged Levers</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image5" alt="Oil Pump Assembly" /></td>
<td><img src="image6" alt="Key" /></td>
<td><img src="image7" alt="Piece Splitter" /></td>
<td><img src="image8" alt="Forged Levers" /></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Levers (Bar and Plate)</th>
<th>Jaw</th>
<th>Rail Assembly (Jaw and Round Bar)</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image9" alt="Levers" /></td>
<td><img src="image10" alt="Jaw" /></td>
<td><img src="image11" alt="Rail Assembly" /></td>
</tr>
</tbody>
</table>
1. Transmission Components

- **Jaw**
- **Rail Assembly**
  (Jaw and Round Bar)
- **Levers**
  (Round Bar and Plate)
- **Forged Levers**
- **Pin**
- **Pivot Pin**
- **Fork**
1. Transmission Components

- Pin
- Pivot Pin
- Fork
- Lock Nut

- DCT Gear
- Input Gear
- Internal Gear
- Secondary Gear

- Primary Gear
- Sun Gear
- Pinion Gear
2. Axle Components

Cast Differential Case

Forged Axle Bearing Case

Forged Lock Nut

Bearing Cap

Axle Bracket

Precision Forging
Production Facility

Automatic Robot Production Systems

- Machining Center
- Cam/Journal Grinding Machine
- CNC Lathe & Tapping Machine
- Induction Hardening Machine
- Laser Cutting
- Fracture Splitting Machine
- Others
Production Line

- Molding Line
- Sand Reclamation Line
- Melting Line
- Casting Line
- Heat Treatment Line
- Finishing Line
Quality Equipment

- 3D CMM (3D Coordinate Measuring Machine)
- Camshaft Measuring Systems
- UTM (Universal Testing Machine)
- Surface Roughness & Counter Tester
- Video Microscope
- Hardness Tester
- Others
Metal Stamped Parts for Automotive Components
1. Metal stamping process line at a glance

Integrated and systematized production lines

Flow chart of metal stamping process

- **ISO 9001, ISO/TS 16949-2002 certified** with abundant experience

- Highly experienced technical R&D center
  : Holds several patents about progressive tool design and processing
  : Die(Mold) design, Die structure and stress analysis
  : Die production and inspection, Full PPAP approval capabilities

- Well-organized manufacturing facilities
  : Press machines for stamping, In-process inspection equipment
  : Projection and spot welding machines, Ultrasonic washing machine
2. Main Automotive Components

1. Suspension Strut & Shock absorber parts

- Spring seat, Angular ring, Rebound stop ring, Striker cap, Bottom plate
- Knuckle bracket, Stabilizer bracket, Hose/ABS sensor bracket, etc.

🔹 Spring seat

🔹 Bracket

🔹 Ring and Cap
2. Main Automotive Components

2. Seat belt stamping parts

- Side and Center tongue, Pretensioner outer and inner bracket
- Height adjustment rail and channel, Metal guide, Lock pawl, etc.

◆ Seat belt tongue and bracket

◆ Height channel and Metal guide
2. Main Automotive Components

3. Press tone wheel and other parts

- Front and Rear type tone wheel, Strut bearing outer and inner rings
- Muffler Shells, ECU bracket, Motor case, Motor impeller, etc.

◆ Front type and rear type tone wheel

◆ Others
3. General Information

General capabilities of metal stamping process

<table>
<thead>
<tr>
<th>Temperature</th>
<th>Room temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td>Press Load</td>
<td>80 ton – 400 ton</td>
</tr>
<tr>
<td>Max Capacity</td>
<td>70.0 Mil EA/Year</td>
</tr>
<tr>
<td>Parts Thickness</td>
<td>5 – 45 mm</td>
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<tr>
<td>Parts Width</td>
<td>350 – 2100 mm</td>
</tr>
<tr>
<td>Parts Weight</td>
<td>10 g – 800 g</td>
</tr>
<tr>
<td>Material Type</td>
<td>Coil and sheet shape type metal</td>
</tr>
<tr>
<td></td>
<td>- Steel, High carbon steel, SUS stainless steel, Aluminum</td>
</tr>
</tbody>
</table>

Global customers that we have supplied to

- Hyundai-Kia, Honda, Toyota, Nissan
- General Motors, Ford, Chrysler
- ZF Sachs (Korea, Germany)
- Takata Holdings (Korea, Japan)
- Ashimori

SQ 인증서

Certificate of Supplier Quality
