EGR System Global TOP Leader & Our Target is to be the World TOP Enterprise

"Without the challenge success waits neither"

Future will be fruitful only for those who wait with preparation. Our adoption of responsible and balanced management is essential step toward to reach daring dreams to reality. Your patronage and support is greatly appreciated as we forward to become a global company with you in mind.
1. Company Overview

- **Headquarter**: Yangsan-city, Gyungnam, KOREA
  - Established: Nov. 2012

- **Local Office**: Troy, MI, US
  - Established: Oct. 2013

- **Local Office**: Frankfurt, Germany
  - Established: Nov. 2012

- **Plant in China**: Zhangjiagang, China
  - Established: 2008

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1. Company Overview

- **Major Business**: EGR Cooler, Tube, Oil Cooler, ATF Warmer
- **Annual Sales Amount**: USD 162M (2013)
- **R&D Investment**: 4% of Sales Amount (2013)
- **Employees**: 620

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1. Company Overview

**Plant in CHINA**

- **Location**: Zhangjiagang, China
- **Established**: 2008
- **Production Capacity**: EGR Coolers (1M), EGR Pipe (2M)
- **Major Customers**: SAIC, CUMMINS, SOGEFI, HAUTAI, OED, FAW
- **Facilities**: EGR Cooler & Tube Assembly Line, Vacuum Furnace / Leak Tester

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2. History

- 2013: Started Oil Cooler Business with Chrysler
- 2012: Established Korens USA Inc in Troy
- 2012: GM Supplier of Year Awards 2013
- 2011: Developing Euro6 with HMC/KIA, BMW, GME, FORD and Others
- 2009: Started EGR Business with Volkswagen
- 2009: Started Euro5 EGR Cooler Module Business with BMW
- 2008: Started EGR Cooler Business with CUMMINS
- 2006: Ford Q1 Award / Started EGR Cooler Business with PSA
- 2005: Started EGR Business with Ford UK
- 2004: Started EGR Cooler Business with HMC/KIA & SYMC
- 2003: Changed Company name to KORENS
- 1998: Established R&D Center
- 1990: Established (Daeil Metal Co., Ltd)

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3. Certificate

Quality Certificate

Nov. 2009

Patent

Dec. 2006

Patent

Patent: Exhaust Gas Heat Exchanger for vehicle

Nov. 2006

Patent: Exhaust Gas Recirculation for vehicle

Patent: EGR Cooler

Mar. 2006

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4. Organization

- Chairman
  - Planning Coordination
  - Finance
    - Auditor
  - R&D Center
  - Korens China
    - Asia Development
    - Domestic Development
    - N.A Developed Analyze
    - Test Team
    - Oil Cooler / Proto Team
    - Development Cost
    - New Tech Development
  - Korens Europe
    - Europe Development
    - Overseas Sales Team
  - Korens USA
    - Domestic Sales Team
    - Overseas Sales Team
  - Production Tech. Division
    - Production Tech. Team #1
    - Production Tech. Team #2
  - Production Management
    - Production Team
    - Maintenance Team
  - Quality Div.
    - Q.A Team
    - Q.C Team
    - SQE Team
  - Finance Div.
    - Finance Team
    - Accounting Team
  - Purchasing Division
    - Supplier Development
    - Purchasing Team
    - Global Sourcing Team
    - I.T Team
    - P.M Team
    - Management Planning
    - Strategy Planning
    - HR Team
    - Environment Team

- CTO
  - R&D Center
    - Sales Div.
      - Domestic Sales Team
        - Overseas Sales Team
      - Production Tech. Team #1
        - Production Tech. Team #2
      - Production Team
        - Maintenance Team
      - Quality Div.
        - Q.A Team
        - Q.C Team
        - SQE Team
      - Finance Div.
        - Finance Team
        - Accounting Team
      - Purchasing Division
        - Supplier Development
        - Purchasing Team
        - Global Sourcing Team
        - I.T Team
        - P.M Team
        - Management Planning
        - Strategy Planning
        - HR Team
        - Environment Team
4. Organization: R & D Center

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5. Sales: Annual Turnover

Euro-6 Emission Start

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<tbody>
<tr>
<td>Value (USD Million)</td>
<td>51</td>
<td>102</td>
<td>140</td>
<td>162</td>
<td>240</td>
<td>365</td>
<td>410</td>
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6. Sales: Composition

**BY PRODUCTS**
- EGR Module: 52%
- EGR Cooler: 30%
- OIL Cooler: 9%
- EGR Pipe: 7%
- Others: 2%

**BY CUSTOMER**
- Oversea: 49%
- Domestic: 51%
- Domestic Major: 40% (Hyundai), 7% (GM), 4% (KIA)
- Oversea Major: 38% (BMW), 4% (Ford), 2% (Volkswagen)

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7. Customer Distribution

- North America
  - Ford
  - GM

- UK
  - BMW
  - Ford

- Germany
  - Volkswagen
  - GM

- Austria
- Turkey

- Korea
  - Hyundai
  - KIA

- Italy
- Austria

- North America
- Japan
- UK

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8. Product Line Up

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9. Products – Mass Product

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EGR Cooler (Passenger)

- 2.2L Diesel
- 2.5L Diesel
- 3.0L Diesel
- 3.0L LP
- 1.7L Diesel

Wavy Fin Type
9. Products – Mass Product

EGR Cooler (Commercial)

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9. Products – Mass Product

EGR Module

Wavy Fin Type

1.9L Diesel

2L Diesel

3L Diesel

2L Diesel
9. Products – Mass Product

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OIL Cooler

- Diesel 2.0L
- Diesel 2.5L
- 1.6L Gasoline
- Gasoline 4.6L
- 2.2L Diesel
9. Products – the others

EGR Pipe & Tube

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9. Products – Developed

**AT Oil Cooler & ATF Warmer**

- 1.2L
- Can core type
- 95*62

- 1.5L
- Layered core type
- 113.2*177.2

Layered Core Type

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10. Main Facilities

Batch Type (11 Furnaces)

Vacuum Brazing Furnace

Continuous Type (5 Chambers)

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11. Production Capacity

Annual Capacity

- EGR Cooler: 3.5M
- Oil Cooler: 2.5M
- Oil Return Tube: 1M
- EGR Tube: 4M
- Tube & Fittings: 4M

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12. Technical Capability : CAD

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3D CAD Software

- I-DEAS / PRO-Engineer
- CATIA / UG

All Commercial CAD System is available

Interface Check

3D Modeling

2D Drawing
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12. Technical Capability : CAE

Analysis Software

- CFD Analysis : FLUENT
- FEA Analysis : ANSYS W/B, FEMFAT

FLUENT
- Performance analysis
- CHT Analysis
- Boiling Analysis
- Flow distribution

ANSYS
- Thermal Stress
- Structural Analysis
- Vibration Analysis

FEMFAT
- LCF / HCF Analysis

KORENS has a lot of experience of Fluid – Structure interface analysis.
12. Technical Capability: Test Facilities

Performance Test Bench & Thermal Shock Test Bench

- **Cooler Test Bench #1**
  - Max. Temp. 850°C
- **Cooler Test Bench #2**
  - Max. Temp. 650°C
- **Cooler Test Bench #3**
  - Performance Test only
  - Max. Temp. 550°C
- **Cooler Test Bench #4**
  - Thermal Shock Test Only
  - Max. Temp. 550°C

Pressure Fatigue Test Bench #1
- Water side: 10bar, Gas side: 50bar, 1.25Hz

Pressure Fatigue Test Bench #2
- Water side: 7bar, Gas side: 7bar, 1.25Hz

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12. Technical Capability : Test Facilities

- **Salt Spray Test Bench**
  - Max. Pressure : 5bar

- **Vibration Test Bench**
  - Max. Frequency : 2000Hz
  - Max. Acceleration : 5bar

- **Internal Corrosion Test Bench**
  - Max. Pressure : 1.5 bar
  - Max. Flow : 50 lpm

- **Corrosion Test Bench**
  - Max. Temp : 550 °C

- **Environment Test Bench**
  - Temp Range : -40°C ~ 120°C
  - Actuator operating : 1Hz

- **Engine Dynamometer**
  - Engine Application :
    - Medium duty ~ Heavy duty
    - Fouling Validation