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### [DAY 2 – Towards R744 serial production](#)

**Leading automotive suppliers confirmed that CO<sub>2</sub> components have reached an advanced technical level to be ready for immediate or early mass production. Presentations focused on evaporators, compressors, hoses, sensors and sealing solutions for R744 MAC.**

2008-02-15

The second day of the VDA Winter Meeting in Saalfelden, Austria, focused exclusively on latest developments in the field of CO<sub>2</sub> Technology. Following the VDA decision to use R744 in MAC, suppliers from Europe, the US and Asia have accelerated the development and refinement of CO<sub>2</sub> components to be part of future MAC systems.

Updates included:

#### Compressors

- **Visteon:** The presentation focused on three different types of compressors – with software control, with sensing control valve, and “self compensation” – to evaluate potential standard control strategies for future R744 compressors. Visteon concluded that a standard specification for the control behaviour of compressors is feasible.
- **Doowon:** The presentation by the Korean supplier attracted high attention as Geon Ho Lee presented the company’s new R744 swivel type compressor for the first time to an open public. The external variable displacement type DC 28 covers 2cc to 33cc, features a good controllability, and leads to a 30% efficiency gain over R134a swash plate type compressors at similar noise levels. Currently in the process of development, the new model will be ready for mass production in June 2009.

#### Sensors

- **Sensata:** Renske Eissens, speaking on behalf of Sensata Technologies, presented several sensor families, including dual analog and digital sensors influencing the accuracy and response time for evaluating pressure and temperature. The products, already available today, can help maximize efficiency levels and protect compressors from damage. They also support a future heat pump functionality of the CO<sub>2</sub> system.
- **Kavlico:** The supplier of pressure temperature sensors showcased a combined pressure-temperature sensor without external temperature probe. The design validation process for this product using a patented thin film technology, will start in July 2008 to allow for a serial production by July 2009.

#### Sealings, Hoses & Valves

- **Freudenberg:** Even the best MAC will not work properly if sealing does not work. This was the main message delivered by Ulrich Frenzel, who confirmed that using elastomer seals for R744 MAC is feasible. Freudenberg’s complete package solution available for CO<sub>2</sub> systems comprises O Rings, PTFE Compressor Piston Rings, and CO<sub>2</sub> charge ports.
- **Witzenmann:** Carlo Burkhardt provided an overview of R744 hose development from first

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prototypes to serial applications. He confirmed that Witzenmann's CO<sub>2</sub> hoses are ready for immediate serial production.

- **Contitech:** The supplier of hoses presented latest solutions to connect the evaporator to the compressor. At present, Contitech is developing and refining five different assembly lines for R744 MAC systems to be ready for industrialisation in 2008/2009.
- **Thomas Magnete, TU Braunschweig, TLK-Thermo:** Norbert Stulgies, speaking on behalf of all involved companies and research institutes, investigated two control concepts for efficient compressor control valves.

### Evaporator & Bus HVAC

- **Behr:** The German supplier, already developing the 4th generation of R744 evaporators, confirmed that after two years of testing it could prove the life time reliability of its extruded flat tube evaporators to replace the current R134a brazed plates model. Behr also showed results about realistic leakage from corrosion, which would be less than that from human exhalation (0,0019 g/s). Behr concluded that R744 is thus safe and reliable.
- **Spheros:** The HVAC (heating, ventilation, air conditioning) system supplier currently focuses on R744 MAC in coaches and city buses. The company decided to drive the development of R744 in buses and coaches to anticipate expected legislation targeting the efficiency and environmental performance of public transport.

### Stationary

- **Danfoss:** The Danish company Danfoss complemented the full session on mobile air conditioning by focusing on stationary applications. Using the periodic table of elements as background, Danfoss showed how the properties of the molecules forming a refrigerant need to be taken into account to consider the risks associated to it. Danfoss insisted on the importance of thinking about the type of installation and its related needs first, and then choosing a suitable refrigerant accordingly. The company thus mentioned the potential to use CO<sub>2</sub> (R744), especially for certain industrial refrigeration installations.

### Conclusion: Industry should decide soon

Markus Matthes, from the VDA Winter Meeting organization committee, closed the event with a call on the automotive industry to make its choice of refrigerant soon. In face of the EU 2011 deadline for refrigerants, the REACH chemicals law, and the findings from the Green MAC LCCP, carmakers should end the confusion and start working on the implementation of viable solutions. Right now, Matthes summarized, there is a vague picture, and industry should try to clarify the situation now - three years before serial production has to start.

### More information:

[NEW: All presentations from the VDA Winter Meeting 2008](#)

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