



Innovative Vehicle Technology

PRESS RELEASE

Haldex acquires new environmental technology for combustion engines

Stockholm, Sweden (July 21, 2003) – **Haldex has signed an agreement with the development company Varivent Innovations AB comprising the exclusive rights to further develop and market a new technology for EGR (Exhaust Gas Recirculation) systems on diesel engines. The Varivent technology makes it possible to achieve the future international (EURO 5, US 07) requirements regarding reduced emissions of nitric oxide and particles from engines with EGR technology, which is the most cost effective technology for the vehicle users and the society. The limitations so far with the EGR technology – limited gas recirculation and energy losses – are eliminated by the Varivent technology. This translates to significantly lower fuel consumption compared to other methods. The Varivent technology also makes it possible to use simpler methods to reduce emissions of particles. After the implementation of EURO 5 and US 07, the total market for the Varivent technology can be estimated to 750 MSEK (95 MUSD) annually.**

Diesel engine emissions include particles and nitric oxides (NO_x), which cause smog and increased acidity. New environmental requirements of emissions from diesel engines will be introduced 2005 (EURO 4) and 2008 (EURO 5) in Europe and 2007 in USA (US 07). The allowed emission levels of NO_x will then be so low that new technology for emission cleaning must be introduced. In addition, an after-treatment will be necessary to reduce the particle emissions.

Two main technologies are being considered:

- EGR (Exhaust Gas Recirculation), where emissions are returned to the engine's air inlet, causing the temperature and amount of NO_x to decline. This recirculation requires pumping energy, i.e. increased fuel consumption.
- SCR (Selective Catalytic Regeneration), where a basic solution (urea) is added, neutralizing the acid nitric oxides of the emissions. SCR requires that trucks are equipped with containers of urea and that an infrastructure is build up for refilling of urea at gas stations in all countries. This leads to both weight and cost disadvantages.

The Varivent technology, which Haldex now has acquired, has shown unsurpassed advantages when applied to EGR engines; both regarding NO_x levels and particle emissions and at the same time fuel consumption is reduced.

Prototypes will now be built and field and life tests carried out during 2004/2005. Introductory contacts have already been taken with several manufacturers of trucks and diesel engines.

With the acquisition of the Varivent technology, Haldex has further strengthened its product offerings to manufacturers of diesel engines: Haldex is since long the world leader of advanced spring wire products for engines (with applications for valve springs, piston rings, etc.) and has a leading position regarding hydraulic fuel transfer pumps and hydraulic systems for cooling fans. In cooperation with Alfa Laval, a hydraulically driven centrifugal separator system (Alfdex) has been developed to clean the oil mist from crank case ventilation gases in diesel engines. With the Varivent technology, Haldex will also be able to offer a fuel efficient NO_x cleaning system.

Haldex (www.haldex.com) is a vehicle technology company with proprietary systems and products for applications in the areas of vehicle dynamics & motion control, performance & safety, and fuel & environmental efficiency. The product range includes brake systems for heavy vehicles, power systems for off-road vehicles, four-wheel-drive systems for light vehicles, and specialty spring wire products for combustion engines.

Varivent Innovations AB (www.varivent.se) operates from the Stockholm Technology Park – Teknikhöjden. The technology originates from research at KTH, the Royal Institute of Technology, at the Combustion Engine Technology institution.

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