



Future Will Be Cheaper, Greener For Trucks, Buses and Other Heavy-Duty Vehicles

*New study predicts significant increase in cleaner engines,
hybrid technology and self-shifting transmission by 2020*

March 7, 2005 (Cambridge, MA) – TIAX, a leading collaborative product and technology development firm, and Global Insight, the world’s foremost industry forecasting firm, today released a study predicting vast changes in the powertrains of trucks, buses, and other large vehicles by 2020. The research indicates that new developments will result in engines that are simultaneously cleaner and more efficient. The study also predicts the greater use of self-shifting transmissions and hybrid heavy-duty vehicles.

The study, "The Future of Heavy-Duty Powertrains," is the first comprehensive analysis of the heavy-duty powertrain – the term used to describe the various engine and transmission technologies that power large vehicles. This special study was commissioned by a group of oil companies, engine and vehicle manufacturers, and component suppliers to investigate the impact of more stringent emissions regulations, increased traffic congestion, and a shortage of skilled drivers for large vehicles on the heavy-duty vehicle industry in North America, Europe, and Japan.

“Heavy-duty powertrains will undergo a revolution over the next 15 years,” said J.R Linna, Principal in the Automotive Unit at TIAX. “Not only will the technical advances be remarkable but the pace of change will be so rapid that some of the technologies that are currently being deployed will be obsolete by 2020.”

Key findings of the report include:

- **A new kind of engine technology -- Homogeneous Charge Compression Ignition (HCCI)--will power nearly 40 percent of heavy-duty vehicles by 2020.** HCCI engines offer high efficiency and low emissions. Unlike the traditional Diesel engine, HCCI emits almost no emissions of nitrogen oxides into the air. Nitrogen oxides are responsible for the creation of ozone, which can be harmful at ground level. Initially HCCI will only be able to power light loads at low speeds so early versions of the engine will also incorporate a conventional Diesel system to supply more power when greater demand is placed on the engine. A full-mode HCCI engine that can meet all the demands placed on it by heavy-duty vehicles will eventually supersede the mixed-mode HCCI/Diesel technology. This finding is particularly significant in that the exhaust-gas treatment systems currently being developed and expected to reach the market in the next few years will start to become obsolete by 2020.
- **By 2020, 15-25% of heavy-duty vehicles globally will incorporate either hybrid electric or hydraulic hybrid technology.** The rapid deployment of hybrid technology in the heavy-duty vehicle industry can partly be attributed to the fact that commercial

vehicle operators have regularly scheduled routes and can therefore accurately calculate how much money they will save on fuel and brake maintenance by investing in the more fuel-efficient hybrid vehicles.

- **The demand for self-shifting transmission technology in heavy-duty vehicles will increase dramatically over the next 15 years.** Because of increasing traffic congestion, concerns about the rising cost of fuel, and greater sensitivity to maintenance costs, a significant number of heavy-duty vehicles will feature self-shifting transmissions that maximize fuel efficiency. Additionally, the use of self-shifting transmissions will broaden the labor pool from which drivers can be recruited because trucks with automated or automatic transmissions are easier to drive.

“This study produced several unexpected findings, in particular that the HCCI engine will form a significant portion of the market by 2020,” said Phil Gott, Director, Automotive Consulting at Global Insight. “There are many exciting innovations on the horizon and we believe that ultimately these new powertrain technologies will be implemented not because of government intervention, but rather because of the cost effectiveness and tangible business benefits that they will provide.”

The report’s conclusions were reached using a step-by-step objective study of the projected market for powertrain technology. Factors such as the availability of crude oil, probable technical developments, predictions of emission control legislation, and the financial impact of new technologies on vehicle costs were all analyzed. Discussions with industry experts and an analysis of future market conditions for each technology were undertaken to further refine the forecasts of the report.

For more information or to obtain a summary of the report, contact TIAX at www.tiaxllc.com or Global Insight at www.globalinsight.com/powertrain.

About TIAX LLC

TIAX LLC (pronounced Ty-ax) is a leading collaborative product and technology development firm that accelerates innovation to help its clients create an impact in the market—and in people’s lives. We integrate business, industry, and hands-on technology expertise to transform ideas into products and problems into solutions. Formed out of Arthur D. Little's Technology & Innovation business, TIAX (www.tiaxllc.com) builds on more than a century of breakthrough innovation and client success using collaborative R&D. TIAX was selected as a Technology Pioneer 2003 by the World Economic Forum and is ISO 9001 certified with more than 50 research and development laboratories.

About Global Insight, Inc. (<http://www.globalinsight.com/>) is a privately held company formed to bring together the two most respected economic and financial information companies in the world, DRI and WEFA. Global Insight provides the most comprehensive economic and financial coverage of countries, regions, industries and markets available to support planning and decision-making. The company has over 3,800 clients in industry, finance and government with

revenues in excess of \$80 million, over 600 employees and 23 offices in 12 countries covering North and South America, Europe, Africa, the Middle East and Asia.

Global Insight's Automotive Group provides vehicle and component manufacturers, and others involved with the automotive industry worldwide with the expertise necessary for the development of their product and business strategies. The Automotive Group consists of 53 dedicated automotive experts with credentials in engineering, finance, marketing, sales, product strategy, and market research, with access to the over 300 Global Insight analysts worldwide. This multi-lingual, multi-national team understands the forces at play — market, product, technology, economic, financial, trade, transportation, energy, regulatory, demographic, and political — and the ways they interact to influence automotive industry growth and market opportunities.

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