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Position paper

Moving forward in an attractive market.

The rail technology market has lost none of its appeal. According to recent studies it can still expect growth in many areas over the years ahead. Rail-bound transportation will remain—especially following the anticipated recovery in the world economy—a key cost-effective and eco-friendly mode of conveyance for many types of goods while offering sustainable long-term passenger transport options in the efforts to address growing mobility needs. Experts reckon that the rail technology market will expand by an annual average of 2.5 percent.

So, where do we stand in this market? How has Vossloh coped with the challenges of the past year? What signals are we setting for the time ahead? This position paper is designed to provide answers.

Vossloh concentrates on promising submarkets. We are investing in existing and new production plants. We are expanding our R&D activities and we are extending our product range in line with requirements we have identified in our markets, where expedient through judicious acquisitions.

For a broadly based rail technology group, the rising demand for green, safe and economical modes of mobility for passengers and freight opens up good prospects. In spite of the economic crisis and ever fiercer competitive pressure we will therefore continue to grow, organically, too.

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Growth through increasing need for mobility

The worldwide availability of goods and services is a factor that governs our global economic system. While more than half of the world's population lives in cities or in conurbations, living, working and recreating are moving further apart for more and more people. Globalization and urbanization are two of the key drivers of the ever greater demand for mobility.

Yet mobility must fit in with societal trends and use limited resources sparingly. Climate change and finite fossil fuels call for greater energy efficiency, now the key argument in investment decisions and thus the driving force behind technological progress. Intelligently mated with other modes of mobility, public transport can make a major contribution to tackling these challenges while pressing home its advantages. Rail-bound transport is economical and environment-friendly, safer than other means of transportation and its infrastructure consumes relatively little space.

Mobility must be socially acceptable and use resources sparingly

In freight transportation, movement by rail always makes economic sense where heavy loads and large volumes are hauled over long distances—such as ore from the mining regions of Brazil and Australia to the exporting ports or coal, steel and bulk commodities right across Europe, North America, Russia or China.

In passenger transportation, rail systems offer sustainable long-term solutions for mass mobility. New railway lines can be built at lower cost, more quickly and on a smaller area than new roads of comparable transport capacity. Even in today's hostile economic climate many countries are therefore investing heavily in the development and expansion of rail networks for both long- and short-haul services. This applies especially to rapidly growing China but also to other emerging nations in Asia, the Middle East and North Africa, as well as South America.

In Europe, the well-developed rail network has long played an important role in passenger transportation. Energy costs and journey times determine the competitiveness of rail transport. Rail systems outscore through their lower energy consumption per passenger—with correspondingly low emissions. A light rail service operating every three

minutes can transport about seven times as many people as a dual-lane highway, for example, while the CO_2 emissions of a high-speed train per passenger are only about one-quarter of that of a car. The time factor is also crucial: high-speed trains on intercity routes with trip times of up to around 3.5 hours have become an attractive alternative to air travel worldwide.

Energy costs and journey times are the competitive factors

The Vossloh brand stands internationally for rail expertise that has matured over years, solutions that point the way ahead, and products that embody state-of-the-art technology. Vossloh is continually broadening its range of products and services.

Infrastructure products from Vossloh: on track worldwide

Durability, superior safety, low operating costs: these are the chief requirements which rail infrastructure has to meet. Vossloh is a world-leading manufacturer of rail fastening and switch systems. In both segments the company with its comprehensive lineup is an established all-in supplier for every type of operation and application—from light-rail via heavy-haul to high-speed.

Low life-cycle costs improve rail transport efficiency. Numerous operators of (sub)urban, regional and long-haul rail services around the world therefore opt for Vossloh's maintenance-free rail fastening systems.

Established as an all-in supplier

VosMat Rapid

The newly developed VosMat Rapid tool enables the automated and thus even quicker installation of rail fasteners, trimming the installation time by around 40 percent.

Vossloh's switch monitoring systems extend switch and turnout maintenance intervals, thus lengthening track availability. A remote diagnosis system scrutinizes correct switch functioning based on a large number of continually measured parameters such as power consumption, vibration or cushioning. Thanks to continuous real-time analysis of switch condition the need for routine on-site inspections, for which rail traffic would, of course, have to be suspended, can largely be eliminated—an advantage especially on busy routes. The early remedying of minor irregularities helps to prevent greater damage and thus disruption to services.

For regions without complete signaling systems Vossloh can—since the takeover of US signaling technology manufacturer Global Rail Systems in October 2009—market a product which is both effective and low in cost. The patented FAS-PAS system has already been installed on several Class 1 freight railroads. On single-track lines with turnouts, it enables the automated actuation of switches from the moving train. The system's cost is usually recouped after just six months' operation.

Vossloh fitting out railway lines worldwide

Vossloh's rail infrastructure products are held in high esteem as emphasized by the numerous contracts awarded for the equipping of rail networks, both new and existing.

For instance, Vossloh has supplied the rail fasteners for what is currently the world's fastest rail service, the high-speed line from Wuhan to Guangzhou in China, inaugurated at the end of 2009. The average speed on the over 1,000-kilometer rail link, almost two-thirds of which runs on bridges or through tunnels, is 350 km/h.

Another two major local transport projects in the Middle East are relying on Vossloh products: the new metro systems in Mecca, Saudi Arabia, and in Dubai, United Arab Emirates. The 18-km line of the Mecca metro connects the most important stops for Muslim pilgrims on their hajj. When the metro reaches its full capacity in 2011, it will transport up to 72,000 pilgrims an hour in either direction. Vossloh is producing over 170 switch systems for the Dubai metro, which at 76 kilometers is the world's longest fully automated rail network.

The first section went into operation in September 2009. In addition, Vossloh is supplying rail fasteners for Dubai's Al-Sufouh tram, the first of its kind on the Arabian Peninsula.

Rail fasteners for presently the world's fastest railway line

Metro Dubai (left), high-speed Wuhan–Guangzhou line (right)

Currently the largest rail project in Malaysia is the double-track upgrade of the 300-km line from Ipoh to Padang Besar and the 110-km link from Seremban to Gemas. Vossloh is not only supplying around 600 switches but is also in charge of their pre-assembly and on-line installation. All the switches will have Vossloh's fasteners. For the Kedah Line, an important section of the Ipoh–Padang Besar route, Vossloh is furnishing some 600,000 sets of concrete sleepers with rail fasteners.

When Vossloh delivered switches with movable crossings for the new high-speed rail link from Perpignan in France to Figueras in Spain, its SURVAIG NG remote diagnosis system was installed together with the switches on a high-speed line for the first time. NG stands for "new generation"; its predecessors had already proved effective on other high-speed routes.

Turkey, which plays a key role as a connecting link between Europe and Asia, has also decided to equip its new high-speed lines with Vossloh switches and rail fasteners. The latter are being manufactured locally, at the Vossloh plant in Erzincan, which was expanded in March 2009 and now turns out annually some eight million tension clamps.

SURVAIG NG remote diagnosis system

Joining the Group: Vossloh Rail Services

Rail services added

Vossloh buttressed its rail infrastructure expertise in early 2010 by setting up the new Rail Services business unit. The companies acquired specialize in the welding and preventive maintenance of rails as well as in complex rail logistics solutions. They command a range of state-of-the art technology for rail welding to exacting standards. Lengths of steel in all standard profiles are welded into rails measuring up to 360 meters in length.

A working speed of 80 km/h is the most important benefit of an innovative, patented high-speed grinding technique enabling rails to be maintained without the need to suspend rail traffic. Preventive grinding eliminates wheel contact damage and rail gouging, and reduces rollover noise while ensuring the constantly good quality and safety of the track infrastructure, whose service life is greatly increased as a result. Currently active mainly in Germany, the new Vossloh Rail Services unit is training its sights on the international market.

Rail infrastructure expertise expanded

Vossloh vehicles: adaptable and energy-efficient

Rail vehicles usually run on for decades. Decisions to invest in them therefore have to be made carefully. The unabated need for locomotives with an I.C. engine coupled with demand for concepts customized as far as possible, has prompted Vossloh to opt for a modular system. Freedom of choice for operators is the policy. It is they that decide on the type of driveline and performance as well as the weight and axle load of their personalized machines.

Freedom of choice is the overriding factor

G 6 (top, left), DE 18 (bottom, left), EURO 4000 (top, right) und EURO Light (bottom, right)

Downward-compatible components guarantee the supply of parts

An individual vehicle can be built to match every operating profile. To this end Vossloh is now seeking to supplement its product portfolio with shunting locomotives fitted with diesel-electric (DE) drive while lengthening its lineup in the medium-duty classes.

In the shape of its triple-axle shunting and industrial G 6 locomotive Vossloh unveiled the first product in the new modular locomotive series at Berlin's InnoTrans 2008. The compact G 6 is especially suited for negotiating tight track curves, typical at goods transshipment terminals. The G 6 achieves much greater traction and performance than any other vehicle in this market segment. One outstanding feature is its homologation for a maximum operating speed of 80 km/h and a travel speed when towed of 100 km/h. This makes the machine's relocation for maintenance purposes and to a variety of operating sites economically viable.

EURO 4000 in a winterized version

The compact G 6 is now to be followed by four-axle models in various capacities for shunting and mainline freight haulage. The locomotives are available with either a diesel-hydraulic or diesel-electric driveline and in three ratings: G 12 and DE 12 with up to 1,200 kW, and G 18 and DE 18 with 1,500 and 1,800 kW.

The diesel-electric drive for center-cab locomotives is a Vossloh development. For the frequency converters functional units have been developed with the simplest possible, unchanging interfaces. This means that the components remain downward compatible even with new developments and further advancements, enabling Vossloh to ensure the supply of replacement parts from current production for many years ahead.

The EURO Light locomotive is a medium-duty machine. This diesel-electric four-axle model has been specially designed for markets where axle loads are restricted to under 20 t. Vossloh's EURO 4000, fifty of which have already been sold, remains the most powerful diesel-electric locomotive in Europe. Available in freight haulage and passenger versions, there is even a winterized version for subzero climates. The EURO 4000 has already been or is set to be homologated for operation in Spain, Portugal, Sweden, Germany, the Netherlands, Norway, Belgium and France, with further countries to follow.

First complete Vossloh train is on the way

First complete train from Vossloh

The first complete train to be built by Vossloh is currently at the engineering stage and will represent a milestone in Vossloh's history. The vehicle is being built at the Valencia plant, with the electrical equipment coming from Vossloh Kiepe. This "Vossloh train" is to be deployed for the first time in early 2011 on the Manacor–Artá route on the Spanish resort island of Mallorca. In its train-tram role, it can operate on mainline and light rail infrastructures, functioning as a tram downtown and as a suburban or regional train uptown and outside the city.

Where no tracks are available for LRV and tram systems, public transport usually comes in the form of buses. Diesel buses fitted with a series hybrid drive supplied by Vossloh are a cleaner and quieter means of conveyance.

The train-tram for Mallorca

The first series-production vehicles have been in regular operation in Luxembourg since mid-2009. These 24-meter double-articulated buses can accommodate up to 200 passengers. With the "hydrogen bus" project the electrical part of the hybrid drive is combined with fuel cells. The result is completely pollutant-free water vapor from the exhaust pipe. An initial model of this bus is to be unveiled at the 2010 World Hydrogen Conference in Essen.

Vossloh is also a world-leading supplier of electrical systems for trolleybuses which are power-fed from overhead lines. This means of transportation was in the spotlight most recently during the Winter Olympics in Vancouver, where vehicles equipped by Vossloh made a key contribution to the environment-friendly "green" games.

With an overhead line (catenary) length of some 300 kilometers, the Canadian city has one of the most extensive trolleybus networks in North America. The electricity driving the quietly operating buses is generated from hydroelectric power.

Trolleybuses are "zero-emission" vehicles from which a hybrid version can be created. This latter scores highly thanks to brake energy recovery, enabling even lower energy consumption and higher efficiency: with the stored energy the bus can thus run for short distances without an overhead line. These arguments certainly proved convincing for the city of Milan, which has ordered 20 such hybrids.

Hybrid bus (top, left), trolleybus (center, left), Tramlink (bottom, left), metro (top, right) and fuel-cell bus

Preferred partner

Services galore

Who better to consult about a rail vehicle than its own builder? This makes Vossloh the servicing partner of choice throughout a vehicle's lifetime. The Group is continually expanding its range of maintenance and upkeep services. From the supply of parts via maintenance programs to full-service packages for general inspections, various modules are available. Services for customers are also facilitated through a network of cooperation arrangements. For engine overhauls a partnership is in place with a major engine repairer. In France, Vossloh works closely with the French state-owned railway SNCF on the maintenance and upkeep of its locomotives. In Spain, ERION, a joint venture between Vossloh and RENFE, maintains and repairs all the diesel-electric long-haul locomotives which Vossloh has built for the state-run rail company.

Tram maintenance work

Orange Line in Philadelphia (top, right), LPG engine for remotorizing locomotives

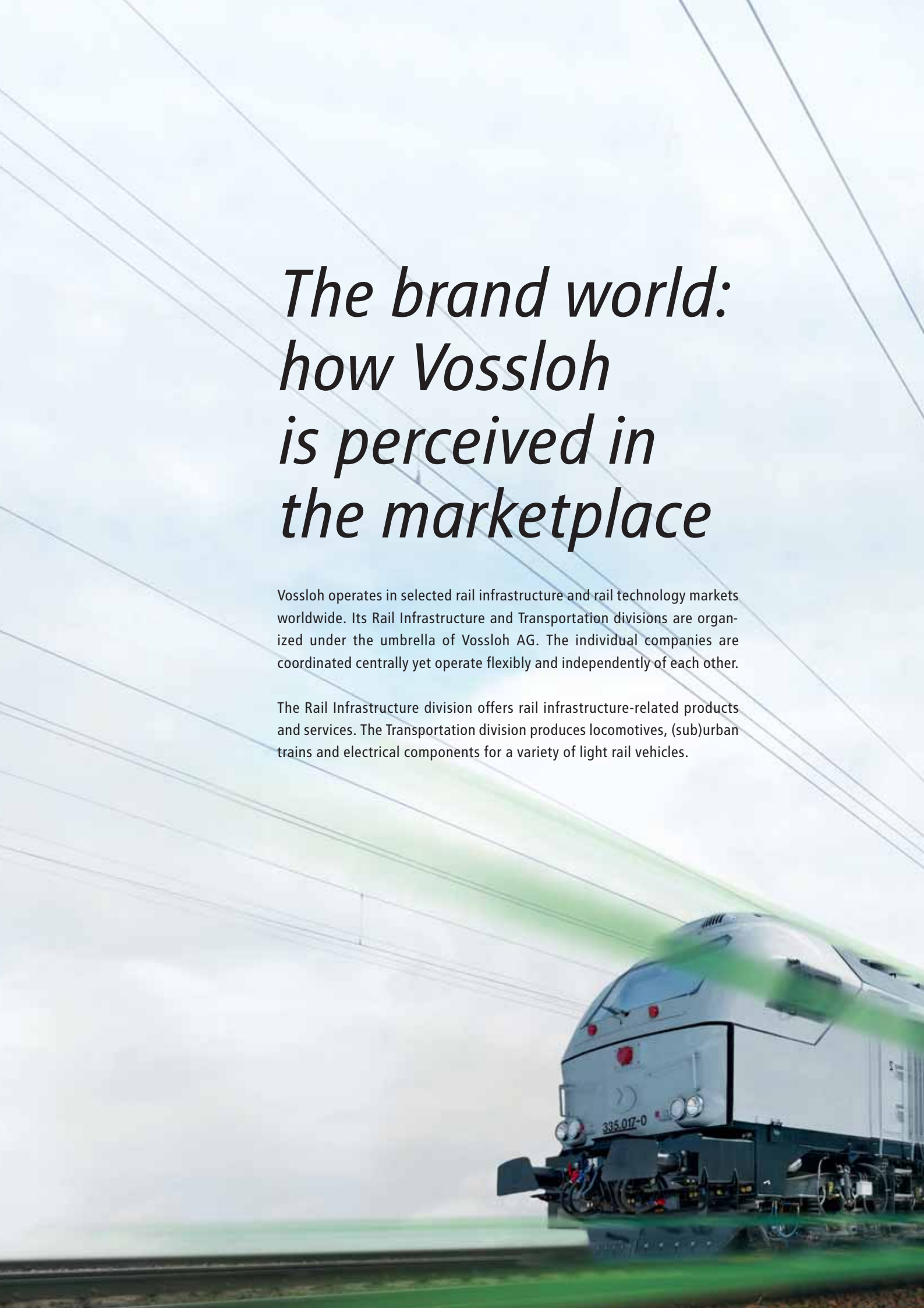
Refurbishing vehicles is an attractive alternative to purchasing new models not only when funds are tight. Vossloh has therefore been intent on developing and widening the relevant in-house expertise for many years. Vossloh specialists are currently renewing the inner workings of 15-year-old low-floor railcars belonging to tram operator Bremer Strassenbahn AG and installing modern drive technology in the 25-year-old vehicles of the famous Orange Line of the Southeastern Pennsylvania Transportation Authority (SEPTA) in Philadelphia. Fitted with Vossloh's new heating, ventilation and air-conditioning systems, even trams that have seen use for more than three decades can again offer passengers a cozy level of comfort. This is demonstrated by the revamped vehicles now running in the Turkish cities of Istanbul and Gaziantep and which originally operated in Cologne and Frankfurt/Main.

Remotorizing diesel locomotives is another topic of interest. In this field Vossloh is developing an environment-friendly engine together with Greencar Consult. Standard diesel engines used in locomotive building and from established producers are taken and then converted to operation on liquefied gas (LPG) while retaining their rated speed and capacity, giving rise to a cleaner and quieter alternative to the diesel engine. The LPG engine consumes less, thus reducing the operator's costs. CO_2 emissions are about 15 percent lower than from a like-for-like diesel version, with particulate emissions negligible even compared with the cleanest diesel.

The brand world: how Vossloh is perceived in the marketplace

Vossloh operates in selected rail infrastructure and rail technology markets worldwide. Its Rail Infrastructure and Transportation divisions are organized under the umbrella of Vossloh AG. The individual companies are coordinated centrally yet operate flexibly and independently of each other.

The Rail Infrastructure division offers rail infrastructure-related products and services. The Transportation division produces locomotives, (sub)urban trains and electrical components for a variety of light rail vehicles.



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Fastening Systems

Vossloh Fastening Systems is a leading supplier of rail fastening systems for all types of operation, from light-rail via heavy-haul to high-speed.

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Locomotives

Together with Vossloh Rail Vehicles, Vossloh Locomotives is Europe's foremost supplier of diesel locomotives. The Kiel location offers diesel-electric and diesel-hydraulic locomotives including comprehensive maintenance and servicing work.

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COGIFER

Vossloh COGIFER is the world's second-biggest rail switch manufacturer and equips rail networks with switches and turnouts as well as control and monitoring systems. Here, too, the range reaches from light-rail to high-speed.

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Rail Vehicles

Besides powerful diesel-electric locomotives, Vossloh Rail Vehicles builds innovative (sub)urban trains for a variety of applications. The lineup also includes extensive services and bogies.

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Rail Services

Since January 1, 2010, a part of the Group, Vossloh Rail Services provides a complete package of rail services including, in particular, rail welding and preventive maintenance plus the related complex logistics.

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KIEPE

Vossloh KIEPE equips light rail vehicles and locomotives with electrical systems. It is also the worldwide leader in electrical systems for trolleybuses. Besides these complete kits, the range covers air conditioners, refurbishment work, servicing, components, and subassemblies.

www.vossloh.com

Vossloh AG · Vosslohstr. 4 · 58791 Werdohl · Mail: Postfach 1860 · 58778 Werdohl · Germany · Phone (+49-2392) 52-0 · Fax (+49-2392) 52-219