

Press release

LiCAS passes test successfully

A consortium consisting of Liebherr-Transportation Systems, Newcastle University and Grand Central has developed an active radial steering suspension system called “LiCAS” (Liebherr Controlled Axle Steering) that has successfully concluded its initial field test phase: the system reduces the wear of tracks and wheels considerably. The project was funded by the Rail Safety and Standards Board UK within the vehicle dynamics competition for innovation funds.

Korneuburg (Austria), September 2021 – Liebherr-Transportation Systems, in association with their consortium partners, the UK rail company Grand Central (part of Arriva Group) and NewRail (Centre for Railway Research at Newcastle University), conducted the initial testing of the LiCAS demonstrator. The aim was to demonstrate that LiCAS could protect the infrastructure, i.e. that wear of track and wheels can be significantly reduced compared to that of conventional suspension systems. Rail transport operators can thus save money on track fees per kilometer (such as those charged in Switzerland and in the UK), as well as on operating and maintenance costs, as the maintenance intervals of wheels can be extended.

A BT10 bogie on a Mark 3 coach from Grand Central was equipped with the active radial steering system. The test runs on the 18 mile Weardale Railway, in the UK, fully confirmed the expected positive impact of LiCAS on the behaviour of the bogie, as it was previously determined by multi-body modelling and simulation work.

In particular, it has been demonstrated that LiCAS considerably reduces the so-called “angle of attack”, even in the narrowest of curves. This means that wear of the wheel and rail would be significantly reduced in the relevant curves with low radii, and sections of railway with switches and crossings undergo significantly less mechanical stress. The simulations and test results showed that, depending on the curve radius, the contact patch frictional energy, $T\gamma$, which is a relevant wear indicator, is reduced by at least 50 % on bogies equipped with the active radial suspension system. This means that, in addition to protecting the infrastructure, the wheelset maintenance intervals can be extended by up to 30 % and, depending on regulation for specific railway networks in each country, a significant reduction in fees per kilometre travelled can be attained.

The core of LiCAS is a compact, hydraulic actuator that has the same size and shape as a conventional swing arm bush and can therefore be integrated in many bogies currently in use. In addition, one hydraulic supply unit with integrated electronics per bogie is required for the system.

“In comparison to any passive control system available today, our active system is much more effective, since it can be optimally adapted to the individual curve radius and the different regional track-wheel geometry of the tracks”, explains Paul Hofbauer, Product Manager Hydraulics at Liebherr-Transportation Systems.

About Liebherr-Transportation Systems

Liebherr's transportation systems division supplies cab and saloon heating, ventilation and air conditioning (HVAC) systems, thermal management systems for diverse mobile and stationary e-mobility applications, hydraulic actuation systems, dampers and hydraulic load levelling equipment for rail vehicles of all kinds. Liebherr has many years of experience in the development, manufacture, and field service of these technologies, offering support throughout the entire product lifecycle. The company invests continuously in its R&D activities in order to offer its customers new generations of diverse transportation systems solutions.

Liebherr-Transportation Systems has four production plants in Korneuburg (Austria), Marica (Bulgaria), Pinghu (China) and Zhuji (China). In addition to its own sales and service centers, the division has access to the Liebherr Group's extensive and unique technologies as well as development and service facilities around the world. This global set-up means that Liebherr-Transportation Systems is there for its customers wherever they may be.

About the Liebherr Group

The Liebherr Group is a family-run technology company with a highly diversified product portfolio. The company is one of the largest construction equipment manufacturers in the world. It also provides high-quality and user-oriented products and services in a wide range of other areas. The Liebherr Group includes over 140 companies across all continents. In 2020, it employed around 48,000 staff and achieved combined revenues of over 10.3 billion euros. Liebherr was founded in Kirchdorf an der Iller in Southern Germany in 1949. Since then, the employees have been pursuing the goal of achieving continuous technological innovation, and bringing industry-leading solutions to its customers.

About Grand Central

Grand Central Railway Company Limited is an established train operator, which provides direct rail connections from towns and cities in Yorkshire and the North East England with London.

Customer satisfaction levels are consistently high and the rail company was named Britain's best value rail operator for the tenth time in the Spring 2020 National Rail Passenger Survey. In 2020, the same survey saw Grand Central rated overall best operator for customer satisfaction

Grand Central operates West Riding services between Bradford Interchange, Low Moor, Halifax, Brighouse, Mirfield, Wakefield Kirkgate, Pontefract Monkhill, Doncaster and London King's Cross. The rail operator also operates North East services between Sunderland, Hartlepool, Eaglescliffe, Northallerton, Thirsk, York and London King's Cross.

Grand Central is part of the Arriva group. Arriva is one of the leading providers of passenger transport in Europe, employing over 53,000 people and delivering 2 billion passenger journeys a year across 14 European countries. We are part of Deutsche Bahn (DB), one of the world's leading passenger and logistics companies, and are responsible for DB's regional passenger transport services outside Germany.

About Newcastle University

Newcastle University is a member of the elite Russell Group, an association of the top 24 leading research-intensive UK universities. It has one of the largest EU research portfolios in the UK and performs globally significant research across a wide range of disciplines and locations.

NewRail, the Newcastle Centre for Railway Research, acts as an interface between rail industry and academia, focusing on railway research activities across Europe, and undertakes university research that is of relevance to the rail industry. The centre delivers quality research to meet the complex technological and managerial challenges and needs of the rail and transport industry, regulators, operators and customers.

NewRail also represents Newcastle University in the recently established UK Rail Research and Innovation Network (UKRRIN). Newcastle University is a founding member of UKRRIN, which was designed to create powerful collaboration between academia and industry, aiming to provide a step-change in innovation in the sector and accelerate new technologies and products from research into market applications globally.

Image



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Test runs with LiCAS on a bogie were conducted on the 18 mile Weardale Railway, in the UK. - © Liebherr

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