

## PRESS RELEASE

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Unusual Bridge Design Requires High Level Engineering

### **The Fortune Dragon on the Mystery Mountain**

**What a story! A coal mining waste dump between *Herten* and *Recklinghausen* is being recultivated to become a “mystery mountain” for the recreation of mankind. And up to its top leads a beautiful dragon bridge as if taken from a fairy tale – magically designed vibration free by GERB Engineers from Essen.**

With its unusual design, shaped like a dragon, the new pedestrian bridge is leading into the constantly growing nature resort *Emscherbruch*, rightfully called by its owners a piece of art. This refers according to Christoph Haep, project leader of the *Regional Organisation Ruhr (RVR)*, not only to the architecture but also to the hidden high level engineering. The 165 m long steel structure is shaped at its end like a long stretched neck with a dragon head at its tip, looking towards the approaching visitors of the coal mining waste dump *Hoheward*. At the same time the engineers of GERB Vibration Control Systems in their Essen office took care - guaranteed! - that the head – weight 1.500 kg - will stay nearly motionless even in stormy conditions.

#### **Unusual Trip to the Coal Mining Waste Dump *Hoheward***

Today there is just a nearly invisible seam between the two parts of the bridge - each about 60 t - connected on site. One would not estimate this weight when looking at the filigree structure. Already since autumn last year it meanders smoothly on a slightly climbing path between the *Recklinghausen* suburb *Hochlarmark* and the waste dump *Hoheward*. With pillars looking like pairs of legs and deep red coloured ribs fixed vertically at different height levels to the web plates of the bridge a picture of a mystery creature from ancient times develops. Apparently unimpressed by the heavy traffic below it crosses calmly the *Cranger Street*. The illusion becomes perfect after the dragon head was mounted to the 12 m long neck's end.

## Exciting Story of the Dragon Genesis

The civil engineers in the office of dragon father *Ralf Wörzberger* had started early to think about the possibility of wind induced vibrations in this tall and filigree steel structure with its dragon like scales on its neck. They asked, therefore, the “experts for not desirable motion”, the engineers of GERB Vibration Control Systems in their Essen office, for help. With their unique knowledge and modern computer technology project leader Oliver Dressen and his GERB team started to work on the dragon problem. The results of their dynamic analysis of the dragon confirmed what people had already assumed. Without special measures the dragon “ would shake its head” , the neck would move laterally and the whole animal would start nodding equally in vertical and horizontal direction under wind excitation because of the unusual geometrical shape and the low system damping in the steel structure. High winds might increase the dragon’s motion and people might not like that too much when crossing this bridge.

## High Level Engineering in limited Space

Centre of all motion was obviously the throat of the dragon where all vibration modes would meet. That became the place to take the countermeasures to solve the vibration problems, a very limited space to do so, since the bent tube segment of the dragon neck was only 57 cm in diameter. In only 5 months the GERB specialists developed, designed and built a novel TMD beyond all existing standards. This extremely compact, spherically shaped TMD was improved in its properties by added-in dampers parallel to the TMD, damping the motion of the TMD itself on one hand and increasing the effective frequency range of the TMD on the other. This was important since the whole design was based on calculated natural frequencies only. Minor deviations in reality from the calculated figures can never be excluded and even certain subsequent shifts in the natural frequencies caused by ice and snow loads can be compensated in this way without reducing the efficiency of the TMD significantly. Wind excited motion of the dragon neck, for example, amplified by resonance will be reduced by 70 %, no matter how strong the winds may be.

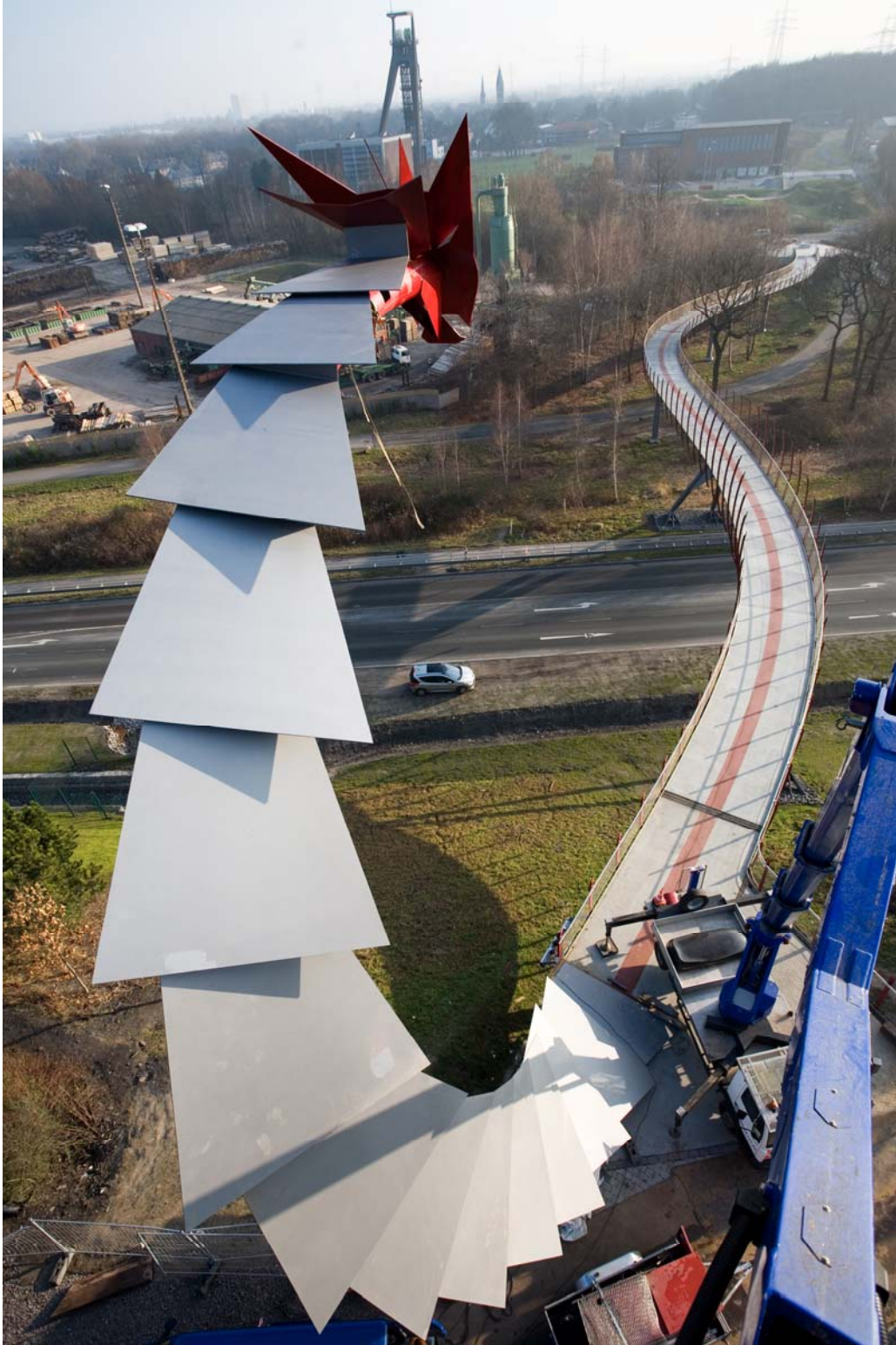


## Long awaited Inauguration

Design and construction of the TMD stayed exactly in the calculated time frame. On December 11, 2007 a big crane heaved the head into its position. The TMD had already been shop mounted into the neck where it can be maintained in the future through two gill like openings. Its life time will be at least that of a dragon, even when taking into account that this dragon is made of steel.

The new entrance to this local park for recreation, costing 1.5 million Euro, sponsored by the local government and the EU, because of its special importance for the recultivation of this 160 ha wide area around the former coal mine *Ewald*, was officially opened to the public in February 2008 when Heinz-Dieter Klink, Director of the RVR said: "The dragon bridge is a truly worthy entrance to the former coal mining waste dump *Hoheward*, now the recreational park *Emscherbruch*." This park shall provide a new horizon not only for recreation but for science and culture as well. It will become part of the so called *Route of Industrial Culture* with all the important monuments of the industry in the metropolis *Ruhr*. Investments of the RVR in this park are enormous. Over the last 2 years already the Northern and Eastern flanks of the waste dump were reshaped and developed for leisure and recreation on several levels. First sections were already opened to the public in 2006. At the end of 2008 a horizon observatory will become the main attraction, 152 m above sea level and with a 100 m diameter observation centre. To the East of the main dump plateau a small top has been finished already, where as a start into the horizon astronomy two years ago a more than 8 m high obelisk was erected as an indicator of the position of the sun. People from *Recklinghausen* will get there now under the watchful eyes of a stylised dragon adding a magic touch to the relaxing atmosphere of the country side park.

Picture 1



Picture 2

