

TESLA TECHNOLOGIES

---

BRIDGE **T** O **T** HE FUTURE

---

INNOVATIVE RAILWAY FASTENING SYSTEM

---

2019

# **Installation of an innovative railway fastening system**

## **Abstract**

Rolling stock safety and speed depend primarily on the state of the railway infrastructure on which they operate.

Railway tracks that are already laid or are under construction determine the safety, speed and weight limit parameters for rolling stock. Rails will deform and erode over a period of time, due to any anomalies during the construction phases, wear and tear from rail traffic, weather or natural disasters.

An Innovative Railway fastener will provide a technical solution that will improve existing railway infrastructure. Simple installation allows the rail to float in all directions, whilst maintaining the exact centre and gauge of the track.

This reduces deterioration of the rail infrastructure and increases useable lifetime. Existing lines can be overhauled with a single new fastener, in an efficient manner. Reducing capital investment costs drastically, whilst improving railway safety.

## **New Features of our Railway Fastener**

Scheduled maintenance of tracks is reduced, thereby increasing volumes of rail traffic. Offering increased safety and a smoother ride for passengers and freight.

Floating rail maintaining a precise profile to suit the rolling stock, environment and other aspects necessary.

Rails are completely insulated from the track installations, which reduces the level of vibration.

Any rail deformities are able to be efficiently and precisely removed.

innovative railway fastening system

Railway infrastructure will become easier to maintain, as the track lifespan increases.

Keywords: tracks, railway maintenance, innovative fastening, infrastructure.

### 1. Why installing the innovative railway couplings?



The tracks that were constructed and built are conditioned by the precision of the finished works. The columns have a deviation from the direction of the construction itself and the use of the track so that an innovative solution is necessary to centre the track path direction under the project.

The innovative railway coupling provides a reliable possibility of technical correction of the track of an already-built track so that the rails allow for a change of the position in all four directions to centre the track path direction by the project. This way the decay will be reduced and the period of using the track is more extended, apropos, the existing railroad tracks can be reconstructed with the replacement of existing couplings without additional expensive work, without changing the location of the setting or changing the thresholds.



## **2. An innovative solution provides new opportunities for existing solutions:**

1. The head of the rails moves in all four directions, at the location of the required track direction,
2. The innovative coupler can be stationary for years because it is providing the innovative technical solutions and additional fuse holders for track bolts, 100% secure,
3. The rails are entirely isolated from the rest of the track with an innovative rubber padding, which significantly prevents vibration transmission on the track construction and reduces noise,
4. Pointwise deformities on the track are eliminated precisely, efficiently and in time, thus maintaining and improving the project speed of the railway tracks,
5. By timely counting of the colossus its fewer collapses, the colossus have a longer lifespan,
6. With constant and precise maintenance of the track, a higher volume of transport is achieved, and driving is more comfortable with a centrally- oriented line.

## **3. Railway coupling**

Innovation which is presented here is a unique technical addition, an innovative railway coupling that can replace the position of the existing couplings on the threshold. The foundation of the innovativeness is that the built track can be further moved in all four directions, precisely laid out with the required track line position, which registers and measures, and then automatically repairs a special robotised train. This innovation reduces the decay; a railway lifespan is longer, and the existing railway lines can be reconstructed with the replacement of existing couplings without additional expensive work or changing the location of the rail setting.

The train moves through the track, which can be viewed as a point with a centre of gravity that corresponds to the total weight of the train, which is equal to the corresponding mass of locomotive wagons. On the movement of the vehicle, according to its weight and the speed of movement, various external

*innovative railway fastening system*

forces are acting, which then have a direct effect on the condition of the railway track, the colossus with the embankment. These forces are always moving in the direction of driving, with the natural forces of earthquake, landslides, floods, which have a negative impact on the project quality and durability of the built railway lines. If human factors are added when constructing a railway line, we obtain potential harmful actions with a reduced use value of already made railways. Additional destructive forces at the position of the railway line come from moving the rudder points, jamming the track under the vertical load due to the movement of the driver, the braking of the driver causing vibrations with the sliding of the points on the surface of the head of the rails.

Under the influence of the dynamic effects of the moving traffic load, the change of the position of the individual seedlings of the ditches in the embankment changes, thus exerting the drift in the space between the threshold and exerting itself in the tampon layer of the embankment, extending sideways beyond the embankment contour. The conclusion is that the design and built geometry of the railroad changes over time, the position of the rail changes in different positions and directions, the railways are failing and changing the original shape of the setting, thus directly reduces the utilisation value and usefulness of the railroad. The resulting changes, the deformation of the rails are precisely and very efficiently eliminated, entirely, at the time are sanitised by the use of this innovative solution.

So that the rails in the curve during the exploration are equally foamed, it is necessary that they are exposed to equal vertical pressures so that this solution provides their stability and the required angle settings. In this way, overloading of the outside rail is avoided, and its contact damage will be reduced, the risk of lateral displacement of the roller conveyed. Thus it directly reduces the cost of maintaining the track, especially in the curve, where the rails are most prone to damage.

The overhang of the outer rails in the curve must be projected, specified, so that the lateral acceleration affecting passengers is within the permissible limits. The comfort is, therefore, higher if a lateral acceleration

with the appropriate ramp position is made for a more extended period based on the projected travel speed. With this conceptual solution, it can be completely remodelled, in almost ideal project frames, placed in the required position of the wheelbarrow, for a more comfortable and quick ride in the curve.

The timely completion of the spatial longitudinal or railway track in the project line of the track is one of the cornerstones of this innovative solution with the tracking of the railways to the imaginary horizontal plane. Innovation is based on the timeline correction of the design axis of the railway line with an unlimited number of corrections, according to the time of decay due to the number of passage of freight or passenger trains followed by the required speed of their movement. Innovation provides the possibility of correcting breakpoints on the railways for the already built railway lines, irrespective of the position of the other rail or the slope, or possibly the lateral displacement of the railways due to use. The time of use of this conceptual solution is up to the time of physical decay, that is, the duration of the embankment with shuttles and rails, during which time we can use the ideal axis of the projected colossus, with the correction of the position of the head of the track in millimetres.

Rolling pulleys are being registered with a new special train at a time, and then shortcomings are corrected in time, using the technical method of this innovation. The direction is the essential element of the situational plan of the railway line since the resistance to movement is the smallest when the train is moving along the horizontal right path. With this innovation, the direction is idealised to the perfection with its lateral and vertical shifting of the rails, maintaining the ideal line of direction of the axis of the Colossus. Thus, railway lines get technical options for higher train speeds, centric and safe drive, without the lateral and vertical concussion and vibration. The correction may be done once in a few years, if necessary.

Additional plates, which would join together with the upper regulation pin 5 employing reciprocating breakthrough, similar to the joining of the leg cube, would be provided from the side discharge.

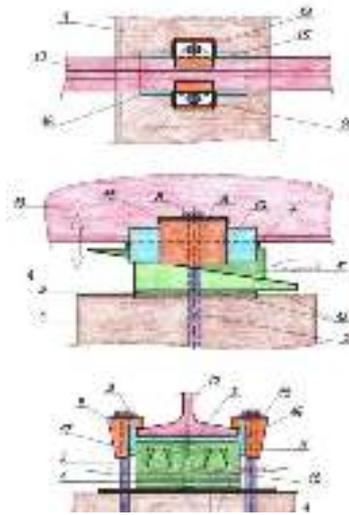
They would be applied to the appropriate extent on the track sections which would have an apparent defect, which would require more lifting of the rails 10. At such positions of preference, a unique extension of the lower underfloor plate would be provided with the support on the tracks to neutralise the increased lateral force or tension of the screws.

The aforementioned special train, which would move along the track of the Colossus, would serve to register and find the resulting deformities on the railways, to use this conceptual solution. Then, a well-known scanning technology of scanning metal deformities would be used, in addition to the scuffs

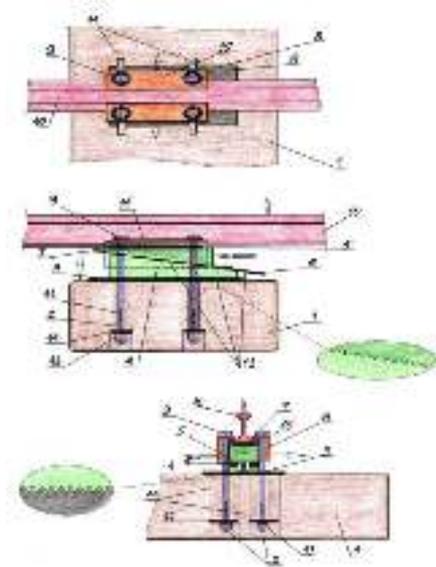
on the head of the rails. Additionally, fixed sideways along the track, placed outside the embankment, they would position the routing base for precise pre-design of the existing railway lines, would be a point of reference for every couple of hundred meters for the future accurate maintenance of the rail headline.

By means of using this innovation, the rails (10) are mutually interlocked with temporary metallic ranges to several tens of meters along the collar, and then the railway couplings will loosen. With the help of controlled mechanical force, the roller is moved lateral, fixed in place with the position of the undercut plates (3). Then, using the lower regulating pins (4) and the upper regulating pins (5), the rails (10) are spaced in equal spacing with a single point at multiple points. The slopes (10) are thus placed on the exact location of the projected line of the track, due to different forces and deformities, were temporarily lost and even improperly constructed. The new position of the Colossus with its built innovative railway couplings secures and holds the line sprockets (12) with the "I" profile (16). The innovative design of railway couplings (8) with the pedals (15) does not interfere with the working process; they are made by the regulating wedges (4) and (5). The attachment of the innovative coupling with the rail (1) is with the changed positions of the screws (2), where the head (9) of the pins is located on the pedal (15), while the lower bolts (13) on the underside (1), in a fixed position for the metal plates (14) in the slot (11) of the pile.

The rubber paddle (7) receives vibration from the train and further tightens the pins at its place. The screws (19) of the screws align with each other with the head (9) of the screws, making a solid connection so that the position of one and the other screws (2) remains stationary, thus preventing the possibility of unplanned undressing due to vibration.



**Figure 1.** Innovative railway coupling



**Figure 2.** Innovative railway coupling

#### 4. Railway coupling overview

##### 4.1 Technology overview (suggestion for solving a problem, what is used in the present world of technology, compared with benefits of our technology).

Currently are used railway couplings, which are fixed, they connect the rail rigidly with the threshold, with such position that the railroad structure with the head of the tracks is in dependence on the collapse of the embankment, the bogie has some deformities which affects on the quality of traffic and its durability.

innovative railway fastening system

Innovative railway couplings besides a secure fixed connection, also provide the possibility of adjusting and levelling the already-built track with the option of improving the rail about the threshold, to make the traffic faster and safer, while its designation provides an opportunity for the extended life of railroad.

#### **4.2 Technology features & specifications (why we think that this is an innovative solution).**

Railway coupling is an innovative solution because it provides the possibility of using couplings in the final stage of railway construction and correcting the resulting deformities during the construction of the railway, we level the position of the head of the rail at (1 mm).

We can set the whole colossal axis to a perfect and demanding project position.

With the use of this innovative solution, the head of the rails is perfectly maintained up to the fatigue of the material.

The part of the track has the required project tiles. That is, in the deformity of the embankment the head of the rails can be moved by height and lateral to the required position.

#### **4.3 Potential applications (possible application, alternative).**

It is applied in the construction and repair of the track, in such a way that the deformation of the path is reduced and neutralised, regardless of the number of passages and types of trains.

An alternative does not exist because innovation foresees for the first time a technical solution for the subsequent fine regulation of the head of the rail on which train is moving. A set of innovative solutions that are envisaged are quite sufficient to eliminate pointless deformities on the colossus by timely and simple rattling.

#### **4.4 Market trends and opportunities (what are the opportunities for investors, what we are looking for funding, what are the stakeholders (users), how far the market for this patent is and what expectations are to 2020 and 2030 year).**

Remains the question, if in the world was built more than 100.000 km and more so kilometres of railway lines is building, how many states will follow technology advancement and apply it. Logic implies possibility to utilise this

technology to be monitored by the states, which are owners and users of future fast lane, pleased to use them for future favourable and long-term maintenance.

The required finances will be used for project development and cooperation.

5. Customer benefits (why is good for users to choose our technology instead of others).

Convenient, practical and well-known design, easy and quick mounting.

Deformity occurs on weak spots in the construction of the Colossus, and cargo train composition affects such weak places continually increasing, while innovative joints are timely correct and revitalise by ripping.

Passenger trains, at high speeds, will have an idealised path on which they can move comfortably, with reduction of pressure and stroke on the colossus.

**5. For further replenishment, the following should be made to make the promotional material more completed:**

**5.1 Brief content, how this technology has resolved the problem and who will buy it.**

The tendency of the train speed will be constant over time track use, with increased speed and volume of transit traffic.

With using of innovative couplings, deformity of colossal on long-term almost doesn't exist.

The head of the rails receives less projected impacts, the rails and the gravel have an extended lifespan.

It is in the interest of every state in the world, which have tracks to improve railways, where the technology of new trains has progressed far beyond the rails that are moving.

With significant economic justification, the use of innovative rail couplings will keep pace with the future demands of all rail vehicles.

**5.2 What advantages does this technology possess?**

Security and safety in traffic. Long-lasting and high quality, the railway line can be maintained at a time.

### **5.3 In which segment of industry can be used.**

In the traffic, more precisely in the metal industry, services related to the construction of new ones, overhaul of existing ones and maintenance of the future railway lines.

### **5.4 Why this product will be attractive from the perspective of potential customers.**

Affordable for production, accessible, maintenance-friendly, required for security, it is a detailed solution for the maintenance and longevity of the colossal bulkhead.

### **5.5 By what is this technology better when it is compared to existing top technologies?**

It is unique by its imagination; the wheelbase can be moved sideways in both directions with independent adjustments of the head of the rail, up and down.

## **6. Based on the above points:**

### **6.1 Basic principles observed.**

The patent solution is commercially highly applied, which in itself provides the safest assumptions to invest in the development and standardisation of railway couplings.

### **6.2 System complete and qualified.**

The advanced technological process is conceptualised to the detail elaborated, it requires its practical application, and the integrity of the said and expected standardisation.

### **6.3 An actual system is proven in the operational environment.**

The railway coupling is by its imagination usable, commercially viable and will work and have their intended purpose.

Email: [info@trueteslatechnologies.com](mailto:info@trueteslatechnologies.com)

[www.trueteslatechnologies.com](http://www.trueteslatechnologies.com)

© TESLA TECHNOLOGIES Ltd