

## Driving Test of the EBECO Folding Trailer

Location of testing:	TATRA test course in Kopřivnice
Date of testing:	02/17/2011
Trailer data:	Freight trailer of the category O <sub>1</sub> (up to 750kg) Net weight: 180kg Total weight: 750kg Commercial name: WT1
Axles:	Type: GH7LV-723566
Tyres:	4.50-10C 76N B61 CARGO Maximum allowable tyre pressure: 4.25bar
Wheels:	350Bx10H2
Towing vehicle:	VW Touareg 3.0 TDI Kerb weight: 2,407kg Weight of fully occupied vehicle (4 persons): 2,750kg

### The purpose of executing the driving test:

Upon the development of new special semi-axles for the EBECO folding trailer the need to test them on a test course has arisen. The reason for testing lied in significant modifications to the semi-axles, necessary for them to adapt the designed folding kinematics, which resulted in the impossibility of using a verified standard design. After unfolding the trailer to the operating state, the position of the semi-axles is defined by a central beam. As the central beam prevents the folding of the semi-axles while driving, as well as defines the driving properties of the trailer (toe-in and wheel track) it was necessary to prove its design regarding to the special semi-axles construction, if it is able to transmit all loads affecting the trailer while driving, with sufficient safety. It was also needed to verify the individual nodal points of the trailer frame, if they are designed safely enough, particularly considering welded joints in critical spots of the frame.

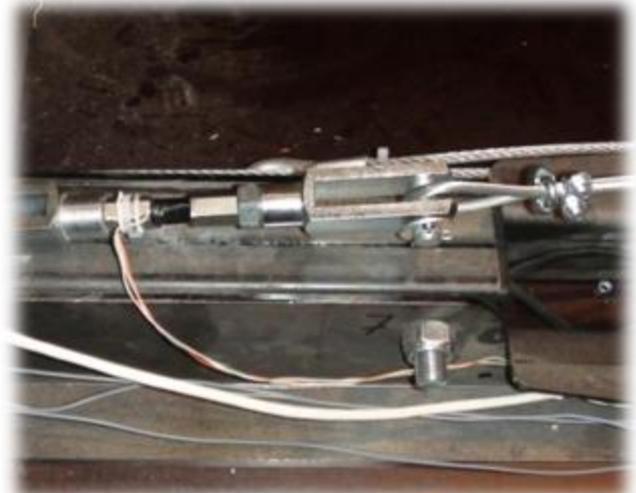


## EBECO trailer driving tests preparations:

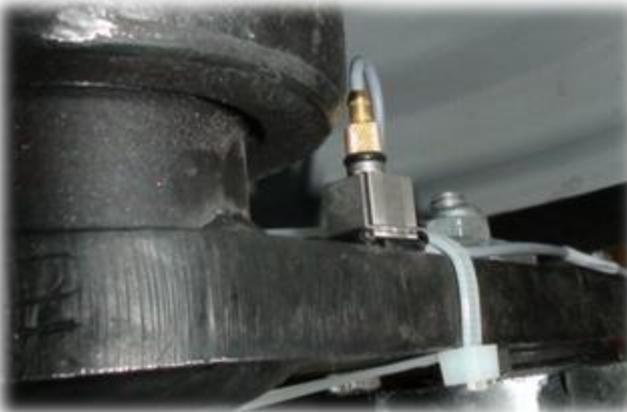
Based on the above mentioned facts, following methodology was chosen to verify the reliability of the EBECO trailer with KNOTT running gear components :

- Determining the magnitude of the axial force in the central beam between the semi-axes
- Determining the magnitude of the axial force in the wire rope that connects the central beam with the drawbar
- Determining the magnitude of the acceleration in a radial direction on the sprung arm of the semi-axle towards the acceleration on the trailer frame and the cross-beam strut
- Examination of the welded joints in critical spots of the trailer frame ;
- Examination of the trailer construction by driving with a 20% trailer overload (900kg total trailer weight)
- Evaluation of the semi-axle suspension wear

Three strain gauges were glued onto the central beam so that their position and connection method provided data collection of the force flow taking place in the brace during the drive. The axial force in the wire rope was measured with the help of specially made force gauge consisting of two strain gauges.



An accelerometer was attached to the semi-axle arm in a radial direction and its readouts were compared with the values of the accelerometer attached to the trailer frame in a close vicinity of the semi-axle arm.



The last accelerometer was installed onto the central beam in a radial direction and should examine the magnitude of the dynamic effects acting during the drive.

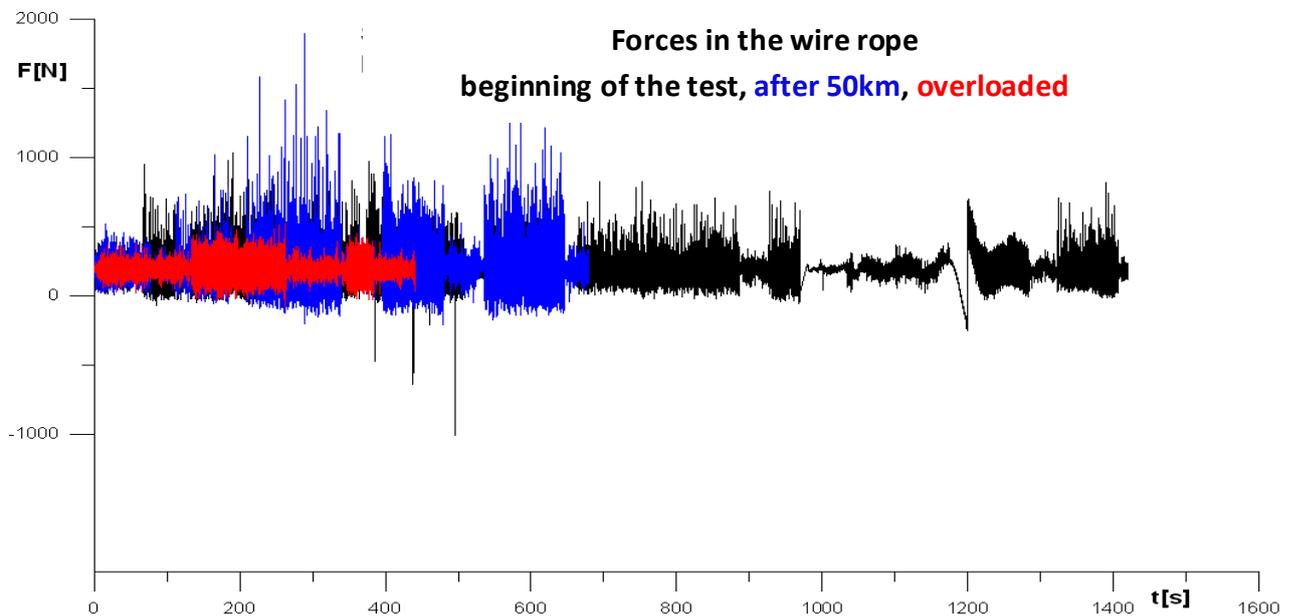
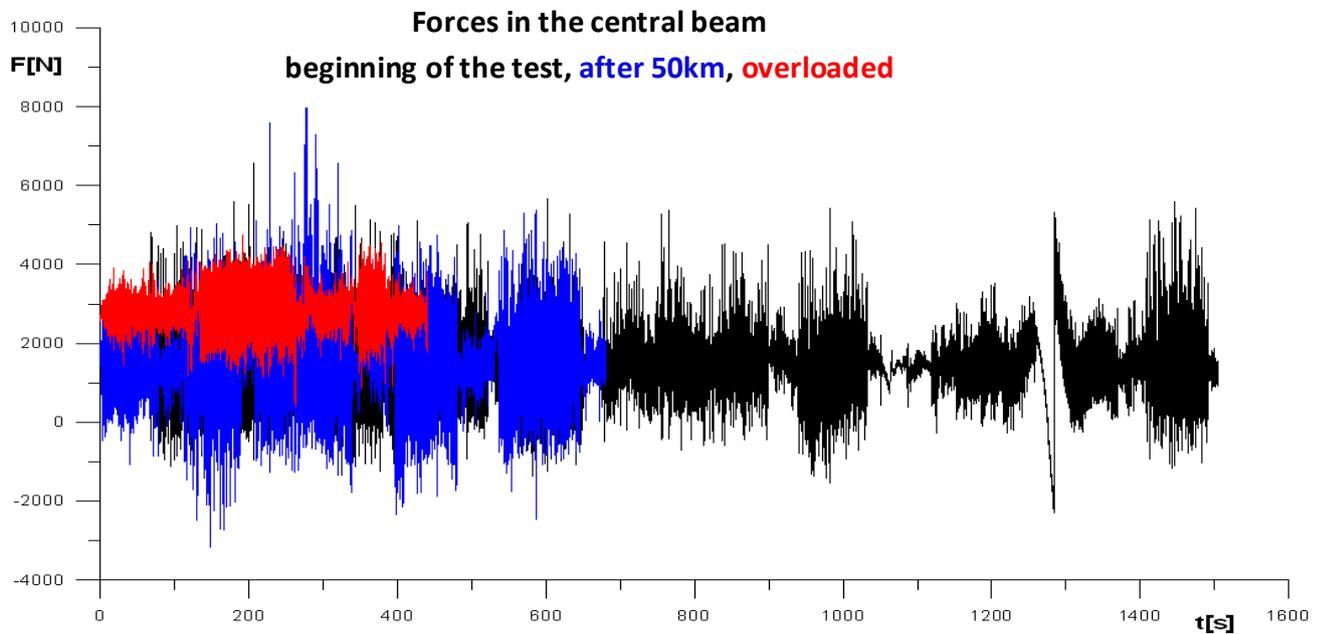
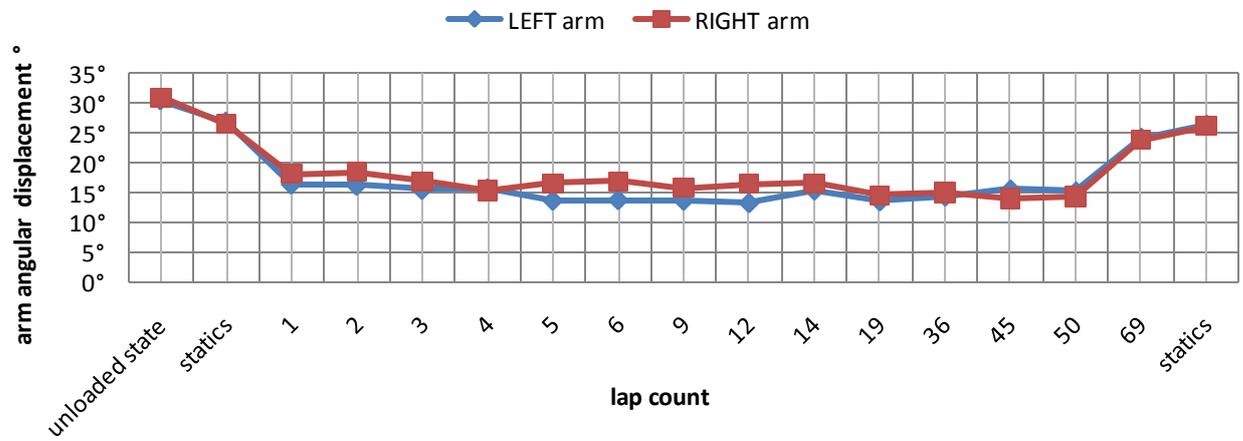
## Proposed driving regimes on the test course:

Driving regimes on the test course were suggested with consideration of the expected operational conditions of the trailer. Besides these driving regimes also short-time extreme loading regimes were chosen simulating reckless trailer treatment by which the dynamic effect rose significantly (loss of wheel contact with the road = jumping of the trailer). Following obstacles were chosen:



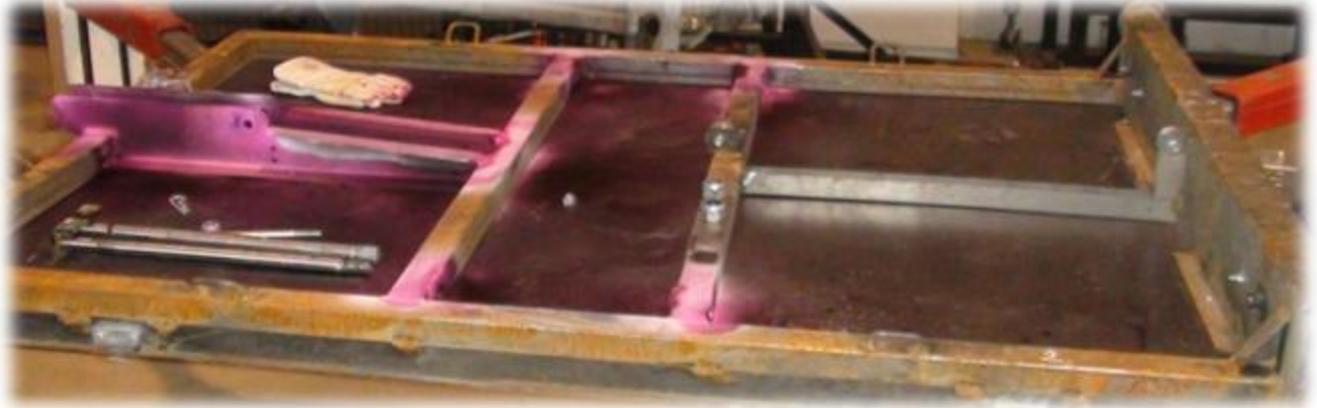
**Results of the driving test:**

**spring action of the semi-axle arms**



## Examination of the welded joints in critical spots of the trailer frame:

Creation of cracks was determined by special spray applied on welded joints. All the joints were intact after finishing the driving tests.



## Evaluation of the axle suspension wear:

After finishing the tests, the semi-axle arms were removed from the axle body and the spring silent-blocks were checked for damage (rupture due to overloading, rubber separation from metal parts of the silent-block). No damage was determined.



## Overall review of the EBECO trailer

Following all measurement results we state that the construction of the trailer running gear elements (KNOTT components) as well as the construction of the trailer body parts (EBECO components), fulfil the requirements defined by the trailer manufacturer and the trailer may be used up to the loading capacity of 750kg.

In Modraon March 14, 2011

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