



## Results of Tipper Test

For a long time the road transport industry has been asked; which negative effects an incorrect deployment of the load would have on the tipping stability of dumper trucks? The SOE (Society of Operations Engineers) investigated this in a test (IRTE Test) in 1992: The stability of dumper trucks and their chassis. For such a test procedure, certain guidelines were defined, however until now no results existed from different vehicle manufacturers, which had been subjected to such a test.

Fliegl Vehicle Manufacture put, in the beginning of May this year, a test facility into service, which would comply with the procedures of the IRTE test guidelines. So for the first time different dump trucks could be subjected to such a test and the results analysed.

Different **manufacturers** were invited to the tests. The following manufacturers subjected themselves to the test:

- Carnehl
- Fliegl
- Kempf
- Langendorf
- Reisch
- Schmitz

Three manufacturers, Meiller, Reisch and Schwarzmüller did not, for different inexplicable reasons, want to take part in the tests.

## Measurement Procedure

It was the goal to discover how a trough, during the tipping process, behaves on uneven ground. In order to establish proof for a stable tipping process, the dump trucks were subjected to different tests. In this the behaviour of, amongst others, the dumper and the frame were investigated – i.e. what happens to the trough with respect to its deforming? Which chassis versions help against this?

Using laser measurements, in the area of the king pin and the C axle, chassis warpage is measured. The measurement points were provided with a measurement table in a tabular measured distance of 2 mm.

The measurement points on the trailer were determined as follows:

- Chassis
- Chassis movement / frame twisting at the king pin and at the C axle
- C axle separated
- Rocker crank separated
- Lateral deflection of the troughs

**Image: Measurement Points**



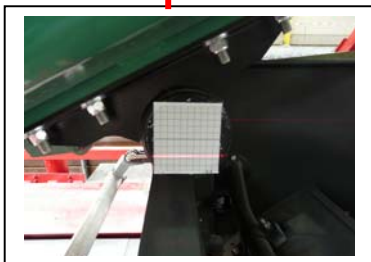
Measurement Point C Axle  
Chassis Warpage



Measurement Point Trough  
Deflection



Measurement Point King Pin



Measurement Point Tilting  
Bearing

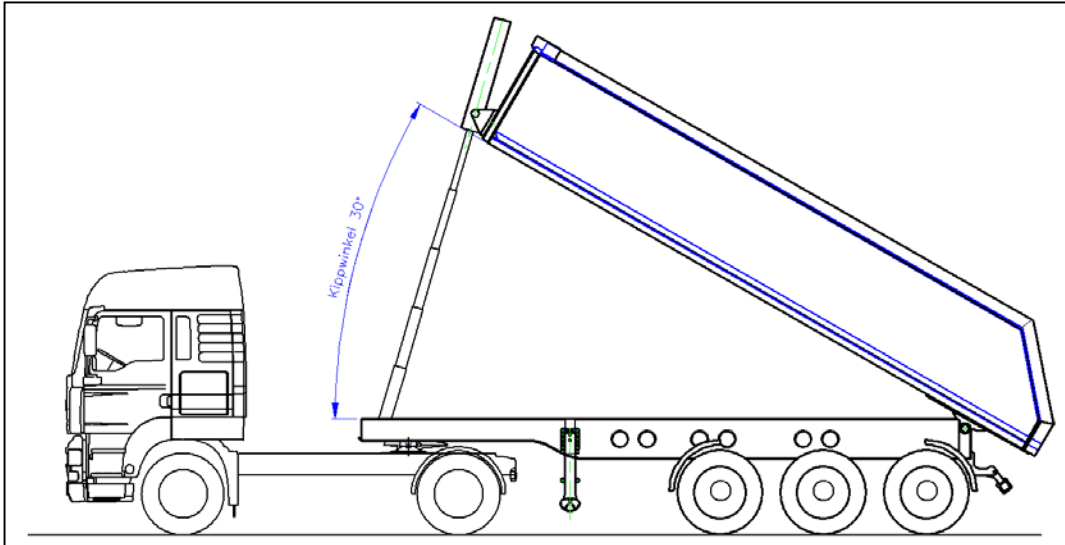


Measurement Point Chassis  
Warpage

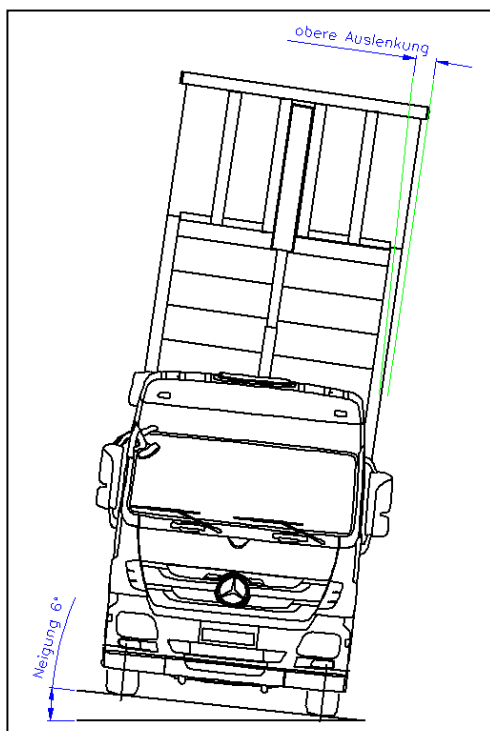
In total two different tests were carried out. It was important that all vehicles were subject to the same conditions. Each trough was loaded up to 25 tonnes. In the first test (see data sheet 1, measurements from 1 July 2008) the trough was first tipped to an angle of 30 degrees and then the vehicle was inclined to an angle of 6 degrees.

In the second test (see data sheet 2, measurements from 2 July 2008) the vehicle was first inclined to an angle of 6 degrees and then the trough was tipped to an angle of 30 degrees.

### Tip Angle 30 °



### Roadway Inclination 6 °



## Data and facts about the test and the test facility

### **Possible parameters with the test facility test facility**

Tip angle of the trough 47 °

Roadway inclination up to a maximum of 11,5 °

Total lorry weight up to 40 tonnes

Total load weight, independent of total lorry weight

Pneumatic suspension either lowered or raised up to maximum

### **Certified parameters with the**

Tip angle of the test facility 30 °

Roadway Inclination 6 °

Total lorry weight 37 tonnes

Load weight 25 tonnes

Pneumatic suspension on lorry and semi-trailer tipper lowered

## Analysis of the Results

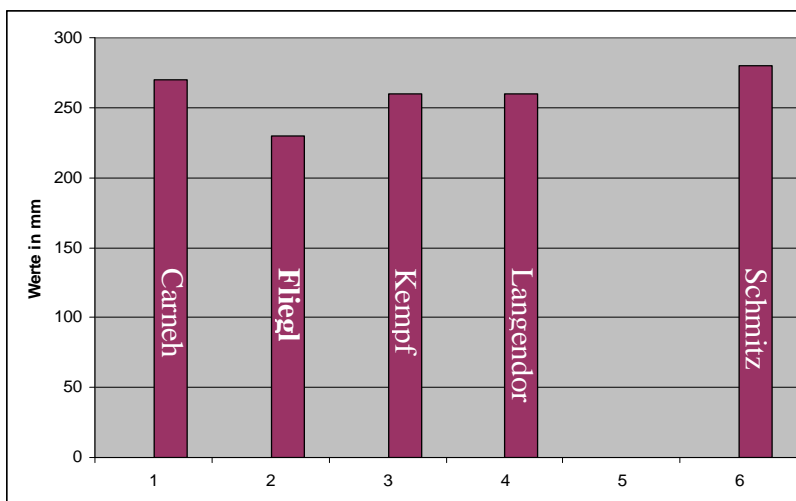
For the analysis of the results we assembled relevant and meaningful readings from the tables of both test days. The following summary now can be seen collected together in one table:

### **1. Upper deflection trough (2<sup>nd</sup> test day)**

**For this measurement the load of 25 tonnes was evenly distributed over the whole loading platform. The reason for the measurement is; to obtain an, as low as possible value of the upper deflection during the tipping process. The smaller the deflection, the more stable the connection between chassis and trough. On the other hand a stable chassis also provides a stable trough during the tipping process. Conclusion: The smaller the trough deflection, the higher the tipping stability.**

### **Manufacturers values in mm**

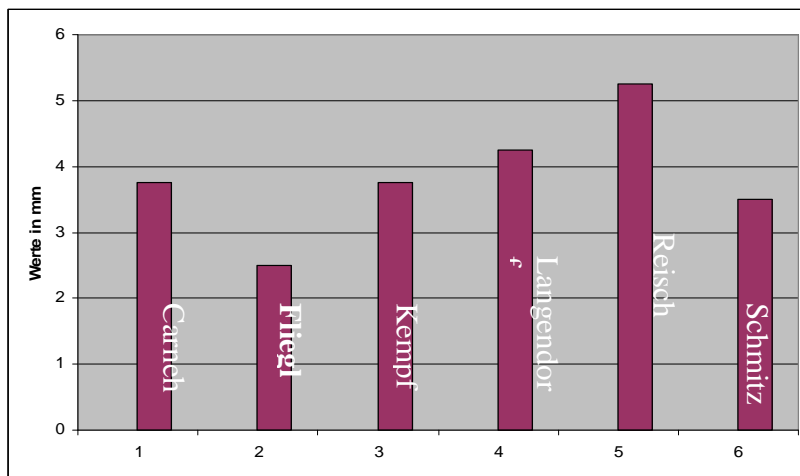
1. Carnehl	270
2. Fliegl	230
3. Kempf	260
4. Langendorf	260
5. Reisch	Only measured on day 1
6. Schmitz	280



## 2. Torsion vehicle frame over king pin (1<sup>st</sup> test day)

The goal is, to keep the torsion at the front of the dump truck as low as possible during the tipping process. A low torsion on the vehicle also has an effect on the lateral deflection of the trough and on the stability during tipping.

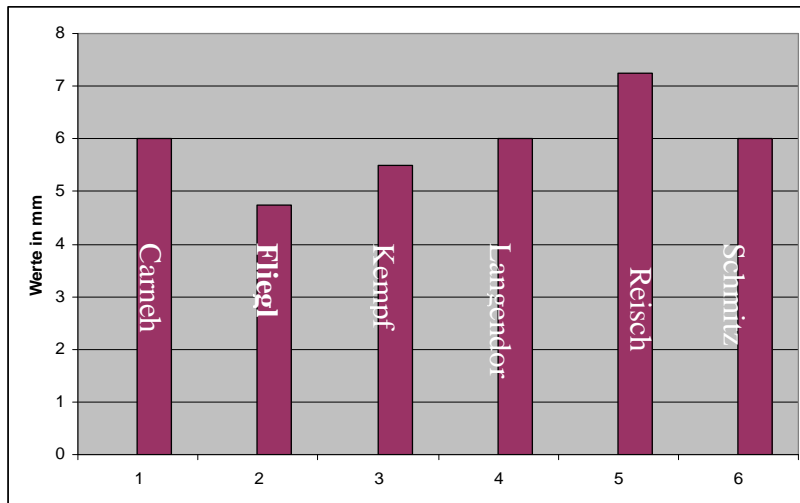
Manufacturer	Values in mm
1. Carnehl	37.50
2. Fliegl	25.00
3. Kempf	37.50
4. Langendorf	42.50
5. Reisch	52.50
6. Schmitz	35.00



### 3. Torsion vehicle frame over the C axle (1<sup>st</sup> test day)

The torsion at the rear of the dump truck should be as low as possible during the tipping process. The smaller the torsion on the vehicle frame, the lower the lateral deflection of the trough. A smaller value creates better stability of the vehicle during the tipping process.

Manufacturer	Values in mm
1. Carnehl	60.00
2. Fliegl	47.50
3. Kempf	55.00
4. Langendorf	60.00
5. Reisch	72.50
6. Schmitz	60.00



### Conclusion

With all manufactures all measured values are close together. Nevertheless Fliegl, with a wheel base of 5,200 mm, a spring centre of 1,400 mm and a track width of 2,140 mm, with respect to the stability and so the working security of tipping behaviour, achieved one of the best results in all measured values.

**NOT with Flieg!**

