

**Evaluation of different concepts
for
heavy tow-trucks**

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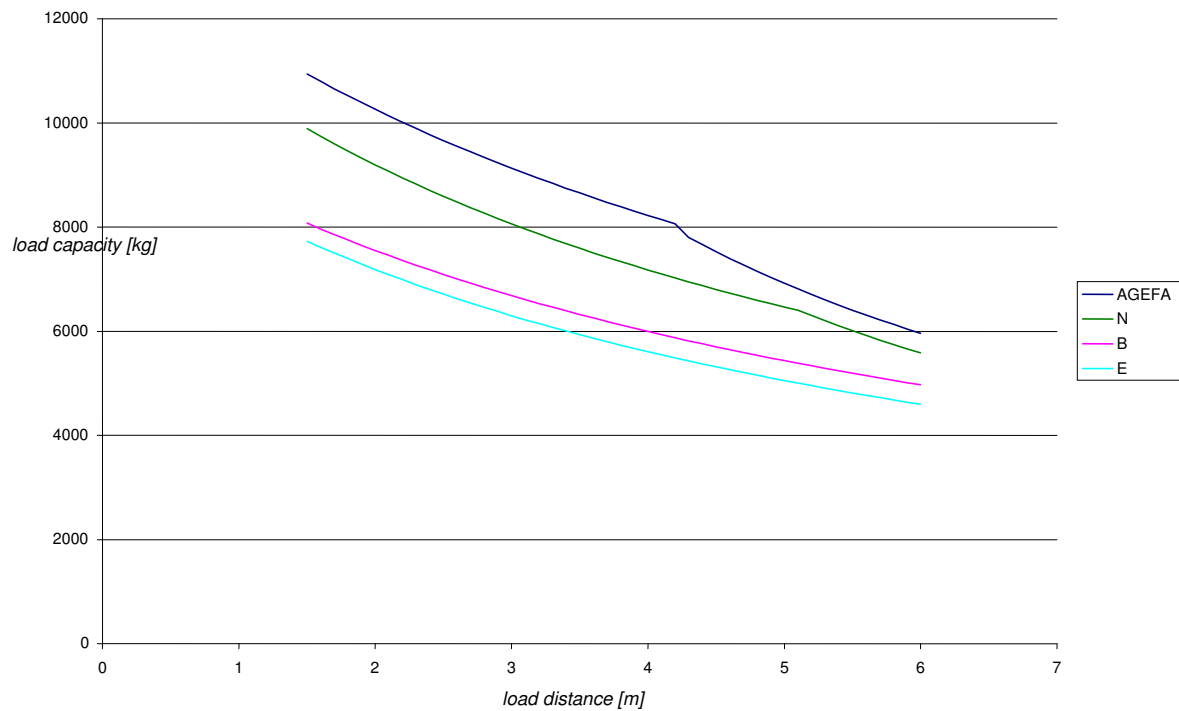


Fig. 1: Load capacities of the tow-trucks

It shows that the lighter 3-axle vehicle by AGEFA has a load capacity which averages between 1 and 3 tons above those of its competitors with 4-axle platforms. The reason for the higher load capacity is the movable counterweight of 3000 kg which gives the tow-truck a better weight distribution both when towing and when load-free.

Another important aspect in the evaluation of the tow trucks is the difference in the maximum load capacity limited by the tractability compared to the maximum load capacity limited by the permissible weight on the rear axle. The corresponding curves are shown in [fig. 11](#). As in [fig. 10](#), the tractability is calculated for a maximum towing speed of 80 km/h.

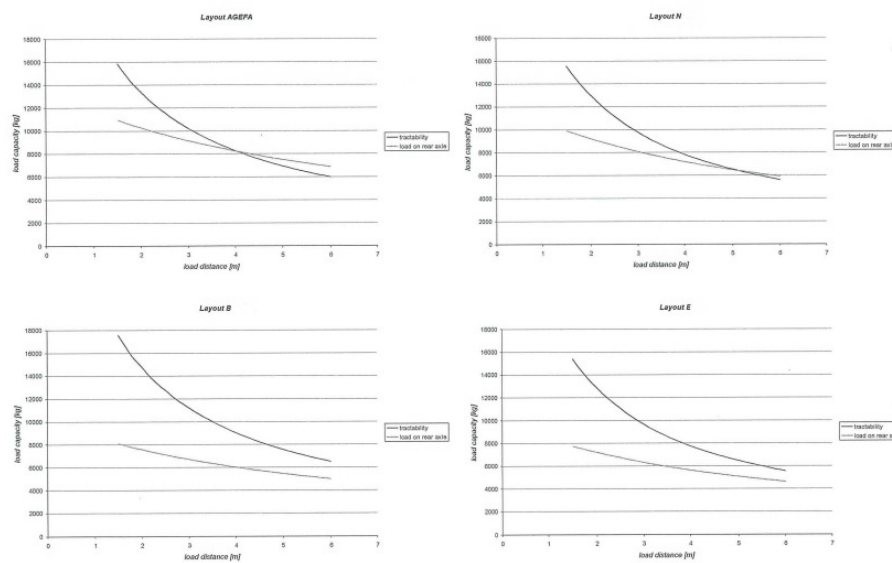


Fig. 11: layout of the tow-trucks

The graphs show that the models E and especially B are limited in their load capacity by the maximum permissible weight on the rear axle long before the limit of the tractability is reached. Their high overall weight causes good tractability on the one hand, but also leads to a rather low load capacity, because too much of this weight rests on the rear axle.

The N tow-truck shows a more balanced layout design, the two curves are much closer together. At a load distance of more than 5 m, the load capacity is even limited by the tractability rather than the maximum weight on the rear axle.

The truck by AGEFA shows the best balanced layout, the curves are very close to each other. At a load distance of more than 4 m, the tractability becomes the limiting factor for the load capacity. In addition to having the highest towing capacity, a reduction of the towing speed would lead to a further increase in the permissible weight to be towed, so that a weight of 7 tons could be towed at a load distance of 6m.

1. Conclusion

Heavy tow trucks do not only have to be equipped with an underlift that allows for easy and precise positioning, they also need to have a high load capacity and good vehicle handling when they are load-free.

Different concepts for heavy tow-trucks were evaluated based on their crane principles as well as their load capacities and layout designs:

- A tow-truck with four axles, equipped with a static counterweight and a conventional pivoting crane with an inclination mechanism for the lift fork between the vertical crane beam and the telescopic arm.
- A tow-truck with four axles, equipped with a static counterweight and a conventional pivoting crane with and an inclination mechanism for the fork lift between the horizontal and the vertical crane beam.
- A tow-truck with three axles, equipped with a movable counterweight and a linear underlift.

The comparison of the different crane systems showed that the linear crane requires lower hydraulic lifting forces and can be positioned more precisely. Regarding the kinematics and the pivoting mechanism, no significant advantages or disadvantages for one of the three systems could be found.

Four tow-trucks of different manufacturers were compared regarding their load capacities. Again, the lighter vehicle with three axles and the linear crane showed the best performance. The crucial factor for this result is the truck's movable counterweight of 3000 kg which results in the following advantages:

- A better balanced weight distribution between the axles when the truck is load free and therefore better vehicle handling
- A better layout design as far as the limitation of the load capacity by tractability and maximum weight on the rear axle is concerned. This results in a higher overall load capacity
- A lower unloaded weight
- The crane can be mounted on a truck with three axles which reduces both acquisition costs and maintenance expenses.