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Easy reference

Easy-to-use tools that help in project execution after the planning stage are a valuable asset, explains MARCO VAN DAAL

A heavy transport project generally starts with a review of the dimensions and weight. After that a feasibility and equipment selection phase takes place. This phase is also used for commercial purposes. Whether engineering gets involved in this phase depends on the complexity of the project. Once the project is awarded, the engineering department gets involved, or should get involved. Engineering determines the importance of the transport, establishes the stability limits, lashing requirements, suspension set-up, forces, ground pressures, etc. In a perfect world this is all communicated to the transport execution crew which also receives a set of drawings and basic transport information.

The transport execution crew than goes to work and finds out that the paper version and reality are not the same. Sometimes the differences are small but other times it requires a field change. Field changes are normal and well accepted as long as the transport crew can oversee the results and consequences of their actions and decisions.

Reference cards are very helpful tools in this matter. They save time on the jobsite and make the user look good as they have all their answers tucked away inside their hard hat.

Reference cards are a common item in our industry, they come in various sizes and shapes and cover a wide variety of topics. From rigging applications to forces to hand signals to inspection to basic math to safety tips to sling use to taglines. You name it and there is a reference card for it.

Except for hydraulic platform transporters... until now.

This article features a reference card

ABOUT THE AUTHOR

Marco van Daal has been in the heavy lift and transport industry since 1993. He started at Mammoet Transport from the Netherlands and later with Fagioli PSC from Italy, both leading companies in the industry. His 20-year plus experience extends to five continents and more than 55 countries. It resulted in a book *The Art of Heavy Transport*, available at: www.khl-infostore.com/books Van Daal has a real passion for sharing knowledge and experience and holds seminars around the world.

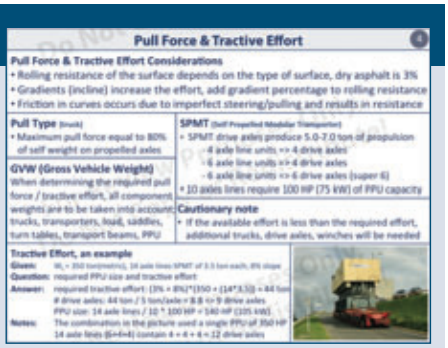
TOPIC 2

This panel explains the difference between an axle and an axle line. It illustrates the possible movements of such HPT axle lines with their respective minimum and maximum height within a margin.

A picture clarifies the various components of a pendulum axle assembly.

The bottom part of this panel shows a sample calculation of how a transporter suspension equalizes the unevenness in the terrain. To know this is a major advantage to the transport crew as they can now determine that a 12 inch (300 mm) pothole is being reduced to a 3 inch (75 mm) lean of the transporter in case of 4 axles per suspension group. It takes the guessing out of a transport operation.

TOPIC 4

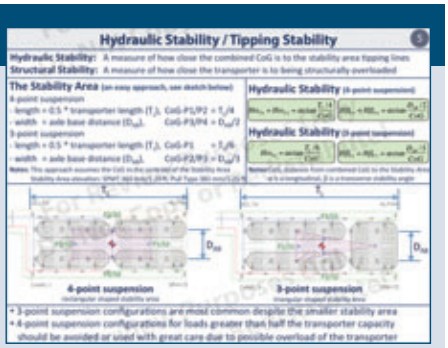


This panel offers an overview of rolling resistance of vehicles and how you can quickly determine the required truck capacity to pull a certain transporter with load. Similarly it shows how to figure out how many drive axles an SPMT would need to transport the same load and what the capacity (kW or hp) of the power pack (PPU) needs to be to handle the demand.

In case the transport is climbing a gradient or incline it is obvious that the required power increases, the panel provides for this as well.

A sample calculation shows how to apply the theory. This panel prevents that a truck is spinning its wheels or having its engine die due to insufficient pulling force.

TOPIC 5



This panel shows a quick and easy calculation on how to determine the hydraulic stability angle of a transport, in 3-point and 4-point suspension configuration, with a single formula. The hydraulic stability angle is a measure of how close the combined centre of gravity is to the tipping lines of the stability area. This gives the field crew a better level of comfort and they now know if the stability has been improved or not.

This panel also provides hints when to use 3-point and 4-point suspension settings and (not less important) when not to use certain settings.

for the use with hydraulic platform transporters (HPT), both pull type as well as self propelled modular transporter (SPMT). Reference cards are not meant to replace back office or home office engineering or detailed calculations. Reference cards are mainly for a relatively quick decision in the field when there is a need for such a decision. Often a deviation from the planned work sequence has taken place and a verification is required to check if the new situation is still within the norm or margins. If the reference card indicates that this is indeed the case, the work can continue without any loss of time. If the reference card indicates that the new situation is too close to a limit for comfort, the engineering department needs to get involved. In such cases the field crew has at least explored the options before any down time is experienced.

For reference

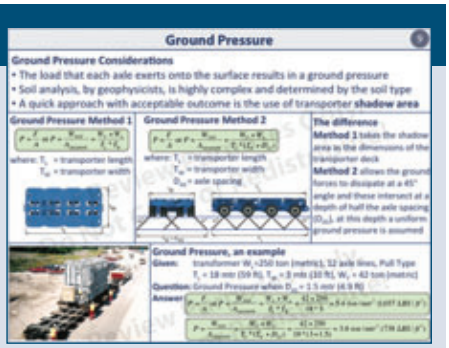
This reference card is applicable for every type of hydraulic platform transporter and SPMT available on the market today. The card consists of 16 panels and covers the following topics:

1. Principle working and terminology, suspension settings
2. Axles, axle lines, pendulum axle assembly
3. Transporter types & required axle lines
4. Pull force & tractive effort
5. Hydraulic stability
6. Structural stability
7. Sample calculation on stability
8. Spine beam
9. Ground pressure
10. External forces, centripetal forces
11. External forces, wind and acceleration forces
12. External forces, gradient forces
13. Lashing & securing
14. Sample calculation on external forces and securing
15. Goose neck
16. Beaufort wind scale ■

TOPIC 8

The spine beam offers resistance to torsion, bending and shear forces. It is important to not exceed the maximum values of these forces. Specifically with concentrated loads there is a significant risk of spine beam overload if not correctly analyzed. Spine beam overload occurs at the location where the loads is no longer in contact with the transporter, in other words, where the transporter extends beyond the load in the front and rear. This panel shows how to determine the spine beam bending moment in any given situation. It also shows how many axles may extend beyond the load given the type and approximate age of the transporter model.

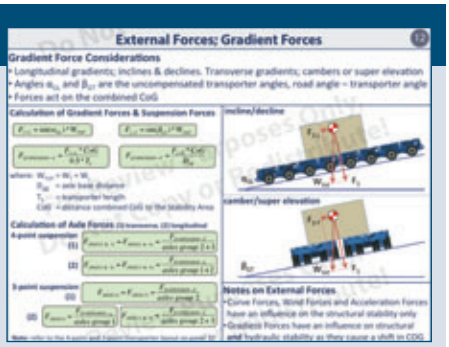
TOPIC 9



Badly prepared soil is a transporter's crew worst nightmare. Often the transporter carries the heaviest item(s) of the entire jobsite. That means that if you get stuck in badly prepared soil, there is nothing available on site to pull you out. Prevention is better than cure.

This panel offers two easy methods of calculating ground pressure underneath a transporter. Both methods are an approach with acceptable outcomes and avoid that a full soil analysis by geophysicists has to be carried out. One method is a bit more conservative that the other but they both use the transporter "shadow area" as the base for the calculation. A sample ground pressure calculation shows the outcome of both methods.

TOPIC 12



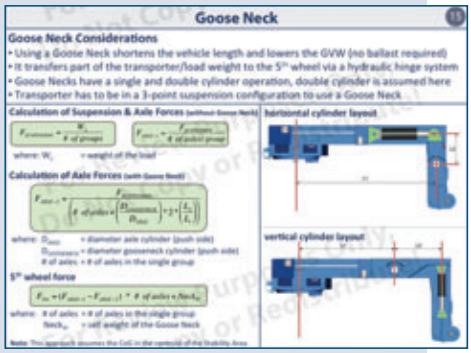
This panel is the third of the external forces that act on a transport. It illustrates the forces as a result of a road camber or incline/decline without the transporter being compensated for the angle. These uncompensated situations result in a longitudinal force (in the case of incline/decline) and a transverse force (in the case of a road camber) that have an influence of the axle loads and ultimately on the stability of the transport.

Underestimating these forces can have disastrous results such as loss of load. A simple calculation approach is shown for both 3-point as well as 4-point configurations.

TOPIC 15

Last but not least, the application of a goose neck.

Used by many, understood by few. This panel explains the difference between the two types of goose necks in existence, the horizontal cylinder layout and the vertical cylinder layout. A gooseneck transfers part of the transport and load weight to the 5th wheel of the truck via a hydraulic hinge system. This means that the truck does not need a counterweight and therefore the gross vehicle weight (GVW) is being reduced which helps in obtaining road permits. This panel shows how much of the transporter and load weight is transferred to the 5th wheel of the truck. Using a goose neck also shortens the overall vehicle length as no tow bars or drawbars are used.



The use of this reference card can really make the life for the transport crew much easier. This card, however, is also useful for other site personnel, for example, operations managers, site managers, equipment contractors, safety personnel, site engineers and many more.

The reference cards are available at: www.store.iti.com