SUMMARY

English

The Jack-up (or Self Elevating Platform) is commonly used for drilling and other activities like assembly or modification of structures in the offshore industry.
As Jack-ups are designed for specific ultimate conditions (mainly wave height, waterdepth and deckload), it is not always obvious if a Jack-up can work at a certain location.
Therefore a site specific assessment has to be carried out for every application, especially when one of the design limits is exceeded.

The two main functions of the jacking system, jacking and holding, lead two different sets of boundary conditions for the design of a jack-up.

In this report an investigation of all the main factors that influence the forces between leg / hull of a Jack-up in jacking- and holding condition has been made.
All different jacking and holding mechanisms used in practice have been described.
Loadpaths and capacities for the mechanism in jacking and holding condition have been described and simply calculations can be found in appendices.

Figure Sum.1 shows a summary diagramm of the elevating and holding mechanisms for a jack-up.

After describing all jacking and holding systems and determination of the factors which mainly influence the load distribution on a jack-up. It came out that the leg / hull interface is the weakest link in the Jack-up structure. To be more precisely the jacking system in jacking condition. This strokes with what is generally assumed.
A more detailed examination of the jacking system leads to the relative importance of specific parts of the jacking system.

Jacking systems can mainly be devided into two groups:

1. Discontinuous sytems
2. Continuous systems

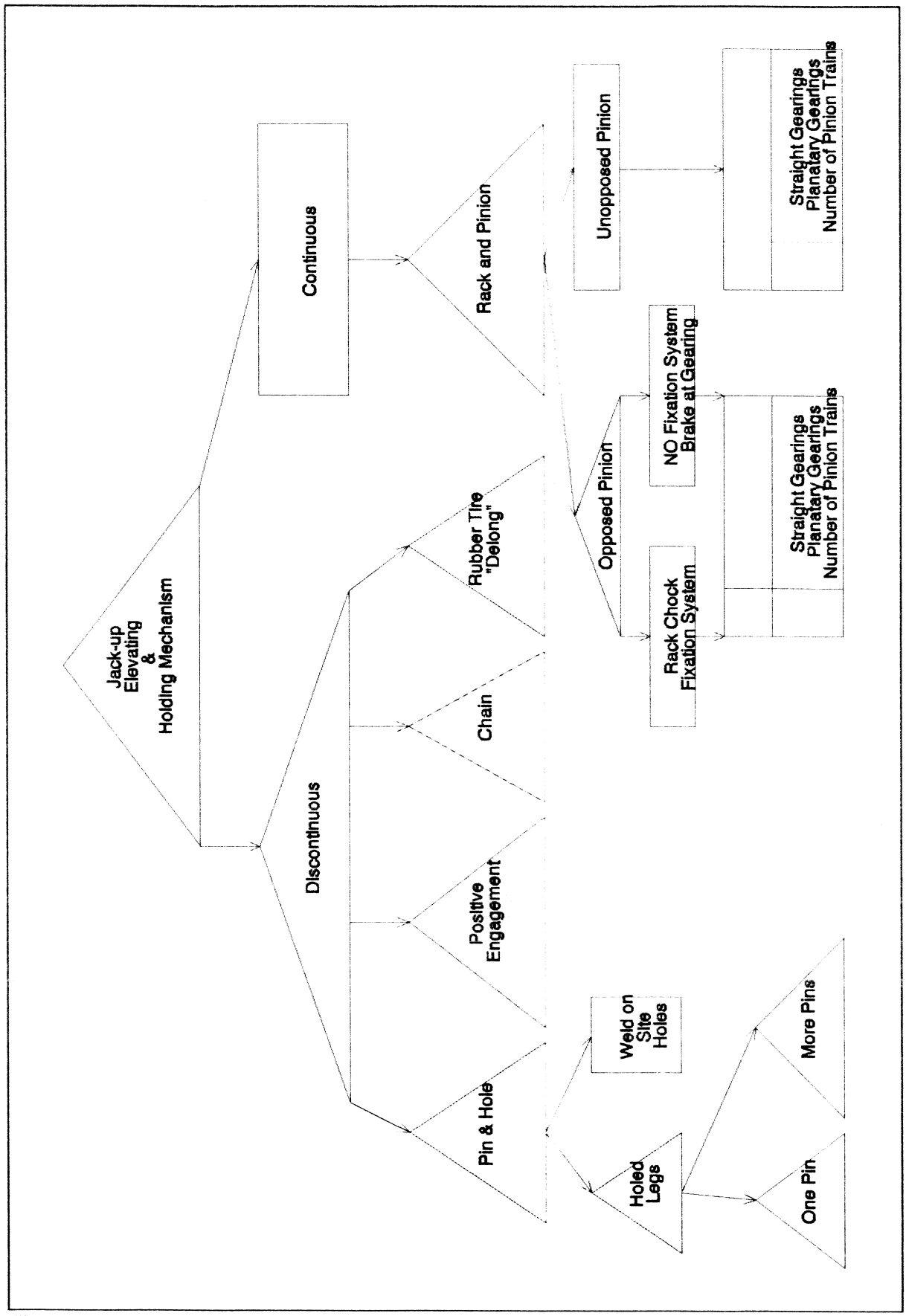

Figure Sum.1: Summary Diagram of Elevating & Holding Mechanism for a Jack-up

Pin & Hole and Positive Engagement are the two most used systems nowadays of the discontinuous group. These systems are cheaper then a continuous system. In general is the deckload capacity lower.

The Rack & Pinion system is most common used for bigger Jack-ups. This can be explained while the Rack & Pinion jacking system:

* Can be combined with a fixation system which leads to a much better interface between leg / hull. The leg bending moment is transfered to the hull in a vertically.
* It is a continuous system
* It is a rigid system

For the Rack & Pinion are two basic configurations possible:
Opposed and Unopposed Pinion
The opposed system can be equipped with a fixation system.

An important aspect is the backlash in the Rack & Pinion systems. Backlash is mainly caused by the inaccurance which creates a 'gap' between rack teeth and pinion teeth. Decreasing backlash and the use of Rack-chocks in holding condition increases the capability of the Jack-up.
For Jack-ups without a fixation system, fretting at the gears in the gearbox occurs in the holding condition. For these Jack-ups the "Bull'-gear can be marked as an important weaklink in the leg / hull connection

When examining the material strength it appeared that the rack material is less strong than the pinion material.
It is not the strength of the elements itself, but the relative stiffness between elements in the leg / hull connection which is important. The relative stiffness determines the forces that occur in the elements.

After the examination of the existing jacking and holding systems no major redesign might be expected. The use of a fixation system realizes a very good leg / hull connection.

To improve jack-up design, the greatest benefit can be gained from knowledge of the moment fixity / foundation interface at the legfooting (the spud-can). The contribution of the rotational stiffness at the spudcan to the bearing of the loads on a jack-up must be determined.
The rotational stiffness at the spudcan increases the load capability of a jack-up more significant than a better design of the leg /hull connection.