Bosch Rexroth has engineered an innovative motion system that enables the combined use of active and passive heave compensation systems. This is especially interesting for use in existing cranes and multi part reeved hoisting equipment. The Split Hoist Heave Compensation system can be designed modular and mobile, has dynamic benefits for the hoisting structure and offers an efficiency benefit of up to 80% compared with traditional active heave systems. This system works above and below sea level.

**Split Hoist principle**

The principle of Split Hoist is to split the Active Heave Compensation (AHC) and Passive Heave Compensation (PHC) system. The Passive heave compensation system requires no energy input and is placed between the hook and the load. The passive system must be designed for 100% of the safe working load (SWL). This allows for a simple separate winch system to apply the extra energy needed for Active control. This is done by applying a single wire line, which is active controlled and run from a second hoisting station on the vessel. The active system due to lower force requirements can be run as a single part line and reduce the line speeds required to fully compensate the load.

For subsea use the PHC is to be engineered and tuned for the dynamic behavior on the specific working water depth. The active heave will only be switched on when target depth is reached and as slack wire protection during the launch of the load through the splash zone.

During lowering and hoisting of the load above and below sea level, the active line will follow the load in a constant tensioning mode. When the active heave is switched on, the active line takes over approx. 20% of the load. And compensates for variations in the passive spring force.

The Bosch Rexroth Split Hoist Heave compensation control system is designed to cope with the dynamics of the cables in both hoisting lines. The control system will also compensate for the cable stretch in the combined systems to allow for accurate position control.
**Drawbacks with conventional systems**

A traditional PHC system has to be adjusted and commissioned before an operation. Therefore, it can only be used for either splash zone crossing, subsea resonance avoidance or landing speed reduction, thus, limiting the utility and flexibility.

Traditional AHC linear or rotary drive (winch) is usually put in the reeved hoisting wire. The effect is, the weight of the hoisting wire, block and hook are also part of the AHC installation dynamic load calculations. The result is an increase in installed power. For multi part reeved systems wire speeds become critical to the system design. The joint effect is that wire speed and installed power become limitations on the payload of the conventional AHC system.

**Benefits of the split hoist solution**

**Size efficient**
Deck space is significantly reduced as the Hydraulic Power Unit’s power, size and weight are reduced and the passive part is placed in the hook of the crane.

**Energy efficient**
Up to 80% more efficient when compared with traditional AHC systems, thus creating long-term cost reduction.

**Bigger power**
The Split Hoist Compensation System enables the use of relatively small AHC winch systems for a 5 times bigger safe working load (e.g. a 500mT Split Hoist System can be built with a common used 100mT active winch).

**Flexibility of installation**
A mobile modular system can be designed.

**No significant interference with existing hoist installation**
Minimal changes to existing hoist installation are necessary, only load and position signals are to be provided.

**Suitable as an add-on to any existing hoisting system**
Less dynamic forces in the hoisting structures as the active and passive lines are run over the same structure.

**Redundancy**
The new passive part is designed for 100% SWL. Thus, eliminates the need for expensive measures in the drive and control system of the active compensation system.

**Increased operational possibilities**
This system principle works above as well as below sea level and has an increased operational weather window.